



FATIGUE AMONG PANAMA CANAL TUGBOAT CAPTAINS

**ITS RELATIONSHIP TO THE CAPTAINS' HEALTH AND
TO PANAMA CANAL OPERATIONAL SAFETY**

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Barry Strauch and Isabel Gonzalez were commissioned by the International Transport Workers' Federation (ITF) to provide an independent assessment of fatigue among Panama Canal tugboat captains.

The *Fatigue among Panama Canal tugboat Captains* report investigates the relationship between captains' fatigue and the operational safety of the Panama Canal, and the relationship between fatigue and the captains' physical and mental health.

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She has contributed to a number of specialised medical publications on workplace medicine, conditions and prevention. She has attended a number of international seminars as an expert on occupational medicine and health risk assessment.

Dr Gonzales' dedication and expertise on occupational health and safety was recognised with her appointment to President of Panama Association of Specialists on Occupational Medicine.

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EXECUTIVE SUMMARY

In June 2018, the International Transport Workers' Federation (ITF), on behalf of the Union de Capitanes y Oficiales de Cubierta (UCOC or Captains and Deck Officers Union), representing Panama Canal tugboat captains, commissioned Dr Isabel Gonzalez, an occupational medicine physician, and Dr Barry Strauch, a transportation human factors specialist, to study the extent, if any, to which Panama Canal tugboat captains, under the oversight and management of the Panama Canal Authority (ACP), were operating under schedules that were fatiguing, and if so, the effects of that fatigue on their performance, their health and on the safety of Panama Canal Operations.

The tugboat captains suggested that their concerns regarding their perceived fatigue were heightened by changes in tugboat operations since the April 2016 opening of the widened Panama Canal. The widening of the Canal allowed an increase in the number of vessels making Canal transits, and therefore, vessels needing tugboat assists, as well as allowing larger, "Neopanamax" vessels to transit the Canal. These vessels required at least two tugboats to assist them through the new locks, unlike the Panamax vessels that needed no tugboat assistance through the locks. Neopanamax vessel transits through the new lock take about two and a half hours and require continuous tugboat control throughout the lock transits.

Although the widened Canal led to an increase in both the number and size of vessels transiting it, the number of tugboats and tugboat captains did not increase. As a result, tugboat captains believe that they have been working more hours, with more required overtime, under more stressful conditions than before April 2016.

Further, several weeks before the interviews for this study were conducted, the ACP eliminated the position of a second captain, someone who had served on the tugboats during transits through the widened locks. Consequently, only one captain remained on the vessel, someone who, because of the need for continuous control of the tugs through new lock transits, had to remain at the controls for the duration of the transits. The tugboat captains perceived that their workload increased as a result of both factors.

Researchers, Gonzalez and Strauch, interviewed 55 of the approximately 150 active tugboat captains to assess:

1. the extent of the fatigue resulting from the work/rest schedules they had been maintaining during the 30 to 60 days immediately preceding the interviews;
2. the work-related health effects from their work and their work schedules;
3. stress-related effects, if any, from their work; and
4. the effects of their schedules on the safety of Panama Canal operations.



The fatigue-inducing schedules were found to have two negative results: one on tugboat captain health; and the other on their performance, and hence on the safety of Panama Canal operations.

The results of the examination of the tugboat captain work schedules were largely consistent. Well over half of the tugboat captain schedules led to two, and on occasion three, different sources of fatigue. These were the result of:

1. disruption to circadian sleep patterns from eight-hour changes to the start and stop times of their shifts, with insufficient time to adjust to the start-stop time changes, causing chronic fatigue;
2. extended time on task, on cognitively demanding tasks that required prolonged periods of concentration, in shifts that were often 12 hours or more in length; and
3. insufficient time to rest following extended shifts, with several captains working over 20 continuous hours, causing acute fatigue in addition to the ongoing chronic fatigue.

The fatigue-inducing schedules were found to have two negative results: one on tugboat captain health; and the other on their performance, and hence on the safety of Panama Canal operations. Consistent with the literature on the impact of fatigue-causing sleep-wake cycles, the schedules led to increases in hypertension, sleep disorders, gastrointestinal disorders from irregular eating schedules, which has led to overweight and obesity and anxious-depressive syndrome. The schedules were also found to have a direct, negative impact on the safety of Panama Canal operations because of the degradation in tugboat captain cognitive performance, in accordance with research on the effects on cognitive performance of operator fatigue. Since the cognitive activities needed for safe tugboat operations include situation

awareness, vigilance, attention, and decision making are activities that degrade when operators are fatigued, the captain's ability to maintain safe operations when fatigued is limited. In addition, consistent with the literature on schedule-induced fatigue, several captains reported experiencing automobile accidents while driving to or from work, just before or after their shifts. Because the tugboats play a key role in the transit of large vessels with hazardous material cargo, through narrow and complex waterways, the potential for a catastrophic, fatigue-related accident increases with an increase in tugboat captain fatigue.

This degradation in safety from tugboat captain fatigue was illustrated in an April 2017 accident in which a tugboat collided with a US Coast Guard cutter in the Canal after its captain had fallen asleep. The absence of Panama Canal Authority action in response to that accident and to the tugboat captains' requests for non-fatigue inducing schedules, suggests an ACP safety culture that degrades safety. Several recommendations are made to the Government of Panama enabling it to maintain a minimal level of safety in Panama Canal operations, and to reduce the risk to the health of its tugboat operators.

INTRODUCTION

BACKGROUND

In June 2018, the International Transport Workers' Federation (ITF), an organisation representing 19.7 million workers in 140 countries, on behalf of the Union de Capitanes y Oficiales de Cubierta (UCOC, or Captains and Deck Officers Union), representing Panama Canal tugboat captains, commissioned Dr Isabel Gonzalez, an occupational medicine physician, and Dr Barry Strauch, a transportation human factors specialist, to study the extent, if any, to which Panama Canal tugboat captains, under the oversight and management of the Panama Canal Authority (ACP), were operating under schedules that were fatiguing, and if so, the effects of that fatigue on their health, their performance, and on the safety of Panama Canal Operations. The human factors study and the occupational health study were conducted jointly, and a single report addressing both human factors and occupational health issues is being issued.



The tugboat captains suggested that their concerns regarding their perceived fatigue were heightened by changes in tugboat operations since the April 2016 opening of the widened Panama Canal. The widening of the Canal allowed an increase in the number of vessels making Canal transits, and therefore, vessels needing tugboat assists, as well as allowing larger, "Neopanamax" vessels to transit the Canal. These vessels required at least two tugboats to assist them through the new locks, unlike the Panamax vessels that needed no tugboat assistance through the locks. Neopanamax vessel transits through the new lock take about two and a half hours and require continuous tugboat control throughout the lock transits.

Although the widened Canal allowed an increase in both the number and size of vessels transiting

it, an increase that the National Transportation Safety Board commented on in its investigation of a 2017 accident in the Panama Canal (National Transportation Safety Board, 2017), the number of tugboats and tugboat captains has not increased. As a result, tugboat captains believe that they have been working more hours, with more required overtime, under more stressful conditions, than before April 2016.

Within two years of the opening of the new canal, two accidents occurred in the Canal, both within two hours after midnight, and at least one of which was directly attributed to tugboat captain fatigue. In April 2017, the tugboat Cerro Santiago struck a U.S Coast Guard cutter, Tampa, while transiting the Canal. The Cerro Santiago Captain told Panamanian investigators that he had fallen asleep just before the collision. The United States National Transportation Safety Board (National Transportation Safety Board, 2017) and the ACP both attributed the accident to the Cerro Santiago's Captain falling asleep. Although representatives of the National Transportation Safety Board, the United States Coast Guard, and the United States embassy in Panama were given Observer status in the ACP investigation, United States investigators were not provided information that they had requested to conduct their investigation. As the National Transportation Safety Board, in its report of its investigation, wrote:

[National Transportation Safety Board and US Coast Guard] investigators were not allowed to formally interview the master of the Cerro Santiago to explore the results of his most recent merchant mariner physical examination, obtain any information on his medical conditions or medications he may have been using at the time of the accident, or obtain details related to his sleep quality.



Within two years of the opening of the new canal, two accidents occurred in the Canal, both within two hours after midnight, and at least one of which was directly attributed to tugboat captain fatigue.

In its investigation, the ACP concluded that there was “no other fault on the part of the Panama Canal Authority or any of its employees,” in the cause of the accident. It made no change to Canal operations or tugboat captain schedules following this accident.

Several months later, in November 2017, a tugboat crew member assisting in manoeuvring vessels through the locks, died of head injuries during a line-handling incident in the Aguas Claras locks. Some tugboat captains believed that fatigue might have played a part in that accident as well.

Since these accidents, in two separate actions, ACP has reduced crew manning in the tugs. On April 12, 2018, it removed a third seaman from the tugs, leaving two captains, two seamen, an engineer, and an oiler, to crew them. The captains were not informed of the removal of this crew member until the action was implemented. On July 1, 2018, ACP also removed the second captain, who was present during transits of the new locks, from the tugs. While the captains were informed in advance of this action their input into the decision was not solicited, and they had no say in either ACP action. Most, if not all, tugboat captains believe that the reduction in manning, particularly the removal of the second captain, increased their workload and their subsequent fatigue while working schedules that they had already found fatiguing. Although the latter action made more captains available for tug operations, thereby reducing the need for mandatory tugboat captain overtime, it also eliminated opportunities for them to take breaks during transits through the new locks, when vessel control was continuously necessary. Captains complained that they are unable to use the toilet, eat, or address other personal needs, when necessary, during vessel assists. Moreover, with the

new canal, larger LNG and LPG vessels, carrying highly volatile and potentially explosive cargo, could transit the Canal, requiring tugboat assists through the entirety of Canal transits, further reducing the opportunity for captains involved in such transits to take physiologically necessary breaks, and increasing the time that they continuously performed cognitively demanding tasks.

The human factors study sought to review the literature on fatigue and human performance, determine the extent, if any, to which tugboat captains were fatigued by their work schedules, and make recommendations, based on the findings, to improve the safety of Panama Canal Operations. The occupational health study aimed to determine the extent, if any, to which tugboat captain health was adversely affected by work-related fatigue, and if so, the particular health effects that were manifest. The extent of tugboat captain fatigue was determined by 1) interviews with over one-third of ACP tugboat captains, and 2) examination of the work start and stop times of tugboat captains for each of the 30-60 days preceding the date of the interview.

This report contains the following sections:

- **Introduction**
- **Review of the literature on fatigue**
- **Methodology-human factors and occupational health**
- **Results-human factors and occupational health**
- **ACP Safety Culture, and**
- **Analysis, conclusions, and recommendations**

REVIEW OF THE LITERATURE

As economies have advanced and become industrialised, increasing numbers of workers work in industries that operate 24 hours a day, seven days a week. As a result, workers in these industries maintain work schedules throughout the 24-hour day, working through the night when they had previously slept, and attempting to sleep during the day, when they had previously been awake. These, and other factors have led to increasing fatigue among those involved in nighttime operations.

Considerable research has been conducted on fatigue and its effects on workers involved in round the clock operations, particularly those in transportation systems. Although much of the pioneering studies of fatigue in applied settings began in the commercial aviation sector (e.g., Foushee, Lauber, Baetge, and Acomb, 1986), research on fatigue has also taken place in such industries as commercial marine operations (e.g., Smith, Allen, and Wadsworth, 2006) as well.

While researchers have not agreed upon a single definition of fatigue, they have reached a consensus on what causes fatigue and fatigue's effects on human performance. As Williamson, Lombardi, Folkard, Stutts, Courtney, and Connor (2011) wrote:

Fatigue is a hypothetical construct which is inferred because it produces measurable phenomena even though it may not be directly observable or objectively measurable. Fatigue, as a construct, links a range of factors that presumably cause fatigue with a number of safety-related outcomes.

In other words, fatigue cannot be readily isolated and identified, but its presence produces "measurable phenomena," in their effects on human performance.

Researchers found that fatigue results from several factors, alone or in combination, leading to one of two types of fatigue. In the first, people who remain awake for an extended period experience what has been termed "acute fatigue." In the other, people who receive less sleep than usual over several days, experience what has been termed "chronic fatigue." Although their causes are different, their effects on cognitive performance are the same, and both can operate together, leading to particularly severe fatigue, in certain circumstances. On the other hand, the effects of chronic fatigue over time, can be considerable.

Researchers have proposed two independent, but related, neuro-biological mechanisms that, while operating independently, cause fatigue. Fatigue resulting from extended wakefulness has been said to be linked to a homeostatic drive for sleep, that is, an internal drive that makes people progressively sleepier the longer they remain awake. This drive is satisfied by sleep, and the longer the sleep, the more the need for sleep decreases until the drive is satisfied. When waking up, assuming that the need for sleep has been satisfied, the need will then increase until people become so fatigued that they have difficulty staying awake and the cycle will then repeat.

A second biological drive has been shown to result from abrupt changes to sleep/wake schedules, or by flying across a number of time zones, thus also leading to rapid changes in sleep/wake schedules. This drive, related to the 24-hour day, has been observed across mammalian species and has been shown to affect such physiological mechanisms as endocrinological and digestive processes, as well as sleep. It functions with a regularity that closely approximates the 24-hour clock (Van Dongen and Dinges, 2003), and is referred to as the "circadian pacemaker," for circadian or daily in Latin. It affects us by influencing the times of day when we become hungry and when we become sleepy, among other biological phenomena. We maintain these cycles about the same times each day, within an approximate 24-hour schedule. However, when the circadian sleep-wake cycle is displaced, such as from rotating work schedules, sleep will be lost, and the person will be fatigued.

Some effects, such as exposure to light, caffeine ingestion, and stress, among others can "mask" the effects of the circadian pacemaker by helping to make us alert in spite of the existing circadian cycle or homeostatic drive for sleep. As Van Dongen and Dingus (2003) explain:

Masking is a critical concept with regard to the assessment of circadian rhythms in neuro-behavioural variables. Masking refers to the evoked effects of non-circadian factors on the measurements of circadian rhythmicity. The context in which such measurements are taken (i.e., the environmental and experimental conditions) is a major source of masking effects. Masking can alter or obscure a circadian rhythm or create the appearance of a circadian rhythm."

Folkard (2008) noted that Melatonin, a hormone that the pineal gland secretes, helps to regulate our sleep-wake cycle. He noted that its secretion is suppressed by exposure to light, and this may explain why light exposure can mask circadian sleep drives. Where the homeostatic sleep drive acts as a type of thermostat to regulate our sleepiness and alertness by increasing the intensity of the need for sleep the longer we remain awake, our circadian “diurnal,” or daily rhythms help to maintain alertness during the day and sleepiness during the night, at the approximate same times. Because most people are awake during the day and sleep at night, the two drives function in sequence for people who maintain regular day awake and night sleep schedules. By maintaining regular hours, and sleeping and being awake the same time each day, the circadian pacemaker matches the homeostatic sleep regulator and people remain alert when they are awake until they approach the time that they ordinarily become tired and sleepy.

The two drives, however, become “desynchronized” by 1) east-west jet travel across multiple time zones, or 2) work schedules that abruptly change sleep and awake schedules. Such schedules have been shown to lead to considerable fatigue because adults, most of whom sleep about eight hours, give or take one hour, within each 24-hour period, are unable to adjust their circadian cycles in sufficient rapidity to match abrupt changes to their sleep-awake schedules (Folkard, 1990; Smith, Folkard, and Fuller, 2006). For example, flying non-stop from Panama to Madrid on a commercial airliner, for example, takes about nine and a half hours. But because of the difference in time zones, in which Madrid is seven hours ahead of the time in Panama City, the traveler will need about a week to fully adjust his or her sleep schedule that had been maintained in Panama, to match those of Madrid; it generally takes one day to adjust to each one hour difference between the “old” sleep-wake schedule and the new one. That traveler will not obtain adequate rest for several days until his or her circadian rhythms have adjusted to the new day/night schedule of wakefulness and sleep. Again, either of the two drives is sufficient to be fatiguing in and of itself; combined, their effects can be profound.

Researchers have found that shiftwork, that is, workers working daytime and then nighttime, and continuing the cycle, is fatiguing. Baulk, Fletcher,

Kandelaars, Dawson, and Roach (2009) found that rotating 12-hour schedules are fatiguing results that they indicated, are “to be expected given that research has demonstrated the adverse effects of both night- and early-morning shifts.” Further, the circadian cycle plays such an important role in when we feel tired and when we feel alert that even working nights exclusively has been found to be fatiguing (Folkard, 2008), largely because spouses, children, and much of society maintains a day awake and night sleep schedule. Permanent night workers, for the most part, tend to maintain the same schedule as their family members and shopkeepers when they are not working, thus preventing their night work from becoming a key night-sleep and day-awake component of their circadian cycles. So pervasive are the circadian effects that, as Folkard (2008) wrote, the findings of research “clearly question whether the use of permanent nightshift systems will result in most individuals’ endogenous body clock showing sufficient adjustment for it to be beneficial to health and safety.”

Lim and Dinges (2008) also found that extended performance on the job, referred to as “time on task,” is also fatiguing. As they describe it:

The time-on-task (TOT) effect describes the phenomenon whereby performance worsens across the course of a cognitive task owing to fatigue or other factors (e.g., boredom or diminishing motivation). Originally thought to be present only in tasks of considerable duration (30 min or greater), it has since been found that TOT decrements are measurable within the first several minutes of performance in sleep-deprived individuals. Sleep deprivation greatly enhances the TOT [time on task fatiguing] effect, especially in operations with high cognitive demand.

That is, the more intense the mental effort needed to perform a task the less time that will transpire before a person becomes fatigued. Because some tasks require more concentration than others, tasks that are cognitively demanding have been shown to be fatiguing.

Medical conditions, most notably obstructive sleep apnea (OSA), has also been found to cause fatigue as a person’s airway becomes blocked when sleeping, causing him or her to waken repeatedly as the need for oxygen is not met. The repeated



interruptions to sleep will be fatiguing. Åkerstedt, Philip, Capelli, and Kecklund (2011) estimate that about five percent of the adult population of advanced countries is afflicted with OSA. Obese people are particularly at risk, but any adult may have OSA. In addition, stressors such as financial concerns, difficulties at work, or problematic domestic situations can lead to insomnia, in which people have difficulty falling asleep or maintaining sleep after having fallen asleep. Other causes of fatigue include some over the counter medications, such as antihistamines, and some prescribed medications. Additionally, alcohol, a central nervous system depressant, will initially cause most people to feel fatigued, but the alcohol will subsequently interfere with sleep patterns and cause difficulty in maintaining sleep, leading to fatigue the next day.

People can reduce fatigue by obtaining sufficient sleep. Many people, even when maintaining regular schedules, sleep longer on weekends than they typically sleep during the week to “recover” from the sleep debt accrued during the week. Unless people receive sufficient sleep, the techniques that provide alertness are effective briefly, if at all. Ingesting caffeine, through coffee, tea, or certain soft drinks, among others, does maintain a

period of alertness, but over time its effectiveness decreases and, as people become habituated to caffeine, as with most medications, they will need increased dosages to maintain the same initial level of alertness. In addition, brief naps have also been shown to provide alertness for limited intervals (Hartzler, 2014).

FATIGUE AND HEALTH

Fatigue has also been found to have adverse health effects as well. Burg (2018) observed:

The importance of sleep as a factor that contributes to the incidence of coronary heart disease (CHD), CHD progression, and prognosis after a cardiac event, has been recognised only recently, and the assessment of sleep in the context of large observational studies is emerging in literature. Furthermore, sleep is often linked to CHD-related comorbidities (and the medications used to treat them), including hypertension, diabetes, heart failure, hyperlipidemia, obesity, and mental health conditions [such as], depression, anxiety, chronic stress, and posttraumatic stress disorder.

Okun (2011) similarly found a link between chronic fatigue and adverse health. As she wrote:

The importance of sufficient sleep to health outcomes is highlighted by the mounting evidence that disturbed sleep (short/long sleep duration, and poor sleep quality or continuity) is associated with a host of adverse health outcomes ranging from the common cold (Cohen, Doyle, Alper, Janicki-Deverts, & Turner, 2009) to postpartum depression (Okun, Hanusa, Hall, & Wisner, 2009) and cardiovascular disease (Gangwisch, Heymsfield, Boden-Albala, Buijs, Kreier, Pickering, Rundle, Zammit, and Malaspina, 2006; Meisinger, Heier, Lowel, Schneider, & Doring, 2007). For this reason, the impact of sleep loss/disturbance reaches beyond the immediate realm of just making an individual sleepy; it can impact the entire biological entity either directly or indirectly, due to the multiple brain regions, immune and endocrine factors, and various neurotransmitters involved in sleep regulation (Benca & Quintas, 1997).

Fatigue in the workplace has been found to lead to increased sickness and increased absenteeism from work (Hoofs, Jansen, Jansen, and Kant, 2017). Dinges et al. (1997) estimated that about 20 to 25 percent of workers in industrialised countries work outside of regular hours, that is, they work in rotating schedules through the 24-hour day. Because shift workers have been found to be at risk for chronic fatigue, and because of the association between workplace-induced fatigue and adverse health consequences, it is likely that shift workers experience more adverse health consequences from their work schedules than those who maintain regular work schedules.

Given the potential adverse health consequences from maintaining a sleep schedule that is counter to the drive for sleep, or of obtaining insufficient rest to allow recovery from fatigue, measures to prevent workplace-induced fatigue have been proposed. Perhaps the most common are regulatory approaches in which governments or jurisdictions limit the number of hours people can work within a given day or week. The International Maritime Organisation (IMO) for example, requires mariners to be given at least 10 hours of rest in one day or 77 hours in a seven-day period. Commercial aviation, recognising the criticality of airline pilot alertness, and the adverse effects of night work on fatigue have implemented hours of service rules that attempt to

provide adequate rest and to account for nighttime work as well (e.g., see Federal Aviation Administration, 2011). Other industries have implemented a fatigue risk management system to identify and mitigate workplace risk factors for fatigue (Fletcher, Hooper, Dunican, and Kogi, 2015; Gander, Hartley, Powell, Cabon, Hitchcock, Mills, and Popkin, 2011).

FATIGUE AND COGNITIVE PERFORMANCE

Researchers have demonstrated that fatigue, in addition to adversely affecting health, degrades cognitive performance, in activities that require extended concentration, distinguishing between important and unimportant stimuli, reacting to events, and even making decisions. People perform cognitive tasks more poorly when fatigued as compared to when they are alert. Wickens, Hutchins, Laux, and Sebok, (2015) for example, found that the ability to perform complex cognitive tasks is decreased when people are fatigued. As they wrote:

Overall, complex cognitive performance was substantially worse for sleep-deprived groups than their respective control counterparts. The loss in complex cognitive performance when sleep deprived is consistent with other findings in the literature on TSD [total sleep deprivation] (e.g., Lim & Dinges, 2010). The circadian analyses strongly suggest that complex cognitive performance (both speed and accuracy) over hours of continuous wakefulness differs between the circadian night and the circadian day. On average, the complex cognitive performance decrement was twice as large during the circadian night, and the effect at circadian night for accuracy was extremely high: 0.009, or 21.6 percent loss in accuracy per sleepless day.

Lim and Dinges (2008) found that fatigue affects cognitive performance related to concentration (i.e., vigilance) and mental performance, which they refer to as “executive function.” As they explain:

Indeed, cognitive deficits after SD [sleep deprivation] can be observed in a wide range of domains, including memory, executive function, and the multiple facets of attention mentioned earlier. However, it is likely that much of this poorer performance is attributable to the inability to sustain attention to the task at hand, as this is a prerequisite for all upstream cognitive processing.

Williamson et al. (2011) add:

...the research shows that the nature of the task being performed can have adverse effects on performance. Two characteristics in particular have been identified as increasing the likelihood of performance deficits: sustained attention and unstimulating or monotonous tasks. Often these two characteristics occur together.

Gunzelmann, Moore, Gluck, Van Dongen, and Dinges (2011) found that fatigue adversely affects sustained attention, the ability to concentrate and focus on events, objects, and other foci of attention. Honn, Hinson, Whitney, and Van Dongen, (in press) found that fatigue degrades a person's ability to recognise and respond to changes in situations, to meet changes in task demands, a skill they referred to as dynamic attentional control.

In summary, fatigue has been shown to negatively affect or degrade a variety of measures of cognitive performance, including:

- reaction time;
- sustained attention;
- vigilance, concentration, and complex cognitive activities; and
- the ability to respond and react to changes in the environment.

FATIGUE AND SAFETY

Because fatigue degrades cognitive abilities that are necessary for effective performance in many tasks, it is not surprising that research has also found that the more an operator is fatigued, the more likely he or she will be involved in an accident.

For example, Terán-Santos, Jiménez-Gómez, Cordero-Guevara, and the Cooperative Group Burgos-Santander (1999), found that drivers with untreated apnea who are, as a result fatigued, sustained a substantially higher risk of being involved in an automobile accident than those who did not have a sleep disorder. Dinges (1995), in a review of the literature, found a relationship between fatigue and accidents in a variety of settings. As he wrote:

...fatigue has contributed to serious incidents and accidents in industrial operations, nuclear power plants, and in virtually all modes of

transportation disasters including rail, marine, aviation, and motorway (truck/bus) accidents (Lauber and Kayton 1988; Mitler et al. 1988; Mitler et al. 1994). Many of these accidents involved human errors by personnel who often had inadequate sleep and/or were working the night shift.

Williamson et al. (2011), in a review of the literature, found:

...considerable evidence from motor vehicle crash studies that sleep restriction is associated with an increased risk of crash involvement. Evidence for a causal association is strongest with respect to acute, severe sleep loss, but has also been shown with respect to chronic partial sleep restriction.

In other words, a person with even moderate chronic sleep deprivation is more likely to be involved in a motor vehicle accident than someone who was rested.

Moreover, specific causes of fatigue have been associated with increased threats to safety. Williamson et al. (2011) found an association between time on task and an increased likelihood of both industrial and occupational accidents. Both Folkard (1997) and Åkerstedt et al. (2011), among others, identified a relationship between circadian rhythm disruption and accident rates. Both groups of researchers found higher accident rates during times of day when people were at their "circadian lows", that is, times associated with their circadian times of deepest sleep, typically around 0300-0500, and a concomitant secondary low in the late afternoon, about 12 hours later, than during times when they were ordinarily awake and alert. Further, this association was consistent across a variety of settings. As Folkard (1997) writes:

Perhaps the most important conclusion to emerge from the findings reviewed in this paper is that there are consistent temporal peaks in accident risk, or "black times", associated with both time of day and time on task. When traffic density is controlled for, accident risk shows a major peak at ca [around] 03:00 and a secondary one at ca 15:00. This time of day effect in accident risk is extremely similar to that found in industrial performance measures, suggesting that it may be due to the individuals' circadian

rhythms rather than to the very different driving conditions pertaining at night.

Because of the disruption to circadian cycles, researchers have also found an association between shiftwork and accidents. Shiftwork is fatiguing when people change their work schedules from day to night and night to day with insufficient time to adjust their sleep-wake cycles to the changed work schedules. The adjustment can take several days to a week or more, depending on the extent of the schedule change. Folkard and Tucker (2003) found a link between the accident rates among workers on a shift work schedule compared to those who were not. As they described:

Risk [of accidents] was found to increase in an approximately linear fashion across the three shifts, showing an increased risk of 18.3 percent on the afternoon shift and of 30.4 percent on the night shift, relative to that on the morning shift... The conclusion to be drawn from this figure would appear to be that in situations where the a priori risk would appear to be constant across the three shifts, there is a consistent tendency for the relative risk of incidents to be higher on the afternoon shift than on the morning shift, and for it to be highest on the night shift."

Van Dongen (2006) explained the increased accident risk among shift workers, in referring to the effects of shiftwork on both the homeostatic sleep drive and the circadian pacemaker or internal circadian rhythms. As he described:

During shift work, the temporal changes in the homeostatic sleep pressure and circadian wake pressure are no longer properly synchronised. During the nightshift, for instance, the sleep/wake-dependent homeostatic pressure for sleep increases as long as wakefulness is maintained, but the time-dependent circadian pressure for wakefulness decreases. The net result is a steady increase in sleepiness across the nightshift, which has a clear adverse effect on cognitive performance capability. During the daytime hours following a nightshift, when it is time to catch up on sleep, the opposite occurs: the homeostatic sleep pressure decreases across the daytime sleep period, but the circadian wake pressure increases. As a consequence, the pressure for wakefulness soon exceeds the pressure

for sleep, and awakening occurs before the homeostatic pressure for sleep has been sufficiently dissipated. The resulting "sleep debt" contributes further to sleepiness and performance impairment during the night. The biological clock, which drives the circadian rhythm in the pressure for wakefulness, is capable of gradually adjusting to altered sleep/wake patterns. However, for rotating shift workers and for night workers who revert to a nighttime sleep schedule during days off, the circadian adjustment is typically not fast enough. These workers therefore continually experience an endogenously [i.e., internally] enhanced level of sleepiness, jeopardising their productivity and safety at work.

FATIGUE AND SAFETY IN MARINE TRANSPORTATION

While much of the research into fatigue and operational safety has been focused on motor vehicles, aviation, and industrial operations, some research has examined the role of fatigue in marine operations as well. In a study conducted in the United States, Sanquest, Raby, Maloney, and Carvalhais (1996), found that mariners were particularly prone to fatigue because of the disruptive effects of their watch schedules on their circadian rhythms, a finding consistent with a subsequent study in Great Britain (Smith et al., 2006). Raby and Lee (2001), identified a link between mariners' disrupted sleep and accident involvement. In a later study, Great Britain's Maritime Investigation Branch [MAIB] (2004) observed that "a third of all the groundings [that were reported to the MAIB in a nine-year period] involved a fatigued officer alone on the bridge at night."

Several major marine accidents have been attributed to fatigue as well. In 1990 the US National Transportation Safety Board (1990) determined that the March 24, 1989, grounding of the tanker Exxon Valdez was the result, in part, of "the failure of the third mate to properly manoeuvre the vessel because of fatigue and excessive workload." That agency subsequently attributed two additional marine accidents, the June 23, 1995, (National Transportation Safety Board, 1997) grounding of the passenger vessel Star Princess in Alaska to the pilot's fatigue, a result of his untreated sleep apnea, and the January 23, 2010, (National Transportation Safety Board, 2011) collision between a tanker and two other vessels



on the Sabine-Neches Canal in Texas. Among its findings in the Texas collision, the agency concluded that the accident was caused by the:

Combination of untreated obstructive sleep apnea, disruption to his circadian rhythms, and extended periods of wakefulness that resulted from his work schedule [that] caused the first pilot to be fatigued at the time of the accident. The first pilot's fatigue adversely affected his ability to predict and stop the Eagle Otome's sheering. No effective hours of service rules were in place that would have prevented the Sabine pilots from being fatigued by the schedules that they maintained.

Most recently, the National Transportation Safety Board determined that the April 18, 2017, collision of an ACP operated tug, the Cerro Santiago, with the US Coast Guard cutter, Tampa, in the Panama Canal was caused by "the failure of the master of the Cerro Santiago to maintain a vigilant watch due to fatigue," (National Transportation Safety Board, 2017).

In summary, fatigue results primarily from insufficient sleep from staying awake too long, performing a task too long, flying across multiple time zones, abruptly changing work schedules, certain medical conditions and medications,

and alcohol ingestion, among others. Fatigue will impair a person's cognitive activities by limiting his or her ability to concentrate, focus attention, recognise and respond to changes in the environment, and perform complex cognitive tasks. These activities are critical to operators safely performing their jobs in a variety of industrial settings. Fatigue has been shown to be linked to higher accident rates in a variety of transportation modes and industrial settings, including marine transportation. In addition, fatigue was found to have been a factor in the cause of marine accidents, including most recently the April 2017 collision between a tugboat and a US Coast Guard Cutter in the Panama Canal.

PURPOSE OF THIS STUDY

The purpose of this study was to determine the extent, if any, to which Panama Canal tugboat captains were found to be fatigued by their work schedules, work hours, and the nature of the tasks they performed as tugboat captains, and if so, the extent to which the fatigue affects their health and the safety of Canal operations. If fatigue was found, recommendations to reduce tugboat captain fatigue and improve the safety of Canal operations would be made.

METHOD

FATIGUE AND SAFETY

The human factors specialist interviewed Panama Canal tugboat captains and examined their work schedules for 30- to 60-day periods preceding the interviews. 55 captains, over a third of the total number of active Panama Canal tugboat captains, were interviewed, either individually or in pairs. Interview questions are included in Appendix 1. UCOC, the tugboat captains' union, invited and arranged for the captains to be interviewed at the UCOC office in Panama City. Interviews were voluntary, and answers were anonymous. Interviewees were also asked to provide their work start and stop times for each of the preceding 30 to 60 days. Twenty-nine captains provided schedules. Submission of start and stop times were also voluntary. Those not involved in Canal operations in that period, because of involvement in classroom training, union office work, or on extended leave, among other reasons, did not provide their work start and stop times.

Interviews were conducted from August 6 through August 10, 2018.¹ All interviewees were asked to describe the most number of hours worked on one shift. In the interest of maximising the number of interviewees in the time allotted, the interviewer selected from other questions during the interviews, so that not all interviewees were asked the same questions. These interviews were

conducted in English. Because fluency in English is required to communicate with Canal pilots and mariners from around the world during Canal operations, this English language requirement did not appear to adversely affect the nature of the interviews, the captains' understanding of the questions, or the quality of their responses.

The interview questions and the tugboat captains' responses are contained in Appendixes 1, 2, and 3. Following analysis of the start and stop time data, the extent to which the tugboat captain work schedules were fatiguing was determined.

OCCUPATIONAL HEALTH

Fifty of the 55 captains interviewed were also interviewed by an occupational medicine physician. The health interviews solicited information on age, years of service working for ACP, occupational history, average hours worked per day, personal and family health history, lifestyle, and perceptions regarding labour-management relations. From this information, an occupational risk profile, among other findings, was developed. The occupational health questionnaire is included as Appendix 2 and the tabulated results of the interviews presented in the results section of this report.

1. UCOC invited ACP to participate in the interviews, but they declined. UCOC also asked ACP to permit the occupational health physician and human factors specialist to ride the tugs for one tugboat captain shift to observe the captains' workload during Canal operations, but the request was also declined.

RESULTS

FATIGUE INTERVIEWS

Most of the 29 captains who provided their work start-time history were assigned as tugboat captains to Canal operations, assisting ships in Canal transits. While the sampling method used for the interviews and the start times was not randomised, the size of both samples and the consistency of responses suggests that the samples

effectively represented the attitudes and work schedules of Panama Canal tugboat captains. Results of the interviews are provided in Appendix 2 and the work start-stop times in Appendix 4.

Almost all captains asked said that they liked being tugboat captains, (Like = 28, Don't like = 3)

More tugboat captains said that they would not recommend the job to their son or daughter as said that they would recommend it (Not recommend = 12, Recommend = 8)

They liked being tugboat captains because they liked:

Performing the manoeuvres	12 times ²
Each job-each day is different	9
Being one's own boss on the tug	7
Being outdoors- in beautiful surroundings	4
Being in charge of people	3
Being home every day/night	2
Don't take the job home	2
The salary	2
Controlling the tug	1
Having freedom while on the tug	1
Being part of a team	1

The following cognitive activities were mentioned as necessary for being an effective captain. (Note-most of the activities mentioned have been shown to degrade when a person is fatigued):

Situation awareness	27 times
Being well-rested, being alert	16
Being able to concentrate	7
Being able to make quick decisions	5
Knowledge of the regulations	3
Quick reactions	3

2. The interview format allowed the captains to respond more than once to questions, according to the particular questions.

Good leadership skills	2
Necessary training and experience	2
Ability to remain calm and relaxed	2
Ability to multi-task	1
Ability to not be distracted	1
Effective depth perception	1
Knowledge of the science behind the tugs	1

Number of captains who said that the work increased with the opening of the new locks = 28

Number of captains who indicated that, when operating in the new locks, they were unable to eat or use the toilet for the duration of their transit in the new locks = 27

ACP-related views

When asked what they didn't like about the job, nearly all captains commented on aspects of ACP management and the schedules they were maintaining. The aspects of ACP management they disliked were:

ACP-caused stress	17 captains
Intimidation by and fear of ACP disciplinary action	11
Absence of procedures	6
Low morale	4
Poor management	4
Adversarial relationship with ACP	4
Poor design of tug controls	3
Being criticised for decisions they made	2
Inability to take a break as needed without a 2nd captain	1
Increased risk of accidents in the new canal	1

Scheduling-related views

All captains, when asked, indicated that ACP did not have written rules governing hours of service or hours of rest.

All captains, when asked, indicated that when on vacation, they would sleep at night, and awaken in the morning. The amount of sleep they received when on vacation was:

1 slept 6.25 hours
29 slept 8 hours
2 slept 9 hours
1 slept 10 hours

Captains indicating difficulty sleeping under current schedule practices:

30 indicated difficulty sleeping
7 indicated no difficulty sleeping
2 indicated trouble sleeping after working in the new locks

Captains indicating difficulty sleeping after working the midnight watch = 30 captains

Most hours worked on a single watch:

11-15 hours	22 captains
16-20 hours	17
More than 20	1

Aspects of scheduling that adversely affected their jobs:

Scheduling practices/nature of the shifts	13 captains
Effects on family lives	7
Unpredictability of shift lengths	4

Number of captains involved in fatigue-related automobile accidents (where they were driving) on the way to or from work = 6

Number of captains who briefly fell asleep while at the controls of their tugs = 6

Number of captains who have been told, or have heard, that dispatchers will send an ambulance to them if they say that they are too fatigued to safely continue operating tugs = 4

Number of captains who took sleep aids to enable them to sleep = 4

Number of captains who called in sick because they were too fatigued to safely operate the tugs = 2

Suggestions to ACP regarding fatigue

Reduce the rotations/watch durations from 7 days	18 captains
Hire more tug captains	14
Provide a 2nd captain or mate	8
Reduce the number of midnight shifts	5
Provide better schedules with shorter shifts	5
Move schedules back 2 hours to encounter less traffic to/from work	4
Establish a maximum number of hours in a single watch	4
Provide ground transportation to vessel location	3
Have relief captain available when shift ends	2
Conduct a study of fatigue among tugboat captains	2
Assign launches exclusively to transport tug captains to/from vessels	2
Establish more efficient scheduling/better planning	2
Assign tugs exclusively to Neopanamax ships	1
Match tugboat captain schedules to peaks in Canal transits	1
Establish a minimum number of rest hours between watches	1
Provide locations on the tugs where captains can rest	1
Establish shorter watch schedules	1
Acquire more tugs	1

General suggestions to ACP

Have more ergonomically-designed tug controls	3 captains
Regularly conduct safety meetings	2
Require managers to have a marine background	1
Fire the managers	1



30-60-DAY SCHEDULES

Disruption to circadian sleep patterns

The captain start-stop work schedules (Appendix 4), indicate fatigue-inducing practices for almost all captains, consistent with abrupt disruption to circadian sleep patterns. Most captains worked seven day schedules that started at three different start times, 0800, 1600, and midnight, that were scheduled to end eight hours after the start times. Schedules changed after seven days followed by two days off between, except following the week when their start times began at midnight. At that point, captains were given four days off. A minority of captains worked schedules with different start and stop times from the majority, and generally worked less overtime than those with the more common schedule. Moreover, the captains indicated that they could work on their off days when asked to do so. Nearly all had been asked to work on their days off, but there was no requirement to do so, and they did not believe that refusing to work on off days would result in sanctions by ACP. As can be seen by the start-stop times among captains who worked immediately

after a seven-day shift schedule, a number of captains agreed to work on their days off. There was no upper limit to the number of hours that captains could work and some, e.g., Captains 28 and 29, on occasion worked 20 continuous hours or more.

Because research has demonstrated that people need more than two days to adjust to an eight-hour difference in sleeping and waking times, people who maintain such schedules will likely be fatigued in the days immediately following the change in start-scheduled stop times. Further, because most people maintain day-awake and night-asleep patterns when not working, if for no other reason than to maintain sleep/awake times consistent with their family members, working immediately after their days off, unless starting at 0800, would be expected to be fatiguing. They would have particular difficulty maintaining alertness during the midnight to 0800 watch period because of 1) the disruption to their circadian sleep patterns from their work schedule, and 2) their extended time awake. When asked about sleeping problems, all

but one of the captains interviewed said that they had the most difficulty sleeping after working the midnight (start time) shift. Most said that they had considerable difficulty with fatigue during that shift. As Captain 9 said, "On the midnight to 0800 shift, from 0400 to 0500, it doesn't matter how well rested you are, at those times you will be sleepy. If you don't come very well rested, you can fall asleep for five to six minutes." Thus, while almost all rotating shift schedules that the tugboat captains maintain are fatiguing, the captains described the week that of their midnight (start time) shifts as the most fatiguing. As Captain 11 added,

Most of the captains, when on the midnight watch, take medications to fall asleep. You must take a rest, but if you go home and only sleep one or two hours, then it is very hard to sleep in the daytime. Sleeping in the daytime is very hard. The concentration they need when working is very hard. If you fall asleep for three seconds, you may go outside the channel and sink the tug, or cause an accident if you miss a pilot order.

Extended time on task

Further, most, but not all captains worked schedules that produced a second cause of fatigue, extended time on task. Although the time on the task of maintaining tugboat control and being on duty as a tugboat captain sufficient to be fatiguing would be expected to vary somewhat because of differences in captain experience, age, and other demographic factors, the results of the interviews, with the facts of their times worked, showed that the captains were nearly unanimous in describing their duties as cognitively demanding, calling on skills that included, in their words, maintaining focus, situation awareness, and concentration. Thus, working shifts of over 12 hours for many captains, would be fatiguing if for no other reason than the extended time on task of those work days.

As Captain 14 explained,

In the old locks they [the tugboat captains] didn't have to do anything through the locks, but under the new locks, they have to be at the controls throughout the lock passage. Even if the pilot says stop, even if you are not doing anything with the vessel you have to watch the tug, the water is rising or lowering, and you have to be careful that the tug doesn't strike the wall or strike the anchor. If the water is going up and the tug is just drifting it can go under the anchor. Because these tasks are cognitively demanding, it can be expected that eight continuous hours of extended duty time as a tugboat captain is fatiguing. The results indicated, in the 30- to 60-day periods they provided, that the following captains worked,³ at least one shift of 12 hours or more: Captains 1, 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 22, 23, 25, 26, 27, 28, and 29. Of those, Captains 1, 2, 3, 8, 10, 14, 15, 16, 17, 19, 25, 28 and 29 worked shifts of 14 or more continuous hours. Captains 8, 14, 28, and 29 worked shifts of 17 hours or more and Captains 8 and 28 worked shifts of 24 continuous hours or more.

The combination of schedule-induced circadian sleep pattern disruption, with extended time on task in performing cognitively demanding tasks, has led to numerous instances of Panama Canal tugboat captain fatigue, to the extent that they have fallen asleep while at the controls, as occurred in the April 18, 2017 collision of the tug Cerro Santiago with the US Coast Guard Cutter Tampa. As Captain 20 explained,

Last Friday C got called by the pilot because C fell asleep. C just finished a cup of coffee, after a good night's sleep, but C had to be woken up by the seaman. The transit had to be stopped. This was the first day of the midnight shift.

3. To maintain anonymity, the captains were identified by number, and the numbers used to designate the captains in their schedules were different than those used to identify captain responses to interviews.

Insufficient rest

Working as many as 14 continuous hours, let alone 20 or more continuous hours, not only causes acute fatigue from time on task, in addition to circadian sleep cycle disruption, but the captains do not have access to rest facilities near their work sites, and they must use time when not working to travel between home and work site. The estimates they gave of the length of their commutes to and from work varied according to the location of their residences and work sites, but estimates varied from 10-15 minutes to as much as two hours.

Thus, with prolonged time on task, extensive commuting time further reduces the time available to the captains to rest between shifts. For example, on June 2, captain 29 had only seven hours available between the end of the shift that began the previous day at 1300 and ended at 0700 the following morning, and the next shift that began at 1300 on the afternoon of June 2. It is highly unlikely that the captain received even five hours of rest, given time needed to travel to a rest site, prepare for bed, arise and prepare for work, while having at least one meal in the interim, after working 17 continuous hours through the night. Thus, not only are such shifts fatigue inducing because of the time on task, unless the captains live within minutes from the work sites, they would have insufficient rest time to recuperate from the acute fatigue produced by the extended time on task, even if the circadian disruption from their alternating work times did not already limit their ability to sleep when not working.

In summary, the results of the work schedules demonstrate that the tugboat captain work schedules are fatigue inducing from three factors:

- circadian disruption from abrupt shifts in work schedule times with insufficient time available to adjust to each schedule change;
- extended time on task; and
- insufficient time to rest after shifts.

Each of these factors is individually fatiguing, but fatigue effects are additive. That is, the more likely more than one fatigue-inducing factor affects someone, the more likely that person is to be fatigued, and the more fatigued that person is likely to be.

HEALTH-SHORT ANSWER QUESTIONS

The first part of the health interviews addressed demographic factors of the captains and their work experience.

Age range in years	percent
Less than 25	0
26-35	7
36-45	41
46-55	28
56-65	6

Experience in the ACP in years	percent
Less than 5 years	0
5-10	56
11-20	0
21-30	32
31-40	2

Gender	percent
Men	94
Women	3

Percent who worked in other maritime companies before becoming tugboat captains

Did work for other companies	64
Did not work for other companies	36

Job-related risks⁴

Physical risks	percent
Noise	96
Vibration	96
No risk of exposure	4

Chemical risks	percent
No exposure	84
Gases	16
Fumes	16

Fire and explosion risks	percent
Fire	100
Explosion	100
Experience fighting on board fire	16

Ergonomic risks	percent
Seat design	94
Repetitive movements of upper limbs	90

Biological risks	percent
No exposure	70
Venomous or hazardous wildlife (e.g., raccoons, snakes, wasps)	30

Psychosocial or Behavioural risks	percent
High concentration task	100
Shift work	100
Conflicts with the ACP administration	100
Work overload	90
Rhythm of intense work	80
Monotony	26
Conflicts with the tugboat crew	25

Mechanical risks	percent
Exposure to falls	75
No exposure to falls	25

Percent experiencing work-related accidents

Yes	80
No	20

Percent with family members with the following illnesses

Hypertension	37
Cancer	33
Diabetes	28

4. Each captain could cite more than one risk source in response to each risk type.

Percent with the following illnesses⁵

Sleep disorders	42
Neck pain	40
Gastrointestinal disorders	32
Overweight	30
Back pain	28
Pain and numbness of hands	14
Anxious-depressive syndrome	14
Shoulder pain	14
Hypertension	10
Diabetes	4

Percent engaged in the following activities that affect health

Sport/athletic participation	14
Smoking	5
Consumption of psychoactive drugs	4
Alcoholism	2

HEALTH-OPEN ENDED QUESTIONS

Captains were asked to describe their perceptions of work. In general, the captains believe that:

1. Their participation in solving problems is not taken into account. One said that “the workers are abused. We feel persecuted.” They feel considerable stress and worry about disciplinary actions against them. They avoid making suggestions to ACP for fear of retaliation.
2. The work shifts are poorly organized.
3. The management of Canal operations is inadequate. The right people are not placed in key positions.
4. The maintenance of the equipment is inadequate.
5. Prior to the administration of the Canal by the Government of Panama (PCC), safety was given a higher priority than it is today.
6. With the start of operations of the widened Canal, no medical evaluations of the workers have been carried out, and no preventive health measures have been implemented. Evaluations by non-ACP medical specialists are not recognised by ACP personnel, and the captains feel that they are punished when they bring in reports with medical recommendations from non-ACP health professionals.
7. Working conditions have had adverse effects on their health and stress has increased. There is a lot of discouragement at work. Tugboat captains were not given explanations why ACP eliminated the third seaman and the second captain from tugboat crews.
8. The workload has increased to three times what it was 20 years ago.
9. ACP needs to hire more operational staff.
10. ACP needs to provide transportation for tugboat captains to transfer to and from their vessels.
11. ACP needs to acquire more tugboats and improve the preventive maintenance of tugboats.
12. They are not sufficiently trained to respond to emergencies in the widened channel.
13. Despite reports of unhealthy conditions, they have not observed a rapid response from the Maritime Safety Unit.
14. ACP’s Occupational Health policy is inadequate.

5. Captains could respond to more than one illness in response to the following two categories of illnesses

ANALYSIS

FATIGUE

Evidence from the captains' work start-stop times demonstrate that their work schedules are fatigue inducing and that the resultant fatigue adversely affects the safety of Canal operations, as the likelihood of tugboat captain error increases with increased fatigue. The schedule-induced fatigue also has adverse effects on their health, although the extent to which the illnesses that the captains reported were the exclusive result of fatigue cannot be established.

The presence of work schedule-induced fatigue, and its impact on the safety of Panama Canal operations, can be seen in two recent accidents that occurred in the Canal, the June 2, 2016, collision between a tugboat/barge combination and a US Coast Guard cutter, and the April 18, 2017, collision between a tugboat and a US Coast Guard cutter in the Canal, both of which occurred between midnight and 0200, times that researchers have identified as sustaining higher accident rates than other times, and one of which was attributed to the tugboat captains falling asleep,⁶ and 2) the six automobile accidents that tugboat captains sustained (one captain was involved in two such accidents, only one of which involved the captain's fatigue), on their way to or from work. Automobile accidents while the driver is commuting to or from work is an indicator of workplace-induced fatigue (see e.g., Dorrian, Tolley, Lamond, van den Heuvel, Pincombe, Rogers, and Dawson, 2008). As Captain 19 said about the automobile accident in which he/she was the driver,

Because the schedules are long they [the captains] are responsible for their own driving. This can lead to [automobile] accidents for them. With the drive they are doing, at least they can have the transportation, and this will give them a little chance to take a nap. The car accidents are very possible because they are not rested and work hard as tug captain. That is coming home, but going to work it may be hard to pull over and sleep.

Moreover, the fact that a tugboat captain's falling asleep directly led to an accident, demonstrates how fatigue increases the risk to the safety of Panama Canal operations. Before an individual is so fatigued as to be unable to remain awake, his or her cognitive performance will have been degraded by fatigue for an extended period of time. Thus, while the captain's falling asleep caused the April 2017 accident, well before the collision he was so fatigued that his cognitive performance, necessary for safe operations, was already inadequate to maintain safety.

Research has consistently demonstrated that fatigue degrades the very cognitive performance that tugboat captains rely on to operate safely in the Canal. The cognitive measures demonstrating this fatigue-caused degradation include decision making, (Harrison and Horne, 2006), sustained attention, (Gunzelmann, Moor, Gluck, Van Dongen, and Dinges, 2011), vigilant attention, (Lim and

6. Both the National Transportation Safety Board and ACP determined that the tugboat captain's falling asleep led to the accident. The National Transportation Safety Board probable cause of this accident reads: "the failure of the master of the Cerro Santiago to maintain a vigilant watch due to fatigue."

Dinges, 2008), cognitive flexibility, i.e., the ability to adapt to changes in events (Honn, Hinson, Whitney, and Van Dongen, in press), relatively simple cognitive performance (Lim and Dinges, 2010), relatively complex cognitive performance, (Wickens, Hutchins, Laux, and Sebok, 2015) and a variety of cognitive and mental tasks (Akerstedt, 2007; Lim and Dinges, 2010).

These cognitive tasks are critical to maintaining situation awareness, and with reaction time and decision making they are the skills essential to safe marine operations in general, and to operations in the Panama Canal, with its narrow waterways, heavy traffic, complex traffic, and hazardous cargo operations, in particular. Because Canal operations will likely increase as larger vessels are permitted to transit the Canal, and as opposing traffic is permitted in previously prohibited sections of the Canal waterway (see Appendix 6), the workload and overtime demands on tugboat captains will increase unless additional measures are taken. These include hiring additional captains to reduce the need for extended overtime and modifying the schedules to reduce the work schedule-caused disruption to tugboat captain circadian rhythms. Until these changes are made to tugboat captain work schedules, the risk of tugboat captain's errors will increase, and with that, the risk of catastrophic accidents in the Canal, and the threat they pose to the Panamanian economy and the lives of Panamanian citizens, will increase as well.

OCCUPATIONAL HEALTH

Most of the captains are middle-aged, and as a result, the health-related risks of their jobs result primarily from work-related fatigue, and work-related stress from actual or feared interactions with ACP management. Further, all captains indicated that they had been adversely affected by exposure to work-related ergonomic and psychosocial or behavioural factors. Both fatigue and stress can, over time, lead to adverse health consequences to the captains, given their ages, because older people are more prone to the adverse effects of work-related fatigue and stress than younger workers are.

Because 64 percent of the tugboat captains have experienced working in other maritime companies, they can compare their experience working with ACP with their experiences in other maritime organisations. All deny having experienced the

stress and fatigue they are currently experiencing working for ACP with their previous marine employers.

Almost all of the captains experience the fatigue-inducing effects of schedules that disrupt their circadian sleeping cycles, and additionally, many also experienced fatigue from extended time on task and insufficient time to rest at the completion of the shift. Some captains, in their ACP experience as tugboat captains, agreed to work up to 35 hours continuously. Such extended time on task, which causes acute fatigue over and above the chronic fatigue they are likely experiencing from other schedule-induced factors, endangers their health, reduces their cognitive performance, and poses a direct threat to the safety of Canal operations, the financial stability of the Government of Panama, and the health of the citizens of Panama.

Almost all captains stated that the most important physical risks they face are exposure to noise and related vibrations, risks that are predominately present in older tugs. The Spanish tugboats produce considerable vibration when operating at their maximum power. The propellers of new tugs also produce considerable vibration. Whistles, radio communications, and machinery, mainly from the oldest tugs, are also noise producing. The presence of both noise and vibration forces them to increase the volume of their radios to enable them to hear critical operational communications and may need to monitor three radios simultaneously. Noise has been shown to adversely affect their ability to concentrate when controlling the tugs.

The tugboat captains also consider the lighting on the tugs to be poor. All of the tugboat captains said that the risk of fire and explosion is always present in tugboat operations. However, only 16 percent have experienced shipboard fires, and none have been injured as a result.

The tugboat captains are not directly exposed to risk from hazardous chemicals, however, they are exposed to carbon monoxide from ship exhausts. Fumes from ships and smoke from high temperatures of the tugboat machinery can pass through the pipelines into the tugboat bridges.

Because the captains often sit at the controls for five or more hours, the need for well-maintained and well-designed chairs is critical. However, almost all found their chairs to be uncomfortable

and indicated that a more ergonomic chair design is needed, in addition to other needed improvements to the design of the tug bridges. Because of poor chair design on the older tugs, captains are unable to sit for any length of time and must work standing up, further fatiguing the captains. Moreover, some of the chairs are broken and have not been repaired, despite some having reported the need for their repair to ACP over a year ago.

Almost all of the tugboat captains said that they experience repetitive motion of their upper limbs, their thumbs, and their wrists. This repetitive motion is worse in the older tugs where the controls are mechanical (in the new ones they are hydraulic or electronic) and therefore, they require greater physical exertion from the operator. Captains indicated that the tugs are designed for remaining at the controls for 45 minutes and not for several hours.

Captains also indicated that the docks lack the necessary equipment or structure to readily move from one tugboat to another.

In relation to psychosocial and behavioural risks, all or almost all of tugboat captains indicated that:

1. The task of the tugboat captain requires high levels of concentration.
2. The workload is intense, and that it has increased by 60 percent or more because of the increase in the number of assignments and the extended work day.
3. The work climate is not pleasant and has had negative effects on morale because of the clashes with ACP. Examples of conflicts with ACP that the captains cited include unsuitability of the tugboat water for human consumption and conflicting alternatives to obtain bottled water.

4. ACP does not adhere to IMO hours of service rules, and despite its lack of written hours of service rules or protocols, those captains who have refused to accept an assignment after working 10 continuous hours because of their fatigue have been threatened with adverse employment action or dismissal.
5. ACP's elimination of the third seaman and the second captain was implemented unilaterally, without consulting the captains, and in the former instance, without informing them in advance. In 2016, the captains asked for, and were denied, a fatigue study of their work activities. From July 1 to the present, there have been three tugboat accidents in the Canal that are presumed to be the result of work-induced captain fatigue.
6. Since the second captain was eliminated, the tugboat captains have been unable to go to the toilet when necessary, and some have been reported for stopping tugboat operations to enable them to attend to their physiological needs. To avoid the need to go to the toilet they have avoided drinking water while operating the tugs and their hydration has been deficient, further jeopardising their health. In addition, the lack of opportunities for breaks has adversely affected their ability to maintain healthy eating habits on the job.
7. Most captains like their work, however, there is much dissatisfaction with what they believe to be persecution by ACP against them.

Three-quarters of the captains interviewed have experienced falls on the tugboats or docks due to slippery floors and stairs, when crossing from boat to tugboat or from one tugboat to another. They also found the construction of the springs is inadequate.

The diseases that appear to be most common among the tugboat captains have considerable genetic components, such as hypertension, cancer and diabetes. Nonetheless, fatigue inducing work schedules, at a minimum exacerbate and contribute to the presence of hypertension, cancer, and diabetes.

The following work-related adverse health effects have been found to predominate among those of the tugboat captains:

1. Sleep disorders linked to shift work. Work-induced sleep disorders have been shown to lead to chronic diseases such as hypertension and diabetes.
2. Anxious Depressive Syndrome, also resulting from work-induced fatigue and from extended time in a limited space.
3. Cervical and lumbar disorders from remaining seated for extended periods in poorly designed chairs, sometimes exceeding five hours.
4. Gastrointestinal disorders from irregular eating schedules, which have contributed to obesity and incidence of overweight.
5. Numbness (mainly ring finger and little finger), and tingling in hands from repetitive upper limb movements. Similarly, repetitive motion also results in shoulder pain.

Eighty percent of the tugboat captains interviewed experienced work-related accidents. The most frequent types of accidents are trips and falls from schedule-induced fatigue, leading to whiplash and herniated lumbar discs, and for one captain, cervical fractures, cervical spine disc injuries and ruptured biceps when performing dangerous manoeuvres.

The results of this study also demonstrate that the ACP is in violation of its June 3, 1999, Agreement # 12, governing the ACP Risk Control and

Occupational Health Regulations, as demonstrated by actual practices in the Canal. This can be seen by the adverse health effects from the working conditions identified in the interviews and schedule data of the captains.

For example, in Article 3 (3), ACP agreed to “maintain the highest levels of safety, to avoid losses, damages or damages to employees, customers, the assets of the Authority and third parties who are in the facilities and areas under the responsibility of the Authority.”⁷ Article 9 calls for ACP to “establish equipment maintenance programs, structures, tools and any other assets, in order to guarantee the execution effectiveness of risk control programs and adequate levels of safety of the employees,”⁸ an article ACP violated according to captains who reported the need for maintenance of broken captain chairs that continued to be uncorrected. ACP also violated the terms of Article 10, “No employee may be discriminated against, disciplined, harassed or negatively affected for their participation in the programs referred to in Article 3, or by denunciation of the unsafe or unhealthy work conditions or practices; or deficiencies in these programs,”⁹ in their reported retaliation against captains who reported that they were too fatigued at the end of their scheduled shifts to safely continue operating the tugs. ACP, in its investigation of the April 18, 2017 investigation of the collision of the Cerro Santiago in the Canal, has also not adhered to article 31 of Agreement 12, “In compliance with the provisions of the previous article, any incident or accident must be duly informed, investigated and registered; and the conditions or unsafe or unhealthy practices corrected or mitigated as soon as possible, to prevent other accidents or incidents or the recurrence of these.”¹⁰

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7. “Mantener los más altos niveles de seguridad, para evitar pérdidas, daños o perjuicios a los empleados, los clientes, el patrimonio de la Autoridad y a terceros que se encuentren en las instalaciones y las áreas bajo responsabilidad de la Autoridad.
 8. El Administrador establecerá programas de mantenimiento de equipos, estructuras, herramientas y cualquier otro patrimonio, a fin de garantizar la ejecución efectiva de los programas de control de riesgos y niveles adecuados de seguridad de los empleados.
 9. Ningún empleado podrá ser discriminado, disciplinado, hostigado o afectado negativamente por su participación en los programas a que se refiere el artículo 3, o por denuncia de las condiciones o prácticas de trabajo inseguras o insalubres; o deficiencias en estos programas. Cualquier persona que por esta razón tome o sea partícipe de represalias en contra de un empleado, estará sujeta a medidas disciplinarias y adversas de conformidad con lo establecido en el Reglamento de Administración de Personal.
 10. En cumplimiento de lo establecido en el artículo anterior, todo incidente o accidente debe ser debidamente informado, investigado y registrado; y las condiciones o prácticas inseguras o insalubres corregidas o mitigadas a la mayor brevedad posible, para prevenir otros accidentes o incidentes o bien la recurrencia de estos.

Because ACP-conducted medical examinations of the tugboat captains do not address the captains' working conditions and the related occupational risks to which they are exposed, the absence of physicians trained and qualified in occupational medicine negatively affects the health of tugboat captains. Despite the fact that the captains indicated, in their interviews, that they had sustained a variety of work-related adverse medical conditions, no diagnoses of occupational diseases have been achieved by ACP medical staff, and no examinations are being conducted that would allow such diagnoses.

Ergonomic, cognitive, and psychosocial factors from work-related conditions and work-related stress appear to be the primary factors leading to accidents and captain illnesses. Because of the potential adverse effects of these factors on captain health and on the safety of Canal operations, further study of these conditions should be conducted as soon as possible to develop corrective measures that, to the extent possible, mitigate those risks.

Communications between the tugboat captains and ACP management has been such that it has contributed to poor morale in a population that otherwise likes their jobs and is committed to operational safety.

ACP SAFETY PRACTICES

The evidence of repeated demonstrations by ACP or what can only be characterised as a disregard for the safety of Canal operations illustrates an ACP safety culture that is counter to what should be expected from an organisation that plays such a critical role in its country's identity, economy, and citizen health and welfare. As important as the finding of fatigue among tugboat captains and its effects on the safety of Canal operations, the actions, decisions, practices and policies of ACP, the organisation that operates the Panama Canal, points to a safety culture that jeopardizes rather than enhances the safety of Panama Canal operations and increases the risk of tugboat captain error and accidents. This conclusion is based on multiple ACP actions or failures to act. For example,

- ACP did not provide requested information to the National Transportation Safety Board in its investigation of two ACP vessel collisions with

the United States Coast Guard cutters in the Canal in 2016 and 2017. In the investigation of the 2017 accident, for example, despite their requests, the United States authorities were not 1) permitted to meet with or interview tugboat captains, even with ACP personnel participating in the investigation, and 2) were not provided the tugboat captain's actual work schedule.

- ACP made no changes to its operations or its tugboat captain scheduling practices in response to either the 2016 or the 2017 collision, despite its own finding that the tugboat captain falling asleep caused the 2017 collision.
- ACP determined that, because the Canal waterway is internal to Panama, it was not required to apply International Maritime Organisation (IMO) rules to tugboat captain scheduling, and it has no written hours of service rules that govern their scheduling. Consequently, there is no upper limit to the number of continuous hours tugboat captains can work.
- ACP did not inform the tugboat captains, until after the fact, that it was removing a seaman from the tugboats, despite numerous indications that the decision had been reached in advance of its implementation.
- ACP denied the tugboat captains' request for a fatigue study into their hours of service and the potential effects on their health and on the safety of Panama Canal operations.
- ACP disregarded tugboat captain input in its decision to remove a second captain from the vessels during Canal operations, a decision that directly affected tugboat captain authority, responsibility, the risk of error, and risk of accidents.
- By removing the second captain, ACP eliminated a necessary component in maintaining the safety of Canal operations, a licensed mariner who could prevent or mitigate the consequences of captain errors. In this way its action violated a critical element of system safety by permitting a single-point failure, one captain, to have a critical role the safety of Canal operations with no backup or redundant element available in case of a captain error.

The National Transportation Safety Board, as most major transportation investigative agencies, permits the States of Interest to participate in their investigations, and they provide them with access to operators and critical information. But, as the National Transportation Safety Board wrote in its report of the investigation,

Investigators were not allowed to formally interview the master of the Cerro Santiago to explore the results of his most recent merchant mariner physical examination, obtain any information on his medical conditions or medications he may have been using at the time of the accident, or obtain details related to his sleep quality. A log detailing the actual hours worked for each shift was not made available to [National Transportation Safety Board or US Coast Guard] investigators.”

Their lack of cooperation in response to the United States Government requests for information necessary for its investigation, a violation of internationally accepted investigation practices, suggests that ACP feared that information about its practices, i.e., the actual hours that the Cerro Santiago Captain worked and the work schedule that he had maintained, could embarrass it before other countries that foster considerably stronger safety cultures.

Both ACP and the National Transportation Safety Board found the cause of the 2017 accident to be the tugboat captain's falling asleep while in control of his tug. An organisation that has operational safety as a high priority would have examined the reasons for the captain's falling asleep, to include an examination of its scheduling practices, and, if nothing else, as called for in its June 3, 1999, Agreement No. 12. If ACP had conducted such an examination, it was not evident in the report of its investigation into the accident that it issued. Instead it found, among other findings that, other than the tugboat captain falling asleep, “there was no other fault on the part of the Panama Canal Authority or any of its employees.” By contrast, the National Transportation found, in its investigation of the same accident, using the limited information of a generic tugboat captain schedule, with no overtime, that,

Long work hours and extended shifts lead not only to fatigue but also to physical and mental stress. Furthermore, working schedules that alternate daytime work with nighttime work in the same week can diminish performance and result in sleep deprivation. In these situations, a worker is not able to get sleep of sufficient duration because of the insufficient time between work shifts, along with the logistics associated with commuting to and from the worksite and the often competing demands for his/her time for family and personal life.

The National Transportation Safety Board, under IMO protocols, provided ACP with a copy of its report. It can be assumed, therefore, that ACP was aware that agency had found its tugboat captain work schedule to be fatiguing. If so, this was not demonstrated by ACP practices in response to the accident, it made no changes to tugboat captain scheduling practices and continued to encourage captains to work excessively long schedules that would be unacceptable in almost all safety-critical industries.

The National Transportation Safety Board also examined the impact of the opening of the new canal on canal safety and found that tugboat captain fatigue further increased as a result of the additional workload created by the increased number of transits and transit requirements of Neoanamax vessels in the new canal. In the year and a half since that accident, these were predicted to lead to even greater impacts on tugboat captain fatigue with the additional number of vessel transits since that time. The National Transportation Safety Board concluded that,

The statistical analysis performed by investigators on the activity levels in the newly expanded Canal during the first four months of 2017, compared to the same period in 2016 before the expansion, identified an increase in the workload activity of the Canal's tugboat fleet and the masters who operate them. Although the tugboat fleet remained constant over that period—at 46 units—and the average in-transit time of vessels moving through the system slightly reduced—from 11.85 to 11.64 hours—the number of larger vessels with beams of 91 feet and over transiting the Canal

increased by three vessels each day. These larger vessels, with their need for assistance in transiting through the locks and the Canal itself, have placed additional task loads on the tugboat operators. Higher workloads for the tugboat masters associated with these new locks, specifically in providing assistance with the approach to and departure from the lock, combined with the average two and a half hours or more of constant positioning, pulling, and backing required while in the lock, all can lead to an increase in fatigue and thereby a negative impact on performance.

That ACP found no organisational fatigue-inducing factors in its investigation of the same accident may be attributed to different investigative techniques and perspectives between it and the National Transportation Safety Board, which did find systemic fatigue-inducing factors in ACP's tugboat captain schedules. But that ACP effected no changes to its operation of the Canal since the 2017 accident, other than to reduce manning on the tugboats and eliminate the one crew member whose absence had a profoundly negative impact on safety (the second captain used during transits through the new locks), indicates that its approach to safety of Canal operations is lacking. With its decision to selectively implement IMO requirements, such as requiring its tugboat captains to be licensed but not implementing IMO hours of service requirements, which are in effect worldwide. ACP is also failing to adhere to Agreement No. 12. ACP does not consider safety standards in its operations to be a high priority.

Finally, ACP's actions in reducing tugboat manning, which directly impacted tugboat captain's tasks, 1) were conducted in a way that was contrary to that of a safety-conscious organisation, and 2) led to a critical lapse in the safety of Canal operations. Eliminating a seaman from tugboat crews without informing the captains in advance, communicates to them that the organisation has little regard for their views, despite the captains having legal authority over the operation of their tugs. Its action to eliminate the second captain during transits through the new locks directly counters fundamental safety principles regarding single-point failures, as noted. Not only are the captains required, as a result, to remain at their controls for the duration of the transits, a period averaging about two and a half hours during which they

must focus entirely on tugboat control with no breaks permitted, the practice, which exacerbates their fatigue levels, prohibits them from taking rest breaks to mitigate fatigue, or to even use the toilet when needed.

An essential element of system safety calls for incorporating safety provisions into system design, before it begins operations, so that critical system elements, whose failures can lead to accident, are either designed so well that the likelihood of failure is close to zero, or if this cannot be done, providing a redundant element so that in the event that the element does fail, a second is available to prevent the failure or system flaw from becoming an accident. The second tugboat captain was such a redundant safety element. By removing that crew member from the very Canal operations that have the least margin for error, transits through the new locks, ACP has eliminated the one element that could prevent the remaining captain's errors from leading to an accident. Consequently, the system has reduced the safety of tugboat operations to a single-point failure, the captain, who has no backup in the event of error to either prevent the error from occurring or mitigate its effects if the error has already been committed.

Worse, not only has ACP created a single-point failure in tugboat operations, it has created this element in tugboat operations where the likelihood of errors was already high from the effects of the work schedule-induced captain fatigue that it created. In effect, ACP has increased the likelihood of captain errors by maintaining fatigue-inducing schedules, and then it increased the likelihood that the resultant errors would lead to catastrophic accidents by removing the one element that could reduce the likelihood of captain errors from becoming accidents, the second captain. The increased potential for such accidents is illustrated by ACP's announcements, included as Appendix 6, that it will permit opposing LNG vessel traffic in the Canal, increase the size of vessels permitted to transit the new locks, and require large vessels to have tugboat assists through Gatun Lake. Thus, not only is the likelihood of a serious error increased, the likelihood of that error leading to an accident has increased, and further, the likelihood of accidents becoming catastrophic has increased as well.



The concept of safety culture emerged following the 1986 nuclear accident at Chernobyl. It was used to explain the reactor facility's managers failure to anticipate and prevent, or respond effectively to the accident itself (INSAG, 1991), despite multiple signs that safety was being degraded, and despite sufficient time available after the initial accident to prevent a meltdown and the subsequent atmospheric release of nuclear material.

A hallmark of an organisation's safety culture is its response to accidents and incidents. Companies with proactive safety cultures would, for example, examine their operational practices to determine ways to avoid future accidents after sustaining one. If ACP took such action following the April 2017 accident or undertook an examination of its practices to reduce the likelihood that a tugboat captain would fall asleep at the controls in the future, such actions are unknown to the tugboat captains and have not been communicated by ACP.

Not correcting a system deficiency that has led to an accident, let alone failing to undertake a search for safety-related system deficiencies subsequent to an accident, are characteristics of organisations that degrade their own operational safety, and of safety cultures that increase, rather than reduce, the likelihood of accidents. The operator errors that result, such as a tugboat captain's fatigue leading to a serious error, are considered to be organisational errors that reflect on the organisation, rather than operator errors that reflect on the operator. As Goodman, Ramanujam, Carroll, Edmondson, Hofmann, and Sutcliffe (2011) write, in describing organisational errors, these are

... errors [that] are essentially organisational in several key respects: First, they represent unintended deviations from organisational expectations about appropriate ways to carry out work activities; second, the deviations represent the actions of multiple individuals who are acting in their formal organisational roles and working toward organisational goals;

third, the deviations can potentially result in adverse organisational outcomes; and, finally, such deviations are primarily caused by organisational conditions (i.e., they cannot be explained solely or even primarily in terms of idiosyncratic features of individuals). Thus, an organisational error is different from an individual level.

ACP actions regarding tugboat captain scheduling, its lack of cooperation with foreign safety investigations, its lack of adherence to the minimum of internationally accepted and applied hours of service rules, and its failure to identify and correct system shortcomings found in at least one accident, exemplify organisational errors that are consistent with Goodman et al.'s (2011) description. They enhance the risk of catastrophic accidents in a critical international transportation system and a vital element in Panama's economy, risking the continued economic viability of that system, let alone the lives of those who work in or live near the Canal. Therefore, the totality of evidence regarding ACP practices suggests the need for immediate action to prevent a potentially catastrophic accident from causing environmental catastrophic, severe damage to the Canal, or from causing harm to residents near the Canal.

Further, because of its history of non-compliance with IMO rules and safe operating practices, and its history of maintaining a safety culture that hampers, rather than enhances, safe operating practices, an independent organisation that is outside of ACP should oversee the safety of its operations. This should prevent, as appears to have been likely in the April 2017 accident, the ability of ACP to preclude examining the full scope of its system safety deficiencies. Given the importance of good safety practices, the need for such independent safety oversight is necessary.

An entity that is independent of ACP, with authority to effect changes that will improve Canal safety and the health of tugboat captains, should also require ACP to implement a Safety Management System. Safety Management Systems or SMSs have been mandated by the International Maritime Organisation for operators of internationally operating vessels, the International Civil Aviation Organisation, for international commercial aviation operators, and by the Federal Aviation Administration in the United States (Federal Aviation Administration, 2016). An SMS, as a fatigue risk mitigation system, identifies operational risks to the system, provides a mechanism to mitigate them, and ensures a robust method to verify that the identified risks have been mitigated. Further, SMS systems provide a mechanism for mariners that is independent of the organisation to voice safety-related concerns without fear of retaliation. The need for such an independent mechanism was made clear by captains who openly expressed their fears of retaliation by ACP.

CONCLUSIONS

1. ACP has no hours of service rules governing the schedules of the Panama Canal tugboat captains, limiting the maximum number of hours captains can work in a time period, or ensuring a minimum number of hours of rest at the end of a work shift.
2. The schedules that the Panama Canal captains maintain are fatigue inducing by disrupting the captains' circadian sleep-wake cycles, providing insufficient time to allow their circadian cycles to adjust to changes in each work schedule, causing extended work days and extended time on task, and by providing insufficient time for rest after each shift. Most of the captains interviewed reported on their work-related fatigue, with several noting that they experienced automobile accidents while driving to or from work, an observation consistent with research on the presence of work-related fatigue.
3. The fatigue-inducing work schedules have adverse effects on the captains' health, exacerbating preexisting conditions or causing such conditions as hypertension, diabetes and cardiovascular issues.
4. The inability of captains to obtain rest, particularly during transits through the new locks, limits their ability to respond to their physiological needs, further adversely affecting their health.
5. The design of the captain's work environment has, for many captains, led to adverse musculoskeletal conditions involving the spine, shoulders, and lower back.
6. Because the nature of the captains' duties involve extended periods of concentration, judgement, situation awareness, and decision making, and because these cognitive activities degrade with fatigue, the captains' fatigue-inducing work schedules pose a distinct and ever present risk to their performance, and therefore to the safety of Panama Canal operations.
7. ACP's failure to address previous incidents resulting from work schedule-induced fatigue, such as a tugboat collision in the Panama Canal in 2017, its lack of cooperation with international authorities in the investigation of that accident, and its lack of adherence to agreements governing mariner hours of service and oversight of tugboat captains' health, manifest a safety culture that increases rather than reduces the risk of accidents.

RECOMMENDATIONS

Given the evidence from interviews with over a third of the Canal tugboat captains, the work start and stop times, and ACP's history in response to accidents in the Panama Canal, the authors make the following recommendations to the Government of Panama and to the ACP:

1. Establish an entity that is independent of ACP to oversee the safety of ACP Panama Canal operations. This entity should investigate all occupational accidents, occupational diseases, and marine accidents, following IMO protocols and best medical practices, using qualified and objective personnel.
2. Insure that personnel who report directly to the Government of Panama and not to ACP follow up on ACP response to safety and occupational health investigations to make certain that all safety and occupational health recommendations are fully considered and are implemented within a reasonable period of time.
3. Involve tugboat captains in decisions concerning tasks that fall within their area of responsibility, their working conditions, and potential solutions to their work-related issues.
4. Require all ACP physicians to be qualified and experienced in occupational medicine, consistent with best medical practices, and in accordance with the provisions of the Panamanian Ministry of Health, Resolution No. 15, of August 15, 2018.
5. Require ACP to implement a safety management system and a fatigue risk management system to ensure operational safety and reduce exposure to schedule-induced adverse health effects. The fatigue risk management system should establish written hours of service rules for operational personnel that:
 - take circadian rhythms into account by providing sufficient time for tugboat captains to adjust their sleeping patterns to each schedule change;
 - limit the number of continuous hours that tugboat captains are permitted to work;
 - provide rest facilities near tugboat captain work sites; and
 - provide minimum rest periods between shifts to allow tugboat captains sufficient rest to counter the effects of extended work periods and nighttime tugboat operations.
6. Require ACP to restore the second captain during transits through the new locks.

We believe that implementing these recommendations will provide a minimum level of safety for Canal tugboat operations and a minimum level of occupational health for tugboat captains.

Agreed to on this date, October 11, 2018

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APPENDIX 1 FATIGUE QUESTIONNAIRE

What is your age, background, and the years of experience that you have as a Canal tug captain?

Please describe any trouble sleeping that you may have.

Please describe the skills that you believe are necessary to properly move ships through the Canal:

- Behavioural/cognitive
- Physical

What is it about your job that you like the most?

What is it about your job that you dislike the most?

What advice would you give to your son or daughter if he or she wanted to be a tug captain? Why?

When you are on vacation, what time do you typically go to bed and wake up?

What are the written hours of service rules for tugboat captains?

How often, in the last year, have you been asked to work in spite of scheduled time off or vacation time?

If you were in charge of tugboat operations, and you can make the changes, what changes would you make to ensure that tugboat captains were not fatigued when they were working?

Please provide, in writing, in the next week, the start and end work times for each day you worked in the previous 30-60 days.

APPENDIX 2 OCCUPATIONAL HEALTH INTERVIEW QUESTIONS

General Information

1. Age
2. Length of service at ACP

Occupational History

3. Companies in which you have worked before joining the ACP? Did you have in any of these companies a job accident or occupational illness?

Occupational Risk Factors

4. Exposure to occupational hazards of a physical type: noise, vibration, heat or cold.
5. Exposure to chemical work hazards: fumes, dusts, gases, vapours, liquids.
6. Exposure to fire and explosion hazards.
7. Exposure to ergonomic hazards: working position, repetitive movements and loadlifting .
8. Exposure to psychosocial risks: monotony, labour overload, shifts.
9. Exposure to mechanical hazards: falls.

Family Health History

10. Diseases present in the paternal and maternal family.

Personal Health History

11. Illnesses that have been suffered, hospitalisations, accidents at work.

Lifestyle

12. Sports engaged in?
13. Smoking habits?
14. Do you have alcohol problems?
15. Do you use any kind of psychoactive drug?
16. What do you recommend to improve your working conditions?

APPENDIX 3 CAPTAIN RESPONSES TO HUMAN FACTORS INTERVIEWS

Responses were transcribed as close to verbatim as possible during the interviews then edited to provide continuity and enhance clarity. When words have been added to enhance clarity, the additions are in parentheses. Changes were also made to ensure grammatical effectiveness.

Identifying information about captains was removed to protect their anonymity. Information that could specifically identify interviewees was deleted. Thus he, she, him, his, and her were changed to C, and husband and wife to spouse. Specific information about illnesses, medications, and clinical diagnoses and treatments were removed from the responses as well. Captains were interviewed, either individually or in pairs.

CAPTAINS 1 & 2

Captain 1: Captain for 21 years

Captain 2: Master for 23 years

Sleep quality and quantity

Captain 1: C's health is declining. C sleeps for two hours, then wakes up, gets up to urinate many times during the night. C may have diabetes. Everything about the work changed when the new channel opened. The week that C works in the old channel C feels relaxed, but in the new channel C doesn't feel that way. Everything has changed in two years.

Captain 2: C's health is okay. C has had medical examinations with regularity, about every six months or so. Part of C job C feels contributed to C's cancer as C has no time to rest. There is no time to rest and C cannot rest more than five hours at a time.

What are the differences between the old locks and new locks?

Captain 1: C feels more relaxed working in the old canal than in the new one. Therefore, the hours worked are not equivalent for the Canal. There was time when working in the old locks allowed time to rest. They feel more relaxed and less stress in how they used to work in the old canal. Since July 1 they work alone, so one hour equals three under the old system. In the new system the tugboat captains cannot eat, use the bathroom etc., because they must stay with the pilot the entire time. This week C worked eight hours in the old locks and feels relaxed. Yesterday C worked in the new canal and was very tired.

Captain 2: Same.

What is the longest shift you have worked?

Captain 1: The longest C worked in one shift in the past year was 21 hours, with a two-hour break in between. They called and asked C to work extra and C agreed to do it because it was in the old locks and it's not hard to work there with two persons in the wheelhouse. C started working at 0800, then at 1600 Captain 2 left, and Captain 1 changed boats and worked an additional shift, again this was on the old locks and they were able to work with another captain and it's more relaxed as a result.

Captain 2: C feels most tired in the midnight to 0800 watch, because there is not enough time to rest before taking the watch. That watch time is difficult because C is tired at the beginning.

C worked 16 hours on the same boat on one occasion because the relief master didn't report, and C had to work an additional four-hour time to cover the watch. The arriving relief captain then had to have lunch and C had to wait until that captain came on board. If C was in a landing C could call MTC [Marine Transportation Center] and say that C was too tired to continue and then put the boat out of service. But if C is the middle of moving a ship or locking and unlocking it there is no way to stop the ship manoeuvre, even if C is very tired.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Captain 1: Recommends against C son becoming a tugboat captain. C wanted the son to be a doctor. C would not say to him don't go to maritime school, but inside C does not want him to be a tugboat captain. Because for C, C's whole life is around the Canal.

Captain 2: Would advise C's son or daughter to be a tugboat captain. The son can have better option than C had. The Canal was a good option in C's time. As a career this is good option. Hopefully things will change for the better.

CAPTAINS 3 & 4

Captain 3: Captain for 10 years

Captain 4: Captain for 25 years

Sleep quality and quantity

Captain 3: Started taking an over the counter medication to remain less anxious. C has no sleep disorders.

Captain 4: Has no sleep disorders.

Skills necessary to properly move ships through the Canal

a. Behavioural/ cognitive

Captain 3: The tugboat captain must be very aware of C's actions and the surroundings. C must be very focused on the task, especially on the critical parts going into and out of the locks and intervening with structures and other things. When interacting with other vessels or coming into and through locks, C must be focused and pay much attention. C must not be paranoid and must remain relaxed and calm.

Captain 4: The tugboat captain must be focused on what is all around, and on the partner. C must be very relaxed because the job is very stressful, going behind or in front of ship. C recently went from Gamboa and was about two hours before C would finish C's watch and they sent C on another job that was going to take another two hours and that is very tiring and strenuous. C would have been unable to say that C was too tired to take the assignment but that is not normal. You need to be well-rested to do the job.

Captain 3: People rarely say that they are too tired to work. What they can do is if they know their relief is there, they can try to work to meet their relief, but that can only be done when their relief was there. Otherwise C would have to finish C's shift, even if the shift was longer than it had been scheduled.

b. Physical

Captain 3: Physical skills are necessary in going up and down ladders, boarding equipment that's on the move, especially in poorly lit areas, slippery areas, high areas, and high climbs can expose C to slips/falls. Sometimes the tugboats don't get to fuel up, and the boats tend to rise, and the docks and landings are too low for the tugboat, and therefore sometimes the tugboat captains will have to climb over things to get on board.

Captain 4: Physical skills are required when exposed to slippery areas, and sometimes the tugboat captains have to jump from the launch to the tugboat or jump from barges to the tugboat. One cannot have bad knees to do the job.

What is it about your job that you like the most?

Captain 3: This is a good job, it's interesting. They go and do whatever they have to do to complete the job. When they get home they don't take the job home with them. They are exposed to beautiful sites, in the open, where they're not stuck in an office all day. You pretty much run your boat during the eight hours. It's very personal, you're in your own personal space, and are very independent.

Captain 4: C used to say that C loved the job. But at present that's not the case. Before C could see that everything was okay and worked without stress. Now every day is stressful, every day they see a new memo to correct something that is not corrected by them but by the people not on the tugboats. That is not normal. That is not a good work environment. C has to do C's job calmly, not thinking of what's going on outside. In 25 years working they never had an accident in the Canal. That is a good reason why C liked the job because C can do it safely. But now they are pushing them in ways that are not safe. Before they worked with another captain, which allowed them to take a break to do the job but now once they start working they cannot take a break.

What is it about your job that you dislike the most?

Captain 3: C dislikes the fact that the job changed to something that is not pleasing. They have a bunch of problems that affect the tranquility that you used to have before. Before whatever work you did the work environment was more jovial and happier, now morale is down the drain. Everything seems to be a problem because every time you make a decision you're concerned that it may not be done right, that you're being watched over, that you may be reprimanded. Before when you got to work you did what you needed to do. Meeting captains when you started your shift was friendly. Now they talk about the problems, the reprimands.

Captain 4: Every week they learn of an additional disciplinary action taken against someone.

Captain 3: Before they were able to predict how their nights and days would be, depending on the shift you were working, you can linger further down the road, more or less you would knock off work, you could plan your life. Now C goes to work at 0800 and C knows that his arrival time at night will be 2000, this is seven days in a row, where C knows C will be asked to work more than C's shift. For the last three days, C was asked to work late. This is something that had never happened before. Before there was always a rotation. Now the priorities have changed. They do what they can with what they have. That is just demoralising.

Captain 3: What has changed is that there is more traffic, new ships, and there is a need for more resources but they are short on resources. They also have people making dispatch decisions that do not know what a tugboat is, what it implies, what the crew does, what they do, and how long they were working before.

Captain 4: Before they had a rotation so that you would not be in the same place every day. Sometimes you would be in Paraíso where it is somewhat more relaxing, than say in Balboa, but right now, every time they must go to Balboa to wait for ships. That is very tiring. They make schedules for machines not people.

Captain 3: We are machines to them. C's been given five different assignments, and the last one is a new ship, the Neos, someone who has been up all night, five different moves with five different ships, now C has a sixth ship, C goes home maybe at 1000 then you're on a boat shipped to Balboa again. C thinks that the scheduling should be better, but the people who do the scheduling have no maritime background and don't understand that people need to go to the bathroom, and do not understand that people cannot work three hours straight on the bridge.

What is the longest shift you have worked?

Captain 3: 16 hours, C was called in to cover someone else's watch. Was called in at 0400, then they had a Neo locking down with C, and they didn't send a relief for C because the person that was to be sent was C's second master. They did not have enough personnel because the boat was locking down so C ended up leaving work around 2000-2030 at night.

Working more than an eight hour watch occurs six to seven times a month. Sometimes the person relieving C is doing something else; sometimes they cannot get the relief person because the relief is doing something. In last pay period (two weeks), this happened three times. This happens six or seven times a month where they don't have a relief. And at times they are locking up a tugboat, which is a two to three hour manoeuvre and they can't stop in the middle. Every one of them on a regular basis does one and a half hours overtime daily, more or less.

Captain 4: Thirteen hours because C's relief did not come, and C had to stay on board, so C had to keep going to do C's job. C is asked two or three times in a pay period to work more than their eight hours. This happens when going through the new locks and they have to wait until they clear the locks to be relieved.

Captain 3: Increased overtime has occurred because they changed the operation. There are new locks and there is pressure from the company to work more efficiently with the new set of locks. The new locks allow bigger ships to come in. This leads to maritime traffic issues and they are pushing for more production and more performance. They sell the slots for the pre-booked ships. If they know that they can push and shove the tugboat captains for more than eight hours to allow five Neoanamaxes northbound in the morning and five in the afternoon southbound, they will do this to meet the schedule. The tugboat captains will have to work more in the programmed chaos to operate the way they want to. They do not take into account that the tugboats are operated by people.

Captain 4: Not all tugboats can work in the new locks because they don't have the equipment. They are short on equipment and they have to use the same number of people to do the job as before.

Captains 3 & 4: They have no idea why they haven't hired more tugboat captains.

Captain 4: They had two years to plan while the opening was delayed.

Captain 3: They don't use their resources appropriately. There are tugboats that are on standby, and the tugboats do not have permanent crews. If they used the tugboats with permanent crews they could be more efficient. But management decided that they will use 36 tugboats per day, but they have more tugboats, about 10 more, they are not manned and not being used, and they are in poor condition. They have eight that are totally unreliable. They do not all have the same power, they can use the powerful ones on the new locks, and have them completely manned, sharing the responsibilities, but since management does not want to, they sacrifice everybody else because they have to work double.

How often in the last year have you tried to avoid a watch because you felt that you were too fatigued to perform safely?

Captain 3: C has said that C was too tired two hours before, sometimes they call and ask you to start early, that you can turn down and C has done that, but lately if you turn it down it is being "frowned upon," for "lack of support for the operation." No one has explicitly said this. C's boss has said we need to count on your support. It's not explicit but it's suggested.

Captain 4: One midnight watch C had worked three days on the new locks and C said that C "felt bad" and couldn't work. C could not say that C was too tired, if C did it too much they would complain.

Captain 3: If you keep saying that you are too tired you start to lose money from your accountability bonus. This is based on company performance, and the number of times you miss work. You can lose a part of your bonus. You can lose 20 percent of your bonus if you have too many absences. Bonus can be two pay periods.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 3: Last three months-cannot put a number on it, on the midnight watch, C has had microsleeps 50 to 70 percent of the time. Before the new locks, this rarely happened. Now it's more frequent. Then, they had strict rotations; they would spend a lot of time in an active area, the next night you would have a more relaxed pace, so you would alternate a lot. Sometimes in the 0800 to 1600 shift you would see guys go down for a complete breakfast and they tend to the ship. Now you get on board and you're controlling the ship constantly, barely having time to eat, then you finish, and they ask you to come in for more time the next.

Captain 3: Last week C worked once where C was too tired, when C was dispatched to work a ship to Gatun. When C got there C was very sleepy, and momentarily had a microsleep, and when C looked up, C saw that C was very close to the ship. Before, in the old system, this rarely happened, the operation was different. Now they have to work every day on the new locks, three hours inside the locks, and it's different.

Captain 3: Before you could make the ship, and go down for break, since the ship was moving you had time to do the other stuff, e.g., eating. With the new locks once you make the ship, especially on the bow, where you are tied to the ship you are moving, even in a lock when the water's coming. Even going to the bathroom is stressful.

Captain 4: Before you could tie up to the walls, you can get coffee, in the old locks.

Captain 3: When they removed the third seamen from the crew pretty much all of them spoke to the port captain. C has written e-mails, conferred with the boss about it, written in log books about problems that they have. Response – a “We’ll look into it, we’ll talk to someone about it.”

Captain 4: C has written it down in the log, spoken to the port captain (when they removed the third seaman). The response is – “Are you going to the job or what?”

Captain 3: They will say right now – “We cannot provide this. We need to know if you will do the job or not.”

Captain 4: They say – “If the tugboat is okay why won’t you do the job.”

Captain 3: We really need to solve this situation. We cannot do this type of job under stress. We cannot do this job under stress. I like my job, but not like this.

Captain 3: We’re doing all sorts of work, but it’s like we’re in prison, sitting there with no control on when you’re going to disembark, if you have a relief or not, (or) if you’re going to see your spouse or child

Captain 4: If you feel tired you cannot say that, then they’ll say “we’ll send the ambulance over.”

Captain 3: Many of the captains, to avoid being disciplined, will put up with it because fatigue is an insufficient reason to not take a watch. As a result, five guys are facing disciplinary action because they said that they were too tired to take a vessel out. Now people feel intimidated and afraid to do this. That’s the way they have been doing this since July 1. There is a document, “Unsafe Work Practices,” they have asked for meetings with ACP. But have not had any. Even to take a bathroom break can subject you to disciplinary action.

Captain 3: Some of these guys in management, the port captains, want to stress the tug captains into doing jobs and things that they don’t consider safe, and they are not too professional.

CAPTAINS 5 & 6

Captain 5: Captain for 21 years

Captain 6: Captain for 9 years

Sleeping quality and quantity

Captain 5: Sometimes C has difficulty falling asleep. This occurs mainly when working the midnight watch, two or three days during the seven-day period.

Captain 6: C feels tired when working the new locks. Always. C cannot sleep two days in his home for two days straight but when working new locks C is always tired. You have three times (in the locks) water falls slowly, three times it rises, something gets you fatigued. Otherwise C in good health. In the old locks when you get to the wall, they tie one line to the moorings, C can sleep 10 to 15 of the 20 minutes while tied to the wall but in the new locks cannot do that.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 6: You must use your hands, always checking every movement to avoid any damage. Actually, in the new locks the fenders put C under stress. The fender’s positions were changed to hanging from chains and C is moving because the pilots give orders like “take me to the wall” and they have to put the tugboat touching the wall, but if you touch the fender you can break the fender, and this will go in your record. C has to check the line to the bits, almost touching the tugboat. C has to have skill to avoid touching the fender and the tugboat reaction is always moving. You cannot take a break or rest. This causes a lot of stress.

The quantity of manoeuvres has changed to (where they are conducting) more manoeuvres. Before you did a manoeuvre and took a break. Now you immediately go from one manoeuvre to another. Now they fight with MTC to go to the bathroom, C has to explain that C needs to go to the bathroom. They always arrange one manoeuvre after another.

Captain 5: You need skills to be aware of everything happening around. The only time you can relax, get a break is when you are in the dock and you have your two lines tied up. That is the only time you can take a little rest.

What is it about your job that you like the most?

Captain 6: C likes the job, likes the manoeuvres. C likes it, C likes to manoeuvre. The problem is what you are assigned to do (manoeuvres) without a stop. C feels the fatigue and the stress from that, and C doesn't feel that they are flexible. They must understand that the captains are human. After five manoeuvres they call it "like being a slave." After five manoeuvres you no longer have the same skills as before, you feel weakened.

Captain 5: C likes the job. Wonderful, rewarding, see the sea. Sometimes there is the weather, the people with whom C works are good people. Working environment is good.

What is it about your job that you dislike the most?

Captain 6: C feels sad because the administration has changed, working improperly, they are making too many mistakes. C has studied economics and law. No one asked for money when the Americans ran it. They knew that if you studied and were ready for a new position you would get it. But they stopped all that. Now the people say they want money. C feels that the administration feels that if you are a captain and want to be a pilot instead of preparing you to be a pilot they stopped. Because they are not good at managing human resources.

Captain 5: They, the management, do not know the issues facing their subordinates, because they did not rise up from the ranks. For example, the captains are responsible for the management of \$14 million vessels, and the lives of those on board. They (the administration) only know what they have in the office. C once worked seven to eight manoeuvres and two lock passages in one shift.

What is the longest shift you have worked?

C once worked 16 hours in one shift. C reported four hours before his shift, then worked eight hours on C regular shift, plus four hours after. C has stopped the vessel many times. After 12 hours you can stop the vessel by regulation, until they get a new captain. But last time C came four hours before (the shift started), and after eight hours C stopped the vessel by regulation, C wanted to stop the vessel, but they would not accept it. They said that the four hours before did not count against his time. The tugboat captains do it because they like this job and they serve. But actually to serve they (the administration) spurn the tugboat captains.

Captain 5: C likes duty. C considers duty when C was younger and sailing ships, C worked 0800 to 1200, and his /her relief worked 1200 to 1600, for C the Canal is the same. On ships, C could stay on board but C needs to have a relief. But in the last two years, during the lock passage time, in the new locks, C needs the rest necessary to work around the clock. For C, that operation looks like it needs two captains to do the job, but the same reason that makes it look not good is good. Two captains talk together about how to do the job safely.

The formula of two captains is good. C doesn't know, it's not easy because you can be tired, but with a second captain you can use a second body when you need it. C works approximately 120 hours a month, more than 100 hours in a pay period, over 80 hours. C has worked, in the past two years, about 360 hours in a pay period. That means some days you will work 24 or 36 hours.

C knows economics and that people need to work the new locks. Most of those (overtime) hours (C worked) were voluntary hours. But before C had someone that C could trust, a second captain, now C has to do this himself/herself, C can feel it was safer with a second captain.

How often in the last year have you tried to avoid a watch because you felt that you were too fatigued to perform safely?

Captain 5: The thing is not just how many hours you work, it is how much you work in that time, now you cannot take a break, now you will the time straight without break. They want to reduce the costs of the operation.

Captain 5: The Canal gives the government a lot of money, and the Canal has not met expectations of traffic. Instead of 10 ships daily as was expected, it's now six and a half. Since the Canal has not negotiated with the pilots, to allow two-way traffic through the cut, this has also limited the traffic. Therefore, they are looking everywhere within the Canal on how to give the government more money. Therefore, there is the exclusion and reduction of the second captain, which results, according to the Authority, of a saving of \$6 million a year. C also thinks that some people hold a personal grudge against the tugboat captains for some reason.

Captain 5: On July 1, they stopped putting the second captain on the vessels. Since then there was an accident in Colon. Before the new locks opened, the crew used two captains, three seamen, an oiler and an engineer. They also took a seaman away as well. Since ITF was complaining about the loss of the seaman, the Canal Authority did a manpower study, a group from London, to determine how to do the manoeuvres with one captain.

Captain 6: The administration has not given them information about fatigue. They made a manpower study (MNG) and they only came on board during day time (when they conducted the study). The administration sends them to take a course, sometimes the courses talk about fatigue. These courses are conducted by ICP; two or three-day courses. In one of them they mention about fatigue, they told you about fatigue conditions, the regulations, but the Authority does not practice it. They know the rules but if you cite it you will be subject to discipline.

Captain 5: The administration has given them no information about fatigue.

CAPTAIN 7

Captain 7: Captain for 25 years

Sleep quality and quantity

Occasionally C takes pills to sleep.

What is it about your job that you like the most?

It is important to go to work well-rested and alert and it is important to keep all of C's senses. Before, with the old locks, the manoeuvres were about 45 minutes each. In the new locks the manoeuvres can be seven hours long. Before, you take one ship and you let go from the ship when it's about to enter the lock, and you have time to eat, use the bathroom, etc. Now during a transit, you have to stay there until you pass through the new locks until Gamboa. And you have to keep alert the whole way.

C has to work like that often, since the new locks opened, about two years ago. This is the principle reason they need two people on the bridge. Before you can rest the tugboat along the sides of the locks, but now they put in fenders hanging by the chains and you can't touch the fenders or walls because you can damage the tugboats or the fenders.

When the new locks opened and they had a second person on the bridge, you worked harder because they had new ships passing. The combination of the new locks, which increased the hours of the captains' work with the length of the manoeuvres, this created more traffic, but they took the second captain away and the combination of the two makes it challenging.

The bridge of the vessel is not ergonomically sound, e.g., the radios can be located in different locations on different tugs. Plus, with the controls the way they are, you cannot let go of the controls to use the radios. When you had a second captain C could handle the radios but when you are doing it yourself you must let go of the controls to handle the radios. There is no standardisation of control designs among the vessels, some are made in Canada, in US, China, and Spain. Some chairs can be raised, some cannot. There is no standardisation of controls and radios, halers, to call to the engineer or across to the different tugboats.

C worked with a captain who had worked 35 hours straight once in the last year. Today one can work 14 to 17 hours continuously, sometimes more, sometimes less. When C worked 35 hours straight, C showed up at 1500, the previous captain had worked 21 hours straight from the day before. C had worked from 1300 the day before and C worked 23 hours in addition to his regular hours. The administration didn't do anything because they need the persons. They do not pay attention if someone works 25 hours straight.

C's watch was to be from 1500 to 2100, but by the time C got the car, and got lunch, C started at 1500, but C finished at 2100. The longest C worked was 17 hours straight. The problem is that once you start going through the locks you have to work through the locks. That time there was too much traffic and the ship was close to the locks so there was no way for him to get off at that point, the ship had to transit the locks. Sometimes you don't have a relief and the manager says, please stay there because they don't have relief, they will state that as a favour to help out the company.

If you complained about the long day they will respond, "we're working on it". They don't really take the response seriously, no matter how the response is made. If you refuse to take the watch because of your fatigue, you will be sanctioned, C would be charged with "abandonment" in the Panama Canal.

C works among the least hours of the captains, C does not want the overtime. C was asked to stay late and worked until 1700, despite starting at 0500. This is because C had no relief at 1600.

When you don't get a relief there is no option of assigning someone to substitute. This is especially true when you are approaching the locks since you cannot stop the ship, the passage must continue.

C has no trouble working eight hours, however C feels anxious and depressed when working more than eight hours. C can work from 0500 to 1300, but C relief reports at 1300 to the office, but if C ends his watch at Gamboa it can take one hour to bring the relief captain to C, and then it would take him another hour to get back, or sometimes they send you to Colon.

The ILO and ITF have a list of occupational illnesses. C considers that the ACP is generating as many occupational illnesses as any company in the world. That is not the reason that C has hypertension, it doesn't cause the ailments, but it can make them worse; it aggravates them. The working conditions can trigger the ailments.

They are under a lot of stress. One person, former secretary general of the union, got a stroke about three years ago, and died. They were 54-55 years old. The captains get a lot of stress.

C doesn't think that a study of the labour environment will be a positive one. The labour environment is not a good one, not a healthy one. It is "toxic." You can't really complain, but if you work the hours asked you will be in bad shape afterwards.

But when they complain to the doctors of the Canal Authority, they do not treat them, and they try to coerce them into not complying with rest needs. There are regulations governing disability, but the Authority disregards them; what applies to the rest of the country does not apply to the Canal. Even though letters have been sent to the Authority saying that the rules do not apply to them.

The captain showed us two responses from ACP to an occupational-related issues question saying that the rules did not apply to ACP. We will describe the letters in general but not refer to specifics of them in order not to violate C's need for confidentiality.

CAPTAIN 8

Captain 8: Captain for 26 years

C got divorced because of work. The long hours and the mood swings from lack of sleep (were among the causes of the divorce). C was aware of the fact that the job was contributing to the divorce. C knew that things were not going to change. That was why C saw a psychiatrist, which C did not share with the MDs of the ACP because C does not believe that they have the ability to diagnose and treat ailments.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

The tug captain must be alert at all times, precise-with no mistakes and no miscalculations. The captain must be able to focus, to concentrate, and be exact. There is no time for distraction, e.g., answering your phone, the captain must be sharp at all times.

b. Physical

Must be in regular health, overall health.

What is it about your job that you like the most?

C is bored to death in the job; it's repetitive. C finds the job boring. Being a tugboat captain is a way to make money fast but otherwise, the hours are bad, and you can have no social life. The problem with the hours is that you start at a certain time and you don't know when you'll end. C is starting at 1600 today and can end as late as 0500 tomorrow. Then C has to drive one and a half hours to home and then C starts it again over again.

The administration can rearrange hours to allow captains to have more rest, but they don't want to do that. A lot of the pilots are obese, because of the job, they hide their problems. C seeks help for his own well-being, and C realised that C had to see a doctor, but some of the captains think they're okay, but they have had people die at 42-45 because they don't take care of themselves.

The job is more demanding now, with the new canal, it is more stressful because you cannot move from the controls while going through the new locks.

C does not like overtime. The most C worked was 16 hours in one day. C does whatever C has to do to get away from it. That one day the operation was such that it was not possible to make a relief for C. C complained to whomever C could.

C does the job because of the money, but C doesn't care about being nice. C will do C's job well but C does not want to work more than one minute beyond C's scheduled time. When C complained C was told "deal with it." C put the tugboat out of service and they got someone else to take the tugboat.

C is disappointed with how the administration is handling these issues. It makes him depressed. The tugboat captains were proud at one time to be working here. Not anymore. The direction of the administration has changed. The shifts are longer, the job is longer and more tedious. If they ask C to work more, and are nice to C, C would understand. They ask like it's an obligation and you must follow the rules otherwise you will be sanctioned.

Removing the second captain has added to the stress because you cannot move from the seat, even to go to the bathroom. C would like to see the shifts changed to get more time off.

CAPTAIN 9

Captain 9: Captain for 9 years

Sleep quality and quantity

The quality of C sleeping depends on the shift. On the 0800 to 1600 shift C sleeps five hours a day. The only shift that C has where C sleeps well is the 1600 to midnight. The particular shift that C is on currently, that starts at 0800, is bad because C has to leave home and allow two hours to travel to work. When C goes home it takes two hours to get home and then it takes C a while to fall asleep. This 0800 shift is the worst. With the one that starts at midnight C gets home and goes to sleep around 0300 but C can sleep until noon.

On the midnight to 0800 shift, from 0400 to 0500, it doesn't matter how well rested you are, at those times you will be sleepy. If you don't come very well rested, you can fall asleep for five to six minutes. This has happened to C a few times, on this shift, not on the others. This is particularly true on the fifth and sixth day of working. Most of the accidents that have happened occur on the midnight shift on the fifth or sixth day of the shift. This is the type of accident where you crash into something or hit the bank. When you are starting the rotation, you are refreshed. But after a few days you have to be very careful. You may lose focus on the job. Today, the seventh day on the shift, C is starting to feel it.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

One must be focused, and one must listen to the radio at all times because there is a lot of radio traffic and you have to recognise when the pilot is calling you. You have to be aware of traffic, such as launches in the area. Skills in controlling the vessel become like a reflex. One must be focused on what's going on. The crew that works with C can "disconnect" but C has to be aware of everything going on. The seaman, for example, can take naps but C has to be focused on instructions, radio calls. Everything changes on schedule, so you have to be listening to the radio on what's happening when transiting ships. You have to be aware if another tugboat is out of service you may be on call to replace the tugboat.

b. Physical

You may be seated as long as four to five hours in a row, helping ships. In the new canal, there is no chance to let go of the controls once you are made up. In the old one you may have five jobs, but you have 10-15 minutes between jobs, and when you change from one job to another. But in the new canal, once you are made up to a ship, you cannot leave the controls. One may get back tension and pain on wrist because of the way you are handling the controls. Other than that, [additional physical issues include], sitting too long, handling the controls, being exposed to the job for too long without having a chance to go to the toilet. In the morning shift you drink a lot of coffee and water, so it is necessary to go to the toilet.

The longest C has worked on a shift, was 16 hours. C was called four hours before, and C took the overtime. C was not assigned to a particular tugboat, so C was free to fill in where needed. C was told to come at 0300, and C accepted it, but C shift started at 0500. C got on board a tugboat serving a Neopanamax. This got through the locks at 0800, and when C [finished], they needed C to take a watch for a ship on a lake. C told them that C would have to finish at 1300, and they told him it would be okay, but at 1830, C told MTC that C couldn't go on anymore. C was going to put the tugboat out of service because C was past his service. The ships always get made when you tell them that it is past 12 hours, they do some kind of bullying on the radio.

Yesterday C checked in at 0800 and when C got in, C was told that the tugboat C was on was in Colon. They gave C a Jitney (to transport him to there), which is uncomfortable for long trips, Colon is one and a half hours away. C got to Colon at 0930 and immediately had to go out and service the ships. C didn't get to the landing and C was relieved at 1830. C got to the launch, [transported via] Jitney, and arrived in the Diablo office at 2030. C had worked 12 ½ hours and then had to drive home, which took about one hour.

C was recently on a midnight shift and at 0900, C was done in Miraflores, C knew C's relief was available, but they had no resources to get the person on board. They told C that C needed to make a ship, but C told them that C knew that the relief was available. MTC told C to talk to the pilot. The pilot said that C needed a tugboat.

MTC expects you to work forever. The schedulers don't know who is on board, they are in the Diablo office, they don't know how many hours someone has, and they are not responsible for that. They plan like you can run forever. The scheduling people for his ships are in Diablo. The schedule for the tugboats is somewhere else. Because different people change their shifts differently they are not aware of when any one person's shift changes.

C is familiar with SMS (safety management systems), but they don't use it here. They are ISO compliant and ISM compliant, but ISO is not maritime. C was surprised that did not use SMS here. They have some sort of procedures that are equivalent, but not much. It is very poor. In ISM you have to fix wrong things on the boat you're on, it is specific to the boat. It is a living document. Many companies make an ISM manual and want to fit the ship to the manual when it should be the other way around.

SMS systems also have a designated person ashore, but they don't have that here. There is a person who checks the fire equipment. This guy only checks the firefighting equipment; C does not deal with other safety issues.

There is a method to report safety issues. C has to fill out the form, give it to C's supervisor, who gives it to another person. It is very complicated. There is an office, but they are only two or three persons and they have to take care of all floating equipment in the Canal, their initials are OPXI. In SMS you have a person you can call directly, it is very simple. But with this system it can take a year for someone to get back to him on an issue. C knows one captain who filled out a complaint about a safety issue on a tugboat and it's been three years, and no one responded.

C has heard many people complain to MTC about working long hours, they have captains who told MTC that it has been more than 12 hours (since they started their shifts) and they did not want to continue working on overtime, when they were already on overtime. Further, they are facing disciplinary action for not following the right procedures. C believes that this is making an example of people so that they won't do that. Sometimes, when C has worked long hours, C came to work two hours late the next morning, so C could sleep more.

Before this job C worked on a tugboat on a 12-hour shift, but C stayed on the shift, C didn't have to drive home, everything was on the tugboat. Now C feels more tired working 12 hours on the same shift, on the same tugboat, C did then.

Here you work from 0800 to 1600, (you get) two days off, then from midnight to 0800 for 7 days, then you go for a long weekend- four days off, then you work, 1600 to midnight. Some shifts you start at 0500 to 1300, the next group works from 1300 to 2100. There you work eight days on one shift, then two days off, then seven days in a row, then you get four days. You can be on the third watch system for a year, and then on the second watch system, it depends on the tugboat and its system. Each tugboat has its own system. Another schedule is the relief watch. Mon-Friday. You start on Monday at 1600, Tuesday at 1300, Wednesday at 0800, Thursday at 0500, Friday at midnight, then you get off Saturday and Sunday. But in this watch, you never just work eight hours, you always work more than eight hours. Because at 1600 C relief is coming to the office and they have to get C to the vessel. Every day C works nine, 10 or 11 hours. It is impossible to work just eight hours.

This schedule affects C mood. C has gained weight as it is difficult to exercise because sometimes C doesn't have time for it. C's eating habits are not great. C cannot take his meals on as regularly as before.

Before when C had 12 weeks on duty, C enjoyed C time off very much, now it is crazy. C came from a maritime academy; C was a cadet and then spent eight or nine years working when C would work a few weeks to a month on a ship. Now when you work and then get off, you have to adapt to the job and to the surroundings, driving home, this is stuff C didn't have to do when C was on board the ship. Everything was there. C is still struggling to adapt to those kinds of things.

CAPTAIN 10

Captain 10: Captain for 25 years

Sleeping quantity and quality

Sometimes C works seven days in one watch, and then has two days off. C thinks that those watches are too long, because with seven days when you want to keep the schedule you cannot sleep seven or eight hours. Sometimes C sleeps just five hours and that's it.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

You need to be relaxed and not be under pressure, but now they have a lot of pressure because if you make a complaint against the administration, you will have a problem with the administration. If you worked before, with the PCC (Panama Canal Commission-US), they were relaxed. Now they are not relaxed. C was an officer of the union in 2009, and the relationship between the administration and the union was

good. At that time, they were beginning a union in the Canal, but now they, the administration, doesn't like the UCOC and C thinks they want UCOC to disappear as a union. C doesn't know how the relationship will end. They [the administration] don't want anything to do with them. They send a lot of memoranda without conversations to the union, and [with no] conversations with the captains, and now they said that if you don't do it, follow those memoranda, you have a problem with the administration, and can face disciplinary action. Then you need to defend your position. C doesn't know how this will end.

For C the special [mental] skill is to be relaxed, but right now there is a lot of tension, a lot of pressure, it's not good. Last night C was working on the Canal with a Neopanamax vessel, then C told the pilot that C needed to go to the toilet, when C came back to the wheelhouse C told the pilot that C was going to eat, pilot said no problem, but C told the captain to keep the ship against the walls. With the old Canal when you tied up to a ship you had time to eat; now they can't. They need to stay under the pilot's orders; you don't have time to do anything.

b. Physical

Captains must have good health. The physical demands are for you to keep your body in good condition, and must be a good listener, understand things. Must be in good shape. Communications between pilot and tugboat master are done via radio, so you must have a good interaction with the pilot.

When not working, what time do you typically go to bed, and what time do you typically wake up?

Typically C will go to sleep about 2200-2300 and will get up at 0530. C tries to exercise now, but in normal conditions C will rest from 2200-2300. The actual sleep schedule depends on which watch C has. If C starts at 0800, C will wake at 0530. C will stay one hour after C arrives at Diablo because they need to meet their relief, who may not be at the dock or landing. They need to meet the relief by launch. They may start at 0930 to 1000 in the morning and will end at one and a half hours after 1600, sometimes two hours after. They pay them the overtime, but normally after one and a half hours after the watch ends, their time on duty will actually end. Right now, 1600 to midnight, most of the time you will finish at Diablo at midnight, so the relief will show up 15 minutes after the end of the watch. Midnight to 0800 is the problem because all the captains go to the place alone, most of the time you will work for two hours after the end of the watch.

The longest C worked was 10 hours in one shift. When working night shift after day shift, to what extent do you encounter difficulty staying awake at night, and if so, how do you deal with that?

C doesn't feel comfortable on a watch because they work under pressure and tension and this affects C's health. C is -- years old and C doesn't want to work anymore. C would like to retire tomorrow. C feels bad in the job. The relation between management and the employees is not good. They don't have the best situation in the relationship. C thinks they have economic needs now, that's why they keep doing it. Before it was a good company, but C doesn't feel that way now.

Yes, sometimes C's angry because of the problems in the Canal and the relationship with management, it's affecting C's life. Now when C drives, C has a problem with people in the street. They have too much time with seven days on, two days off, then seven days again on another watch. Just from midnight to 0800 you get maybe five days off to start 1600 to midnight, in that time you feel a lot better, but when they have seven days continuous then two days off, then seven days on, it's not good. They need to change their schedule. It's affecting more than the tugboat masters. Before July they worked two captains on the tugboat through the new locks, but now you are alone, with too much responsibility and too many demands on you. C doesn't like it. C would like to retire tomorrow if C could.

C doesn't know why the administration now has a lot of problems with the union, all unions, more than UCOC. All the members of the Junta of UCOC and the administration had good relationships, but C doesn't know why the administration doesn't like the tugboat masters. C thinks that they want to privatise the tugboat service. This is what his /her opinion is. C doesn't know why they [the administration] has a problem with them. Before the new canal locks, the Canal Authority had a good relationship with UCOC but not now. C thinks that they can and will privatise the service. They want to privatise the guards, the janitors. They privatise the training of the people. They have private companies inside the Canal. C thinks that they want to privatise the tugboat operations also.

CAPTAIN 11

Captain 11: Captain for 5 years

Sleeping quality and quantity

When on the midnight watch, and the 1600 to midnights C has trouble falling asleep. When coming home from the end of the midnight watch his family wakes up to go to work/school, and as a result C sleeps sometimes three or four hours. It is difficult for C to sleep seven hours without medications. In April, C had an [automobile] accident and then had back surgery. C is on physical therapy and cannot do exercise.

Typically goes to sleep about 2200 and wakes up around 0700 to 0800 when on vacation. Right now, when not working these are C hours. Sometimes though C needs to wake up early to do physical therapy.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Must be alert to radio communications from the time you get on board. You have to be aware of everything around. At night you have to be aware of navigation lights. Every time you work with a pilot you must be totally focused on the pilot orders. If you miss a pilot order you can have an accident. You must be totally focused on the job and what is going on. It's not like working at an office. When C goes to the bathroom C must take C's walkie-talkie with C. When C goes to eat C must be on watch as well. Sometimes C must ask the pilot for permission to go the toilet because sometimes there is no time for it. You must be alert at all times when you get on board.

b. Physical

You have to have the strength to work with three to four hours of sleep. You have to be able to move between equipment on the sea, from the launch to the tugboat, or from tugboat to tugboat, sometimes the berths require you to climb a ladder when at low tide. When at high tide the tugboat is over the pier, so you have to climb a ladder to climb up. You have to be healthy because you may have to climb, jump, and you have to carry your food, water because sometimes you can be on a tugboat for 10 hours. You carry enough food for two meals, and coffee. The bag of a captain can weigh 10 to 15 pounds.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would support their decision, if that is what they wanted to do. But C would tell them what the job is really like. The sacrifice C makes. C's kids know that when C is at home C cannot be disturbed. When on the 1600 to midnight C can go five days without seeing C's spouse and family. C leaves home at 1430 but C's spouse and kids get home at 1500. In the morning when they get up, C is asleep.

Now C's spouse sleeps in a room with C's child so that C won't wake the child up when C gets home at 0300. His kids know the sacrifice. Actually C prefers the sacrifice so that C can give them the opportunity to get an education. C would prefer that they did something else. C worked for 10 years overseas. When on the 1600 to midnight watch C sees his family on weekends. C sees them in the mornings and at lunchtime, when on that watch. Then C has two consecutive days off so C can see them completely during those days.

The midnight watch is also difficult because when you arrive home at noon you are tired and need to sleep. Sometimes C gets up at 1700 to 1800 to have dinner, then C goes back to sleep again. This job is a sacrifice for all of the family.

In general, the length of the watch depends on which of the three watch schedule C's on. On the midnight to 0800, watch vessels start the transit at midnight to 0100 so when you get off the birth for the first assignment you may not be done, you may have to stay on the controls for eight to nine hours on that duty since they removed the second captain. If you are in the new locks it may take three hours to finish the lock passage you will be done at 1100. Before, the other captain could take the controls or stay on the bridge, but now you can't do that. What also makes this bad is that you have to do this watch seven days in a row. The first three days you may be done at 1000 and you are tired.

On the 0800 to 1600 watch sometimes you have to wait for a northbound transit because you cannot have a north- and southbound vessel going head to head in the Saylor Cut, so you may wait as long as one to two hours, depending on the assignment and in that time you have to stay focused and you can have the seamen to maintain. Sometimes you are in Gamboa and your relief is in Diablo and it may take an hour to get the relief.

What is the longest shift you have worked?

Maybe around 14 hours, but this is sometimes because C accepts it. There was a time when C had no relief, because your relief is sick, and they call you and say that the relief is coming and ask him to stay another four hours. If on the midnight to 0800 and the 0800 captain is sick they ask C to stay till noon and the 1600 captain they'll ask him to come in four hours early. Then you may have to wait an additional one to two hours for the relief captain to come. But the problem right now is they if they don't get someone to relieve you can choose to stop the tugboat after 12 hours for safety reasons. But you may be tired after 10 hours.

This situation has not happened to C. But C has heard that when people said that [to MTC] after 12 hours, and MTC didn't say anything. But if you have 11 hours and they have an assignment that will take you beyond 12 hours and if you explain to them that taking a vessel through the locks will take you to 15 hours and if you try to explain to them, they will not accept that because they don't understand.

Sometimes the problem is agreeing to work that additional four hours. Sometimes C can say that they need to bring someone else and they will try to find someone. But if they call C and say that they didn't find anyone, C will tell them that C will not work over 12 hours. By informing them that C will not stay over 12 hours C has never had a problem telling them that. But C thinks that since C stopped working, the situation has changed and C colleagues do have many problems with saying that.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

Before there was a procedure for going through the old locks. When tied to a vessel, you can get maybe 15 minutes to take a break, to eat, have coffee, go to the toilet. Then with another lock you also get a 15 minutes break where you can relax. But now with the new locks there are no locomotives, so you are working with the ship, and when transiting a lock, you have to be alert and follow the pilot orders, and the pilots expect you to work for the three hours passing, keeping the ship steady. The pilots will ask you keep the ship at an angle and all of this time you are still working. You have to keep alert to the lines that are over the tugboat, so you can't go down because you are still following an order. There is then an additional three hours in which you cannot go to the toilet, eat, you can't do anything. If this happens to you when you have already put in eight hours in your shift you have an additional three hours and you will be tired. The new locks demand more work and more concentration from their side. It is not the same as in the old locks.

b. How do these affect your health?

Before they had the second captain so if going through the new locks C could hand off the control to the new captain so it hasn't affected C yet.

How often in the last year have you tried to avoid a watch because you felt that you were too fatigued to perform safely?

This has happened on the midnight watch, maybe 10 times; C was too fatigued to go to work. There was a time when C woke up about 2200 to go to work and C's hands were shaking. C's spouse told C that you cannot go to Colon like that, about one and a half hours and if you fall asleep you will kill yourself. The Canal refused to give C transportation to Colon and C called in sick. This has happened about 10 times. They don't understand that if C falls asleep in the controls someone can be killed.

When C calls in sick and sees a doctor they don't say anything to C. The requirement is to call at least two hours before duty. As long as you do that, you'll be okay. But if you call in too many times a year, then they may do something, like require you to be examined to see if you're fit for work. Last year, because back issues, C had to take medication but some of the medications made him sleepy and on the midnight watch C didn't take medication as a result. Now C may have to take medication for a year and then C may have to work only the daytime shifts.

How often, in the last year have you been asked to work beyond the maximum permissible times?

If you want, the maximum is 12 hours, but there are people who work more than 12 hours. But if you accept to stay for an extra four hours, you must be aware that you will work more than 12 hours because your relief will take time to get there, so if you accept four hours additional, you must be prepared to work for 13 hours. For the Panama Canal they think that you are forced to work 12 hours. There is a captain who is working on a tugboat for one watch, midnight to 0800, and then transit told him he was done. But the Canal thinks that this one watch tugboat won't get relief. So they are forcing these people to work over eight hours. This captain on the one watch tugboat called in after 10 hours saying that C was fatigued and was going home. C didn't get relief after 10 hours and now is facing disciplinary action. They think that you can be forced to work 12 hours. That is not in the contract and not written anywhere. As a captain that if C feels fatigued it is more dangerous to the Canal working in that condition. And if you are in Colon you must think of your safety because then you must drive on your own to Panama. C drinks a lot of coffee in that situation but then when C gets home C cannot fall asleep.

Most of the captains, when on the midnight watch, take medications to fall asleep. You must take a rest, but if you go home and only sleep one or two hours then it is very hard to sleep in the daytime. Sleeping in the daytime is very hard. The concentration they need when working is very hard. If you fall sleep for three seconds you may go outside the channel and sink the tugboat or cause an accident if you miss a pilot order.

How often, in the last year have you been asked to work in spite of scheduled time off or vacation time?

This has happened, when there was a second captain before it happened every day when on C's holiday. When you are on regular vacation they cannot call you, but if you have two days off duty they called each day. But you can refuse it. Most of the people will accept it because you get time and half [pay]. Most of the time C will not accept it because C needs the rest.

When fatigued, what techniques do you use to remain alert?

Drinks a lot of coffee and eat. But this has led to C being overweight. But C is anxious, and C must have coffee to stay awake, but when C is anxious C eats.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C thinks that since [the year] 2000 when the Americans handed the Canal back to the Panamanians, many things changed, but the schedules did not change. C understands that the Canal must be open 24/7, 365 days a year. But the seven days in a row of midnight watches are too dangerous for their health. And now with the new locks, you have more work and when you arrive home you are completely tired. Maybe they find a way so that you work only three midnight shift. They must find a way to reduce the seven-day midnight shift. For the pilots this is the same, but they found a way to develop a new schedule for the pilots. When a pilot works starting at midnight the next day he's off. This is too much for the tugboat captains.

There are still American tugboat captains here. They can tell you how it was before, then when they started at midnight they didn't start working until 0400 and they have a long weekend. Now C has only one weekend a month off, and when that weekend comes around C is totally tired.

Some captains have the responsibility because they want the money and they always will take additional time, and work on holidays. For that group of captains, the administration thinks that if that group can do it they all can do it. Some do it because they made some financial mistakes and they must take the additional work. But C is not like that. C is not in that situation and wants to do the job safely. The Authority must think of safety to avoid having an accident.

CAPTAINS 12 & 13

Captain 12: Captain for one and a half years

Captain 13: Captain for two and a half years

Quantity and quality of sleep

Captain 13: Sometimes has trouble sleeping. It depends on which watch you work.

Captain 12: C feels whenever you do the midnight watch you have trouble because they have to sleep during the day. Any vessel when you have to work nights and adjust to a new shift it is normal.

Captain 13: Will typically go to sleep at 2100 and will get up at 0600.

Captain 12: Same.

Captain 13: Midnight watch-C will try to sleep at 1700 and will have to be ready at 2200, will try to do that but sometimes cannot do that.

Captain 12: When finishing that shift will try to sleep immediately will wake up around 0600 to see C child, will then try to go to sleep again from 0700 to 1000.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 13: Must be very focused on what is going on around C, listening to the radios and seeing what the pilots are doing to be sure that their order is the correct order. Must be very focused on the entire situation, what is going on with the ship and with the other tugboats.

Captain 12: Says the same thing. Like in those eight hours you must put all of your senses into the job, everything. Not only on you but on your crew, the pilots, the crew on the ship, the environment, everything. In those eight hours it must be completely on the job.

b. Physical

Captain 12: If you have good health you have to adjust your systems, your endocrine system, everything because you cannot eat at the time you are used to because you have to eat when you have time. You have to go to the bathroom when you have time. As a person with one AB, C knew that they need to go to the bathroom when you can.

What is it about your job that you like the most?

Captain 12: Likes that every day is different. Would not work in an office.

Captain 13: The tugboats are different, the weather is different. This makes it interesting.

What is it about your job that you dislike the most?

Captain 12: Nothing.

Captain 13: Does not like when C has to come up and at that time you have a Neo and you have to stay two hours more, you work your eight hours and the time you have to go home you can't because you have a Neo, and you have to stay another two to three hours. You cannot refuse that. That is the only part C doesn't like. C likes the eight hours [watch schedule].

Captain 13: They adjust their environment to make their job place a good place to work. It doesn't start in the vessel when C goes into the car. C plays music to be in a good mood when C starts in job. When C sees the other tugboat captains in the room C tries to get along well with them.

Captain 12: It is hard for anyone to work longer, whether man or women. On board if you want to go home it doesn't matter, everyone has family. Sometimes it is easier for women as they prepare their sons (one's son is nine years old and the other's is eight years old). In their homes their families support them.

Captain 13: When C is working, C doesn't see C child, he (the child) is with C's mother. C must be free to do things with him. But during C's work week, C cannot see C's child because it is too difficult to do that because C knows that C's child wants to see C but C is tired and needs to sleep.

Captain 12: Yes, C needs to sleep too. People may be more understanding of women's need to rest and go home.

Captain 12: The situation here, with Captain 13, is that C recently [lost a spouse], and Captain 12 got married again, it is difficult to share the job, the kids and the family, and then as a man you are in charge of the house and you have to do everything for the house, and you need a wife to support you a lot. If you don't have that, you are in trouble. But as women their families supported them a lot. To get that type of life they must have the support of their wives. If the wives do not understand how hard it is for the job, it will be terrible.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Captain 13: C would say yes.

Captain 12: C would say no. The point is to be a marine officer. This career is difficult. Their sons cannot tell them that this job is difficult because they did the job, even though it was very hard for them. But the marine career is hard for anyone. They see how at sea, people suffer. Sometimes the men suffer more than the women. At sea if family situation is difficult it can be bad and threaten safety.

Captain 12: C usually works 10 hours. C must stay on board, C has to, because it may take time to find the relief so C may have to stay on board until the relief arrives.

Captain 13: Most C worked was 12 hours, because that is the maximum C can work. After that C has to put the tugboat out of service. C has done that a lot. The Authority cannot take action against C. C called them and told them that in one hour C will be up against the 12 hours and the people who do the schedules must know that and they will abide by that, but if C does this in less than 12 hours they [MTC] will object.

How accurate are the work schedules when they come out?

Captain 13: They will make a lot of changes, the tugboat will change, the watch schedule will come out on Wednesday and within 72 hours they can change them again. But they don't change all, one or two of the captains, because maybe one captain must go to training and they need to change one person's schedule to fill that position.

When fatigued, what techniques do you use to remain alert?

Captain 13: Coffee or do some exercise. With C, the coffeemaker for travel on C's back because C needs the coffee. 0300 is the worst. 0500 C is happiest C puts in C coffee.

Captain 12: Exercise and listen to music. Dances to keep awake. C doesn't drink coffee. When you are tired nothing can work. C is happiest when C sees the light of the day. 0400 to 0500 is the worst. C will climb stairs or do squats [to stay awake].

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 12: C would like to adjust the schedules and do fewer midnight shifts and provide reliefs on time. On the fifth day of the midnight shift your body is tired, and they have to do seven days. C thinks that it should be no more than four days.

Captain 13: Most important thing is to have the relief there on time.

What are the differences between the old locks and new locks?

Captain 12: The time needed to assist the vessel has changed.

Captain 13: When assisting the vessel they have to be focused, but in the old locks they had time to relax. Must be alert when you make fast to when you cast off, two to two and a half hours you can't go anywhere, you have to be focused on what is going on, talking to the other captains on the stern or the bow. Maybe you have five minutes to go to the bathroom. Sometimes the pilots make mistakes and you have to be very alert to what is going on with the ropes, the people on the wall, the people on the ship, everything.

What changes would you make to reduce fatigue?

Captain 12: If C had the chance, if what C is saying went to the highest level of the Canal, C would say that it was their dream to do this job as a marine officer to work in the Canal, and they still have the dream that everything will be in a good way again, that they can solve the situation to take care of them because they

are also part of the Canal. They are human beings and the only thing they want is to be considered as good human resources, because they want to work, but they want to work in good conditions, to stay here. The shifts make it difficult, if they can adjust the schedules to make them less challenging [and] to have the relief on time, that would be good.

Captain 13: C likes the new canal, but C doesn't like that when C has to go home after eight hours, they may call C and say that C has to assist a Neo which will mean another two to three hours where C must go through the new canal towing a ship. C wants to have C relief arrive on time and do the job in the best way because C is tired after eight hours.

Captain 12: In the new canal, if all the people understand that they are human beings, they need to go to the bathroom, they need to do the things that humans do, and they don't want to be blamed because they are requesting now. C hasn't done this yet, but other colleague's request five minutes to go to the toilet and C doesn't want them to get made [to a vessel], three hours made fast to a vessel.

Captain 13: Sometimes you take a vessel from the Atlantic side to the Pacific side, the entire watch can take up to 12 hours, and then you have to wait for your relief on the other side. They have LNG vessels, that they have to assist all the way through the Canal. When they finish the lock passage, they have to escort it to the Pacific side - that is the worst.

CAPTAIN 14

Captain 14: Captain for 5 years

Quality and quantity of sleep

On April 12 they were told to reduce the additional crewmembers and on April 12 Canal transits stopped. And no one knew about this reduction beforehand. C was free on April 12 and the scheduler called C to come in, it was C's day off, and C was told that they needed C to come as a second captain, and C agreed. When C got to the office, C asked for an additional crew for the Neo, C was to be the second captain, but instead of it being a few hours it was the entire shift. When C asked for the third seaman, C was told that from today there won't be a third seaman. C checked and had not seen anything to that effect in writing. The scheduler told C that C had an email from their boss to that effect, but when C asked C was told that they could not show C the email. C decided to ask the pilot to go as slowly as possible. The second captain told C that C did not want to do the job under these conditions. C's tugboat was reassigned, and C was brought up on disciplinary action even though the other captain made those decisions.

If that captain does not want to make the manoeuvre, C cannot do the manoeuvre without a second captain. The administration has some telephones that are recording, and now many people think that the phones are recording their conversations. This situation is making C upset. The disciplinary process has been very stressful for C.

Every day C gets up from sleep several times thinking about this problem. C thinks that they are going after C and all of the captains. It is very stressful to work when you feel that someone is trying to find something just to go after you. This is very difficult for C to work in these conditions if C has not been given a reason for this persecution. C has never had an accident as a mate and as a captain. C always pays attention to the job, doing the manoeuvres well and yet to be in this situation [is bad] just because they need to have names to show that they are punishing somebody, and they need to show they are punishing people.

When you are not working what time do you typically go to bed and wake up?

C would go to sleep about 2100 and would get up at 0600 to 0700. But during the week C would get up at 0500 to take C kids to school. C used to sleep eight or nine hours on C days off.

C doesn't like to work overtime, but C finds that C always works eight to 10 hours and you cannot avoid it. There is always one to two hours of overtime. C used to try to save time for C's family and for C's church. C doesn't go for overtime. The one to two hours can't be avoided because you have to wait for your relief.

C will not work beyond 12 hours. But C knows people who will work 32 hours [at one time]. For C will stop after 12 hours and will put the tug out of service. If they have no relief for C they will send a car for C, so

they won't pay C more overtime after 12 hours if relief isn't there. C doesn't want to work beyond 12 hours because it's not safe and C may get into an accident.

The exception is if C gets into the new locks in, say, 11 hours, and it will take another three hours to get through. So the longest C has worked has been 14 to 15 hours. Because there is nothing in writing, only past practice, but C doesn't know if someone has tried to stop after 10 or 11 hours because of fatigue. C doesn't want to take the chance. But if you say that you're fatigued after nine hours they will take you out via an ambulance to have you checked out.

Your health can be okay but if you are fatigued that is no call for an ambulance. And they will create a lot of paperwork, and C doesn't want to be in that position. If C has to stay, it will be no more than 12.

The midnight shift makes C the most fatigued. C started at midnight [last night] and finished at 0921 this morning, so C made one manoeuvre for the old locks, then C made fast to a Neo and C was really sleepy. C asked a seaman to keep C company just so C wouldn't be too fatigued. C did first manoeuvre at 0200 and was told to go to the Pacific to get to a Neo, and was relieved at 0830. It was a really fast relief today because there was no traffic to get to Paraiso. C came ashore at 0858 via launch. Today was a good day because C got relieved early.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

In the old locks they [the tugboat captains] didn't have to do anything through the locks, but under the new locks they have to be at the controls throughout the lock passage. Even if the pilot says stop, even if you are not doing anything with the vessel you have to watch the tugboat, the water is rising or lowering, and you have to be careful that the tugboat doesn't strike the wall or strike the anchor. If the water is going up and the tugboat is just drifting it can go under the anchor.

b. How do these differences affect your health?

If C needs to go to the toilet, C needs to tell the pilot to put a line out to keep the tugboat safe, and that C crew is ready to step in, and if the manoeuvre has started C may not be able to stop and go. They need to concentrate fully on the manoeuvre. To do a job like this you have to be fully alert and if you are doing a job with a Neo it should be your first job so that you will be fresh and alert, not for example, at the end of your duty when you are already tired, to start one of the most important manoeuvres.

C really likes what C does, C likes to do the manoeuvres, but the manoeuvres now are longer than the usual job and C now gets more tired than C used to with the new locks.

How often in the last year have you tried to avoid a watch because you felt that you were too fatigued to perform safely?

If C is tired C calls in sick. But if C is tired C cannot risk the lives of C crew or the ship. If C considered himself a risk C will not come to work. C has done this several times. C doesn't know that if this continues that C will make it to C's retirement age, which is 62. Before C dies C will quit. This is because they are working a lot more than before the new locks were built. They are trying to maximise the movements of ships, but with the new locks they are working a lot more. This is not healthy. C has never called in sick when C was tired before. But C is doing this now. C started working as a deckhand for six to eight months. Then C got a position in Gamboa as a launch seaman but C never got as tired as C is now. C never got into a situation of persecution as now. C never got as tired as C is now working a normal day. The last two years have been the worst working for this company, since the locks opened.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

If you are working on the midnight watch, and you are working a Neo, there should be another captain to relieve you. If you have been working four or five hours and you have to work a Neo, it is better to get relief. You will start a job that needs full concentration. The job looks simple, but it is stressful.

C would like to see the persecution ended. It will make the job get a little better. In the hospitals, the people who work in the emergency room work fewer hours, six, compared to the eight for those in the

other parts of the hospital. C would like the administration to make a study to change the schedule to reduce the number of midnight watches from seven. These are the shifts when the Neos enter the channels both ways. They should alternate days off with the midnight shift. The problem is not money, the problem is fatigue. They translate their stress to their families and this is not going in a good way.

CAPTAIN 15

Captain 15: Captain for 5 years

Sleeping quality and quantity

Sometimes C has a problem with sleeping due to the weekly change in schedules. A year and a half ago. C started to have massages, and this has helped C. When C has some days free, C will do that when C can. The midnight to 0800 watch is the most disruptive to C sleep. When C gets off it is difficult to sleep straight so C will try to split it up, C cannot sleep more than six or seven hours straight. C has to eat also, so he will wake up, eat and try to sleep again.

When not working C will typically go to sleep at 2300 and will arise at 0700 or 0800.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Must be able to concentrate and think ahead. Maintaining situation awareness on many things and what can happen suddenly.

b. Physical

Not that much. Must have good rest, and try to avoid stress, keep your stress at home, and keep eating well. Want to be as relaxed as possible to do a good job.

What is it about your job that you like the most?

C has been doing the job for five years in all. The job has recently increased, and C has tried to think about how things will end. C doesn't know what time C will finish. For C, it is more challenging than what C has expected. This is because of the increasing number and size of ships. They have more jobs to do and more level of exposure to working a vessel. On the new locks they don't use the locomotives, so they can be with a ship for three, four, or five hours. Before that, the longest they could be with a ship was one hour but now it can be as many as three, four or five hours. This has been going on since 2016 to now.

Eliminating the second captain the stress has increased because you have no one who can replace you for something, like going to the toilet. Now you must recognise when the vessel is made fast you have to calculate when you will stop. You cannot drink as much to avoid going to the toilet, and sometimes you have to eat while working and talking on the radio.

What is it about your job that you dislike the most?

C doesn't like the shifts, too many working straight, seven days, the midnight shift is difficult because when you get off you are still tired. C likes the job, but C has seen that there is no comfortable way to eat, and to go to the toilet. Somethings cannot allow you to be relaxed.

What advice would you give to your son or daughter if he or she wanted to be a tug captain?

I would tell them to take the career but sail around first, if you want to be a tugboat captain. C likes the job but wants to make the job better. C doesn't get that stressed, C tries to be calm. But one day, C had been working too many days the midnight shift and C felt all of his muscles seize up and C had to go to the hospital. They told C that it was an accumulation of stress, from the job. It's a job where you need to be focused, get sufficient sleep, and be relaxed. But sometimes you can't get enough sleep when, say on the midnight shift for several days in a row.

Is SMS present and if so how does it address fatigue?

There is an SMS here. There is an ISM here but for the Canal. There is a document that lists certain jobs, and what needs to be done. There is something for safety for the tugboats. C doesn't know about audits.

There is a safety Boson, if there is an accident he will come to coordinate with the ambulance. Sometimes when they are fatigued they just announce to MTC (marine traffic control) and say they are at the end of the 12 hours. But they don't call him when they are fatigued. They call him when there is an accident.

In the last 60 days, there is a union and C is one of the officers. Since there is the problem with ACP, C has been getting a lot of stress, going back about 120 days, and this has affected C's work time. And it has also affected C's stress level.

Nowadays, the company is taking notes and they will punish you if you complain, even to say that you need eight minutes to go to the toilet. This has been going on since April 12. On that day the new locks opened two years before that. They had a normal crew, seven crew members. On April 12 they reduced the number of the seamen by one without telling anyone. The ACP, none of the supervisors would answer the captain's or union's request. But there was no warning. That day, in the afternoon, two vessels got delayed because the tugboat was incomplete with the crew. But the Canal put out that the tugboat captains were on strike and the ACP lied about it, and this is what they told the newspapers. They were there doing their job. They took one of the crew members out of the normal crew. They got all of the captains that reacted to that reduction and got a list of 23 investigations to fire people.

They knew that this was planned to let people know that the union was at fault. A lot of people were afraid they would lose their jobs. It has been four months since this has been started. Then on July 1, they reduced the number of captains, but this time they gave them one-month advance notice. Now, for the captains, they are concerned about insufficient people to respond to an emergency. Since that day they have been going to the news, dealing with lawyers. From April 12 to now, there has been a constant fight with the ACP. They never answered their correspondence. They have been trying to do whatever they can to protect their jobs. All of those things have a direct impact on their everyday job. Reducing personnel, threatening sanctions against captains, a lot of people are afraid of what is happening.

ACP does not have someone to whom you can talk to regarding safety. None of them are captains. They are only business people.

What is the typical length that you are on watch?

0800 to 1600, seven days on, two days off, 1600 to 2400, seven on two off. But you never work eight hours. 11 hours is the average. Almost every day you work nine or 10 hours. You are not in a single place, you have to be there until you get your relief, and sometimes they have road traffic and the relief can't get there.

What is the longest shift you have worked?

14 hours was C's longest. One day C was working and at the end of the watch they called C and said that they didn't have relief, but the place where the tugboat was located was not easy to get to. Then C had to get on a launch to get back. But if C feels tired at 10 or 11 hours or so C will call MTC and say that C can't work beyond the 12 hours. There has not been retribution for C doing that.

If you wanted to work more than 24 hours you couldn't because C knows that he would not risk safety. There are no rules against working long hours. But those people who want to work as long as they can, they do. As a captain C will not let a person come on board even if they have worked 24 hours safely.

Normal practice is to put the tug out of service after 12 hours. But this is not written. There are no rules here. People will be sent out on watch regardless of the number of hours worked. There is no maximum number of hours work.

One day C worked a long watch and would not start the next day until three hours later. They deducted the time from C's vacation accrual as a result. Today most of the people put the boat out of service after 12 hours.

During 0400 until 0530 it is the most difficult to stay awake for C. On certain days you have an assignment and may have a 40-minute gap, you will try to tie up the ship and will try to nap, but with the radio on C

will be attuned to C call sign. That is how C tries to deal with it to be more awake. C doesn't drink coffee but C had trouble sleeping and tries to eat during C shift, so C doesn't have stomach issues. Once C had trouble at the beginning but didn't have advice on what was a good diet, so C did research on the internet on diet. C would prefer if the company provided guidance on diet and fatigue.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

In the new locks the level of exposure to working with a vessel is longer. In the old locks you didn't work more than an hour with a vessel. Now with the new locks you can be three to seven hours with a vessel.

b. How do these differences affect your health?

Now with less time C cannot go to the toilet without informing the pilot. Even going briefly to the toilet, you have the engines running and you're trying to think what could happen to your vessel, to the ropes. That is one of the things C doesn't like about it, that you cannot even go to the toilet and be relaxed. He also doesn't like eating while working.

c. How do these differences affect your life?

It's created more stress try to avoid making mistakes, being there's more exposure but not a second captain to help out.

How often in the last year have you tried to avoid a watch because you felt that you were too fatigued to perform safely?

If C is too tired to take a watch, C will call up and say that C is too tired to take the watch. C talks to the clerk and doesn't get retribution. Since the conflict, C has been doing his job and his union activities as well. C has done this three times since the conflict and over the year, maybe five or six.

a. What was the outcome?

He hasn't seen any negative outcome, but it is possible that at the end of the reporting year, September 30, when his evaluation period ends, they may show C the documentation on the number of times he has said that he was too fatigued to work.

How often in last year have you been asked to work beyond the maximum permissible times?

C has not been asked to work more than 12 hours, after 12 hours C waits for his relief, maybe three or four times. More than eight hours, always.

How often in the last year have you been asked to work in spite of scheduled time off or vacation time?

Yes, when you are in your free days they have called and asked him if he would work. At the beginning of the year C agreed, but in the past six months C has said no. No adverse response as a result.

What fatigue mitigation measures would you like to be put in place?

C would like an office that can see if C is too tired or not well enough to do C's type of job. C has seen some people who work with him who have hypertension, diabetes; one had paralysis, heart issues. C has seen a lot of people going through that. They are in charge of a \$12 million tugboat towing vessels costing hundreds of millions.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

The first thing C would do to address fatigue is to do what we are doing now. An audit to see how fatigued the tugboat captains are. He would change the schedules to stop the seven days straight of work, and would like to see considerations given to those doing overtime. They can change things, but ACP doesn't want to.

CAPTAIN 16

Sleep quality and quantity

Sometimes C is so tired, and under such stress that C goes to bed and cannot sleep. Now C is working the midnight to 0800 watch, but the watch doesn't end at 0800, and when you add in the time travelling to and from home there are periods where C cannot sleep well, and C is very tired. C stays in the bed and cannot sleep, tries to go to sleep at 1600 and sometimes C sleeps until 2000 or 2200 then has to wake up again at midnight. But this isn't all the time. Sometimes C sleeps well.

C sleep quality and quantity depends on the watch change every week, or the stress C is under. Next week C will be in another watch schedule on the 1600 to midnight watch. So that will affect the way C sleeps.

When on vacation C will go to sleep around 2100 to 2200, and even if C is not tired C can't sleep beyond 0600 to 0700. Sometimes C will try to rest more and recover C's energy, but C cannot do this. C will wake up around 0700 and will go to bed about 2100 to 2200.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Coordination [is needed] between what you see and your hands to operate the tugboat. You also have to answer the radios. You must have full coordination between hands, what you say on the radio, and what is happening around you. You need coordination and concentration. The tugboat is a big machine, but you operate it with slow, fine movements with your hands, even if you are tired. The depth perception is needed because, during nighttime, it is difficult [to see] because the ship hulls are often black, and the tugboat hulls are black, so when you and the ship are moving it is hard to avoid contact. You must equalise speed with that of the ship while you are looking around at the seamen, trying to see if a launch is coming, seeing the waves that could disrupt things. There are so many details that you have to keep in mind to avoid any accident that you can cost somebody his life.

b. Physical

Good vision and good hearing. Don't really need strength but you need a strong back because you stay in the chair for long periods, so your back will be affected.

What is it about your job that you like the most?

There are a lot of things C likes. Here in the Canal the view is beautiful, very relaxing, and in the boat you can feel good because you can see good views, landscapes, and then you have a powerful machine in your hands and you can feel all that power and how you can affect a very large vessel, it's a good feeling.

What is it about your job that you dislike the most?

C doesn't like the midnight watch. Seven nights in a row is too many.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Yes, C would recommend it. The only thing is what you need to do to become a captain in the ACP is you have to go to an academy and then go to sea. Some people may not want to be away from their families for a long time, but the job itself is nice.

What is the typical length of watch?

Normally they work a minimum of 10 hours, the watch is supposed to be eight hours. But in the areas where the tugboat is assisting the vessel, inside the locks, you cannot be relieved. Sometimes your relief is sick, so you have to stay longer. Normally they work a minimum of 10 hours. Sometimes it can be more, 10, 12 or 14 hours. Sometimes they start at Gatun on the Atlantic side and to go through the Canal, wait for the relief there or bring the tugboat back from Gatun to the Pacific side and this makes the journey much longer. Sometimes they start the watch at 0800 and stop at 2000 and sometimes 2100.

What is the longest shift you have worked? What follow up action was taken, if any?

In the last year C doesn't remember the longest C's worked, but C thinks that C has worked seven hours overtime, with a total 15 hours. In that instance C doesn't remember what happened.

If C felt that C cannot continue working safely, you can put the boat out of service, but past practice says that you should work at least four hours after your regular work hours so you try to work at least four hours more. But sometimes you are the only tugboat available to assist a vessel. In those times you get pressure from the company to assist the vessel. But you also feel that it is your responsibility to give good service. That happens frequently. Marine traffic moves the traffic, in the mornings the major part of the tugboats is on the entrance to the Canal, so sometimes there are moments when another tugboat gets out of service for any reason, and there is nothing else that you can do but assist the vessel. You can say no but they will have to stop the vessel transit. Those are the circumstances where you try to go that extra mile.

What are the differences between the old locks and new locks?

The new locks have increased the workload because now every Neopanamax, the larger vessel transiting the locks, needs more tugboats for every vessel, and now the workload has increased. Now they need more tugboats. With the old locks the tugboats were not transiting the locks, now with the new locks they are transiting LNG vessels, vessels over 530,000 metric tons, and these vessels need to be escorted from one end of the Canal to the other. Now the new Panamax vessels start transiting the midnight watch, the worst watch for C both in the Pacific and the Atlantic entrances. Sometimes you have to go beyond the American bridge to meet the Neopanamax, lock up and assist the vessel until Gatun Lake on the Atlantic side. This can take five to six hours, and you have to assist the vessel, on the D tugboat on the ship you must assist without a break until buoy 10. With the old locks they did not have to do that. The meeting point was much closer to now. Now the total [time assisting a ship can be] five and a half to six hours. During the midnight watch, and then in the worst of the scenarios, you get in the midnight watch, assist maybe two or three vessels, and then assist a Neopanamax. From midnight until 0600 you can tow vessels to the old locks, then around 0630 you can be assigned to take a Neopanamax through the new locks, this can take another three hours, and in each chamber of the locks you are trying to keep the vessel along the side of the walls.

a. How do these differences affect your work?

The new locks have mainly affected C sleep, like a scratch in the legs C starts to feel like scratches on the legs. Sometimes back pains. C has spent more time since then sitting on the chair. If the escorted vessel is too heavy they will use different lines when in the lock. So the tugboats will be standing by in case the vessel is getting too close to the wall. The time available to go to the toilet is reduced. The pilots are in charge and they may say to let them know if they are going down, but you're still in charge of the tugboat and if anything happens you are still responsible.

What are the written hours of service rules for tugboat captains?

There is no rule, nothing written. There is something in case an emergency situation comes up, the company, in that case they have the right to have an employee work in the event of an emergency, but otherwise, not, just past practices.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would try to manage the working schedules, rotations, in a better way. Fewer midnight watches, or maybe change the rotation to three or four days. Right now, C is on the midnight watch, which C started on Friday. If the schedule could be shortened today (Tuesday), or yesterday, C would be on a different schedule. Now C has two more days to go. There are different options.

Maybe in the case of the Neos have people dedicated to taking them through the new locks. So maybe C could start the watch when the time when needed and be relieved by another captain whose job would be to take the Neo through the locks. There are different choices that they could take but the problem is that the load of work has increased but they are working the same way they did it 50 or 60 years ago. The rotations and the schedules have not changed but the operational conditions have changed.

Now they have a lot of traffic on Panama roads. Another measure would be to avoid the hours when there's a lot of traffic in Panama. Some people drive two hours before they get here. They are some guys who live on the Pacific side but work on the Atlantic side. Maybe they could change the schedules so that they don't meet the rush hour road traffic. The main problem is that they are making more work with the same schedules, the same way and methods and same rotations they've had for years.

The staff in charge of the transit schedules are not thinking of the fatigue of the person on the tugboat. They see the tugboat as a chess piece to be moved around. You have to work eight hours, but there is a difference between eight hours in an office and eight hours on a tugboat. If you fell asleep in an office that's bad, but fall asleep in a tugboat through the Canal, it can be catastrophic. You are hauling 120-130,000-ton vessels.

CAPTAIN 17

Captain 17: Captain for 22 years

Sleep quality and quantity

Problem for C sleeping is during the midnight watch. C will sleep maybe three or four hours, not more. C sleeps only a short period of time then C wakes up, then C sleeps two hours before going to work again. In C day off C sleeps about 2100 and will wake up 0100, then will spend the time something until 0500, then will sleep another hour and wake up. C doesn't feel that C gets a good rest. Every six months C gets two weeks off [and it's] the same thing then. C will go to sleep at 2100 then awoken at 0100, then will watch television until about 0500 then will wake up at 0700. C cannot sleep past 0700.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Must be alert, concentrate all the time because you have to listen to the radio all the time, somebody may call C, someone may need assistance, and must be alert all the time, every time. In any emergency the first reaction is to call the tugboat, that is the first person to be called in the event of an emergency on the Canal.

Sometimes there have been ships aground, ships losing control and you have to react and respond at once. Yesterday there was a ship ahead going to the pier and it needed a tugboat to hold its stern and they, MTC, asked C to go over and help. The pilot had asked MTC and MTC called him.

b. Physical

Must know how to swim, with no physical impediments to walking and to using your two hands. The midnight watch is very hard and in the last period C went every day to the new locks, for a long period maybe 10 to 11 hours, with one ship. And every day they were going to the new locks. C would estimate that four hours each watch of the past 60 days, about 40 percent, has been through the new locks. That is because the tugboat C has been on is needed for the new locks. It is powerful and has 80 tons bollard pull.

What is it about your job that you like the most?

C is in the field C wants to be, on a ship, in command of ship, working with a crew to guide ships transiting the Canal.

What is it about your job that you like the least?

C doesn't like the working schedule. It is an unhealthy schedule. The long periods they are on board without rest. This is hard for C. Especially after 20 years.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would say no. Today C knows that to be on board, with different watch schedules, is not normal for a human being that lives in that kind of society. For C there are jobs where you can have a better life. Even though the schedule has always been like this it is an unhealthy schedule. With this type of job, it is very hard to do this. Maybe if you got two days of rest after working three days it would be a lot better. Six or seven days straight with the volume of work they are doing now, this is too much.

When C started years ago the schedule was the same, but the amount of work was different. There were few ships going through, you had periods of rest between assignments. It was not so stressful. Now they are assisting bigger ships, with more stress. The old ways were completely different. For example, maybe 15 years ago with one shift you had one vessel assist, now you have maybe five or six assists in the same period. As a result, you don't have time to rest. This is the average.

Typically, C has days where from the time C comes on board to the time C gets off C is not alongside the pier. C is moving the whole time. C doesn't finish until relief comes aboard. This can be nine, 10, or 11 hours, sometimes as many as seven vessel assists. Today this is the norm.

What is the longest shift you have worked?

Longest C has worked has been 13 hours straight, with no break. C will work no more than 12 hours. C will call MTC and say that the captain has more than 12 hours, and C cannot operate the tugboats in that condition, C is very fatigued, and C will stop the vessel. They [MTC] won't say anything, they will put the tugboat out of service and will send the relief over.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

Before, on the old locks, they didn't assist ships through the locks unless it had loss of control, only as a special job. Now on the new locks they assist ships through the locks, the same way, but now the ships have controls and engines, it's not a dead vessel but they assist the ships through the locks, this is new kind of job they are doing now. You have to concentrate and be alert doing a new kind of job inside the locks. You have to make up the ship on the hawser and sometimes the ships tied up with ships going more than three or four knots, this is very dangerous to make fast a ship to a ship going three or four knots. It is very stressful watching your crew, the equipment, current, winds, etc. with the lines going up. When you are going on the bow this is what happens. On the stern when the ship is going dead slow ahead you have to deal with strong wash from the vessel, it can push you into the wall. Much has changed with the new locks. The spaces are small between the stern of the ship and the gates of the locks maybe 30 40 or 50 feet behind. Sometimes the ship is going astern and you are going to the gates. They have a new set of fenders on the locks and you are not to touch them so you have to deal with the wash of the ship, avoid going to the fenders, while listening to the pilot, and dealing with all of this at the same time. Sometimes the pilot gives an engine order and doesn't tell you and the wash from the ship gets a lot stronger.

a. How do these differences affect your health?

Under much more stress now. On the midnight watch C has to assist two or three vessels going to the old locks, then assist, at 0600, when they are very tired, must assist a ship going through the new locks. During about three hours of the lock passage, you finish at 1000 it is very hard, and you don't only do this one day, but three or four days straight. If you are someone who doesn't sleep well this is very hard. C has not seen a doctor because C thinks that C could deal with it without seeing a doctor. The last day of the midnight shift C is very angry, more than the other shifts. C is angry all the time.

What are the written hours of service rules for tugboat captains?

There are no hours of service rules, they expect you to work 12, 14 or 16 hours. There are no rules that say you can work no more than 12 hours. For the administrative people they don't care how long you work. Although STCW rules prevent this, but the government can have special rules and they don't have this restriction.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

The first thing C would do is the change the schedule and limit the length of time a captain can be aboard to no more than 10 hours. C would change the schedules to shorten the period of working to say three days' work and two days off, or two days' work and one day off. No six or seven days schedule like they have today. Second change C would make would limit the time captain on board to 10 hours, then they would have to have a relief. C would like to see the controls of the boat to be ergonomic, and to establish a period of rest on board, within the 10 hours to allow you to eat and to use the toilet.

CAPTAIN 18

Captain 18: Captain for 8 years

Quantity and quality of sleep

C has trouble sleeping, the kind of schedule C has, always interferes with C's natural body clock. The first three days of a new shift C has the body clock of the previous week. If C starts the midnight to 0800, C has to go to bed at 1500 but the previous week C was awake at that time because C was working 0800

to 1600. They finish their duties and have the watch change, C has to drive home and they find every time a traffic jam so this is for C, if C sleeps four or five hours that is great. C doesn't want to take sleeping pills to avoid being addicted to them. C has been using magnesium citrate, it's a laxative but it does relax C to sleep better. Now C is on vacation for two weeks, so even though C is on vacation C still gets up at 0300.

If on vacation for a while would typically go to sleep at 2200 and get up at 0600, but because of the continuous change in schedules that continuous change in shift C always at the beginning of the shift and tries to adjust to the new schedule to get at least six hours of sleep, but C is finding that C sleeps less, when on the 0800 to 1600 shift C has to get up at 0400 to 0430 to deal with the traffic getting to Diablo, you can sit in the car two for two and a half hours. Sometimes doing this for eight days in a row, and sometimes C will stay in the office for an hour so that traffic going home will be better. This is stressful. The time sitting in the car with the time sitting in the tugboat is stressful. That's a lot of time to be seated. And then going on board you have to be sitting and when going through the new locks you don't even have time to stand up, you still have to have contact with the controls.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

You have to have good coordination with the crew, always talking to them about how C is doing the manoeuvring. C likes when they go to carry out the job. C will use the haler and be in touch with them so that things will be what C wants, so that C doesn't have to activate a plan B.

Having a good rest is very important to avoid the stress of lack of sleep. Knowing all the procedures to do their job, that is part of the job. C puts a lot of consideration on communicating with the rest of the crew, to have a pleasant watch.

b. Physical

Don't have many physical demands, like carrying something on their back to take something on board. More than that, stepping on the tug, making sure it's not a big step, being careful when you go ashore, or when going from the launch to the tugboat. Hasn't seen other hard [physical] aspects of the job.

What is it about your job that you like the most?

C likes the job in that each job is different, each manoeuvring is different you can make fast on the bow, the stern, etc. each ship is different and for C avoiding a hard landing or avoiding touching the ship that is rewarding. To have the pilot say to C that C did a good job is very nice. C does like the job, yes.

What is it about your job that you dislike the most?

They can have better schedules to go on board, not just for those who now live on the west but people on the east as well. [C would like it] if they can shift their start times. They are already in a continuously changing shift schedule. To avoid the hard traffic in the morning it would be nice to have shift start earlier, say 0500 to avoid the traffic on the road. Their sleep schedules are already bad, so it wouldn't make that much of a difference. C talked to C's boss about it and the boss said that C would have to talk to different unions. C explained that it wouldn't be that much of a change, just a few hours and that is, for C, the worst thing, because everything starts at 0700 or 0800 in Panama.

C's perception is that they, as captains, have a bad reputation by the administration because of what happened in April 12. How is it that their boss is saying that their salaries are making \$200,000 to \$250,000 a year? This could jeopardise the safety and security of the captains. The people then get the impression, why are these people making so much money? If some people are making that much in overtime it is because of bad management of personnel and missing personnel. If they had more captains, there would not be as much overtime.

What are the written hours of service rules for tugboat captains?

There is something, but C never saw it in writing, that you must stay four hours beyond your shift. It depends on your physical condition after eight hours. It depends on past practice, staying four hours more than your shift. C will tell them they at 12 hours C will put the tug out of service. C told them that C was

putting the tugboat out of serve and C asked them to send a jitney. They said it was okay. [There is] no regulation that you have to stay but there is a past practice to stay on board more than four hours beyond your eight hours.

What is the longest shift you have worked?

One day last year C worked 14 hours. There are guys that work 16 hours, but if it's okay for them that is okay. C is on a tugboat that the captains have normal attendance, so it is not often that C works more than 12 hours.

C was in a tugboat that was not doing the new locks. Soon C will work on a tugboat going through the new locks and C hasn't done that without a second captain. It depends on what time you start going through the locks, when you get off. [You] can also have very dense fog so no ship is transiting.

C has not worked on the new locks without a second captain. C worked on a tugboat that was not going through the new locks. That tugboat was sent for repairs and C went to another tugboat that was not doing that job. C went once through the new locks and when C finished it was 1630 in the afternoon and it was not that hard.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

The amount of time staying at the controls is much longer. If you need to go to the toilet and the pilot needs you, you cannot go. You must be there at the controls. You have to ask the pilot. With a second captain you can share the load with him but now C alone is there the whole time. On the midnight shift on a Neopanamax, on the alpha or delta tugboat, the entry captain cannot relieve you at 0800. You may have to stay until 1100. They are not going to have your tugboat standing by for another ship. Since 2330 you can listen to the radio and you know that this guy is already on the way and that by 0045 you will be going down to work with C.

This has affected C's health, that in the midnight to 0800 shift, C feels that C is angrier because of the lack of sleep. C does not feel very communicative. C's spouse knows that this is something that C will have to deal with. C doesn't want to talk too much. It affects both of them a lot, and sometimes C feels that C has to eat at different times will have heartburn, and because they constantly changing the sleep and rest time C is on board and C mind is somewhere else. C will get afraid of what is going on with C. Like when you are nodding off, but you must be alert. C will take deep breaths to relax. At 0400 - 0500 C feels that C cannot be there anymore. But after 10-15 minutes, C will start to stand up to become more alert. Sometimes in the afternoon this happens as well.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

If C could C would like to see another type of schedule. One person told C that they work the same type of schedule, but instead of starting one week at 1600 and the next one is at 0800, so instead of going forward they would go backwards. These guys start at 0700, then after two or three days they start at 1600, then two days later they start at midnight. They still get one weekend a month at home. They finish on Thursday, and then they start on Monday at 0800.

Their current schedule, they start at 1600, the next shift starts at 0800, and then the next shift starts at midnight. You are always going eight hours less. If C could C would move ahead, adding eight hours rather than subtracting eight hours. The shifts also would be every two days so that in seven days you do all of the shifts.

It could be that if you work 10 hours you get more time off. They should keep people working 40 hours a week. People who need the money from overtime, C's not concerned about them.

CAPTAINS 19 & 20

Captain 19: Captain for 4 years

Captain 20: Captain for 4 years

Sleep quality and quantity

Captain 19: When on the midnight watch C cannot sleep in the daytime. C must take pills to sleep. C tries different pills and after a while they don't work. C ends up sleeping four hours. This is specifically the midnight watch. As far as C knows in Panama no one works seven days straight on this nighttime schedule. On the other two watches C doesn't have this difficulty sleeping. C would ask the pharmacy for medications, and pharmacist gave C some medications. C has tried all the natural stuff, and nothing works with C. C doesn't do any exercise during the midnight watch because C doesn't have the energy. C is totally too tired to do it.

Captain 20: If on the midnight watch C cannot sleep more than five hours straight. Sometimes if C is there early, C can sleep another hour. The only time C can get good sleep [on this watch schedule] is from 1700 to 2200. Then C will get dressed and drive to Colon. When on the 1600 to 2400 watch C is up at 0800 tops. C will get home about 0530 and will sleep until 0800, no matter what. That's all C sleeps. If C gets up at 0100 and gets home at 0200 C will get up at 0800. C tries to have a good diet, doesn't smoke, will have a glass of wine every so often. When C works during the day, C got to bed at 2100 and is up at 0600. C will work out when with the midnight shift but C gets a migraine when doing this, but this is only during the midnight shift period.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 20: Full concentration all the time. You are in charge of a \$14 million tugboat. Now you have four crew members. Even if you have free time at the dock, you still have to be aware of the radio and they have two radios on all the time, some of them have three, one for Channel 13, one for MTC, and one for manoeuvring the ship. It is therefore very difficult to relax, you have to be aware of everything. Sometimes MTC will give you an assignment four hours later, and then they keep calling you to remind you, so it is difficult to relax and rest.

In your mind to have to plan to get the tugboat to do what you want because it doesn't move the way older tugboats did. Once you get used to it, but if you are not well rested you end up doing "stupid stuff" that doesn't make sense that you wouldn't do if you were alert.

Captain 19: Full concentration, situation awareness, and good eyes, hearing, and you must be aware of everything. The important thing is to fully concentrate on everything, and to be alert and to concentrate. You must be fast when doing things and when you are fatigued you do things slowly. C has tried many things to sleep in order to do C job well. Having different shifts every week does not allow you to get used to a schedule.

b. Physical

Captain 20: Good hands. C had two car accidents going to work, 2018 and 2016, that hurt C's neck and at that time C realised how important your neck is because you must be able to turn around to see things. You also need to have good eyes, and you need good wrists and good hands to handle the controls. The back is also important and sitting in one position for a long time creates tensions that can give you stress. Also, you need circulation and if you cannot stand on your chair, sometimes C will just stand a little or move C's legs up and down.

Captain 19: You need a good back. Long ago, C had trouble with C's back, elbows and hands, and shoulder and C went to a physician and asked C to do some back and knee exercises. The back and neck are very important. The exercises have helped C but over time this overstimulates C and C cannot sleep. Many times they have to go for one and a half hours riding a tugboat to assist a vessel, escort it all the way back, while on the stern fighting the wash, trying to keep the tugboat in line. Many times C starts at 0800 and will

finish after 10 hours with the vessel through the new locks. You are all the time with that. You are unable to go to the bathroom. If they are in a good position in the new set of locks C will ask the pilot [for time to go to the bathroom] and pray that nothing goes wrong and hit a fender or hit the vessel. This will increase the stress level.

Before management cancelled the second captain they could share this and take a break when needed. Now you can eat twice during an eight hour shift, and the shift can last as long as 12 hours. The next day you do it again and again for seven or eight days.

What are the differences between the old locks and new locks?

Captain 20: On the old set of locks you went to the vessel, made up, and stopped. Now with the big ships you are exposed all the time. If you are the alpha tugboat you finish a job in the old locks, then you go straight to a Neo Panamax and go on the sterns. Before you waited at the locks and had time to go to the bathroom but now you can work and not have time to get your lunch. You try to eat while doing a manoeuvre. That is not healthy.

Captain 19: The difference between working the old and new locks is huge. In one case, C had an eight-hour watch and C had 20 minutes between manoeuvres and had no time to go to the toilet. C had no one to help C since they eliminated the second captain. The second captain is necessary to do this job safely; that person is there when you go to the toilet or eat. If you work too long you will lose the concentration. With a second person, you can take a break and remain more alert. The job with one captain in the new locks is inhuman. We are all humans, and all have needs, and now you cannot do their human needs. They are not considering jobs in between so you don't have time to go to a landing and go to the toilet. There is no one to help because you are the only person available to control the ship.

Captain 19: Before the new set of locks C had no problem with sleeping, stiff neck, migraine, they had at least they had time between assignments.

Captain 20: This has affected their health as well. It is too short a time to see the full consequences. C has had a urinary tract infection because of the inability to go to the toilet when needed. Also, the stress has made it difficult for C to enjoy the job. There is the same number of people doing more jobs than before.

What is it about your job that you like the most?

Captain 20: They took all the fun out of it. But, it's not the same every day. It's an honour to be a tugboat captain. The way they work the vessels is nice. But the thing is if you do this twice a day, like on Sunday C did four jobs, then at 0730 (started at midnight) was told to pick up the bow of a big container ship, and finished at 1100; C was drained. C was too tired was even to pick up C's family at the bus terminal. C was too tired the next day to work, and this is after having slept well the night before. When driving from Colon C had to stop at the gas station and take a 15-minute nap. C was too tired, set the alarm on C cell phone for 20 minutes and got up after 15 minutes. C got up the next morning to call in sick. This is very difficult for people not doing this to understand what they have to deal with.

This brings up not only health issues but family issues as well. It is difficult for C's spouse and children. C's children want C to go out and play with them, but C can't because C is so fatigued. And C has to drive safely when completing a shift. Sometimes C's spouse will tell C that C is better off sailing because C is here, but not here.

Captain 19: In this job it is hard to be with family.

Captain 19: What C likes about the job is that it's different every day. C feels very excited every time C does a new manoeuvre. It is an amazing job and C is very proud to be a tugboat master. It is different and unique, and it makes C happy when C does it. C feels that C has accomplished something. It is something that C helps the country given the importance of the Canal to the country.

But C feels that the administration doesn't care for them. They don't negotiate with them. They never considered that using the tugboats instead of locomotives through the locks changed the working conditions. Now they took the second captain away, they don't have time. Now C is a parent and they are expecting another baby. C's child told C (when aged two) that C doesn't have time. As a parent C has more

responsibility for the child. Time is precious because C could be home and not have time for the family. They need different and better schedules to give them more time with family and to sleep better. The administration takes care of other personnel but not them. It is hard to believe that a big company like them is only concerned with the money. To C what is vital is that they forgot about safety. To C they are more concerned with money than with safety. Safety should be most important.

What are the written hours of service rules for tugboat captains?

Captain 20: There are no rules to prevent excess hours or prevent fatigue. One captain a few weeks ago told MTC that if C took the assignment C would work 13.5 hours and would exceed more than 12 hours. MTC asked C if C refused to do the job. It went back and forth like this, and the captain said finally, to avoid a disciplinary action, C took the job. There are no rules in place. C heard this conversation, and then in a room they said that the captain ended up working 14 hours. C understands that in an emergency they are the first line of defence, but if you have another tugboat with fresh captains why would you go to another captain who would work more than 12 hours. Going back and forth, are you refusing, yes or no to take the job. They have to feed their families, but if the rules say that you cannot work more than 12 hours why are they asking C to work more than 12 hours.

Captain 19: There is no rule and no consideration. With the things now with the workload and the same situation, if C has to go to the new locks at the end of the shift C talks to everyone C can, the pilot, MTC, they took this into account but in the case Captain 20 mentioned you can explain the situation and they really don't care. Their boss told them to try to make the tugboat captains angry. C's coworkers are facing disciplinary action. Now they are trying to work in unsafe conditions, even when they know it is unsafe because they need the jobs to feed their families. But they [the captains] are doing the jobs despite this because they need the jobs even though you feel threatened.

Captain 20: At the end of the midnight watch if you have no relief you still are paying a captain from the 0800 shift. You need better planning to be at the landing to make the relief not as expensive as you would be otherwise. If you want to reduce costs this is one way to do that.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 19: First change [C would make] would be to put in the second captain through the new canal. They could do the job safely and nicely with them. C would also do the organisation of the assignments better since the new jobs can take several hours and you will have too much time at the controls. This is especially true in the new canal. They don't take this into account in the new locks. C would also keep people on the schedules to stick closer to the schedules. C is suggesting that they get a specialist to improve the life of the people working as captain by scheduling better. C wants to see more captains as well. The problem is they didn't have enough people with two captains, and the overtime [cost] was too high. So, they decided to remove the captain to save on the overtime. They need more people to do the job, to have better lives, and do a better job. They also need better transportation. They are hired in Colon but most live in Panama City, but they have no responsibility for transporting to Colon. The pilots have transportation from Panama to Colon. If they live in Colon they report to Colon. For the tugboat captains this is not the case. Because the schedules are long they are responsible for their own driving. This can lead to [automobile] accidents for them. With the drive they are doing, at least they can have the transportation, and this will give them a little chance to take a nap. The car accidents are very possible because they are not rested and work hard as tugboat captain. That is coming home, but going to work, it may be hard to pull over and sleep. One accident C had C was sleepy because of the sun, the second one [involved] someone hitting C. This will improve a lot the working condition of the pilots. Living in Panama and working in Colon they are responsible for their own transportation. C has done already trying to suggest to administration but now they don't care.

Captain 20: C would fire everyone in management section. C would bring back the second captain. Two seamen are okay, but you need the second captain. If they want to keep the shift schedules [that is okay], but not so many days in a row, particularly in the midnight watch; they should have a break in the middle. Transportation to Colon is important as well, these are the three ways to improve fatigue.

Captain 19: In all this time what they [the captains] are trying to negotiate is safety and health. It's not about money. They are not willing to negotiate.

Captain 20: Their attitude is 'take it or leave it'. The ones that are in place to enforce this policy never go to the new locks. They work the tugboats that don't go to the new locks.

Captain 19: The whole country is against them because ACP has turned the population against them by saying it's about money, but it's really about safety, [especially] since July when they removed the second captain.

Captain 20: Last Thursday a guy that started with them fell asleep and went under the flair and messed up the [tugboat's] radar antenna.

Captain 19: God is always with them. One time, C was in the bow in the new locks and C was falling asleep C was praying to god to keep C safe. The only reason they don't have accidents is because people really want to do a good job and it will not be possible to avoid an accident.

Captain 20: Last Friday C got called by the pilot because C fell asleep. C just finished a cup of coffee, after a good night's sleep, but C had to be woken up by the seaman. The transit had to be stopped. This was the first day of the midnight shift. C had the day off, took a nap during the afternoon. But the daytime shift was hard as well, almost a seven-hour assist. C shift that started at 0800 finished every day at 1900.

Captain 19: They are doing their best efforts but C is not sure how long it will continue like this. Safety is most important here.

CAPTAINS 21 & 22

Captain 21: Captain for 6 years

Captain 22: Captain for 4 years

Sleep quality and quantity

Captain 21: C no real trouble but sometimes has difficulty sleeping, depending on the rotation. During the night shift it is hard to rest during the next day, which is the only time C can sleep. Plus, there is a lot of traffic in the city and you try to go home to rest. In the dayshift C gets up at 0330 to get to work at 0800. Just trying to avoid the traffic, when it is 1700, C's body is tired, and C is fighting sleeping. Then C has to drive from work in the traffic. C lives further away than Captain 22. C used to work in Colon for 14 years. The time C spent on the road is almost the same as driving from here to Diablo. C gets up at 0330 in the dayshift because the time C spends driving is almost the same as driving to Colon. Traffic has gotten really bad here. A lot of them spend three and a half to four hours driving to/from work. This is a constant.

Captain 22: Each shift is seven days, 0800 to 1600, then you go to midnight to 0800 and your body is not used to sleeping. Your body does not have time to adjust. This happens in all shifts. You have two days off, which is not enough to adjust. They work, six, seven or eight days. You have time to sleep but not time to adjust. C has to drive all the way to the Atlantic side. C took at least four hours to drive every day to go to Colon, every day, two hours each way. If C is working from midnight to 0800 and if C's relief doesn't get there, C may have to work an additional four hours. Then in that case C works at 2200 and gets home 1400 to 1500, depending on the traffic. C lives far from the city, close to the airport, so this is the drive to/from Colon.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 22: You have to be able to multitask. You are in charge of everything and must be aware of the radio, the seamen. C was a captain of an oceangoing vessel. This is worse in the sense that the responsibility is greater. You are responsible for many things at one time. As an ocean-going captain, you are really a captain. Here, you have to do things a certain way and if you don't do it this way you are fired. As an ocean captain, they respect your position.

Captain 21: Here, it's not worse, but the difference between a career captain and an ACP captain is that you are involving many things that belong to the career [captain] but the administrative part is done by others.

You don't have control but you are responsible for many things. The people who run things are not in the field. The worst thing for the tugboat captains is that they have many things that they need to take care of to keep things running but they are not really in charge of anything. In ACP the captains in Gamboa act as captains, but these folks don't. They took away the respect of the captains. They are used to it. In the past, those who were tugboat captains did not have this type of situation. This is a new area. The change happened in the 90's before the Panamanians took over the Canal.

b. Physical

Captain 22: You have to be in good shape. You have to drive three plus hours to get to and from the place, and you have to take care of yourself. Physical condition and good rest are important. C believes that all of the captains try to take care of themselves with regard to sleep. C is sure that before they go to work they try to do so. You don't sleep you will have a "kind of a night." Sometimes you must choose between dealing with your families or sleeping. All of them must be responsible to go to the job knowing that they must be awake. During the interview for the job ACP asks, "What is the most important thing to you when running the tugboat." ACP will tell them that the most important thing is your crew members. Most important to C is C's crew, from that point that they take this situation very seriously, to guarantee that they sleep [for the safety of their crew].

Captain 22: You need good reaction skills. Any distraction that you can have, even for a second, can result in someone's death. You must be very alert when doing manoeuvres, when handling situations in a tugboat. Even a distraction of a second or a fraction of a second can lead to a fatality. You have to concentrate.

When you are trying to get the job done the important thing is your crew. Once you start working the priority is the ship transits. It is one thing when you are trying to get a job, and another once you get it. Really, what happens in the field is that they don't take care of the people. C got into an accident in a tugboat where something had been wrong with it for a year and a half. Captains had been telling them that something was wrong. With C, something went wrong with the tugboat, in a close area where C could not avoid anything, and C hit another tugboat. For that reason, they wanted to fire C. But in the investigation, they found that the problem had been reported one and a half years ago. There was a problem in a unit in the engine room. You can lose control immediately. Nobody knows why they didn't fix it.

In the job interview they say a lot of things that are important at that time. They had enough time to fix it but no one with the right authority to fix it gave the order. C can imagine why but C doesn't know for sure. C thinks that they were starting with the new lock construction and they were trying to save money. They weren't doing much with maintenance with anything. They had a set maintenance schedule and they skipped anything out of the ordinary unless it was a complete failure. After that they put that tugboat in the shipyard for a year, and now the tugboat is back in Canal operations.

What is it about your job that you like the most?

Captain 22: C likes the manoeuvres, C likes to be on board a ship, whether a tugboat or a ship. C likes being on board. C enjoys the job. C feels good when they finish assisting a ship. To be a captain, to do the job, to be successful, every day is fun. C enjoys it. C has stayed 14 days [on a ship], to be on board is normal. This is a piece of cake to be a tugboat captain. C really likes it. C loves to be there. It's an interesting job, you have your skill and when the pilot says you did a good job that means a lot.

Captain 21: Since C was a young person, most of the people in C family worked at sea so it was part of the family. The day C started thinking of working at sea it was a challenge. Becoming tugboat captain is a challenge. Every day is a challenge. Every day you do different types of manoeuvres. Most things C likes about it is that you are in control every time, every manoeuvre, and you are the one who decides how you will do the manoeuvre. There are different types of handling ships. But when you do the job and you finish it and you see that everything went well and worked out for the best for the company and the client. It is like an orgasm. You feel proud of it. The difference between a tugboat captain and a pilot is that the pilot gives orders, they are not complying with the orders—they are doing the job. That is what C likes about it. C knows that C can be a pilot. C rides yachts through the Canal but that doesn't satisfy him. What does is being in control of the manoeuvre.

What is it about your job that you dislike the most?

Captain 22: The way that they treat them, it is like you're going to work for the enemy. Even if you finish your shift successfully, you don't know if you will have a disciplinary action or not, even if you don't complain. At the end of the day, the boss can tell you that you have a disciplinary action. You are not motivated at all, as a result. Someone will point out something about your job and it makes no sense.

The environment in the office is like how the people feel, like someone is following you all the time. Makes you paranoid. If you say something that is not following the way, you are wrong. It is like, according to ACP, 150 captains are wrong, only the boss is right. Their judgment is wrong. They are on board writing down, or calling your boss saying you have a problem. C just says okay, do the job. Why does C have a captain's licence, and why is C given this responsibility if they don't listen. If someone dies, it's C's fault, not theirs. That is the point. All are trying to do their job as best as they can, taking care of the ACP facilities and the client. Everybody is down. C doesn't want to work. C saves C's vacation for when C doesn't want to work. Doing the job doesn't feel good anymore. If C gets another job C will leave.

This is a captain. C will do whatever to be working here, because C doesn't want to go the city. If you look at the accidents where tugboats are involved, around the world, the [number of] accidents that are due to the tugboats is really low. C thinks that they think that they do their jobs because they don't want to sail anymore. They thought that they would be with their families but now they don't want to do the job anymore. They wanted to work here; they try to do their job as safely as possible. They have not had a tugboat accident due to operational reasons.

Captain 21: C used to work in Gamboa as a tugboat captain, the way ACP treats you is totally different. You lose all of the authority. C doesn't know if management understands if a captain is a captain. The authority you have is something like a judge. You can't have a judge who doesn't know the law. That is what C doesn't like. Every time you go to work, you leave happy. But when you get to the job you figure out if you will be happy or not. Every day they change something, totally different from the way it should be. Every day it is conflict, conflict, conflict. They are now living in a high stress situation that they have to deal, even having responsibility with their families, dealing with security, this is another problem they have to deal with. These kinds of things they don't like. C has eight years training, but C has [many more] years with the company. In the other position C had with the company, C worked directly with administrative people. C never, ever felt the way C does today. When C started in training and as a tugboat captain, C used to come to work because it was a sensation of liking and loving the job. Nowadays C is trying to avoid it because of the situation, every day you have something, and you have to fight for something. That is the way they should be working. Everyone should be the same working together. They are always in conflict. C doesn't know if they're trying to make the tugboat captains paranoid. C had an interview on Monday and C told him that C is doing things that will lose talent. Their fellow captains have considerable experience in the field and what will happen is that they will lose the best human force and they will have to start at zero. You will not get that experience again. The experience of the people is not used by the administrative people in safety. If you use that experience to improve safety, they would be a different type of company. They are taking you to work here without anything to do with what you did before. You do the job as I tell you. No experience brought into the country to perform better, they are not considering. This is what is killing motivation. The type of tugboat accident that resulted in a fatality usually was the result of the equipment, not the captain.

When you are not working what time do you typically go to bed and wake up?

Captain 22: From 2000 to 2200 but C usually gets up at 0600.

Captain 21: The only way your body will adjust is if you had a one-year vacation. 2100- 2200, up at 0600. C cannot sleep beyond 0600.

What is the longest shift you have worked? What follow up action was taken, if any?

Captain 22: One day C worked more than 16 hours. It happened at the time. C didn't want it. C was doing a manoeuvre, and something went wrong and couldn't get out, C was in the locks and couldn't get out. It was more than 16 hours, maybe, 18 hours. That was a record.

Captain 21: Sixteen hours because the relief captain didn't show, and you must stay 12 hours. If C's relief doesn't come, C must stay with the new Panamax [ship], and C was inside the locks so no one could relieve him. By the time C got out, it had already been 16 hours.

Captain 22: It's not written but they have the right to retain you, it doesn't say how many hours, but it says that you have to stay until they provide you a relief. The past practice is that it is 12 hours. That is how they understand it, although nothing is written. In a shift, one, seven-day period, they will work 12 hours at least three days, you may have a relief, but C can't get to the tugboat.

Captain 21: Same thing. Three or four days every seven days.

Neither Captain 21 nor Captain 22 works more than 12 hours now. Captain 22-C tells them in enough time to avoid putting the tugboat out of service.

Captain 21: If you work more than 12 hours you have to think about the drive home and at that time you are already tired. Especially if you are on the midnight shift, you need at least six hours of rest to come to work again. If you finish at midday you get home at 1400 and you have to sleep because you must get up at 2200. Sometimes they hold you for 16 hours and you will only get four to six hours of rest. C last shift was 0800 to 1600. C started 0820 and finished C shift at 1630 every day, and then went directly he was told to do a special lockage, but C was lucky that C relief [was there]. You finish on time and if you don't get your relief they send you on another manoeuvre.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

Captain 22: The job is totally different. They don't want to say that it is, but it is hazardous. This requires that you have some time of assistance, but they don't want to provide assistance. They refuse to negotiate in order to avoid getting all the parts involved. They haven't done this yet. Someone in administration is giving you a booklet and these are the procedures, but you don't have the right to discuss them. In the past they used to have weekly safety meetings involving all the parties to allow them to give input, in order to reach an agreement in how to get the job done in the best way. Now, they don't involve the unions and the only group that has the right to negotiate is the pilots. The tugboat captains have no input into how things are done. This can result in a fatal accident.

Captain 21: Now they are working more. They think that the tugboat captains want to stand on the landings doing nothing. C has shifts where C works eight hours straight with no break, and in that time, C has to use the bathroom, has to eat. It is unsafe to even go to the bathroom and you have no time to do anything. They don't care if you don't eat or use the bathroom. They are not young; this will take its toll over the future. The way they are working now you make three or four shifts in a day and each Neo takes four hours, and you have to be alert the whole time. They are human beings. Different divisions have coffee breaks and they don't even have time for that. Before they would agree to overtime, now they ask, and people say no. They are tired, physically, and mentally you feel that someone is checking up on you.

Captain 22: Yesterday C was in the locks waiting for a ship and a car took pictures of the tugboat, and C is thinking, why is he taking pictures? This car is from ACP. He takes pictures to prepare for any disciplinary action. C doesn't know what, if any, they will do with that.

Captain 21: This has to affect you. Like with your paranoia, something may well happen. On the tugboat you don't even drink water because you can't go to the toilet [when the tugboat is] in front of a huge bow. C cannot drink because C won't have the time to go to the bathroom, the bathroom is down, and you can have an accident in one second, and with an LNG or LPG ship this can lead to a bunch of fatalities. They don't give you the dignity to even go to the toilet. C needs to have time for him. They don't respect that as a captain. They don't even give them transportation to Colon. You feel like a slave and must follow their orders.

Captain 22: There are four persons on the tug. Once the lines are made the seaman doesn't have anything to do. The engineer is in C cabin checking the monitors and if something appears C can disable it from there or if C needs to go to the engine room C does. The oiler is the same, (if not worse). They, the captains, in a manoeuvre, from the moment they depart from a landing to the moment they finish and get to a safe place where they can moor the tugboat, they are working. The time that they spend in that manoeuvre, for common sense you need a few breaks. If you don't have the assistance that you cannot take a break, but

in the past, before July 1, there were two captains on board for the new lock manoeuvres. After that they took the second captains away, but when you have to do a human necessity you are stuck there. You think better not to eat or drink so that you don't have to go to the toilet. This is creating an unhealthy situation for tugboat captains. At the end of the careers they will spend more time in the hospitals than with their families. Tugboat captains that retire, don't end up at 90, they have a few years to live. Your health decreases, and the time you have to live decreases as well. Most who retire die before the statistics for the general population say [the age that] you should live towards.

Captain 21: They are running the new locks without procedures.

Captain 21: Before the new locks, some captains died from diabetes, brain problems, heart attacks, but with this type of operation you don't want to do anything at the end of the day, you don't want to exercise, you are too tired to do anything for your health.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 22: Better schedules. First you have to have a human force that can make the changes. You have now the amount of people to fill the ships but if one is missing you have one less tugboat that can work. First you need more people. Now you can do four shifts on the old locks and then work on the new locks, which will take four to five hours. If you had one person in the office who can replace that captain on the job C can send a new captain to the job. They are dealing with the real issue to deal with the new locks because no one who has the power to make changes wants to listen to them.

The problem is not just the tugboat captain. They have different sections involved in the operation. C can say what can change for C, but any changes will involve the rest of the people involved in the operation. C can change but C will have to get an agreement from everyone else to make the job better. If you don't do that nothing will change. There are also the deckhands and the pilots. They can change that by hiring more captains. That is needed. They are not prepared to handle the changes. The average of the new Panamax through the new locks is six per day, they can handle 14 but they don't have enough tugboat captains. In the future there will be more, larger ships. They have to prepare for that. You must hire more people to make a better schedule.

Captain 21: They can hold the ship for 10 minutes to get a relief captain aboard, but they don't do that. They can change the captain. The only way to improve the situation is to hire more crew members, captains, seaman, and pilots. Then this will be much better.

CAPTAIN 23

Captain 23: Captain for 20 years.

Sleep quality and quantity

When C goes to work C normally sleeps around four to five hours. C never sleeps well, C always wakes up when C is at home. When C sleeps straight maybe a maximum of four to five hours. When C gets home at 1400 C can always take a nap, maybe for 45 minutes, one hour, max.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

C has to be rested. C knows that as a master, when C works at midnight, and passing the eight hours or 12 hours [of work], his skills are not the same. Even writing the logbook C makes errors. You have to be focused, you need memory to keep up, and sometimes C [needs to] writes it down. You have to be clear about what you are going to pay attention to your seamen so that they know what to do. If C is with a new seaman C will observe and if, needed, tell him how to do things, C is in charge of a machine and it can fail. For example, letting go of the lines. C tells the pilot to let him know, in advance, if C is going to lose the lines, C cannot depend on the pilot remembering that. C will handle the situation differently on the type of ship, the configuration of the stern, C can do one line, avoid the ship's wash to handle the line. If C sees a seaman go quickly on the lines C will inform the guy to explain the risk of doing it that way, in case something fell.

You must have good ability to focus on what the pilot is telling you. Sometimes the job will change. If you are made fast to the bow you know when the pilot will ask for an order. You can do something ahead of his order, C knows what the pilot will want before the pilot will ask. C can anticipate what will be done. You can't be easily distracted. C is on a Chinese boat where you have to focus a lot on the controls because it is easy to lose control. You have to be more focused on the boat, unlike the Voight Schneiders where you can be more loose.

b. Physical

If you are in good physical condition you can do the job better than if you are not well rested or not in good condition. Otherwise C really can't identify the physical demands of the job. Ordinarily you sit at the console. When the vessel is made fast C can get up and take a little work around the bridge, when C does the job. It all depends on where C is working.

When at the landing, sometime C will go down and C knows how much C can do to avoid hurting C's back. C will help the seaman but not to the extent that C will injure C's back. C likes to help the seamen clean the wheelhouse but does not exert himself to the point where C will injure his back.

What is it about your job that you like the most?

C likes having control of the people under you, as a supervisor. C likes what C does, it's a different job. You feel that you own your time, you are on your boat, no one telling you what to do. You can go down (if you are at the landing), spend time with your crew. They can cook so you can have a good relationship with your crew. C has worked at an office and you feel that your time is not yours. In this job there is always something to do. You have plenty of things to do. C enjoys the manoeuvres, C enjoys taking control of the boat. Once you finish your job you can forget about your job. C doesn't have to worry about not having enough to do.

What is it about your job that you dislike the most?

C doesn't like to work seven days in a row. C doesn't like the schedule, it can be better. They work seven days straight then get two days off. They can probably work five days and rest two. Sometimes it is very overwhelming, very tiring. In C's case, C could complain, right now, because C has not complained to his boss. C is in charge of a tugboat that is working a special schedule. One week at midnight, and the next week 0800 to 1600, when C finishes his watch C ties up the tugboat. Normally on the 0800 watch you never finish at 1600, maybe 2000 or later.

At midnight, when they started with the new locks, they started with two tugboats at Miraflores. C can see the difference between when C started 20 years ago and now. The demand has increased probably 100 percent over the time. For example, C starts at midnight and his tugboat is out of service because of insufficient crew. C goes to Miraflores Lake, C calls the tugboat into service, and there are two tugboats entering service at that time. Once, depending on the schedule, they work the first ships coming out of the locks, there are only two tugboats handling the ships going through the lakes until 2000. They give you more jobs to do because they know that you can do it until 2000. It is more fair, where, as they used to do they had four tugboats, and at Miraflores you can see two ships waiting for them to go back and take the helm. There are only two tugboats for all the ships. In the old days they would split the jobs. Before, when you finished your eight hours, you normally do three or four ships passing, now you do as many as nine in eight hours. In this schedule you can do six, seven, and as many as nine ship manoeuvres.

Last week there was a second tugboat with him, and where there are several Neopanamax, the job in the new locks increases, if not the crew will need more tugboats to help you. With the Neopanamax you can be really tired. When a tugboat is out of service they continue using the tugboat from 0800 to 1600 and you have to stay four more hours, even though you worked straight, but you cannot refuse, you can say try to get someone else and you have to take the additional four hours. After those four hours you can refuse.

If so, C would say, I'm fatigued. C knows C's skills and you start to like bump into a ship. Your reflexes may not be the same; C knows that happens. After 12 hours when C says C is fatigued C will tie up the boat, C knows that there are no more ships waiting for him, or C knows that there is another tugboat to take the job, C will telephone the tugboat and arrange, and by radio they will coordinate it. C tries to handle the situation where C doesn't leave them without an option or in a bad way. C can see the schedule and see whether there is a relief.

One day they sent C and C started to work and they sent C to Gatun, the other side. C did three or four jobs then, C thinks this was the 0800 to 1600 shift. They sent C back to the Pacific side. They needed the tugboat to go to Diablo, the other side. C was really tired, maybe 15 hours on the control. C was at Gamboa. C told them that if C stayed there the ship would lose the lockage. At Gamboa C told them that C had already 15 hours and C would wait there. They told C that they needed the tugboat at Diablo. C said that C would take the tugboat out of service. C told them that C would go to Paraiso and C would stop there. C relief was there. This was an extra stop C would do to avoid difficulty. Maybe C does more than C has to. They don't know how many hours C has, they don't care. This is the way MTC does its work.

What is the longest shift you have worked?

The most C worked was 16 hours. They called C on C's day off, C worked eight hours, and C knew the next day was his day off. If C wants to do that C knows the next day will be his off day. Otherwise C wouldn't do that because C knows that C would not be fit the next day.

Everybody is different. C has three children and C wants to spend time with them. Sometimes it is the last day of C's shift, or the first day off after the last day of C's shift. That is the only way C would do that. C has done this, worked on C's day off, probably every week, instead of working five days, C works six days. If C feels C can go, C will go. If C doesn't feel C can go, C will not.

Maybe every 15 working days C will work one additional day on his working day. Regularly C offers them one of his off days to work.

In this one watch 0800 to 1600 they never finish at 1600 you work 10 to 12 hours. C has been in that schedule since the beginning of this year one day at midnight one day at 0800. C starts on Monday 0800 to 1600 to Friday. Normally they work 10 hours, sometimes 12. A few times eight or nine hours. Then C has Saturday off and C starts working on midnight on Sunday to Thursday, then C will work on Friday, since C would get Friday to Sunday off, and on Monday C would work 0800 again. This tugboat has no other captain available, so they always call C. If C wants to work 24/7, C could. They offer C to work on all C's off days, but C only works one.

They don't have enough captains to fill up all the watches. If C doesn't go, another captain will go on C's day off. Sometimes they can't do a job until there is a full crew for that tugboat. Not often, but it happens. There may be another tugboat available that could do the job.

Sometimes you can work other tugboats, but it's not difficult for C to change from one tugboat to another. It can happen that you get confused. If at the landing they can rest, not sleep, but you have to have the radio on to listen for C's call sign, but if C is on another tugboat C may miss the call to C's tugboat because C's not used to the name of the tugboat.

Sometimes you can get confused because the controls are different and if you are not sure you can accidentally shut down the engine, when you were trying to do something else. The colours of the buttons are not the same, and you cannot see the label on the control, particularly at night. Otherwise it is not a problem in manoeuvring since the training aims to get you to handle any type of vessel, but if you are one month in training and, let's say, on a Voight-Schneider, and you go to a Chinese tugboat, you may have to spend a few hours getting a feel for it. Every tugboat has a different feel to it. This is kind of how it is with tugboats.

C doesn't like when the assignments of the tugboat assistants aren't fair. C knows that they start working two tugboats, doing different shifts. When C sees a captain starting at 0530 and they can give the ship to the fresh crew they will give the assignment to another tugboat that has been working already and the 0530 won't start until 0700. This happens some time. In his area two tugboats start at midnight, others at 0530, and another at 0800. Even though his shift will end at 0800 they will give them an assignment until or at 0745 even though another tugboat is available to do the job with no assignments yet. They want to get all the work out of them.

The ships' schedules may change and there will be a delay, so they will change the tugboat schedules as a result, C thinks they don't want to change their schedule. You can see your schedule and you can see your schedule with the other tugboats and the ships to which they are assigned. Ordinarily they don't want to change that. One time, C called them and asked them what time they started. C told

them that C has started at midnight and C didn't even have time to go to the bathroom and they are giving C another assignment and C has asked them why when there are other ships that have not been given an assignment yet. Once C sees they don't know how long the captain has been working C doesn't know if they can handle that. They just see the name of the tugboat and that assign that. They don't know or care how much you have been working.

Now, in the new locks, C doesn't go frequently because C is in charge of tugboat that regularly works on the lake and cannot go into the new locks for safety reasons. Sometimes C may change with a colleague. One time, C was there 0800 to 1600 then C had to do a Neopanamax through the new locks at C was at Paraiso where you cannot get a relief, and C knew that C was going to work another three to four hours so C would finish about 2100, even though C started at 0800. C can't even go to the bathroom, so C doesn't drink water, before entering the locks C will go to the bathroom because C knows that once C enters the locks C cannot do that. Eventually, this will take its toll.

Your concentration and your working skills degrade after 10 hours. C has to concentrate more than normally. But C did it and nothing happened. But C say a tugboat there working 1300 to 2100 and if they know that C would work over 12 hours they should use that other tugboat that started working at 1300. Use that tugboat to do the job.

When you are not working, what time do you typically go to bed and wake up?

C doesn't go on vacation much. C would ordinarily go to sleep max seven hours. C always wakes up around 0200 - 0300. Would ordinarily go to sleep around 2230 and up at 0445 to get C children ready for school. If C is working at midnight C finishes at 0800/0900 C cannot sleep right way. Will sleep three hours after lunch, wake up at 1600 then will sleep two more hours before starting his midnight shift.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would change the schedule. C has two years' experience working full watch, where you work seven midnights in a row. UCOC proposal suggests that this should change to five days on, and two days off. This would be easier. When C was starting, there was as secretary that changed C's schedule. If you start midnight on Friday, you would work seven days through to Thursday, but if you treat it as five days, you work 40 hours. They can take two shifts and attach them, so now you work 10 days in a row. They don't regularly do that, but C explained to the secretary that this would make C work 10 days in a row. They don't see how many days in row C works. They only see the five days that you work.

C's current schedule is five days on, three days off, five days on one day off. Midnight one week, 0800 to 1600 the other week. In the latter C works at least 10 hours a day, sometimes more. The midnight shift, normally nine hours, sometimes nine.

CAPTAIN 24

Captain 24: Captain for 9 years

Sleep quality and quantity

Small things can wake C up. When C is on the midnight to 0800, even the minimum noise can wake C up. This happens only on this shift. On the 0800 to 1600 C sleeps well and from 1600 to midnight C sleeps well. The problem is that midnight shift. On the midnight watch C will typically get five to six hours of sleep. C will sleep from noon time to about 1700 to 1800. Then C will try to sleep again one hour, sometimes less. On the 0800 to 1600 watch C will get mostly seven to eight hours of sleep. On the 1600 to midnight watch, C will also get seven to eight hours of sleep.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

This job calls for quick decisions, sometimes very quickly. You have to concentrate in what you are doing. You have to be focused on what you are doing and awake. In a matter of seconds, you can be in an

accident. You have to be always noticing many things, other tugboats, your crew, the console. Requires all of your senses working well, and you have to be awake.

b. Physical

Physically, you have to be able to react quickly. It doesn't demand other physical skills that C can think of. Just to be able to quickly react quickly. For them, no real other physical demands, they always sit at a console handling the controls. Doesn't demand many physical movements. Just must be awake and alert to everything. The incidents and accidents that happen here result from their not having good shifts. Seven nights working at midnight day by day the work increases, so you have to be alert from midnight to almost 0800 to 1000 and when you are over 10 hours you will get tired and in that way the accidents happens. C is pretty sure that all of the things that have happened in their job are because the captains get tired, and fatigued.

Today C was at the bow of the vessel inside the new locks and C started to have a microsleep and then C woke up. This happened to him today, and C believes this has happened to most captains. C doesn't drink coffee, C drinks coke. One guy started to drink Red Bull. No one wants to fall asleep because that could lead to an accident. Some drink a lot of coffee, others drink Red Bull, and others drink Coca Cola, to remain awake. The midnight watch also prevents C from exercising since C needs to rest. Sometimes C works 10, 11, 12 hours. With 12 hours you are not giving service. C won't work more than 12 hours.

C won't work more than 12 hours, C will put the boat out of service after 12. It is not so often that C will work 12 hours. C relief is part of the union and C often has to do union activities, and C spends time working at the UCOC office and they may not have a relief for C, but after 12 hours C will put the tugboat out of service. It's not often.

Before C started here C doesn't not how it was. If C says after 12 hours that C will put the tugboat out of service, they say nothing. Last month C didn't do overtime, but now C has been doing 12 hours around 20 times in the last month. This was more often than before. Then C had reliefs always available and there was no need for overtime. Sometimes they will ask C to work on C day off and sometimes they would do it if they could use the money. C started to do this last month. Before that C wouldn't do it. Nothing happened to C as a result.

It has not happened to C where C has turned down overtime after eight hours. C is sure that if that happened they will send C to be evaluated for a fitness for duty exam.

What is it about your job that you like the most?

C loves what C is doing. C has been doing it since November 1999. C enjoys what he does. C really likes it.

What is it about your job that you dislike the most?

C doesn't like the way the administration wants to do things. That's what C doesn't like. They do things by themselves without soliciting their input, about things that they do. They make decisions about their jobs. In this job in a second you can jeopardise people's lives. If you make decisions without considering the captains that means you don't care about the lives of the people that work on board the tugboats. That is what C doesn't like about it. There is no dialogue with the administration. They just say you have to do this, like slaves. You do that. I don't care if you mind doing it or not, they don't care what they, the experts, think about it. That is disappointing.

What are the written hours of service rules for tugboat captains?

There are no rules, to C's knowledge, on how many hours C can work. Even 12 hours working is not written. But they don't say anything if you have been over 12 hours. It's not written anywhere eight, nine, or 10 or 12 hours. But if something happens, they will ask you why you worked over 12 hours.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

New locks cause you to stay three, four, or five hours without moving from your chair. That was only the case before when you moved vessel after vessel. Today C asked the pilot to go to the bathroom, and the pilot

told C not to move yet. C said to the pilot that they needed to go to the toilet and the pilot waited until C came back. This was the first time C had done that. C can't say what the other pilots would say. Today C gave C break. Then C came back. This was C first time asking the pilot to go the bathroom inside the new locks. In other situations, C has asked before, but this was the first time inside the new locks.

C's not sure yet how the locks have affected C's health. C knows that C is getting fat. C attributes this to lack of exercise and stress and anxiety. C may be eating without regular times what effect this has had. Recently sometimes C will start breathing heavily.

C feels that the stress is caused by insufficient sleep. C is involved in the April 12 situation and this has caused C a lot of stress. Worrying about it and it causes stress. C knows that C fatigue is because of the constant shifting of C's work times.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would change their duties and change the midnight shift. Seven nights in a row is too much; this should be five and that's enough. Likewise, for the other two watch shifts. They have only one long weekend and the time they get off 0800 to 1600 you may get off 1800 or 1900 and you go home. The next day at midnight you will start at midnight. For C, this is not enough time to get rest. There should be fewer days working and more days off. They don't have enough time with their families. They get only one weekend a month free. They are like from another planet. They studied to be away from home, but if you have the opportunity to change things, why not.

CAPTAIN 25

Captain 25: Captain for 3 and a half years

C worked for large oil company for years. They adhered to the regulations stringently. They followed the work hour limits to the letter, and all the environmental laws, and that is where C came from. They were never questioned as captains, "why did you slow the watch down," and they adhered to STCW, IMO, and OPA 90 regulations, they complied with all of them.

Panama is a signatory to Panama STCW, but ACP is an entity unto themselves. Whether sailors and captains, the amount of overtime they work is "ridiculous." In the last year or two it's not uncommon to have C's sailors work double shifts, which they work 17 hours and have to be back [for their next shift]. They're not in compliance with IMO. It's a Catch 22 and a lot of the guys want the money but it's not good for their health. It's the same with their captains. Some captains work a lot of overtime, but it's their choice. But they don't have enough captains.

C doesn't think that the Coast Guard has jurisdiction in the Canal.

C is under investigation for putting a boat out of service when there was no relief. There was an unwritten practice from the American days, where you can put a boat out of service, but you had to stay with the boat. What is written, is that if you lack personnel, you can put the boat out of service. C was getting tired. Tied it up, secured the lines, there was an engineer and two sailors on it, they wanted C to stay until somebody came. In the American days there were fewer tugboats, and they would stay on board and now there are more tugboats and if one boat goes out of service there are others around.

They are ISO certified, go through the manual, but don't say "we've always done it this way." C wants to rest so that C can be alert. C doesn't want to be told that C has to stay. They are ordering new tugboats, but they are short of ordering people. They don't talk about their plans.

They are not ISM certified and there is no SMS. They have a manual of operations for tugboats and an ops manual for the Canal, and there are procedures for many things but no procedures for the new locks for the expansion. If they were ISM certified with internal and external audits, if done by ABS and the CG they would look at work hours and half the people would be working in excess of the maximum and not getting the minimum rest hours. Noncompliance with the rest hours would be the big thing. At the large oil company, they had an SMS and followed it.

C sailors are aboard, and they sleep when they're not tying up or letting go. Since they went to one captain guys are getting less overtime. C thinks it's safer to have two captains going through the new locks. Having a second captain in the new locks is the way to go. But they don't have enough people to do it properly and get enough rest. With one captain people are getting less overtime and more rest.

Today they worked a job in the new locks and for three hours C was non-stop, with a second captain C could take a break, but now C was unable to do that, and focus better. After three hours you start to get fatigued from having to pay constant attention to what is going on without a break. That's the way it was for C this morning. It may not be the duration but the intensity of what you're doing in the middle. From the time C tied up to the time C let go C could not divert C attention for more than 10 to 15 seconds. If they were against the wall C would have gone to the head but in the center chamber C couldn't do that. The constant concentration for extended periods of time produces the fatigue.

On the midnight watch C still gets seven hours of sleep from 1300 to 2100, and C takes a half a Benadryl to sleep, then C drinks coffee and is pretty ready. Just a half a dose, C takes one and it helps C sleep. That is the only watch in which C does that.

C doesn't know if there is a designated person here. Here C would talk to C's manager first, and if it wasn't addressed C would go to the union. But he is facing disciplinary action, and C's manager has asked several of C's subordinates to lie about what C did. When they took the third sailor away, C had trouble with the clutch on one unit. C was assigned to be the alpha tugboat on a Neopanamax and C asked for a third sailor. The two sailors were given a statement from C's boss who gave them something false to sign, C's boss asked three people to sign a statement that is false.

C loves the job, C likes ship handling. But stuff like this is really distressing. The stress C is getting is the hostile work environment from the management.

This was the case in the first few years. One of the differences in the Canal Zone days the head of the marine bureau was a USN or USCG captain with lots of experience. Now there are no people in senior management with marine backgrounds. The Canal is not run by maritime people who know what it is to be in command of a ship or a tugboat and know how to make decisions. There is a reluctance to listen to their input or to pilot's input. C's dad was a Canal pilot and to have this animosity and not a team is sad. The hostility between management and workers is sad, when it could be a team.

Some of the captains need the overtime and C doesn't need the job, but C wants to do it because C loves it. C has no intention of leaving the job. C shows up 20 minutes before C starts C's watch.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

In a tanker, things don't happen very fast, with a tanker you need a lot of foresight to see what will happen and in a tugboat, things happen very fast, and you have to look ahead.

Tugboat training should ensure that captains are able to do this relatively swiftly and without much thought. However, they cannot train people quickly to do that. A lot of guys want the money they get here, without having to go to sea. This is a steady job and it's secure, but the hostile work environment hasn't helped. It could be a team with more maritime people in the administration. And a lot of people in upper management have a sense of entitlement from the elite. It's a small country and there is a lot of elite, but in the United States, it's spread out. In Panama, despite the comparatively small amount, they all know each other.

C still thinks that the second captain is a good idea through the new locks, even if it means less overtime for C. Good seamanship.

C's been to SAS academy in Stockholm and to Warsash, the oil company would send C every five years. BRM [bridge resource management] is about shared responsibility. There is nothing like that here. Here you won't get a break.

Panama is a signatory to IMO; IMO has hours of service rules for a reason. Recommend an audit and it will not go down well. They're not following the guidelines. C was captain on a tugboat and C was assigned a second captain who came on board at 1430 and the person came aboard and told C that he was tired. The captain told him that he had worked a total of 16 hours and C asked for a different second captain. They took that captain off and put him on a different tugboat. Now you're going to have accidents because the captains are sitting at the controls for extended time without a break.

What is it about your job that you like the most?

C loves what C is doing. C has been doing it since November 1999. C enjoys what C does. C really likes it.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

If in charge, C would have sufficient people to always have extra sailors or captains in the office. C would rather have an extra expense of personnel than an extra expense of injuries and accidents. To have one or two extra sailors and captains would be an expense that is well worth it. People call in sick every day. People have to work an extra four hours, if you have an extra few people that would be good. C thinks that they should also have a second captain through the locks.

LNG ships need to be escorted through the locks. C used to have a second captain through the locks (this was year ago), but now with only one captain, you can be with the ship for six or seven hours without a break. Now C would say that C's taking a break and will join them later. C would have an additional captain for 1) overall work hours and 2) for the intensity of the new locks.

Organisationally, managers should have a time limit of three years then you go back to the fleet, like in the military so that people don't lose touch with things. They should also have a maritime background. At least have be an operations manager, it's a pilot or someone brought in from the outside, like in the old Canal Days, where they had maritime backgrounds.

CAPTAIN 26

Captain 26: Captain for 8 years

Sleeping quality and quantity

For C, in the job, the problem is time, like not having time to get your lunch. The tugboats have to be ready if MTC or others are calling C. Now there is more traffic in the Canal and as result there is less time to do things. Before, working for the Canal there was time to do other things.

C has no problem sleeping after a shift, regardless of the shift. C does not have a problem sleeping day or night. When you feel tired, more on the Pacific side than the Atlantic side. There is only one set of new locks on the Atlantic side, one set of new locks. On the Pacific side there are two old locks and one new lock. Also early in the morning- midnight to 0800 shift, you are in Diablo on the Pacific side and you have the first New Panamax as the alpha or delta side you have to push the vessel on the wall, like an LNG or LPG, you have to hold the vessel. If there is fog you have to wait until the fog disappears, because when the vessels clear the locks they are asking for the weather and [if the weather is bad they] make the other side wait out the weather. Then when you finish, you wait for another ship to traverse to Gamboa. When you finish with this vessel, it is about 0500 0600, and then you go back to Pedro Miguel and wait for a northbound. You then go back to Gamboa to wait for your relief, at about 0900 to 1000. So, you will get to the office at Diablo 1030 or 1100 in the morning.

Every day for seven days, midnight to 0800 and 0800 to 1600 in Panama they have problems with the traffic, if the tugboat is in Paraiso you have the jitney and there is traffic on land. Yesterday C went to Paraiso and it took about 1 hour 40 minutes to get to Diablo, then C had to wait for a launch to get on board. It was about 1800 when C got on board. The captain on board had to wait for C relief, then wait for the jitney, so C won't get to the office about 1900, 11 hours in all. This is common, day by day. Midnight to 0800, or seven days you work continuously, and 0800 to 1600, you work seven days. In that period, you will work 11 to 12 hours daily. Midnight to 0800 [you will work] about 10 hours /day and 0800 to 1600, about 11 hours a day. Today C will work 1600 to midnight, will work few hours. In that shift C can work eight and a half hours.

If you are in Miraflores and have to get to Diablo you can work until 0200, for 10 hours total, but this is not common. Also, if you are in Gamboa the Jitney from Diablo to Gamboa will take about 50 minutes, you can arrive at the office about 0200. Then you have to drive to your home. If you are in Colon, on the Atlantic side, it takes C about an hour to get to the office.

What is it about your job that you like the most?

C likes C job; being a tugboat driver and assisting the vessels. Some pilots are not so friendly so when you have good communication with the pilot, and joking with C, the job is easier.

What is it about your job that you dislike the most?

The job is okay. C does not like working seven days continuously from midnight to 0800.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would say no. C doesn't want them to go through the same things that C experienced being a seaman, and then as a captain. C doesn't want that for them. C has to spend Christmas working and not with C family. C also misses birthdays and C cannot be home. Things like that are difficult.

When you are not working, what time do you typically go to bed and wake up?

C would go to sleep at approx. 2200 or 2300 and would wake up at about 0800 or 0700. But when C is working, the most sleep C can achieve is about five to six hours. When working the midnight to 0800 shift, C sleeps for only five to six hours. When you leave the job you have things to do, and often the traffic is heavy going home. In this case, you only have time to sleep five or six hours and then you have to get ready to drive to the office again for the next shift.

What is the longest shift you have worked?

In one shift C worked 14 hours. If one guy doesn't show up for their shift, they will ask C to work an additional four hours and ask the next person to do the same thing. But if C is in Gamboa, then C has to wait for relief and then get to the office. This can take another hour, so in total, C worked 14 hours. C has worked 14 hours maybe one or two times and this usually occurs when working the 0800 to 1600 shift.

C can tell the administrators that C is too fatigued to work additional hours, but if you put the boat out of service, ACP can discipline the captain. If you did this after eight hours, C might give them another two hours. Sometimes the captains do that, you work hard and you feel tired, you call transit and say that you don't want to work after the relief gets there. If 10 hours they ask you why, they won't say anything, but maybe you get a letter from your boss, at 10 hours they took the boat out of service and they got a letter sanctioning them. There is nothing in writing that says you have to work more than eight hours. Your contract says eight hours; you are not obligated to work more than eight hours. You will get a letter from your boss if you wouldn't work beyond 10 hours, but if it was at 12 hours you would not get a letter from your boss.

C does not like to work overtime. If C sees an opening in the shift C will talk to somebody to find someone to cover the additional four hours. C prefers to spend more time with C family. C would prefer working eight hours each day; that would be perfect.

Before, they had two captains through the new locks and they would split the duty in the middle of the locks. They took the second captain off. If you are the alpha tugboat you cannot release the controls at end time. Plus you cannot push against the wall in this position, before you could that and take a little break on the bridge. Before entering the locks C told the seamen to stay on the bridge, quickly went to the bathroom, before entering the locks. Leaving the locks on the Pacific side at 2200, the north one the pilot reported at 2330, on the delta tugboat C friend had to leave the tugboat before C could find C relief. They were again the alpha tugboat for that vessel and C relief came as 0020 and the boat went again as an alpha tugboat..

On the midnight shift, with five to six hours of sleep, C is tired and you have to work hard on board, and sometimes you get sleepy as you work. C tries to drink coffee and invites a seaman to come up and talk

to C. This occurs mostly in the midnight to 0800 shift. Good coffee will work.

What are the differences between the old locks and new locks?

a. How do these differences affect your work?

With the new locks you have to stay at the controls more time. With the new locks it takes two and a half hours a complete a transit and you have to be on the controls the whole time. There is no locomotive, only tugboats and the shift maybe going forward or aft as the water rises or lowers and the pilot will ask to do something to keep the vessel in position. Then the lockmaster will ask you to do something to avoid damaging the fender, so you may have to stay at an angle without touching the wall.

b. How do these differences affect your health?

C has problem with neck pain because of the stress. The stress is from the additional work that came with the new locks.

What are the written hours of service rules for tugboat captains?

There is no rule like that.

How often in the last year have you been asked to work in spite of scheduled time off or vacation time?

This happens all the time. C will refuse it, and they will say please captain we don't have anyone to cover the watch, but C won't do it. There is no punishment for that.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would change the shift schedule to work fewer days, particular the 0000 to 0800 shift. C is not aware of other parts of the work where they work seven days continuously. In C's old job C worked five days and then had five days free. That is what C wants. The time before is not the same as now. The traffic through the Canal is increasing and now they are building more port terminals and they have an LNG terminal on the Atlantic side so the work will increase every year.

CAPTAIN 27

Captain 27: Master for 10 years

Sleep quality and quantity

Has problems sleeping, went to a doctor and the doctor gave C some drops. This happens mostly on the midnight shift, but sometimes on other shifts. C can't fall asleep, C mind is always working, like it doesn't disconnect. The doctor recommends that C doesn't get a job with shift work. It is a difficult decision but the doctor says that if C doesn't manage the problem well that is one of the solutions. This has been going on for two years now.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Must have full mental capacity and good decision making skills, good reaction (time), good knowledge of the maritime regulations, good knowledge of your equipment, of all the dangers involved. You need to make good assessments of all of the situations.

b. Physical

Not so much physical demands because you are mostly sitting. But now you have extended periods of time at the job, you can be sitting eight hours, sometimes 12 hours in one position and you must be in good shape, do regular exercise and if you are not in good shape it will get to you. Even though the job doesn't require physical abilities, but if sitting down eight to 12 hours is difficult. C had a nine and a half hour assignment where C was in one position, it was difficult to go to the toilet, it was difficult to eat, so you need to be in physical shape to do this.

What is it about your job that you like the most?

C likes being in command, C doesn't have a supervisor nearby, C gets to make decisions that are appropriate. C gets to see the outside, the environment. C gets to assist the ships, which C likes. C gets to be around C's crew and they are good people. It is close to C's home, in C's country, it is outside. The job is good. But outside people are trying screw it up. But the job itself is a good job.

What is it about your job that you don't like?

The outside people are forcing upon them extra working requirements and putting more stress on people, putting more demands on them without compensating for the effects of these demands. C had one manoeuvre of 12 straight hours. This didn't happen before in the old locks. Now you have these long shifts. Now it is impossible to get just eight hours. The standard now is 10 or more hours of a shift. And this is a problem. The job is a regular job and you have to be attentive to be alert, but it is difficult to be alert for nine or 10 hours.

C is a master in charge, and C is responsible for the tugboat. C wants to have good maintenance on the tugboat but sometimes the purchasing of supplies and parts is very slow, of goods as well. If C wants to do something on board everything has changed. The master chair covers on C's vessel need to be replaced because material on the armrests is scratchy. C told the engineer to order a replacement and C told C that ACP bureaucracy is very slow. This week the boat was going into maintenance and there was no paint which they could have done while the vessel was in dry dock.

Usually they do the paint job on board, now with the regular jobs, always working, you don't have time to paint or do those types of maintenance. Now they won't do the job while the boat is stopped because there is no paint. Besides the working hours and the extended hours the bureaucracy is too slow.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would tell them not to do this. It's like C sold C's soul to the Canal and you don't have time for the family. The long shifts, Christmas, you're working and you don't spend too much time with the family. C would tell C to take a job that gave C time for C family.

When you are not working, what time do you typically go to bed and wake up?

Normally once C gets home C spends an hour relaxing. C won't go to sleep right away, maybe C will go to sleep at 0200 after returning at midnight. Yesterday C went to sleep at midnight. If C wasn't working, C tries to maximise the sleeping time, C would try to sleep at 2200 and would get up at 1000. C lives nearby and likes to cycle and likes to ride all along the beach strip, C also has a mountain bike and C goes up on the mountain.

What is the longest shift you have worked?

Most hours worked in a shift past year-14 hours in one shift. When your relief doesn't come, it's automatic that you will work another four hours, but if you are in a place where C can't reach you, then it is another one or two hours till C gets there. After 12 hours you can stop the tugboat, but you have to wait till you're not in the middle of a manoeuvre. You can be assigned to a ship and the manoeuvre will take another 12 hours, and you still have another hour to go to complete the manoeuvre. It is very easy to get to the 14 hours, even if you don't want to. C doesn't like when that happens. When C finishes C eight hours C wants to go home. When C finishes C eight hours C will tell them to please find C relief, before it reaches 12 hours.

Typically in a seven days shift C will work three days for 12 hours. The tugboats that C works assist the LNG vessels. They require escorts through all ranges of the Canal. The extended shifts are more in this tugboat because you have to escort them all along. They are being drained in that job. This occurs more on the midnight to 0800 and the 0800 to 1600, on the 1600 to midnight this doesn't happen. On the 1600 to midnight C will work eight hours, maybe nine with the relief, that is the easiest shift. The other two shifts are hell, especially for the fifi tugboats that pull the LNGs.

There should be special consideration for these tugboats because of the demands on the shifts and the extra assignments due to the LNGs. And there aren't too many of these tugboats, just three on the Atlantic and three on the Pacific side. These six tugboats have to share this demand. Sometimes if you're in the Pacific side and you have to go to the Atlantic side, or vice versa. On the other tugboats this doesn't happen, they treat everyone the same, but they don't take into account that the fifi tugboats have more assignments. They don't see it that way.

That is why that is a nine hour straight job with no time to do anything. You have to squeeze your time to go to the toilet in that time. You have to strain yourself. In the other jobs the assignments are shorter and you have a better control yourself or between assignments you can eat or go to the toilet. But with these new assignments on the fifi tugboats and the LNGs, the assignments are longer.

There are no rules on maximum number of hours rules. There may be a rule on the 12 hours. C used to sail around the world and C knew that C shift was four hours. The other hours you did some light work. Here that's not the case. They expect you to work 12 hours every day.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would change the schedule and cut the number of midnight shifts. Panama City is very congested and you can help the situation by starting shifts two hours further back so instead of starting at 0800 you start at 0600 everyone would have less traffic to encounter, you won't be working in peak hours and the relief won't be made at peak hours. Just move the clock two hours back. Instead of 1600 start at 1400, and instead of working at midnight start at 2200, this would ease the burden of traffic, and you make a lot of overtime when reliefs are stuck in traffic.

For the fifi you need some assistance especially in the locks. You may not need another master, just a mate, would make a big difference, so the mate can take the wheel while C eats or go to the toilet. But right now on person alone it is very difficult. As a fifi master it is even more difficult.

CAPTAINS 28 & 29

Captain 28: Captain for about 1.5 years.

Captain 29: Captain for 21 years

Sleep quality and quantity

Captain 28: C has problems sleeping, especially on the midnight shift. It is hard to sleep during the day and at 0300-0400 it is very difficult to stay awake. They have very erratic sleeping routines. They do shift work which breaks your sleeping habits, maybe more so for the pilots. It is as if C is always trying to catch up to get eight hours of sleep. C tries. But they have to listen to the radio to listen for the next jobs and in the back of your mind is that you have to listen to the radio and C finds that when C is sleeping C is not fully in deep sleep, especially the shift work, the seven shifts of midnight wear you out C feels it throughout the five years working here.

Captain 29: C has trouble sleeping. The seven days in a row is inhuman. C doesn't get enough sleep when C finally gets tired and 30 minutes later C has to get up. Right now C is working in the office but when C was on watch it was difficult. C could see it in C's colleagues that on the third or fourth night on watch they are knocked out.

Captain 28: When C was at sea C found that C was told to loosen something but C tightened it instead, this was due to fatigue. And fatigue mistakes are dangerous, especially when you have a crew and a million dollar tugboat and you have to be on it and a mistake could cause injuries to crew members, and damage the equipment. C's number one concern is the crew and this fatigue causes stress and the lack of good rest habits is not good. There is STCW for a reason and here they don't follow it. That is in their constitution, they don't have to follow international or local rules. These rules are there for a reason, because experience shows that there is a limit to what you can do as a company to force employees. Here they can do whatever they want with the labour force, without regards to the personal well-being.

Captain 28: There are no rules on how long you can work. Longest C has worked was 16 hours straight. C worked that long because there was no relief. In C case, C has worked many different places, but C has never seen a place where you are forced to work overtime. Here they tell you that you have to stay. If they don't have a relief that is a problem. They should let people know that C will not work more than eight hours, unless C wants it. There is no rule, C has never seen anything written that say C can be forced to work more than eight hours. C signed up for eight hour shift. Here there's no time for personal activities, it's just work and sleep. Nowhere has C seen a company where they force you to work overtime. Most companies

don't want to pay overtime. Here everybody is working overtime. It doesn't smell right the way they are doing this. C feels that they are accusing them of this. They're running the show, not C. C job is to do C normal job. Here it is out of control. Who is running this show?

Captain 28: Longest C's worked this past year was 14 hours. Usually when there is a tugboat on one watch you start at midnight and finish at noon, sometimes every day. Maybe five days of that seven you are working 12 or more hours, especially the midnight watch, you're on until MTC tells you are done. They keep saying here's your next job. If you say you're tired then you will be disciplined. C thinks that if they call the tugboat out of service they may fire C. It's almost like you're a slave. That's not the way it's done. Either do as I say or you get fired. Within eight hours C doesn't mind but beyond that and they are forcing C by threatening C with being fired. And they can do whatever they want. C is very stressed for this. They have their own rules. They make their own rules. C didn't think it would be like this when C signed on. It wasn't like this when the US ran the show.

If it was safety first those mistakes would not have happened. If it was safety first, including the personnel people it would be different. C's father worked here and it was a totally different place to work then. Then it went to the Commission and they were phasing in the Panamanian workforce, safety and maintenance were the main drivers. When they turned the Canal over to the Panamanians the first thing that stopped was maintenance. C understands that the Canal is a money making business but it's still the Canal and they are still people. C feels stressed and it is uncomfortable. Morale is low throughout the workforce in the Canal. Different management styles and C believes that this management has adopted a harassing style, to harass the employees to make them produce. C feels oppressed. That is one management style. In the Canal Zone that had gyms, bowling alleys, they wanted employees to be happy, now it's different. Same job but it's different.

Captain 29: Longest C worked was 16 hours. It is an administrative problem. Here the traffic is bad as well. When C worked 16 hours there was no relief. They wanted to punish C when C didn't want to work that long. C fell asleep at the controls. They were going to discipline C for refusing to work the 16 hours, this was a long time ago. C never worked before in a place where they force you to work overtime.

Captain 29: C has been working as an instructor for over a year. Before that C worked overtime all the time. There are not enough captains and personnel so they must do overtime. Paying this overtime doesn't make economic sense. When the US ran the show everything was safety. Now its business first and we'll deal with safety as we go along. If someone gets hurt, someone lost C's life last year, that wasn't the tugboat's fault, it was the line handlers on the ship's fault. They feel like it's a dictatorship.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 29: They need to know the science behind the units, it's not complicated, and anyone can do it. It is more experience and knowledge but the details of controlling the tugboats, depends on the tugboat, some are modern and some are old. The new ones have vectors that are the most complicated but you practice on your mind how vectors behave and it's just a matter of time and experience.

Captain 28: C should have a high sense of situation awareness while doing C's job. The manoeuvring, with practice, you have to have your mind on what is happening with the units and with the tugboat and what is happening with the ship, with the crew, and what is happening around C and you have to always mentally aware about what is going on. You have to be aware of many situations. The manoeuvring must come instinctively, must be an extension of your body and there are others things that must occupy your mind. And even though your control will come with practice mistakes do happen.

Captain 29: Besides the controls they have to monitor the radios, intercoms, in combination with the crew, handling the chairs, which are bad, C's back and three vertebrae were hurt by the chairs. You have to deal with so many things. The only things they need to have is a psychologists' degree, which is the only thing they lack. You have to eat when you have five minutes of slack. You can't drink too much water because then you have to go the bathroom and the toilet is downstairs.

Captain 28: Add on to that poor eating habits. They are not machines and they are humans that have human factors that must be considered. They gave the pregnant captain an office job while she was pregnant. They do have consideration for pregnancy.

What is it about your job that you like the most?

Captain 29: C really likes the job, but not under the pressure that they have been going through, probably the last five years. And with the opening of the new canal it has blown up in a dimension they didn't have before. Now you can't deny any job for safety they tell you that you have to do it. They had one seaman reduced [from the crew], with no advance warning. It was told to everyone in an e-mail. They also took away the second captain, but that they announced.

Captain 28: C thinks they eliminated the third seaman as a prelude to getting rid of the second captain. And then they got rid of the second captain. They just did it, and they threatened firing to those who objected. Getting rid of a crew member on a very sensitive manoeuvre is not done in an email. They had never done it with two people, always with three, just overnight. Now they got rid of the second captain. Where C worked before, every two hours C got a 20-minute break, Greek ships, MEBA ships, dredging ships break. Here in the new locks the average is three to four hours being on straight. The pilots change and they have a second pilot. Here they eliminated the second captain all the way. This will cause accidents. It hasn't yet because they are good, but the lack of breaks will end up causing a bad accident. The writing is on the wall. There is a reason for the international 20-minute break every two hours. Here no, just go straight. Do that job, take that ship through, and now take it the other way. C has never worked anywhere where people don't take breaks. They are the masters, and they have a crew. In C's opinion the main job is to take care of the crew, manage the crew, and come back to the dock with the crew. That is C's main job. That is why C is there. Any monkey can do the job. It's the decisions that C makes that separates C from the monkeys that could do the job. C's focus is on the safety of C's crew.

Captain 28: C likes that, it is how C is programmed. C likes to enjoy C's job. C likes the Canal and C's job. C likes it here, C's hobby is fishing; it's C's number one hobby, and now they are harassing C for fishing on C's time off in places where nothing is going on. Even there they are harassing C. There is no rule that says you can't fish in the Canal, but there was a rule and they changed the wording.

Captain 29: There was no study of how to do it. There was no study behind it. Not even by questionnaire or interviews. It is ridiculous. This year in the office it's like it's a completely different world. But if you make a mistake on the job you can kill someone, not in the office.

When you are not working, what time do you typically go to bed and wake up?

Captain 28: Will go to sleep when C's tired, and will get up when C's not. When the sun comes up C gets up. Tries to go to bed early when C's not working, tries to sleep about 2100 2200 but that never happens, and would get up at 0500 0600.

Captain 29: Will get up at 0600 and will try to go to sleep at 2100, the latest at 2200.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 29: C would change the conditions of the working environment. C would have daily or weekly meetings with the people about how to make things better, and reinforce safety first as it was before. That was the first and last commandment. They would have safety meetings very often with the top guys. For them ACP, they are running the show as a business, C understands that, but if they worked with more concerns to safety money would be earned as a result of working safely, not by forcing people by threatening them with punishments. That is how they feel at work. They feel guilty all the time. When they go to a hearing you are supposed to be innocent until proven guilty, here it's the other way around; you are guilty until you prove innocent. C feels it even in the office. Things are terrible, too much stress. The work itself is stressful but with the change in structure it is becoming, at some point it will explode into a big accident. C thinks people are staying because of the salary, only.

Captain 29: C would make sure that there were enough personnel so that people would not be forced to work overtime. C would adjust the schedule so that C would not work seven days, with then one and a half days off, then another seven days of work. C only works five days a week but it is not five days then two

days off. Seven days, one and a half days off, and then seven days. C suggests four 10-hour days, then three days off. Get more people so that C's not forced to work. It is a relaxed place where you can call in sick but that has been abused, but that comes from people needing to take care of themselves, but that affects everyone else.

C would hire people and adjust the schedule, and stress safety first. They don't have that anymore, the safety meetings everyone is aware and you are less stressed because you are working in a dangerous environment but where they are good at what they do. But if you have an aware work force you have less stress and you have more confidence that your team will do the job safely. Stress is the number one factor in a work environment; the less stress you have the more productive the work environment you have. They should just try to eliminate that, have more people, more training. There is none. In the mate training program to captain that C was in, there was training from a few captains, that was eliminated, and C was put in charge of the training and it was eliminated.

They took an experienced captain who had been in charge of training and replaced C with a secretary who had no licence and no experience on the water and they were put in charge. They eliminated parts of the training. This canal is not theirs, it belongs to the world, it's not theirs but they're just taking money from it. C doesn't see it that way.

CAPTAIN 30

Captain 30: Captain for 7 years

Sleep quality and quantity

C has an allergy that is a result of the tugboats, from the diesel smoke entering the bridge and inflaming C's sinuses, and this leads to sleep apnea. That is one of the health problems C has from the work. C had a car accident driving after the night shift. They are exposed to a shift that is very demanding. In the Canal in the 1500 to midnight shift there were no vessels in the Canal, today every shift there are vessels transiting and they have increased demands on them. One of the things C is suffering from is that C has seven midnight watches straight, at the end of the seven days C is in bad [shape], it's like C is dying. Last week C had an accident on the fifth watch on the vessel. C fell asleep at the controls and the radar antenna broke as a result. That was about 0400 in the morning. This is one of the consequences of the elimination of the second captain.

In the new locks they have a more demanding kind of manoeuvre. The ACP contracted with an outside company to do a manpower study and the study said that the captain needs a second person at the bridge, the study found that they needed a second hand. Then the ACP eliminated the second captain just to release costs. C feels more tired since then.

C is just waiting to hear about the accident. C did the report and C hasn't heard anything yet. Sometimes this happens and they have some procedures to follow. Until now C hasn't heard anything.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

You need to be able to foresee any kind of dangerous situation in any kind of manoeuvre. You need to be very sure of your decisions and to have good judgement and you need to have a lot of knowledge and experience to have good judgment. For C that is one of the most important things. If you don't know what you're doing, you can have people dead or seriously injured. This is happening right now. Last year one of the seamen died in the operation of the Canal. The ACP didn't publish that, they say that everything is perfect.

In general the operational people feel attacked by the ACP. The job conditions are that the ACP wants to make them worse. They don't care about transportation from the Office to the Atlantic Zone. After driving two hours sometimes C works 10 to 12 hours, then has to drive again two hours back. In total, it's 18 hours driving the car and the vessel, straight. Before the US administration had living quarters in Gatun, now they don't have that. That is one of the things that ACP is doing that is making working conditions poor. They

are doing their best to keep the Canal running. They have fewer supplies available. The reduction in costs is reducing the safety of the operations. The cost reductions are affecting operational safety. There is no control.

What is it about your job that you like the most?

C likes manoeuvring the small boats, you can do anything, but you need to have good equipment, but they are having troubles with maintenance. The capacity of the tugboats is incredible. [He likes that the] small are very powerful.

What is it about your job that you dislike the most?

The shifts are killing C. It is crazy. It is jet lag, where every shift has six to seven days straight and to change over you have two days or rest. You are sleeping nighttime one week and then in two days you are sleeping daytime, than in two days you are sleeping in the afternoon. The fatigue is increasing. They don't have a healthy sleep.

In the new canal, you must be more concentrated and now you are alone. There is no intention of the ACP to make their job safer and more efficient. There are so many administrative deficiencies that are affecting the operation. For example, sometimes the tugboats go to the shipyard where they can be in repair for two months or so. Before, the senior crew worked on the tugboats in that time. Now the crew is taken off to work on other tugboats and the tugboats stay in repair alone, only with the maintenance crew. Then after the two months you come to activate the tugboat. Everything is all over the place, and in less than two hours you have to take a vessel out and everything is out of place. This is an administrative decision to eliminate the crew in the shipyard to save costs. But you must work with the vessel as it is to go immediately to assist a transiting vessel. If you say no they want to fire you.

When you are not working, what time do you typically go to bed and wake up?

C would go to sleep about 2200 and arise about 0600. C tries to respect the circadian rhythms. Normally the shift doesn't respect the circadian rhythms. The shifts are against the natural processes. Sometimes on the midnight watch C only ate two times. You develop some type of stomach upset with changing your eating schedule. One day you are eating at regular time, then the next time at 0100.

What is the longest shift you have worked?

One time C worked 15 hours. They have a dredging division and an operational division. In the operating division C tries to work 12 hours max, but in the dredging division you can be in a situation where they are dredging far from the reporting point and if you don't get relief that time they can extend [your shift]. On that day it extended 15 hours because C didn't have relief.

In a seven-day shift C will try not to accept 12 hours, but currently will happen about twice, in his case in Gatun if C doesn't have relief, but the ACP does not want to hire more people. For some reason, they have delayed that. So they are short of captains.

What are the written hours of service rules for tugboat captains?

Nothing is written on the maximum [number of hours worked], but in their union convention it says that if you are working eight hours and your relief is not coming you can work four hours more until the next watch, that can start four hours earlier. They can do that and they follow that. But there is nothing that says you have to do it. If you are fatigued you have to put the tugboat out of service.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would change the shift schedule, but the change in shift schedule may look like it will be more expensive and they, ACP, will object. Second, they should assign a launch for the tugboat section because they have a number of launches but when you speak to them, the pilots and deckhands are the priority and you have to wait and you can't be relieved, and this costs them more in overtime. C doesn't know why they don't do that. They should assign more resources for the relief of the tugboat crew. The cost reductions are affecting the operation.

They have conducted working environment survey, last time was when C was in training six years ago but they, the employees don't know the results. C is sure people complained but there is no communications.

They all feel stressed and they have so much to give to improve safety, but all decisions are based on cost reduction, and they are the experts, the ones that can give ideas to make things better but they aren't asked.

CAPTAINS 31 & 32

Captain 31: Captain for nine years

Captain 32: Captain for nine years

Sleep quality and quantity

Captain 31: Sometimes, especially after the midnight watch. C can't fall asleep, C tries everything that is supposed to help and sometimes it doesn't work.

Captain 32: It's not only one day but every day C has problems sleeping. If C works during the day, C has trouble falling asleep at night. If C works at night C cannot fall asleep when it's light outside. C usually sleeps four to five hours tops. Before C used to sleep seven to eight hours, now it's no more than four or five. Sometimes C stays in bed, wakes up after three hours, is up, and then falls asleep again.

When you are not working, what time do you typically go to bed and wake up?

Captain 31: Will go to sleep around 2200 and wake up at 0600 - 0700.

Captain 32: Will go to sleep around midnight and wake up around 0800.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 31: Must be alert. Recently during the midnight watch C was going through the middle chamber and was falling sleep, even though C had slept well the night before. The thing is it was calm and quiet.

Captain 32: All of your senses must be totally aware. You have to pay attention to the people on the deck and this requires listening and hearing. You have to communicate with the pilots and you have to be fully aware. Just watching the manoeuvres is not enough. Something may be happening that you cannot see so you have to listen to the radios.

b. Physical

Captain 31: Must be able to go up and down stairs and sometimes when you go to the bathroom you have to do it quickly and you don't have time to do it.

Captain 32: Sometimes you have to eat while you are working a vessel. If you want to eat at noontime and you are manoeuvring a vessel, you may not be able to eat until 1400.

Captain 31: The pilots require you to listen and respond to their instructions, and sometimes that is difficult, trying to eat and work at the same time. You can stay on one job four or five hours straight at the controls and in that time you have to eat, as quickly as you can, and go to the bathroom, and that is not good for your health.

What is it about your job that you like the most?

Captain 31: The captain is the boss and C likes being the boss. On the bridge it is just C working alone and C likes that.

Captain 32: C likes working on vessels and being home every day. Before C had to choose, sea or land, and here you can do both, you work eight to 10 hours and then you go home. C loved sailing, C sailed eight years before. When C stopped C came back to Panama and worked in an office for a shipping agency but C liked working on a vessel and to do that and go home is the best.

What is it about your job that you dislike the most?

Captain 32: C doesn't like that C is no longer the captain. C is just an operator. Every decision you make they refuse it or use it against you. If you are the captains they should be able to make decisions. They need to take care of their crew and if they can't do that they are no longer captains.

Captain 31: The people in the offices don't know anything about navigation or tugboats and they are making decisions for them that they don't like.

Captain 32: They are making decisions about what is safe or not safe. They make those decisions but they are not on board. Before if you are used to do a job it was because you felt that it wasn't safe. Now you can't do that anymore because it will affect Canal operations and they will take disciplinary action against you.

Captain 31: Most of the captains feel that they cannot complain even though they notice that things are improper because of their fear that the ACP will take disciplinary action against them. They are being forced to work more than eight hours and they can't say know. You can't say that you are too tired. If you did that is affecting the Canal.

Captain 31: They don't think about the time in traffic to go to/from Colon, that's three hours of driving plus eight hours of work and they can't say that they are tired after eight hours because the administration will question them. C lives 21 kilometers from C job and that can take four hours to get there. Usually it is two hours and if you work nine or 10 hours and then to wait for the relief, then C has to spend two hours driving home. When C gets home, C just wants to sleep because C has to work the next day. To start at 0800 C gets up at 0430 to leave home at 0500 to get to work by 0800.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Captain 31: C would say no. C wanted them to do that at the beginning, but it became difficult to get jobs on ships, from Panama.

Captain 32: C still likes C's career and C would be honoured if C did that. But there are a lot of sacrifices. The job is not as good as it used to be. When C was a cadet and was on the Canal, the facilities, the lives were a lot better. The maintenance was better.

C would not recommend C child be a tugboat captain, at least not here. Right now C is not getting satisfaction from the job. C is doing it because C is supporting a family. As a cadet this was the first choice of people. They still pay better than a lot of companies in Panama but the way they make you feel is not good. C feels like C is the enemy of C's own company and C would not want C's child to be treated like that.

What is the longest shift you have worked?

Captain 31: C worked almost 16 hours once, C agreed to 12 hours and C's relief didn't show and it was almost 16 hours until they found C relief. If you accept to start four hours earlier, and when you finish your normal shift it will be 12 hours, but no one realises that. When it would be close to the end of your shift they will send you to another job. C stopped agreeing to come four hours early as a result, because C knows they will not assure C that C will finish when C is supposed to.

[One works extra hours on the] neo ships on the new locks. C started at midnight, they had to go to Gatun at 1000 and C relief could not go to Gatun and C had to take the tugboat back and C finished at 2000.

Captain 32: A pilot has a second pilot but if they ask the tugboat captain to take the tugboat from Colon to Panama there is only one and once you are done they will send you back. If you refuse they will say that you still have time to go in your shift. You will be accused of violating the rules. You cannot be tired.

What are the written hours of service rules for tugboat captains?

Captain 32: Right now you don't know the rules.

Captain 31: If you are not relieved you must stay another four hours and it may not be just four hours you can end up working four or five hours or more. If you don't have a relief you are not allowed to say no.

Captain 32: C has two or three coworkers who took the boat out of service after eight hours and they have disciplinary actions against them.

Captain 31: Rules are that you must stay another four hours in addition to the eight.

Captain 32: C looked but could not find anything written. There is a clause that they have the right to retain you but that may apply when you are not working a vessel, say at the dock with no assignment, it's not clear how they can exercise the "right of retention." It doesn't say that you have to work four hours, it's not written anywhere. In the last time they negotiated the bargaining agreement they did not get to any agreement on that.

Captain 31: Every day you will work eight hours, more if on the Pacific because it can take two hours to get to Paraiso. Usually you work more than eight hours. Right now C is on a two shift tugboat so most of the time C will work eight hours in a shift. But it depends where. In Diablo C will work around eight hours. Anywhere else you will work more than eight hours. It happens sometimes working 12 hours or more but if C relief doesn't come C has to stay four hours after C regular shift, but that doesn't happen often.

Captain 32: More on the night shift because that is when the Neos come. In Colon the distances are shorter. There is usually at 0730 you are about to finish your shift there is a Neo coming in and you will take it and it will take several hours. For a regular seven day schedule C will work 12 hours or more two or three times. It depends if someone doesn't show up for work. A lock passage will take two to three hours. But in Colon C has to add the one and a half hour drive afterwards. If C is almost finished C has to consider whether to take another vessel on because that will take several hours then the drive home. Sleep pattern when off duty-time is up, it's time to sleep.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 32: Would provide transportation for those who work on the Atlantic side and work on the Pacific side. There is transportation in Colon but they have fixed schedules so C cannot rely on the transportation to really provide good transportation to the captains involved in tugboat operations. And they would provide more captains available to relieve those working more than eight hours. C would also improve the schedules. C would make the midnight watch less than seven days. C would make sure that people are relieved after eight hours, especially on the night shift, when you are really tired you have more risks.

Captain 31: C would have more captains available right now, if they have extra personnel on the Pacific side they send them. But after they work seven days straight they will send those to relieve guys working more than eight hours, and that is your eighth day. For those tugboats [he would have] watches, with a day of overlap, and the crew that is starting the shift, and the other one remains as an extra crew. That was a day when you stayed in the office. It was the eighth day and instead of staying the office they send them to relieve other people on the tugboats.

CAPTAINS 33 & 34

Captain 33: Captain for five years.

Captain 34: Captain for four years.

Sleep quality and quantity

Captain 34: Yes C has problems sleeping. It is hard to sleep during the day, and C has small children at home and you will hear the noise from them. Because of the schedules there are jobs you do on your free time that must be done, so it is getting more difficult each day to get normal sleep. If C is really tired C will call in sick. Three years ago C never did this but now C is doing it more before the work load is three times what it was before the expansion of the Canal. Then when you were working you were at least relaxed. Now after eight or nine hours C feels like C was working 16 hours.

Captain 33: C has been captain for five years but here in the Canal has been working shifts for 16 years. By nighttime C used to be a good sleeper, but in the last five to six years C can sleep four hours, wakes up and has trouble sleeping again. Trying to sleep in the daytime is very difficult for C. C tries to avoid doing anything else during the day when C is working the midnight shift, C tries to go straight to C house, black out the room, get into bed but it is very difficult to sleep in that period. If C sleeps four hours, that is good. Now this is the last day on the midnight shift. Yesterday C slept because C took a pill, but the night before that C had trouble sleeping and came to work with no sleeping. Pill was a muscle relaxer. This enabled C

to sleep four or five hours. C tries to avoid taking pills but C didn't want to take the risk of going to work and because exhausted the day before.

When you are not working, what time do you typically go to bed and wake up?

Captain 34: Will go to sleep around 2100 and up at 0500. That used to be C schedule.

Captain 33: Used to go to bed around 2200 to 2300 and would sleep until 0700 to 0800, now C goes to sleep about 2300 and at 0300 C gets up and C feels that is not normal because before it wasn't like that. Now C doesn't need any alarm.

Skills necessary to properly move ships through the Canal

a. Cognitive

Captain 34: Must be aware of everything around you, and what the ship is doing. You have to mentally see everything from above. You cannot ignore anything because things can happen very fast. Whatever you think you are so integrated into the machine that whatever you do you must input it into the machine instantaneously. When everything gets complicated you must be calm. If the pilot gets excited you must be calm. You must be aware of everything and everybody. A lot of stuff [can happen], nowadays even more so. You have to be aware at all times.

Before, when you were helping the ship to go to the lock, you can tie up when the ship was attached to the locomotive. Now when you are tied up you aren't done until the ship goes through the locks. You have to be focused at all times. That is one of the things that has changed from what they have doing before.

Captain 33: You must have situation awareness, of the movement of your ship, the ship you're towing and everything around you.

b. Physical

Captain 34: Good coordination with your hands, especially the new tugboats, one hand may be doing one thing and the other something else. Must stay awake. You must be able to keep up with everything happening quickly and you must be sharp, you may have one loudspeaker saying something and the radio something else and you must listen [i.e., selective attention]. You vision and aural skills must be good.

Captain 33: You need to be capable of moving by yourself. You must have complete freedom of your legs. You cannot have any disability. When moving from the launch to the boat or the boat to the dock you need your legs.

What is it about your job that you like the most?

Captain 33: C likes what C does, C likes to be in control of C's boat and assisting another one. C likes manoeuvring the boat, any challenges and manoeuvres, it is difficult but C knows that C can do that.

Captain 34: C likes the decision making. On the boat C is charge and C is really the one making the decision. C really likes that. Before when C started and saw the tugboats C thought that would be neat [my word used here] to do that and now C is doing that. To work the guys, it's almost like a family, and sometimes you see them more than your own family. One of the best things of the day used to be to go to work. Now it's getting bad. C has not changed what C does.

What is it about your job that you dislike the most?

Captain 33: C doesn't like coming to work from midnight to 0800. Basically what they are experiencing now, they are like the public enemy of the country. You can say they are blaming them for any issues in the Canal, the administration, politicians, and the rest of the population. That is very stressful. It is difficult to come to your job and feel like somebody is waiting for you to do something wrong to punish you.

Captain 34: C doesn't like the administrative part. The way they do things compared to what C saw in the shipping business. It is frustrating and it increases each day. Nobody listens to what C has to say. C is a tugboat captain but C doesn't feel that people listen to what C says. It was different before they would

listen to what C had to say about safety or technical issues, but now you don't feel that. You feel like you are the enemy of the state. This is annoying. Whenever C steps into the tugboat C feels good. But the workload has increased a tonne and you know that it can be different. Before C was very happy. The decision making has been affected. You have to look over your shoulder for each decision, or each decision not taken. They sanction people for decisions they made. C doesn't feel the freedom to deal with something that C sees is wrong. It is hard under those circumstances to make decisions. When C came here everything was so beautiful but now C feels like a criminal. And it's too late for C to change. They are professionals and now they are being treated so poorly.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Captain 34: C would support them and say it is the best job in the world. C is still proud of C's job, and C knows those administration won't be there forever. C is proud of the job. To be a tugboat captain is the best job in the world. Even better than being a [Canal] pilot. You know your tugboat. But sometimes you are stressed about situations and you start fighting with your wife, it's not her it's the job, C tries to separate that out but it's hard.

Captain 33: C's son is in the last year of high school and they told C that they wants to go the maritime university. C told them that C would have all of C's support. The people who are making the job so stressful will not be here forever. Besides, there are other opportunities beside the Canal.

What is the longest shift you have worked?

Captain 34: 17 hours in one shift. C was the second captain, and C had to wait for relief. On the tugboats now, no second captain as it was 14 hours because the relief didn't come and C had to stop the vessel. C's relief was coming but C was in the middle of the Canal and couldn't stop. That job was given to C at 11 hours so C had another seven hours. C put the vessel out of service and they didn't say anything.

Captain 34: Last Saturday or Sunday C was on board, in charge, 15 hours. C's relief called in sick and C had to stay an additional seven hours and the next captain was to come four hours earlier, but because C was doing what C was C couldn't be relieved after 12 hours. C was in the middle of a manoeuvre and when C finished and could be relieved it was 15 hours.

Captain 34: In any one seven-day period C will work, on average five days that C will work 11 hours at least. The ships enter the locks just as you are about to finish your eight hours. You have a shift but they can send you to the other side and then it's another hour driving to and from the office to the dock. That can add another two hours to the day.

Captain 33: In any one seven-day shift they work an average of 11 hours a day. They don't take into account driving to the dock.

What are the written hours of service rules for tugboat captains?

Captain 34: There are no rules here. C knows that there are international rules under IMO about 10 hours but that's all C knows. There is nothing written here. You are supposed to have 10 hours of rest in a 24-hour period. They put you in office standby and you can start at different times each day for five or six days straight and they did this to C and C complained. They told C they gave C eight hours or rest.

Captain 33: There is nothing written about how many hours you can be forced to work after eight hours. But if you call and say you are tired, and C's shift is ending they will say okay, and they will send an ambulance to take you to be examined. The past practice is you must stay at least four hours if your relief doesn't come. But it is not written. If you complete 12 hours they won't say anything if you put the tugboat out of service. If you try to do this after eight hours they will say that you must work another eight hours. You are supposed to be able stay a long time on the vessel.

Is there a mechanism for addressing fatigue issues resulting from nighttime work?

Captain 34: Drink a lot of coffee, cold water in the eyes, and other crew members will go up with you and talk to you. It's not just the hours it's the quantity of work you do in that time. C doesn't know who stays focused the whole time. C runs like hell to go to the bathroom, especially in the new locks. You have to do everything fast. Eating is always rushing. You try to find the time to put the stuff in the microwave. Between job and job C doesn't call anyone C goes to the bathroom and doesn't talk to anyone. Now C knows that C has reduced the amount of water, so C won't have to go to the bathroom as often.

Captain 34: Slaps himself/herself.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 33: C would do two things, 1) C would limit the hours that you can stay after your eight hour shift and 2) C would try to have a policy where a captain is not coming to work, C would prefer to have someone fresh from home than extending someone's duty, and 3) would reduce the number of days worked within a shift.

Captain 34: Would first hire more people, plan the jobs better so that if a vessel is entering the locks at 1600, start them at 1620 instead, and second change the priority of the launches. Now its pilots and line handlers, then tugboat captains. Postponing the lock passages would enable the tugboat captains to get off the tugboat without starting the lock passages. They need to buy more tugboats and hire more tugboat crews. Knowing that the manoeuvre can take five hours they need a second captain so that one can be on the controls and be focused. They should have people in the office just standing by, so they can be available in case someone calls in sick. It's not hard to fix this. Plus this will save overtime money as well. Just needs better planning and see what people are doing to reduce how much people will work on one tugboat. Better planning and more resources [are needed].

CAPTAINS 35 & 36

Captain 36: Captain for four years

Captain 36: Captain for six years

Sleep quality and quantity

Captain 35: Yes, because of the schedule, there is little time to sleep. When C gets home, there is almost no time to rest. C has the working time, then the travel time on the Atlantic side, then C must help C kids study, and do things for the house. C has trouble falling asleep, especially after the midnight shift. C will get home at 1000 and it's light outside, then it's too early to sleep. On the Atlantic side C will get home at 0300 and will sleep but get up at 0700 and C cannot sleep again. Every day it's the same.

Captain 36: What happens to C is that they work seven days in a row at midnight. The first and second night you're okay, but on the third night you start feeling very tired. When C tries to sleep, arriving home let's say 1000 to 1030, when C sleeps C can't sleep more than two or three hours, and C will stay up until 2200 and will sleep some more. On the fourth or fifth day C will be so tired, C will sleep at 1300 and can sleep until 2100 to 2200. C tries to do that but it's very hard. On the first days of the shift, trying to sleep until 1500, maybe C can sleep until 2300 but maybe not. When C feels tired C sleeps until about noon and will tried to sleep again at 2000 to 2100. On the midnight shift the most sleep C will get is two episodes of three-hour sleep.

When you are not working, what time do you typically go to bed and wake up?

Captain 35: C would go to sleep at about 2200 to 2300 and get up at 0700 to 0800, depending on what C has to do.

Captain 36: Would go to sleep about 2200 to 2300 and get up around 0700 to 0730.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 36: They are paid to make decisions what to do, where to tie up, where can they be more effective. Take a good look of the situation, have good situation awareness. Know not only what's going on with their tugboat but with the ship as well. Be aware of the position of the ship and how it is in relation to the approach they have to make, like the locks. Calls for a very high degree of alertness and situation awareness of C's surroundings, the lights of the buoys, the lights of the shore, and the ship's relation to all those.

Things can go south very quickly. They even have to validate the pilot orders, because the pilots can make mistakes. They will ask you to execute something and you know that what C wants is the opposite. But if you are acting like a robot you will put C in trouble, and you know that C wants the opposite things, but if

you are acting as robot you will follow C command automatically. But you know C doesn't mean that. You have to be alert to do that. If you are not fully concentrating, you are more of a problem than a helper.

Captain 35: They must pay attention from the times they let go of the lines at the dock. They have to attend to the pilot's alerts, to the crew's actions. Two different worlds, the old locks and the new locks. In the new locks they have to attend how the ship is moving, what the pilot is telling them. Sometimes they see things that the pilot may not see. They must pay attention at all times to the controls, to the engines, and the engine readings.

b. Physical

Captain 36: Good vision, good reflexes. Skills are developed through practice. Usually their tugboats are ASDs. These are something you don't think about you just know what is needed and do it so that the tugboat will do what is needed. You need good coordination between your brains and your hands.

Captain 35: Agrees. Right now they need time to eat and to go to the bathroom. This needs good conditioning. It can take six hours to go through the locks and you can't leave the bridge unattended in that time. Right now there is nothing in writing about this. If you do leave the bridge to use the bathroom you can be disciplined.

What is it about your job that you like the most?

Captain 36: The jobs stays there. Once C gets relief the other captain is briefed, and C goes home and totally disconnects. C knows the relief will take over well. C doesn't take the job to the home. Before C was a professor at the university, C had to grade exams, prepare lectures and was working at home doing this. Now C has been temporarily promoted to senior captain, so C has to plan maintenance activities as well. But beyond that C doesn't have to think about it. C's job is to assist the vessels when C's on board the tugboat. It's a fun job. It's always different. C can assist the same ship, but it can be a different time, a different direction, each time is something different. It's dynamic and fun.

Captain 35: C has the experience do this, before C knew nothing about tugboats, C never paid attention to tugboats. C has learned what it is about the tugboats, it's exciting, it's a good experience. C likes the job. Nothing to do with labour relationships. C does the job, gets off and doesn't think about it. C does the job and keeps doing what C has to do to avoid accidents.

There are four types of tugboats and different needs of each one (Voight Schneider, ASD, tractor tugboats and twin screws-ASDs and tractors go through the new locks, other ones have insufficient power).

What is it about your job that you dislike the most?

Captain 35: The labour relationships and the schedules. From starting from the Atlantic side and working on this side, C doesn't like the travelling to the side sometimes they are stressed and then have to drive home and that is very dangerous. Not being able to respond to your physiological needs is part of the poor labour relationship.

Captain 36: The company things, when you are working in Colon at least nine to 10 hours on the tugboat, and you add one and a half hours travelling each way. Schedule C doesn't like the too many days in a row of the same schedule. Seven days straight is difficult. It used to be that you did two or three jobs on a watch and you got on board and stood by. Now every watch you do five watches, sometimes as many as seven. You finish a job and you are assigned to another job and you must take time then to use the bathroom. Those jobs that used to be easier you work a lot more. Now with the new locks you can do three or four jobs in the old locks, then you can spend five hours taking a ship through the new locks. This is horrible. You will work normally two to three jobs, then do a special job in the new locks when you are tied to the ship and you cannot move for three to six hours where you can't move from the controls. From the Pacific side you may have to take it through the Atlantic side, and that is over the three to six hours through the locks.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Captain 35: C would advise them to do it. The problems they have now won't be forever. The job is not the problem, it's the labour relationship. For C would support it if they want to do that.

Captain 36: C has two children, C would support them in whatever they want to do. But C doesn't think the maritime business is good for women. It has always been male oriented. Women deserve the opportunities but to be a tugboat captain they would have to be at sea first and they would not have the same chances as men. They can be on board for a week and this makes relationships difficult for women on the ship. That is why C would not recommend it, but C would support them if that's what they wanted. The best opportunities for women are on cruise ships, but on cargo ships it's very difficult.

What is the longest shift you have worked?

Captain 35: 14 hours. C doesn't remember the circumstances.

Captain 36: 14 hours for C as well. Past practice states that if the relief captain is not coming, and another captain cannot be provided, you must stay on board another four hours and the captain will subsequently start four hours earlier, if the captain cannot be provided a captain from C off duty day. That means you will work at least 12 hours. But the problem is you may be in the middle of a lock passage when the relief comes, and that is why C worked 14 hours. The next guy will get to the office four hours before C shift but the earliest C will be on board is one hour later. C will then get off and may not get to the office another one hour or two later.

But some people like overtime, they like the money. They will work 16 or 20 hours, from one shift to another. But they are so slaves to the money that they will do that. That makes it bad for the others. C wants to spend time with C family. They were seafarers before and they quit the sea because they could not be with C families. If C takes a job near land C wants to spend time with C's family. Even completing 10 to 12 hours of overtime in a pay period, C feels that C is not devoting the time to C's family. C's children are sleeping when C gets up and C would like to see them. C doesn't blame the people who put in a lot of overtime, C blames the company.

Captain 35: It depends on the operations where C will work 12-hour days. On the Atlantic side it's less than the Pacific, In the Pacific side they are mostly working 12-hour shifts. Now it's once every 15 days.

Captain 36: If they ask C will say no, find another guy, but if they can't find anyone C will do it. It doesn't happen often to C, just when it's strictly necessary. But it does happen from time to time.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 36: They need more people so that people aren't called to come in on their off days, have more flexible schedules, C doesn't know how to arrange it, but C does not want the seven day in a row schedule.

Right now, if C is tired C sleeps two hours, gets to bed but C is not able to sleep after sleeping two or three hours. C has been along in C's home, everything is dark, and C wakes up after three hours but cannot sleep again until 2200 to 2300.

Captain 35: Improve the schedule, the transportation on the Atlantic side, and provide or assistance when going through the new locks, as they did it before. But that also people.

CAPTAINS 37 & 38

Captain 37: Captain for five years.

Captain 38: Captain for six years.

Sleep quality and quantity

Captain 38: Yes, on the midnight watch C barely sleeps five to six hours. Especially because they don't rotate the schedule as they should so when they go from 0800 to 1600 they go to the midnight shift and it is difficult to get sleep, you get seven days sleeping at night then you quickly have to shift to sleeping daytime. C gets home 1200 to 1300 after the midnight shift. C sleeps a few hours, then tries to sleep again three hours at 1900. At the end of seven days you are completely exhausted. Because of not sleeping well C has mood changes. C's spouse sees it all the time. Spouse notices that this happens when C is on the midnight watch. They also don't eat properly because the night shift changes their eating schedules as well and this affects your body weight and everything.

Captain 37: The midnight watch is the hardest to get proper rest. On top of that you have to participate actively in your life and it is very difficult to sleep during the day, particularly during the first two days of the shift. Throughout the seven days at least two days of the shift C sleeps six hours straight, but this doesn't happen very often. Most of the time the workload is very high and C doesn't sleep well at night. C only has a sleeping problem when working at night. C does believe that their working schedule can be updated by hiring more people or a better distribution of work among the captains, especially during the night. After finishing the seven days of night shift C feels like C just came back from Asia. It takes a while to reconnect with C normal life.

When you are not working, what time do you typically go to bed and wake up?

Captain 37: C would go to sleep at about 2300 and get up at to 0800

Captain 38: Would go to sleep about 2130 to 2200 and get up around 0700. C's child goes to school so they have to get them ready to go. But on vacation C can sleep a bit later. Between 2100 and 2200 they are getting ready for bed.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 38: Focus. You must be focused all the time and check around everything, what is moving and not moving. [There was] an accident in the new locks, the captain did not have any rest. C was given an instruction but did the opposite of what C was told, because C was so tired. A ship got hit. The captain did not have enough rest. This happened a few months ago on the new locks. C was so tired C wasn't in top shape. The captain told C what happened. They made a watch change for C. When you don't have a watch change you are assigned to an office so that you can go to any watch and they will not give you a regular work schedule. C got swapped from one watch to the next. No changes were made. The first question they asked C was how many hours of rest did they get? C explained that C only had two hours. They did not do anything to C. This happened a few months ago.

Captain 37: Concentration, must [be able to] make rapid concentrations by sight in terms of distances, times, and adequate response to requests made of them. Efficient response to whatever is requested. Must be a good listener and a good communicator. Must receive the message and act or relay it to your crew members. Must be a good communicator and listener. On top of the working hours C has to transport himself to the west side, C lives half an hour from here.

b. Physical

Captain 37: Must have good mobility of two hands. Good wrist and hand movement for manoeuvring the boat and grabbing the radio. Also a good neck so that you can turn around a lot left and right or behind you so you need good neck and body mobility.

Captain 38: To renew your licence you have to demonstrate vision, hearing, and you must meet certain standards. For pilots they must have good eyesight, cannot use glasses. But tugboat captains can wear glasses. Some tugboats are very noisy and it's hard to hear the radio so you have to put the radio at full volume, makes everything louder on the bridge

What is it about your job that you like the most?

Captain 38: It's fun to drive the boat. They like what they do. C likes that C can get home every day and see the family. On the ports, you work 15 days on, they sleep on board, and then get 10 to 15 days off. It's different [on the Canal] as they don't see their families much.

Captain 37: C likes being helpful to the whole operation. C feels that they are an essential part of the Canal. The tugboats have always been a part of the operations, but especially now. They know that the pilots really need them and rely on them for them to be able to do their jobs. There's teamwork and feeling that C is an important part of team is very important. Being at sea you don't get to see your family every day. C really values it.

What is it about your job that you dislike the most?

Captain 37: C doesn't like that C never knows what time C is getting off. They know what time they start. They never know when their relief will show and if C will be there after the eighth hour. Sometimes the assignments they get, if during a manoeuvre, they won't have time to go to the dock, so they will work for 12 hours. This is what the ACP expects of them. At least up to 12 hours of work. Now at 1600 C needs to go to Colon, C doesn't know if C will finish at midnight, or 0200 or 0400. C will know more around midnight and thus C cannot plan for what C will do when C finishes working. That uncertainty is what C dislikes. C lives on the Pacific side but works on the Atlantic side. Because of the lack of transportation C must spend an hour each way driving to the dock. They have the means to provide transportation. They do for the pilots but not for them. Driving to the other side caused him to have a car accident last year. C was not injured but C could have been. They have a lot of expenses in order to get to the other side. C tried to minimise the effect of moving from one side to the other by renting a room close to work. But C left behind C's family. But it didn't do well because other areas of C's personal life were differently affected. C gave up the room and just drives every day.

Captain 38: The company has calculated how many tugboats and how many captains [they need]. Now they have the exact number they need and if one captain calls in sick they will not have enough captains and either two people will work an extra eight hours or one guy will come in on C day off. You must stay at least 12 or 13 hours on board. Last night C made up to a ship at 0100 and let go at 0800. In that time C could not drink water or could not drink anything. Only when C let go was C able to eat or drink. On the midnight watch you cannot eat when your body wants food, or drink water, or go to the bathroom. Before the new locks you had a second captain, so you could take a break and the other one would cover it. You cannot do what you want to do on time and you have to wait until the operation is over. C has heard captains tell the pilots that they are going to leave the bridge to go down and the operation will be delayed for several minutes. Because of that a lot of them have eating disorders and digestive issues. You cannot eat, drink or even go to the bathroom when you have to go. C's spouse's company gave them a new set of tyres, paid for the maintenance of the car. You have to figure out how you will get to work on your own.

What is the longest shift you have worked?

Captain 37: 14 hours.

Captain 38: 16 hours. C was hitting 12 hours, but from inside the locks there was no relief, so C had to wait until the lock passage was done and you can hit 16 hours easily.

How often will you work overtime in a seven-day period?

Captain 37: Two or three times. Minimum 10 hours a day.

Captain 38: Two or three times in a seven-day period you will work 12 hours or more. You will get that much if your relief doesn't show. If someone calls in sick it can be more. You will have to wait for the relief; two is in the office waiting for the lock passage to clear. Average is 10 hours per day minimum. If your vessel is inside the locks you can be fogged in the midnight watch and all transit stops until the fog is lifted when the sun comes up, the ships will all time up until 0700 and there is no relief. This is exceptional but it does happen. There is no relief in sight.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

Captain 37: C would say yes, go for it. It's a great job when it comes to the skills that you have to develop and demonstrate. It's a very exciting job. This is not the only place in which they can do this job, but there's only one Panama Canal. The skills can be applied anywhere in the world.

Captain 38: C has a daughter, if she likes it, C won't say no, but C would say that at times it's hard for a woman to work among men. Sometimes you get harassment. It's a good job that pays well. You don't get to stay in an office. You do something different. If she wants to do it C would explain the good and the bad things but if she wants to do that C won't say no.

What are the written hours of service rules for tugboat captains?

Captain 37: C hasn't seen any specific guidelines, but C would say that it is a common practice that C must stay up to 12 hours.

Captain 38: The Canal has what's called past practice, but nothing is in black and white. But they keep the past practice going and 12 hours is the maximum on board and you can stop after that without penalty. But it doesn't force you to do overtime after eight hours. You can call the office after eight hours and they will try to find you a relief. But now you can be sure that they won't find anyone, and you can be sure that you will work another eight hours.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 38: C would hire more personnel so that there would be overlap among the shifts and there would not be the uncertainty of when they were getting off. Also, C would do the research C's union is doing about fatigue and get feedback from all the captains about their suggestions. There have been a lot of changes, and people don't like changes. But several things have been imposed. Since they want to keep their changes, they don't want severe disciplinary actions so they go with the flow, but they know that this can give them a health problem or impact their personal lives. This lack of sleep and proper rest will hurt them.

Captain 38: The Canal has been doing things this way for over 100 years. But C tells C's spouse if they have got a problem come with a solution and if it doesn't work we'll find another way, but here it's my way or the highway. The current boss is taking a personal vendetta against the union. He is getting aware of what is going on. He doesn't want the unions to get stronger. And this has been going on for the past year. They are on a collision course with every demand it's always no, or no way. The system is not working as it should be. Every time there is a problem with an employee the solution will go to the other department, you will get a trial and then will be told what to do. If the employee wins the case their company will send the case to court outside and this will cost money and time, which they have. Usually the case will drop, and the employee has to stay doing the job, even if C won the case. It's difficult now how it's managed. You don't do your job happily.

CAPTAIN 39

Captain 39: Captain for 19 years

Sleep quantity and quantity

No problems sleeping.

When you are not working, what time do you typically go to bed and wake up?

When on vacation would go to sleep at 2200 and get up 0500 the next day.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

C is a lawyer so C is thinking of the regulations, C is also the secretary of the union, so C is thinking how to fight. C tries to control and time between the information C has about the ship, in C's head and in C's hands. In C's mind C has a standard procedure in C's head that C usually tries to do, exactly the same way always. C takes the information, especially what C can see, and sometimes what C can smell. Because C has been a captain so long there is also something that C does automatically.

b. Physical

Must have good coordination between what C is thinking and doing. It's very important to get up from C seat to avoid having a lot of time in the chair and must be a good listener also.

What is it about your job that you like the most?

C loves the job that C does, working as a tugboat master. C also likes preparing documents to comply with the job C has in the union. C loves what C does, especially being a master. C tries to be better and better.

C used to like where there is a lot of action. This is the kind of job C likes to do. As a tugboat master C is the boss of the ship and C makes the decision necessary to do the job as safely as C can. Making decisions you must keep always in mind the laws and regulations to know what you have to do. C likes to follow the procedures.

What are the written hours of service rules for tugboat captains?

Supposed to be [limited to] eight hours during the day according to Panama regulations. And not more than seven hours on the midnight watch. This is the normal [shift] to work, and to not work many days continuously. In this job if C's supervisor told C that C has to work more than 12 hours, if C feels strong enough to work more than 12 hours, C would. Even working more than eight hours is not compensatory. Everyone knows that if you work more than eight hours you will get overtime. For this reason, C will work more than eight, but rarely more than 12. C did this when C was younger and stronger. Now working 10 hours straight for C is a big problem. And if C can avoid working more than 10 hours C would.

ACP used to work with a legal system different than the one in Panama. According to the ACP administrative people, you cannot work more than 12 hours. But there is nothing in writing, no document that says you cannot work more than eight hours. Sometimes C has had to put the vessel out of service because C was so tired. The rules that are in the manual of personnel will prevent them from making you work at least eight hours per day.

You must be alert every time. And after eight hours your ability to be alert will decrease. There have been many times that the ACP will ask you to do overtime, despite you being tired. But if you are working 10 or 12 hours for four days straight, you can say no.

There have been occasions where people were investigated if they were too tired to work after eight hours. If you say this you will be under investigation if you say you are too tired to work after eight hours. You must work four hours of compulsory overtime each day. They will ask you can you work more than two more hours today. If they ask you for several days you may be able to say no some times and other times no. STCW does not apply to the Canal. The rules that you have to follow are what you have in the manual and what you have in the contract. They give you a schedule they want you to follow and that is it.

If there is an accident the Panama Coast Guard will not investigate it. The Board of Local Inspectors must investigate accidents or incidents in Canal waters. Sometimes the Panama Authorities can investigate it, but usually the ACP authorities will complete the investigation. It is an ACP employee who investigates the accidents.

What is it about your job that you dislike the most?

C doesn't like the administrative jobs. Sitting in front a computer, C doesn't like that. C likes all aspects of the job that provide C with decisions and controls. C doesn't like where C has to be sitting in the same place, watching the computer, watching papers. During C non-working days, if C has something to do as a lawyer C does it.

What is the longest shift you have worked?

C worked 13 hours in one shift. By the time C relief came around the tugboat was in the lock. C was in the Pacific district and the tugboat was in the Atlantic side.

On average in a seven-day week would work 10 hours a day, nine and a half or 10. It depends on the time of year whether C will work 12 hours or more and depends on the rotation you are working. In a typical week C will work 12 hours or more.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would advise them against doing the job, now because the conditions in the way ACP runs tugboats are bad, in the relation between ACP and the workers, in the relation between the bad working conditions, and in the work as a tugboat master. C would tell them that working in this time is not a good idea.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would change some kind of place on the tugboat where they could rest. You are supposed to be coming from home in good shape.

CAPTAINS 40 & 41

Captain 41: Captain for six years

Captain 42: Captain for three years

Sleep quantity and quality

Captain 41: Sometimes C cannot sleep right away, C lies in C bed and after an hour or hour and a half C will fall asleep. C cannot sleep for a long time, like seven hours straight, like C used to. Now C gets up after five or six hours of sleep. Usually this happens on the midnight watch.

Captain 40: It's about the same for C. C got home this morning at 0440, set the alarm for 1100, and before the alarm went off C got up half an hour to one hour before. After the midnight watch it is difficult to sleep. C has the room darkened and the AC on, but you have more noise. On this watch C tries to sleep from 1300, if C can, but length of sleep depends, but on average five or six hours. Sometimes he doesn't sleep when going to the watch.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 41: You have to have situation awareness, be able to multi-task, [have] good coordination, good at calculating time and speed, thinking ahead of the situation that can happen and coordinate a lot of things like where C wants to be, when and how C will put it there. Must be able to control the ship and crew.

Captain 40: Be aware of the situation. Everything is about safety. The boat is made of iron and steel and you have the other vessel that is steel and the only thing you have between your vessel and the ship is rubber. You must be aware that everything you do you must do safely. In your mind you must always think about avoiding collisions. You have to be on top of the knowledge that you have two people working for you and you must be training them each day because they can do the opposite of what they tell you. You have to be aware of those people as well and checking the surroundings. For some reason, rules in the Canal state that if you hit somebody you caused it, even if you caused a wake that led to someone else's accident you will be blamed. The launch operators, the other vessels, you have to make sure that if they are coming too fast you have to calculate what you will do when their wake reaches you. You have to be aware of where the shore is, you may have to work with a shorter line, and you have to be responsive to the pilots and always a step ahead or a thousand steps ahead, whatever is happening around you.

b. Physical

Captain 41: Working on tugboats they need you to have good health because you will be under pressure and stress, so you have to be healthy. But physically you don't need to be in great shape. You need to control when you want to go to the bathroom, how you will eat. You need to physically control that. How to be awake on the watch when you need to sleep. But most of the time you are working while sitting on the chair. The old tugboats you need to stand while operating the board. They have a lot of fat guys in the fleet.

Captain 40: The only thing is you must walk just to get to the boat, while carrying luggage sometimes. Work is easy physically, but you have to be aware of how you stand, of ergonomics. Working on a boat, you have to be careful and you must be in shape. But once you are sitting in the chair you don't really need a lot of physical traits.

What is it about your job that you like the most?

Captain 41: C likes the technical aspects, controlling the big ship in the channel, or within the locks. It can look very easy to someone not involved or have an idea of what they do. [They must be aware of] all the things going on around the ship, the weather, the hydrodynamics of the ship. To control that and save a situation of a ship that can hit the locks or go aground. The fact that you have in your hand [the ability] to enable the Canal to make more money, C loves those aspects of the job. C really likes the manoeuvring day by day, controlling the strong tugboats and enabling the ship to sail through the Canal safely, that has worldwide impact. All those things. C loves those aspects of the job.

Captain 40: C likes the fact that you are sitting in equipment that cost millions of dollars and you have all this power. C likes that every day is different. A vessel that you have assisted through, each passage will be different. It's not like you're at sea when all you see is the sea. C likes the fact that every day is a different job no matter who you are assisting. You wake up in the morning, you know you're going to assist vessels, you don't know where.

What is it about the job you don't like?

Captain 41: C doesn't like the politics that they have now from the administration. C comes from jobs where captains were listened to. Here they buy tugboats and they don't consult the captains. You have tugboats that may not work well and you, as captain, have to resolve the situation. They have to deal with tugboats in bad situations. The people in charge of buying equipment, they never talk to the captains first. Those kinds of politics C doesn't like.

Captain 40: C doesn't like mainly that a person was hired for a reason. The Canal has a slogan that they hire the best. They train them to be captains. They used to do things one way. They learned from the old captains who taught them how to do things and how they used to do things. First you have the word captain; that means something. You are the one in charge of the whole tugboat and if something happens they're going to blame the captain. For that reason, if you decide to do something you decide because of safety or some safety factors that you calculate, and you tell them why, and the guy in the office says no, that's the proper way to do something. If they don't have procedures the captain is determining the safest way and the captain is telling you. People sitting behind a desk are telling the ones in the field, the ones doing the job. If you have procedures for that kind of job that's one thing. But, they don't have procedures. They just issue memos. The manager issued a memo stating that the safest speed to tie up a moving vessel is four knots. The book says three knots and the guy hasn't operated a boat in 15 years. He doesn't know how to do the job and he's increasing the risk factors for the captains.

What are the written hours of service rules for tugboat captains?

Captain 40: They have to stay four hours at the end of the shift. It's not written anywhere. It's what is called past practice.

Captain 40: C told them C would stay. C told them C already passed Cocoli. C told them if you are planning to put this boat past Cocoli, the job is more than 5 hours, and if so C would put the boat out of service. Today they called C and told C would work another four hours more today.

This is not written anywhere. In their bargaining agreement it is written that if the watch is open the first option is to use the person on board. They have to ask that guy. They would call C early and C say to you that you have to find someone else. They can say you have to stay. If you say you're tired they don't care. You can say you have to find a relief in two hours. These are not written anywhere. This is past practice. They have no procedures.

Captain 41: This is what C doesn't like. They say you have to stay four hours. When do they know when it is too much?

Captain 40: They can refer to the IMO but here they have ISO, not ISM, and they are not going to implement ISM here.

What is the longest shift you have worked?

Captain 41: Longest worked in one watch, 14 and a half hours. That was over two times.

Captain 40: 16 hours in one day. Then twice C worked 14 hours.

Captain 41: Typical seven-day shift is nine and a half to 10 hours average per day.

Captain 40: Last week C worked on average 10 hours per day.

Captain 40: It's not often that C works 12 hours or more. Two days.

Captain 41: Not that often maybe one or two days C will work 12 hours.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 41: C would do two things. C works on the Atlantic side, but it takes C 94km each way to get to the job. That is very tiring. The other thing is to finish the watch [earlier than] an average of 10 hours. A maximum of nine hours would be better. C cannot just leave. C has to take a launch. By reducing [the average] watch to nine hours would reduce fatigue. Also, working seven days in a row on the same schedule is very difficult. Seven days in a row is too much.

Captain 40: C would change the schedules, do a different rotation. Place more people on the job. They have saying that for a long time. C got here in 2010 and came in for a program that was supposed to train 110 captains and they finished the program with less than that. They had less than that, maybe 80 were trained. Now you have people retiring and they need to hire more people. When they had two captains, there were people working 120 hours of overtime. Some captains were earning \$250,000 a year. To earn that kind of money that is 150 basic hours per pay period. With that money they could pay four captains with no overtime. You have to bring in maybe five or 10 guys more and the overtime will be reduced to zero. They want to implement some special boat like a hybrid but there's no assurance of safety with that.

They are afraid of the expenses and the budget. You cut the budget by reducing overtime, or you have to implement a different schedule for some people. All the time you have to hire a few more captains. The other thing is that they need to prevent people from working really long hours but if you do that some people will not get overtime. For the pilots they have special units sitting somewhere counting the time for them. If they make more than the time they are supposed to make they get a bonus. For the tugboat captains they don't care. The schedule is one thing that needs to be changed.

They schedule the tugboat captains, if there is an agreement they don't know about it. The way they're fixing it is to ask some guys to come in two hours early so that C will relieve C and remain on aboard. People can work 16 hours this way. C doesn't understand how this will solve the problem.

CAPTAIN 42

Captain 42: Captain for 6.5 years

Sleep quality and quantity

C has problems sleeping on the midnight watch. Last week on the midnight watch C slept an average of four hours. Other watches C has no problem sleeping. On the 0800 to 1600 watch C will go to sleep at 2200 and get up at 0640. On the 1600 to midnight watch C may have problems if C relief doesn't come or C has to come in early, then C won't get enough sleep. At 0630 to 0700 everyone in C's house gets up and makes noise so it's hard to sleep in C's house. If C can get at least six hours that will help C.

When you are not working, what time do you typically go to bed and wake up?

When on vacation would go to sleep at 2200 to 2230 and get up 0630 to 0700 the next day. C cannot sleep more than eight hours. Usually C gets up automatically after eight hours, if C has the time to sleep eight hours.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captains to be completely alert to everything, sounds, looking everywhere. A few days ago, a tugboat hit a launch, and you have to be looking all around, sometimes there are obstructions and you can't see everywhere. Sometimes you hear noises like something caught in the propeller, or the horn of another tugboat. You have to be completely alert.

b. Physical

You don't need to be strong, we're not lifting anything heavy, we just need to be able to get from a launch to the boat, and sometimes there's a wave so you need to be a little athletic when doing it. One captain in Colon has a hand with one finger and can do the job, and C is missing part of C's foot. C is older than 60.

What is it about your job that you like the most?

When you are trying to catch a ship; that is fun. C likes driving the boat. The salary is not bad, and it is better than what C did before on a cruise ship when C was 10 weeks on and 10 weeks off, and that was the best contract C had. Before that C had been on for six months. C had been a first officer on Royal Caribbean before.

What is it about your job that you dislike the most?

Here you are always thinking what we are going to be fighting about next. There is too much stress. When they were building the new canal they didn't know how the work would be done, or how many captains they had. They put two captains on the tugboat then they took one off. Sometimes there is too much stress. C doesn't like that C feels that every single thing that has changed has been bad. Every time it's like we're taking this. Other than when they sign a new contract they get some more money.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would say no, because there are no weekends, they get one weekend a month, on a normal schedule. C tries to get more, but that is 12 weekends a year. That is not enough for C. If there is one change C would like to make it would be to provide another weekend or even half a weekend off a month.

What is the longest shift you have worked? How many hours is an average week?

C doesn't care about overtime, so C doesn't track it that closely. C would average 10 to 10 and a half hours a day in a seven-day period. Longest C worked in one shift in the year was 13 hours. It did not happen by choice, it was because there was no relief. If you stop the boat before 12 hours they will call you in. What C does is that as soon as C finishes, or is near 12 hours, C will call 12 hours and say they will put the boat out of service. C has heard that other people have been called in because they said they were tired before 12 hours, they were called in because they "left" the boat not because they "stopped" the boat. The dispatchers know that C will not work more than 12 hours and C will stop the boat. If you work 13 hours you are expected to show up the next day on the same schedule.

What are the written hours of service rules for tugboat captains?

There are no rules that C knows of. C knows of captains that have worked 20 to 24 hours, by their choice. This should not be permitted. Even if you want to work that much you should not be able to. C knows that the pilots once they get off they cannot be called back after 14 hours. C knows that from friends of C that are pilots and their contracts are public (500 pages), theirs are 50 pages.

How often, in the last year, have you been asked to work in spite of scheduled time off or vacation time?

It used to happen often, but before C would do it, but since they removed the second captain, C does not do it and therefore C doesn't get the calls. Now there is less overtime available because there are fewer captains, and they had to call everybody. Now even if there is overtime they call the people who will answer the phone and C will not answer the phone. C will only answer if C's on board. If C's off C will not answer.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would put a mate on board instead of a second captain. They can reduce the number of lines as they do everywhere else in the world, but the lines would have to be stronger. When you have one line you don't need that many people on the deck. You make up faster and let go faster. C would have one mate and two seamen. They used to have three seamen. The mate can help on deck also. C thinks that if the mate goes to the winch it's no big deal.

Their rotation should change as well. Seven days in a row is not good, you never work just eight hours; you work, nine, 10 or 12. When you come from a weekend after midnight you start working 1600, seven days two days off, then by the time you start at midnight you have worked so many days. It is better when you come from the weekend to start at midnight, in other words, the opposite of the type of rotation they do. You would start at midnight, be well rested from the weekend, then you get more time in between the watches. When you finish watches you have two days' rest, then you would start at 1600, it would give you almost three days off. Now when you finish midnights you get off Thursday, you get whole Friday, Sat, Sun, Monday, then start at midnight on Tuesday, but you don't need that many days off.

CAPTAIN 43

Captain 43: Captain for 30 years

Sleep quantity and quality

No real problems sleeping. Sometimes C oversleeps. C needs at least six hours, sometimes C doesn't get that much, and sometimes C does. When C doesn't get six hours it could be because of family issues, or because C gets off of work late. This happens about once a week. C works on a special shift. C works from Monday through Friday and on Wednesdays C works 0800 to 1600 and then on midnight to 0800 the next. Thursday evening C sleeps only about four hours, no more than five, to prepare for the midnight shift. In C situation, C can handle it, perhaps because C has much experience. C has co-workers for them it is very difficult to do that.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Must be able to evaluate dangerous situations and make decisions quickly, fast, based upon the circumstances. You have to be responsible and be conscious that the lives of your crew members depend on you. That includes their personal limitations. For example, if C believes that C is too tired to work safely, C should be able to make that decision. But if C does C will lose money. C would prefer to lose money than have an accident.

If C were to say that C would have to call the office and report that. The consequences of that is that the person already on board would have to stay another four hours and that wouldn't be fair to C.

b. Physical

You should have normal use of legs, hands, and all of your senses, vision, hearing, should work properly. C believes that they should be conscious that with age their health decreases and therefore the risk of such things as heart attacks can increase. With age this increases. They, the captains, should recognise that with increasing years they should pay more attention to their health. When C was in C twenties and thirties C would work midnight shifts with few hours of rest. Now with age C has to rest properly before going to work.

What is it about your job that you like the most?

I like activity and that it is fairly well paid.

What is it about your job that you dislike the most?

C doesn't like that with the new canal the risk of accidents has increased a lot. Now the tow boats must work ahead of the ship and this is a great risk of accidents. Nothing has happened yet, only some small incidents, but when an accident occurs, most probably, it will involve loss of life. It will probably be a serious accident. And it could be because of equipment failure or human error. The new locks have created more risk because the transiting vessels need the tugboats inside the locks. There is little room for tugboats to manoeuvre.

What advice would you give to your son or daughter if he or she wanted to be a tugboat captain?

C would tell them to prepare as much as they can to be ready for any emergency. It is a risky operation. C would not advise them to pursue the jobs because it is risky, and because working shifts is very hard. C has been off a few months.

What is the longest shift you have worked?

C hasn't worked since April. When C worked last C worked nine hours a day, never less than nine, that was very rare. Most C worked was 13 to 14 hours. C worked that long because C relief didn't show and when that happens you have to work another four hours and another two hours for the next relief to show up. That easily makes 14 hours.

For C, this would be about once a month where C worked 14 hours. But C is sure that other tugboat captains do that more often than once a month. Sometimes the captains choose to stay another four hours to get more money. But sometimes they have to stay anyway, whether they want to or not.

What are the written hours of service rules for tugboat captains?

The rules, as C understands it is that when needed C will have to stay another four hours, but C is not too clear on the rules.

How often, in the last year, have you been asked to work in spite of scheduled time off or vacation time?

This has happened at least once per pay period, once every two weeks. C agreed to do it because C wanted the money.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

C would, for the new locks, put on two captains for the safety of the passage. That is a very important issue.

CAPTAINS 44 & 45

Captain 44: Captain for four years

Captain 45: Captain for 22 years

Sleep quantity and quality

Captain 45: No problems sleeping. It is easy for C to fall asleep. No problems. In C's academy time they learned to sleep whenever they had time to sleep. Last night C was working in Diablo and was able to sleep three hours during the shift and C didn't have any manoeuvre until 0100, and C used the time to sleep. When they become permanent masters, they get assigned to the Atlantic side, they would work 14 to 16 hours per day, adding four hours of driving time. C did that for at least seven years and got used to a maximum of five hours of sleep. If C sleeps more than five hours C's body gets pain all over C's body, and C feels like C didn't sleep at all, like C had been drinking all night. C did that for seven years. After seven years C was able to move to the Pacific and C didn't have to spend four hours/day driving to the site. About two years ago the average working time for master, was about 10 hours per day, in the Pacific Side. Two years ago, when the new locks opened, they were short of masters and most of the guys were working at least 14 to 16 hours, and C's body had been used to that from working on the Atlantic side. This was harder for the new guys.

Captain 44: C cannot sleep. When they have no manoeuvres, C tries to sleep but C is afraid that C won't be able to wake up when they try to wake C. C has this fear. When C doesn't have two hours to go before a manoeuvre, C can take a short rest and wake up. When C has a 16 - 24-hour shift, C stops in a gas station to get coffee. C had a car accident driving home and had neck pain from the accident. The accident happened about 1530. C was passing a point going along a freeway and C fell asleep at the wheel. That day C woke at 0300, after sleeping about four hours, went to work, and C finished work at 1400, stayed in the office a while talking to C friends. C stopped for a bottle of water. C didn't feel tired, but when C went inside C car, C fell asleep and the impact woke C up.

After that C changed C's routine a lot because C is afraid of falling asleep again. In that accident the car was okay and the police said that C was lucky C's car wasn't turned around, C hit on the side and was pushed to the other lane, and people on the street started running. C's legs were like jello. C went to the psychologist during the 15 days C was off, C was shaking when C went to the highway and C's spouse took the wheel of the car. The psychiatrist gave C some exercises to stay awake. C avoids the highway going to work. No matter what time, C stops 90 percent to get some coffee, get a break. In addition to the nine, 10 hours of work, C will stop in the gas station and get a coffee. Before C started working C never drank coffee.

Captain 45: Captains from C's generation, after traveling to Colon for seven years, they are used to working 12 to 14 hours. The new generation is not used to working that long. The new generation people have problems working 12 hours.

Captain 44: How fatigued you are depends on the kinds of manoeuvres. Now C spends two hours each way driving to work. The problem is finding a relief time. Now it is harder to find a relief people than before. In that time the work needs to be assigned to say way to each person. Don't give a lot of work to one boat, and now if a boat goes one way in a lock C may be assigned to go all the way but one tugboat may only get one assignment and may stay at the dock for a while. The people who make the assignments don't know this. They don't see who did the watch and the work that they were doing all day. One time, C told the guys that there was another tugboat. C was told not to tell them how to do their job. The people who

schedule tugboat captains don't know the marine world. They have another profession, with nothing to do with the marine profession.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 45: It's very complex. You have to be well-prepared, you have to know the rules and regulations, what to do, what not to do. You need the skills to do the job. You have to practice two years to reach the skill level. That's why training takes two to three years. The MTC guys have no idea what they do in the tugboats. They just sit at their screens and their priorities are to get as many ships through the Canal as possible.

When C started 20 years ago, the master was doing the same job as them, but the workload has tripled since then. The administration doesn't seem to care. They are getting the same amount of money with triple the work. Back then within the assignments you have at least one to two hours work. Now when you finish an assignment you get another one. Now you get seven to eight in one day shift, before it used to be three or four assignments. The workload has tripled.

Captain 44: The night shift can have four or so assignments. 0800 to 1600, four or five assignments. Midnight to 0800 you can have three or four assignments.

Captain 45: Before you had two assignments during the night shift. Now you get six or seven assignments during the night shift.

Captain 44: C has had eight assignments at night and 1600 to midnight C did six assignments. Now at night you will do at least six assignments. If you are staying in a lock you will do more.

What is the longest shift you have worked?

Captain 44: 16 hours. Once C worked 18 hours, but C was the second captain then.

Captain 45: 18 hours. When you are inside the locks you can't get relief until you get out of the locks. It can take two and a half to three hours to get through the locks. Typically, on the 0800 to 1600 shift, C will enter the locks and will have to get to work early because the previous guy didn't show up, so C came early. C entered the locks at the end of the shift and once C entered the locks had to go through them.

Captain 44: Inside the area they don't have the launch resources to carry new captains to the vessels. Priorities are pilots and others.

Captain 45: The problem is not that the captains want to work more. It's just when the ship enters the locks at 1700, it's at least three hours through the locks. One day the ship broke down inside the locks and C ended up working 18 hours. There is no way to bring relief inside the locks. The company proposed putting a ladder inside the locks to bring a relief captain inside the locks, but it is very dangerous, you have to totally stop operations inside the locks to do that. It is easier to pay the person overtime as this doesn't disrupt Canal operations.

Captain 44: In a typical seven day shift C will work typically more than 70 hours.

Captain 45: Up to now C worked 65 hours in six days; in a typical seven day week C will work 100 to 110 hours. Sometimes they call C on C day off and if C has nothing to do C will go in and work. Normally C works five days a week and typically C works on C's day off, will work six days per week.

What are the written hours of service rules for tugboat captains?

Captain 44: Can work up to 12 hours a day, but sometimes with the manoeuvres you can work 13 hours. Per week multiply 12 by five days, you will work 60 hours.

Captain 45: There is no limit. It's up to you if you want to work on your days off. They are short of personnel. No limit to how many hours per week you can work. The priority here is to get as many ships as possible. They don't have the workload evenly spread during the year. Sometimes they don't have as much work. During the high season, starting in September through Christmas, the workload will double. During February to now, the transits go down.

Captain 45: On the Pacific side they have 10 tugboats for 20 shifts. The 0800 to 1600 shift one local person has to stay in Diablo, in that time that captain will have nothing to do. C is there on standby if C is needed. That is the person C's manager must pay. The administrators will point to this person, and complain about paying C to do nothing, but the rest of the people are working very hard. The number of assignments depends on where you are. Now the most work is in the north area. In the 0800 to 1600 shift the guys in Miraflores will get an assignment at 1400 and C must work until C is through the Canal. Workload is different for every person. C is assigned to a tugboat that works the new locks. C ends up on the locks in the North area and C ends up working more on these ships. The other persons will end up working less than C, because C may be in Diablo or Miraflores. It depends what kind of tugboat you are on.

Captain 45: C will complain.

Captain 44: The captains have told ACP that they need to hire more personnel. They would rather give one person a lot of work than hire more people. Nothing happens when they complain. They don't care. Here they will delay a year or two if you do something good, but if you do something bad you will get a letter after a week. C has seen this.

Captain 45: If you are assigned to Colon you will spend two hours each way traveling, but your workload has doubled.

What is it about your job that you like the most?

Captain 44: C likes to manoeuvre the vessels, C likes being on the water. C is happy when manoeuvring the tugboats. C loves the work, but if you can pay off C's mortgage C will work. C doesn't like the administration. Most of the people want to leave. They don't like the stress. Before C never talked about C's work at home, now C does. Now the atmosphere is toxic. C has two colleagues who got a letter because they needed to go the bathroom, but got a letter of complaint because they delayed the transit. People want to work the Canal, but the stress, how they manage, they don't comply with the rules they themselves make. C doesn't like fighting with the administration. This causes a lot of problems. You are always tense at work, and you bring this tension home and cause family problems. That stress you will transmit to you family.

Captain 45: Everything is different now day by day. That is why C doesn't do a desk job where you are doing the same stuff every day. What C did yesterday is not the same as what C will do to tomorrow. C loves the work in Paraiso, and sometimes C works on the Atlantic side, this is a special job. It's not monotonous. C enjoys doing something different every day.

In the old locks, on the Pacific side, C ties up and from where C ties up from the bridge to the locks it's relaxing, and you can have coffee, have breakfast. Usually the pilot doesn't need you. That's why you take a break. This is how they did the job for 20 plus years. But in the new canal, the new systems you must sit at the controls for three straight hours, maybe four. You cannot leave the controls to take a break or go to the bathroom. That is what they are complaining about and requesting a second master to share the workload. If you are used to the old system, this is very difficult. You cannot find anyone happy with the new system. It's too much work. In the new canal you get at last 100 orders from the pilot in the shift, in the old locks it was maybe three or four.

Captain 44: In this year, in less than six months, C has taken many vacation hours to take a day off. C is too tired to go to work. This week C called in because C was too tired. C has like 112 hours of vacation days that C used to take off. Last week C lost an engine inside the locks. C was on the water; they put the wrong fenders with big chains. C needed to make a report, but this fender caused accidents. Five tugboats had problems with the chains of the fenders. They asked the wrong people about the fender - the people had no marine experience. You work under stress as a result.

What is the longest shift you have worked?

Captain 45: Before July 1 the average overtime was 60 hours per pay period.

Captain 44: C stopped doing overtime in July, normally C put in 40 hours of overtime per pay period.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 44: C would hire more people and would change the shift schedule to less than five days. Now working the midnight watch seven to eight days, C would reduce to three or four days. C would improve the working conditions. No more than five days on a watch period. C would have better coordination of assignments with MTC, so that in normal (non-emergency situations) each tugboat gets the same number of assignments. You will be assured eight hours of rest after a shift, or extended period of time off like the pilots, not fixed start times. You will have different captains with different start times, to reduce the overtime.

Captain 44: Very difficult to do what [one captain] did. Some captains want an easy job. C's generation is used to doing a lot of work. Some people want to work, but not that much. [There are] three different groups of people. The company doesn't care. You will find that you can't make everyone happy.

Captain 45: The workload is more than it was 15 years ago; it's triple what it was. To fit that workload, you need two guys working at the same time, on the new tugboats, (the Spanish and Chinese). Those tugboats on the old canal is enough for one guy. The people in the administration cannot see how the workload has tripled. Now C ends up drinking less water to avoid going to the bathroom, which is bad for their health. C doesn't have time to cut the meat for C's meal. C has meals like chicken nuggets where C can grab a nugget when C can. C has changed C's eating and drinking habits on the new canal. That's why they need a second master.

Captain 45: C's not complaining

CAPTAINS 46 & 47

Captain 46: Captain for five years.

Captain 47: Captain 21 years.

Sleep quality and quantity

Captain 47: Normally C sleeps no more than six hours a day. This causes C to sleep during the day. When C is on the night shift, and C has to sleep during the day, that is when C has problems. During the night it's not that hard for him to get sleep.

Captain 46: C is finishing C night shift and every day it is difficult to sleep. With the rotation shift the first day is the hardest because your biological clock is not adjusted. You find yourself working the night shift starting at midnight. It's like having permanent jet lag. It is difficult to get continual rest. Maybe you sleep three or four hours, max five, and then you wake up, especially during the night shift.

When you are not working, what time do you typically go to bed and wake up?

Captain 46: Normally C would go to sleep at 2300 to midnight and get up at 0700.

Captain 47: Maybe go to sleep between 2200 and 2300 and would get up maybe 0700 to 0800. Usually C can't sleep after 0800, C always wakes up before that time.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 46: Common sense. Situation awareness at all times. Must have a core of experience and training.

Captain 47: The same.

b. Physical

Captain 47: They don't need to have special physical abilities because you climb a stairway and walk the floor which is almost even. The only things they climb is from the mess to the wheelhouse. Most of the time they are sitting manoeuvring the tugboat. Sometimes they stand up sometimes they sit. They don't need to be exercising to stay in condition to do their job.

Captain 46: In their job basically they use their hands to control the tugboat. They use their voices for the radios, Nothing special. They have to be in good shape, but always they must be alert, at all times. More than physical the job is mental. Knowing what to do, when to do it.

What is it about your job that you like the most?

Captain 46: C likes being outdoors, they are kind of navigating in interior waters, but always in touch with the waters. C enjoys the sunrises and sunsets, even the rainy days. It's like your office is outdoors. C likes that every day, every single manoeuvre is different. Keeping you away from the routine, from the mechanical jobs.

Captain 47: C likes that C is alone on the bridge and the job that C does is pushing and pulling ships, C likes that. The other thing is C makes C's own decisions. C has to decide because most of the time C is alone on the bridge and C doesn't have someone next to C telling C what to do.

What advice would you give to your son or daughter if he wanted to be a tugboat captain?

Captain 46: C doesn't like the long shifts, the fatigue, and that the administration basically underestimates what they do. They try to do their best every day in a professional way.

Captain 47: C doesn't like the kind of shifts that they have. C doesn't like the way the Administrator treats the employees. C feels that they don't respect the position of the tugboat masters, but they now that they are different from the people in the office.

What is the longest shift you have worked? How many hours is an average week?

Captain 46: C averages 10 to 12 hours a day. The shift is normally eight hours and at the end of the eight hours their reliefs will be in the office, but sometimes they have traffic, different scenarios, the relief can't come to the boat and they must put in another two to three hours before the relief can come.

Captain 47: The traffic jams can also delay the relief coming and this will cause a delay. Also, the operations because when the relief is ready and they are in the middle of a manoeuvre and it may take a while to get to where the relief is. Sometimes they will have to wait more than an hour if there is no launch available and it will take a long time for the relief to get there.

Captain 46: C has worked 14 hours in row. This happened only once.

Captain 47: One day C was expecting relief at 1200 and C didn't get there until 1400. This happened only once; C relief was under way. The other time when it was about to happen, C put the tugboat out of service at 12 hours.

What are the written hours of service rules for tugboat captains?

Captain 46: There are no written rules on how many hours they can work. What the administration expects is that if they finish their eight hours shift if their relief doesn't show they expect the captains to put in another four hours and after that they can put the boat out of service. In the one-time, C worked 14 hours the relief was available but it was just difficult to get C to the tugboat.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 47: C would try to work less than eight hours. Try to have the relief available earlier. C would change the schedules since on some shifts they are working six, seven, eight days in a row. They should add a day off in the middle of the seven-day shift on the midnight shift.

Captain 46: Have the relief available before eight hours, say at hours five or six, the person is at the office and C can end the shift at eight hours. Would change the schedules, in Panama City traffic is real bad, especially during rush hour. One of the shifts starts at 0800 and ends at 1600, if they could move the shift up two hours to start at 0600 to 1400 it would help a lot. It would enable the relief crew to get to the boat faster. The midnight shifts, working a whole week in a row, is exhausting. It takes a couple of days to recover from the jet lag of the midnight shift.

CAPTAINS 48 & 49

Captain 48: Captain for 20 years

Captain 49: Captain for seven years

Sleep quality and quantity

Captain 48: C knows that once C tries to sleep, even with the room blacked out, C needs to relax once C finishes C's duty. C doesn't smoke or drink, C doesn't gamble, it's just that C's mind is so used to things going on that C requires time to relax before C tries to sleep. Today, C's day off, C will start the midnight watch, C knows that C will not sleep until 2000. C will not be able to sleep if C goes to sleep at 1700. Because C had been working from 0800 to 1600 in theory and was finishing C's duty, because of the Neo operation at 2000. Once C finishes C shift, the next one C starts at midnight.

Captain 49: In C's case the problem is with the periods of rest. Normally C can only sleep five hours. If for some reason C wakes up after four or five hours, C can't go back to sleep. C's normal periods of resting are between four and five and a half hours of sleep. It's kind of crazy because when C has long weekends, maybe in one of those days C can sleep 13 hours straight, but normally no more than five. When C is in the midnight shift, it is not logical with rest periods. If C goes to sleep now after finishing C midnight shift at 1100 C will awaken at 1700 and not be able to go back to sleep. C will try to sleep at 1700 to awaken at 1030 or 1100. Most of the time that period of rest is very deep. C has a child who makes a lot of noise but C sleeps so deeply that C won't hear them. But now C can't sleep more than five hours. When at sea C sleeping was very regular. You had a regular shift, working two four-hour shifts. But after the rotating shift in the Panama Canal, working the midnight shift for seven days straight, more than five hours of sleep is very difficult. Now that is C's reality.

When you are not working, what time do you typically go to bed and wake up?

Captain 49: When on vacation, C would go to sleep at midnight, 2300 and awaken at 0800 to 0900.

Captain 48: The same, sometimes C would awaken earlier.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 49: You need to be 100 percent focused, well rested, and sober. You may have only a fraction of a second to react, when you really need it. When you are focused, you are taking care of many things at the same time. You have the controls, the deck, two and sometimes three radios, the pilot giving orders, the Canal itself. Must be mentally focused 100 percent. Falling asleep is a sin. You're driving 6800 HP piece of equipment. It is worse for people working in the Atlantic because of the drive, there, one and a half hours each way to get there and get home.

Captain 48: Your senses must be accurate. Your state of awareness must be high. When you prepare for your duty, you work 10 or 11 hours, on average. But from the reporting station to the end of the reporting station, you must be focused.

How many hours do you work in an average shift ?

Captain 49: In an average week C will work between 70 and 80 hours a week, C will avoid overtime as much as possible.

Captain 48: In C's case the first shift 80 hours, 10 hours per day.

What is the longest shift you have worked?

Captain 49: Once worked 17 hours, maybe twice in C life. It's common to work 12 hours each day during the 0800 to 1600 days. Midnight shift also. The 1600 to midnight less so.

Captain 48: With the Neo operations, from 0800 to 1600 can get extended to 2000 to 2100 five days in a row. 13 hours every day can happen. That happens when C takes a Neo through and C's relief doesn't come, due to traffic, and C will work four hours beyond C duty.

What are the written hours of service rules for tugboat captains?

Captain 48: As far as C knows there are no rules. If C is fatigued after 10 hours and asks for C relief, C will be written up for wanting to go home after 10 hours. That is why there is now a struggle. They feel fatigued all the time. There is only one captain on the tugboats for the Neos through the Canal. You can be fatigued in less than eight hours. Those operations on the Neo, C is under more stress. C is alone and can't have a meal when C needs to or go to the toilet. Instead of being happy C is really pissed off, C is treated like a child. C needs someone there to support C.

Captain 49: There is nothing written about how many hours you can work. There is a practice that has emerged that after 12 hours you can ask for relief and put the boat out of service. There is nothing written officially. C can put the boat out of service after 12 hours, but C cannot leave the boat until the relief comes. The only thing that is written is that your working period of time is eight hours. After that there is nothing that is official. Most of the accidents happen in the last two days of the midnight shift. People are tired.

What is it about your job that you like the most?

Captain 48: C used to like the manoeuvres. When you help someone, and assist C, you feel good. You've done your job. But C feels that it is not going well. If management continues like this there will be an accident. Further, if you know that after 10 hours of duty if you ask for relief and you know that some colleagues are under investigation for saying they are fatigued working less than 12 hours, this puts stress on us. That is what is happening now. There was a captain that fell asleep and the next thing C demanded relief and C took leave anyway because C was so tired.

Captain 49: The job is fun. There are always different scenarios every day. As profession it demands a lot from C and C likes that. It's not a boring job. You have different ships every day, you are with your crew; you can cook and build rapport with your guys. But the schedules are killing them. And when you're tired and angry the whole scenario changes.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 48: C would hire more captains, work on the rotations. For the Cocoli operations have another captain there to support, or qualified mate. You need someone there. Before these rotations, it had been like this 40 or 50 years, but in those days the Canal was not in its full capacity. Probably from 0800 to 1600 [you would do] maybe three manoeuvres. Nowadays the old canal is at full capacity. There is no chance for anything. There is nothing written saying that C has an hour to eat because then they have the time to do that.

Captain 49: Change the schedules. C would schedule the operation when it gets crossed with the peaks of the operation. For example, at 1600 to midnight, that is the time when the ships are entering the channel so the relief can be a problem. When you end a shift at 0800 that is when ships are entering Cocoli. When you place a captain in a shift at 0200, say another shift, having a relief will be possible. Also, road traffic is a problem because at 1600 it can take the relief two hours to get to a point that at night will take 10 minutes. If you get to Cocoli at that time, it will be a while before your relief gets there. C doesn't feel that they are taking these options seriously because they are not providing a safe operation for that type of environment. The locks are not a good place to have reliefs. They are proposing solutions that are not safe. In case of the operations for the new canal, it is dangerous to be alone on the bridge. You need help there. C doesn't care if it's a captain or a mate, there must be someone who can take the controls if C needs to go to the toilet, eat, or even get up from the chair. After four or five hours at the controls with the shifts they are doing they need to address their human needs.

CAPTAINS 50 & 51

Captain 50: Captain for 20 years

Captain 51: Captain for 35 years

Sleep quality and quantity

Captain 51: Sometimes after waking up to go to the bathroom C can't go back to sleep.

Captain 50: C has no problems falling asleep. The problem is that C had a hard time sleeping when in the academy so C can take a nap when needed and get a nap. It bothers C because with the rotation and shift work and shifting the nap time, C does not have a sequential sleeping order. C cannot speak for other people, but C has developed the ability to rest and keep on going, and depending on the shift C is on it's problem. For C the 1600 to midnight is the worst shift. It is the worst because you have the entire day to run errands. Then you start working at 1600 and then our mindset is to rest, but you have a lot of ships coming through, and then it's 1130 at night and they call and say that they need your tugboats at Diablo so in this shift you never rest. In C's mind the 1600 to midnight shift you have southbounds and northbounds you never rest, and you are tired. In the middle of it your relief doesn't come.

Captain 51: Before, a normal watch was three jobs maybe four, so there was a lot of rest time, but today, they're getting more ships and when you're working a Neo you're dedicated to being alert for three hours straight, sometimes more if there's a delay, and the ship has to stand on the wall and you extend that concentration period more than your used to. It's not like you can kick back because you have to be alert.

Captain 50: There's a little zone where nothing happens and you have the propeller wash of the vessel, if that ship slows down for some reason you will go into the counter the rudder of the vessel, depending on how light the vessel is.

When you are not working, what time do you typically go to bed and wake up?

Captain 50: Now C has been on leave for the past three weeks, C goes to sleep at 2100 and wakes up at 0700. The body never gets accustomed to the fact that you keep changing your schedule. By the time you get the rhythm going it's time to change again. Then on the next watch instead of the rotation going backwards it does the other way around.

Captain 51: You're supposed to get two days off between shifts, but you don't get a full day of leave because you have to prepare for it.

Captain 50: Had the rotation gone forward rather than backward you can have a better quality rest. As parents they can't have the quality time with kids because they are active. The idea that as a normal parent you want to spend time with your family and now because of the amount of work that there is, and the fact is they need to work and the only way they can get more money is to get overtime, and that overtime happens on your day off. And this collides with the fact that you need to be a parent.

Captain 51: The real problem isn't the changing shifts, it's doing it for a minimum of six to seven nights, at the end the last one is a piece of cake, but the six prior you are really tired and if you have a young family when you get off it, you're expected to do things with the family. The problem is the sequential shifts that go on long. The seven days is what causes the fatigue. Even one day off will make it easier.

Skills necessary to properly move ships through the Canal

a. Behavioural/cognitive

Captain 50: You need to understand the position you are in, people need to learn to operate the tugboat innately rather than just knowing how to drive it. Things can go wrong quickly and you need to know how to correct it quickly. You have to know what to do to avoid that type of situation. But at the same time you have to understand what is going on, the operation, the pilot. With a lack of communication, you need to be more aware of what is going on. You need to distinguish the information coming out of each radio. It's important to know what you're doing and how to do it, and when to do it, you have to express it to your crew as well so that everyone understands what to do. Then you have to motivate them enough so that they can put their lives in your expertise. You need to be on top of everything. That is under appreciated. The crew that you talk to everyday doesn't really understand your part in the operation. Instinct is critical.

Captain 50: C was involved in training for the Neos in the new locks. The idea was to have them practice in the simulator and have them know what to do as well. C knows for a fact that working with them when they were mates; C knows how they operate. Trying to push the envelope was very difficult for them. Their mindset was already set. Add to that lack of motivation, a real captain has to push the envelope every day. Any given manoeuvre can be done better. He is sure the administration sees that. People have decided to stay where they are rather than trying to improve.

Captain 51: You also need communication and leadership skills to manage your crew, specifically when things go wrong. The crew just expects you to come back safely every day. One of the things that is understated, is that the training can't be minimised, and there is the need to continue the training. One thing is moving the ship from chamber to chamber a ship can create a lot of wash. That takes a lot of practice. There are other captains that will tell the new mates something else. If you're well trained, you are better prepared for this and can respond better.

Captain 51: When this job started it was fun. They would rather work than go home. As things began to change and the way the administration's culture changed managing the whole operation, the morale changed. A pilot told C when C started C used to have fun, then it became work. The way they micromanage things, now it's just work. The sad thing for C is that C watched it happen. It's sad to see the morale get so bad. In this past year C has never see morale this bad.

Captain 50: You have some that are not necessarily willing to stay 20 hours at work, they enjoy what they are doing, and are getting paid for it. Their morale has not tanked yet. They have a different mindset than everyone else. They have a group that is saying they are only here for eight hours, and then I am going home.

There is no heartfelt commitment to doing your best. There are many pilots and tugboat captains that become adversarial rather than working together. This is happening more and more. There is a lack of good management. No written procedures of how they will do things.

Captain 51: When you are negotiating with different units and one gets a lot and the others don't that destroys working together as a team. Before your salary was that of a GS-12, controlled by Congress, and that was it. Now they only have five steps and by the time you get to be a senior captain you either retire or became a pilot. Now things are frozen at the step.

The whole management tack has destroyed morale. It takes people's heartfelt commitment to change. One of the things is that they tied their salaries to the pilots. And they don't want to negotiate with them. The upper guys are not getting enough themselves.

As an older captain what C sees wrong is how bad it is that they blatantly allow a tugboat captain to work until C is fatigued. A regular pay period is 80 hours, There are captains who choose to work another 100 hours. Someone working 16 hours a day, seven days a week, will not be sharp when needed. They're not honest in what they want them to do. There is no effort to protect the employee, only harass the employee.

What are the written hours of service rules for tugboat captains?

Captain 51: There are no rules. They use the US Coast Guard rules when they want to.

Captain 50: The rules are not to work over 12 hours, but if your relief is still at the office then you're not being relieved. There are rules in the convention.

Captain 51: When they do that, if you have an accident and say you were fatigued, they say it's your fault. Now you have some captains who will put the boat out of service after 12 hours. Now they want to sanction the captains for taking the boat out of service because of fatigue.

Captain 50: The contract doesn't limit you but says you are not supposed to work more than 12 hours.

Captain 51: According to Panamanian law, the law doesn't apply here to their waters. The Canal is not sea but they are inland waters, and therefore they don't have to comply with the rules. This is part of the mindset that is creating the monster morale.

Captain 50: Even with IMO and SOLAS, before the new locks, all these rules that needed to be attended to, weren't. Once they did the new [STCW-Manila] convention, those rules went out the window and were not included in the rule. Legally, SOLAS, IMO, STCW do not apply, even though Panama has signed off on them. Now the Canal says you can't go against their own constitution. The maritime world operates with these rules and regulations.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 50: C would change the schedule; have a four day week, with two days in between. Instead of shift work, C would work like the pilots, by assignments. That way everyone knows that they are to relieve a particular pilot, just asking personnel to a certain tugboat, for a certain shift. This may be confusing at the beginning, but everyone will have a day off that is scheduled, and the others would come in on their assigned days. If you worked at midnight the next day you will shift every 14 -16 hours of rest, you will go the next shift.

CAPTAINS 52 & 53

Captain 52: Captain for six years

Captain 53: Captain for 25 years.

Sleep quality and quantity

Captain 52: C has missed work several times because C not slept because of insomnia. C has to go to the doctor and get a certificate. C has an irregular schedule. Next week C will be 0800 to 1600, then 0500 to 1300 then the last day C will finish at Colon, drive one and a half hours, try to sleep, then start work again at midnight. In Colon there are irregular shifts for 10 of them.

If in a week C has different schedules C will have trouble either getting up or falling asleep because the schedule is so irregular. The one that causes the most fatigue is the 0800 to 1600. Not the midnight. Once C is done with the midnight watch C just goes to sleep. Every now and then C gets insomnia. Doesn't take any medication for it. When C gets insomnia it lasts for a few days, so far.

Captain 53: No problems falling asleep. In general, no problems C has been blessed so far. C tries to do some kind of physical activity when C gets off watch so that when C gets to bed C can sleep. Basically C has no problems. But C understands that C is the exception and not the rule. A lot of people complain about difficulty sleeping.

When you are not working, what time do you typically go to bed and wake up?

Captain 52: When on vacation C goes to sleep at 2300 and gets up at 0700 to 0800.

Captain 53: Now that C is working in the office, C goes to bed at 2200 and up at 0600. When on rotation C has to sleep six hours and it does not feel like it's enough. It is difficult when you are on rotation, because in addition to your family life you have to do errands, and it makes it hard to get the full hours of sleep. The amount of sleep you get depends on what schedule you get. On the 0800 to 1600 watch, this is close to what most people sleep, C can be home between 1800 and 1900, and sometimes C gets home after that. Then C gets up at 0630 or 0700. No problems doing that with that watch, but with the 1600 to midnight watch C gets home between 0100 and 0300 and C has little kids and will usually get up before C wants to, like 0700 or 0800 Then once you are awake it is hard to go back to sleep.

On the midnight watch by the time C gets off work it would be after 1000, there are only a few occasions that you will get off at 0800, and this is before they took the second captain away. This is what C used to do before July 1. On the midnight watch C will go home, sleep about four to five hours, do what C has to do, family time, and will go back to sleep again at 2100-2200 and try to sleep again before working at midnight, and do this again for seven days. If for only three days C can do it, but for seven days it is brutal.

Captain 52: C has to drive to Colon and the relieving stations are closer by. C might get off at 0830 or 0900, then drive for one hour 20 minutes, but C doesn't have kids so C goes home, goes to sleep, then will wake up around 1900, grab dinner and will go back to work.

Captain 53: C is lucky C lives right there, only four or five captains can say that. If they get on the wrong end of the traffic jam they will get home whenever.

Captain 52: C lives near the highway and that saves a lot of time in traffic. C doesn't do overtime. They can call C if all they want but C won't do it.

Skills necessary to properly move ships through the Canal

Captain 52: Must focus for a long period of time. Attention to details Must be able to think quickly and correctly and must have good situational awareness for everything that is going on around you. Knowledge of what the tugboat is trying to do, what the pilot is trying to do and the ability to focus on multiple tasks at one time, what the tugboat is doing, the other tugboat, the ship, and what the pilot is doing.

Captain 53: In addition to that, you have to develop resilience and mental toughness and must withstand the crap that management is trying to do each time. The stress of the job is one thing, but every day the people don't know what management will try to do with them. Those are the guys who are outside the group of 25 who are being investigated as a result of the third seaman fiasco in April. They also have four more guys in the union being investigated. So, you have to be resilient and have a strong defence against what you're facing, some people break down, they have a lot of new cases of anxiety and depression.

What is the longest shift you have worked? How many hours is an average week?

Captain 52: In Colon will work about nine hours each day. But C has to drive one and a half hours each day. For C, that's almost 11 or 12 hours each day, driving either a tugboat or a car. And that's without traffic.

Captain 53: C doesn't work on C's day off and hasn't done it in 25 years. When C has to stay over most of the time C will do it. If C has to come early, C may not. C would do, in the Pacific, about 20 hours of overtime in a pay period, or about four hours a day.

What are the written hours of service rules for tugboat captains?

Captain 52: There are no rules. They say they stay within SOLAS, but C says that this isn't true. In a ship you really do get 10 hours of sleep. On the ACP tugboats you have to drive, then get home, so C doesn't get to bed two to four hours later, depending on where you leave. They claim that is the rule, but C has never seen it. He has seen captains work 20 and 26 hours straight. It's not usual, but C has never heard anyone say no. It goes against the ILO treaty.

Captain 53: In the contract they encourage it. When you don't have relief you split the watch, eight hours plus half of the other shift. There is no regulation on this. On the other hand, it's important to know that one of the things they're doing, according to management, [is compiling] a list of sanctions and faults that the employee do. One of them is that you are obliged to do overtime if required to do so. They have told some guys that they cannot leave work until relieved. Two guys are facing sanctions because the manager said that C can make them do overtime if they want them to.

What is it about your job that you like the most?

Captain 52: C likes the fact that you have to know your craft and know the technical stuff about ship handling. You have to not just know it but apply it as well. You get to apply it in real situations.

Captain 53: C likes that you are basically your own boss, you're in charge, not tied to a desk and are in charge of people. C creates a team of people that is like a home away from home. The job can be monotonous, but it is a good job that offers a lot of opportunities to develop a lot of personal traits like leadership.

What is it about your job that you don't like?

Captain 52: C doesn't like the company, he doesn't like the way the schedules are constructed, how they work with the schedules, it's like you're working with the minimum number of people, without considering sleep, family time. C feels that C has to sacrifice a lot more than the company either from C family or C sleep. C has to travel to and from Colon to work, and the rest take from C family or don't sleep and probably have an accident the next day. C really doesn't like the scheduling.

Captain 53: It's not the company, it's the people who are running the company. The Canal, and their attentions, and how they neglect the value of the workforce and what they mean to the Canal and to the country. On the other hand C hates the work schedule. Twenty years earlier there wasn't that much trouble with those schedules. But the combination of age and experience and the increase in workload has made these schedules unmanageable. There is no way someone can handle it. It feels like they are killing them slowly. The management should be removed. They won't listen.

Captain 52: Management has said that the ILO rules will apply only when they say.

The ACP acts like they make their own laws. If the ACP does not approve the regulation or that international norm, it will not apply to the Canal. That is how they see it. They pick and choose what they follow.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 52: C would either reduce the amount of hours in a shift, or reduce the amount of days in a schedule, say four days a week then three off. C would change the way they do schedules. In cases where they will be more than two or three hours at the controls, C would provide a relief. If you're escorting a ship from the Pacific to the Atlantic side, that is 10 hours plus with an LNG vessel, that is brutal. You can lose awareness because staying at the controls, it's monotonous, and you can lose focus, all the things that lead to accidents.

Captain 53: In addition to what captain 52 said, they need to hire a lot more people. Despite the amount of people, they have they don't have enough people to run both the old and the new canals and there is no way to alter the schedules without more people.

Right now, the schedules depend on the barest minimum number of people needed to run the tugboat operations. Whatever schedule they come up with will need more people.

Captain 53: They are running the operation by using the stick of overtime to get people to work on their days off. If something happened to a guy who was coming to work, then they are in real trouble. A lot of people are not as willing as they used to be to do overtime. It will be even more difficult to sustain it. C heard that they will offer people two hours to get there early. This will add to overtime to other people as well.

Captain 52: Working 40 hours a week, working four days, 10 hours, and then get three days off. Working 0800 to 1800 C's relief comes in at 1600 and C has two hours to relieve C. Then get three days off. For the administration this will create a problem for some watches they will need an extra captain. And for one watch they will need two captains instead of one. At the end of the day they will need more people.

CAPTAINS 54 & 55

Captain 54: Captain for 4 years

Captain 55: Captain 40 years

Sleep quality and quantity

Captain 54: When C works the midnight to 0800 shift and from 1600 to 2400, after the shift C cannot sleep, and when C tries to relax C can't. But when C is getting near the time C goes to work, then C sleeps.

Captain 55: When your body gets tired you feel sleepy. C doesn't get it as much because C doesn't get many midnight shifts. But on the midnight shift, that's where you have the bulk of work for the one ending transit and the one starting transit. The bulk of their people get stuck on the midnight and get stuck on the 1600 to midnight.

Captain 55: When you finish the job, you start to go another location. You may go from Gatun to the Pacific because you may go with an LNG and [it will need to] be escorted the whole way. That is very bad.

Captain 55: And when you are tired when you make up, to C you can get a little break. But you may be assigned when you are really beat up. Everyone gets exposed to this at sometimes. The tugboat escorting the LNG is in worse shape than the guy made up to C. That's the problem. And somebody should see this, but they have the worst idiots running things. It's a matter of knowledge and common sense. The guy will be lucky if C gets relieved in Gamboa. And that is an accident waiting to happen.

Skills necessary to properly move ships through the Canal

Captain 55: Must be alert. That is the most important. Not more than that. You must be able to see the things before they happen. They do fewer mistakes with a pencil than they do with each operation they do. One mistake can lead to a million dollar loss and loss of life. C enjoys C's time on the job, but it's getting worse.

Captain 54: You need to be always alert, aware of everything and you need to be aware of your crew, the pilots, the MTC, with all the people in the administration and the managers. You must have the kind of mix, and management [that knows] how to treat people and knowledge to do the job in a safe way and to know what situations are becoming dangerous.

What is the longest shift you have worked? How many hours is an average week?

Captain 55: In a seven-day period how many hours you put in depends. You will put in 10 hours a day minimum. But you can put in 16 or 17. It depends what you get. If you get a ship going from the Atlantic to the Pacific that ship may have to be escorted all the way to the Pacific.

Captain 54: It depends. Sometimes you may have a relief at the landing and you depart the landing and your relief will be there after six jobs, or after working continuously 10 to 12 hours. This is a normal day.

Captain 55: It all depends on what happens. You can go to the Atlantic and your relief can get stuck in traffic. But if people don't care about those things, what can be done to help out.

Captain 55: The most C has worked in one day was 15 or 16 continuous hours. This was because there was no relief.

Captain 54: It depends on where you are. If you are in Gamboa it is two hours to get to Gatun. And you don't get a relief.

What are the written hours of service rules for tugboat captains?

Captain 55: Before 1999 the maximum number of hours was 12 hours, now there is no policy.

Captain 54: There is no regulation on the maximum you can work. Now they are investigating captains who have refused to work after eight hours. One person put the boat out of service after working 10 hours, C said that C was too tired to continue working. They want to fire C. And there are more investigations going on.

Captain 55: The regulations that C remembers, allowed C to put the boat out of service after 12 hours. Then there was a request for clarification. They were then under FLRA jurisdiction. The 12 hours shift that they could stop was gone. There is an OSHA regulation that says you can't work more than 12 hours. It's in limbo. They don't want to put it in writing. They are fighting for that.

Captain 54: They will send you an ambulance if you say you are too fatigued to work.

What is it about your job that you like the most?

Captain 54: C likes the job except the fog watches.

Captain 55: C doesn't like making running light from Gamboa to Gatun. C gets upset. The job is fun. C enjoys everything but the running light.

What is it about your job that you dislike the most?

Captain 54: C doesn't like the situation they have now with no proper regulations with fatigue, working overtime. The way the administration is treating the tugboat captains now. That's the other thing.

Captain 55: C hates the running light from Gamboa to Gatun. The rest C enjoys.

What changes would you make to ensure that tugboat captains were not fatigued when they were working?

Captain 55: It's not easy. It depends on good planning. First you must have more planning. They have to correct the lack of people. Then negotiate with the union on an alternate way of working so that you have the peaks of work covered without affecting their rest. Or the people coming in are available to relieve the people who need it. It is dangerous to change reliefs in the locks. One person fell off in the lock. One lineman fell into a tugboat and lost C's life. C thinks that they must work with the union to determine the bulk of the work. You need to make sure the people will be relieved when needed and to do that you need planning and have people available. You don't do that with what they have now.

Captain 54: The first thing they need to do is address the working environment. Between the administration and tugboat captains the relationship is bad. Then they need to negotiate together to fix the environment. They need to develop new schedules that prevent working continuous days. Now they work seven consecutive days. C thinks they need to reduce the number of days they work continuously.

They need to change the schedules that are better with the peaks they have of the operations. They also need to regulate the hours and how many hours they work. The administration must pay more attention to safety. They are paying more attention to income than have safety on the maritime operations in the Canal. Those things need to be addressed.

APPENDIX 4 START AND STOP SHIFT TIMES OF TUGBOAT CAPTAINS

The numerical identity of the captains is different from those used in Appendix 3. The format of the data presented varies in an effort to maintain, to the extent possible, the formats used by the captains who provided this information. Continuous time refers to the hours of continuous duty when the duty time extended into the following date.

- Continuous hours on duty (12 or more)
- More continuous hours on duty (14 or more)

CAPTAIN 1

Date	Time started	Time stopped	Total hours	Continuous time
10 June 2018	0:00	9:22	9:22	
11 June 2018	0:00	10:17	10:17	
12 June 2018	0:00	10:22	10:22	
13 June 2018	0:00	10:22	10:22	
14 June 2018	0:00	9:34	9:34	
15 June 2018				
16 June 2018				
17 June 2018				
18 June 2018				
19 June 2018	16:00	0:00	8:00	
20 June 2018	0:00	1:16	1:16	9:16
	16:00	0:16	8:16	
21 June 2018	16:00	0:00	8:00	
22 June 2018	0:00	0:22	0:22	8:22
	16:00	0:00	8:00	
23 June 2018	0:00	0:28	0:28	8:28
	16:00	0:00	8:00	8:00
24 June 2018	16:00	0:00	8:00	
25 June 2018	0:00	05:22	5:22	13:22
26 June 2018				
27 June 2018	8:00	18:10	10:10	
28 June 2018	8:00	17:22	9:00	
29 June 2018	8:00	22:34	14:34	
30 June 2018	8:00	20:34	12:34	
01 July 2018	8:00	21:04	4:00	
02 July 2018	8:00	19:28	13:28	
03 July 2018	8:00	20:40	12:40	
04 July 2018				
05 July 2018				
06 July 2018	0:00	10:40	10:10	
07 July 2018	0:00	9:16	9:16	
08 July 2018	0:00	13:40	13:40	

09 July 2018	0:00	11:00	11:00	
10 July 2018	0:00	10:52	10:52	
11 July 2018	0:00	10:16	10:10	
12 July 2018	0:00	10:00	10:00	
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018	16:00	0:00	8:00	
18 July 2018	0:00	0:22	0:22	8:22
	16:00	0:00	8:00	
19 July 2018	0:00	0:22	0:22	8:22
	16:00	0:00	8:16	
20 July 2018	0:00	0:16	0:16	8:16
	16:00	0:00	8:00	
21 July 2018	0:00	0:22	0:22	8:22
	16:00	0:28	8:28	
22 July 2018	16:00	05:10	13:10	
23 July 2018				
24 July 2018				
25 July 2018	8:00	19:00	11:00	
26 July 2018	8:00	21:34	13:34	
27 July 2018	8:00	18:34	10:34	
28 July 2018	8:00	19:10	11:10	
29 July 2018	8:00	17:28	9:28	
30 July 2018	8:00	17:04	9:04	
31 July 2018	8:00	20:00	12:00	
01 August 2018				
02 August 2018				
03 August 2018	0:00	10:34	10:34	
04 August 2018	0:00	10:40	10:40	
05 August 2018	0:00	10:40	10:40	
06 August 2018	0:00	10:40	10:40	
07 August 2018	0:00	9:34	9:34	
08 August 2018	0:00	9:00	9:00	
09 August 2018	0:00	9:04	9:04	
10 August 2018				
11 August 2018				
12 August 2018				
13 August 2018				
14 August 2018	13:00	21:00	8:00	
15 August 2018	13:00	21:00	8:00	
16 August 2018	13:00	21:00	8:00	
17 August 2018	13:00	22:04	9:04	
18 August 2018	13:00	21:00	8:00	

CAPTAIN 2

Date	Time started	Time stopped	Total hours	Continuous time
27 May 2018	13:00	21:00	8:00	
28 May 2018	13:00	0:00	11:00	
29 May 2018	0:00	0:05	0:05	11:05
	13:00	21:00	9:00	
30 May 2018				
31 May 2018				
01 June 2018	5:00	12:00	7:00	
02 June 2018	5:00	13:00	8:00	
03 June 2018	5:00	16:20	11:20	
04 June 2018	5:00	20:00	15:00	
05 June 2018	5:00	13:20	8:20	
06 June 2018	5:00	17:25	12:25	
07 June 2018	5:00	13:20	7:20	
08 June 2018				
09 June 2018				
10 June 2018	16:00	0:00	8:00	
11 June 2018	0:00	1:40	1:40	
12 June 2018	13:00	21:00	8:00	
13 June 2018	16:00	0:00	8:00	
14 June 2018	0:00	0:20	0:20	8:20
	16:00	0:00	8:00	
15 June 2018	0:00	1:05	1:05	9:05
	16:00	0:00	8:00	
16 June 2018	0:00	4:55	4:55	12:55
	16:00	0:00	8:00	
17 June 2018	0:00	1:55	1:55	9:55
	13:00	21:48	11:43	
18 June 2018	13:00	21:00	8:00	
19 June 2018	15:00	20:00	5:00	
20 June 2018				
21 June 2018				
22 June 2018	6:00	15:50	9:50	
23 June 2018	6:00	15:10	9:10	
24 June 2018				
25 June 2018	13:00	18:00	5:00	
26 June 2018	13:00	21:00	8:00	
27 June 2018	13:00	21:00	8:00	
28 June 2018	13:00	0:00	11:00	
29 June 2018	13:00	22:40	9:40	
30 June 2018	13:00	21:25	8:25	
01 July 2018	8:00	17:10	9:10	
02 July 2018	8:00	16:00	8:00	
03 July 2018	8:00	16:00	8:00	

04 July 2018			
05 July 2018			
06 July 2018	0:00	9:20	9:20
07 July 2018	0:00	9:00	9:00

CAPTAIN 3

Date	Time started	Time stopped	Total hours	Continuous time
24 June 2018	0:00	8:45	8:45	
25 June 2018	0:00	10:35	10:35	
26 June 2018	0:00	10:00	10:00	
27 June 2018	0:00	11:35	11:35	
28 June 2018	0:00	8:00	8:00	
29 June 2018				
30 June 2018				
01 July 2018				
02 July 2018	16:00	0:00	8:00	
03 July 2018	0:00	4:50	4:50	12:50
04 July 2018	16:00	0:00	8:10	
	0:00	6:10	6:10	
05 July 2018	16:00	0:00	8:00	
	0:00	0:35	0:35	8:35
06 July 2018	16:00	0:00	8:00	
	0:00	0:35	0:35	8:35
07 July 2018	16:00	0:00	8:00	
	0:00	0:50	0:50	8:50
08 July 2018	16:00	0:00	8:00	
	0:00	1:00	1:00	9:00
09 July 2018	16:00	0:00	8:00	8:00
10 July 2018	0:00	1:05	1:05	9:05
11 July 2018				
12 July 2018	8:00	18:50	10:50	
13 July 2018	8:00	16:35	8:35	
14 July 2018	8:00	18:35	10:35	
15 July 2018	8:00	17:20	9:20	
16 July 2018				
17 July 2018				
18 July 2018				
19 July 2018				
20 July 2018	0:00	13:10	13:10	
21 July 2018	0:00	12:10	12:10	
22 July 2018	0:00	14:00	14:00	
23 July 2018	0:00	13:30	13:30	

24 July 2018	0:00	15:00	15:00	
25 July 2018	0:00	12:00	12:00	
26 July 2018	0:00	10:35	10:35	
27 July 2018				
28 July 2018				
29 July 2018				
30 July 2018				
31 July 2018	16:00	0:00	8:00	
01 August 2018	0:00	1:00	1:00	9:00
	16:00	0:00	8:00	
02 August 2018	0:00	5:30	5:30	13:30
	16:00	0:00	8:00	
03 August 2018	0:00	0:35	0:35	8:35
	16:00	0:00	8:00	
04 August 2018	0:00	0:35	0:35	
	16:00	0:00	8:00	
05 August 2018	0:00	1:30	1:30	9:30
	16:00	0:00	8:00	
06 August 2018	0:00	1:30	1:30	9:30
	16:00	0:00	8:00	
07 August 2018	0:00	0:20	0:20	8:20
08 August 2018				
09 August 2018	8:00	19:20	9:20	
10 August 2018	8:00	21:20	13:20	
11 August 2018	8:00	19:10	11:10	
12 August 2018	8:00	22:40	14:40	
13 August 2018	8:00	18:00	10:00	
14 August 2018	8:00	20:40	12:40	
15 August 2018				
16 August 2018				
17 August 2018	0:00	11:10	11:10	
18 August 2018	0:00	10:20	10:20	

CAPTAIN 4

Date	Time started	Time stopped	Total hours	Continuous time
01 July 2018	8:00	16:36	8:36	
02 July 2018	8:00	16:00	8:00	
03 July 2018	8:00	16:00	8:00	
04 July 2018				
05 July 2018				
06 July 2018	0:00	8:36	8:36	
07 July 2018	0:00	9:00	9:00	
08 July 2018	0:00	8:00	8:00	

09 July 2018	0:00	8:00	8:00	
10 July 2018	0:00	8:00	8:00	
11 July 2018	0:00	9:06	9:06	
12 July 2018	0:00	9:30	9:30	
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018				
18 July 2018				
19 July 2018				
20 July 2018				
21 July 2018				
22 July 2018				
23 July 2018				
24 July 2018				
25 July 2018				
26 July 2018				
27 July 2018				
28 July 2018				
29 July 2018				
30 July 2018				
31 July 2018				
01 August 2018				
02 August 2018				
03 August 2018	0:00	9:12	9:12	
04 August 2018	0:00	8:48	8:48	
05 August 2018	0:00	8:48	8:48	
06 August 2018	0:00	9:36	9:36	
07 August 2018	0:00	8:00	8:00	
08 August 2018	0:00	8:42	8:42	
09 August 2018	0:00	8:00	8:00	
10 August 2018				
11 August 2018				
12 August 2018				
13 August 2018	16:00	0:00	8:00	
14 August 2018	0:00	2:04	2:04	10:04
	16:00	0:00	8:00	
15 August 2018	0:00	0:48	0:48	8:48
	16:00	0:00	8:00	
16 August 2018	0:00	0:48	0:48	8:48
	16:00	0:00	8:00	
17 August 2018	0:00	1:48	1:48	9:48
	16:00	0:00	8:00	
18 August 2018	0:00	0:10		8:10

	16:00	0:00	8:00	
19 August 2018	0:00	0:25	0:25	8:25

CAPTAIN 5

Date	Time started	Time stopped	Total hours	Continuous time
06 June 2018	20:00	0:00	4:00	
07 June 2018	0:00	0:04	9:04	13:04
08 June 2018				
09 June 2018				
10 June 2018	20:00	0:00	4:00	
11 June 2018	0:00	8:35	8:35	12:04
	20:00	0:00	4:00	
12 June 2018	0:00	9:52	9:52	13:42
13 June 2018	0:00	9:16	9:16	
14 June 2018	0:00	9:00	9:00	
15 June 2018				
16 June 2018				
17 June 2018				
18 June 2018	16:00	0:00		
19 June 2018	0:00	1:34	9:34	
	16:00	0:00		
20 June 2018	0:00	1:22	9:22	
	12:00	0:00	12:00	
21 June 2018	0:00	0:52	0:52	12:52
	12:00	0:00	12:00	
22 June 2018	0:00	0:46	0:46	12:46
	12:00	0:00	12:00	
23 June 2018	0:00	0:30	0:30	12:30
24 June 2018	16:00	0:00	8:00	
25 June 2018	0:00	1:22	1:22	9:22
26 June 2018				
27 June 2018	8:00	17:22	9:22	
28 June 2018	8:00	17:23	9:23	
29 June 2018	8:00	17:17	9:17	
30 June 2018	8:00	17:35	9:35	
01 July 2018	8:00	16:25	8:25	
02 July 2018	8:00	22:30	14:30	
03 July 2018	8:00	19:34	11:34	
04 July 2018				
05 July 2018				
06 July 2018	0:00	9:30	9:30	
07 July 2018	0:00	10:36	10:36	
08 July 2018	0:00	9:30	9:30	

09 July 2018	0:00	9:23	9:23	
10 July 2018	0:00	10:00	10:00	
11 July 2018	0:00	9:47	9:47	
12 July 2018	0:00	8:40	8:40	
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018	16:00	0:00	8:00	
17 July 2018	0:00	0:15	0:15	8:15
	16:00	0:00	8:00	
18 July 2018	0:00	2:10	2:10	10:10
	16:00	0:00	8:00	
19 July 2018	0:00	0:43	0:43	8:43
	16:00	0:00	8:00	
20 July 2018	0:00	5:30	5:30	13:30
	16:00	0:00	8:00	
21 July 2018	0:00	1:12	1:12	9:12
22 July 2018	16:00	0:30	8:00	
23 July 2018	0:00	0:30	0:30	8:30
24 July 2018				
25 July 2018	8:00	16:18	8:18	
26 July 2018	8:00	18:04	10:04	
27 July 2018	8:00	16:45	8:45	
28 July 2018				
29 July 2018	8:00	17:06	9:06	
30 July 2018	8:00	20:00	12:00	
31 July 2018	8:00	19:19	9:32	
01 August 2018				
02 August 2018				
03 August 2018	0:00	9:13	9:13	
04 August 2018	0:00	10:00	10:00	
05 August 2018	0:00	9:45	9:45	
06 August 2018	0:00	9:50	9:50	
07 August 2018	0:00	10:00	10:00	
08 August 2018	0:00	9:05	9:05	
06 August 2018	0:00	9:50	9:50	
07 August 2018	0:00	10:00	10:00	
08 August 2018	0:00	9:05	9:05	

CAPTAIN 6

Date	Time started	Time stopped	Total hours	Continuous time
27 June 2018				
28 June 2018				
29 June 2018	5:00	14:00	9:00	
30 June 2018				

01 July 2018				
02 July 2018				
03 July 2018	5:00	13:00	8:00	
04 July 2018	5:00	13:00	8:00	
05 July 2018	5:00	13:00	8:00	
06 July 2018				
07 July 2018				
08 July 2018				
09 July 2018				
10 July 2018	13:00	21:00	8:00	
11 July 2018	8:00	16:59	9:59	
12 July 2018	8:00	17:06	9:06	
13 July 2018	13:00	21:30	8:30	
14 July 2018				
15 July 2018	8:00	16:54	8:54	
16 July 2018	5:00	14:12	9:12	
17 July 2018	5:00	1:54	8:54	
18 July 2018				
19 July 2018				
20 July 2018	0:00	11:48	11:48	
21 July 2018	0:00	8:18	8:18	
22 July 2018	0:00	8:12	8:12	
23 July 2018	0:00	10:06	10:06	
24 July 2018	0:00	8:42	8:42	
25 July 2018	8:00	16:42	8:42	
26 July 2018	8:00	16:00	8:00	
27 July 2018				
28 July 2018				
29 July 2018				
30 July 2018	8:00	16:48	8:48	
31 July 2018	8:00	16:00	8:00	
01 August 2018	8:00	16:36	8:36	
02 August 2018	5:00	13:00	8:00	
03 August 2018	0:00	8:12	8:12	
04 August 2018				

CAPTAIN 7

Date	Time started	Time stopped	Total hours	Continuous time
08 July 2018	8:00	17:45	9:45	
09 July 2018	4:00	19:16	11:16	
10 July 2018	8:00	19:05	11:08	
11 July 2018	8:00	18:20	10:05	
12 July 2018				
13 July 2018				
14 July 2018	0:00	10:17	10:17	

15 July 2018	0:00	9:50	9:05	
16 July 2018	0:00	10:16	10:16	
17 July 2018	0:00	10:32	10:32	
18 July 2018	0:00	13:21	13:21	
19 July 2018	0:00	9:11	9:11	
20 July 2018				
21 July 2018				
22 July 2018	8:00	19:26	11:26	
23 July 2018				
24 July 2018	13:00	21:00	9	
25 July 2018	13:00	0:00	11:00	
26 July 2018	0:00	1:04	1:04	12:04
	13:00	22:06	9:06	
27 July 2018	13:00	21:00	9:00	
28 July 2018	8:00	18:42	9:42	
29 July 2018	12:00	0:26	12:00	
30 July 2018	0:00	0:26	0:26	12:26
31 July 2018				
01 August 2018	8:00	16:00	8:00	
02 August 2018	8:00	17:30	9:30	
03 August 2018	8:00	18:01	10:01	
04 August 2018	8:00	18:28	10:28	
05 August 2018	8:00	17:14	9:14	
06 August 2018	8:00	19:04	11:04	
07 August 2018	8:00	19:20	11:20	
08 August 2018				
09 August 2018				
1 August 2018	20:00	09:26	13:26	

CAPTAIN 8

Date	Time started	Time stopped	Total hours	Continuous time
02 June 2018	13:00	19:35	6:35	
03 June 2018	4:00	12:00	8:00	
04 June 2018				
05 June 2018				
06 June 2018				
07 June 2018	8:00	23:10	17:10	
08 June 2018	8:00	18:35	10:35	
09 June 2018				
10 June 2018				
11 June 2018	13:00	21:55	9:55	
12 June 2018	15:00	0:00	9:00	
13 June 2018	0:00	13:35	13:35	22:35
14 June 2018	13:00	0:00	11:00	
15 June 2018	0:00	13:00	13:00	24:00

16 June 2018	0:00	9:22	9:22	
17 June 2018	0:00	9:30	9:30	
18 June 2018	13:00	22:00	9:00	
19 June 2018				
20 June 2018				
21 June 2018				
22 June 2018	21:00	21:22	0:22	
23 June 2018	0:00	9:12	9:22	
24 June 2018	0:00	5:40	5:40	
25 June 2018				
26 June 2018	8:00	9:30	1:30	
27 June 2018	8:00	10:30	2:30	
28 June 2018	8:00	10:10	2:10	
29 June 2018	8:00	8:34	0:34	
30 June 2018	14:00	21:35	9:35	
01 July 2018	0:00	9:00	9:00	
02 July 2018	8:00	19:23	11:23	
03 July 2018				
04 July 2018				
05 July 2018				
06 July 2018	0:00	10:09	10:09	
07 July 2018	0:00	9:55	9:55	
08 July 2018	0:00	9:18	9:18	
09 July 2018				
10 July 2018				
11 July 2018				
12 July 2018				
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018	13:00	22:05	9:05	
17 July 2018	16:00	0:00	8:00	
18 July 2018	0:00	0:53	0:53	8:53
	16:00	0:00	8:00	
19 July 2018				
20 July 2018				
21 July 2018	0:00	6:00	6:00	
22 July 2018	0:00	10:10	10:10	
23 July 2018	0:00	8:52	8:52	
24 July 2018				
25 July 2018				
26 July 2018				
27 July 2018	0:00	11:53	11:53	
28 July 2018	0:00	6:59	6:59	
29 July 2018	0:00	8:00	8:00	

CAPTAIN 9

Date	Time started	Time stopped	Total hours	Continuous time
20 May 2018	16:00	0:00	8:00	
21 May 2018	0:00	4:40	4:40	12:40
	16:00	0:00	8:00	
22 May 2018	0:00	0:40	0:40	8:40
23 May 2018				
24 May 2018	8:00	16:00	8:00	
25 May 2018	8:00	18:54	10:54	
26 May 2018	8:00	19:00	11:00	
27 May 2018				
28 May 2018				
29 May 2018				
30 May 2018				
31 May 2018				
01 June 2018				
02 June 2018				
03 June 2018				
04 June 2018				
05 June 2018	0:00	10:50	10:50	
06 June 2018	0:00	10:55	10:55	
07 June 2018	0:00	13:00	13:00	
08 June 2018				
09 June 2018				
10 June 2018				
11 June 2018				
12 June 2018	16:00	0:00	8:00	
13 June 2018	16:00	0:00	8:00	
14 June 2018	0:00	2:35	2:35	10:35
	16:00	0:00	8:00	
15 June 2018	0:00	4:00	4:00	12:00
	16:00	0:00	8:00	
16 June 2018	0:00	4:00	4:00	12:00
	16:00	0:00	8:00	
17 June 2018	0:00	4:00	4:00	12:00
	16:00	0:00	8:00	
18 June 2018	0:00	4:00	4:00	12:00
	16:00	0:00	8:00	
19 June 2018	0:00	4:00	4:00	12:00
20 June 2018				
21 June 2018				
22 June 2018				
23 June 2018	8:00	19:05	11:05	
24 June 2018	8:00	20:55	12:55	

25 June 2018				
26 June 2018				
27 June 2018				
28 June 2018				
29 June 2018	0:00	9:05	9:05	
30 June 2018				
01 July 2018				
02 July 2018				
03 July 2018				
04 July 2018				
05 July 2018				
06 July 2018				
07 July 2018				
08 July 2018				
09 July 2018				
10 July 2018				
11 July 2018				
12 July 2018				
13 July 2018				
14 July 2018				
15 July 2018	16:00	0:00	8:00	
16 July 2018	0:00	1:40		
	16:00	0:00	9:40	
17 July 2018	0:00	0:35	0:35	
18 July 2018				
19 July 2018	7:00	15:00	8:00	
20 July 2018	7:00	15:00	8:00	
21 July 2018	8:00	11:50	3:50	
22 July 2018	8:00	20:10	12:10	
23 July 2018	8:00	19:50	11:50	
24 July 2018	8:00	16:00	8:00	
25 July 2018				
26 July 2018				
27 July 2018	8:00	16:00	8:00	
28 July 2018	8:00	16:40	8:40	
29 July 2018				
30 July 2018	0:00	10:00	10:00	
31 July 2018				
01 August 2018	0:00	10:55	10:55	
02 August 2018	0:00	16:00	16:00	
03 August 2018				
04 August 2018				
05 August 2018				
06 August 2018				
07 August 2018	16:00	0:00	8:00	

08 August 2018	16:00	0:00	8:00	
09 August 2018	0:00	1:10	1:10	9:10
	16:00	0:00	9:00	
10 August 2018	16:00	0:00	8:00	
11 August 2018	0:00	0:35	0:35	8:35
	16:00	0:00	8:00	
12 August 2018	0:00	1:00	0:35	8:35
	16:00	0:00	8:00	
13 August 2018	0:00	1:05	1:05	9:05
	16:00	0:00	8:00	
14 August 2018				
15 August 2018				
16 August 2018	8:00	16:00	8:00	

CAPTAIN 10

Date	Time started	Time stopped	Total hours	Continuous time
10-Jun-18	16:00	0:00	8:00	
11 June 2018	0:00	1:20	1:20	9:20
	16:00	5:10	13:10	
12 June 2018	12:00	18:30	6:30	
13 June 2018	0:00	6:50	6:50	
14 June 2018	8:00	23:40	15:40	
15 June 2018	8:00	0:00	16:00	
16 June 2018	0:00	0:40	0:40	16:40
	8:00	23:55	15:55	
17 June 2018	8:00	21:35	11:35	
18 June 2018	8:00	19:25	11:25	
19 June 2018	8:00	18:50	10:50	
20 June 2018	0:00	7:35	7:35	
21 June 2018	4:00	11:05	7:05	
22 June 2018	0:00	10:40	10:40	
23 June 2018	0:00	10:25	10:25	
24 June 2018	0:00	12:35	12:35	
25 June 2018	0:00	13:35	13:35	
26 June 2018	0:00	9:10	9:10	
27 June 2018	0:00	11:40	11:40	
28 June 2018	0:00	17:25	17:25	
29 June 2018	1:00	8:40	7:40	
30 June 2018				
01 July 2018				
02 July 2018				
03 July 2018	16:00	0:00	8:00	
04 July 2018	0:00	0:35	8:35	
	16:00	0:00	8:00	
05 July 2018	0:00	4:35	4:35	12:35

	16:00	2:10	10:10	
06 July 2018				
07 July 2018	16:00	0:35	8:35	
08 July 2018	16:00	0:35	8:35	
09 July 2018	16:00	0:35	8:35	
10 July 2018				
11 July 2018				
12 July 2018	8:00	17:50	9:50	
13 July 2018	8:00	21:10	11:10	
14 July 2018	16:00	3:10	11:10	
15 July 2018	8:00	19:40	11:40	
16 July 2018	8:00	20:05	12:05	
17 July 2018	8:00	18:05	10:05	
18 July 2018				
19 July 2018				
20 July 2018	0:00	10:00	10:00	
21 July 2018	0:00	10:53	10:53	
22 July 2018	0:00	9:50	9:50	
23 July 2018	0:00	14:15	14:15	
24 July 2018	0:00	14:55	14:55	
25 July 2018	0:00	10:30	10:30	
26 July 2018	0:00	10:30	10:30	
27 July 2018				
28 July 2018				
29 July 2018				
30 July 2018				
31 July 2018	16:00	0:00	8:00	
01 August 2018	0:00	0:30	0:30	8:30
02 August 2018	16:00	0:00	8:00	
03 August 2018	0:00	0:50	0:50	8:50
	16:00	0:00	8:00	
04 August 2018	0:00	0:50	0:50	8:50
	16:00	0:50	8:00	
05 August 2018	0:00	0:50	0:50	8:50

CAPTAIN 11

Date	Time started	Time stopped	Total hours	Continuous time
10 June 2018				
11 June 2018				
12 June 2018	12:00	0:00	12:00	
13 June 2018	0:00	0:30	0:30	12:30
	12:00	0:00	12:00	
14 June 2018	0:00	0:23	0:23	12:23
	12:00	0:00	12:00	
15 June 2018	0:00	0:37	0:37	12:37

	16:00	0:00	8:00	
16 June 2018	0:00	5:24	5:24	13:24
	16:00	0:00	8:00	
17 June 2018	0:00	4:43	4:43	12:43
	16:00	0:00	8:00	
18 June 2018	0:00	5:08	5:08	13:08
	16:00	0:00	8:00	
19 June 2018	0:00	4:17	4:17	12:17
20 June 2018				
21 June 2018	4:00	20:23	16:23	
22 June 2018	8:00	18:55	10:55	
23 June 2018	4:00	19:43	15:43	
24 June 2018	8:00	16:55	8:55	
25 June 2018	8:00	17:31	9:31	
26 June 2018	8:00	18:00	10:00	
27 June 2018				
28 June 2018	20:00	0:00	4:00	
29 June 2018	0:00	9:56	9:56	13:56
	21:00	0:00	3:00	
30 June 2018	0:00	10:00	10:00	13:00
01 July 2018	0:00	10:08	10:08	
02 July 2018	0:00	9:17	9:17	
03 July 2018	0:00	9:49	9:49	
04 July 2018	0:00	14:17	14:17	
05 July 2018	0:00	10:13	10:13	
06 July 2018				
07 July 2018				
08 July 2018				
09 July 2018				
10 July 2018	16:00	0:00	8:00	
11 July 2018	0:00	0:30	0:30	8:30
	16:00	8:00	8:00	
12 July 2018	0:00	0:29	0:29	8:29
	16:00	0:00	8:00	
13 July 2018	0:00	0:25	0:25	8:25
	16:00	0:00	8:00	
14 July 2018	0:00	0:24	0:24	8:24
	16:00	0:00	8:00	
15 July 2018	0:00	0:23	0:23	8:23
	16:00	0:00	8:00	
16 July 2018	0:00	0:24	0:24	8:24
	16:00	0:00	8:00	
17 July 2018	0:00	0:24	0:24	8:24
18 July 2018				
19 July 2018	8:00	16:30	8:30	

20 July 2018	8:00	18:48	10:48	
21 July 2018	4:00	19:47	15:47	
22 July 2018	8:00	19:48	11:48	
23 July 2018	8:00	16:30	8:30	
24 July 2018	8:00	20:12	12:12	
25 July 2018				
26 July 2018				
27 July 2018	0:00	10:11	10:11	
28 July 2018	0:00	11:00	11:00	
29 July 2018	5:00	15:36	10:36	
30 July 2018	0:00	10:24	10:24	
31 July 2018	0:00	9:17	9:17	
01 August 2018	8:00	17:12	9:12	
02 August 2018	8:00	16:48	8:48	
03 August 2018	8:00	16:56	8:56	
04 August 2018	8:00	16:36	8:36	
05 August 2018	8:00	16:24	8:24	
06 August 2018	8:00	16:30	8:30	
07 August 2018	8:00	16:00	8:00	
08 August 2018				
09 August 2018				
10 August 2018	0:00	8:12	8:12	
11 August 2018	0:00	9:30	9:30	

CAPTAIN 12

Date	Time started	Time stopped	Total hours	Continuous time
19 July 2018				
20 July 2018				
21 July 2018				
22 July 2018				
23 July 2018				
24 July 2018	16:00	0:00	8:00	
25 July 2018	0:00	4:34	4:34	12:34
	16:00	0:00	8:00	
26 July 2018	0:00	0:46	0:46	8:46
	16:00	0:00	8:00	
27 July 2018	0:00	0:30	0:30	8:30
	16:00	0:00	8:00	
28 July 2018	0:00	0:50	0:30	8:30
	16:00	0:00	8:00	
29 July 2018	0:00	0:58	0:58	8:58
	16:00	0:00	8:00	
30 July 2018	0:00	0:48	0:48	8:48
31 July 2018				
01 August 2018	8:00	17:12	11:12	

02 August 2018	8:00	18:20	10:20	
03 August 2018	8:00	17:22	11:22	
04 August 2018	8:00	16:57	8:57	
05 August 2018	8:00	20:28	12:28	
06 August 2018	8:00	17:30	8:30	

CAPTAIN 13

Date	Time started	Time stopped	Total hours	Continuous time
11 June 2018	16:00	24:00	8:00	
12 June 2018	16:00	24:00	8:00	
13 June 2018	16:00	0:00	8:00	
14 June 2018	0:00	4:36	4:36	12:36
	16:00	0:00	8:00	
15 June 2018	0:00	6:00	6:00	14:00
	16:00	0:00	8:00	
16 June 2018	0:00	4:44	4:44	12:44
17 June 2018	16:00	0:00	8:00	
18 June 2018	0:00	5:48	5:48	13:48
	16:00	0:00	8:00	
19 June 2018	0:00	1:18	1:18	9:18
	08:00	17:30	9:30	
20 June 2018				
21 June 2018	8:00	16:30	8:30	
22 June 2018	8:00	17:06	9:06	
23 June 2018	8:00	16:48	8:48	
24 June 2018	8:00	16:48	9:48	
25 June 2018	8:00	16:00	8:00	
26 June 2018	8:00	16:48	8:48	
27 June 2018	5:00	16:54	11:54	
28 June 2018				
29 June 2018	0:00	8:54	8:54	
30 June 2018	0:00	8:00	8:00	
01 July 2018	0:00	12:00	12:00	
02 July 2018	0:00	9:24	9:24	
03 July 2018	0:00	8:42	8:42	
04 July 2018	0:00	10:48	10:38	
05 July 2018	0:00	8:36	8:36	
06 July 2018				
07 July 2018				
08 July 2018				
09 July 2018				
10 July 2018				
11 July 2018				
12 July 2018				
13 July 2018				

14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018				
18 July 2018				
19 July 2018				
20 July 2018				
21 July 2018	8:00	20:00	12:00	
22 July 2018	8:00	17:00	9:00	
23 July 2018	8:00	20:00	12:00	
24 July 2018	8:00	16:12	8:12	
25 July 2018				
26 July 2018				
27 July 2018	0:00	8:54	8:54	
28 July 2018	0:00	8:48	8:48	
29 July 2018	0:00	8:00	8:00	
30 July 2018	0:00	8:42	8:42	
31 July 2018	0:00	9:36	9:36	
01 August 2018	0:00	8:00	8:00	
02 August 2018	0:00	8:18	8:18	

CAPTAIN 14

Date	Time started	Time stopped	Total hours	Continuous time
10 June 2018	0:00	8:54	8:54	
11 June 2018				
12 June 2018	0:00	17:20	17:20	
13 June 2018	8:00	-		
14 June 2018	8:00	18:45	10:45	
15 June 2018				
16 June 2018				
17 June 2018				
18 June 2018	8:00	18:20	10:20	
19 June 2018	8:00	17:45	9:45	
20 June 2018	8:00	18:10	10:10	
21 June 2018	-	-	9:16	
22 June 2018				
23 June 2018	-	10:00		
24 June 2018				
25 June 2018				
26 June 2018				
27 June 2018				
28 June 2018				

29 June 2018				
30 June 2018				
01 July 2018				
02 July 2018				
03 July 2018	16:00	0:00	8:00	
04 July 2018	0:00	1:02	1:02	9:02
05 July 2018	8:00	18:38	10:38	
06 July 2018	8:00	18:57	10:57	
07 July 2018				
08 July 2018	13:00	21:00	8:00	
09 July 2018	16:00	2200	6:00	
10 July 2018	13:00	21:00	8:00	
11 July 2018	8:00	16:00	8:00	
12 July 2018				
13 July 2018				
14 July 2018	0:00	10:05	10:05	
15 July 2018	8:00	16:00	8:00	
16 July 2018	Sick leave			
17 July 2018	Sick leave			
18 July 2018	8:00	16:00	8:00	
19 July 2018	8:00	16:00	8:00	
20 July 2018				
21 July 2018				
22 July 2018				
23 July 2018				
24 July 2018	13:00	21:00	8:00	
25 July 2018	13:00	21:00	8:00	
26 July 2018	8:00	16:00	8:00	
27 July 2018	14:00	21:00	7:00	
28 July 2018	13:00	0:00	11:00	
29 July 2018	0:00	0:20	0:20	11:20
30 July 2018	7:00	15:00	8:00	
31 July 2018	7:00	15:00	8:00	
01 August 2018	8:00	16:00	8:00	
02 August 2018	8:00	16:00	8:00	
03 August 2018	8:00	18:10	10:10	

CAPTAIN 15

Date	Time started	Time stopped	Total hours	Continuous time
01 June 2018	0:00	12:50	12:50	
02 June 2018	0:00	15:00	15:00	
03 June 2018	0:00	12:50	12:50	
04 June 2018	0:00	9:20	9:20	
05 June 2018	0:00	12:00	12:00	
06 June 2018	0:00	8:00	8:00	

07 June 2018	0:00	11:50	11:50	
08 June 2018				
09 June 2018				
10 June 2018				
11 June 2018				
12 June 2018	16:00	0:00	8:00	
13 June 2018	0:00	1:16	1:16	9:16
	12:00	0:00	12:00	
14 June 2018	0:00	1:05	1:05	13:05
	16:00	0:00	8:00	
15 June 2018	0:00	7:10	7:10	15:10
	16:00	0:00	8:00	
16 June 2018	0:00	4:45	4:45	12:45
	16:00	0:00	8:00	
17 June 2018	0:00	2:05	2:05	10:05
	12:00	0:00	12:00	
18 June 2018	0:00	0:55	0:55	12:55
	12:00	0:00	12:00	
19 June 2018	0:00	0:40	0:40	12:40
20 June 2018	4:00	18:40	14:40	
21 June 2018	4:00	18:00	14:00	
22 June 2018	3:00	8:00	5:00	
23 June 2018	8:00	21:00	13:00	
24 June 2018	3:00	17:05	14:05	
25 June 2018	8:00	20:30	12:30	
26 June 2018	8:00	17:40	9:40	
27 June 2018				
28 June 2018				
29 June 2018	0:00	14:20	14:30	
30 June 2018	0:00	9:50	9:50	
01 July 2018	0:00	9:35	9:35	
02 July 2018	0:00	10:00	10:00	
03 July 2018	0:00	9:20	9:20	
04 July 2018	0:00	11:30	11:30	
05 July 2018	0:00	11:10	11:10	
06 July 2018				
07 July 2018				
08 July 2018				
09 July 2018				
10 July 2018	16:00	0:00	8:00	
11 July 2018	0:00	1:50	1:50	9:50
	16:00	0:00	8:00	
12 July 2018	0:00	2:40	2:40	10:40
	16:00	0:00	8:00	
13 July 2018	0:00	0:55	0:55	8:55

	16:00	0:00	8:00	
14 July 2018	0:00	1:00	1:00	9:00
	16:00	0:00	8:00	
15 July 2018	0:00	1:15	1:15	9:15
16 July 2018				
17 July 2018				
18 July 2018				
19 July 2018	8:00	19:10	11:10	
20 July 2018	8:00	19:00	11:00	
21 July 2018	8:00	19:00	11:00	
22 July 2018	8:00	18:25	10:25	
23 July 2018	8:00	17:20	9:20	
24 July 2018				
25 July 2018				
26 July 2018				
27 July 2018	0:00	11:05	11:05	
28 July 2018	0:00	10:20	10:20	
29 July 2018				
30 July 2018	0:00	10:10	10:10	
31 July 2018	0:00	9:05	9:05	
01 August 2018	0:00	14:10	14:10	
02 August 2018	0:00	14:10	14:10	
03 August 2018				
04 August 2018				
05 August 2018				
06 August 2018				
07 August 2018	16:00	0:00	8:00	
08 August 2018	0:00	1:25	1:25	
	16:00	0:00	8:00	9:25
09 August 2018	0:00	1:00	1:00	
	16:00	0:00	8:00	9:00
10 August 2018	0:00	1:05	1:05	
	16:00	0:00	8:00	9:05
11 August 2018	0:00	1:05	1:05	
	16:00	0:00	8:00	9:05
12 August 2018	0:00	1:45	1:45	9:45

CAPTAIN 16

Date	Time started	Time stopped	Total hours	Continuous time
24 June 2018	16:00	0:00	8:00	
25 June 2018	0:00	0:35	0:35	8:35
26 June 2018				
27 June 2018	8:00	16:50	8:50	
28 June 2018	8:00	17:12	9:12	

29 June 2018	8:00	16:00	8:00	
30 June 2018				
01 July 2018				
02 July 2018	8:00	18:30	10:30	
03 July 2018	8:00	19:55	11:55	
04 July 2018				
05 July 2018				
06 July 2018	0:00	9:50	9:50	
07 July 2018	0:00	9:05	9:05	
08 July 2018	16:00	1:00	9:00	
09 July 2018	16:00	0:00	8:00	
10 July 2018	0:00	1:05	1:05	9:05
11 July 2018				
12 July 2018	8:00	18:50	10:50	
13 July 2018	8:00	16:35	8:35	
14 July 2018	8:00	18:35	10:35	
15 July 2018	8:00	17:20	9:20	
16 July 2018				
17 July 2018				
18 July 2018				
19 July 2018				
20 July 2018	0:00	13:10	13:10	
21 July 2018	0:00	12:10	12:10	
22 July 2018	0:00	14:00	14:00	
23 July 2018	0:00	13:30	13:30	
24 July 2018	0:00	15:00	15:00	
25 July 2018	0:00	12:00	12:00	
26 July 2018	0:00	10:35	10:35	
27 July 2018				
28 July 2018				
29 July 2018				
30 July 2018				
31 July 2018	16:00	0:00	8:00	8:00
01 August 2018	0:00	1:00	1:00	9:00
	16:00	0:00	8:00	
02 August 2018	0:00	5:30	5:30	13:30
	16:00	0:00	8:00	
03 August 2018	0:00	0:35	0:35	8:35
	16:00	0:00	8:00	
04 August 2018	0:00	0:35	0:35	
	16:00	0:00	8:00	
05 August 2018	0:00	1:30	1:30	9:30
	16:00	0:00	8:00	
06 August 2018	0:00	1:30	1:30	9:30
	16:00	0:00	8:20	

07 August 2018	0:00	0:20	0:20	8:30
08 August 2018				
09 August 2018	8:00	19:20	11:20	
10 August 2018	8:00	21:20	13:20	
11 August 2018	8:00	19:10	11:10	
12 August 2018	8:00	22:40	14:40	
13 August 2018	8:00	18:00	10:00	
14 August 2018	8:00	20:40	12:40	
15 August 2018				
16 August 2018				
17 August 2018	0:00	11:10	11:10	
18 August 2018	0:00	10:20	10:20	

CAPTAIN 17

Date	Time started	Time stopped	Total hours	Continuous time
27 May 2018	16:00	0:00	8:00	
28 May 2018	0:00	4:47	4:47	12:47
	16:00	0:00	8:00	
29 May 2018				
30 May 2018				
31 May 2018				
01 June 2018	8:00	20:30	12:30	
02 June 2018	8:00	20:10	12:10	
03 June 2018	8:00	19:40	11:40	
04 June 2018	8:00	16:50	8:50	
05 June 2018	8:00	16:00	8:00	
06 June 2018				
07 June 2018				
08 June 2018				
09 June 2018	0:00	14:12	14:12	
10 June 2018	0:00	9:51	9:51	
11 June 2018	0:00	9:19	9:19	
12 June 2018	0:00	8:11	8:11	
13 June 2018	0:00	9:37	9:37	
14 June 2018	0:00	8:18	8:18	
15 June 2018				
16 June 2018				
17 June 2018				
18 June 2018				
19 June 2018	16:00	0:00	8:00	
20 June 2018	0:00	2:12	2:12	10:12
	16:00	0:00	8:00	
21 June 2018	0:00	4:00	4:00	12:00
	16:00	0:00	8:00	
22 June 2018	0:00	4:00	4:00	12:00

	16:00	0:00	8:00	
23 June 2018	0:00	0:50	0:50	8:50
	16:00	0:00	8:00	
24 June 2018	0:00	0:50	0:50	8:50
	16:00	0:00	8:00	
25 June 2018	0:00	6:00	6:00	14:00
	16:00	0:00	8:00	
26 June 2018	0:00	4:50	4:50	12:50
27 June 2018				
28 June 2018	8:00	20:40	12:40	
29 June 2018	8:00	16:50	8:50	
30 June 2018	8:00	16:00	8:00	
01 July 2018	8:00	16:00	8:00	
02 July 2018	8:00	16:00	8:00	
03 July 2018	8:00	16:00	8:00	
04 July 2018				
05 July 2018				
06 July 2018	0:00	8:10	8:10	
07 July 2018	0:00	9:10	9:10	
08 July 2018	0:00	8:00	8:00	
09 July 2018	0:00	9:00	9:00	
10 July 2018	0:00	8:00	8:00	
11 July 2018	0:00	8:00	8:00	
12 July 2018	0:00	9:40	9:40	
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018	16:00	0:00	8:00	
18 July 2018	0:00	1:50	1:50	9:50
19 July 2018	16:00	0:00	8:00	
20 July 2018	0:00	0:50	0:50	8:50
	16:00	0:00	8:00	
21 July 2018	0:00	1:37	1:37	9:37
	16:00	0:00	8:00	
22 July 2018	0:00	0:50	0:50	8:50
	16:00	0:00	8:00	
23 July 2018	0:00	0:40	0:40	8:40
24 July 2018				
25 July 2018	8:00	16:50	8:50	
26 July 2018	8:00	17:00	9:00	
27 July 2018	8:00	18:00	10:00	
28 July 2018	8:00	16:00	8:00	
29 July 2018	8:00	16:00	8:00	
30 July 2018	8:00	16:50	8:50	

CAPTAIN 18

Date	Time started	Time stopped	Total hours	Continuous time
26 July 2018	16:00	0:00	8:00	
27 July 2018	0:00	0:28	0:20	9:20
	16:00	0:00	8:00	
28 July 2018	0:00	0:35	0:35	8:35
	16:00	0:00	8:00	
29 July 2018	0:00	0:21	0:21	8:21
	16:00	0:00	8:00	
30 July 2018	0:00	0:45	0:45	8:45
	16:00	0:00	8:00	
31 July 2018	0:00	0:45	0:45	8:45
01 August 2018				
02 August 2018				
03 August 2018				
04 August 2018	8:00	16:40	8:40	
05 August 2018	8:00	16:26	8:26	
06 August 2018	8:00	16:00	8:00	
07 August 2018	8:00	16:00	8:00	
08 August 2018				
09 August 2018				
10 August 2018	0:00	9:06	9:06	
11 August 2018	0:00	9:20	9:20	
12 August 2018	0:00	10:28	10:28	
13 August 2018	0:00	9:18	9:18	
14 August 2018	0:00	9:25	9:25	
19 June 2018	16:00	0:00	8:00	
20 June 2018	0:00	2:12	2:12	10:12
	16:00	0:00	8:00	
21 June 2018	0:00	4:00	4:00	12:00
	16:00	0:00	8:00	
22 June 2018	0:00	4:00	4:00	12:00

CAPTAIN 19

Date	Time started	Time stopped	Total hours	Continuous time
27 May 2018	8:00	19:25	11:25	
28 May 2018	8:00	20:00	12:00	
29 May 2018	8:00	17:05	9:05	
30 May 2018				
31 May 2018				
01 June 2018	0:00	8:55	8:55	
02 June 2018	0:00	8:20	8:20	
03 June 2018	0:00	15:10	15:10	

04 June 2018	0:00	9:25	9:25	
05 June 2018	0:00	8:25	8:25	
06 June 2018	0:00	8:00	8:00	
07 June 2018	0:00	9:30	9:30	
08 June 2018				
09 June 2018				
10 June 2018				
11 June 2018				
12 June 2018				
13 June 2018				
14 June 2018				
15 June 2018				
16 June 2018				
17 June 2018				
18 June 2018				
19 June 2018				
20 June 2018				
21 June 2018				
22 June 2018				
23 June 2018				
24 June 2018				
25 June 2018				
26 June 2018				
27 June 2018				
28 June 2018				
29 June 2018				
30 June 2018				
01 July 2018	0:00	8:25	8:25	
02 July 2018	0:00	9:10	9:10	
03 July 2018	0:00	9:10	9:10	
04 July 2018	0:00	8:30	8:30	
05 July 2018	0:00	8:05	8:05	

CAPTAIN 20

Date	Time started	Time stopped	Total hours	Continuous time
08 July 2018	0:00	8:18	8:18	
09 July 2018	0:00	10:10	10:10	
10 July 2018	0:00	8:16	8:16	
11 July 2018	0:00	10:25	10:25	
12 July 2018	0:00	8:36	8:36	
13 July 2018				
14 July 2018				

15 July 2018				
16 July 2018				
17 July 2018	16:00	0:00	8:00	
18 July 2018	0:00	1:40	1:40	9:40
	16:00	0:00	8:00	
19 July 2018	0:00	0:30	0:30	8:30
	16:00	0:00	8:00	
20 July 2018	0:00	0:25	0:25	8:25
	16:00	0:00	8:00	
21 July 2018	0:00	1:10	1:10	9:10
	16:00	0:00	8:00	
22 July 2018	0:00	0:36	0:36	8:36
	16:00	0:00	8:00	
23 July 2018	0:00	0:36	0:36	8:36
	16:00	0:00	8:00	
24 July 2018	0:00	0:30	0:30	8:30
25 July 2018				
26 July 2018	8:00	17:36	9:36	
27 July 2018	8:00	18:20	10:20	
28 July 2018	8:00	17:20	9:20	
29 July 2018				
30 July 2018	7:30	16:30	9:00	
31 July 2018	7:30	16:30	9:00	
01 August 2018	7:30	16:30	9:00	
02 August 2018				
03 August 2018	0:00	9:00	9:00	
04 August 2018	0:00	9:45	9:45	

CAPTAIN 21

Date	Time started	Time stopped	Total hours	Continuous time
18 June 2018	0:00	12:00		
19 June 2018	0:00	8:05	8:05	
20 June 2018	0:00	10:29	10:30	
21 June 2018	0:00	11:30	11:30	
22 June 2018				
23 June 2018				
24 June 2018	16:00	0:00	8:00	
25 June 2018	0:00	0:42	0:42	8:42
26 June 2018	16:00	0:00	8:00	
27 June 2018	0:00	3:18	3:18	11:18
	16:00	0:00	8:00	
28 June 2018	0:00	0:40	0:40	8:40
29 June 2018	16:00	0:00	8:00	
	0:00	0:05	0:05	8:05
30 June 2018	16:00	0:00	8:00	

	0:00	1:42	1:42	9:42
01 July 2018	16:00	0:00	8:00	
=	0:00	0:48	0:48	8:48
02 July 2018	16:00	0:00	8:00	
03 July 2018	0:00	0:59	0:59	8:59
04 July 2018				
05 July 2018	8:00	16:48	8:48	
06 July 2018				
07 July 2018	8:00	16:00	8:00	
08 July 2018	8:00	16:40	8:40	
09 July 2018	8:00	16:00	8:00	
10 July 2018	8:00	16:00	8:00	
11 July 2018				
12 July 2018				
13 July 2018	Sick leave	Sick leave		
14 July 2018	0:00	8:48	8:48	
15 July 2018	0:00	8:05	8:05	
16 July 2018	0:00	9:00	9:00	

CAPTAIN 22

Date	Time started	Time stopped	Total hours	Continuous time
10 June 2018				
11 June 2018				
12 June 2018	13:00	21:00	8:00	
13 June 2018				
14 June 2018				
15 June 2018	5:00	18:00	13:00	
16 June 2018	5:00	14:30	9:30	
17 June 2018	5:00	18:30	13:30	
18 June 2018	5:00	14:06	9:06	
19 June 2018	5:00	14:30	9:30	
20 June 2018	5:00	15:06	10:06	
21 June 2018	5:00	14:30	9:30	
22 June 2018				
23 June 2018				
24 June 2018				
25 June 2018				
26 June 2018	16:00	0:00	8:00	
27 June 2018	16:00	0:00	8:00	
28 June 2018				
29 June 2018	16:00	0:00	8:00	
30 June 2018	16:00	0:00	8:00	
01 July 2018	16:00	0:00	8:00	
02 July 2018	0:00	1:18	1:18	9:18
	16:00	0:00	8:00	

03 July 2018	0:00	0:24	0:24	8:24
04 July 2018				
05 July 2018	8:00	18:42	10:42	
06 July 2018	8:00	19:00	11:00	
07 July 2018	8:00	20:48	12:48	
08 July 2018	5:00	13:42	8:42	
09 July 2018	5:00	13:00	8:00	
10 July 2018	5:00	13:54	8:54	
11 July 2018	5:00	16:00	11:00	
12 July 2018	5:00	13:00	8:00	
13 July 2018				
14 July 2018				
15 July 2018	0:00	10:12	10:12	
16 July 2018	0:00	10:06	10:06	
17 July 2018	0:00	9:54	9:54	
18 July 2018	0:00	10:00	10:00	
19 July 2018	0:00	10:00	10:00	
20 July 2018				
21 July 2018				
22 July 2018				
23 July 2018				
24 July 2018				
25 July 2018	13:00	21:00	8:00	
26 July 2018	8:00	18:48	10:48	
27 July 2018	8:00	20:00	12:00	
28 July 2018	8:00	18:42	10:42	
29 July 2018				
30 July 2018	0:00	8:30	8:30	
31 July 2018	0:00	8:42	8:42	
01 August 2018	0:00	8:30	8:30	
02 August 2018	0:00	8:42	8:42	
03 August 2018	0:00	8:36	8:36	
04 August 2018				
05 August 2018				
06 August 2018	8:00	18:48	10:48	
07 August 2018	8:00	18:48	10:48	
08 August 2018	8:00	19:00	11:00	
09 August 2018	8:00	17:06	9:06	
10 August 2018	8:00	19:00	11:00	

CAPTAIN 23

Date	Time started	Time stopped	Total hours	Continuous time
01 June 2018	8:00	16:04	8:04	
02 June 2018	8:00	16:48	8:48	
03 June 2018	8:00	16:48	8:48	

04 June 2018				
05 June 2018				
06 June 2018				
07 June 2018				
08 June 2018	0:00	12:10	12:10	
09 June 2018	0:00	14:30	14:30	
10 June 2018	0:00	13:48	13:48	
11 June 2018	0:00	9:10	9:10	
12 June 2018	0:00	8:04	8:04	
13 June 2018	0:00	9:00	9:00	
14 June 2018				
15 June 2018				
16 June 2018	8:00	16:10	8:10	
17 June 2018				
18 June 2018				
19 June 2018	16:00	0:00	8:00	
20 June 2018	0:00	0:42	0:42	8:42
	16:00	0:00	8:00	
21 June 2018	0:00	0:48	0:48	8:48
22 June 2018				
23 June 2018	16:00	0:00	8:00	
24 June 2018	0:00	0:42	0:42	8:42
25 June 2018	16:00	0:00	8:00	
26 June 2018	13:00	21:00	9:00	
27 June 2018				
28 June 2018	8:00	16:42	8:42	
29 June 2018	8:00	16:00	8:00	
30 June 2018	8:00	9:04	1:04	
01 July 2018	8:00	16:36	8:36	
02 July 2018	8:00	16:00	8:00	
03 July 2018				
04 July 2018				
05 July 2018	13:00	21:00	8:00	
06 July 2018	8:00	16:04	8:04	
07 July 2018				
08 July 2018				
09 July 2018	0:00	8:00	8:00	
10 July 2018	0:00	8:00	8:00	
11 July 2018	0:00	9:04	9:04	
12 July 2018	0:00	9:36	9:36	
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018	17:00	0:00	7:00	

	0:00	0:04	0:04	7:04
18 July 2018	16:00	0:00	8:00	
	0:00	0:48	0:48	8:48
19 July 2018	16:00	0:00	8:00	
	0:00	1:04	1:04	9:04
20 July 2018	16:00	0:00	8:00	
	0:00	1:00	1:00	9:00
21 July 2018	16:00	0:00	8:00	
	0:00	0:42	0:42	8:42
22 July 2018	16:00	0:00	8:00	
	0:00	0:36	0:36	8:36
23 July 2018	16:00	0:00	8:00	
24 July 2018	0:00	1:00	1:00	9:00
25 July 2018				
26 July 2018	8:00	16:42	8:42	
27 July 2018	8:00	16:30	8:30	
28 July 2018	8:00	16:48	8:48	
29 July 2018	9:00	16:48	8:48	
30 July 2018	8:00	17:18	9:18	
31 July 2018	8:00	17:18	9:18	
01 August 2018	8:00	16:04	8:04	
02 August 2018				
03 August 2018				
04 August 2018	0:00	12:00	12:00	

CAPTAIN 24

Date	Time started	Time stopped	Total hours	Continuous time
11 June 2018	5:00	17:48	12:48	
12 June 2018	5:00	13:00	8:00	
13 June 2018	5:00	13:00	8:00	
14 June 2018	5:00	17:00	12:00	
15 June 2018	5:00	13:00	8:00	
16 June 2018				
17 June 2018				
18 June 2018	8:00	16:00	8:00	
19 June 2018	8:00	16:00	8:00	
20 June 2018	8:00	16:00	8:00	
21 June 2018	8:00	17:16	9:16	
22 June 2018	8:00	17:07	9:07	
23 June 2018				
24 June 2018	8:00	17:30	9:30	
25 June 2018	8:00	16:00	8:00	
26 June 2018	8:00	16:00	8:00	
27 June 2018	7:30	15:30	8:00	
28 June 2018				

29 June 2018	7:00	15:00	8:00	
30 June 2018				
01 July 2018	13:00	0:00	11:00	
02 July 2018	0:00	1:10	1:10	12:10
	16:00	0:00	8:00	
03 July 2018	0:00	0:55	0:55	8:55
04 July 2018				
05 July 2018	13:00	21:00	9:00	
06 July 2018	13:00	21:00	9:00	
07 July 2018	13:00	0:00	11:00	
08 July 2018	0:00	0:38	0:38	11:38
	13:00	21:00	8:00	
09 July 2018	16:00	22:00	6:00	
10 July 2018	13:00	21:00	8:00	
11 July 2018	8:00	16:00	8:00	
12 July 2018				
13 July 2018				
14 July 2018	0:00	10:05	10:05	
15 July 2018	8:00	16:00	8:00	
16 July 2018	Sick leave			
17 July 2018	Sick leave			
18 July 2018	8:00	16:00	8:00	
19 July 2018	8:00	16:00	8:00	
20 July 2018				
21 July 2018				
22 July 2018				
23 July 2018				
24 July 2018	13:00	21:00	8:00	
25 July 2018	13:00	21:00	8:00	
26 July 2018	8:00	16:00	8:00	
27 July 2018	14:00	21:00	7:00	
28 July 2018	13:00	0:00	11:00	
29 July 2018	0:00	0:20	0:20	11:20
30 July 2018	7:00	15:00	8:00	
31 July 2018	7:00	15:00	8:00	
01 August 2018	8:00	16:00	8:00	
02 August 2018	8:00	16:00	8:00	
03 August 2018	8:00	18:10	10:10	

CAPTAIN 25

Date	Time started	Time stopped	Total hours	Continuous time
09 July 2018	5:00	13:00	8:00	
10 July 2018	5:00	13:00	8:00	
11 July 2018	0:00	11:30	11:30	
12 July 2018				

13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018	8:00	18:05	10:05	
18 July 2018	8:00	0:00	16:00	
19 July 2018	0:00	0:45	0:45	16:45
	8:00	0:00	16:00	
20 July 2018	0:00	1:15	1:15	17:05
21 July 2018	8:00	0:00	16:00	
22 July 2018	0:00	0:45	0:45	16:45
	8:00	0:00	16:00	
23 July 2018	0:00	0:45	0:45	16:45
	8:00	0:00	16:00	
24 July 2018	0:00	0:47	0:47	16:47
25 July 2018				
26 July 2018	8:00	18:25	10:25	
27 July 2018	8:00	16:53	8:53	
28 July 2018	8:00	20:52	12:52	
29 July 2018	8:00	16:50	8:50	
30 July 2018	8:00	17:23	9:53	
31 July 2018				
01 August 2018				
02 August 2018				
03 August 2018	0:00	8:00	8:00	
04 August 2018	0:00	12:35	12:35	
05 August 2018	0:00	8:00	8:00	
06 August 2018	0:00	10:30	10:30	
07 August 2018	0:00	10:50	10:50	
08 August 2018	0:00	10:05	10:05	
09 August 2018	0:00	10:07	10:07	
10 August 2018				
11 August 2018				
12 August 2018				
13 August 2018				
14 August 2018	16:00	0:03	8:03	
15 August 2018	16:00	22:30	6:30	
16 August 2018	0:00	8:36	8:36	
17 August 2018	0:00	9:03	9:03	
18 August 2018	0:00	8:36	8:36	
18 August 2018	0:00	8:36	8:36	

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Date	Time started	Time stopped	Total hours	Continuous time
03 July 2018	8:00	16:02	8:02	
04 July 2018				
05 July 2018				
06 July 2018				
07 July 2018				
08 July 2018				
09 July 2018	8:00	19:05	9:05	
10 July 2018				
11 July 2018				
12 July 2018				
13 July 2018				
14 July 2018	0:00	10:46	10:46	
15 July 2018	0:00	9:10	9:10	
16 July 2018	0:00	10:40	10:40	
17 July 2018	0:00	9:32	9:32	
18 July 2018	0:00	10:00	10:00	
19 July 2018	0:00	12:17	12:17	
20 July 2018				
21 July 2018				
22 July 2018				
23 July 2018				
24 July 2018	16:00	0:00	8:00	
25 July 2018	0:00	1:00	1:00	9:00
26 July 2018	16:00	0:00	8:00	
27 July 2018	0:00	0:56	0:56	8:56
	16:00	0:00	8:00	
28 July 2018	0:00	1:19	1:19	9:19
	16:00	0:00	8:00	
29 July 2018	0:00	0:40	0:40	8:40
	16:00	0:00	8:00	
30 July 2018	0:00	0:36	0:36	8:36
	16:00	0:00	8:00	
31 July 2018	0:00	2:05	2:05	10:05
01 July 2018				
02 July 2018	8:00	18:57	10:57	
03 July 2018	8:00	19:18	8:50	
04 July 2018	8:00	17:29	9:29	

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Date	Time started	Time stopped	Total hours	Continuous time
08 July 2018				
09 July 2018	8:00	16:00	8:00	

10 July 2018	8:00	16:00	8:00	
11 July 2018	8:00	18:42	10:42	
12 July 2018	16:00	0:00	8:00	
13 July 2018	0:00	0:42	0:42	8:42
14 July 2018	8:00	18:42	10:42	
15 July 2018				
16 July 2018	5:00	14:18	9:18	
17 July 2018	5:00	17:12	12:12	
18 July 2018	5:00	14:12	9:12	
19 July 2018	5:00	14:24	9:24	
20 July 2018	5:00	15:00	10:00	
21 July 2018				
22 July 2018				
23 July 2018	7:00	15:00	8:00	
24 July 2018	7:00	15:00	8:00	
25 July 2018	7:00	15:00	8:00	
26 July 2018	7:00	15:00	8:00	
27 July 2018	7:00	15:00	8:00	
28 July 2018	7:00	15:00	8:00	
29 July 2018				
30 July 2018				
31 July 2018				
01 August 2018	8:00	16:36	8:36	
02 August 2018	8:00	16:42	8:42	
03 August 2018	8:00	16:42	8:42	
04 August 2018	8:00	20:00	12:00	
05 August 2018	8:00	18:00	10:00	
06 August 2018				
07 August 2018				
08 August 2018	8:00	16:48	8:48	
09 August 2018	8:00	16:48	8:48	
10 August 2018	8:00	16:00	8:00	
11 August 2018	8:00	16:00	8:00	
12 August 2018	8:00	19:30	11:30	
13 August 2018	8:00	16:00	8:00	
14 August 2018	8:00	16:00	8:00	
15 August 2018	8:00	16:00	8:00	
16 August 2018	8:00	16:00	8:00	
17 August 2018				
18 August 2018				

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Date	Time started	Time stopped	Total hours	Continuous time
01 June 2018	0:00	0:00	24:00	
02 June 2018	0:00	0:40	0:40	24:40
	8:00	0:00	16:00	
03 June 2018	0:00	0:40	0:40	16:40
	8:00	0:00	16:00	
04 June 2018	0:00	1:25	1:25	17:25
05 June 2018	0:00	5:25	5:25	
	8:00	16:59	8:59	
06 June 2018	4:00	9:10	5:10	
07 June 2018	2:00	8:15	6:15	
	12:00	19:30	7:30	
08 June 2018	0:00	13:05	13:05	
09 June 201	0:00	14:10	14:10	
	17:00	21:12	4:12	
10 June 2018	0:00	12:22	12:22	
11 June 2018	0:00	13:22	13:22	
12 June 2018	0:00	17:42	17:42	
13 June 2018	0:00	12:28	12:28	
14 June 2018	0:00	8:58	8:58	
	16:00	22:28	6:28	
15 June 2018	0:00	7:10	7:10	
	8:00	21:28	13:28	
16 June 2018	0:00	9:10	9:10	
	12:00	0:00	12:00	
17 June 2018	0:00	8:00	8:00	
18 June 2018	2:00	7:46	5:46	
	13:00	19:25	6:25	
19 June 2018	16:00	0:00	8:00	
20 June 2018	0:00	10:22	10:22	20:22
	16:00	0:00	8:00	
21 June 2018	0:00	6:30	6:30	14:30
	16:00	0:00	8:00	
22 June 2018	16:00	0:00	8:00	
23 June 2018	0:00	4:30	4:30	12:30
	12:00	0:00	12:00	
24 June 2018	0:00	4:45	4:45	16:45
	16:00	0:00	8:00	
25 June 2018	12:00	0:00	12:00	
26 June 2018	0:00	1:10	1:10	13:10
27 June 2018	0:00	0:00	24:00	
28 June 2018	0:00	3:30	3:30	27:30
	8:00	0:00	16:00	
29 June 2018	0:00	10:52	10:52	26:52
30 June 2018	8:00	16:00	8:00	

01 July 2018	4:00	17:00	13:00	
02 July 2018	8:00	0:00	16:00	
03 July 2018	0:00	0:50	0:50	16:50
	8:00	16:30	9:20	
04 July 2018	Off duty			
05 July 2018	12:00	19:40	7:40	
06 July 2018	0:00	11:12	11:12	
	17:00	21:00	4:00	15:12
07 July 2018	0:00	14:00	14:00	
	20:00	0:00	4:00	
08 July 2018	0:00	8:58	8:58	12:58
	13:00	19:30	6:30	
09 July 2018	0:00	9:42	9:42	
10 July 2018	0:00	10:58	10:58	
11 July 2018	0:00	8:46	8:46	
12 July 2018	0:00	9:17	9:17	
13 July 2018	0:00	10:20	10:20	
	13:00	21:58	8:58	19:18
14 July 2018	13:00	21:00	9:00	
15 July 2018	8:00	18:40	10:40	
16 July 2018				
17 July 2018	16:00	0:00	8:00	
18 July 2018	0:00	0:58	0:58	8:58
	16:00	0:00	8:00	
19 July 2018	0:00	8:30	8:30	16:30
	12:00	0:00	12:00	
20 July 2018	0:00	0:58	0:58	12:58
	12:00	0:00	12:00	
21 July 2018	0:00	1:14	1:14	13:14
	12:00	0:00	12:00	
22 July 2018	0:00	0:30	0:30	12:30
	12:00	0:00	12:00	
23 July 2018	0:00	0:52	0:52	12:52
	12:00	0:00	12:00	
24 July 2018	0:00	0:36	0:36	12:36
25 July 2018	8:00	19:08	11:08	
26 July 2018	8:00	18:46	10:46	
27 July 2018	8:00	18:46	10:46	
28 July 2018	16:00	0:00	8:00	
29 July 2018	0:00	1:25	1:25	9:25
	4:00	17:40	13:40	
30 July 2018	8:00	19:22	7:22	
31 July 2018	8:00	12:58	4:58	
31 July 2018	8:00	12:58	4:58	

CAPTAIN 29

Date	Time started	Time stopped	Total hours	Continuous time
01 June 2018	13:00	0:00	11:00	
02 June 2018	0:00	6:00	6:00	17:00
03 June 2018	13:00	21:00	9:00	
04 June 2018	13:00	0:00	11:00	
	0:00	3:10	3:10	14:10
05 June 2018	13:00	21:00	9:00	
06 June 2018	16:00	0:00	8:00	
	0:00	1:00	1:00	9:00
07 June 2018	12:00	22:30	10:30	
08 June 2018	5:00	13:00	8:00	
09 June 2018	13:00	21:10	8:10	
10 June 2018	5:00	21:40	16:40	
11 June 2018	5:00	21:20	16:20	
12 June 2018	5:00	18:00	13:00	
13 June 2018	5:00	18:40	13:40	
14 June 2018	5:00	18:35	13:35	
15 June 2018	0:00	10:00	10:00	
16 June 2018				
17 June 2018				
18 June 2018	13:00	0:00	11:00	
18 June 2018	0:00	2:15	2:15	13:15
19 June 2018	16:00	0:00	8:00	
20 June 2018	0:00	4:00	4:00	
20 June 2018	16:00	0:35	8:00	
	0:00	0:35	0:35	8:35
21 June 2018	16:00	0:00	8:00	
21 June 2018	0:00	4:47	4:47	12:47
22 June 2018	16:00	0:00	8:00	
22 June 2018	0:00	0:10	0:10	8:10
23 June 2018	16:00	24:00	8:00	
24 June 2018	13:00	0:00	11:00	
24 June 2018	0:00	8:40	8:40	19:40
25 June 2018	13:00	0:00	11:00	
25 June 2018	0:00	5:00	5:00	16:00
26 June 2018	13:00	0:00	11:00	
27 June 2018	0:00	9:10	9:10	20:10
28 June 2018	0:00	13:50	13:50	
29 June 2018	5:00	22:00	17:00	
30 June 2018	5:00	21:00	16:00	
01 July 2018	5:00	21:00	16:00	
02 July 2018	8:00	21:30	13:30	
03 July 2018	8:00	17:00	9:00	

04 July 2018				
05 July 2018				
06 July 2018	0:00	9:00	9:00	
07 July 2018	0:00	0:10	0:10	
08 July 2018	0:00	16:00	16:00	
09 July 2018	0:00	8:35	8:35	
10 July 2018	0:00	10:10	10:10	
11 July 2018	0:00	8:47	8:47	
12 July 2018	0:00	8:30	8:30	
13 July 2018				
14 July 2018				
15 July 2018				
16 July 2018				
17 July 2018	16:00	0:00	8:00	
17 July 2018	0:00	0:35	0:35	8:35
18 July 2018	16:00	0:00	8:00	
19 July 2018	0:00	0:50	0:50	8:50
19 July 2018	16:00	0:00	8:00	
20 July 2018	0:00	1:25	1:25	9:25
20 July 2018	16:00	0:00	8:00	
20 July 2018	0:00	4:10	4:10	12:10
21 July 2018	16:00	0:00	8:00	
21 July 2018	0:00	0:30	0:30	8:30

APPENDIX 5 ACP ANNOUNCEMENTS

INCREASING CANAL TRAFFIC



AUTORIDAD DEL CANAL DE PANAMÁ
EXECUTIVE VICE PRESIDENCY FOR OPERATIONS

ADVISORY TO SHIPPING No. A-29-2018

August 31, 2018

TO : All Shipping Agents, Owners, and Operators
SUBJECT: Modifications to the Transit Reservation System Rules for Neopanamax Vessels

Beginning October 1, 2018, certain navigation restrictions currently imposed on LNG vessels will be lifted. Specifically, meetings between opposing LNG vessels in Gatun Lake will be allowed, as well as transiting during hours of darkness in certain areas of the Canal.

In order to maximize the benefits of these new navigation rules, modifications to the Transit Reservation (Booking) System for Neopanamax vessels are required. The following changes are the result of in-depth analysis of the needs of this market segment and consultation with our customers. Among the main issues addressed were the need to increase the number of LNG vessels that may book per day, and adjustment of the booking periods based on the needs of the LNG industry, which include the spot and long term contracts market (Annual Delivery Program) scheduling.

The modifications to the reservation system also address the current practice by some LNG customers of acquiring booking slots during the first period competition, to the point where these slots are nearly sold out up to 365 days in advance, while in reality these slots are only used on average 60 percent of the time. This practice is detrimental since it creates the perception that the Panama Canal does not have the capacity to handle the actual LNG demand, affecting not only the best interests of the Panama Canal Authority (ACP) and the LNG industry, but of other customers as well.

These modifications will allow the Panama Canal to better handle the present and expected demand for LNG vessel transit slots by providing the certainty and flexibility required by the LNG market segment. These changes should also improve the efficiency of the transit reservation system, which will benefit all users of the Neopanamax locks.

The modifications that will be implemented for Neopanamax vessels include a new booking period within the 1st Booking Period; modifications in the duration of the periods; redistribution of slots within the periods; modifications to the cancellation fee structure; as well as other modifications, which will become effective October 1, 2018.

Modifications to the Neopanamax Booking periods.

1. The 1st Booking Period for Neopanamax vessels will extend from 365 days to 81 days prior to the booking date.

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Subject: Modifications to the Transit Reservation System Rules for Neopanamax Vessels

2. A new booking period, called Booking Period 1.a, will extend from 80 days to 31 days prior to the booking date.

3. The 2nd Booking Period will extend from 30 days to 4 days prior to the transit date.

Distribution and Allocation of Booking Slots per Booking Periods.

1. During the 1st Booking Period, a total of three (3) slots will be offered to all interested vessels, except LNG vessels. Of these three (3), a maximum of two (2) may be allocated to vessels transiting in the northbound direction, and a maximum of one (1) may be allocated to vessels transiting in the southbound direction. LNG vessels will not be allowed to book during the 1st Booking Period beginning with the 1st Period competition to be carried out on **September 1, 2018**.

2. During the Booking Period 1.a, two (2) slots will be offered daily, one northbound and one southbound. Only one (1) of these slots may be allocated to an LNG vessel. During the tiebreaker competition at the beginning of the period (between 0900 and 0930 hours), the allocation of these slots will be handled in the following manner:

a. The first of the two (2) slots will be allocated to the full container vessel with the highest ranking that participates in the competition. If no full container vessels are interested, the slot will be allocated to the LNG vessel with the highest ranking that participates in the competition. If no LNG vessels are interested, the slot will be awarded to any vessel that participates in the competition, based on ranking.

b. The second slot will be allocated to the LNG vessel with the highest ranking that participates in the competition, taking into account the limits per direction and/or restriction and provided that the 1st slot was not awarded to an LNG vessel. If no LNG vessels are interested, the slot will be allocated to the full container vessel with the highest ranking that participates in the competition. If no full container vessels are interested, the slot will be awarded to any vessel that participates in the competition, based on ranking.

c. After the competition, the remaining slots will be allocated to interested vessels on a *first come-first served* basis for the remainder of the period.

d. Unused slots that are carried over from the 1st Booking Period to Booking Period 1.a will be awarded based on ranking during competition, and on a *first come-first served* basis after the competition.

3. The maximum number of slots that may be allocated during Booking Periods 1 and 1.a is three (3) for vessels in the northbound direction and two (2) in the southbound direction.

4. During the 2nd Booking Period, two slots will be made available to all vessels, including LNG vessels, in addition to any unused slots that are carried over from the previous periods. Container vessels shall have preference over other vessels when assigning these slots or

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any slots that are carried over from the previous period during competition, followed by LNG vessels. After the competition, the slots will be awarded on a *first come-first served* basis.

The slot distribution of per booking period will be as follows:

BOOKING PERIOD	MAXIMUM # OF SLOTS OFFERED PER DIRECTION		# OF SLOTS PER PERIOD
	NORTH	SOUTH	
1	2	1	3*
1.a	1	1	2
2	1	1	2
Maximum per direction**	4	3	7**

*includes the slot from the special period for passenger vessels

**does not include the conditioned slot announced in Advisory to Shipping A-10-2018

5. The maximum number of "*daylight-restricted*" booking slots remains at one per direction, and the maximum number of slots that may be allocated to LNG vessels will be two (2) per day, either two in the northbound direction, or one northbound and one southbound.

In summary, the maximum number of "*daylight-restricted*" slots combined with slots awarded to LNG vessels per direction is as follows:

- a. Two northbound LNG vessels and one *daylight-restricted* vessel (either northbound or southbound);
- b. One northbound LNG vessel, one southbound LNG vessel, and one *daylight-restricted* vessel (either northbound or southbound);
- c. One *daylight-restricted* northbound vessel, one daylight southbound vessel, and one LNG vessel (either northbound or southbound).

In order to implement the above-mentioned modifications effectively, LNG vessels that have already obtained slots during Period 1 for all booking dates from **October 1, 2018** forward, will be allowed to release those slots without being assessed a cancellation fee, provided that the slots were awarded prior to the publication of this advisory, and that the request is received no later than September 9, 2018. Vessels that elect to retain their slots past September 9, 2018, will be subject to the additional charges stated in the paragraphs below, if the slots are cancelled on or after September 10, 2018. The request to "VOID" the booking shall be submitted through the ACP's Maritime Service Portal, by fax or through other acceptable means as determined by the ACP.

We encourage all customers to take this opportunity to release any slots that may not be used in the future in order for the ACP to reallocate the slots to other interested vessels, and to avoid the application of the surcharges mentioned below.

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Subject: Modifications to the Transit Reservation System Rules for Neopanamax Vessels

For cancellation of slots of LNG vessels with bookings for dates on or after October 1, 2018, the following *additional* cancellation fees will apply:

Cancellations between 365 and 81 days prior to the vessel's booking date, the regular cancellation fee will be applied in accordance with the published ACP Official Tariff.

For booking cancellations between 80 and 31 days prior to the vessel's booking date, a surcharge of **\$15,000.00 USD** will be assessed in addition to the regular cancellation fee.

For booking cancellations between 30 and 4 days prior to the vessel's booking date, a surcharge of **\$25,000.00 USD** will be assessed in addition to the regular cancellation fee.

For booking cancellations with less than 4 days prior to the vessel's booking date, or for booked LNG vessels that fail to arrive by 0600 hours on their booked date, an additional fee of **\$35,000.00** will be assessed, in addition to the regular cancellation fee. In either case, if the vessel fails to arrive within the next five (5) days after the booked date, the customer who requested the booking will be penalized with the reduction of 0.5 transits in the transit portion of the customer's ranking.

The surcharges and ranking penalty mentioned in the previous paragraphs shall not apply when the reason for the vessel's late arrival or cancellation of the reservation is due to a medical or humanitarian emergency, fortuitous event or force majeure, as stated in Article 23A of the Maritime Regulations for the Operation of the Panama Canal.

Substitutions and changes in booking dates will not incur in the above-mentioned surcharges.

Transition period for the allocation of slots in Booking Periods 1.a and 2.

The new Booking Period 1.a will commence November 29, 2018. Applications for booking slots for this period will begin at 0900 hours, September 10, 2018.

In addition, at 0900 hours September 10, 2018, competitions will be held for allocation of Booking Period 2 slots for October 1 to October 10, 2018.

Since some dates within Booking Period 1 have already been sold out up to one year in advance, there may be days where no slots are available in the new Booking Period 1.a. In these cases, competitions will not be held. If slots are released during the grace period or cancelled for booking dates between October 1, 2018 and November 28, 2018, these will be offered at the opening of the corresponding 2nd period through competition. If the slots released or cancelled are for dates beginning November 29, 2018 and beyond, these will be incorporated into Booking Period 1.a.

For booking dates between October 1, 2018 and November 28, 2018, LNG vessels may request booking slots during the 2nd Booking period through the normal booking process, whereby up to two (2) slots may be awarded to LNG vessels.

OP, August 31, 2018

Subject: Modifications to the Transit Reservation System Rules for Neopanamax Vessels

The following table is provided for clarification purposes:

DATE OF CANCELLATION REQUEST	FOR BOOKING DATES	CHARGE TO BE ASSESSED	AWARD PROCESS FOR RELEASED SLOTS
31 Aug – 9 Sept 2018	1 Oct – 28 Nov 2018	No charge (grace period)	Through Competition in corresponding Period 2
31 Aug – 9 Sept 2018	29 Nov 2018 and beyond	No charge (grace period)	Through Competition in Period 1.a of booking date
10 Sept 2018 and beyond	1 Sept - 30 Sept 2018	Regular cancellation fee	Current rules
10 Sept 2018 and beyond	1 Oct – 28 Nov 2018	Regular cancellation fee plus surcharge	Through Competition in Period 2 of booking date
10 Sept 2018 and beyond	29 Nov and beyond	Regular cancellation fee plus surcharge	Through Competition in Period 1.a

Other relevant changes.

Substitutions between Neopanamax vessels will only be allowed between vessels from the same market segment. The Ship Type Code table presented in Advisory to Shipping A-34-2017 will be used to determine the vessel types that fall within each market segment.

The required arrival time for LNG vessels is being modified to 0200 hours of the transit date.

The ACP is confident that these modifications will improve the utilization of the Transit Reservation System and provide added value to the waterway. Nevertheless, these rules may be modified and additional provisions may be established at any time in order to guarantee the effectiveness of the system.

We look forward to continue serving you in the future.

ORIGINAL SIGNED

Esteban G. Sáenz
Executive Vice President
for Operations



3654-A (OPXI)
V. 4-2-2015

AUTORIDAD DEL CANAL DE PANAMÁ
EXECUTIVE VICE PRESIDENCY FOR OPERATIONS

ADVISORY TO SHIPPING No. A-31-2018

September 4, 2018

TO: All Shipping Agents, Owners, and Operators
SUBJECT: Changes in Vessel Dimension Eligibility for the Additional Booking Slot

The Panama Canal Authority announces changes in vessel dimensions eligible for the additional booking slot announced in Advisory to Shipping A-10-2018.

Effective October 1, 2018, this additional booking slot may be awarded to vessels that meet one of the following:

- Full container vessels with a length overall (LOA) of less than 335.28 meters (1,100 feet), beam less than 43.28 meters (142 feet), and deep draft less than 13.72 meters (45 feet) Tropical Fresh Water (TFW), or
- Vessels with precaution designator of PD-1 or PD-2 (excluding full container vessels) with a beam of 36.58 meters (120 feet) or less, or with a length overall (LOA) of 259.08 meters (850 feet) or less, or
- Other vessel types with a length overall (LOA) of less than 304.8 meters (1,000 feet), beam of less than 41.15 meters (135 feet), and deep draft of less than 13.72 meters (45 feet) Tropical Fresh Water (TFW).

Applications for slots under this new criteria will be received at the opening of the 2nd Period competition beginning at 0900 hours, September 10, 2018.

We look forward to continue serving you in the future.

ORIGINAL SIGNED

Esteban G. Sáenz
Executive Vice President
for Operations



3654-A (OPXI)
V. 4-2-2015

AUTORIDAD DEL CANAL DE PANAMÁ
EXECUTIVE VICE PRESIDENCY FOR OPERATIONS

ADVISORY TO SHIPPING No. A-34-2018

September 21, 2018

TO : All Shipping Agents, Owners, and Operators
SUBJECT: Update Regarding Escort Tug Requirements for Neopanamax Vessels due to Displacement

In response to inquiries from customers regarding tug requirements due to displacement for Neopanamax vessels transiting through Gatun Lake, the following information is provided:

- Full Container vessels transiting with displacements of 130,000 metric tons or more, and Dry Bulk carriers and Tankers with displacements of 120,000 metric tons or more, require one (1) escort tug through Gatun Lake, in addition to the standard tugs required through Gaillard Cut and at the Locks. Extraordinary Tug Services are charged under tariff item #1020.5067 of the ACP Marine Tariffs.

For your reference, ACP Marine Tariff Item #1020.5067 is available at the following link:
<https://www.pancanal.com/eng/op/tariff/1020-0000-Rev20160620.pdf>

ORIGINAL SIGNED

Esteban G. Sáenz
Executive Vice President for Operations

APPENDIX 6 IMO-MARITIME HOURS OF SERVICE RULES

Standards regarding watchkeeping

Section A-VIII/1

Fitness for duty

1. Administrations shall take account of the danger posed by fatigue of seafarers, especially those whose duties involve the safe and secure operation of a ship.
2. All persons who are assigned duty as officer in charge of a watch or as a rating forming part of a watch and those whose duties involve designated safety, prevention of pollution and security duties shall be provided with a rest period of not less than:
 - a. minimum of 10 hours of rest in any 24-hour period; and
 - b. 77 hours in any 7-day period.
3. The hours of rest may be divided into no more than two periods, one of which shall be at least 6 hours in length, and the intervals between consecutive periods of rest shall not exceed 14 hours.
4. The requirements for rest periods laid down in paragraphs 2 and 3 need not be maintained in the case of an emergency or in other overriding operational conditions. Musters, fire-fighting and lifeboat drills, and drills prescribed by national laws and regulations and by international instruments, shall be conducted in a manner that minimizes the disturbance of rest periods and does not induce fatigue.
5. Administrations shall require that watch schedules be posted where they are easily accessible. The schedules shall be established in a standardized format* in the working language or languages of the ship and in English.
6. When a seafarer is on call, such as when a machinery space is unattended, the seafarer shall have an adequate compensatory rest period if the normal period of rest is disturbed by call-outs to work.
7. Administrations shall require that records of daily hours of rest of seafarers be maintained in a standardized format□, in the working language or languages of the ship and in English, to allow monitoring and verification of compliance with the provisions of this section. The seafarers shall receive a copy of the records pertaining to them, which shall be endorsed by the master or by a person authorised by the master and by the seafarers.
8. Nothing in this section shall be deemed to impair the right of the master of a ship to require a seafarer to perform any hours of work necessary for the immediate safety of the ship, persons on board or cargo, or for the purpose of giving assistance to other ships or persons in distress at sea. Accordingly, the master may suspend the schedule of hours of rest and require a seafarer to perform any hours of work necessary until the normal situation has been restored.

As soon as practicable after the normal situation has been restored, the master shall ensure that any seafarers who have performed work in a scheduled rest period are provided with an adequate period of rest.

9. Parties may allow exceptions from the required hours of rest in paragraphs 2.2 and 3 above provided that the rest period is not less than 70 hours in any 7-day period. Exceptions from the weekly rest period provided for in paragraph 2.2 shall not be allowed for more than two consecutive weeks. The intervals between two periods of exceptions on board shall not be less than twice the duration of the exception.

The hours of rest provided for in paragraph 2.1 may be divided into no more than three periods, one of which shall be at least 6 hours in length and neither of the other two periods shall be less than one hour in length. The intervals between consecutive periods of rest shall not exceed 14 hours.

Exceptions shall not extend beyond two 24-hour periods in any 7-day period.

APPENDIX 7 SELECTIONS FROM SAN FRANCISCO BAR PILOTS FITNESS STUDY

Dr Robert Kosnik, University of California, San Francisco

EXECUTIVE SUMMARY

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).

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.

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.

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.

