

July 15, 2019

Commissioner Sheri Tonn, Chair
Washington State Board of Pilotage Commissioners
2901 Third Ave., Ste. 500
Seattle, WA 98121

Re: PMSA Submission Regarding BPC Setting the Number of Pilots

Dear Chair Tonn and Board Members,

Thank you for the opportunity to provide this final set of comments regarding the consideration of the Puget Sound Pilots' (PSP) request to increase the number of pilot licenses and in response to prior PSP comments. PMSA submits these comments in addition to our May 6th and June 12th submissions on this issue, and we incorporate those comments by reference. This final letter addresses the latest release of pilot assignment data relevant to this process, provides further analysis of the report commissioned by the Puget Sound Pilots (PSP) from NASA-SJSU, and replies to and raise questions regarding the PSP Rebuttal.

In short, the latest data and further analysis of PSP's arguments only serve to reinforce and highlight the obvious conclusion that there is no evidence or current basis for granting the PSP request to increase the number of pilot licenses and we recommend that the Board focus on how to properly optimize the pilotage system and create a system which runs much more efficiently.

The Latest Shipping and Pilot Activity Summaries Show A Significant Decrease in Pilotage Assignments and Workloads Undermining Any Request to Increase the Number of Licensed Pilots

The BPC's June 2019 activity summaries demonstrate a double-digit percentage decrease in pilotage assignments. This comes on the heels of a near double-digit drop in pilotage assignments in May.

- ✓ **In June Pilot Assignments Decreased 13.4% from the Prior June**
 - *June peaked in 2015 at 29.5% MORE assignments than June 2019*
 - *The annualized rate of assignment loss based on a June 2019 to June 2018 comparison is 1,140 fewer assignments (-95 * 12). This would equal a need for 7.9 fewer full-time pilots at a 145 TAL.*
- ✓ **In May Pilot Assignments Decreased 8.6% from the Prior May**
 - *The annualized rate of assignment loss based on a May 2019 to May 2018 comparison results would equal a need for 4.7 fewer full-time pilots.*

The latest Pilotage Monthly Activity Reports, (also summarized by BPC staff monthly) for May and June provide this data.

These latest activity figures also continue to support PMSA's position that the easiest, best, and quickest way forward would be to simply fill the existing vacant license spots already authorized by the Board and address management issues that allow so many "scheduled for duty" pilots to be unavailable for a ship assignments.

May and June Reductions in Pilot Assignments Did Not Alleviate Inefficient and Uneven Pilotage Utilization – Efficient Pilot Resource Management Needed

The significant reductions in May and June pilot assignments should have simplified allocation of pilotage resources to the core mission of piloting. However, despite the significant decreases in assignments over this same period:

- ✓ PSP still reported 88 call backs in June despite a decrease of 95 assignments.
- ✓ PSP still reported 15.5 hours of delays in June while listing meetings as a primary source of pilot activity – these delay hours are more than double all of Calendar Year 2011 which was a higher workload year.
- ✓ May 2019 PSP reports indicated 29 of 34 meetings were held on days other than transition Tuesdays impacting on the availability of pilots.

It is inarguable, that when more on duty pilots are actually available for ship assignments, the supply of properly rested pilots increases. This is true independent of any inefficiency or sub-optimization built into the system.

Put another way, the Board cannot presume that even if the Average Ship Assignment Workload of a PSP pilot is reduced, that it will result in a better optimized or more efficient pilotage service without management reforms.

Yet, this is precisely what PSP is asking for in its request for an increase in the number of authorized licenses: it seeks an increase in the number of pilots from the Board in order to reduce workload per pilot and for the Board to presume that this will translate into fewer call backs and better management practices. The May and June Monthly Activity Reports demonstrate that such a presumption is misplaced.

PSP's Rebuttal Fails to Respond to Basic Issues Raised by PMSA and Questions Remain Regarding Inefficient Pilot Utilization, Duty Calendars, Accounting for Meetings and Repo's, Treatment of Lifestyle Pilots, and Proper Treatment of Rest Hours

PSP is the petitioner and has the burden of proving that their proposal fulfills the requirements in the Pilotage Act. PMSA is not requesting a change in the number of pilots' licenses.

Prior submissions in this process over the years have addressed training, repos, meetings, prep and travel, and included substantial evidence on these topics. Therefore, the BPC has been well aware of these factors as almost all of this information comes directly from the PSP to the public or comes indirectly from PSP to the public through reports by the BPC staff based on PSP data. PMSA

submissions also largely refer to PSP reports, letters, tables and graphs submitted to BPC over the years in addition to the RCW, WAC and BPC letters, memos, meeting minutes and policy documents.

Uneven Utilization of Pilot – A Management Issue

PSP/BPC data show:

- ✓ The least productive ship assignment pilots (piloting) in 2018 piloted 30% less than the most productive 30 pilots who averaged 167.5 ship movement assignments.
- ✓ The range was from 90 up to 223 ship assignments.
- ✓ The least productive fully available pilots in 2018 completed on average 40 fewer assignments than the top 30 and 18 “less” than the TAL – essentially missing 1.5 months of average assignments. The total impacts of this uneven utilization should be fully understood by the BPC so actions can be taken to ensure that efficiency mandates of the Pilotage Act are complied with.
- ✓ The PSP Vice President is now moving fewer ships than the non-working PSP President. The President and the Executive Director (Business Manager before that) handled most of the external meetings, including BPC meetings and tariff hearings.
- ✓ The last 11 months the VP has averaged 2.6 actual pilot assignments per month and in calendar year 2019, the VP has moved only 6 ships in half a year while PSP justifies this transition into non-piloting activities as the equivalency of a full-time pilot.
- ✓ PSP has added up to 17 meeting days per month focused on UTC contributing to delays and call backs; to our knowledge the BPC does not know the length or substance of these meetings and whether they were internal or with UTC. This is just one type of meeting listed monthly.
- ✓ PSP allows significant number of pilots on duty to not be available for assignment creating shortfalls, delays and call backs. Stacking up vacation with comp days on top of meetings is inefficient management of pilots.

It is a clear and inarguable tenet that the value of the State License to Pilot is in piloting large vessels safely and competently in and out of the Puget Sound. Nowhere in the description of the pilotage license itself, or in the Pilotage Act, are duties prescribed with respect to pilot “meetings” much less is there any requirement for the Board to equate going to meetings as the same as actually piloting a vessel. Yet, the PSP Request remains partially based on this premise.

Even if the Board were to do an about-face on the Pilotage Act, common sense, and historical past practice regarding the treatment of the meetings of pilots differently than the actual assignment of pilots to vessels, the PSP Rebuttal fails to adequately address or respond to these clear and outstanding issues regarding their unprecedented new theory that attending meetings is actually a core component of a pilot licenses.

PSP has internal rules on how to address pilots on duty that are serving on and attending BPC meetings. These rules reflect a logical management decision made collectively and privately amongst PSP pilots.

TEC, FMC and exam committee participation might be comparable. PSP has not submitted any evidence that these have changed, therefore they have already been included in the pilotage baseline for all existing licensees. Why should the Board change the treatment of licensees if non-discretionary meetings have already been accounted for in the PSP work rules and have been on the books for years?

PSP's Rebuttal continues to avoid the fact that when licensees are piloting on average for 140 to 145 days per year, that still leaves up to 225 days a year for such things as discretionary and mandatory meetings, including such things as managing independent contractor business, associations' collateral duties, required training, medical checks and so on. Why does PSP consider this 225-day period insufficient?

PSP Continues to Equate Repo's With Actual Piloting Assignments, Even Though the Pilotage Act, Common Sense, and Historical Practice Do Not Equate Repo's with Actual Piloting

Repos are not Ship Assignments. Similar to their calculus regarding "meetings" above, PSP and their consultant equate a repo to a full ship pilotage assignment. Under this logic, if a pilot completes a 14-day duty period with an outbound departure and then travels from Port Angeles to home, we must conclude that PSP would now count that as two assignments. This does not make any sense. For instance, if a pilot living in Gig Harbor completed an arrival to Cherry Point and then traveled back home would PSP now count that transportation as a completely different pilotage assignment?

With a decreasing number of arrivals boarding in PA or departures ending in PA, there should be fewer repos but we have seen no evidence of that in any of the data submitted.

If Half the Pilot Corps Actually Stood Duty and Available for Piloting Assignments Each Day then Delays, Call Backs and Accrued Comp Days Would Greatly Diminish

PSP has demonstrated during this process that the number of pilots actually available to pilot each day is significantly less than the number of pilots "on duty" each day. For example, BPC staff reported that in August of 2018 there were 50 licensed pilots with 47 on rotation. Yet, PSP reported on page 10 of their May 2019 submission, that on August 6, 2018 there were only 21 pilots scheduled to be on watch. And, only 11 of those pilots were actually available for ship assignment primarily due to 6 pilots taking call backs and 2 attending meetings – this is a management issue. Therefore, PSP's internal management of assignments, as described by their own evidence now seems to encourage rather than prevent this type of limited availability outcome.

The Board and public have not reviewed PSP's policies, presuming they all exist, for requesting or being granted vacations and comp days, scheduling of BPC required training days or meeting days and so on. Without considering policies that impact pilot availability how can the BPC properly set a number of pilots to comply with the Pilotage Act?

As we have identified in previous submissions, there were some years such as 2011 where workloads exceeded the current TAL and yet call backs were minimized and reduced. Were policies changed to discourage these improvements in efficiency. Or, has PSP incentivized a less-than-full complement of available pilots in their two-watch system?

PSP has introduced a new term in the last year to describe pilots that apparently refuse to take call backs: "Lifestyle Pilots." This trend would mean inefficiently staffing to the peak instead of improving pilot resource management.

PSP's Rebuttal (page 8) also claims that the pilot "having worked 'only' 90 vessel movements was involved in such a substantial number of meetings and trainings that he was second in total work events among pilots in 2018." Is this an admission by PSP that the true purpose of this Request is NOT to increase the number of pilots for fatigue management purposes, but to add pilots to attend meetings and to not actually pilot?

"Three And Out" and 8 Hour Rest Standards Have Been In Place Since 2015 With No Issues or Need for Additional Pilot Licenses

PSP's previous reports to the Board confirmed that they had implemented both the "3 and out" and "8-hour rest" policies in 2015 with great success. We were told that these changes did not result in pressures on pilotage assignments as PSP did not report negative impacts to pilot dispatch, nor did they request an increase in the number of pilots.

- ✓ If 3 years of data, beginning in 2015, did not support the need for more pilots, how then does several months of data reflecting a move from 8 hours to 10 hours (which impacts only an exceptionally small number of assignments) suddenly create problems?
- ✓ PSP and the Board documented that 2018 presented unprecedented challenges regarding daily pilot availability which was at historic lows. Why should PSP's unilateral management decisions force available pilots to come up in rotation faster than they would otherwise thereby creating more situations where the next pilot up had less than 10 hours of rest.

Industry Continues to Comply with PSP's Ordering Rules.

Industry complies with ordering lead times set by PSP in addition to full compliance with the Coast Guard 96-hour advance notice of arrival rule.

- ✓ Change orders have always occurred with respect to vessel schedules and have been handled by PSP consistent with their own ordering rules. If the PSP ordering rules have not changed, and the impacts of changes of under 2 hours are historically consistent, what evidence of a need for an increase in pilots has been submitted?
- ✓ How can the Board evaluate why Change Orders are necessitating an increase in the number of pilots in 2019 if the same Change Order occurrences did not necessitate an increase in the number of pilots in previous years?

PSP's Relies on the Theoretical Analysis of A Single Report As Its Principle "Evidence" In Its Request, Yet Numerous Questions Regarding this Report Remain Outstanding

PSP presents its consultants' report as a "fatigue study" but focused only on a recommendation on the number of pilots. The report's findings are facially inconsistent with actual fatigue study

recommendations. Instead, they chose to add more and more pilots to address any issue like simply adding 4 more pilots to wipe out accrued comp days or adding 2 for work hour reductions finally totaling between 49 and 78 pilots. These add-ons are not justified and overlook pilot resource management.

PSP is the petitioner and has the burden of proving that their proposal fulfills requirements in the Pilotage Act but they didn't accomplish that. PSP's primary piece of "evidence" in this regard is a directed report which it purports is a fatigue study, but in reality it is simply a report meant to create a theoretical construct upon which it can advocate for an increased number of pilots. As the Board is well aware, PSP has hired a team from SJSU/NASA to prepare this report.

The Board should acknowledge that numerous foundational questions exist unanswered which go to the heart of the report's credibility and reliability, that the report created is not an actual "fatigue study" but is intended to be an advocacy tool for PSP, and that the appropriate place to discuss fatigue management is in the Board's Fatigue Management Committee, not in a hearing meant to set the appropriate number of pilots.

Fundamental Questions Regarding the Substance of the Report Remain Unanswered, Revealing That This Report is Not Reliable "Evidence"

PMSA submits a number of fundamental and substantive questions reflective of the report itself, as presented in this process separate and apart from the FMC meeting process. These questions are provided here as *Attachment A*.

The SJSU/NASA team attended one FMC meeting and at that meeting it was unable to answer questions about the merits of studying an anomaly year, could not give specifics about the development of the scope of work that they were hired for, and could not explain why they claimed their work was to recommend an optimal number of pilots when they did not evaluate optimal management of pilots. The questions propounded here are largely independent of those propounded after that FMC meeting, which have also for the most part remained unanswered.

The Scope of Work for the PSP Contract with SJSU/NASA was to Produce An Advocacy Tool for PSP to Use to Increase the Number of Pilots

A number of questions raised in the FMC meeting process, and during this exercise as well, have focused on the true nature of this report since PSP would not share the actual scope of work associated with the SJSU/NASA report. The purpose of these questions was to inform the Board and the public as to whether or not this report was intended to be a "fatigue study" or an advocacy tool for PSP to increase the number of pilots.

PSP's counsel submitted a letter of March 29, 2019 (*Attachment B*), which amongst other things, acknowledged that SJSU/NASA report was intended to be an advocacy piece for PSP to set the number of pilots. While the report is couched as being necessary to respond to fatigue management, the purpose of the report was that "PSP engaged NASA to analyze pilot workload data" in order to get at a recommendation to "be submitted as part of the process by which the BPC sets the number of pilots." In

this same letter, PSP refused to disclose the actual and complete scope of work and would not allow SJSU/NASA to answer further questions regarding its fatigue or staffing expertise from the FMC.

In short, PSP hired experts in fatigue management, but would not allow them to fully participate in the Fatigue Management Committee process. Instead, PSP cited the need to preserve their role as advocates for a certain number of pilots in this exercise.

In order to ascertain the true scope and nature of the PSP contract with SJSU/NASA, PMSA obtained a copy of the contract through the State of California's application of public records act law to the SJSU Research Foundation. The contract is submitted here as *Attachment C*.

We believe the contract speaks for itself, and that Board members have a right to examine it and an obligation to understand it.

It confirms the PSP letter of March 29, 2019: that SJSU/NASA fatigue experts were hired to conduct some sort of fatigue recommendation exercise, but have instead been limited only to the creation a workload advocacy tool and report for PSP under the veneer of the application of fatigue-related metrics. If there is a complete set of fatigue-related recommendations, none have been produced or delivered to the Board or the public. And, obviously, if they had been, PMSA would insist that they be produced as evidence and examined by the Board in this process, given the high likelihood that the creation of other fatigue-mitigation tools which do not require new licensees would undermine the current report's advocacy for such a high increase in new pilots.

The Report is Not a "Fatigue Study" Like That Completed By This Team in San Francisco for the State of California

It is obvious from PSP's communications with the Board and the contract scope of work, that PSP did not hire SJSU/NASA for the purpose of providing PSP with an independent fatigue management study or set of recommendations to reduce fatigue. Rather they were hired to produce an advocacy tool and report regarding setting the number of pilots – an area in which their expertise or experience is limited.

Moreover, one can come to the same conclusion by comparing the work product of the SJSU/NASA fatigue management team for PSP with the work product of the SJSU/NASA fatigue management team for the State of California where they were hired to complete a study in a field in which they are bona fide experts: fatigue management.

In California, SJSU/NASA completed a multi-year, publicly-scoped, and publicly-contracted but industry-funded study on fatigue management for the State Board of Pilot Commissioners with respect to pilotage on the San Francisco Bay. The report concluded with 19 fatigue management recommendations meant to help the state create a regulatory structure for reducing pilot fatigue. The Final Recommendations of this comprehensive and well-regarded report are submitted here in relevant part as *Attachment D* (the full text of the report can be accessed on-line at www.bopc.ca.gov).

Of the 19 recommendations only ½ of one of the recommendations had to do with the number of pilots. AND, even in that recommendation, the fatigue study included a call to reduce the number of meetings attended and other non-piloting essential tasks by pilots as a viable alternative to simply increasing the

number of pilots. Moreover, that recommendation was couched on management of availability of pilots for assignments.

By comparison with the fatigue study, the PSP report here was procured from SJSU/NASA only to provide a recommendation for the number of pilots. SJSU/NASA did not evaluate, revise, or apply the 18 ½ other fatigue recommendations from the California fatigue study in its advocacy tool creation and report for PSP. Moreover, even if they had, SJSU/NASA was restricted by PSP from participating to such a degree in the FMC process because the primary purpose of their contract was to advocate for a specific increase in the number of pilots.

In short, the fatigue study in California was a Report in which SJSU/NASA was hired to provide a comprehensive opinion in their field of expertise. In contrast, the work prepared for PSP in Washington is not an application or analysis of fatigue management tools, but an application of workload constraints to data. No expert opinions have been rendered by the SJSU/NASA team for fatigue management or overall pilot resource management, despite the potential for such recommendations to be delivered. Instead PSP has presented this report and advocacy effort to argue for a significant increase in the number of pilot licenses in the Puget Sound.

Conclusion – No Need to Increase Number of Pilots

The good news is that there is no need for the BPC to change the authorized number of Pilot Licenses. Simply filling the existing vacant slots with qualified candidates already in the pool will provide more than enough pilots to handle decreasing assignment levels.

What is less obvious is how PSP management decisions and practices have resulted in inefficient pilot utilization creating call backs and delays when past PSP management handled higher workloads without these issues. While we understand that the BPC licenses individual pilots and not their membership organizations, management practices do impact service and potentially pilot morale. The wide variation in the number and volume of assignments piloted within the pilot corps should be an issue that requires the attention of management as well as the BPC.

Sincerely,



Captain Mike Moore
Vice President

Attachments

ATTACHMENT A

Outstanding Questions on the SJSU/NASA Report Procured by PSP

1. Why does this report focus exclusively on adding pilots but remain silent on pilot resource management and licensee optimization or efficiency per Pilotage Act mandates?
2. Why does the report ignore management of pilot availability?
3. Where are the report recommendations to improve management of duty days, vacation, call backs, comp days, repos, duty day trading, training, meetings or not fit for duty days?
4. Why hasn't the data used in the report been independently validated given that it is sourced by an interested party?
5. Why did PSP limit NASA to 12 months of data when many other years of data highlight more efficient management of pilots performing higher average workloads while minimizing call backs? Why were more efficient years not considered at all?
6. Why did the report choose to simply add 4 full time pilots to increase the comp day burn rate instead of reviewing past years where comp days decreased with higher workloads?
7. Why did the report not consider the impacts of a relatively steady level of accrued comp days as has been the case for a majority of the preceding 3 decades?
8. Why did the report indicate an allocation of 1.51 pilots each day all year long including weekends to training and meetings (see Table 7 pg 41 of NASA report) with no assessment as to type or length of training or meeting or whether they were essential or discretionary (and shouldn't that be a BPC determination)?
9. Did the report count repos as a full assignment (apparently adding 2.87 pilots per day for repos) without evaluating how repos can be minimized or managed? Was NASA aware that in the past
10. Why did the report choose to simply add 2 more pilots for future fatigue management rules yet to be described or acted upon and unable to model?
11. How did the report determine a need to add 2 more pilots for the 10-hour rest rule when there is no clear basis for this determination?
 - a. NASA stated there would be 1,368 incidents when pilots had more than 8 hours rests but less than 10-hour rest and then listed total hours involved indicating an average of 1 hour 52 minutes per incident – this is inconsistent with PSP's reported numbers and defies mathematical logic; please explain.
 - b. To accept NASA's calculations, one must accept that 18.7% of assignments (including cancelations) would involve pilots averaging 8 hours and 8 minutes of rest. Natural distribution would indicate much more rest than this so again please correct or explain.
 - c. And, the 10-hour rule was in place less than 3 months of the anomaly year of 2018 with unprecedented shortages articulated by the BPC letter to industry. This included empty pilot license slots, the large number of monthly UTC pilot

meetings, more than normal NFFD pilots and a VP hardly moving ships thus making fewer pilots available for assignment. Wouldn't this reality result in a pilot being up in rotation sooner than normal thereby increasing the frequency of incidents with less than 10 hours rest? If not, please explain.

- d. In leading up to adopting the 10 hour standard, the FMC/BPC heard from PSP that 500 assignments per year would be impacted and many of those were just short of the 10 hours rest and involved many assignments that were not very time sensitive so short delays were acceptable in those circumstances. That input preceded an FMC vote to recommend 10 hours to the BPC. Can you reconcile the PSP report of 500 with the 1,368 while accounting for how many incidents were created by limiting the number of pilots available for ship assignments?
 - e. The PSP legal counsel submission on June 12th stated that over 700 assignments would be impacted. But, PSP stated at meetings of the FMC and BPC that there are 500 instances of less than 10 hours rest (in an unprecedented shortage year) while the PSP lawyer submission states there were "over 700" occasions (no exact number provided) and NASA says there 1,368 instances. And all are based on an unprecedented year with fewer pilots available for assignment than any time in recent memory thus causing a pilot with less rest to come up in rotation sooner.
 - f. Based on the 500 number put forward by PSP at the FMC which voted to forward the 10 hour standard to the BPC who then passed it, PMSA put forward the math analysis that based on 500 instances of pilots having more than 8 hours rest but less than 10 would involve from 1 minute to 1 hour 59 minutes per incident. This would result in an additional 49 seconds of rest per pilot per month up to 1.6 hours of additional rest per pilot per month. At that time, PMSA was not aware so many on duty pilots in each rotation were not actually available for ship assignment which clearly increases and skews the number of instances.
12. What justification forms the basis for the report's conclusion that an additional 3 pilots are needed to provide earned time off? The report failed to address pilots overlapping and overstaffing duty days by each pilot claiming a full 24 hours of duty on transition Tuesdays that average less than 20 assignments. Transition Tuesday's create 14 days of vacation duty days per pilot per year.
- a. There is no need for all pilots to be listed on duty all 24 hours every transition day (7% of all duty days) for a total of over 600 lost duty days per year.
 - b. If license slots are filled and these lost duty days are efficiently allocated this management change alone would dramatically reduce or eliminate delays, significantly reduce call backs and allow for a relatively high comp day burn rate.
13. The report seems to estimate that 18.65 pilots would be used on vessels per day when accounting for multiple harbor shifts (page 42 NASA report), but if so then how does the report conclude that 31 pilots stand duty each day in each of two watch sections with one non-piloting president and still recommend an increase in the number of pilots needed based on fatigue? How does the report account for the 184 days each pilot doesn't stand duty, plus double counting transition Tuesdays, which apparently serves to justify an additional 14 days of vacation on duty days, in its model?

14. Where is the justification for average overstaffing of 12.35 pilots per day?
15. What justification in the report is given for a recommendation on staffing that 40% of licensed pilots' duty days should be spent on non-ship piloting activities?
16. As referenced on page 17 of PSP's May 6th submission, does the report actually recommend a cap on the accumulation of comp days, and that they should be used in non-peak days during the year as vacation?
17. What is the clear articulation of the breakdown of the NASA math on 26.33 pilots per day plus all the add-ons?
18. How would all of the NASA analysis, predictions and correlation of factors determinations have changed if the base year was 2011, when more jobs were done per pilot while call backs were minimized?
19. If every pilot stands 181 days of duty and there is no double-counting then we would see between 24 and 26 pilots available for dispatch most days. Since the report looks at managing average ship movements of 18.46 per day, does that acknowledge that an average day is already overstaffed by 35%?
20. What is the basis for the Report recommending an additional 4 pilots to address accrued comp days?
21. Historically, average accrued comp days in the 12 years from 1993 to 2004 inclusive was 2,100 with a low of 1,917 and a high of 2,263.
22. In the 5 years between the end of 1996 and the end of 2001 inclusive, accrued comp days were "reduced by 346" for an average reduction of 69 comp days per year. The average assignment per pilot per year during those years was coincidentally 145.2, the current TAL. Why didn't NASA study this?
23. PSP has emphasized the correlation between workload and accrued comp days, but beyond relying on PSP's desired outcome, the report has no justification for adding 4 pilots to bring the number of accrued comp days down to zero. This conclusion is not based on a linear regression, it is not a Monte Carlo simulation, and does not include any analysis of data; it simply just assumes a static management system and duty system and picks a zero outcome in a certain timeframe without historical analysis of accrued comp days.
24. What is the Report's basis for adding 2 more pilots for future "undefined fatigue management measures"?
25. The report seems to make a recommendation for an extra pilot to accommodate meetings for the President and the Vice President.
26. On what basis did the report reach the conclusion that meeting attendance was equivalent to an average ship assignment?
27. Since the report's linear regression model states the average need for licensees to actually move ships is around 19 pilots, is it really recommending 7 additional pilots each day for administrative and other purposes and then adding another 5 per day for other non-piloting purposes?

March 29, 2019

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Chair Sheri Tonn
Board of Pilotage Commissioners
2091 Third Ave. Suite 500
Seattle, Washington 98121

Re: Fatigue Management Committee Member Questions for NASA and NASA's Scope of Work

Dear Chair Tonn,

On behalf of the Puget Sound Pilot Association ("PSP"), I am writing to address the questions posed by members of the Fatigue Management Committee ("FMC") to NASA, through PSP in relation to the upcoming process for setting the number of pilots pursuant to WAC 363-116-065 (the "065 hearing") and with respect to inquiries about NASA's scope of work.

As you know, the FMC has been examining the recommendations of Dr. Charles A. Czeisler, PhD, MD made to the Board of Pilotage Commissioners ("BPC") on December 7, 2017 for many months. As a result of Dr. Czeisler's recommendations, the FMC proposed revisions to RCW 88.16.013 to revise the interval of rest required following vessel assignments for pilots. In an August 10, 2018 letter, you set out a number of data analyses the BPC felt would be necessary in order to move forward with agency-request legislation. In response to that letter, knowing that the relevant stakeholders lacked the expertise to examine PSP's relevant workload data, PSP engaged a research group consisting of scientists from the Fatigue Countermeasures Laboratory at NASA's Ames Research Center and the San Jose State University Research Foundation (collectively "NASA"). In addition to their expertise and studies of the relationship between sleep loss, circadian deyschrony, cognitive function, and alertness, the research group also had familiarity with fatigue countermeasures for marine pilots based on their study of the San Francisco Bar Pilots fatigue commissioned by the state of California.

Since the time PSP engaged NASA to analyze pilot workload data, PSP has been transparent regarding the work NASA was asked to perform. For example, PSP asked NASA's Fatigue Countermeasures Laboratory Director, Dr. Erin Flynn-Evans, PhD, and Senior Researcher for San Jose State University Research Foundation, Kevin Gregory, to attend a meeting of the FMC in February to answer questions about their work. PSP has also been open about the fact that NASA has been asked as part of its analysis to recommend a proposed number of pilots necessary to comply with Dr. Czeisler's recommended fatigue countermeasures. Ultimately, we expect that recommendation to come in the form of a written report addressing the impacts of fatigue countermeasures on pilot workloads and therefore the number of pilots needed to safely perform the anticipated workload in the coming year, which will be submitted as part of the process by which the BPC sets the number of pilots.

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Despite PSP's efforts at transparency, industry members have persistently complained about not being provided the scope of work for which NASA was engaged. Those complaints are highlighted in the numerous questions posed by FMC members to NASA through question compilation first circulated on February 26, 2019 and updated with additional questions on March 25, 2019.

For a number of reasons that need not be fully addressed here, but which include preserving privacy for its members and the unilateral and unfair burden placed on the pilots to constantly provide additional internal operating data, PSP declines to provide a full copy of its engagement with NASA. However, to put to rest questions regarding what research and analysis NASA has been asked to perform, I am providing a verbatim copy of the pertinent sections of the Fatigue Management Program Data Analysis Project in the attached Addendum A. It is my hope that by providing this description of the work being performed by NASA, the FMC can continue its work without resorting to the type of combative and cumulative questions that were included in the February 26 and March 25 compilations.

As noted, I am also writing to address PSP's intentions for addressing the questions posed by members of the FMC. PSP's intentions here are best understood in the context of the due process concerns raised by me and Dave Wiley with respect to the 065 hearing process. As you know, Dave Wiley and I spoke with Albert Wang prior to the February meeting of the BPC in an attempt to outline a process for the BPC that would provide a semblance of the due process and fairness that the BPC owes to relevant stakeholders, including PSP and industry. We were advised that the BPC has no procedural rules which would permit discovery, cross-examination or testimony as part of the 065 hearing process. However, it was generally agreed that through simultaneous submissions, with opportunity for response (and rebuttal if an out-of-sequence submission was permitted), oral presentation, and questions by the Commissioners to the submitting parties, the process would be sufficiently fair and transparent under the circumstances.

Two documents setting forth somewhat similar processes resembling what was previously discussed were then introduced at the BPC meeting on February 21, 2019. The Commissioners voted to approve one version of the process, which, like the other, did not include opportunity for discovery or cross-examination to or from any Interested Party, but did provide "Q&A" sessions following formal written submissions.

It is our understanding that a meeting of the FMC took place the following day, on February 22, 2019, and at that meeting, Captain von Brandenfels invited written questions to be posed to NASA. It is our further understanding that this invitation was made so that NASA could be prepared to provide responses to fatigue management-related questions, rather than providing on-the-spot answers without time for preparation.

Chair Sheri Tonn
Board of Pilotage Commissioners
March 29, 2019
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Despite the nature of Captain von Brandenfels' invitation, rather than providing written fatigue-management related questions to assist NASA, FMC members instead submitted questions to PSP on February 26 that appear to be nothing more than discovery and/or cross-examination of PSP and the NASA scientists on matters relating solely to the future PSP written submission for the 065 hearing. This characterization seems to equally apply to most of the additional questions circulated on March 25.

On March 21, 2019, the BPC voted to adopt a new schedule for the WAC 363-116-065 process to accommodate PSP's request for additional time. Like the schedule approved on February 21, the current schedule calls for simultaneous submissions, permits subsequent "Q&A" sessions, but does not permit discovery or cross-examination. In accordance with the process that was approved by the BPC and which applies to all Interested Parties, rather than attempting to answer obvious discovery requests, PSP declines to provide answers to the numerous questions compiled and circulated by the FMC in advance of its written submission in the 065 hearing process. PSP further declines to be bound to provide formal written responses of the nature that would be required of all Interested Parties, including industry, if discovery were authorized by the BPC with attendant due process protections. Instead, PSP has provided the questions to NASA and plans to engage in the three Q&A sessions following the formal submission deadline on May 6, 2019. By that time, we expect the attached description of the scope of work and the substance of NASA's written report will combine to narrow the scope and subject matter of the questions the Commissioners seek to have answered in assisting their decision making process.

We trust this letter puts to rest any questions regarding PSP's intentions as we move closer to the May 6 submission deadline. We look forward to submitting on May 6 and advancing this process in a way that is comprehensive but fair to the pilots in the Puget Sound Pilotage District.

Best regards,



Blair I. Fassburg
(206) 628-2772
bfassburg@williamskastner.com

cc: Albert Wang



Fatigue Management Program Data Analysis Project

Puget Sound Pilots Background

The Puget Sound Pilots (PSP) mission is to ensure against the loss of lives, loss of or damage to property and vessels, and to protect the marine environment by maintaining efficient and competent pilotage service on our State's inland waters within the Puget Sound Pilotage District. In executing this mission, PSP provides ship pilotage services on behalf of Washington state, as required. Currently, 52 pilots are authorized by the Washington Board of Pilotage Commissioners (BPC) to service the 7,000+ sq mi Puget Sound Pilotage District (PSPD) which includes 14 major ports. To accomplish this, PSP operates from two dispatch hubs, the Port Angeles Pilot Station (PAPS), which operates much like a fire station, and the Seattle office where PSP dispatch, executive and administrative staff operate from.

FMP Data Analysis Project

PSP established a Fatigue Management Program (FMP) subsequent to the NTSB report on the Eagle Etome incident that was a catalyst for increased awareness of the affects of fatigue in the marine pilotage industry. This led to further research and education in sleep science, circadian rhythm and misalignment, cumulative affect of fatigue on individuals and ultimately PSPs own FMP. In addition, the BPC Fatigue Management Committee (FMC) is addressing 4 measures recommended by Dr. Czeisler, a Harvard a sleep science and fatigue management expert. During the next year or two I expect other recommendations will be on the table. In an on-going effort to better manage and mitigate pilot fatigue, PSP is seeking more in depth analysis by enlisting a consultant to model a number of measures for possible impact and implications, using proprietary operations data and other information.

Scope of Work

1. Source data will be provided from PSP operating system (Coe System) in csv/excel format.
2. Consultant to review and fully understand rules and regulations related to current PSP dispatch rules, including pilot repositioning (repos) and fatigue management.
3. Consultant to develop a database, based on PSP original data and subsequent updates to data, with modeling capability that can be readily and easily accessed and updated by PSP members and/or employees, as designated by PSP.
4. Capability to import/upload PSP monthly data files (Coe system and possible others) into the consultant database/model to incorporate most current data into the model and produce the updated information we need.
5. Model should enable ongoing data processing capability to adapt to additional or modified fatigue management measures and/or changes to other rules and regulations.
6. Capability to model changes in the target assignment level (TAL) and number of pilots.

APPENDIX A

CONTRACT

Between

PUGET SOUND PILOTS

and

SAN JOSE STATE UNIVERSITY RESEARCH FOUNDATION

This document is to serve as a CONTRACT between PUGET SOUND PILOTS (herein after referred to as "SPONSOR") AND SAN JOSE STATE UNIVERSITY RESEARCH FOUNDATION (herein after referred to as "SJSURF").

ARTICLE I. PERIOD OF PERFORMANCE

The period of performance of this CONTRACT shall be September 17, 2018 through March 31, 2020.

ARTICLE II. STATEMENT OF WORK

The SJSURF as a Contractor shall perform the statement of work as detailed in Exhibit "A", attached hereto and incorporated by reference herein, expressly made part of this CONTRACT.

ARTICLE III. KEY PERSONNEL

Key personnel for this Project shall be designated as

SJSURF:

Technical Management

Kevin Gregory
Principal Investigator
San Jose State University
One Washington Square
San Jose, CA 95192
650-604-6441
kevin.gregory@sjsu.edu

Contract Administration

Ellen Orasa
Sponsored Programs Manager
Office of Sponsored Programs
San Jose State University Research Foundation
210 N. Fourth Street, 4th Floor
San Jose, CA 95112-5569
408-924-1427
ellen.orasa@sjsu.edu

SPONSOR:

Technical Management

Ivan Carlson (and Linda Styrk)
Marine Pilot
Puget Sound Pilots
101 Stewart St, Suite 900
Seattle, WA 98101
360-421-0583
icarlson@pspilots.org

Contract Administration

Linda Styrk
Executive Director
Puget Sound Pilots
101 Stewart St, Suite 900
Seattle, WA 98101
206-518-5454
lstyrk@pspilots.org

ARTICLE IV. PAYMENT

SJSURF shall be reimbursed for allowable costs incurred in providing the work required of this CONTRACT not to exceed a maximum amount of \$ 119,354 . CONTRACT expenditures shall be in accordance with the budget that appears as detailed in Exhibit "B", attached hereto and incorporated by reference herein, expressly made part of this CONTRACT.

Payment to SJSURF shall be made within thirty (30) days upon receipt and approval by SJSURF of an itemized monthly invoice, showing approved budget categories, expenditures for the period covered by the invoice, and cumulative expenditures to date.

ARTICLE V. RECORDS AND RETENTION AND AUDIT

The SJSURF's directly pertinent books, documents, papers and records of this CONTRACT shall be retained for a period of three years following the date of the final payment under this CONTRACT.

ARTICLE VI. HOLD HARMLESS

SPONSOR agrees to indemnify, hold harmless and defend the State of California, Trustees of the California State University, California State University, San José State University, San José State University Research Foundation, and all officers, employees, volunteers and agents of each of them from any and all liability, loss, damage, expense, costs of every nature, and causes of action arising out of or in connection with this CONTRACT. SJSURF agrees to indemnify and to hold harmless SPONSOR from damage to persons or property resulting from any act or omission on the part of each party, its employees, agents or officers.

ARTICLE VII. RIGHTS IN DATA.

The SJSURF and SPONSOR shall mutually retain all rights in data including copyrights, patents, trademarks and other intellectual property resulting from the work performed under this CONTRACT.

ARTICLE VIII. TERMINATION.

SJSURF shall use its best efforts to provide the services herein contained at the time and in the manner herein provided. This CONTRACT may be terminated by the SJSURF or by the SPONSOR at any time upon the giving of thirty (30) days prior written notice to the other party. Said notice shall be given to the person executing this CONTRACT. In the event of termination, the SJSURF shall be entitled to payment for acceptable and allowable work performed under this CONTRACT, and for all non-cancelable obligations made in connection with such work, through the date of termination.

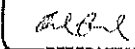
ARTICLE IX. ENTIRE CONTRACT


This CONTRACT and the Exhibits hereto contain the entire CONTRACT of the parties, and no representation, provision, warranty, term, condition, promise, duty or liability, expressed or implied, shall be binding upon or applied to either party, except as herein stated. No amendment or modification of any term, provision or condition of this CONTRACT shall be binding or enforceable unless in writing and signed by each of the parties.

IN WITNESS WHEREOF, the parties have executed this CONTRACT as of the date hereof.

SAN JOSE STATE UNIVERSITY
RESEARCH FOUNDATION:

SPONSOR:

DocuSigned by:

By: _____
Name: Rainesh Prasad
Title: Executive Director
Date: 9/28/2018


By: _____
Name: Linda Styrk
Title: Executive Director
Date: 10/4/18

ATTACHMENTS:

- EXHIBIT A – Statement of Work
- EXHIBIT B – pBudget Justification
- EXHIBIT C – Non-Disclosure Agreement

Exhibit A

Scope of Work

1. STUDY OBJECTIVES

In accordance with the Puget Sound Pilots Fatigue Management Program Data Analysis Project Request for Proposals, the Project will address the following objectives:

- Identify characteristics of Pilot schedules that could be associated with elevated fatigue levels or that violate current work-rest guidelines (e.g instances of < 10 h rest between assignments, > 15 days of continuous work) using historical scheduling information.
- Identify characteristics of Pilot working conditions that contribute to extended work episodes or insufficient rest (e.g. commute times, density of ship traffic, pilot census)
- Provide information and recommendations to the Puget Sound Pilots on how to mitigate Pilot fatigue, including recommendations concerning Pilot staffing needs.

2. DELIVERABLES

The project will deliver the following:

- A database structure that can be used to re-evaluate factors associated with fatigue following completion of the project.
- A model that can be used to assess the number of Pilots necessary to meet scheduling requirements based on the factors described above.
- A final report summarizing findings and recommendations.

3. STUDY TEAM ORGANIZATION

The project shall be led by Mr. Kevin Gregory. Mr. Gregory is a Senior Research Associate with San Jose State University Research Foundation, based in the Human Systems Integration Division at National Aeronautics and Space Administration (NASA) Ames Research Center.

Throughout the study, the following team members will contribute Project specialist expertise:

- Erin Flynn-Evans, Ph.D., MPH. Dr. Flynn-Evans, is a Research Psychologist at NASA Ames Research Center, specializing in fatigue and sleep research. Dr. Flynn-Evans leads the Fatigue Countermeasures Laboratory and has direct oversight and guidance of members of the Fatigue Countermeasures Laboratory, including Mr. Gregory and Mr. Bathurst
- Nicholas Bathurst is a Research Associate with the Research Foundation. Mr. Bathurst has experience conducting data analysis on similar projects, including among maritime pilots.
- Alan Hobbs, Ph.D., is a Senior Research Associate with the Research Foundation. Dr. Hobbs specializes in human factors research and recently led a research project that studied pilot fatigue in San Francisco Bay maritime operations.

4. STUDY MANAGEMENT

The study will involve a staged approach using several complementary data collection and analysis techniques. Before each major stage of the research, the Pilots will be consulted to ensure that the Research Foundation and the Pilots are in agreement concerning the tasks to be performed.

The Project research team is locally situated in the San Francisco Bay Area. Travel will be required for familiarization visits and ride-alongs with the Pilots.

5. CONFIDENTIALITY

The research plan will be approved by the Human Subject Institutional Review Board (IRB) of San Jose State University. The IRB will not issue an approval unless they are satisfied that adequate protections are in place to protect the confidentiality of all subjects participating in the research, and all data that may be collected from the subjects.

To protect against this eventuality, all Project data will be stored on non-networked computers. If there is a need to record names or other personally identifying information (for purposes of informed consent, for example) the information will be stored in separate files that cannot be merged with data files.

6. SUMMARY OF THE STUDY APPROACH

The Project will involve a multi-pronged approach involving data from a variety of sources. Key stages of the research will be:

- a. Review of Puget Sound Pilot operations.
- b. Analysis of operational information provided by the Pilots.
- c. Application of fatigue modeling software to the available record of operations and work periods.
- d. Identification of factors associated with fatigue and to inform staffing requirements.
- e. Formulation of a model to determine the number of pilots required given work-rest rules and workload.
- f. Validation and verification of model predictions through pre and post surveys, actigraphy, psychomotor vigilance testing, and sleep diaries.

7. DESCRIPTION OF PROJECT TASKS AND TIMELINE

TASK	DESCRIPTION
TASK 1 — Preparation and Familiarization	<p>Project Staff will meet with the Pilots to obtain approval of the research plan, and identify any necessary refinements or changes in the planned activities and schedule. Arrangements will be made for access to Pilots and available records of operations and Pilot work periods.</p> <p>During this phase, Project Staff will use documentation and site visits to obtain an overview of the work of Pilots, including the nature of the tasks, the work environment, and work schedules.</p>
TASK 2 — Identification of factors contributing to extended work hours and wakefulness, and high workload	<p>Project Staff will work with the Pilots to identify factors contributing to extended work hours and wakefulness, and high workload. Factors that will be considered include ship traffic movement and density of ship traffic, surface traffic and commuting variability, along with factors identified by the Pilots.</p>

TASK 3 — Analysis of operational datasets provided by the Pilots	<p>One year or more of de-identified data describing hours of work and rest and ship movements will be obtained from the Pilots.</p> <p>It is anticipated that this information will include the number of consecutive work days, time off between blocks of work days, day vs. night duty, and start and finish times of work periods.</p> <p>The best way to measure fatigue objectively is through the frequent administration of cognitive tasks and collection of sleep information. When limited objective data is available, fatigue models may be useful in the identification of schedules that would be expected to lead to elevated fatigue. Such models are frequently used by the airline industry and by NASA in order to guide schedule design. Using fatigue modeling programs, this data provided by the Pilots will be used to estimate fatigue on a variety of work hour scenarios.</p>
TASK 4 — Development of a Pilot Staffing Model and Analysis Database	<p>Using the information collected in Tasks 1-3, Project Staff will develop a model to estimate Pilot staffing requirements under different scenarios.</p>
TASK 5 — Validation and Verification of Model Predictions	<p>Model validation and verification is essential to ensure that the introduction of changes to schedules or workforce based on the model predictions yields acceptable estimates for future action. Model validation and verification will commence in two phases:</p> <p>Phase 1: Validation Phase, baseline data collection. Prior to the introduction of any changes to the schedules, Pilots will be asked to complete fatigue surveys, to wear actiwatches, and to complete cognitive tests and a sleep log while on shift. Data collection will last two weeks and Pilots will be solicited for data collection on a volunteer basis.</p> <p>Data gathered during the Validation and Verification Phase 1 will be compared against model predictions.</p> <p>Phase 2: Verification Phase, post-implementation data collection. Following changes to work hour rules or staffing levels, the two-week study conducted during Phase 1 will be repeated.</p> <p>Data gathered during the Validation and Verification Phase 2 will be compared against the model predictions.</p>

TASK 6 — Final Report	<p>The information gained from Tasks 1-5 will be summarized in a final report that will be presented to the Pilots. This report will include findings regarding the following:</p> <ul style="list-style-type: none">• How historical schedules may have induced fatigue• Guidance on how changes to duty hour limits might mitigate fatigue• Recommendations for Pilot staffing needs to meet work hours and traffic management needs• Guidance on how to use the model for future application
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Fatigue Management Project Proposal – San Jose State University Research Foundation

Exhibit A1

SCHEDULE OF DELIVERABLES

Deliverable	Description	Due Date
Deliverable 1. A brief report summarizing familiarization exercises and containing IRB submissions*	<u>Task 1 & 2. Preparation</u> <ul style="list-style-type: none"> • Make arrangements for access to personnel and available operations/work period records. • Preliminary familiarization site visits with Pilots. • Review of available documentation and model inclusion factors. • Preparation and submission of research proposal to San Jose State University Institutional Review Board (IRB). 	2 months from start of Project
Deliverable 2. Summary of the operational analysis*	<ul style="list-style-type: none"> • The Pilots will be provided with a short report on the findings of the operations records analysis • The Project Staff will present findings from this analysis at a Pilot and/or Commission meeting 	4 months from start of Project
Deliverable 3. Preliminary model estimating Pilot staffing needs*	<ul style="list-style-type: none"> • The Pilots will be provided with a short report on the variables included in the model and the staffing estimates generated from the model • The Project Staff will present findings from this analysis at a Pilot and/or Commission meeting 	5 months from start of Project
Deliverable 4. Report on preliminary findings from validation study*	<ul style="list-style-type: none"> • The Pilots will be provided with a short report describing the relationship between the model input estimates (e.g. traffic, sleep, performance) and actual data 	7 months from start of Project
Deliverable 5. Revised model estimating pilot staffing needs	<ul style="list-style-type: none"> • The Pilots will be provided with a short report describing the revised model 	8 months from start of Project
Deliverables 6. Final report	<ul style="list-style-type: none"> • The Pilots will be provided with a final report summarizing findings from the entire analysis project 	9 months from start of Project
Deliverables 7. Report on findings from model verification	<ul style="list-style-type: none"> • The Pilots will be provided with a report describing the findings from the verification study (i.e. the study conducted following implementation of recommendations to verify the findings of the model and recommendations) 	18 months from start of Project

* This report may take the form of an email with attachments.

*Fatigue Management Project Proposal – San Jose State University Research Foundation***Exhibit A2****PROPOSED BUDGET**

PERSONNEL	TOTAL
K Gregory N Bathurst A Hobbs	<ul style="list-style-type: none"> • 40% time (annual period) • 40% time • 2.5% time <p>* As part of the Fatigue Countermeasures Laboratory at NASA Ames Research Center, we will have access to some resources and other personnel at no additional cost.</p>
SUBTOTAL (including Research Foundation fringe benefits rates)	\$89,325
TRAVEL	
4 total trips (2 x 2 personnel, 3 days total each)	\$4,400
MATERIALS/SUPPLIES	
	\$1,000
TOTAL DIRECT COSTS	\$94,725
ADMIN/INDIRECT COSTS	\$24,629
TOTAL COST	\$119,354

September 5, 2018

Exhibit B

SJSURF Budget Justification

Personnel

Senior Personnel:

The project shall be led by Mr. Kevin Gregory. Mr. Gregory is a Senior Research Associate with San Jose State University Research Foundation, based in the Human Systems Integration Division at National Aeronautics and Space Administration (NASA) Ames Research Center.

Mr. Gregory is requesting funding for approximately 825 hours throughout the calendar year for this project.

The deliverables for this project are the following:

- A database structure that can be used to re-evaluate factors associated with fatigue following completion of the project.
- A model that can be used to assess the number of Pilots necessary to meet scheduling requirements based on the factors described above.
- A final report summarizing findings and recommendations.

Other Personnel:

Throughout the study, the following team members will contribute Project specialist expertise:

- **Erin Flynn-Evans, Ph.D., MPH.** Dr. Flynn-Evans, is a Research Psychologist at NASA Ames Research Center, specializing in fatigue and sleep research. Dr. Flynn-Evans leads the Fatigue Countermeasures Laboratory and has direct oversight and guidance of members of the Fatigue Countermeasures Laboratory, including Mr. Gregory and Mr. Bathurst.
- **Nicholas Bathurst** is a Research Associate with the Research Foundation. Mr. Bathurst has experience conducting data analysis on similar projects, including among maritime pilots. Mr. Bathurst is requesting funding for approximately 825 hours throughout the calendar year for this project,
- **Alan Hobbs, Ph.D.,** is a Senior Research Associate with the Research Foundation. Dr. Hobbs specializes in human factors research and recently led a research project that studied pilot fatigue in San Francisco Bay maritime operations. Dr. Hobbs is requesting funding for approximately 825 hours throughout the calendar year for this project,

Fringe Benefits:

The Department of Health and Human Services reviews and approves the SJSU Research Foundation, fiscal agent and auxiliary of SJSU, fringe benefit rates, which are effective as of July 1st of each year. SJSU provides approved overload rates for faculty based on CSU negotiated contracts. Rates are subject to change. The actual rate at time of award will be used.

Travel:

\$4,400 is being requested as travel will be required for familiarization visits and ride-alongs with the Pilots. It is expected that 2 trips to the Seattle/Puget Sound area will be necessary for 2 project staff members to meet with personnel there and observe operations, and eventually present findings. Estimated travel costs included airfare to/from Seattle, 2 nights of lodging, per diem and ground transportation.

Indirect Costs:

Indirect cost rates, approved by the Department of Health and Human Services have been applied to this budget. Rates are subject to change and the current rate at time of award will be charged. The current rate for off campus research is 26%. This rate is applied to the modified total direct cost requested (Total Direct Costs less stipends, tuition, participant costs, equipment over \$5,000 and the portion of each subcontract(s) over \$25,000). A copy of the approved rate agreement can be found:

http://www.sjsu.edu/researchfoundation/osp/preparing-proposals/projectcosts/DHHS_Colleges_and_Universities_Rate_Agreement_2018-2019.pdf

Exhibit C

NON-DISCLOSURE AGREEMENT

THIS AGREEMENT is made and entered into as of by and between **Puget Sound Pilots**, (the "Disclosing Party"), located at **101 Stewart St, Suite 900, Seattle, WA 98101** and **San Jose State University Research Foundation**, (the "Recipient" or "Receiving Party"), located at **210 N. Fourth Street, 4th Floor, San Jose, CA 95112**.

This agreement is entered into pursuant to **Contract**. Recipient shall be acting as **Contractor**.

Throughout the term of this Agreement, the Disclosing Party may deem it necessary to disclose or share certain proprietary information with the Recipient. Therefore, in consideration of the mutual promises and covenants contained within this Agreement, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, both parties hereto agree as follows:

Confidential Information

For all intents and purposes of this Agreement, "Confidential Information" shall mean and include any data or information that is deemed proprietary to the Disclosing Party and that which is not generally known to the public, whether in tangible or intangible form, whenever and however disclosed, and whether or not marked or otherwise identified as confidential including, but not limited to, (i) any form of pilot member information, financial information or projections, dispatch or business operations, quotes or estimates, strategies, business plans, performance results which may be related to the past, present and/or future business activities of said party, its past or current subsidiaries and affiliated companies; (ii) service programs and customer or supplier lists; (iii) any scientific, technical or data information, design, process, procedure, formula, improvement, technology or method; (iv) any concepts, reports, data, knowledge, works-in-progress, designs, development tools, specifications, computer software, source code, object code, flow charts, databases, information and trade secrets, creative content; and (v) any other information that should reasonably be recognized as confidential information of the Disclosing Party. Confidential Information need not be novel, unique, patentable, copyrightable or constitute a trade secret in order to be designated Confidential Information. The Receiving Party acknowledges that the Confidential Information is proprietary to the Disclosing Party, has been developed and obtained through great efforts by the Disclosing Party and, as such, the Disclosing Party regards all of its Confidential Information as trade secrets.

Notwithstanding anything in the foregoing statement to the contrary, Confidential Information shall not include any such information which: (i) was known by the Receiving Party prior to receiving the Confidential Information from the Disclosing Party; (ii) becomes rightfully known to the Receiving Party from a third party source not known, after diligent inquiry, by the Receiving Party to be under an obligation to the Disclosing Party to maintain confidentiality, (iii) is or shall become publically available through no fault or failure to act by the Receiving Party in breach of this Agreement; (iv) is required to be disclosed in a judicial or administrative proceeding, or is otherwise requested or required to be disclosed by law or regulation, although the requirements of Compelled Disclosure shall apply prior to any disclosure being made; and (v) is or has been independently developed by employees, consultants or agents of the Receiving Party without

violation of the herein contained terms and conditions of this Agreement or reference or access to any Confidential Information.

Confidential Information Disclosure

The Disclosing Party may deem it necessary, from time to time, to disclose or make available to the Receiving Party Confidential Information. It shall then become the responsibility of the Receiving Party to: (i) limit the disclosure of any Confidential Information belonging to the Disclosing Party to the Receiving Party's directors, officers, employees, agents or representatives (collectively herein referred to as "Representatives") who have a need to know such Confidential Information in connection with the current or contemplated business relationship between the parties to which this Agreement relates, and only for that purpose; (ii) advise its Representatives of the proprietary nature of the Confidential Information and of the obligations set forth herein this Agreement and require such Representatives to keep the Confidential Information confidential; (iii) shall keep all Confidential Information strictly confidential by way of exercising a reasonable degree of care, but not less than the degree of care that the Receiving Party would exercise in safeguarding their own confidential information; (iv) not disclose any Confidential Information received to any third parties, unless otherwise provided for herein this Agreement; and require any recipient of confidential information to acknowledge in writing that said recipient understands his/her obligations pursuant to this agreement and agrees to abide by those terms and conditions.

Therefore, each party shall be responsible for any breach of this Agreement by any of their respective Representatives.

Confidential Information Usage

The Receiving Party herein agrees to make use of the Confidential Information solely for the purpose and in connection with the current or contemplated business relationship between both parties and not for any purpose other than that which has been stipulated and contained herein this Agreement, unless otherwise authorized by prior written consent by an authorized representative of the Disclosing Party. There shall be no other right or license, whether expressed or implied, in the Confidential Information granted to the Receiving Party hereunder. Ownership and title to the Confidential Information shall remain solely with the Disclosing Party, any and all use of the Confidential Information by the Receiving Party shall be solely for the benefit of the Disclosing Party, and any type or manner of improvements or modifications thereof by the Receiving Party shall remain the sole property of the Disclosing Party. There shall be nothing herein contained that would be intended to modify the parties' existing agreement that the parties' discussions in furtherance of a potential business relationship shall herein be governed by Federal Rule of Evidence 408 – Compromise Offers and Negotiations.

Induced Disclosure of Confidential Information

Notwithstanding anything in the foregoing clauses to the contrary, the Receiving Party may be compelled to disclose Confidential Information pursuant to any governmental, judicial, or administrative order, subpoena, discovery request, regulatory request or similar method, provided that the Receiving Party promptly notifies, to the extent feasible, the Disclosing Party in writing of any such demand for disclosure so that the Disclosing Party, at its sole expense, may seek to make such disclosure subject to a protective order or other appropriate remedy to preserve the confidentiality of the Confidential Information; provided in the case of a broad regulatory request with respect to the Receiving Party's business (not targeted at Disclosing Party), the Receiving

Party may promptly comply with such request provided the Receiving Party provides (if permitted by such regulator) the Disclosing Party prompt notice of such disclosure. The Receiving Party agrees that it shall not oppose and shall cooperate with efforts by, to the extent feasible, the Disclosing Party with any such request for a protective order or other relief. Notwithstanding the foregoing, if the Disclosing Party is unable to obtain or does not seek a protective order and the Receiving Party is legally requested or required to disclose such Confidential Information, disclosure of such Confidential Information may be made without liability.

Independent Development

Receiving Party may currently or in the future be developing information internally, or receiving information internally, or receiving information from other parties that may be similar to the Disclosing Party's Confidential Information. Accordingly, nothing in this Agreement will be construed as a representation or inference that Receiving Party will not develop or have developed products or services, that, without violation of this Agreement, might compete with the products or systems contemplated by the Disclosing Party's Confidential Information.

Term

The herein contained Agreement shall remain in effect **September 17, 2018 through March 31, 2020**. Notwithstanding the foregoing, the parties' duties to maintain in confidence any and all Confidential Information that may have been disclosed during the term shall thus remain in effect indefinitely.

No Warranty

All Confidential Information is provided by Disclosing Party "AS IS" and without any warranty, express, implied or otherwise, regarding the Confidential Information's completeness, accuracy or performance.

Remedies

Both parties to this Agreement acknowledge and agree that the Confidential Information hereunder this Agreement is of a unique and valuable nature, and that the unauthorized distribution or broadcasting of the Confidential Information could have the potential to destroy and, at the very least, diminish the value of such information. The damages that the Disclosing Party could sustain as a direct result of the unauthorized dissemination of the Confidential Information would be impossible to calculate. Therefore, both parties hereby agree that the Disclosing Party shall be entitled to claim injunctive relief that would prevent the dissemination of any Confidential Information that would be in violation of the terms set forth herein this Agreement. Any such injunctive relief provided shall be in addition to any other available remedies hereunder, whether at law or in equity. The Disclosing Party shall be entitled to recover any sustained costs and/or fees, including, but not limited to, any reasonable attorney's fees which may be incurred while attempting to obtain any such relief. Furthermore, in the event of any litigation which may be related to this Agreement, the prevailing party shall be entitled to recover any such reasonable attorney's fees and expenses incurred.

Return of Confidential Information

Upon completion/expiration or termination of this Agreement, the Receiving Party shall immediately return and deliver to the Disclosing Party all tangible material and/or information representing or exemplifying the Confidential Information provided hereunder and all notes, summaries, memoranda, drawings, manuals, records, excerpts or derivative information deriving therefrom and all other documents, materials, notes or copies ("Notes") which may have been converted to any computerized media in the form of any image, data or word processing files either manually or by image capture or any other form of work product that may be based on or include any Confidential Information, in whatever form of storage or retrieval, upon the earlier of (i) the completion or termination of this Agreement or (ii) at such time as the Disclosing Party may so request; provided however that the Receiving Party may retain such of its documents as is necessary to enable it to comply with its document retention policies. Alternatively, with the prior written consent of the Disclosing Party, the Receiving Party may immediately destroy (in the case of Notes, at the Receiving Party's sole discretion) any of the foregoing embodying Confidential Information (or the reasonably non-recoverable data erasure of computerized data) and, upon request, certify in writing such destruction by an authorized officer of the Receiving Party supervising the destruction of the material and or information.

Notice of Breach

The Receiving Party shall immediately notify the Disclosing Party upon discovering any unauthorized use or disclosure of Confidential Information by the Receiving Party or its Representatives, or any other breach of this Agreement by the Receiving Party or its Representatives, and will cooperate with any efforts by the Disclosing Party to assist the Disclosing Party to regain the possession of its Confidential Information and thus prevent its further unauthorized use.

No Legally Binding Agreement for Transaction

Both parties hereby agree that neither party shall be under any legal obligation of any kind whatsoever with respect to a Transaction by virtue of this Agreement, except for the matters specifically agreed to herein. The parties further acknowledge and agree that each party herein reserves the right, in their sole and absolute discretion, to reject any and/or all proposals and to terminate discussions and negotiations with respect to any Transaction at any time. This Agreement does not create or constitute a joint venture or partnership between the parties. In the event that a Transaction should go forward, the non-disclosure provisions of any applicable transaction documents entered into between the parties (or their respective affiliates) for the Transaction shall supersede this Agreement. Should and such provision not be provided or stipulated in said transaction documents, then this Agreement shall be the controlling instrument.

Warranty

Each party herein warrants that it has the right and authorization to make such disclosures under this Agreement. NO WARRANTIES ARE MADE BY EITHER PARTY UNDER THIS AGREEMENT WHATSOEVER. The parties acknowledge that although they shall each endeavor to include in the Confidential Information any and all information that they each believe relevant for the purpose of the evaluation of a Transaction, the parties understand that no representation or warranty as to the accuracy or completeness of the Confidential Information is being made by either party as the Disclosing Party. Furthermore, neither party is under any obligation contained within this Agreement to disclose any Confidential Information it chooses not to disclose. Neither party hereto shall have any liability to the other party, or to the other party's Representatives,

resulting from any use of the Confidential Information except with respect to the disclosure of such Confidential Information in violation of this Agreement.

Entire Agreement

This Agreement constitutes the entire understanding between the parties and supersedes any and all prior or contemporaneous understandings and agreements, whether oral or written, between the parties, with respect to the subject matter hereof. This Agreement can only be modified by written amendment signed by the party against whom such enforcement is sought.

Governing Laws

The validity, construction and performance of this Agreement shall be governed and construed in accordance with the laws of the State of California. The Federal and State courts located in the State of California shall have sole and exclusive jurisdiction over any disputes arising under the terms of this Agreement.

Waiver of Contractual Right

Any such failure by either party to enforce the other party's strict performance of any provision of this Agreement shall not constitute a waiver of its right to subsequently enforce such provision or any other provision of this Agreement.

Severability

Although the restrictions herein contained in this Agreement are considered by the parties to be reasonable for the purpose of protecting the Confidential Information, if any such restriction is found by a court of competent jurisdiction to be unenforceable, such provision will be modified, rewritten or interpreted to include as much of its nature and scope as will render it enforceable. In the event it cannot be so modified, rewritten or interpreted to be enforceable in any respect, it will not be given effect, and the remainder of the Agreement shall be enforced as if such provision was not included.

Notices

Any notices or communications required or permitted to be given hereunder may be delivered by hand, deposited with a nationally recognized overnight carrier, emailed, or mailed by certified mail, return receipt requested, postage prepaid, in each case, to the aforementioned address of the other party, or any such other address or addressee as may be furnished by a party in accordance with this paragraph. All such notices or communication shall be deemed to have been given and received (i) in the case of personal delivery or email, on the date of said delivery, (ii) in the case of delivery by a nationally recognized overnight carrier, on the third business day following dispatch, and (iii) in the case of mailing, on the seventh business day following such mailing.


Transfer or Assign

This Agreement is personal in nature, and neither party may directly or indirectly assign or transfer it by operation of law or otherwise without the prior written consent of the other party, which consent shall not be unreasonably withheld. All obligations contained in this Agreement shall extend to and be binding upon the parties to this Agreement and their respective successors, assigns and designees.

Paragraph headings used in this Agreement are for reference only and shall not be used or relied upon in the interpretation of this Agreement.

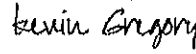
IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the aforementioned effective date.

By:
San Jose State University Research
Foundation

DocuSigned by:
 9/28/2018
07E6B4FF00514FB
Rajnesh Prasad, Executive Director

By:
Puget Sound Pilots

 10/4/18
Linda Styrk, Executive Director

DocuSigned by:
 10/1/2018
0631B78A72F248D...
Kevin Gregory, Principal Investigator

8. Recommendations

The following recommendations are addressed to the Board of Pilot Commissioners (BOPC). Some of these recommendations may require regulatory action, while others could be addressed in other ways.

Before considering these recommendations, it should be recognized that interventions intended to manage fatigue will sometimes have unintended adverse consequences. For example, a reduction in the length of work periods would cause the board to “turn faster”, resulting in reduced rest periods for pilots. Providing relief to one pilot may only transfer the burden to another. For this reason, interventions should be introduced cautiously, with a trial period to enable effectiveness and potential side-effects to be evaluated. Individuals typically find it difficult to adjust to changes in work requirements, and it can be hard to judge the effectiveness of a change based on subjective feedback alone. As a result, work rule changes should ideally be evaluated using objective measures of fatigue before and after implementation to adequately assess the impact of changes.

1. Interventions intended to prevent or manage fatigue should be introduced as part of an overall Fatigue Risk Management System (FRMS), some elements of which are already in place.
2. A limit on the duration of work periods is advisable. The current Bar Pilot Association policy (a limit of 12-hours) appears to be appropriate.
3. The maximum duration of a night work period without a rest opportunity should be less than the allowable duration of a daytime work period.
4. A limit to the number of consecutive night shifts is advisable. A limit of two consecutive night shifts would be most desirable; however, a limit of three consecutive night shifts may be more practical.
5. The BOPC should explore the reasons for the early morning peak in arrivals and consider options to distribute arrivals more evenly throughout the 24-hour day.
6. The BOPC should consider whether a change to the minimum advance notice required when ordering a pilot would help to increase the predictability of pilot schedules.
7. The BOPC should consider whether technological solutions (such as software applications) could enable the timing of piloting assignments to be predicted with greater accuracy.
8. The BOPC should consider whether pilots who are on-call for 14 days should be provided with a rest break at or around the mid-point of the 14-day period. A midpoint break of at least 24 hours may be appropriate. If such a break does not occur naturally due to the movement of the board, it may be feasible to delay the pilot’s BoB time to achieve this.
9. The BOPC should consider ways to minimize advancing shift rotation. An advancing shift rotation occurs when each work period in a series has a start time earlier than that of the preceding work period.
10. There should be a Minimum Rest Period (MRP) between work periods. The current Bar Pilot Association policy (12-hour MRP) appears to be appropriate.

11. Minimum Rest Period (MRP) exceptions should be monitored to ensure that no individual pilot is disproportionately burdened with MRP exceptions.
12. The BOPC should consider whether an extended rest period is needed following an MRP exception.
13. Recalls of pilots from an off-call period should be managed so as to minimize disruption of their recovery rest prior to the start of their next on-call period.
14. Pilots should receive an appropriate recovery period after awakening, before boarding a ship. A longer recovery period will be needed when the awakening occurs during the circadian low, or when the pilot has been asleep for more than 30 minutes.
15. The BOPC should receive information on the number of Bar Pilots available on the board.
16. Implement solutions to increase the number of Bar Pilots available on the board at any given time. Approaches could include reducing the amount of "other duties" performed by Bar Pilots, or increasing the number of Bar Pilot Licenses.
17. Implement a system to enable pilots to report fatigue and remove themselves from the roster without consequences when they are significantly fatigued. It will be necessary to address the cultural barriers that could prevent such a system from working.
18. Provide pilots with educational material on the effective use of caffeine, and other aspects of good sleep hygiene.
19. Provide advice to pilots on how to improve their home sleeping environments. This could include educational material for families on how they can contribute to Bar Pilot rest and alertness.