Exh. SS-___X
Docket No. TP-190976
Witness: Scott Sevall

BEFORE THE WASHINGTON

UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PUGET SOUND PILOTS, Respondent.	**DOCKET TP-190976**

CROSS-EXHIBIT FOR

Scott Sevall

PSP Response to PMSA DR 334, 362, 364

August 7, 2020

DATE PREPARED:	April 3, 2020	WITNESS:	Jessica Norris
DOCKET:	TP-190976	RESPONDER:	Jessica Norris
REQUESTER:	PMSA		Puget Sound Pilots

PMSA DATA REQUEST NO. 334: Regarding Exh. JN-05, p. 6, please provide documentation of the number of pilots on the working pilot roster for this 12 month period using the same approach as is taken in the audited annual financials for 2018 (Exh. JN-04).

RESPONSE TO DATA REQUEST NO. 334

PSP objects to producing documentation of every action taken by the auditor. Cumulatively, such requests are unreasonably burdensome and are unlikely to discover probative evidence. When such requests are not otherwise objectionable, or where PSP will respond despite its objection, a narrative response may be given.

Subject to and without waiving the foregoing objection, PSP and Ms. Norris respond as follows:

PMSA DATA REQUEST NO: 334		
WORKING PILOT ROSTER FOR TEST YEAR		
Total Duty Days	18,051	
Days in a Year	365	
Working Pilot Roster	49.5	*
**rounded to nearest tenth*		

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DATE PREPARED:	April 17, 2020	WITNESS:	Stephan Moreno
DOCKET:	TP-190976	RESPONDER:	Stephan Moreno Puget Sound Pilots
REQUESTER:	PMSA		

PMSA DATA REQUEST NO. 362: Please provide a definition of the phrase "more proportional charges across all vessel sizes and classes" as referenced at Exh. SM-1T, p. 8, lines 3-4.

RESPONSE TO DATA REQUEST NO. 362:

Objection. This and many other data requests served by PMSA request the witness to "define" testimony that has been given. These are improper data requests and do not seek evidence or information that will lead to evidence, but are instead an attempt to cross-examine the witness through countless data requests. In many instances the testimony is clear and unambiguous and thus these dozens of data requests appear designed to harass or annoy the witness and PSP.

Subject to and without waiving the foregoing objection, Capt. Moreno responds as follows:

The best example of how we propose to make pilotage fees more proportional are the changes we proposed to the Tonnage charge. Under the existing BPC tariff, the gross tonnage charge is built like an upside down pyramid. The BPC tariff charges minimal tonnage rates at the bottom and the rate per ton increase over the next two tonnage tiers. In PSP's proposal to the UTC, the amount per ton decreases as the ship gets larger and a tonnage tier was added. This change would create a more stable tariff base and decrease the disparity in total tonnage charges between the smallest ships and the largest ships.

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DATE PREPARED:	April 17, 2020	WITNESS:	Stephan Moreno
DOCKET:	TP-190976	RESPONDER:	Stephan Moreno
REQUESTER:	PMSA		Puget Sound Pilots

PMSA DATA REQUEST NO. 364: Please provide (1) a definition of the phrase "the risks associated with the provision of service to these vessels" as referenced at Exh. SM-1T, p. 8, lines 12-13, and (2) a metric by which to measure the definition of "risks associated with the provision of service to these vessels" and (3) document how the proposed tariff reflects these "risks" in a manner which "is to be more reflective of current traffic", as stated at Exh. SM-1T, p. 8, lines 17-18, with specific reference to the proposed Tariff, including individual Tariff Items, and with specific reference to individual classes of vessels and ports which reflect these "risks."

RESPONSE TO DATA REQUEST NO. 364:

Response to Subpart 1:

Objection. This and many other data requests served by PMSA request the witness to "define" testimony that has been given. These are improper data requests and do not seek evidence or information that will lead to evidence, but are instead an attempt to cross-examine the witness through countless data requests. In many instances the testimony is clear and unambiguous and thus these dozens of data requests appear designed to harass or annoy the witness and PSP.

Subject to and without waiving the foregoing objection, Capt. Moreno responds as follows:

"The risks associated with provision of service to the vessels" includes the risks to human lives, risks of loss of property and vessels, and to risks of harm to the marine environment of the state of Washington that may be posed by the operation of a ship in Washington's intrastate waters. It also includes all potential liabilities to the pilot resulting from handling a ship.

Response to Subpart 2:

Objection. As with many of PMSA's Data Requests seeking a "metric by which to measure…" this request appears designed to cross-examine the witness rather than seek discoverable information, and further seeks the creation of a new document, standard or criterion of measurement that may not exist, or which may not be readily produced in response to a Data Request. Where feasible, PSP or the witness may attempt to respond. However, this is nonetheless an inappropriate data request for which no response should be required.

Subject to and without waiving the foregoing objection, Capt. Moreno responds as follows:

The short answer is that Gross tonnage and piloting service time are both appropriate metrics by which risk for different ships and assignments can be compared or measured. Gross tonnage has

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a relationship to a number of risk factors which if not properly managed could lead to an allision, grounding, or worse. Similarly, the longer a pilot is piloting a vessel, the greater the risk. These concepts are elaborated upon further below.

As discussed in response to DR 363, with changes in vessel design which are trending toward larger beam instead of increased length, the Gross Tonnage is a more appropriate metric by which to measure "risk. Referring back to the table, the Ever Smile is almost 47% larger in Gross Tonnage than the Dusseldorf Express. I have piloted both of these vessels and a multitude of other of similar size over my 29 years of piloting and I can attest to the stark contrast between piloting vessels of this size. The larger vessel requires a far more developed skillset than the smaller vessel. The six year license upgrade program of the BOPC contemplates this and is validation of this fact.

The time a pilot spends piloting a vessel is another metric by which to measure risk. The 2010 and 2015 Vessel Traffic Risk Assessments utilized as part of its model to access risk a metric called Vessel Time Exposure or "VTE. The following is an excerpt from the 2015 to add context:

> The VTRA analysis tool evaluates the duration that vessels travel through the VTRA study area, referred to as vessel time exposure (VTE), by vessel type and the potential accident frequency and potential oil losses from a class of cargo focus vessels (bulk carrier, containerships and other cargo vessels) and a class of tank focus vessels (tankers, chemical carriers, articulated tug barges and oil barges).
>
> The inclusion of the-time-on-the-water element in the evaluation of exposure sets the VTRA methodology apart from count based approaches that focus on, for example, number of annual/monthly vessel transits, visits or calls. The value of a duration based approach versus a count based approach is that the former appropriately distinguishes between short and long transits in the evaluation of vessel traffic risk as well as differing vessel speeds. The VTRA Model methodology has been well documented and peer-reviewed in the academic literature and continuously improved over the course of the above

I actually discussed this metric with the authors of the study and how it informs the modeling to determine risk. In summary, VTE is used to determine the potential for an accident in a particular area. For example, let's use the 9 mile stretch between Pt Wilson and President Point. A certain level of risk is associated with transiting this area. If a vessel is traveling at 18 knots, it will be exposed to that risk area for 30 minutes. If another vessel is travelling at 9 knots through that same area it will be exposed to that risk for 60 minutes.

The Service time charge therefore is reflective of that risk or VTE. If you spend more time in a risk area the more exposed you are to that risk

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VTE does not account for risks related to vessel size. In the same VTRA study the following excerpt explains risk associate with an increase in vessel size:

> An increase in mass of a vessel leads, when keeping speed of the vessel the same, to an increase of kinetic energy in a POTENTIAL accident, which in turn leads to increases in transversal and longitudinal damage extend in a POTENTIAL accident, which may results in an increase of the POTENTIAL number of compartments penetrated in a POTENTIAL accident.

Mass cannot be increased unless there is corresponding volumetric increase to hold this mass. In order to recognize the risk associated with an increase of size and speed the known and measurable value of Gross Tonnage is utilized by the tariff to reflect this metric.

The Block coefficient of a vessel is also a determinate of a vessels handling characteristics and the risk associated with piloting different classes of vessels. The block coefficient is defined as the ratio which underwater body volume bears to a rectangular solid of the same length beam and depth. As a vessel's Block coefficient increase the vessel loses direction stability. In other word it is harder to stop a turn once the vessel rudder or other external forces are applied such as wind or tugs. Tankers and bulk carriers are notorious for being directionally unstable as a result of their large Block coefficients. Container vessels are now being constructed with large Block coefficients. In the case of the Dusseldorf Express I would expect the Block Coefficient to be about .7 at its summer load line and the Ever Living to have a block coefficient of about .82 due to it increased beam. The Ever Living is much more difficult to handle than the Dusseldorf Express as a result. With a move toward "beamier" or wider vessels to increase cargo capacity, vessels are increasing their Block coefficients and thus are more difficult to handle.

Vessel squat and Blockage factor are significant metrics to determine how increase in vessel size effect the vessels handling characteristics in both open and confined waters and therefore the risks associated with piloting a vessel.

With regard to vessel classes. I again reference to table in DR 363. Compare the Dusseldorf Express and the Ever Living transiting at the same speed of 18 knots.

Squat is the amount of additional draft added when a vessel is traveling at a certain speed and determined by the following formula:

Squat (meters) = $Cb \times V^2/ 100$

Cb= the Block coefficient of the vessel

V^2= the vessel's speed

Using a Cb of .7 for the Dusseldorf and because of it larger beam a block coefficient of .82 for the Ever Living the following calculation show the squat of the respective vessels:

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Dusseldorf Express - increased draft of 2.26 meters or 7.5 feet

Ever Living – increased draft of 2,65 meters or 8.7 feet

Both values are significant however for a vessel of basically the same length the increased beam created an additional 1.2 feet of draft. As a vessel approaches shallower water this increased draft due to squat has a significant effect on a vessels handling characteristics. The most significant are the increase in the vessel turning circle, which can increase as much a twice that of the same vessel in deep water (it's harder to turn) and the vessel's headway carries longer (the vessel is harder to slow down). Additionally, it should be noted that squat varies as a proportion to the square of the vessel speed. If vessel speed is doubled, squat is increased by a factor of four. This is why controlling vessel speed is so important and the risk is amplified as a vessel's size increases, particularly in shallow water.

In the report regarding the grounding of the Queen Elizbeth II on the east coast, the NTSB determined the most significant factor in the accident was squat or the ignoring the effects of squat, which increased its draft by about 10 feet.

With regard to blockage factor, the Dusseldorf and the Ever Smile are used for comparison. The Blair waterway is Tacoma at its narrowest point is 100 meters with controlling depth of 15 meters. Compare Dusseldorf Express and the Ever Smile transiting this waterway, both with a draft of 12 meters and 13.5 meters respectively. The blockage factor is determined by the formula:

Fb% = (b x T/B x H) x 100

Where b = beam

T= draft

B= channel width

H = depth

Following this formula, the blockage factor for the Dusseldorf is 25.6 % and the blockage factor for the Ever Smile is 41.1%. These values represent the percentage of available waterway each vessel occupies during a transit. This risk is increased as the vessels blockage factor is increased. As the blockage factor increases, a vessel compresses the available water around her and causes the vessel not to respond as easily to rudder, engine and tug assists.

Another risk factor to consider is the effect of the Center of Gravity, also known as Metacentric height or "GM" in different types of vessels. For simplicity's sake, the GM is a determinant in how a vessel reacts when forces are applied. (Determination of GM and a full description can be found in the Merchant Marine Officers handbook or other naval architecture books.) As the GM

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decreases, the vessel becomes more directionally unstable and rolls or tips easier when forces are applied such as rudder and wind or tug forces. This type of vessel is referred to as "tender" and are easier to tip.

The increasing size of container ships and cruise ships has highlighted the various risks associated with the reduction in GM. The larger containerships, some car carriers, and cruise vessels arrive with very small GM's in their loaded condition.

For container vessels, the lower GM makes the vessel directionally unstable and susceptible to angle of heel when forces such as rudder commands, wind, or tug assist are applied. This is for every degree a ship tips from side to side, draft is increased by a certain amount. For every degree of heel or tip of a container vessel of 150 feet of beam, draft is increased by 1.3 feet (tan 1^{o} x (150 ÷ 2). This is a significant risk when the vessel in transiting a waterway with minimum under keel clearance. Additionally, when turning, the rate of turn can increase rapidly to the point where the vessel may not be able to respond to opposite rudder to stop the turn. Precise control of the rate of turn is paramount.

Cruise vessel operate with lower GM since the underwater portion of the vessels is significantly less than the above water portion. Stabilizers are used to mitigate some of the heel, but in large turns at high speeds this can become dangerous to passengers and crew if the vessel heels suddenly or substantially. The common practice for most vessels is to give rudders commands to initiate or increase a rate of turn. In order to mitigate this risk course change commands are given in degrees per minute until the desired heading is achieved to minimize this heel effect. Given the sensitivity of cruise vessels with the passengers who have little or no seagoing experience it is imperative to protect lives by ensuring that the heel effects are kept under control.

Additional risks are Wind Loads and Current.

The Wind Load on a vessel is becoming a more significant factor in both determining the number of tugs required and in whether or not the vessel should proceed to the berth.

To begin, the sail area of a vessel is determined by an estimated area of exposed hull and on deck cargo (for Container vessels). Many vessels have this already calculated at various loaded conditions. If not, the Pilot will do this calculation. The next step is to determine based on wind velocity how many tons of force are created as the wind impinges on this surface area and at what angle.

Wind load is determined by the following formula:

$$V^2/18 \text{ x Sail Area } (m^2) \div 1000$$

Car carriers and cruise vessels with their high sides, and container vessels with their large deck loads of containers, are the best examples of vessels that are susceptible to high wind load forces.

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Many of the larger car carriers, container vessels and cruise vessels have sail area numbers from 10,000 (2.5 acres) to 14,000 (3.5 acres) square meters.

Higher wind velocities and greater vessel sizes increase the tons of force applied by the wind. That force must be offset to bring the vessel to or from a berth. Additionally, these wind loads must be calculated in scenarios with higher wind speed to determine if additional tugs are needed or if the vessel must wait until conditions improve.

PSP has spent many hours and invested significant money training pilots and working with customers and Ports to determine wind limits or risk limits and feasibility of new classes of vessels for a particular waterway. The most recent example id the work done with the Port of Seattle to determine the feasibility of 18,000 TEU vessel in the West waterway/terminal 5 construction.

Current is another important consideration for risk, particularly in the oil terminals in Anacortes and Ferndale. As a general rule, every one knot of current is equal to about 25 knots of wind. The PSP guidelines contain numerous tidal current windows that were developed to mitigate the risk of current.

The waterways in the Puget Sound region have changed little since their construction many years ago, and it is doubtful that waterways will be significantly deepened or widened in the near of far future. These waterways were never designed for the size of vessels that are routinely transiting. From a report titled "Channel Design and Vessel Maneuverability - Next Steps" WHEN SHIPS GET TOO BIG FOR THEIR DITCHES" the following excerpts were taken:

> Some of the more fundamental "Rules of Thumb" for channel design are often violated in practice – both in the US and abroad. For example, the general rule that the width of one-way channels should be between 4 – 5 times the maximum beam of ships expected to use it is seldom followed.
>
> Many shipowners, as well as other stakeholders, are not familiar with the risks to navigation safety and protection of the marine environment associated with ship maneuverability;

As an example of this seldom followed principle, the Blair Waterway in Tacoma has a project width past the 11th street bridge of 343'. Vessels up 160' in beam are routinely transiting this waterway. The risk is obvious, and PSP has mitigated this risk through extensive simulator and manned model training and by developing the techniques necessary to transit these waterways safely.

In more recent years, vessel wake or the waves created by a vessel while transiting has become a significant factor. As a vessel's speed increases and the Block coefficient is increased, a correspondingly larger wake is created. This wake must be controlled in an effort to reduce the risk to other smaller vessels such as recreational boaters and people and property on shore. As the population of this area increases so do the risks associated with interaction with piloted ships.

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Vessel Traffic Service regularly broadcasts wake advisories and when tidal height exceeds ten feet, it broadcasts a wake advisory continuously until the tidal height is below ten feet.

There are also federal laws with the potential for penalties where the wake is inadequately controlled:

> **46 USC § 2302. Penalties for negligent operations and interfering with safe operation**
>
> (a) A person operating a vessel in a negligent manner or interfering with the safe operation of
>
> a vessel, so as to endanger the life, limb, or property of a person is liable to the United States Government for a civil penalty of not more than $5,000 in the case of a recreational vessel, or $25,000 in the case of any other vessel.

Simply stated, we are responsible to manage vessel wake. The protection of lives, property, and the marine environment cannot be overemphasized when considering vessel wakes.

In summary, the metric of risk is multi-faceted. As discussed, mass and volume, Vessel Tine Exposure (VTE), Block Coefficient, Squat, Blockage factor, Metacentric Height (GM), Wind loads, current, and channel design are substantial considerations for the Pilot. This list is not by any means meant to suggest this is all a Pilot must consider during the provision of service but is representative of the most significant factors.

As a final quote from the report "Channel Design and Ship Maneuverability":

> Handling a ship in all conditions of tide and weather is not always possible in the confined waters and low speeds associated with port operations. If the UKC is too low, the waves too high, the current too strong, the wind speed too great, the vessel speed too low or the visibility too poor, the ship may be endangered. The pilot may not be able to control the vessel safely, tug operations may be compromised, or berthing may not be possible.

Response to Subpart 3:

Objection. A number of PMSA's requests ask PSP to "document" a statement in testimony in a way that merely seeks to challenge the statement, rather than to seek information that might be admissible or otherwise lead to admissible evidence. These questions are an inappropriate use of data requests and considering the sheer volume of such requests, they appear to be designed by the author to harass or annoy rather than made for a proper purpose. Additionally, this request cites to p. 8 lines 17-18 of Capt. Moreno's testimony, which does not include the words quoted in the request. Because the context of the testimony is important to answer these data requests, it is impossible to respond with precision.

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Subject to and without waiving the foregoing objections, Capt. Moreno responds as follows:

See my response to Subpart 2 of this data request.

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