EXH. DAH-1T
DOCKETS UE-19___/UG-19___
2019 PSE GENERAL RATE CASE
WITNESS: DUANE A. HENDERSON

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-19____** **Docket UG-19____**

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF

DUANE A. HENDERSON

ON BEHALF OF PUGET SOUND ENERGY

JUNE 20, 2019

PUGET SOUND ENERGY

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I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy.

A. My name is Duane A. Henderson. My business address is 20111 120th Ave. NE, Bothell, Washington, 98011. I am Manager, Gas Systems Integrity, with Puget Sound Energy ("PSE").

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

A. Yes. Please see the First Exhibit to the Prefiled Direct Testimony of Duane A. Henderson, Exh. DAH-2, for an exhibit describing my education, relevant employment experience, and other professional qualifications.

Q. What is the scope of your testimony in this proceeding?

A. This prefiled direct testimony will describe PSE's distribution system upgrade work related in part to the Tacoma Liquified Natural Gas Project (the "Tacoma LNG Project") performed between October 1, 2016 (the end of the test year in PSE's 2017 general rate case) and December 31, 2018 (the end of the test year in this proceeding), including the need for the work and the benefit to PSE's customers of the work.

II. DISTRIBUTION UPGRADES RELATED TO TACOMA LNG PROJECT

Q. Describe how system needs are identified.

A. As described in the Prefiled Direct Testimony of Catherine A. Koch, Exh. CAK-1T, PSE's planning department evaluates the capability of PSE's natural gas system to reliably deliver natural gas to PSE's customers. The Gas Systems Integrity-Gas System Planning group analyzes the gas system infrastructure using current customer load information. Future system models are built by adding additional loads, both known and projected, as necessary, to account for anticipated growth. Periodically, PSE updates the future year models based on actual observed load growth and new projected growth. PSE uses only firm loads for this analysis, as all interruptible loads are assumed to be curtailed on peak days. PSE then compares predicted system performance with acceptable minimum system performance criteria to identify potential system weaknesses. Models are then developed that incorporate potential solutions to correct the identified weaknesses.

Q. Briefly describe the distribution supply system serving the Tacoma area.

A. PSE currently serves the Tacoma area by two distinct systems, the North Tacoma and South Tacoma supply systems. The North Tacoma supply system originates near the Dieringer area in north Pierce County (located to the south of Auburn) and traverses westward approximately seven miles to the tide flats area of Tacoma. This system has a maximum allowable operating pressure ("MAOP") of 250 psig and provides direct supply to the area in the vicinity of the Tacoma LNG

Project. The South Tacoma supply system originates in the Fredrickson area of Pierce County and traverses northwestward approximately 9.5 miles to a crossing with I-5 near and to the north of Joint Base Lewis-McChord ("JBLM"). The South Tacoma supply system is comprised of several interconnected pipelines that, prior to upgrades made in 2017, also had a MAOP of 250 psig.

Q. Were system improvements needed in the area served by the South Tacoma high pressure system prior to the consideration of the Tacoma LNG Project?

A. Yes. The South Tacoma high pressure system serves the area from downtown Tacoma to University Place, Steilacoom, Lakewood and DuPont. This area has experienced high load growth and low pressure areas were identified under peak day conditions, even prior to planning for the inclusion of the Tacoma LNG Project. PSE identified system improvement projects that would be necessary to reliably serve the anticipated growth in the area. These projects were first identified in long range plans beginning in 2012 with an initial anticipated need date of 2019. Please see the Second Exhibit to the Prefiled Direct Testimony of Duane A. Henderson, Exh. DAH-3, for an excerpt from the PSE 2012 Ten Year Plan HP Projects List.

Q. Please describe the projects identified to reliably service the anticipated growth.

A. Two interrelated projects were undertaken to serve the growing load in the South Tacoma system. First, a pressure regulating station was installed in proximity to the I-5 and JBLM area. This would allow the northern leg of the interconnected

South Tacoma system to be isolated from the southern leg. The second project entailed retiring the Clover Creek pressure regulating station and increasing the pressure in the northern leg to its previously designed and tested for MAOP of 500 psig. Collectively, these projects increased the capacity of the South Tacoma system.

Q. What options were considered for serving the Tacoma LNG Project?

A. The Gas Systems Integrity-Gas System Planning group considered several options for serving the natural gas load at the Tacoma LNG Project. The first option was to upgrade the North Tacoma supply system by looping the existing system with five miles of 16-inch pipe. This option was estimated at the time to cost in excess of $60 million with the additional risk of a river crossing and steep hill to complicate construction. The second option was to increase capacity of the existing South Tacoma supply system and provide a connection to the North Tacoma supply system. In addition to the work already identified in the area, this option would require the installation of a one mile connector pipeline, a pressure regulating station, and rebuild of the Frederickson gate station. This option was estimated to cost $49.26 million. It was determined that the cost-effective and efficient approach was to reinforce the system from the south. In either option, a four mile pipeline was required to connect the Tacoma LNG Project to the gas distribution system.

Q. Please describe the distribution system work associated with the Tacoma LNG Project.

A. PSE is installing the Tacoma LNG Project at the Port of Tacoma for use both as a peak day resource for natural gas customers and a source of liquefied natural gas ("LNG") for an LNG fuel supply service. There were three primary area upgrades necessary to connect the Tacoma LNG Project to the PSE gas distribution system:

Upgrade 1 Four miles of new piping connecting the Tacoma LNG Project to the PSE natural gas distribution system. The new 16-inch line will (i) supply natural gas to the Tacoma LNG Project for liquefaction and (ii) transport vaporized natural gas from the Tacoma LNG Project to the distribution system when required to provide a peak day resource to the system.

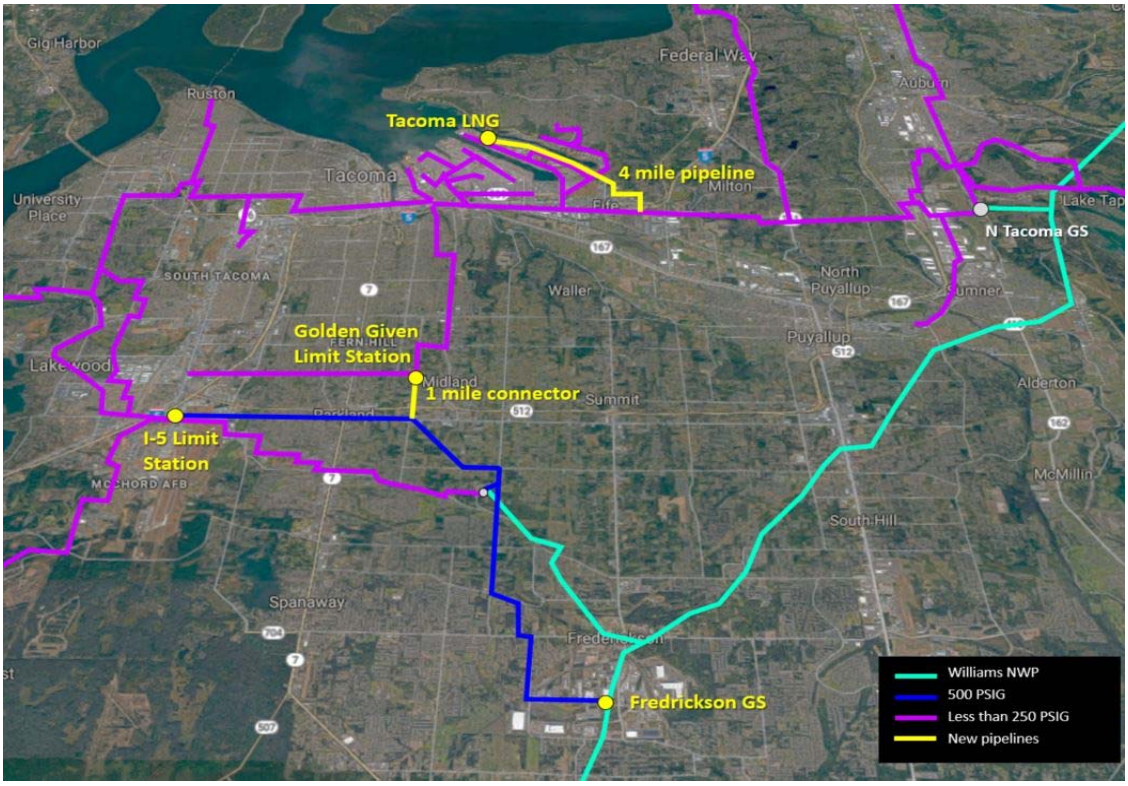
Upgrade 2 One mile of 12-inch high pressure piping installed along Golden Given Road East, and installation of the new Golden Given Limit Station. With the addition of the Tacoma LNG Project, natural gas load will exceed the capacity of the North Tacoma high pressure line unless reinforcement actions are taken to increase system capacity, which requires the installation of the one mile of piping connecting the North Tacoma high pressure line and the South Tacoma high pressure line and the installation of the new Golden Given Limit Station. This allows the South Tacoma high pressure

line to support more of the load and increase overall system capacity.

Upgrade 3 Upgrades to the Frederickson Gate Station. The prior Fredrickson Gate Station delivery capacity of 2,356,000 standard cubic feet per hour ("SCFH") was inadequate to supply the anticipated 6,000,000 SCFH, necessary to meet the projected 20-year future loads, including the Tacoma LNG Project. This necessitated a rebuild of the Frederickson Gate Station to accommodate the increase in required delivery capacity.

Please see Figure 1 below for a map of the three natural gas distribution system upgrades associated with the Tacoma LNG Project.

Figure 1. Map of Natural Gas Distribution System Upgrades



Q. What is the timeline for the completion of the LNG distribution upgrades?

A. Initially, the three upgrades were staged for construction to be completed over the course of three years with final completion in advance of the original in service date for the Tacoma LNG Project, which was planned for early 2019. Construction on the four miles of new pipeline was completed and the pipeline was placed in service October 2017 (Upgrade 1). Construction on the upgrade to the Frederickson Gate Station was completed and the project was placed in service September 2017 (Upgrade 3). When it became apparent that the Tacoma LNG Project in-service date would be extended due to delays in issuance of permits, construction of the one mile of 12-inch high pressure piping and new Golden Given Limit Station was postponed pending release of permits and determination of a new in-service date for the Tacoma LNG Project. (Upgrade 2).

Q. Are the completed upgrades listed above in service and used and useful?

A. Yes. The upgrades to the Frederickson Gate Station and the newly installed four miles of pipeline have been commissioned and are connected to the gas distribution system. They are both capable of being put to use and are being put to use. On three consecutive days this past winter (February 5-7, 2019), the flow through the Frederickson Gate Station exceeded the design flowrate of the previous station by over 40,000 SCFH. Further, had a design peak hour event occurred, the calculated shortfall of the previous station would have exceeded 540,000 SCFH. The four miles of pipeline have increased the line pack of the North Tacoma high pressure system by 28 percent. The increase in line pack

provides additional system reliability and flexibility during times of emergency operations and normal maintenance activities.

Q. What was the final cost of all the work completed to date?

A. As of the end of the test year, the final cost of the work in service is $31.5 million. This includes the final cost of the four miles of the 16-inch pipeline (Upgrade 1) which was $27.4 million, and the final cost of the Frederickson Gate Station Upgrade Project (Upgrade 3), which was $4.1 million.

Q. Describe how PSE kept management informed during the upgrades.

A. PSE utilizes a Project Lifecycle Model whereby management provides review and approvals at significant milestones as a project progresses through development. PSE management reviewed the initial Tacoma LNG Project and related system upgrades in July 2014 and again during the proceedings in Docket UG-151663. PSE's Board of Directors conditionally approved the Tacoma LNG Project and related system upgrades on September 22, 2016. Project updates were provided to PSE management at monthly forecast meetings.

Q. Were there any material changes that impacted the project scope, schedule or budget?

A. No. The four mile, 16-inch pipeline and the Frederickson Gate Station were estimated at $30.6 million and were completed within reasonable variance at $31.5 million.

Q. Why did PSE choose to proceed with the system upgrades even though the Tacoma LNG Project had been delayed?

A. The permitting and construction process for a large project, like the Tacoma LNG Project, involves many moving parts and interrelated approvals and subprojects. With the Tacoma LNG Project, it would not have been reasonable to wait to permit and perform various system upgrades until the Tacoma LNG Project was fully permitted and under construction. Had PSE waited to perform necessary system upgrades, it is likely that the Tacoma LNG Project would have come online prior to the system being ready to service the facility. PSE planned for the system to be ready to service the facility prior to it coming online, and some elements, including the four-mile pipeline and the Frederickson Gate Station, have been completed, while the Tacoma LNG Project is not yet done. Also, as noted earlier in my testimony, the system upgrades were employed in providing capacity to serve anticipated growth in the area. The upgrades are now both capable of being put to use, and are currently being put to use.

III. CONCLUSION

Q. Does this conclude your testimony?

A. Yes, it does.