BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of: Application No. 2013-01 TESORO SAVAGE, LLC TESORO SAVAGE DISTRIBUTION TERMINAL	CASE NO. 15-001 SWORN PRE-FILED TESTIMONY OF RUSS GIBBS

I, Russ Gibbs, state as follows:

1. I swear under the penalty of perjury of the laws of Washington and the United States that the following testimony is true and correct.

2. I am over eighteen years of age and am otherwise competent to testify in this case. My testimony is based upon my education, training, experience, professional qualifications, and understanding of the matters herein.

3. Based on my professional experiences and training, I have developed an expertise in heavy civil and industrial fabrication and construction, including tank construction. I have extensive on-the-job experience in aboveground, field-erected fuel storage tank projects.

I. INTRODUCTION, EDUCATION AND PROFESSIONAL BACKGROUND, AND OTHER QUALIFICATIONS

4. I am a high school graduate, with some college. I have over 40 years' experience as a heavy civil and industrial contractor specializing in fabrication and construction, including ground improvements, utility, concrete work, mechanical, steel erection and tank construction. I have extensive on-the-job experience in aboveground, field-erected fuel and water tank projects. As part of the team of experts at T Bailey, I

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have completed numerous projects throughout the Pacific Northwest, including Alaska and Hawaii. T Bailey is a licensed contractor in the state of Washington, among other states.

5. I have a vast understanding of steel fabrication and erection pertaining to fuel storage tanks, including performance of radiography and numerous other nondestructive examination procedures used to determine their integrity. This includes welding procedures and techniques used to construct them.

6. T Bailey is qualified to perform construction work in the State of Washington for industrial projects including refineries and co-generation/chemical plants, and is very familiar with the application of the regulations for those facilities, including tank design, which complies with those regulations. Our design and fabrication complies with numerous codes and standards such as American Petroleum Institute (API), American Welding Society (AWS), Underwriters Laboratories (UL), American Institute of Steel Construction (AISC), and American Society of Mechanical Engineers (ASME) including fabrication and construction of UL tanks, pressure vessels, API shop and field erected storage tanks, large diameter casings/caissons, penstock, water piping, breeching, exhaust stacks, and wind turbine towers.

7. T Bailey's calculations on the tank design are contained in the report attached hereto as Attachment B, which is incorporated herein by reference.

II. PURPOSE OF TESTIMONY

8. The purpose of my testimony is to address how the Vancouver Energy Project's Application for Site Certification (ASC) complies with the requirements of WAC 463-60-145 and Adjudication Issue 16 and 31, as identified in the Administrative Law Judge's Order Clarifying EFSEC's Process, Modifying Dispositive Motion Deadline,

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Summarizing Preliminary Issues, and Setting Hearing Dates (Feb. 3, 2016). As explained below, based upon my review of the Application for Site Certification as it relates to storage tanks and available information, the tank design component of the ASC meets the requirements of WAC 463-60-145, all applicable codes and engineering standards, and the tanks as described in the ASC are designed to protect against risks from geological or soil hazards and human or mechanical error.

III. SCOPE OF WORK ON THE PROJECT

9. T Bailey was hired by Applicant Tesoro Savage Petroleum Terminal LLC, d/b/a Vancouver Energy (VE) to provide the six (6) bulk fuel storage tanks planned for this Project.

10. T Bailey is responsible for the design, procurement, fabrication, erection, and testing of the six (6) 240' diameter x 50' high API 650 crude oil storage tanks required. The API 650 Welded Tank Standard for Oil Storage is a standard established by the API, 12 Ed.. We applied Project-specific design criteria for the tank site in Vancouver, Washington following the IBC, API 650 Standard, and AISC documents.

11. Our tank designs were developed by Professional Engineer Doug Bayless with Hagen Engineering, Inc. in conjunction with our fabrication and erection practices and procedures. Doug Bayless was contracted by T Bailey for this Project. Our design accounts for tank loads (the volume contained in a tank and its associated weight) that were used by the Project design team to develop necessary ground improvements, including specific foundation designs required to support the tank loads when in full operation.

12. Our fabrication is controlled by the AISC following our very thorough practices and quality control procedures. Tank erection includes numerous inspection hold

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points during construction, which is a point in the construction activity when we stop work for nondestructive examination of the tanks using multiple methods to ensure the integrity of the tank structures is maintained through the installation. The methods include magnetic particle, dye penetration, radiography, pneumatic, and hydro testing. These techniques will be applied to fabrication and installation of the tanks at the Project.

IV. TANK DESIGN AND ANALYSIS OF TANK DESIGN COMPLIANCE

A. Applicable standards, regulations, and design criteria

13. We received and reviewed the soils report for the Project site from GRI, including their analysis of appropriate design criteria standards and loads based on existing geotechnical conditions at the site. This report allowed us to customize the tank design to those conditions and the design criteria for this specific site. GRI's design criteria provided, among other things, the tank capacity and tank size that the soil conditions would allow and set a "design seismic event" of a magnitude 9 earthquake. In order to comply with those criteria, the tank design had to ensure the tanks could withstand a magnitude 9 earthquake, and include design components to allow for the tank capacity and size desired by the Applicant, while not exceeding the limits the soil conditions presented on the tank load. Based on my professional experience, I found the design criteria standards and basis of design to be conservative (protective) and consistent with the design guidelines relied upon by engineers and tank design professionals.

14. In addition, we received and reviewed a ground improvement design provided by Hayward Baker. The ground improvement design recommended a combination of ground improvement techniques to provide additional support for the proposed structures planned at the Project facility. In particular, the ground improvements proposed for the tank area, which is referred to as "Area 300" consisted of stone columns

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3 feet in diameter, spaced at 8.2 feet on centers (square grid spacing). The length and tip elevation for the stone columns are different for each tank to account for the specific soil conditions for that tank, which tip elevations ranging from Elevation -14 feet to approximately Elevation -18.5 feet. Finally, at Tank 1, the base design contains two additional rings of stone columns to address potential differential settlement in light of the soil conditions. Based on my professional experience, the ground improvement design is consistent with generally accepted design guidelines and practices taking into account the site-specific soil and geological conditions, and takes a conservative approach to ground improvement to ensure that it meets or exceeds any requirements. We completed tank design projects in the Tacoma, Washington tide flats that used this same type of ground improvement design.

15. The standards applicable to the tank design for the Project include the International Building Code (IBC 2012), API 650 Standard, National Fire Protection (NFPA 30), and AISC 360-10. Those standards establish minimum requirements for material, design, fabrication, erection, and inspection for vertical, cylindrical, aboveground, closed and open-top welded storage tanks in various sizes and capacities for internal pressure. They also establish minimum requirements for fire protection and safety features for the tanks. Finally, the standards set minimum requirements for structural stability, seismic performance, and structural integrity.

B. Tank design

16. A typical cross-section of a storage tank is included in Figure 2.3-10 of the ASC. Our tank design calculations take into account all of the information available to us, including GRI's soils report and the Hayward Baker ground improvement designs. These calculations are attached as Attachment B.

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17. The crude oil will be stored in six double-bottom, internal floating-roof aboveground storage tanks located in Area 300 (*see* ASC Section 2.3-10) dike containment. These tanks will be approximately 50 feet in height and 240 feet in diameter with a shell capacity of approximately 400,000 bbl each. Despite the shell capacity, the maximum amount of product that can be stored in each tank will be approximately 380,000 bbl, to account for the presence of the internal floating roof and the additional headspace required to allow product movement in the event of seismic conditions. The working capacity of the tanks will be approximately 340,000 bbl. The working capacity of the tanks is slightly lower than the total capacity to reflect the maximum volume that each tank will actually hold during operation.

18. The tanks will be painted white and positioned so that the distance between each tank is 120 feet in any direction, which meets NFPA standards. The design layout of the tanks and the distance between them meets the applicable standards, and substantially reduces, if not eliminates, the risk of product loss in the event of a catastrophic event (such as a magnitude 9 earthquake) or structural damage to a tank.

19. T Bailey will fabricate the tanks per the API 650 Standards, and erect them in the field with our trained and qualified crews. Tank features include a uniformly supported sloping bottom (coned up at the center), welded carbon steel construction, controls for crude oil temperature, and internal tank pressure to API specifications, and will use appropriate live load characteristics for roof design. Two of the tanks may be equipped with electrical heat coils to allow their contents to be heated to approximately 150 degrees F. Heating allows the operator to control oil viscosity during loading and unloading. Heat loss is controlled by insulating the shell and roofs of these tanks. All of the tanks will be equipped with mixers to prevent the crude oil from stratifying during storage.

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20. Each tank will have a fixed roof supported on steel columns and rafters to keep precipitation from reaching the inside of the tank and an internal floating roof with dual seals to control vapor emissions to the atmosphere. The internal floating roof of the crude oil storage tanks will have primary and secondary rim seals, which provides an extra barrier to minimize vapor loss per regulatory requirements. The typical arrangement of such seals is a mechanical shoe primary seal that presses against the wall of the tank, and a secondary seal wiper mounted above the primary seal to provide additional control of evaporative losses. The floating roof will be designed to avoid tipping or rotation during operation.

21. The first tank floor provides primary containment and the second floor acts as secondary containment of the tank contents. The primary and secondary containment substantially abate the possibility of any discharge in the unlikely event of a leak from the primary tank bottom. In addition, the interstitial space within the double-bottomed tanks will include leak detection nozzles which is constantly monitor (by the Programmable Logic Controller) to verify the primary tank bottom integrity.

22. The tanks will also have cathodic protection system to prevent any potential corrosion. This is a preventive method to provide extended life to the tanks from potential stray electrical currents from the soil reacting with any possible moisture present during tank operations.

23. The tank design complies with all applicable codes and regulations, to meet or exceed applicable requirements for the tanks and related cathodic protection for safe operation of this bulk fuel storage facility.

V. ATTACHMENTS

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24. The following documents are attached to my testimony for reference:

Attachment A: Curriculum Vitae

Attachment B: Tank Design Calculations

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DATED this 13th day of May, 2016.

Russ Gibbs, Declarant

STATE OF WA)
)
COUNTY OF Thurston)

Russ Gibbs, being duly sworn upon oath, deposes and says: The foregoing testimony is true, correct and complete to the best of my knowledge, information and belief and is given subject to the laws of perjury in the State of Washington.

GIVEN under my hand and official seal this 13 day of May, 2016

JENNIFER A. ROSSNAGLE NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 01-13-17

Jennifer A. Rossnagle

NOTARY PUBLIC in and for the State of: Washington

Residing at: Thurston County

My Commission Expires: 01-13-17

Printed Name of Notary: Jennifer A. Rossnagle

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