

1 5. I have worked in the industrial sector of the civil engineering profession for
2 over 40+ years. As the owner and president of R&M Engineering, I have been involved
3 in the development and have functioned as the engineer in responsible charge on hundreds
4 of projects. During my career, I have focused my attention in the field of structural
5 engineering, including foundation & steel design for many varied types of structures.
6 Attached as Attachment A is a curriculum vitae showing the breadth and depth of my
7 experience.

8 6. R&M Engineering started work on the Vancouver Energy Project as a
9 consultant to the Savage/Tesoro team based on work of over 30 years on numerous
10 material handling projects. Our involvement started in the conceptual layout phase when
11 we met with the Port of Vancouver to review their rail layout and the plans for the
12 development of the port for future clients.

13 **II. PURPOSE OF TESTIMONY**

14 7. The purpose of my testimony is to address how the Vancouver Energy
15 Project's Application for Site Certification (ASC) complies with the requirements of
16 WAC 463-60-145 and Adjudication Issues 16 and 31, as identified in the Administrative
17 Law Judge's Order Clarifying EFSEC's Process, Modifying Dispositive Motion Deadline,
18 Summarizing Preliminary Issues, and Setting Hearing Dates (February 3, 2016). As
19 explained below, based upon my review of the application and available information, the
20 ASC meets the requirements of WAC 463-60-145, all applicable codes and engineering
21 standards, and the Project as described in the ASC is designed to protect the public
22 interest with respect to risks from geological or soil hazards and human or mechanical
23 error.

1 **III. SCOPE OF WORK ON THE PROJECT**

2 8. As the Engineer in responsible charge for the Project, I have worked with
3 Jeffrey Hale and all of the engineers in the office to provide supervision making sure that
4 the work has been performed in a manner that meets the design requirements of the
5 Project and code compliance, in all of the areas including the following:

- 6 • Underlying structure of the tank storage area, and the area from the tanks to the
7 dock ship loading area.
- 8 • Overall layout of the Vancouver Energy Terminal to meet the needs of the
9 Applicant and the limitations of the Port of Vancouver site.
- 10 • Layout of the tank area, with berm containment and preliminary design of the
11 foundations for the storage tanks.
- 12 • General overall review of the pipe routes for transporting the crude from the
13 train unloading area
- 14 • Review of the preliminary design of foundations for the pipe support designed
15 in our office.
- 16 • Engineering oversight of the preliminary design of the foundations for the rail
17 unloading structure, an office and change room building, motor control
18 buildings, fire pump house and other miscellaneous structures.
- 19 • R&M has responsibility for the dock steel structures for observation and access
20 for the connection of the pipeline to the ship manifold. I have reviewed the
21 design of the structure and design criteria.
- 22 • R&M has been involved in the coordination of the site plan and information
23 for the ground improvements in the tank storage area as well as the pipeline as
24 it approaches the dock area. Hayward Baker is contracted as a sub consultant

1 to R&M Engineering for their role in the project, which is as a specialty
2 contractor responsible for the ground improvement. While we have no
3 professional responsibility for the ground improvement design, we have
4 facilitated the information transfer from GRI, BergerABAM, ICPE and the
5 owners for Hayward Baker, and worked collaboratively with that entire team
6 to ensure that the Project design meets all applicable standards and regulations.

7 9. As noted above I have personal knowledge of the work performed by my
8 office in many of the areas but generally we were responsible for site layout, concrete
9 support for buildings, foundations for tanks, pipe supports both steel and concrete, and
10 steel structures on the dock area.

11 **IV. DESIGN WORK AND ANALYSIS OF COMPLIANCE**

12 10. The design of a facility like the proposed Vancouver Energy Project is only
13 successful if it has a team approach to the creation of the Project. In this case, the team is
14 made up of an owner/operator that has engaged the services of consultants that provide
15 their particular expertise and knowledge to the Project. As a whole, the team can
16 accomplish the work in a planned and organized way that will meet the objectives of the
17 owners/operators, and also meet the safety, environment and code compliance that is
18 needed for a successful project. The following team members (collectively, the Design
19 Team) have provided information, in one form or another, to R&M, which it relied on in
20 its work on the Project and to allow the Project to function:

- 21 • Intermountain Consumer Professional Engineers, Inc. (ICPE)
22 Mechanical and Electrical
- 23 • GRI Engineering (GRI)
24 Geotechnical Engineering
- 25 • Hayward Baker Incorporated

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- Special geotechnical contractor
- BergerABAM
Permitting, dock design and site drainage
- Poole Fire Protection
Fire Protection

11. During the course of our work, R&M relied upon information provided for our design from the Design Team. Because the R&M scope of work is limited to the civil/structural engineering portions of the Project, we have relied upon information that has been provided by those on the Design Team with specific expertise. We were provided information from the Design Team as detailed below.

12. ICPE provided mechanical engineering and electrical engineering for the Project. This included the sizes of the buildings needed as well as loading for the pipeline and configuration of the pipelines. The settlement criteria for ground improvement and allowable settlements for foundation design have been provided by ICPE. ICPE also provided the concrete for the tunnel areas inside the rail unloading building which we used to coordinate the building foundation which was designed by our office.

13. GRI Engineering has provided a soils report for the Terminal that we have relied upon for design of the footings for buildings and pipe supports. They have also provided the seismic information for design of ground improvements.

14. Hayward Baker is a specialty contractor who has provided information for the ground improvements that need to take place both in the tank storage area as well as the shoreline improvements. The design criteria for their work, establishing the allowable settlement and horizontal movement, were established by GRI based on their geotechnical analysis.

1 15. BergerABAM has provided the elevations for the finished site work to
2 provide for drainage work. This information has been coordinated with the site layout
3 work that R&M has provided. BergerABAM has also provided the geometry and other
4 information for the dock design where R&M has provided structural steel structures. In
5 order to perform the structural design for a tower, on the dock, we have relied upon the
6 work by other team members that provide a support similar to a foundation for the
7 structure if this was located on the ground instead of a dock.

8 16. R&M has performed preliminary design on a number of items for the
9 Terminal and we have incorporated the information from GRI such as the allowable
10 bearing pressure that helps us determine the sizing of the footings for both buildings and
11 also for pipe supports. ICPE provided specific loading information for the pipe structures,
12 such as the location of anchor points along the pipeline that, once anchored, will allow for
13 expansion and contraction of the pipe during temperature changes and seismic and wind
14 loading. This input will continue to guide the design process as the work is completed, to
15 ensure that any final design changes comply with all applicable codes, regulations, and
16 standards.

17 17. As civil and structural engineers, we have designed structures and
18 foundations on hundreds of projects, mostly dealing with industrial facilities. These
19 designs require the use of codes, computer programs and engineering judgement that is
20 developed based on many years of experience. We have been contributing partners and
21 consultants on transportation projects very similar to the Project, which provides us with
22 the ability to use our expertise to provide a safe and code compliant facility.

23 18. As structural and civil engineers we used standard practice and codes that
24 are typical for industrial work defined and adopted by state and local authorities. These
25 codes provide the acceptable standards for loading, design and define the standard of care

1 that should be used in the design process. We have used the following codes and
2 regulations in our design effort:

- 3 • International Building Code (IBC 2012)
- 4 • American Society of Civil Engineers (ASCE 7-10)
- 5 • National Fire Protection (NFPA 30)
- 6 • Burlington Northern Santa Fe Railroad Company (BNSF) Railway
Company Design Guidelines... Dec. 2011
For Required Clearances ONLY
- 7 • American Concrete Institute (ACI 318-11)
- 8 • American Institute of Steel construction (AISC 360-10)

9 19. The above standards were used for guidance, as applicable to each facet of
10 the design, as well as the use of experience gained in the design of similar facilities. The
11 standards are intended to ensure seismic and structural stability of all design elements, to
12 protect against property damage or injury.

13 20. In addition to considering the applicable codes, we incorporated the input
14 from other consultants on the Design Team noted above, and worked collaboratively on
15 each design element to ensure that each component of the design elements meets all the
16 applicable standards and codes. R&M Engineering produced the preliminary site plans
17 for the Project, and worked with Hayward Baker to consider each component in
18 conjunction with the design criteria from GRI, and the ground improvement design, to
19 determine the location for the various components of the Project.

20 21. For example, we considered design criteria from GRI and pipeline design
21 specifications and characteristics from ICPE in order to provide direction to Hayward
22 Baker, the ground improvement specialty contractor, for their ground improvement design
23 concerning allowable settlement and horizontal displacement. Hayward Baker was
24 directed to use the soil parameters from GRI and the pipeline design specifications from
25 ICPE for the allowable movements on the ground improvements.

1 22. R&M provided the design layouts and general arrangements for the entire
2 site, including the location of the storage tanks, mechanical buildings, pipelines, loading
3 facilities, and all other structures and features at the Terminal. The backgrounds for many
4 of the exhibits and drawings provided in the preliminary draft EIS were based on site
5 plans developed in our office. See ASC § 2.3.

6 23. The design team worked closely to ensure that all elements of the site
7 construction design plans meet or exceed all applicable standards and regulations, from
8 GRI establishing design criteria requiring all design to withstand a significant seismic
9 event, to a ground improvement design plan that takes a protective approach by
10 combining ground improvement technologies to ensure sufficient support for planned
11 structures, mechanical and operational elements of the Terminal, to locating those
12 improvements carefully taking into consideration the soil types, ground improvements,
13 containment and safety measures, and oil spill response mechanisms and capabilities.

14 24. Based on my professional opinion, and my reliance on the professional
15 opinions of others on the Design Team, and in particular GRI and Hayward Baker, the
16 structural, foundational, and layout design work performed by R&M meets or exceeds the
17 requirements of all applicable standards, laws, and regulations governing the design of
18 those improvements at the Terminal. By meeting or exceeding those requirements and the
19 conservative design criteria established by GRI through their geotechnical analysis, it is
20 my opinion that the facility improvements are designed to withstand a significant seismic
21 event and maintain structural integrity over time.

22 25. Our continued role in the Project is anticipated to include finalizing the
23 design of the civil and structural components of the Project. My office reviewed,
24 analyzed, and considered the DEIS and subsequent comment letters, and the issues raised
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1 in those documents, and will consider any new information in continuing to work with
2 the permitting agency to finalize design plans.

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SWORN PRE-FILED TESTIMONY OF NORMAN L. BENNION - 9

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Feldman** LLP

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1 **V. ATTACHMENT**

2 26. The following document is attached to my testimony for reference:

3 Attachment A: Curriculum Vitae

4 DATED this 13th day of May, 2016.

5
6 *Norman L. Bennion*
7 Norman L. Bennion, Declarant

8 STATE OF *Utah*)
9 COUNTY OF *Salt Lake*

10
11 Norman L. Bennion, being duly sworn upon oath, deposes and says: The
12 foregoing testimony is true, correct and complete to the best of my knowledge,
13 information and belief and is given subject to the laws of perjury in the State of
14 Washington.

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

16
17 *Melloney Szarek*
18 NOTARY PUBLIC in and for the State of:

19 *Utah*
20 Residing at: *Salt Lake City*
21 My Commission Expires: *March 24, 2019*

22 Printed Name of Notary:
23 *Melloney Szarek*

