

March 3, 2023

Attn: Brittany Flittner
Department of Ecology
Spill Prevention, Preparedness, and Response Program
PO Box 47600, Olympia, WA 98504-7600

Re: Public Comments for Proposed Rules Related to Chapter 173-180 WAC issued on January 4, 2023.

Introduction:

The purpose of this letter is to provide public comments for proposed rules related to Chapter 173-180 WAC issued on January 4, 2023. Our comments will be focusing on seismic protection and retrofit measures for storage tanks and transfer pipelines.

Proposed Rules:

Proposed Rules for Existing Storage Tanks – 173-180

The proposed rule would add seismic protection requirements for storage tanks at Class 1 facilities. It would require tanks installed before the effective date of the proposed rule to install and maintain one or more of the following:

- Flexible mechanical devices between tanks and pipe connections.
- Foundation driven pilings.
- Anchored storage tanks.
- Another equally protective measure approved by Ecology

Proposed Rules for Existing Transfer Pipelines – 173-180

The proposed rule would add seismic protection requirements for transfer pipelines at Class 1 facilities. It would require pipelines installed before the effective date of the proposed rule to install and maintain one or more of the following:

- Flexible mechanical devices between tanks and pipe connections.
- Flexible mechanical devices between pipe connections.
- Pipeline supports that protect against seismic motion.
- Automatic isolation shutoff valves triggered by seismic events.
- Another equally protective measure approved by Ecology.

Comments on Rules:

Roundtable Engineering would like to provide comments on the above proposed rules on seismic protection and retrofit measures for storage tanks and transfer pipelines. It is our opinion that the proposed rules do not effectively address seismic protection of storage tanks and transfer pipelines. Instead of focusing only on retrofitting certain parts of the tank system, the rules should be written to focus on a comprehensive seismic evaluation of storage tanks and their transfer pipelines. There are many components beyond the scope of the proposed rules that can be adversely affected by earthquakes which require a robust seismic analysis to determine whether tank and transfer piping are fit-for-continued-service. Without proper analysis, the proposed rules may not provide the safety intended. We would like to propose the following:

Analysis of Existing Storage Tanks:

The proposed rule would add seismic protection requirements for storage tanks at Class 1 facilities. It would require tanks installed before the effective date of the proposed rule to perform a seismic evaluation based on following:

1. Perform seismic evaluation in accordance with API 650, API 653, and ASCE 7-22. If the evaluation above shows that the entire tank and the piping connection is adequate, then no further evaluation or retrofit is required and tank & piping connections are deemed to be fit-for-service.
2. Perform rigorous non-linear response history analysis using finite element analysis (FEA). FEA should incorporate fluid structure interaction to verify the current tank structural integrity. This analysis must be performed by a professional engineer with extensive experience in storage tank design and the proper use of FEA. If the evaluation shows that the entire tank and the piping connection is adequate in its current condition, then no further evaluation is required, and the tank & piping connections are deemed to be fit-for-service.
3. If the evaluation above shows structural deficiencies, modifications will be required. Modifications include changes in operating conditions and retrofits of the storage tank. Additional seismic evaluations should be performed on the modified storage tank in accordance with API 650 or rigorous non-linear FEA evaluations. Modifications should be approved by a professional engineer with extensive experience in storage tank design.
4. Modifications may include one or more of the following:
 - a. Lower maximum design liquid level.
 - b. Install new double bottom.
 - c. Install new bottom annular ring.
 - d. Install new anchorage.
 - e. Install new or retrofit existing foundation.

- f. Install flexible mechanical devices between tanks and pipe connections.
- g. Modify existing piping system to provide needed flexibility to resist seismic forces and displacements.

Analysis of Existing Transfer Piping:

1. Perform a seismic evaluation in accordance ASCE 7-22 and ASME B31.3 for the transfer piping system. The analysis should focus on the strength and flexibility of the piping system, especially at the tank to piping connection. If the evaluation shows the piping system is adequate, then no further analysis is required, and the piping is deemed to be fit-for-service.
2. If the evaluation above shows deficiencies for the current seismic demand, modifications will be required. Modifications include changes in operating conditions and retrofits of transfer piping. Additional seismic evaluations should be performed on the modified transfer piping.
3. Modifications may include one or more of the following:
 - a. Install flexible mechanical devices between tanks and pipe connections.
 - b. Modify existing piping system to provide needed flexibility to resist seismic forces and displacements.
 - c. Install new or retrofit existing piping supports.

Note: Tank modifications may impact the flexibility requirements for the piping system.

Closing:

Roundtable Engineering appreciates the opportunity to provide these public comments. Please contact us if you need further information.

Best regards,

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