Oregon Department of Environmental Quality

Seismic Vulnerability Assessment Forms

Form 2: Checklist for Tanks to Comply With OAR 340-300

All petroleum tanks within each facility must follow the checklist below. LNG tanks are considered separately. The performance criteria per OAR 340-300-0002(13) and OAR 340-142 is the MAUS per tank spill limitation of 42 gallons (1 BBL).

1. Submit a plan view of the tank farm, to scale, including cross-sections and dimensions of all berms. (TNK1)
2. For each tank, provide tank age, any previous inspection records, contents, dimensions (height and diameter) and type of anchorage to the concrete foundation. If the tank was built prior to 1988, there were no standards for anchorage or design (Ref. CalARP). If a tank is empty, provide details of how long since it was used and whether or not it is permanently out of service. From the results of the geotechnical investigations or reports verify the site class (A-F) with the appropriate seismic risk. For the parallel treatment of the tanks compared to the requirement of Risk Classification IV (Per OAR 340-300-0004(a)(a) and Table 1.5.1, ASCE7), the analogous treatment for tanks would be the “SUGIII” classification. (TNK2)
3. The first and preliminary inspection or assessment of the tank farm consists of a walk-through based on CalARP, with the seismic evaluations performed under the direction of an Oregon-registered civil, structural, or mechanical engineer (CalARP Section 1.4). This includes a preliminary seismic assessment, using the seismic demand as provided in the initial geotechnical inspection/report required by the DEQ. This preliminary assessment would include possible liquefaction or lateral spreading, seismic settlement, and landslides (per CalARP 2.3, 2.4 and 2.5). This initial report provides some direction for the full tank assessment per API 653 and the rehabilitation or mitigation per API 650. (TNK3)
4. Per OAR 340-300-0004 (1) (a) retrofits, reconstruction or other mitigation measures must comply with ASCE7 Risk Category IV. Per ASCE7, Section 11.4.8; if the soil type is “F” a site-specific ground motion is to be used. Risk Category IV (ASCE7, Table 1.5-1) implies that these tanks are “essential facilities”. Per API 650, the seismic risk group would be SUG III (API 650, Annex E, Section E.3.1.1). With this seismic criterion, tank spills are limited to the MAUS (1 BBL/tank). Verify site classification and associated PGA/Spectra. (TNK4)
5. For the comprehensive API 653 inspection, the inspectors must be certified by API. Provide copies of information as required in Annex D of API 653 (Sections D.1 thru D.4). For the tank bottom inspectors, the procedures/personnel qualified must satisfy Appendix G (Sections G.1 thru G.5) of API 653. Obtain approval from DEQ before proceeding with the API 653 inspection process. (TNK5)
6. Verify berm capacities are within allowable spill volumes, as stated in 40 CFR 264.175(b). “Spill Prevention, Control and Countermeasure Requirements” and that the secondary containment (e.g. berms) are sufficient to contain the entire contents of the largest tank or 10% of the total of all tanks (Containment, 40 CFR 264.175(b)) adding in precipitation, usually during the most severe 24-hour period. (TNK6)

This preliminary assessment can be submitted for review before the full tank(s) API 653 inspection that follows. All records of historical inspections must be maintained by the facility and submitted to DEQ upon request.

All inspections must conform to API 653 “Safe working practices”, per Section 1.4. Any additional explanations of these inspection processes should be referred to the text of API 653 in addition to the Annex material referenced below. Unless stated, all of the following checklist items are from API 653.

7. Section 4, “Suitability for Service” contains criteria and inspection activities. Evaluation questions and inspection procedures are provided for each of the following components. Each relevant question or evaluation shall be investigated:

a. Roof tank (TNK7)
b. Tank shell (TNK8)
c. Tank bottom (TNK9)
d. Tank foundation (TNK10)

8. Section 5, “Brittle Fracture Considerations” includes criteria and inspection activities for the assessment of existing tanks that might have a risk of brittle fracture. The assessment procedure of the 11 steps must be followed. Any deficiencies or issues shall be documented, and further action is required. Respond to each of the questions and provide all answers, if not applicable, respond N/A. (TNK11)
9. Section 6, “Inspections” – using the same numbering system of 6.1 thru 6.9 document all of the questions and include the reports in Section 6.9. This process must be completed for each tank within the facility. Tank inspections must be per Annex C. All tables must be submitted as presented in Tables C. 1 for in-service tanks and C.2 for out-of-service tanks. These checklists are to be followed, with any discrepancies listed. Tank bottom settlement shall be inspected/reported using Annex B. If the tanks have no existing corrosion historical rates, Annex H can be used, and the datasheets documented and reported. Tank inspection shall comply with Annex F, “Non-Destructive Examination.” Tank qualification of tank bottom examination procedures, Annex G. Relevant sections of this annex should be applied as necessary. A report must follow the format of Section 6.9.2. (TNK12)
10. Section 7, “Materials” – if any of this section 7.2 to 7.4 are applicable, explain/document for each tank. Respond to each of the questions and provide all answers; if not applicable, respond N/A. (TNK13)

Sections 8, 9, 10, 11. 12 and 13 should be considered during mitigation activities and brought up to the current API 650 requirements. See Annex “E” of API 650 for the seismic assessment of tanks.

References

1. California Environmental Protection Agency. 2019. “Guidance for California Accidental Release Prevention (CalARP) Program – Seismic Assessments.”
2. American Petroleum Institute. 2023. “API Standard 653: Tank Inspection, Repair, Alterations and Reconstruction.” API publications, Washington, D.C.
3. American Petroleum Institute. 2021. “API Standard 650: Welded Tanks for Oil Storage 13th edition.” API publications, Washington, D.C.

Non-discrimination statement