Seismic Stability Program

Status Report

July 31, 2025

State of Oregon
DEQ Department of Environmental Quality

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Overview

This report highlights the activities and accomplishments of the Fuel Tank Seismic Stability Program during the Aug. 2024 – July 2025 period. The program aims to ensure the seismic resilience of 17 large-capacity fuel storage and distribution terminals in Multnomah, Columbia and Lane Counties. Its main goal is to protect the environment and surrounding communities by preventing spills and other impacts from earthquakes. Facilities are required to submit Seismic Vulnerability Assessments and Risk Mitigation Implementation Plans for DEQ's review and approval. By providing technical assistance and working closely with these facilities, the program seeks to reduce risks from seismic events and improve the safety and integrity of the fuel infrastructure. This helps prevent spills and protects local communities. The Multnomah County facilities located along the Willamette River, often referred to as the Critical Energy Infrastructure Hub, are shown in Figure 1.

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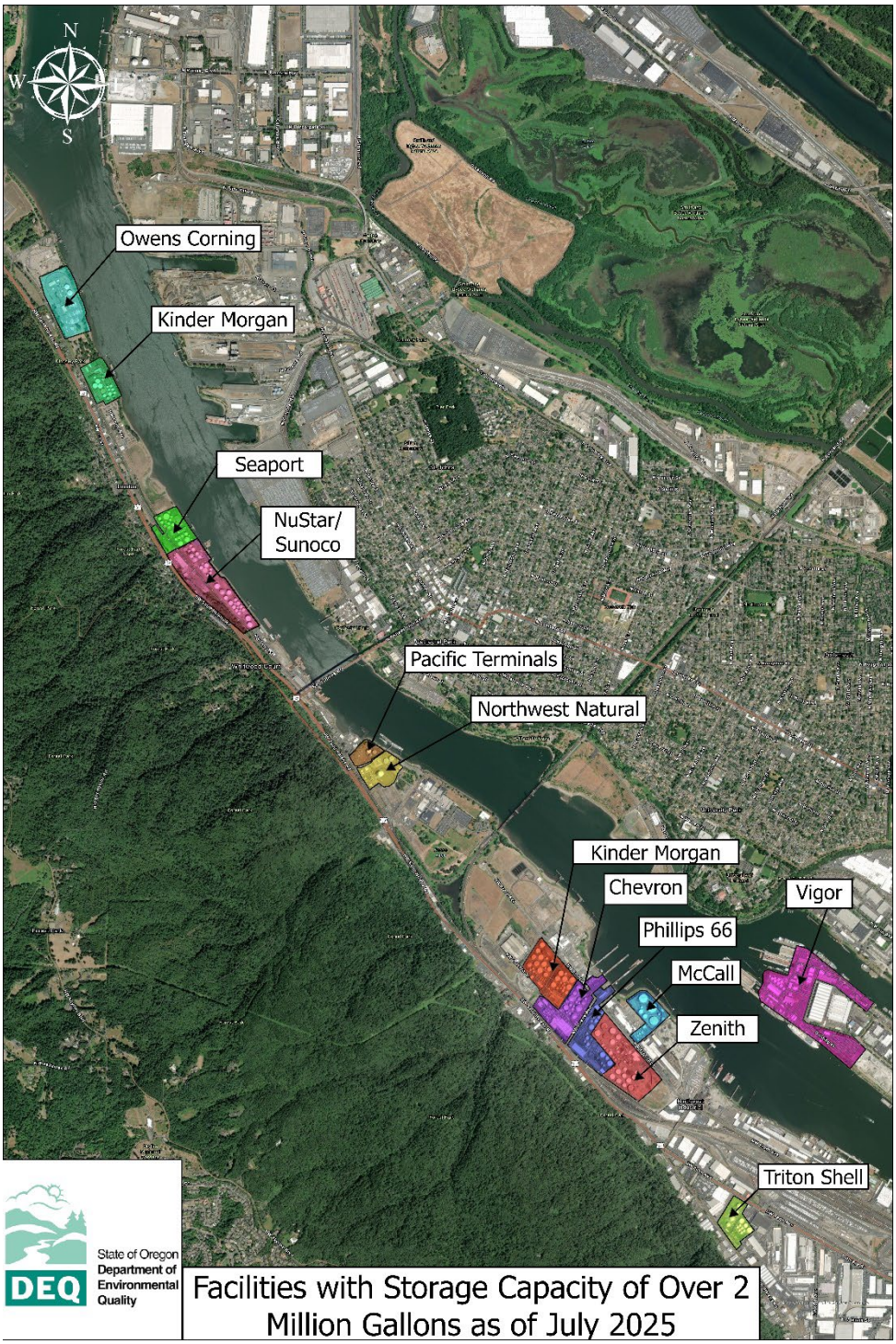

Figure 1. Fuel terminals managed under the FTSS program that have a storage capacity of 2 million gallons or more, as of July 2025

Program background

The Fuel Tank Seismic Stability Program, created by the Oregon Legislature in 2022 (SB 1567), resides in DEQ's Land Quality Division. The regulatory program evaluates and improves the earthquake resilience of large-capacity oil and fuel storage facilities. It gives DEQ authority to regulate seismic vulnerability assessments and risk minimization implementation at the largest fuel storage and distribution facilities in Columbia, Multnomah, and Lane counties. The program enhances DEQ's ability to safeguard public health, life safety and the environment from fires and fuel product releases linked to earthquakes. It establishes the process and criteria for facilities to develop and submit Seismic Vulnerability Assessments and Risk Mitigation Implementation Plans to DEQ for review and approval. The assessments, implementation plans and timeline, DEQ's review and approval process, fees, implementation criteria, and reporting requirements are provided in Oregon Administrative Rules Chapter 340, Division 300, adopted by the Oregon Environmental Quality Commission in consultation with the Oregon Department of Geology and Mineral Industries and the Oregon Department of Energy on Sept. 14, 2023.

As of June 1, 2024, the statutory deadline, 16 facilities submitted their initial Seismic Vulnerability Assessments to DEQ. The final assessments must consist of the geotechnical, structural and safety assessments as prescribed by the OAR 340-300-0003.

Geotechnical Assessment consists of site surface and sub-surface conditions evaluation, complete with soil tests and field explorations.

Structural Assessment consists of a description of the expected seismic performance of all onsite structures where damage could result in a potential release of fuel including any above or underground storage tanks, pipes, foundations of structures, buildings, structures, additional components, spill containment structures, transloading facilities, wharves, piers, moorings and retaining structures, loading racks, control equipment and any other structures within the property line or operated together.

Safety Assessment consists of three elements:

- Evaluation of the fire control and suppression systems and procedures and the analysis of the potential impacts of seismic hazards on these systems.
- Evaluation of spill containment systems, equipment, and procedures in the event of an earthquake and their vulnerabilities to the identified seismic hazards at the site.
- Evaluation of onsite emergency equipment, operational safety measures, and personnel policies/availability and their vulnerabilities to the identified seismic hazards at the site.

OAR 340-300-0004 describes the Risk Mitigation Implementation Plan requirements. Plans must be submitted to DEQ 180 days after the Seismic Vulnerability Assessment is approved. The plan must do the following:

- Propose risk mitigation measures to address vulnerabilities identified in the Seismic Vulnerability Assessment to protect public health, life safety and the environment.
- Outline and justify milestones for one, three and five years to get as much done as efficiently as possible.
- Identify the risks remaining after all mitigation measures are implemented.

All risk minimizing actions must be implemented within 10 years of the plan's approval.

Program implementation

In 2024, 16 facilities submitted the required initial Seismic Vulnerability Assessments. DEQ reviewed them for completeness and asked all facilities for more information. All submitted SVAs are available on DEQ FTSS website.

One additional facility, Vigor Industrial, LLC located in Multnomah County, signed an enforceable Mutual Agreement and Final Order with DEQ. The MAO requires the facility to eliminate four million gallons of oil storage capacity by 2028 rather than going through the Seismic Stability Program. Vigor is submitting progress reports to DEQ every other month and on June 4, 2025, DEQ has conducted the first inspection to confirm compliance.

DEQ and its engineering consulting team have reviewed all submitted Seismic Vulnerability Assessments and requested additional geotechnical investigations from most of the facilities. DEQ provided facilities with facility-specific comment logs and next steps letters. In general, DEQ found that all seismic and geotechnical aspects were adequate as interim drafts, but most facilities need to provide additional items to comply with FTSS rules. Geotechnical, structural and safety engineering reviews are an iterative process that involves interactive conversations among DEQ, facility operators and engineering teams.

DEQ has been meeting with the facilities to discuss the application of the rules, industry practices and expectations. These meetings helped DEQ understand the emergence of deficiency trends and provide feedback regarding understanding the SVA expectations versus information that follows as part of the RMIP. The meetings are designed to help facilitate submittals to meet the rules' requirements. DEQ identified the following overall SVA deficiencies:

- Overall, the geotechnical evaluations are initially satisfactory but require additional investigations for structural analyses of tanks and components, as well as the listing of those deficiencies in Form 10, to facilitate tracking through the mitigation phase.

- There were suggestions to defer assessment that appeared to be a result of confusion about the timing of assessment work – whether it should be part of the SVA phase or the RMIP phase.

- Many equipment evaluations were based on cursory walk-throughs. The SVA requires closer inspection, including possibly invasive testing. The current cursory style of inspection is leading to assessments that categorize components as acceptable in their current state, which does not accurately describe the component's ability to comply with the performance objective of Maximum Allowable Uncontrolled Spill or Risk Category IV design requirements.

To address these deficiencies and expectations, on June 26, 2025, DEQ shared the draft Supplemental to Roadmap document with the facilities. When finalized, the document will be posted on DEQ website.

The final SVA requires a comprehensive list of all the risks or deficiencies identified for the facility by all disciplines (structural, geotechnical, electrical, mechanical, etc.). All deficiencies identified in the SVA must be addressed in the Risk Mitigation Implementation Plan, as per OAR 340-300-004(5). The RMIP must be submitted to DEQ no later than 180 calendar days after DEQ's approval of the SVA. This tight timeline requires the majority of investigations and assessments to occur in the SVA.

The geotechnical assessment identifies seismic demands when an earthquake occurs, and each structural component is required to be evaluated based on these seismic demands. Suppose the structural components are expected to require structural modifications, repairs and strengthening to comply with OAR 340-300 even after the completion of the geotechnical mitigations at the site. In that case, this must be identified in the SVA and included in the Form 10.

In early 2025, one facility started their risk mitigation implementation work. PDX Fuel Company, LLC submitted both the SVA and the Risk Mitigation Implementation Plan, proposing to replace the existing tanks with new tanks that meet modern seismic resilience requirements. DEQ conducted a public hearing in November 2024, and following a public comment period, approved the RMIP. The public comment report and the RMIP approval letter are posted on the PDX Fuel page of the FTSS website. On June 6, 2025, the PDX Fuel Company submitted its first annual implementation status report, showing that the facility is on track to meet its 1-, 3-, and 5-year milestones.

Portland General Electric Beaver plan in Port Westward was the second facility to submit the Risk Mitigation Implementation plan following DEQ’s approval of the SVA the facility submitted in October of 2024. A RMIP intending to end oil storage was submitted in April and DEQ initiated the public comment period required in OAR 340-300-0007 before taking action on the RMIP. Public comments will be accepted until 5 pm on Aug. 11, 2025.

Seismic vulnerability assessment review process

The technical review team consists of DEQ’s Seismic Stability Team, a California engineering firm called Moffatt and Nichol, Portland State University’s Institute for Sustainable Solutions, the Oregon Department of Geology and Mineral Resources, and Washington State Department of Ecology.

The Moffatt and Nichol’s team specializes in marine terminals, transportation, energy and environmental engineering. Moffatt and Nichol’s engineers and subconsultants involved in the

SVA reviews are experts in geotechnical, structural and earthquake engineering, seismic inspection and the assessment of marine oil terminals and refinery structures and ground deformation effects on structures located on active faults.

The PSU Institute for Sustainable Solutions has been assisting DEQ since the 2022 rulemaking process began. PSU is responsible for identifying and cultivating a community of practice consisting of industrial partners, consultants and communities with the goal of enhancing data collection, identifying and coordinating resources, developing a seismic stability protocol and conducting scientific research related to the FTSS program. PSU's contributions to the program include geotechnical expertise, staying up-to-date with seismic developments and best practices and methods being developed worldwide. PSU work includes collating data received from all facilities to help DEQ evaluate consistency among facilities and overall adequacy.

DOGAMI is named in SB 1567 as a consultant and has been advising DEQ on program development and reginal geotechnical considerations since the rulemaking began in 2022.

WA Ecology's Spill Prevention, Preparedness, and Response Program and its WAC 173-180 Implementation Guidance for Class 1 Facilities and WAC 51-50-1613 rules informed the FTSS program design and continue to help with program implementation.

The Fuel Tank Seismic Stability Program has been designed to:

1. **Regulate Seismic Vulnerability Assessments:** Require each facility to evaluate and identify seismic vulnerabilities in their fuel storage tanks and associated infrastructure.
2. **Approve Risk Mitigation Implementation Plans:** Review and approve RMIPs that outline corrective measures for mitigating seismic risks identified in the SVAs.
3. **Provide Technical Assistance:** Offer guidance and support to facilities submitting SVAs and RMIPs, ensuring compliance with regulations and promoting best practices in seismic resilience.
4. **Facilitate Regulatory Compliance:** Work closely with facilities to ensure that their operations align with the DEQ requirements.

The SVA review process consists of the steps shown in Figure 2 to ensure compliance with OAR 340-300-0003. Each facility's SVA undergoes the same iterative evaluation: a preliminary review, a request for additional information, submission of the additional information, approval of the schedule to complete the final SVA, and a comment log from DEQ review to the facility, also known as Form 10 . The Iterative process of clarifying and addressing comments follows, culminating in the final SVA submittal and approval. Figure 2 outlines the SVA geotechnical review milestones to ensure compliance with OAR 340-300-0003. Once the final SVA is approved, the facilities have six months to develop and submit their Risk Mitigation Implementation Plans.

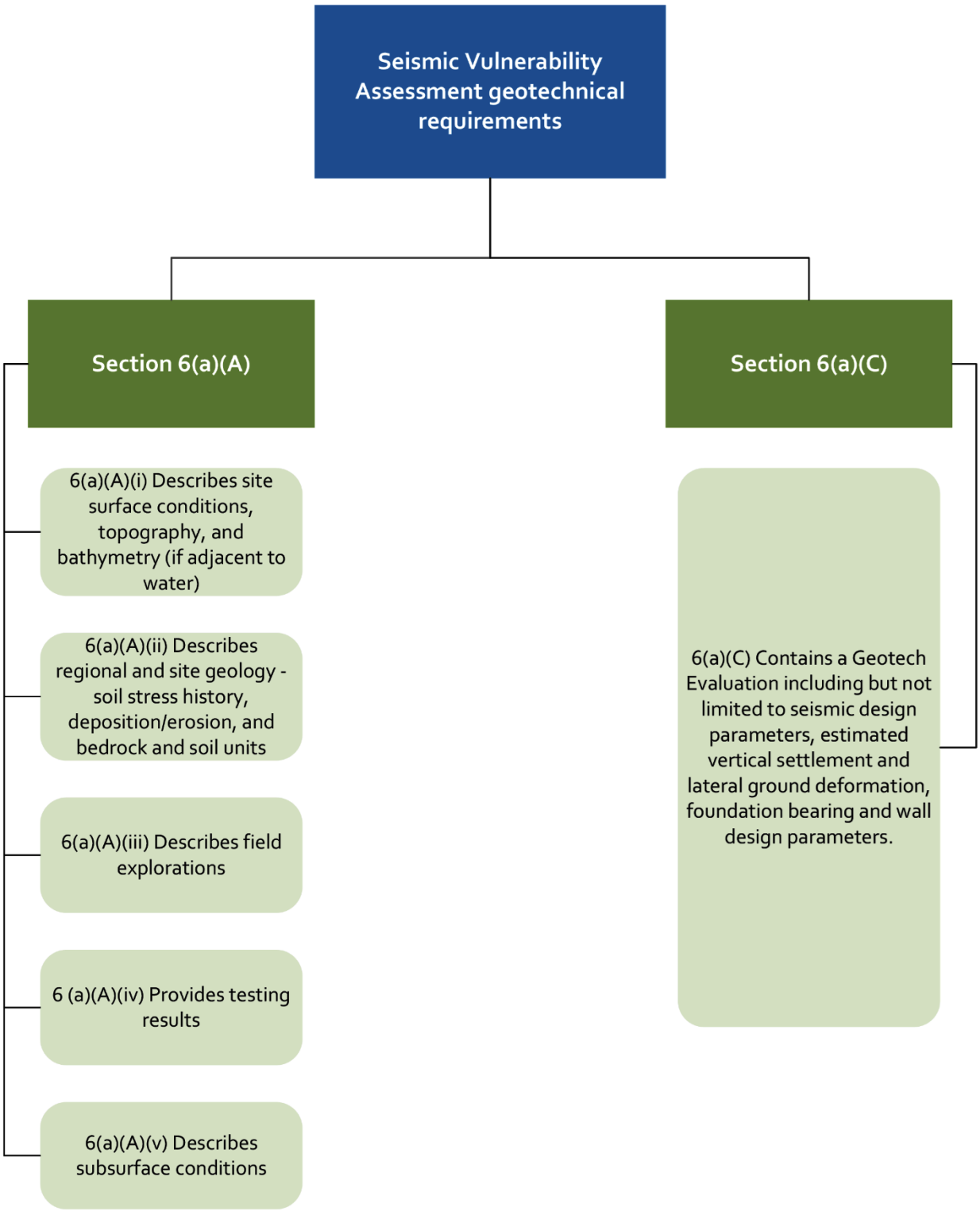

Figure 2. SVA geotechnical review milestones

To facilitate the preparation of the Seismic Vulnerability Assessment and Risk Mitigation Implementation Plan. DEQ developed a document titled "Roadmap to Compliance with OAR 340-300." The document provides direction on content, allowing organization, and timeline and allows the facilities to streamline their assessments. There are also 10 forms designed as step-by-step checklists for assessing tanks, pipes, piers, wharfs, dikes, buildings, fire suppression and control systems.

Facility assessment status (July 2025)

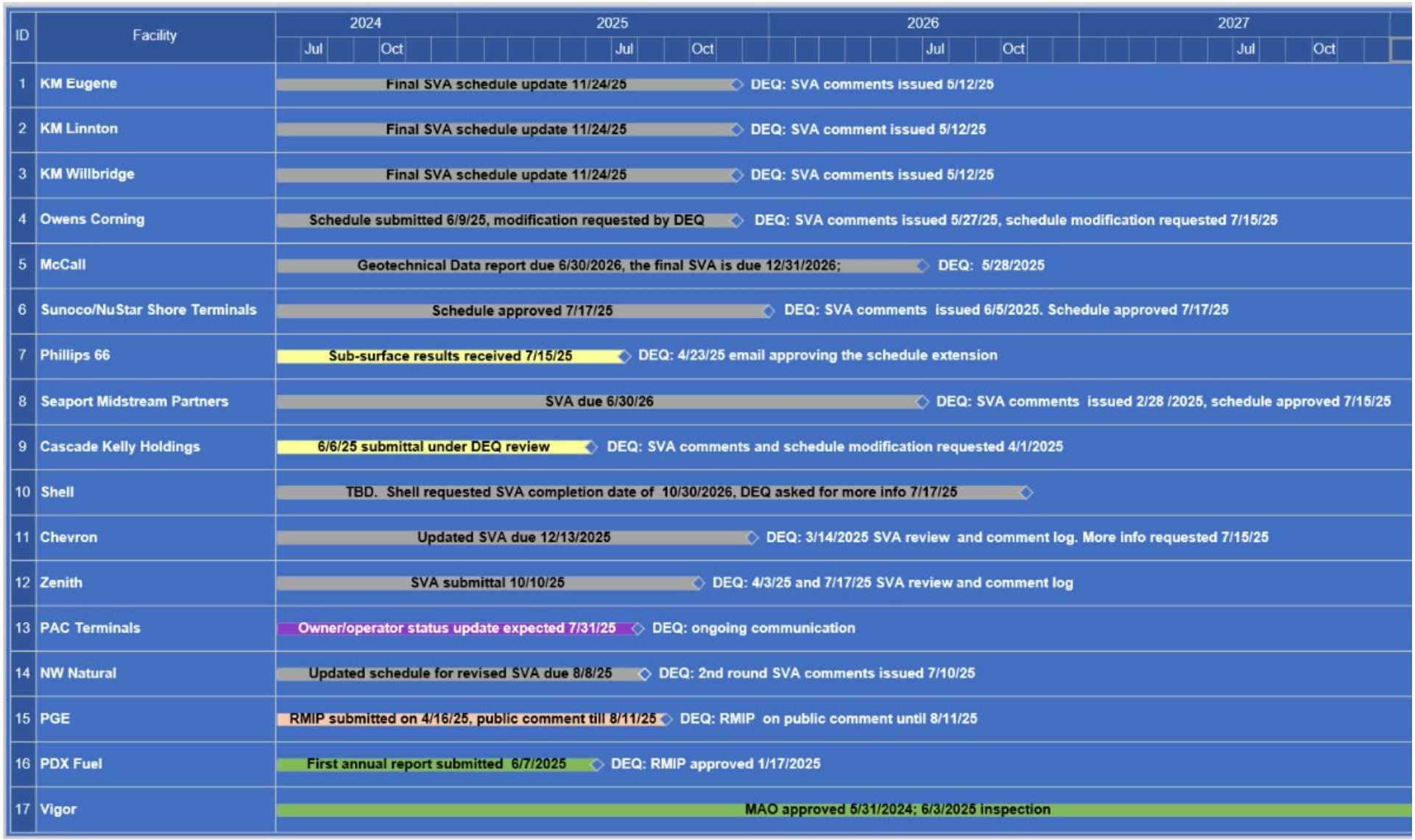

Figure 3. Facility Seismic Vulnerability Assessment status

Figure 3 shows a snapshot of the SVA progress for each regulated facility to date. The color of the bar represents the snapshot in time of the SVA review process: yellow bars mean DEQ is reviewing the latest submission from the facility and preparing to provide comments. Gray bars indicate that DEQ has issued comments and set a deadline for the facility to respond. Green bars are the facilities with submitted or approved RMIPs. The chart displays DEQ's latest action and the next deadline for facility's subsequent submittal.

- The three Kinder Morgan facilities submitted their responses to DEQ's requested geotechnical checklist and updated their SVA reports on March 28, 2025. The assessment team acknowledged the terminals' susceptibility to earthquakes. DEQ reviewed, provided all three facilities with comments on May 12, 2025 and held a meeting to discuss the SVA process on July 24, 2025. The facility will submit a schedule for the SVA completion in November 2025.
- Owens Corning submitted its geotechnical checklist responses on March 31, 2025. DEQ provided comments on May 27, 2025. The facility responded to comments with the proposed final SVA timeline on June 9, 2025. DEQ met with facility and their consultant on July 15, 2025 to discuss the contents and the timeline.
- McCall Oil and Chemical submitted its project schedule on April 4, 2025. DEQ approved the requested schedule extension for in-water work on May 28, 2025. The facility's geotechnical data report is due June 30, 2026 and the final SVA is due Dec. 31, 2026.
- Sunoco NuStar submitted its geotechnical checklist on March 31, 2025. DEQ met with the facility to clarify expectations and provided comments on July 11, 2025. Sunoco's final SVA is due Dec. 31, 2025.
- Phillips 66 submitted the data report summarizing the results of geotechnical investigations on July 15, 2025. DEQ is reviewing.
- DEQ approved Seaport's revised project schedule on July 15, 2025. The revised SVA is now due in June 2026.
- Cascade Kelly Holdings submitted its workplan, which DEQ reviewed and conditionally approved, pending a few changes requested by DEQ. The facility submitted the requested information on June 6, 2025. DEQ is reviewing.
- Shell submitted a schedule on April 11, 2025 and updated it with additional information requested by DEQ on July 15, 2025.
- DEQ approved Chevron's project schedule on July 15, 2025. The facility's updated SVA is due on Dec. 13, 2025.
- Zenith submitted additional tank reports on April 3, 2025, DEQ reviewed, provided comments and met with the facility and its consultants to discuss the scope, timeline and expectations on July 25, 2025.

- Pacific Terminals is operating the facility owned by NW Natural and the future of these operations has been coordinated by the owner and operator. Both facilities have been meeting with DEQ to design a realistic timeline for the Pacific Terminals SVA submittal.
- DEQ provided NW Natural with comments on July 10, 2025, and set a deadline of Aug. 8, 2025, for the facility to respond with the updated SVA schedule.
- DEQ approved PGE's SVA in November of 2024. PGE submitted its draft RMIP in April. DEQ reviewed and initiated the public comment period. Comments on PGE's RMIP will be accepted until 5 p.m. on Aug. 11, 2025. PDX Fuel has an approved RMIP and submitted their first annual risk mitigation implementation report in June 2025.
- PDX Fuel company submitted its first annual implementation report in June 2025 indicating compliance with the risk mitigation implementation timeline established in RMIP.
- Vigor has been submitting bi-monthly reports to DEQ and is expected to complete the closure of its oil operation by June 2, 2028, as agreed upon in the MAO signed on May 30, 2024. DEQ conducted an inspection in June 2025 to confirm the facility's progress and compliance.

Risk mitigation implementation status - July 2025

Following the completion of the Seismic Vulnerability Assessments, DEQ requires facilities to submit Risk Mitigation Implementation Plans outlining measures to reduce identified seismic vulnerabilities.

Two risk mitigation plans from PDX Fuel and PGE have been submitted to date.

Key mitigation strategies

- **Tank Replacement:** PDX Fuel, LLC, is in the process of replacing the three existing tanks with the new Risk Category IV compliant tanks.
- **Tank decommissioning:** PGE is curtailing their diesel use at their Beaver Plant in March 2026, in compliance with their Air Quality permit and will decommission the existing tanks.

DEQ approved PDX Fuel LLC's RMIP following a robust public comment and hearings process.

DEQ initiated the public comment hearing process for the RMIP submitted by PGE's Beaver Plant on July 11, 2025.

Technical assistance and compliance support

The program has provided ongoing technical assistance to facilities, ensuring that SVAs and RMIPs are submitted in compliance with DEQ regulations. Support has included:

- **Roadmap to compliance:** issued in March 2024 as a roadmap for facilities to use in developing Seismic Vulnerability Assessments to comply with the DEQ's Fuel Tank Seismic Stability Program rules OAR 340-300. It provides direction about the contents of the assessment. The 10 forms published alongside the roadmap streamline the organization of assessment reports and complement the roadmap and the rules.
- **Meetings with facilities and their consultants:** to discuss the rules application, expectations and industry standards and to guide on conducting SVAs and developing effective RMIPs.
- **Community of practice convening workshops led by Portland State University on behalf of DEQ:** These workshops serve as an opportunity for local seismic, geotechnical and structural experts, academics, facility operators and community members to discuss best practices, lessons learned and ongoing needs.
- **On-Site Consultations:** DEQ conducted a site visit to Vigor. DEQ plans to visit other facilities with the technical teams involved in SVA and RMIP reviews this summer. Site visits and consultations will be instrumental in providing tailored support in addressing specific seismic vulnerabilities.
- **Letter to all facilities:** After the first round of reviews and comments to all facilities, DEQ identified common themes related to the Roadmap and sent a letter summarizing these themes and clarifying expectations to all facilities on April 8, 2025.
- **Roadmap Supplemental document:** in response to facilities' replies to comments received from DEQ, DEQ had discussions with facilities and their consultants regarding application of the rules, industry practices, and expectations. These meetings highlighted the need to further clarify specific items. On June 27, 2025, DEQ shared with the facilities the draft Roadmap supplemental document.
- **Regulatory Updates:** Program staff is monitoring any changes to seismic standards, guidelines, and regulatory requirements, ensuring continuous compliance.

Next steps

The timing of SVA approvals will vary by facility and DEQ anticipates that most approvals will happen in the second half of 2026. Figure 4 shows an example of an SVA and RMIP preparation and submittal schedule. Each line describes a different task, with a timeline including both the beginning and ending of the task. The timeline primarily is measured in yearly quarters (top row) with specific months defined below for finer details.

ID	Task Name	Duration	Start	Finish	% Complete
1	Pre-Exploration Analysis	43 days	Fri 11/1/24	Tue 12/31/24	100%
2	Investigation Scoping	43 days	Fri 11/1/24	Tue 12/31/24	100%
3	ODEQ Consultation - Investigation Scope	22 days	Fri 3/14/25	Sun 4/13/25	0%
4	**Geotechnical Exploration & Analysis**	**196 days**	**Mon 4/14/25**	**Mon 1/12/26**	**0%**
5	Geotech Field Exploration - Scheduling and Planning	45 days	Mon 4/14/25	Fri 6/13/25	0%
6	Geotech Field Exploration - Perform Exploration	22 days	Mon 6/16/25	Tue 7/15/25	0%
7	Laboratory Analysis	108 days	Wed 7/16/25	Fri 12/12/25	0%
8	ODEQ Consultation - Geotechnical Analysis Scope	22 days	Fri 8/15/25	Sun 9/14/25	0%
9	Geotechnical Analyses and Numerical Modeling	107 days	Fri 8/15/25	Mon 1/12/26	0%
10	**Structural, mechanical, and other disciplines**	**218 days**	**Mon 6/2/25**	**Wed 4/1/26**	**0%**
11	Structural Assessment	108 days	Wed 10/1/25	Fri 2/27/26	0%
12	Draft Structural Assessment Report	22 days	Mon 3/2/26	Tue 3/31/26	0%
13	**Submit Draft Structural Assessment Report**	**0 days**	**Wed 4/1/26**	**Wed 4/1/26**	**0%**
14	Mechanical and other disciplines assessments	217 days	Mon 6/2/25	Tue 3/31/26	0%
15	**Final Geotechnical Report**	**205 days**	**Mon 12/1/25**	**Fri 9/11/26**	**0%**
16	Prepare Draft Final Geotechnical Report	87 days	Mon 12/1/25	Tue 3/31/26	0%
17	**Submit Draft Final Geotechnical Report**	**0 days**	**Wed 4/1/26**	**Wed 4/1/26**	**0%**
18	ODEQ Consultation - Review of Draft Final Geotechncial Report	23 days	Wed 4/1/26	Fri 5/1/26	0%
19	Supplemental Geotechnical Analysis	65 days	Mon 5/4/26	Fri 7/31/26	0%
20	Finalize Geotechnical Report	30 days	Mon 8/3/26	Fri 9/11/26	0%
21	**Final SVA and RMIP Preparation**	**248 days**	**Wed 4/1/26**	**Fri 3/12/27**	**0%**
22	Prepare Draft of Final SVA	48 days	Wed 4/1/26	Fri 6/5/26	0%
23	**Submit Draft Final SVA**	**0 days**	**Mon 6/8/26**	**Mon 6/8/26**	**0%**
24	ODEQ Consultation - Review of Draft Final SVA	23 days	Mon 6/8/26	Wed 7/8/26	0%
25	Prepare Stamped Final SVA	23 days	Thu 7/9/26	Mon 8/10/26	0%
26	**Submit Final SVA**	**0 days**	**Tue 8/11/26**	**Tue 8/11/26**	**0%**
27	Final SVA Evaluation	23 days	Tue 8/11/26	Thu 9/10/26	0%
28	**ODEQ Approval of Final SVA**	**0 days**	**Fri 9/11/26**	**Fri 9/11/26**	**0%**
29	Develop Draft RMIP	130 days	Fri 9/11/26	Thu 3/11/27	0%
30	**Submit Draft RMIP**	**0 days**	**Fri 3/12/27**	**Fri 3/12/27**	**0%**

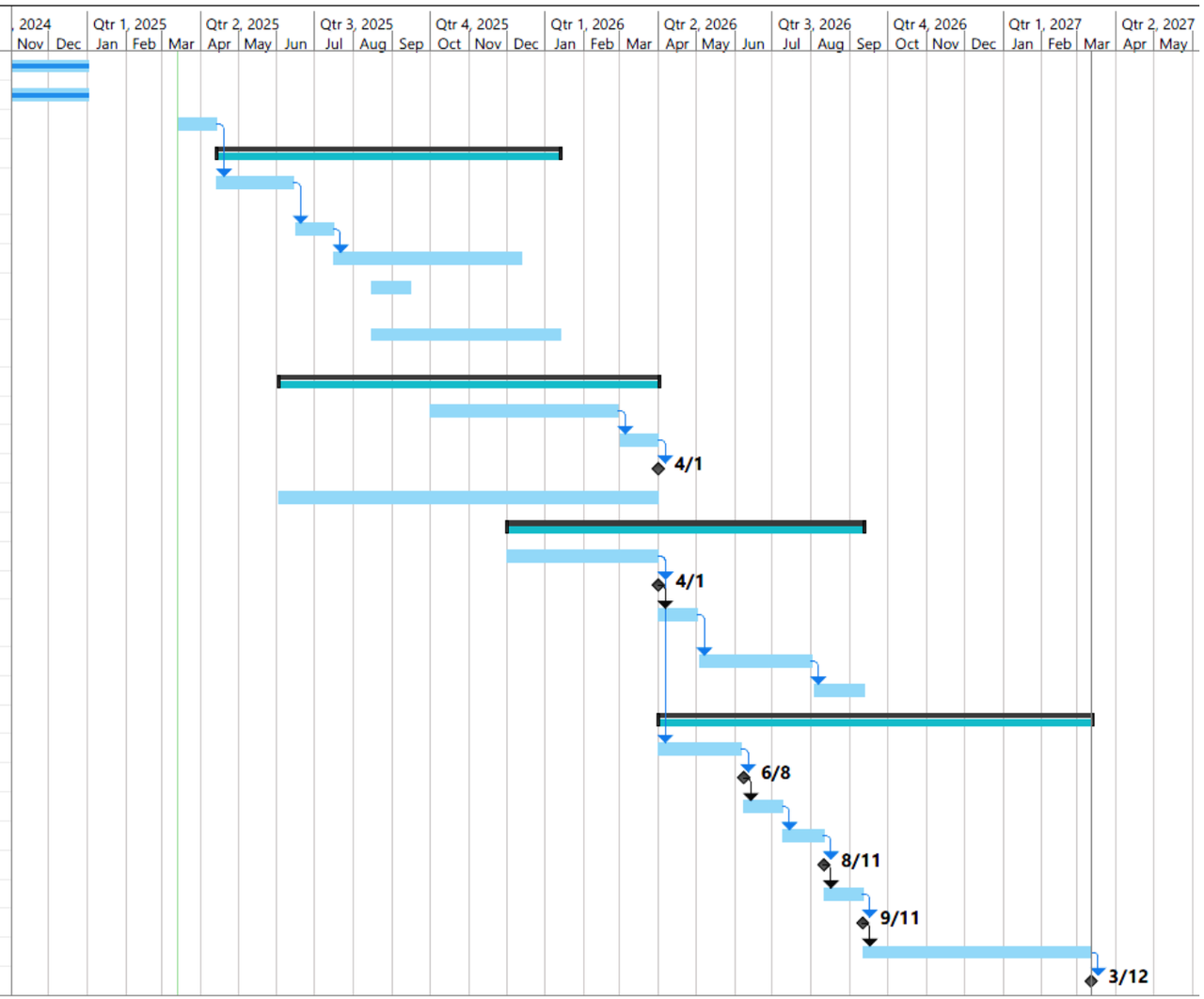

Figure 4. An example schedule for the preparation and submission of an SVA and RMIP

Conclusion

Work to ensure the seismic resilience of large capacity fuel storage and distribution terminals is progressing as expected. Continued efforts are being made to support facilities in addressing complex seismic vulnerabilities and ensuring full compliance with DEQ regulations. The program remains committed to working collaboratively with each terminal and surrounding communities to achieve these goals and enhance the safety and resilience of the fuel infrastructure. Engineering reports, including seismic vulnerability analyses and mitigation assessments, are not written for general audiences and often include highly specialized language. Readers of such reports should exercise caution to avoid overinterpretation and misinterpretation of the report content. Please contact the Seismic Stability team at SeismicStability@deq.oregon.gov with any questions.