DTSC
Department of Toxic Substances Control

GUIDANCE FOR PREPARING TANK ASSESSMENT REPORTS

FOR DTSC-PERMITTED FACILITIES

January 2024

This document is intended to be guidance only, and it does not supersede or implement laws or regulations. The information in this advisory is intended solely as guidance and as educational reference material and should not be considered enforceable or regulatory in nature.

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Acronyms and Abbreviations

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
Cal. Code Regs.	California Code of Regulations
DTSC	Department of Toxic Substances Control
HWMU	Hazardous Waste Management Unit
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
RCRA	Resource Conservation and Recovery Act
STI	Steel Tank Institute
UL	Underwriters Laboratory
U.S. EPA	United States Environmental Protection Agency

SECTION 1 PURPOSE

The purpose of this Guidance is to provide Tank Assessment Report preparers with an overview of the regulatory requirements for Tank Assessment Reports prepared for "upper-tiered" permitted facilities where tanks are used to manage hazardous waste. Upper-tiered permits consists of Resource Conservation and Recovery Act (RCRA, sometimes called "full" RCRA or RCRA-equivalent) permits, California-only (sometimes called State-only) permits, and standardized permits.[1] "Lower-tiered permits" consist of Conditional Exemption, Conditional Authorization, and Permit-by-Rule permits. Tank Assessment Report requirements for tanks in lower-tiered permitted facilities will not be specifically addressed herein.

The information provided in this Guidance is meant as a summary of the required contents in a hazardous waste Tank Assessment Report. This is not a "how to" manual. This Guidance is not meant to be a substitute for the regulations, building code requirements, or applicable industry standards. It is the responsibility of each permit applicant and their engineer(s) certifying the tank system(s) to refer to the correct regulations for the exact requirements.

SECTION 2 REGULATORY APPLICABILITY

Before preparing a Tank Assessment Report, it is important to confirm which regulations apply. There are several regulatory requirements that address tank systems, and it is not always easy to know which rules are applicable. The applicable regulations depend on factors such as the type of hazardous waste management unit (HWMU) and the age of the tank. Additional details are provided below.

2.1 Types of Hazardous Waste Management Unit

The first step in determining what regulatory requirements are applicable is to determine what type of HWMU is present at the facility. Specifically, is the HWMU a tank system? The definition of a tank or tank system is relatively straightforward, but there are instances where containers or miscellaneous units could mistakenly be categorized as tanks.

"Tank" is defined in regulation as a *stationary device* [emphasis added], designed to contain an *accumulation* [emphasis added] of hazardous waste which is constructed primarily of non-earthen materials (e.g., wood, concrete, steel, plastic) which provide structural support. "Tank system" means a hazardous waste transfer, storage or treatment tank and its associated ancillary equipment and containment system (Cal. Code Regs., tit. 22, § 66260.10).

Tanks are not distinguished from containers or miscellaneous units based on size or material of construction; tanks can be large or small and of different materials including steel, fiberglass,

[1] Fact Sheet Hazardous Waste Facility Permits, DTSC, September 1998.

plastic, and concrete. The key distinction between tanks and containers or miscellaneous units is that tanks are "stationary" and contain an "accumulation" of hazardous waste.

Containers, in contrast, are designed and operated to be "portable." Specifically, the regulatory definition of "container" is any device that is open or closed *and portable* [emphasis added] in which a material can be stored, handled, treated, transported, recycled, or disposed of (Cal. Code Regs., tit. 22, § 66260.10).

Miscellaneous units are defined, in part, as a HWMU where hazardous waste is transferred, treated, stored, or disposed of and that is *not a container or tank* [emphasis added] (Cal. Code Regs., tit. 22, § 66260.10). Therefore, a HWMU cannot be both a tank system and miscellaneous unit. However, certain tank system requirements may also apply to miscellaneous units to ensure protection of human health and the environment (Cal. Code Regs., tit. 22, § 66264.601). These requirements are applied on a case-by-case basis depending upon the design and operation of the miscellaneous unit and are not specifically addressed in this Guidance.

If a device is not designed and/or operated to be portable, and it contains an accumulation of hazardous waste, it is likely considered a tank for the purposes of permitting and will require an assessment as described in this Guidance. Examples of tanks include the following:

- A small fiberglass device that is hard-piped and filled and emptied in place
- A tanker truck on blocks within secondary containment
- A tanker truck or Baker tank with expired Department of Transportation registration
- A large Baker tank or similar that can only be moved when empty or by crane

If you are unsure whether your HWMU is a container, miscellaneous unit, or tank, please contact your DTSC permitting project manager for guidance.

2.2 Age of Tank

Once you have confirmed the device meets the definition of a "tank," the next step is to determine whether it is an "existing" or "new" tank. This step is important because different regulatory requirements apply based upon the age of the tank . The terms "new" and "existing" tank have specific regulatory definitions, and it is not always intuitive.

An "existing tank" or "existing tank system" means a tank system or component that is used for the transfer, storage, or treatment of hazardous waste and that is in operation or for which installation has commenced on or prior to July 14, 1986, for tanks containing RCRA hazardous waste, or July 1, 1991, for tanks containing only non-RCRA hazardous wastes. Conversely, a "new tank system" or "new tank component" is defined as a tank system or component that is used for the transfer, storage, or treatment of hazardous waste for which installation has commenced after July 14, 1986, for tanks containing RCRA hazardous waste, or July 1, 1991, for tanks containing non-RCRA hazardous wastes. By definition, a "new" tank could be over 30 years old. Refer to title 22 in the California Code of Regulations, section 66260.10 (Cal. Code Regs., tit. 22, § 66260.10) for

the full definition of existing and new tanks as the tank age status for non-RCRA hazardous waste tanks is different from tanks containing RCRA hazardous waste.

In the event the tank installation date is unknown, the Tank Assessment Report should be prepared to meet the new tank standards.

SECTION 3 TANK ASSESSMENT REPORT CONTENTS

This section will highlight some of the tank information and design details required in the Tank Assessment Report.

Cal. Code Regs., tit. 22, § 66270.16(a) requires that owners and operators of facilities using tanks shall provide a description of the design and operation procedures, including a written assessment that is reviewed and certified by an independent, qualified, professional engineer registered in California, as required under Cal. Code Regs., tit. 22, § 66264.191(b) and (f) for existing tanks and Cal. Code Regs., tit. 22, § 66264.192(b) for new tanks. This written assessment is also known as a Tank Assessment Report.

The regulations do not provide instructions on how to design a tank; instead, tank design must be based on engineering principles, industry design standards, and relevant building codes. However, the regulations do provide certain conditions the tank design must meet. These conditions can be found in Cal. Code Regs., tit. 22, § 66264.191(a) and (f) for existing tanks and Cal. Code Regs., tit. 22, § 66264.192(a) and (b) for new tanks. Namely,

- Tanks shall have sufficient shell strength and, for closed tanks, pressure controls (e.g., vents) to assure that they do not collapse or rupture.
- The Department requires that a minimum shell thickness be maintained at all times to ensure sufficient shell strength.
- The Tank Assessment Report shall show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be transferred, stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

The following subsections will elaborate on many of the above conditions and expectations for the Tank Assessment Report; however, a tank design has many components and all may not be addressed herein.

3.1 Part B Requirements vs. Tank Assessment Report Requirements

A permit application consists of two parts, Part A (or DTSC Form 1093A for standardized permits) and Part B. The Part B information requirements presented in Cal. Code Regs., tit. 22, § 66270.14 through 66270.23 reflect the standards promulgated in Cal. Code Regs., tit. 22, § division 4.5, chapter 14, *Standards for Owners and Operators of Hazardous Waste Transfer, Treatment, Storage, and Disposal Facilities.*

One of the Part B information requirements for tanks at permitted facilities is the Tank Assessment Report, which is typically submitted as an appendix to the Part B. The Tank Assessment Report only needs to address the specific subsections required by Cal. Code Regs., tit. 22, § 66270.16(a). The Tank Assessment Report does not need to address the remaining design and installation requirements for tanks at permitted facilities found in California Code of Regulations, title 22, division 4.5, chapter 14, article 10, *Tank Systems*, unless specifically incorporated by reference in Cal. Code Regs., tit. 22, § 66264.191(b) and (f) or Cal. Code Regs., tit. 22, § 66264.192(b). However, it is important to note that although not required in the Tank Assessment Report, some of the requirements of these other subsections may be required to be addressed elsewhere in the Part B (see Cal. Code Regs., tit. 22, § 66270.16 for details).

3.2 Correct Regulatory Citation (New vs. Existing Tank)

The Tank Assessment Report must identify whether the tank is an existing tank or new tank by regulatory definition (see Section 2.2), and it is recommended to also include the corresponding regulatory citation (e.g., Cal. Code Regs., tit. 22, § 66264.192 for new tanks). As the definition of new versus existing tanks are based on the tank installation date, the year the tank was installed must also be included in the Tank Assessment Report, not just the age of the tank in years. In the event the tank installation date is unknown, the Tank Assessment Report should be prepared to meet the new tank standards.

3.3 Design Standards and References

Tank Assessment Reports must provide references to design standards, including the edition and/or addendum used, or other available information used (or to be used) in the design and construction of the tank (Cal. Code Regs., tit. 22, § 66264.191(c)(1), Cal. Code Regs., tit. 22, § 264.192(b)(1)). This could include, but is not limited to, standards by American Petroleum Institute (API), American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME), American Concrete Institute (ACI), National Association of Corrosion Engineers (NACE), National Fire Protection Association (NFPA), Steel Tank Institute (STI), Underwriters Laboratory (UL), and others. For example, the API Standard 650 *Welded Steel Tanks for Oil Storage* applies to vertical, cylindrical, aboveground, and welded storage tanks under certain conditions.

At a minimum, the tank(s) should be designed in accordance with the California Building Code, and/or local building codes, which typically reference the latest edition of ASCE 7 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*.[2]

In the case of a previously constructed tank, where the design standards are unknown or have been superseded, the certifying engineer must evaluate the tank to determine whether the tank(s) continues to have sufficient structural integrity and continues to be acceptable for the transferring, storing and treating of hazardous waste.

[2] The current edition of ASCE 7 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures* is ASCE 7-22.

The Tank Assessment Report must also provide a description of, and the design standards used for, the ancillary equipment (Cal. Code Regs., tit. 22, § 66264.191(c)(1), Cal. Code Regs., tit. 22, § 66264.192(b)(1)). "Ancillary equipment means any device including, but not limited to, such devices as piping, fittings, flanges, valves, and pumps that is used to distribute, meter, or control the flow of hazardous waste from its point of generation to a storage or treatment tank(s) between hazardous waste storage and treatment tanks to a point of disposal onsite or to a point of shipment for disposal offsite" (Cal. Code Regs., tit. 22, § 66260.10).

If design standards for ancillary equipment are not available, the Tank Assessment Report must include an evaluation of the suitability of ancillary equipment for the proposed use based on industry standards, observations, and/or available information.

3.4 Tank Configuration

DTSC must review the tank design information submitted in the Tank Assessment Report, including the foundation, structural support, seams and pressure controls, and seismic considerations (Cal. Code Regs., tit. 22, § 66264.191(a) and § 66264.192(a)). Since the tank configuration affects the design requirements, it is recommended that the Tank Assessment Report provides design drawings and/or a description to identify whether the tank is situated aboveground, on-ground, or underground.

"Aboveground tank" means a device meeting the definition of "tank" in Cal. Code Regs., tit. 22, § 66260.10 and that is situated in such a way that the entire surface area of the tank is completely above the plane of the adjacent surrounding surface, and the entire surface area of the tank (including the tank bottom) is able to be visually inspected. "On-ground tank" means a device meeting the definition of "tank" that is situated in such a way that the bottom of the tank is on the same level as the adjacent surrounding surface so that the external tank bottom cannot be visually inspected. "Underground tank" means a device meeting the definition of "tank" which is substantially or totally beneath the surface of the ground.

It is also recommended that the Tank Assessment Report identify whether the tank is a vertical, horizontal, rectangular, or double-walled; double-bottom tank, flat bottom, or cone bottom; and/or supported on saddles, legs, other structures, or supported on the ground. Tank configuration also includes whether the tank has a fixed roof (cone, dome, or umbrella shape) or a floating roof.

3.5 Tank System Sufficient Structural Strength

The Tank Assessment Report must show that tanks "have sufficient shell strength… to assure they do not collapse or rupture" (Cal. Code Regs., tit. 22, § 66264.191(a), Cal. Code Regs., tit. 22, § 66264.192(a)). The Tank Assessment Report must include all justifications and calculations performed for the design or assessment of the structural strength of the tank system. The Tank Assessment Report must include tank information (e.g., manufacturer information and specifications), design standards, assumptions, reference citations, and conclusions.

For previously constructed tanks, the Tank Assessment Report must also evaluate the current shell thickness of the tank compared to the design minimum thickness (see Section 3.6) to assess its continued minimum thickness compliance. Measurements must be taken in accordance with applicable standards such as API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction* and STI SP001 *Standard for the Inspection of Aboveground Storage Tanks*. It is recommended that the report and/or results of the current shell thickness be included in the Tank Assessment Report. Estimated corrosion rates may also need to be reevaluated based on the observed change in shell thickness of the tank.

3.5.1 Calculating Tank Design Loads

The Tank Assessment Report must provide calculations showing the tank system has sufficient structural integrity to withstand static and dynamic loading conditions. Factors to consider may include but are not limited to the following: an assessment of hoop stresses and buckling; consideration of the tank material of construction and design; hydrostatic pressure/weight of the waste when full; weight of the tank roof; wind; and seismic loads.

Along the California coastline, facilities may be in tsunami-prone regions. The tank design standards for coastal facilities should identify tsunami inundation areas based on either ASCE 7, the California Department of Conservation Official Tsunami Inundation Maps, or municipal government sources and include tsunami loading in the design, as appropriate.

3.5.2 Calculating Seismic Forces

Tanks must be designed and constructed to resist the effects of earthquake motion. Industry standards (such as ASCE 7 and API 650) provide varying methods for seismic design of tanks, and each involves complex equations and calculations. This is because seismic design considers many factors including, but not limited to, earthquake lateral forces (shear) and vertical earthquake forces on the tank, overturning moment caused by an earthquake and resisting moment of the tank, the impulsive and convective (contents sloshing) effects, the occurrence of Risk-Targeted Maximum Considered Earthquake (MCE_R) ground shaking, and other factors. The Tank Assessment Report must identify the method used for seismic considerations and provide the source and rationale for the selection of various input coefficients and factors. The output of the seismic design calculations must demonstrate sufficient structural integrity of the tank. DTSC will not approve a Tank Assessment Report that does not demonstrate sufficient structural integrity.

Key inputs must be listed in the Tank Assessment Report. For example, if using ASCE 7, the Risk Category, Importance Factor, Site Class, and Seismic Design Category must be included in the Tank Assessment Report. The Tank Assessment Report must also provide the basis for selecting each of these parameters. The Risk Category for buildings and structures are classified based on the risk to human life, health, and welfare in the event of a failure or damage. The Risk Categories (also known as Occupancy Categories) are classified from I (lowest risk) through IV (highest risk). The Commentary book to ASCE 7 provides more clarification of the Risk Categories given in ASCE 7-22 Table 1.5-1 *Risk Categories of Buildings and Other Structures for Flood, Wind, Snow, Earthquake, and Ice Loads*. The Importance Factors provided in ASCE 7 correspond with the selected Risk

Category. The Risk Category is also used as one of three components (the other being site class and mapped MCE_R spectral response acceleration parameters) in selecting the Seismic Design Category (ranging from A through F).

The soil properties (e.g., shear wave velocity) at or around the Facility are used to determine the Site Class for seismic design. The current version of ASCE (ASCE 7-22) classifies Site Class as either A, B, BC, C, CD, D, DE, E or F. The latest version of API Standard 650 *Welded Steel Tanks for Oil Storage* (13th Edition) classifies Site Class as either A, B, C, D, E or F. It is recommended that the basis for the Site Class selection (e.g., default, geotechnical report) be provided in the Tank Assessment Report.

3.5.3 Calculating Wind Forces

Another design factor to consider is the stability of the tank or the resistance to the overturning load and shear forces caused by wind. If applicable, the Tank Assessment Report must include the procedure for determining design wind loads and include wind design parameters (such as wind velocity and wind pressure) that are used for the wind load determination method and calculations. Different design standards (e.g., API 650 or ASCE 7) provide these parameters. In addition, many city municipalities (e.g., building departments) have posted design wind speeds for various risk categories and exposure categories. For instance, the City of Fontana Building and Safety department indicated they are in a "special wind region" and provide local parameters for use. Using local building department wind parameters when available is preferable to wind speed maps based on regional climate data. Local meteorological data, if representative, may be considered. Regardless, the Tank Assessment Report must identify the source of the wind parameters.

ASCE 7-22 identifies Wind Exposure categories A, B, C, and D related to the surface roughness and channeling conditions corresponding to heights of nearby residences, city buildings, open land, shorelines, etc. The Tank Assessment Report must provide the rationale and basis for the Wind Exposure category selected (A through D), if used.

3.6 Minimum Shell Thickness

The Tank Assessment Report must provide the design minimum shell thickness. The minimum shell thickness is dependent on the tank dimensions, configuration, properties of the contents, and loading conditions. The Tank Assessment Report must include the calculation of the design minimum shell thickness taking into consideration anticipated loading conditions and combinations during operation including, but not limited to, pressure due to fluid static head, internal and external pressures, wind loads, seismic loads, and corrosion allowances as applicable. If industry standards are used to establish the minimum shell thickness, the Tank Assessment Report must provide the reference for the industry standard.

For previously constructed tanks, the Tank Assessment Report must also evaluate the design minimum thickness compared to the current shell thickness of the tank (see Section 3.5) to assess its continued minimum thickness compliance. However, meaningful design minimum shell

thicknesses are difficult to obtain on plastic tanks (e.g., polyethylene, fiberglass-reinforced plastic). Therefore, the Tank Assessment Report must evaluate the integrity of the shell of plastic tanks by other means such as evaluation for cracking, resin layer erosion, delamination, chemical degradation, brittleness, swelling, softening, and seam or joint failure.

3.7 Foundation Design

The foundation for a tank must be designed and constructed to provide a stable support and limit settlement. The Tank Assessment Report must present the foundation specifications such as materials of construction, thickness, and structural strength to show that the foundation is adequately designed (Cal. Code Regs., tit. 22, § 66264.191(a), Cal. Code Regs., tit. 22, § 66264.192(a) & (b)). The foundation must have sufficient strength to maintain the loads, such as the weight of full tanks and structural supports (see Section 3.8). Additionally, the design should consider how tank systems will withstand the effects of frost heave, if applicable.

Site subsurface conditions are critical parameters for foundation design. The subsurface soil type and characteristics must be known to estimate the soil bearing capacity, settlement that will be experienced, and seismic site classification. Typically, this information is obtained through a geotechnical investigation (e.g., Cone Penetration Testing, exploratory borings) at the facility and subsequent laboratory analysis (e.g., moisture content, density, consolidation, direct shear, expansion). Sometimes this data may be obtained as part of Corrective Action at or nearby the Facility. Alternatively, the California Geological Survey or the local municipality building department may govern soil design properties for their jurisdiction. References must be provided for all soil design properties, such as bearing capacity, used in the Tank Assessment Report. Any improvements to the site soil conditions (e.g., removal and replacement with fill material, compaction, grading, stabilization, concrete, or gravel ringwall, etc.) must be designed and documented in the Tank Assessment Report if the changes affect the tank foundation.

The structural design of any foundations must be provided for review. Included in this design should be calculations for tank anchorage and an indication of how the anchorage is tied into the foundation elements (See Section 3.8). In the event historical records regarding the design and installation of the foundation are not available, the certifying engineer must still evaluate the adequacy of the foundation. At a minimum, the certifying engineer shall provide the rationale for their conclusion.

3.8 Tank Structural Supports and Anchorage

The Tank Assessment Report must show that all tank supports are adequately designed (Cal. Code Regs., tit. 22, § 66264.191(a), Cal. Code Regs., tit. 22, § 66264.192(a) & (b)). Calculations must be provided to demonstrate that the structural supports have sufficient strength and stiffness to resist the anticipated loads[3]. The tank support design may also include a foundation analysis e.g., to ensure footings for saddles can withstand the load without settling. The Tank Assessment

[3] Note: Several companies provide tank and anchor design software solutions. If used, be sure to provide the calculations or formulas, inputs, and outputs in the Tank Assessment Report.

Report must also provide design information about the tank's structural supports (if applicable) and anchorage system. Design information includes the type and configuration of the supports, such as cradles, saddles, skids, racks, beams, legs, and similar structures designed to elevate the tank above the ground as well as the anchor and plate details such as their size, type, and count.

Design of tank anchor systems are also critical for seismic and wind loads. For instance, anchor bolts are designed to resist overturning, uplifting, and sliding forces; therefore, the Tank Assessment Report must describe any mechanical anchors such as anchor bolts, straps, or other devices to anchor the tank to the foundation and provide their design calculations. If applicable, the Tank Assessment Report should also include design considerations to ensure that tank system will be connected or anchored to the foundation to prevent flotation or dislodgement where the tank system is placed in a saturated zone or is located within a seismic fault zone subject to Cal. Code Regs., tit. 22, § 66264.18(a). If this requirement is not applicable, the Tank Assessment Report should state why it is not applicable.

Tanks at grade are permitted to be designed without anchors where they meet the requirements for self-anchored tanks in industry standards and shown to resist overturning forces.

3.9 Seams, Connections, and Pressure Controls

The Tank Assessment Report for existing tanks must show that any tank seams and pressure controls are adequately designed (Cal. Code Regs., tit. 22, § 66264.191(a)). The Tank Assessment Report for new tanks must show that any seams, pressure controls, *and* connections are adequately designed (Cal. Code Regs., tit. 22, § 66264.192(b)).

Most tank seams are welded; however, some tanks may have riveted or bolted seams. Seam design criteria for seams are provided by various industry associations such as API, ASME, and the American Institute of Steel Construction, Inc. (AISC). The integrity of the joint must be discussed. For example, a bolted seam must detail how the joints are sealed, the effects of vibration on the bolt, comparing the axial tension strength and applied axial loads, bolt corrosion protection etc.

Tank connections consist of, but are not limited to, manholes, nozzles, piping and hose connections, sampling ports or drawdown ports, gauging ports in the roof to gauge liquid levels, vents, etc. Design criteria for connections are provided in various industry standards such as API 650 and ASME-VIII. If connections are present, seismic displacement should also be considered in the Tank Assessment Report.

Tanks operated above atmospheric pressure will have pressure controls such as pressure vacuum valves and pressure relief devices. The internal vapor pressure must be maintained below the tank's design pressure, which is the maximum allowable working pressure of a tank. Design criteria for pressure control systems are provided in various industry standards such as NFPA 30 *Flammable and Combustible Liquids Code*, API 2000 *Venting Atmospheric and Low-Pressure Storage Tanks and* API 620 *Design and Construction of Large, Low-Pressure Storage Tanks*.

If no seams, pressure controls, and/or connections (for new tanks) are present, the Tank Assessment Report must include a statement indicating as such. If seams, pressure controls, and/or connections (for new tanks) are present, then the Tank Assessment Reports must show that they are adequately designed.

3.10 Tank Contents

The Tank Assessment Report must describe the contents of each tank and the hazardous characteristics of the waste to be handled (Cal. Code Regs., tit. 22, § 66264.191(c)(2), Cal. Code Regs., tit. 22, § 66264.192(b)(2)). U.S. EPA or State hazardous waste codes are not sufficient on their own to identify the hazardous characteristics. The tank assessment should also list properties of the waste that are used in the design of the tank system such as, specific gravity, vapor pressure, operating temperature, ignitability, and reactivity.

3.11 Tank Compatibility with Waste(s)

The Tank Assessment Report must provide information showing that the tank materials and/or liner are compatible with the wastes to be managed (Cal. Code Regs., tit. 22, § 66264.192(b)). Simply stating that the tank materials and/or liner are compatible with the wastes is not sufficient. A justification must be provided by the certifying engineer. This is the sole requirement of the Tank Assessment Report which may be attested to by a California-licensed chemical engineer. All other requirements must be certified by a California-license civil engineer (see Section 3.13).

3.12 Corrosion Protection

The Tank Assessment Report must include information to show that the tank system has corrosion protection to ensure that it will not collapse, rupture, or fail (Cal. Code Regs., tit. 22, § 66264.191(c)(3), Cal. Code Regs., tit. 22, § 66264.192(b)). Factors to consider include the tank and liner materials of construction and compatibility of the wastes to be managed and subsequent need for corrosion protection. Simply stating that corrosion protection is not warranted is not sufficient and a justification must be provided.

Additionally, Cal. Code Regs., tit. 22, § 66264.192(b)(3) states the Tank Assessment Report shall include, for any "new tank system or components in which the external shell of a metal tank or any external metal components of the tank system will be in contact with the soil or with water [emphasis added], a determination by a corrosion expert of the following: (A) factors affecting the potential for corrosion … and (B) the type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or component …". Cal. Code Regs., tit. 22, § 66260.10 defines "corrosion expert" as:

> A person who, by reason of that person's knowledge of the physical sciences and the principles of engineering and mathematics, acquired by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. Such a person must be certified as being qualified by NACE or be a registered professional engineer who has

certification or licensing that includes education and experience in corrosion control on buried or submerged metal piping systems and metal tanks.

3.13 Tank Assessment Report Certification and Attestation Statements

Cal. Code Regs., tit. 22, § 66264.191(f) and Cal. Code Regs., tit. 22, § 66264.192(b) require "a written assessment reviewed and certified by an independent, qualified, professional engineer registered in California in accordance with Cal. Code Regs., tit. 22, § 66270.11(d) …". The engineer signing the Tank Assessment Report must make the following certification verbatim in accordance with Cal. Code Regs., tit. 22, § 66270.11(d):

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

In addition to the certification statement above, Cal. Code Regs., tit. 22, § 66270.16(a) and Cal. Code Regs., tit. 22, § 66264.191(f) state the Part B permit application for existing tank systems must include a written assessment "attesting that the tanks and containment system are suitably designed to achieve the requirements of this article [Article 10, *Tank Systems*]". Cal. Code Regs., tit. 22, § 66270.16(a) and Cal. Code Regs., tit. 22, § 66264.192(b) state the Part B permit application for new tank systems must include a written assessment "attesting that the tank system has sufficient structural integrity and is acceptable for the transferring, storing and treating of hazardous waste and that the tanks and containment system are suitably designed to achieve the requirements in this article [Article 10, *Tank Systems*]". In both existing and new tank system cases, the certifying engineer must also include a "suitability for service statement" that attests to the tank being in acceptable condition and is suitable for use. These two statements, that is the certification and attestation statements, must be included in the Tank Assessment Report along with the engineer's stamp, license number, date, and signature.

It is the DTSC's interpretation that a "qualified" engineer is one whose license (Title of Practice) allows that individual to engage in the work of assessing whether nor not a tank system meets the operating requirements specified in the applicable regulations.[4] In other words, they must have expertise within the area they are practicing. Civil, structural, and geotechnical registered California professional engineers may sign for the entire assessment. Other registered engineers can sign off only for parts of a tank certification within their specific discipline.

[4] Hazardous Waste Tank System Assessments Certification Requirements, DTSC, date unknown. (This statement was sent by letter from Kim F. Wilhelm, Chief, Statewide Compliance Division, DTSC, to Michael Dorsey, Chief, San Diego County Department of Environmental Health, Hazard Materials Division on October 28, 2005.)

3.13.1 Suitability of Secondary Containment System

Cal. Code Regs., tit. 22, § 66270.16(a) requires a written assessment that attests to the structural integrity and suitability for handling hazardous waste of each tank system, *including the containment system*, as required by Cal. Code Regs., tit. 22, § 66264.191(b) and (f) and Cal. Code Regs., tit. 22, § 66264.192(b). Therefore, the Tank Assessment Report must include a statement from the certifying California Professional Civil Engineer attesting that the containment system is suitably designed to achieve the requirements of Article 10, *Tank Systems*.

Cal. Code Regs., tit. 22, § 66270.16(g) outlines additional details that must be submitted with the Part B application to show the tank system secondary containment meets requirements in Cal. Code Regs., tit. 22, § 66264.193, *Containment and Detection of Releases*. This information may be submitted as part of the Tank Assessment Report or may be a separate report and/or prepared by a different engineer. However, the Tank Assessment Report must, at a minimum, include a statement from the certifying engineer attesting as to the structural integrity and suitability of the containment system for handling hazardous waste.

SECTION 4 FINDINGS

Many Tank Assessment Reports will include a suitability for continued service statement as well as a summary of the tank evaluations performed and the findings. It is the responsibility of the facility owner to address any recommendations or findings provided by the certifying engineer in the Tank Assessment Report. Some tank conditions may require immediate corrective action while others may warrant more frequent inspections or maintenance per the engineer's recommendations. DTSC issuance of a permit or permit renewal will depend on the significance of the engineer's findings.

SECTION 5 FREQUENCY

The facility must submit a written Tank Assessment Report that will be used by DTSC to review and approve or disapprove the acceptability of the tank system design (Cal. Code Regs., tit. 22, § 66270.16(a), Cal. Code Regs., tit. 22, § 66264.191(b) and (f), Cal. Code Regs., tit. 22, § 66264.192(b)). Tank assessments must be included in all permit applications, including permit renewals, for each tank proposed to be permitted even if tank assessments were submitted for earlier permits. There may be instances where surrounding conditions have changed over time e.g., depth to saturated zone, distance to fault zones, earthquake forces or other parameters. The Tank Assessment Report must reflect the current site conditions.

Upper-tier hazardous waste permits are usually issued for 10-year durations; thus, a new tank assessment is required at least every 10 years. A new tank assessment report may be required sooner, however, based on recommendations from the certifying engineer, permit condition requirements, or in the event tank modifications or major repairs warrant one sooner. API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction* provides a definition of major alteration or major repair. Note that repairs to tank systems may also trigger the DTSC

permit modification process. Refer to Cal. Code Regs., tit. 22, § 66270 Appendix I, Classification of Permit Modification, Section G titled "Tanks" for examples of modifications that would require submittal of a permit modification application.

SECTION 6 CONCLUSION

This Guidance is intended to summarize some of the key requirements for Tank Assessment Reports in upper-tiered permit applications. Table 1. *Checklist for Preparing Tank Assessment Reports for New Tanks at Permitted Facilities, and* Table 2. *Checklist for Preparing Tank Assessment Reports for Existing Tanks at Permitted Facilities,* are designed to accompany this Guidance. These checklists may be useful to facility owners and their consultants, but it is not a substitute for reading, understanding, and applying the applicable regulations, building codes, and industry standards. It is the responsibility of each permit applicant and their engineer(s) certifying the tank system(s) to refer to the correct regulations for the exact requirements. Working with your DTSC permitting project manager is recommended to ensure the Tank Assessment Report review process goes smoothly.

Table 1. Checklist for Tank Assessment Reports for New Tanks at Permitted Facilities

This checklist highlights several regulatory requirements and citations for "new" tanks (by regulatory definition) at permitted facilities. This may be useful to facility owners and their consultants, but it is not a substitute for reading, understanding, and applying the applicable tank regulations, building codes, and industry standards.

Facility Name:				
Facility Address:				
Tank Name/Number:				
Guidance Section	*Cal. Code Regs., tit. 22*	*Requirement*	*Criteria Met? Yes, No, or N/A*	*Location/Notes*
3.2 Correct Regulatory Citation (New Tank)	66264.192, 66260.10	Does the tank assessment report refer to the correct regulatory citation(s) for new tanks?		
3.13 Tank Assessment Report Certification	66264.192(b), 66270.11(d), 66270.16(a)	Does the Tank Assessment Report include the independent, qualified professional engineer's stamp, date, and signature? Does it include both the certification statement verbatim and a suitability for service statement?		

3.5 Tank System Sufficient Structural Strength	66264.192(b)	Does the Tank Assessment Report include the loading calculations and demonstrate that each meets its intended performance level (such as dead, live, wind, rain, snow, soil, earthquake, tsunami loads, etc.)? Does the Tank Assessment Report identify methods used for calculating the effects of wind forces and provide the source or rationale for the selection of various input coefficients and factors? Does the Tank Assessment Report identify methods used for seismic considerations and the provide the source or rationale for the selection of various input coefficients and factors?		
3.11 Tank Compatibility with Waste(s)	66264.192(b)	Assessment must provide information indicating that the tank materials/liner materials are compatible with waste(s) to be managed.		
3.6 Minimum Shell Thickness	66264.192(a)	Does the Tank Assessment Report contain the minimum shell thickness required for each tank to ensure sufficient shell strength?		
3.7 Foundation Design	66264.192(a) & (b)	Does the Tank Assessment Report demonstrate the foundation is adequately designed and will maintain the load of a full tank? Does it mention foundation specifications, materials of construction, thickness, structural strength, soil bearing capacity, anchorage tied to foundation elements?		
3.4 Tank Configuration	66260.10	Does the Tank Assessment Report specify the tank configuration (such as aboveground, on-ground, underground, vertical, horizontal, rectangular, double-walled, double bottom, cone bottom, fixed roof, floating roof, etc.)?		

3.8 Tank Structural Supports and Anchorage	66264.192(a) & (b)	Does the Tank Assessment Report provide design details for the tank's structural supports (such as cradles, skids, beams, saddles, racks, legs, etc.) and anchors (anchor bolts, anchor straps, etc.) and show that they are adequate?		
3.9 Ancillary Equipment, Seams, Connections, and Pressure Controls	66264.192(b)	Does the Tank Assessment Report provide a description of and the design standards used for ancillary equipment (such as piping, valves, nozzles, pumps, vents, flanges, fittings, manholes, hose connections, sampling/drawdown ports, etc.), seams, connections, and pressure controls (if applicable)? If none are present, does the tank assessment report include a statement indicating so?		
3.3 Design Standards and References	66264.192(b)	Does the Tank Assessment Report refer to the design standards (e.g., industry standards or building codes) used in the design and construction of the tank and ancillary equipment including edition and/or addendum?		
3.10 Tank Contents	66264.192(b)	Does the Tank Assessment Report identify the specific hazardous waste characteristics of the waste(s) to be handled?		
3.12 Corrosion Protection	66264.192(b)	Does the Tank Assessment Report describe corrosion protection measures for each tank?		

Table 2. Checklist for Tank Assessment Reports for Existing Tanks at Permitted Facilities

This checklist highlights several regulatory requirements and citations for "existing" tanks (by regulatory definition) at permitted facilities. This may be useful to facility owners and their consultants, but it is not a substitute for reading, understanding, and applying the applicable tank regulations, building codes, and industry standards.

Facility Name:				
Facility Address:				
Tank Name/Number:				
Guidance Section	*Cal. Code Regs., tit. 22*	*Requirement*	*Criteria Met? Yes, No, or N/A*	*Location/Notes*
3.2 Correct Regulatory Citation (Existing Tank)	66264.191, 66260.10	Does the tank assessment refer to correct regulatory citation(s) for existing tanks?		
3.13 Tank Assessment Report Certification	66264.191(a), (c) & (f), 66270.11(d), 66270.16 (a)	Does the Tank Assessment Report include the independent, qualified professional engineer's stamp, date, and signature? Does it include both the certification statement verbatim and a suitability for service statement?		

3.5 Tank System Sufficient Structural Strength	66264.191(a) & (c)	Does the Tank Assessment Report include the loading calculations and demonstrate that each meets its intended performance level (such as dead, live, wind, rain, snow, soil, earthquake, tsunami loads, etc.)? Does the Tank Assessment Report identify methods used for calculating the effects of wind forces and provide the source or rationale for the selection of various input coefficients and factors? Does the Tank Assessment Report identify methods used for seismic considerations and the provide the source or rationale for the selection of various input coefficients and factors?		
3.11 Tank Compatibility with Waste(s)	66264.191(c)	Assessment must provide information indicating that the tank materials/liner materials are compatible with waste(s) to be managed.		
3.6 Minimum Shell Thickness	66264.191(a) & (c)	Does the Tank Assessment Report contain the minimum shell thickness required for each tank to ensure sufficient shell strength?		
3.7 Foundation Design	66264.191(a)	Does the Tank Assessment Report demonstrate the foundation is adequately designed and will maintain the load of a full tank? Does it mention foundation specifications, materials of construction, thickness, structural strength, soil bearing capacity, anchorage tied to foundation elements?		

3.4 Tank Configuration	66260.10	Does the Tank Assessment Report specify the tank configuration (such as aboveground, on-ground, underground, vertical, horizontal, rectangular, double-walled, double bottom, cone bottom, fixed roof, floating roof, etc.)?		
3.8 Tank Structural Supports and Anchorage	66264.191(a)	Does the Tank Assessment Report provide design details for the tank's structural supports (such as cradles, skids, beams, saddles, racks, legs, etc.) and anchors (anchor bolts, anchor straps, etc.) and show that they are adequate?		
3.9 Ancillary Equipment, Seams, Connections, and Pressure Controls	66264.191(a)	Does the Tank Assessment Report provide a description of and the design standards used for ancillary equipment (such as piping, valves, nozzles, pumps, vents, flanges, fittings, manholes, hose connections, sampling/drawdown ports, etc.), seams, connections, and pressure controls (if applicable)? If none are present, does the tank assessment report include a statement indicating so?		
3.3 Design Standards and References	66264.191(c)(1)	Does the Tank Assessment Report refer to the design standards (e.g., industry standards or building codes) used in the design and construction of the tank and ancillary equipment including edition and/or addendum?		

3.10 Tank Contents	66264.191(c)(2)	Does the Tank Assessment Report identify the specific hazardous waste characteristics of the waste(s) to be handled?		
3.12 Corrosion Protection	66264.191(c)(3)	Does the Tank Assessment Report describe corrosion protection measures for each tank?		
Age of the Tank System	66264.191(c)(4)	Does the Tank Assessment Report consider the documented age, or estimated age, of the tank system?		
Results of a Leak Test or Other Integrity Examination	66264.191(c)(5)	Does the Tank Assessment Report consider the results of a leak test or other integrity examination that addresses cracks, leaks, corrosion, and erosion?		