New Jersey Department of Environmental Protection

Bureau of Release Prevention

A Guide to Hazardous Substance Storage Capacity

February 28, 2017

Introduction

The Spill Compensation and Control Act (the Spill Act), N.J.S.A. 58:10-23.11a *et seq*., establishes storage capacity as the basis for determining if a facility is major and thus subject to the Spill Act's planning requirements. The "Discharges of Petroleum and Other Hazardous Substances" (DPHS) rules, codified at N.J.A.C. 7:1E, implement these planning requirements and delineate storage capacity.

The purpose of this guidance document is to address how to determine a facility's total aggregate storage capacity pursuant to the DPHS rules. Only containers, structures and equipment containing hazardous substances are addressed in this document. The document also addresses how to calculate a facility's total aggregate hazardous substance storage capacity.

Any remaining questions regarding hazardous substance storage capacity under the provisions of N.J.A.C. 7:1E may be directed to the Bureau of Release Prevention, NJDEP, PO Box, 420, Mail Code 22-03D, Trenton, NJ 08625-0420 or by telephone at (609) 633-0610. Additional guidance on the DPHS rules may also be found on the Bureau's website at http://www.nj.gov/dep/enforcement/dp/dpdown.htm.

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Background

Major Facility Definition

A major facility is defined in the Spill Act. This definition is subsequently expanded and clarified in N.J.A.C. 7:1E-1.6 as a facility with a total, aggregate storage capacity of

- 20,000 gallons or more of hazardous substances other than petroleum products;
- 200,000 gallons or more of all hazardous substances including petroleum products; or
- an equivalent measure for substances not commonly measured by volume, where equivalent measure means:
    - ♦ the total volume, in gallons, of the drum, tote, or other container holding the hazardous substance; or
    - ♦ for hazardous substances not stored in containers, the calculated volume, in gallons of space the substance occupies.

Petroleum, petroleum products, and any substances listed in Appendix A of N.J.A.C. 7:1E, by name or by substance group, are hazardous substances as defined under the Spill Act. A hazardous substance as established under N.J.A.C. 7:1E-1.7 includes solids, liquids, and gases. There are two exceptions: certain size metal solids and gases, designated with an asterisk in Appendix A, are not subject to regulation under this rule. Additionally, petroleum and petroleum products must meet the definition of "liquid" found in N.J.A.C. 7:1E-1.6 to be considered hazardous substances. All hazardous substances stored at a facility are part of the facility's storage capacity, regardless of physical state or type of container used for storage.

Storage Capacity and Exemptions

As defined at N.J.A.C. 7:1E-1.6, "storage capacity" means that capacity which is dedicated to, used for, or intended to be used for storage of hazardous substances of all kinds. This term includes, but is not limited to, above- and underground storage tanks, drums, reservoirs, containers, bins, and the intended or actual use of open land or unenclosed space. This term does not include the capacity of:

- a heating oil tank servicing only the individual private residence at which it is located;
- any underground storage tank (UST) at the facility used solely to store heating oil for on-site consumption;
- any tank or container that is "out-of-service", as per the definition at N.J.A.C. 7:1E-1.6; or
- any container five (5) gallons or less in size.

Questions frequently arise as to whether a particular tank should be considered to be a storage tank and, therefore, part of the facility's storage capacity. In addition, facility personnel often

inquire as to how the storage capacity of a storage tank or other type of container is determined. The storage capacity for tanks, for other containers, and for the entire facility is important because it determines whether a facility is a major facility subject to the requirements of the DPHS rules.

Determining whether a tank is a storage tank or a process tank

Both aboveground tanks and underground tanks can be either storage tanks or process tanks. However, there has been some confusion as to whether usage of a given tank results in it being considered a storage tank or a process tank. Both storage tanks and process tanks are regulated under N.J.A.C. 7:1E, but the requirements are different for the different types of tanks, and only storage tanks are considered as part of a facility's storage capacity.

As defined at N.J.A.C. 7:1E-1.6, a storage tank is "any tank or reservoir which is a container for hazardous substance(s) and which is primarily used for bulk storage". The predominant function of a storage tank is to hold materials. Design of storage tanks is typically based on the chemical and physical characteristics of the contents.

On the other hand, a process tank's predominant function is to transform constituents during a manufacturing process, for example by chemical reaction or physical transformation; design of such tanks is typically specific to the function for which they will be used. Nonetheless, a tank that was designed to be used as a process tank but is actually used as a storage tank is considered to be a storage tank. What a tank is called or how it was designed does not establish whether it is process or storage.

Additionally, during some fraction of the time that a hazardous substance spends in a storage tank, some action that may be deemed processing may take place. For instance, often additives are introduced into petroleum base products in the tank in which the petroleum is stored. One example is the addition of dye to diesel fuel. In spite of that, the mixing in of additives occurs only briefly and the predominant purpose of the tank is for the storage of hazardous substances.

In some cases, it is not immediately apparent whether a tank is a storage tank or a process tank. The function of the structure in question must then be evaluated. If the evaluation establishes that the predominant function of the tank is to hold a hazardous substance, it is a storage tank.

The easiest way to demonstrate the difference between storage tanks and process tanks is with examples. Some common examples of both types of tank follow:

- A tank which is filled and emptied but in which no process (e.g., distillation, reaction, or neutralization) occurs is a storage tank.

- A tank that is located within an area designated as a process area but is used only to hold a hazardous substance is a storage tank. This includes so-called holding tanks of any size that feed into process equipment. Note that the tank designation (such as, Unit 1 Tank or

Process #4) has no bearing on whether the tank is considered to be a storage tank or process tank under these regulations.

- Day tanks may be used to store oil or other hazardous substances; they are usually, but not always, sized so that they feed into a process tank, boiler, or other equipment for at least one day. Day tanks are storage tanks.

- Silos used for the storage of solid hazardous substances are storage tanks.

- Some tanks are primarily used for storage but occasionally may have an additive introduced. For example, red dye may be added to tanks holding diesel fuel. These tanks are storage tanks.

- Mixing and blending tanks used in batch operations are usually process tanks. However, if after blending, the material is held for a significant period of time until the material is later drawn off, the tank could be a storage tank; further evaluation would be necessary. Please consult with the Bureau of Release Prevention if any tank's predominant function is unclear.

- In a continuous-flow mixer, flow rate and mixing gradient are carefully controlled and the contents of the mixer move directly into the next phase of the manufacturing process. This would be considered a process tank; materials are not stored in the tank for any appreciable length of time.

- In the case of emergency generators and stand-by generators that have an attached tank which stores fuel oil for later use, the tanks are storage tanks.

- Tank cars and tank trucks are normally used for transportation, not storage. However, if a tank car or truck is parked and the motive power is detached or removed, then it must be considered a storage tank if it contains a hazardous substance.

- While domestic sewage is exempted from being considered a hazardous substance under the Spill Act, industrial wastewater is not exempted and is, therefore, hazardous if it contains any hazardous substance. Wastewater tanks may be process tanks or storage tanks depending on the usage of the tank. For example, a tank that's purpose is continuous treatment (e.g., neutralization) of wastewater to meet permit limits prior to release is a process tank. On the other hand, a tank used solely for collecting and holding wastewater until it is pumped out and transferred to a treatment facility is a storage tank. In some instances, a tank that contains wastewater may be neither storage nor process, but rather is a part of a secondary containment/diversion system. As always, please consult with the Bureau of Release Prevention if a tank's predominant function is unclear.

- Distillation units and reactors are process tanks.

- Vapor recovery units are process equipment but associated knockout tanks that are intended to hold the condensed vapor are storage tanks unless the condensate is continuously fed back into the system.

- Surge tanks or expansion tanks for refrigeration systems, heating systems, and turbines, that are meant as safety relief features, not for hazardous substance storage, are treated as process equipment under these regulations. An example of an expansion tank is where ammonia leaves the tank and enters the refrigeration unit and on expansion leaves the refrigeration unit and re-enters the tank; ammonia very rarely if ever leaves or enters the closed system.

- Other closed systems, in which a hazardous substance is circulating but neither enters nor leaves the system are also considered to be process equipment.

- The oil within electrical transformers is being used for cooling as a part of the device rather than being stored. Therefore, transformers are regulated as process equipment.

Tanks normally kept empty and used only as spill tanks in the event of a hazardous substance leak are neither storage tanks nor process tanks. They are part of the facility's secondary containment/diversion system and are subject to the requirements for such systems.

While this document addresses the most common uses of tanks for which questions have arisen, it does not address every type of tank or tank usage in existence. Site-specific situations may arise where it is initially unclear as to whether a tank is considered to be a storage tank or a process tank. In that case, please contact the Bureau of Release Prevention with a detailed description of how the tank is being used and a determination as to the tank status will be made.

Underground storage tanks

The Spill Act specifically cites buried storage capacity in the definition of "major facility". Since N.J.A.C. 7:14B regulates USTs, N.J.A.C. 7:1E-2.2(b) simply cites these rules for requirements applicable to USTs. Although they are not specifically regulated under N.J.A.C. 7:1E, USTs are counted as storage capacity because the Spill Act does not entirely exempt them from regulation. Certain types of underground storage are expressly exempted under the Spill Act; specifically, storage of heating oil solely for onsite consumption does not count toward the aggregate storage capacity of the facility. Again, any UST that is not exempted from the definition of storage capacity and that contains a hazardous substance must be considered when determining the facility's storage capacity.

Drum, tote, and other container storage

As with storage tanks, the capacity of an individual drum, tote, or other container is the volume of that entire container. This means, for example, that the storage capacity of a 55-gallon drum is 55 gallons, whether it is full or not.

For non-rigid containers or for containers where the capacity is not commonly measured in gallons, the volume for that container is determined using standard geometry. An example of this type of container is a five-pound bag of sodium hydroxide pellets. The volume of a gas cylinder can also be determined in this manner. Determine the volume in cubic feet, then multiply this volume in cubic feet by 7.48 to obtain the volume in gallons for that container.

For groups of non-rigid containers, such as numerous bags on a pallet, the aggregate volume for that entire grouping of containers is determined in the same manner using standard geometry. If the volume of all the bags on the pallet is determined in cubic feet, the volume can then be converted to gallons as described above.

The means of determining the aggregate storage capacity of an area used to store a group of containers, such as drums or bags, is discussed later in this document.

Containers of five gallons or less are excluded in the determination of a facility's storage capacity. But if the facility is a major facility based on the aggregate capacity for all other tanks, drums, totes, and containers, the 5-gallon and smaller containers are regulated as part of the major facility.

Occasionally, a facility will have one or more smaller containers holding a hazardous substance packaged within a larger container. For instance, numerous 8-ounce containers of pool chemicals in plastic pouches may be stored together in a plastic pail or several 1-quart containers of motor oil might occupy a single box. The plastic pouches and 1-quart containers are the primary containment and would be excluded when determining the facility's storage capacity and major facility status.

A frequent question concerns whether staging areas for drums and other containers are part of the storage capacity. Staging areas where the containers are removed from their designated storage locations and moved to a loading/unloading bay or dock for *no more than* an 8-hour period are not counted towards the facility's storage capacity.

Storage for hazardous substances not in containers

The storage of hazardous substances outside of containers is not common. However, when hazardous substances are present on site but not stored in containers, the storage capacity is the volume of space the substance occupies. The storage capacity is calculated by measuring the dimensions of the hazardous substance mound and determining the volume of the mound. This method of determining the storage capacity is consistent with the N.J.A.C. 7:1E-1.6 definitions of "equivalent measure" and "major facility." The weight and density of the hazardous substance in question are not used in determining the storage capacity.

Determining storage capacity

A facility could have a wide assortment of hazardous substances in a variety of different sized

containers and be a major facility with a storage capacity of 20,000 gallons or more of non-petroleum hazardous substances or of 200,000 gallons or more of all types of hazardous substances including petroleum. For the purpose of the DPHS rules, the storage capacity is calculated in gallons. The means of determining the aggregate storage capacity of an area used to store a group of containers, such as drums or bags, is discussed below. The total, aggregate storage capacity of a facility is the sum of the capacities of all storage tanks, drums, totes, and other containers, or groups of containers, as well as the storage capacity of hazardous substances not in containers. Thus, the hazardous substance storage capacity of each aboveground storage tank, underground storage tank, container storage area for liquids, container storage area for solids, container storage area for gases, and any storage area for a hazardous substance that is not in a container must be added together to obtain a total, aggregate storage capacity for the entire facility.

- Tank storage capacity

  For a storage tank, the storage capacity is the total volumetric design capacity of the tank. For instance, if the only hazardous substance at a site is 10,000 gallons of hydrochloric acid stored in a 25,000-gallon tank, the storage capacity both of the tank and of the entire facility is 25,000 gallons.

  Changing the setting at which the high level alarm is triggered does not alter the storage capacity.

  If a tank itself undergoes a structural modification that increases or decreases the volume that it is physically able to hold, the storage capacity also changes. For instance, reducing the shell height reduces the storage capacity.

  In a multi-compartment storage tank, each compartment is counted separately. If one of the compartments is permanently designated for the storage of a non-hazardous substance, then that compartment is not counted towards the facility's hazardous substance storage capacity.

  The diesel tank of any emergency generator, as well as any other storage associated with the generator, counts towards the storage capacity of the facility.

  If the contents of a storage tank may change on a frequent basis, sometimes hazardous and sometimes non-hazardous, the tank is considered to be a hazardous substance storage tank and is counted as part of the facility storage capacity.

  Any tank that is "out-of-service" as per the definition at N.J.A.C. 7:1E-1.6 is not counted towards a facility's storage capacity. This is discussed in more detail later in this document.

  If a tank is intended to be used for the storage of a hazardous substance and is in a physical condition to be used for storage, it is part of the facility's storage capacity. Therefore, a tank that is empty but not "out-of-service" is considered to be a storage tank

and part of the storage capacity. For example, a newly constructed tank having all necessary permits that is intended to be used to store #2 fuel oil, and with all connections in place and initial integrity testing completed as required by N.J.A.C. 7:1E-2.16(b), could be filled immediately and, therefore, is part of the facility's storage capacity.

- Drum, tote, and other container storage capacity

  There has been some difficulty at facilities that store large quantities of substances in drums, such as in warehouses, as to how to determine the storage capacity for groups of containers. For example, warehouse owners are sometimes unsure as to whether the entire warehouse building, from wall to wall and from floor to ceiling, is their capacity or if another standard applies. The following guidelines should be used in determining the storage capacity for groups of containers.

  - If a particular portion of the facility is designated as the hazardous substance storage area and the documented, enforced facility policy is that no hazardous substances are stored elsewhere, only that designated portion of the facility is considered storage capacity. The calculated storage capacity is based on physical limitations (such as, how many drums can be placed on existing storage racks) as well as legal limitations (such as, how many hazardous waste drums can be stored given regulatory requirements on aisle spacing and stack height). This applies not only to warehouses, but also to secondary containment pads and other areas where containers may be stored.

  - If any hazardous substance may be stored anywhere in a warehouse, historical usage is taken into consideration. This is based on the maximum number of containers of hazardous substances on site at any given time over the past several years. Inventory records are requested to support such a determination. If additional inventory is expected to be added within the next few months, this should also be taken into account when determining whether a facility will become a major facility. Also, if inventory records are not available or are incomplete, a conservative estimate, up to the maximum capacity of the warehouse, is used.

Out-of-service

As defined at N.J.A.C. 7:1E-1.6, out-of-service means "any container, pipe, or equipment from which all liquid and sludge has been removed, all connecting lines and piping have been disconnected and blanked off, all valves (except for ventilation valves) have been closed and locked, and on which conspicuous signs have been posted that state that it is out of service and note the date of removal from service".

This definition was adopted in order to clearly establish which storage tanks must be included as storage capacity for major facility determinations pursuant to N.J.A.C. 7:1E-1.6 and to clarify when the Department will consider a storage tank no longer capable of storing hazardous substances. The definition of "storage capacity" utilizes the term "out-of-service" to clearly

indicate when a storage tank or other storage area is no longer considered part of the total storage capacity for the facility, thereby affecting determinations of major facility status.

Nevertheless, in some instances, facility personnel may indicate that they have taken a tank "out-of-service" for an unspecified period of time but with no intention of permanently removing the tank from the facility's hazardous substance storage capacity. The tank has been fully emptied (i.e., no residual left in the tank) and lock out/tag out has been performed in accordance with Occupational Safety and Health Administration (OSHA) requirements, but lines and piping have not been removed. Written records document the status of the tank. This tank is not "out of service" per the definition. Such a tank still counts toward the hazardous substance storage capacity.

An empty, but not out of service, storage tank at a major facility, must continue to undergo testing pursuant to N.J.A.C. 7:1E-2.16; it can be used for the storage of hazardous substances at any time. A tank that still contains any quantity of hazardous substance must also continue to undergo all required testing and inspections. See the document "A Guide to the Inspection and Testing of Aboveground Storage Tanks" for more information on tank testing and inspections.

When a tank is permanently taken out of service such that it is no longer considered as part of the facility's storage capacity, all requirements of the definition of "out-of-service" found at N.J.A.C. 7:1E-1.6 must be met including emptying the tank, disconnecting and blanking lines and piping, closing and locking valves, and posting signs on the tank itself. Any tank that has not been taken out of service in a manner that meets the regulatory definition will be considered as part of the facility's storage capacity.

Examples of storage capacity calculations

In each of the following examples, a facility has the stated storage on site.

Example 1

5,000 gallon aboveground storage tank containing hydrochloric acid;
10,000 gallon underground storage tank of gasoline;
2,000 gallons of chlorine gas in one ton containers;
5,000 gallons of sodium hydroxide pellets in sacks; and
12,000 gallons of assorted non-petroleum hazardous substances in totes;

This facility has a total storage capacity of 10,000 gallons of petroleum and 24,000 gallons of non-petroleum hazardous substances. This is a major facility because the storage capacity is 20,000 gallons or more of non-petroleum hazardous substances.

Example 2

155,000 gallon aboveground storage tank containing gasoline;
5,000 gallons of antifreeze (containing ethylene glycol) in totes; and
capacity for 100 55-gallon drums of motor oil.

This facility has a total storage capacity of 165,500 gallons of which 160,500 gallons is petroleum and 5,000 gallons are non-petroleum hazardous substances. There are no other hazardous substance storage areas. This is not a major facility because the storage capacity is less than 20,000 gallons of non-petroleum hazardous substances and less than 200,000 gallons of all types of hazardous substances, including petroleum.

Example 3

5,000 gallon aboveground storage tank of an arsenic compound; and
250,000 gallon aboveground storage tank containing #2 fuel oil.

This facility has a total storage capacity 255,000 gallons of which 250,000 gallons is petroleum and 5,000 gallons are non-petroleum hazardous substances. It is a major facility because it has a storage capacity of 200,000 gallons or more of all types of hazardous substances, including petroleum.

Example 4

300,000 gallon aboveground storage tank containing 150,000 gallons of jet fuel.

This facility has a total storage capacity of 300,000 gallons of petroleum. It is a major facility because it has a storage capacity of 200,000 gallons or more of all types of hazardous substances, including petroleum.

Examples of storage capacity calculations

Example 5

A warehouse with a recent history of storing up to 1000 drums of assorted non-petroleum hazardous substances.

This facility has a total storage capacity of 55,000 gallons of non-petroleum hazardous substances and is a major facility because it has a storage capacity of 20,000 gallons or more of non-petroleum hazardous substances.

Example 6

190,000 gallon aboveground storage tank of #2 fuel oil; and
15,000 gallons of ethylene glycol in drums

The facility has a total storage capacity of 205,000 gallons of hazardous substance including petroleum products and is a major facility because it has a storage capacity of 200,000 gallons or more of all types of hazardous substances, including petroleum.

Example 7

250,000 gallon aboveground storage tank that has been removed from service as per the definition of "out-of-service"; and
1,600 cubic feet of sodium hydroxide pellets in sacks

The facility has a total storage capacity of 11,968 gallons of all types of hazardous substances; 1,600 cubic feet is equivalent to 11,968 gallons, and the tank is not part of the storage capacity because it is out of service. The facility is not a major facility because it has a total storage capacity of less than 20,000 gallons of non-petroleum hazardous substances and less than 200,000 gallons of all types of hazardous substances, including petroleum.

Example 8

A facility stores ten ISO containers containing hazardous substances on-site. Each ISO container has a capacity of 6,000 gallons. Five of the ten ISO containers are attached to tank trucks which will be leaving the site within a few hours and the rest are stored in a designated storage area on-site.

The facility has a total storage capacity of 30,000 gallons. Only the five ISO containers stored in the storage area on-site, count towards storage capacity. The remaining five ISO container tanks, which are still connected to the trucks, are not counted towards the storage capacity of the facility because they are connected to motive power and will only remain on-site for a few hours.