Emergency Response Information

For all products, call CHEMTREC at 1-800-424-9300.

Storage and Handling Guide *for*

Curfew® (same as Telone II)

Telone® II

Telone® II CA

Telone® C-17

Telone® C-17 CA

Telone® C-35

Telone® C-35 CA

Telone® EC

InLine®

Storage and Handling Guide

for Telone® and InLine® Fumigants

To obtain additional copies of this Guide or other information about Telone® and InLine® fumigants, go online at teleosagsolutions.com or contact your Teleos Ag Solutions Telone® Specialist.

INTRODUCTION

This Guide is intended for use in the United States of America. Consult Teleos Ag Solutions for guidance in other countries. This Guide includes information about the following fumigants:

- Curfew®
- Telone® II
- Telone® II CA
- Telone® EC
- Telone® C-17
- Telone® C-17 CA
- Telone® C-35
- Telone® C-35 CA
- InLine®

This Bulk Storage and Handling Guide is part of the continuing Product Stewardship Program initiatives of Teleos Ag Solutions. The Guide describes practices and equipment believed to be suitable for handling Teleos' products as noted. This Guide also includes the Teleos' requirements for new bulk systems and explains how to improve existing ones.

This Guide is not intended as, and should not be used as, a substitute for engineering or legal advice. Applicable legislation and regulations are constantly changing. Future regulatory and judicial developments may necessitate changes in the guidelines and procedures recommended in this Guide. Each user or handler of bulk products is responsible for compliance with all applicable federal, state, and local laws, regulations, and codes. Each user or handler of products is responsible to always read and follow product label directions.

For more information, contact your local government agencies responsible for regulating the operations in question.

To obtain additional copies of this Guide, call your Teleos Ag Solutions Telone® Specialist.

Stewardship Guide

Product stewardship information is included in a separate document, the *Stewardship Guide* for Telone®, Curfew® and InLine® fumigants. The Stewardship Guide includes:

- Product Information, including:
  - Physical properties (e.g. product density, flash point, etc.)
  - Material Compatibility (i.e. product compatibility charts)
- Personal Safety, including:
  - Precautions, Education, Hygiene, and Protective Procedures
  - Personal Protective Equipment
  - Exposure Symptoms, First Aid, and Note to Physician
  - Safety Equipment Suppliers
- Environmental & Emergency Information, including
  - Environmental Fate and Wildlife Toxicity
  - Fire, Spills, and Clean-Up
  - CERCLA RQs, SARA Listing, & FIFRA Reporting

Transportation Guide

Transportation requirements information is included in a separate document, the *Transportation Requirements* for Telone®, Curfew® and InLine® fumigants. The transportation guide includes:

- Selecting Transport Equipment, including
  - Selecting Cargo Tanks (Trucks) and Railcars
  - Selecting Cylinders & Mini-bulks
- Placard and Label Requirements, including
  - Cargo Tank Vehicles (Trucks) Placarding
  - Cylinder and IBC Labeling & Repackaging Requirements

To obtain additional copies of this Guide, call your Teleos Ag Solutions Telone® Specialist.

BULK EQUIPMENT AND PROCEDURES

General Bulk Site Issues and Best Practices

Contact Teleos Ag Solutions before establishing or expanding a bulk facility. No Telone®, Curfew® or InLine® product will be delivered to a site until the facility has been approved by a Teleos Ag Solutions technical representative. Planning, design, and installation of a new site may take several months to a full year.

Prior to establishing a bulk facility, the owner or operator must obtain all required permits and comply with all applicable laws and regulations governing the storage of bulk pesticides. The bulk pesticide facility must meet the Teleos Ag Solutions requirements in addition to federal, state, and local codes, laws, regulations, and ordinances covering such product systems. These include, but are not limited to, those issued by the federal and state Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA).

General Steps for Establishing or Expanding a Bulk Site:

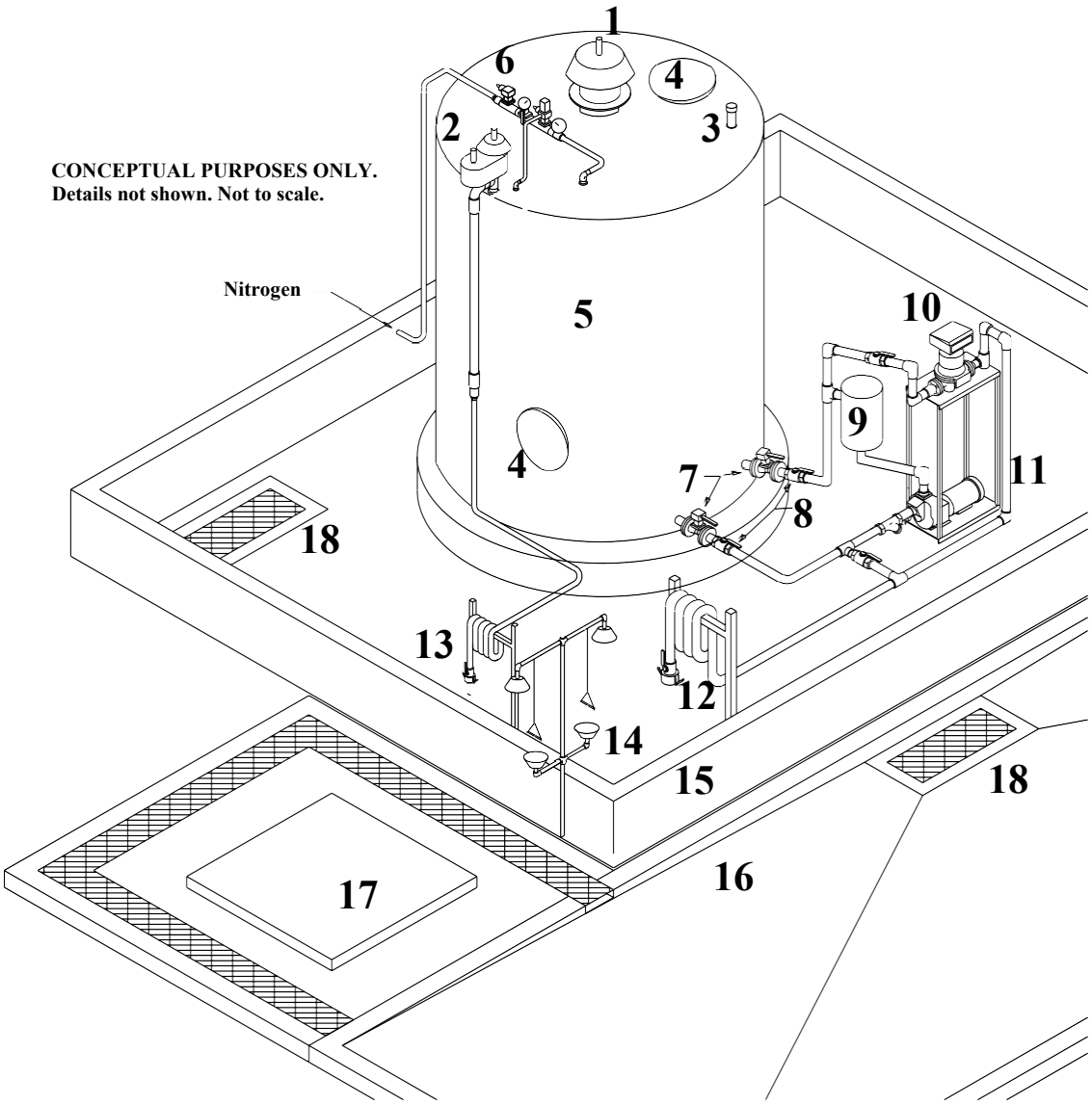
1. Review this manual, the *Stewardship Guide*, and the *Transportation Guide* from Teleos Ag Solutions for these products. Discuss plans and request a Repackaging Agreement (if needed) with Teleos Ag Solutions.
2. Survey property for a tank location. Request a Teleos Ag Solutions representative assess the location before construction starts.
3. Assure that a current, active EPA Establishment Number exists.
4. Register for required permits. Local zoning approval may be required. (Remember to check for air permits.)
5. Locate “code” tank and equipment vendors, and request bids that meet the criteria in this manual, plus any federal, state and local requirements.
6. Share the design plans with Teleos Ag Solutions.
7. When permits are approved, begin site preparation and order the bulk tank and other equipment.
8. Assemble and test the facility.
9. When the facility is complete, Teleos Ag Solutions must inspect and approve the facility prior to first product shipment.

Typical Bulk Site Components

This table and chart are intended as a high-level overview of typical components. Sites may vary significantly in detail, but all will have components that perform similar functions. See appropriate sections of this guide for further details.

	Key Component	Comment
1	Emergency Relief Vent (ERV)	Required by NFPA for flammable and combustible products. Relieves tank pressure in the event of a fire. Must vent outside building for products with less than 200ºF (93.3°C) flash point.
2	Conservation Vent	Conservation vent, also called a Pressure Vacuum Relief Vent (PVRV) relieves tank during normal breathing. Required by NFPA due to product flammability. Must vent outside building for products < 200ºF (93.3°C) flash point.
3	Level Indicator	Some means of indication required; may be manual. Sight tubes are prohibited by EPA after August 2011.
4	Man-Way	Optional access to tank interior enables easier clean–out of tank.
5	Bulk Tank	See "Bulk Tank" section for materials and code requirements.
6	Nitrogen Blanket Regulation System	Used to inert tank head space. Air driers are allowed in certain regions. Source is usually nitrogen in compressed gas bottles.
7	Self-Closing Fire-Safe Valve	Required for flammable products.
8	Locking Ball Valves	Required on tank openings below liquid level.
9	Strainer or Filter	Protects meter or pump. Maintains product quality.
10	Meter	Scale may be used instead for container filling.
11	Centrifugal Pump and Motor	Electrical components must meet local code or NEC #70, including Hazardous Zone rated motor and wiring.
12	Liquid Transfer Connection with Dry Disconnect	Liquid connections must utilize dry disconnects. Confirm size with delivering carrier.
13	Vapor Exchange Line with Connection	Confirm vapor connection with delivering carrier.
14	Safety Shower and Eye-Wash	Required. Must be accessible from work areas. See OSHA requirements.
15	Containment Dike	Required by federal EPA.
16	Load/Unload Pad	Required by federal EPA.
17	Fill Pad and Scale	Container filling may also be within dike or load-pad area.
18	Sumps	Sump areas are required by EPA for new construction. Automatic sump pumps are prohibited.
	Liquid Sample Port	Not shown. The system should have a method of obtaining a sample of the product.
	Headspace Sample Port	Not shown. A method of sampling headspace to verify oxygen content of headspace is recommended.

Typical Bulk Site Components



Complete systems are available from several vendors. See the References section at the end of this document. Equipment and designs used must comply with the requirements of this Guide plus federal, state, and local requirements.

General Bulk Site Requirements

For purposes of this document, the term "bulk" primarily refers to pesticide storage tanks with capacities of 500 gallons or greater that are fixed in place or are portable tanks in place for 30 days or more. There are other bulk storage capacity definitions and requirements pursuant to EPA, NFPA, OSHA, DOT, and specific states regulations for flammable liquid products that would have to be met as well that may or may not be included in this document.

1. Pesticide handling facility and operating procedures comply with all federal, state, and local pesticide handling laws and regulations, including applicable portions of 40 CFR 165.
2. Rain water management complies with state and federal storm water regulations.
3. The tank and any pump, meter, hose, and piping must be located within the dike or containment area.
4. Bulk location has a contingency plan for spills, leaks, fire, and other emergencies.
5. Pesticide handling meets or exceeds the Worker Protection Standard.
6. Current SDSs are available on site to all employees.
7. Protective equipment, spill containment equipment and absorbent must be on site to handle minor spills or releases.
8. Safety equipment storage must be marked by signs that are highly visible from the work sites.
9. An OSHA-compliant emergency eye wash station is located near the bulk area.
10. An OSHA-compliant safety shower is available near the bulk area.
11. Loading and unloading risers are identified by color or markings to identify product and prevent cross-contamination.
12. Proper means of waste disposal are provided where needed for systems operations and cleaning. Clean leaks or spills immediately and properly dispose of clean-up materials. Decontamination should be done by properly protected and knowledgeable people.
13. Keep everyone whose presence is not required away from areas where these products are stored, handled, or loaded.
14. Minimize contamination of work areas, such as mixing or loading sites, rail sidings, and truck floors.
15. Materials used for construction of tanks, screens, strainers, valves, fittings, hoses, meters, pipes, seals, gaskets, and pumps are compatible with products.
16. Telone® soil fumigants are Class 1C flammable products according to National Fire Protection Association (NFPA) and Class IC Group D liquids by National Electric Code (NEC). Keep sources of ignition, including cutting and welding, away from vapors. All electrical transfer or repackaging equipment must meet NEC 70 or local requirements whichever is stricter. In most cases, this requires Class 1, Group D, Div 1 or Div 2 electrical equipment at the fill site. Consult your local code inspector for more information.
17. A valid EPA Establishment Number must exist for each location where the product will be repackaged.
18. Facility must comply with the state fire code, or the NFPA Standards for Flammable and Combustible Liquids Code (NFPA 30) if no state fire code exists.
19. All bulk systems must be bonded and grounded and electrical continuity confirmed **and documented.** Bonding and grounding cables must be used at all product transfer stations.
20. Water sources are protected from back siphoning.
21. Pesticides are not stored in the same area as food, feed, clothing, or animal health products.
22. A security system is in effect at the site. At minimum, this shall include a fence at least 6' tall immediately around the bulk storage location or entire site. Alarms, or a locked building, are recommended.
23. Post conspicuous signs which prohibit smoking within 50 feet of bulk handling area.
24. Assess the storage and fill area to isolate liquid and vapors from possible ignition sources.
25. Fire extinguishing capability deemed appropriate by the responsible local or state authorities and/or by Underwriters' Laboratories (UL) codes must be present. As a minimum, a fire extinguisher rated at 20B must be at each site where these products are stored.
26. Emergency plans for spills, leaks, and other emergencies must be established and exit routes clearly identified.
27. No bulk mixing or loading is done within 150 feet of an unprotected well site. Well sites are identified and comply with state and federal guidelines.
28. Loading personnel, application drivers, transport drivers, persons performing equipment repair, supervisors, and any other individuals working with fumigants must understand the safety recommendations and emergency procedures. Deviations from appropriate safety procedures must be corrected. Safety equipment is to be specified for the job and used until the task is completed and the work area adequately cleaned and cleared.

29. Since these products are flammable, no spark-producing, flame-cutting, or welding operations may be performed on equipment, or in areas around equipment until proper isolation, clearing, and testing with an approved combustible gas meter has established that safe conditions exist. Do not use, pour, or store these products near heat or open flame, and do not cut or weld containers which contained these products.
30. Do not wear shoes equipped with small nails or studs in hazardous locations. They can produce sparks.
31. Avoid entering vessels. If entry must be made, it should be done only under strict procedures established and supervised by knowledgeable personnel experienced and certified in this type of operation.
32. Outdoor facilities are recommended, however, if the bulk tank is indoors, it must comply with all additional requirements for indoor facilities. This includes such items as proper air ventilation, building construction, and electrical wiring prescribed by NFPA 30.
33. Do not transport or store contaminated equipment in closed areas such as vehicles or buildings. Do not decontaminate exposed equipment inside buildings except in areas ventilated especially for such use.
34. Perform product transfers or repackaging with equipment that meets requirements of the National Electric Code. Operations should be done in clean, well-ventilated areas, preferably separated from other operations.

General Bulk Site Recommendations

1. Implement a preventive maintenance program to repair and replace hoses and other equipment as appropriate.
2. Provide lighting around the bulk handling facility bright enough to provide for easy reading of package label information.
3. A fire inspection is conducted annually by an external party such as the local or state fire marshal. Written records of inspections are maintained.
4. The fire department reviews the “Emergency Action Plan” annually.
5. Equipment is free from leaks at seams, couplings, packing glands, valves, points of closure, etc.
6. At the end of the application season, pumps, meters, piping, and dispensing hoses should be prepared properly for the off season.
7. Housekeeping must occur on a routine basis. This includes removal of debris, unneeded equipment, and proper storage of hoses.
8. Single inlet/outlet tanks or tanks with both an inlet and outlet may be used, but separate lines are preferred.

Secondary Containment

Requirements

1. All bulk tanks (500 gallons or greater) must have secondary containment. Containment design must follow state or federal requirements, plus those of NFPA 30 Flammable and Combustible Liquids Code, or those listed below—whichever is more stringent.
2. Containment structures (dikes and load pads) must be compatible with the pesticides stored or transferred. They must be constructed of reinforced concrete, steel or other rigid material. Concrete block walls--reinforced with rebar--which are filled, capped and sealed are permitted, but concrete block or steel systems are not recommended. Natural earthen material, unfired clay and asphalt are prohibited.
3. The structure must be liquid-tight with cracks, seams and joints sealed with chemically resistant materials. The containment must support the gravity load of all full tanks and be able to withstand the potential hydraulic load.
4. Dikes must contain 100% (under roof) or 110% (without roof) of largest tank volume plus displacement for all other storage tanks or be designed to applicable state or federal laws, regulations and codes if more restrictive.
5. The load pad must hold at least 750 gallons, or at least 100 percent of the largest container on the pad up to 750 gallons per EPA by August 2009; or meet state requirements—whichever are more stringent. A rigid, liquid-tight pad must exist for transfer of product between the bulk tank and all delivery trucks, nurse vehicles, refillable containers, application equipment or other containers. Container cleaning must also be done over containment.
6. US EPA requires the tank be elevated or anchored to prevent flotation as of August 2009.
7. US EPA requires operational area containment (e.g. load pads) constructed after November 16, 2006 to be sloped to a collection point or sump. Some states may also require the floor of the dike to be sloped toward a sump.
8. The tank, pump, and meter (if used) must be located within the dike.
9. All outlets or drains in the secondary containment must be permanently plugged and sealed. However, drains to other adjacent containment areas may be permitted.
10. Automatically activated sump pumps are not allowed. Manual controlled pumps may be used. Pumps must be rated for flammable service if product flash point is less than 100°F (37.7°C) .
11. Do not permit other bulk tanks made of combustible materials (polyethylene) in the same containment as tanks containing flammable and combustible liquids. This is an NFPA 30 requirement, and exceptions should be approved by the local authority having jurisdiction.
12. Visually check integrity of the stationary pesticide containers, secondary containment and load pad, including sumps, on a frequency to comply with EPA requirements, including 40 CFR 165.90 to 165.95. In general, this requires monthly documented inspections.
13. Tank-in-tank, or double walled tank designs which incorporate their own secondary containment, are allowed. However, they are discouraged due to difficulty of inspecting the containment integrity. If used, tank-in-tank designs must meet the requirements for emergency venting and leak monitoring indicated in NFPA 30. NFPA also limits tank in tank size to 12,000 gallons or less.
14. Rail site spill containment, drainage systems, or grading shall be present such that a spill of the entire rail car shall not run off the site or expose people, important structures, properties, and environmental features to uncontrolled spilled liquid. Impervious containment is recommended, at least for small spills at point of connection.
15. Visually check integrity of the secondary containment and load pad, including sumps, on a frequency to comply with EPA requirements, including 40 CFR 165.90 to 165.95. In general, this requires monthly documented inspections.

Recommendations

1. A roof over the bulk tank and diked area is recommended to minimize rainwater contamination and the need for proper disposal of this water. A roof over the containment pad is also recommended. If flammable or combustible liquids are present, be sure the design does not constitute an indoor storage facility or building. This would trigger additional NFPA venting and electrical requirements.
2. Contiguous concrete containment between dike and transfer area is recommended.

3. Avoid passing piping through dike walls. However, drains to other containment areas may be permitted to pan through dike walls providing they can be valved off and locked when not in use, if state law permits.
4. The load pad should prevent liquids from seeping into or flowing onto it from adjacent land or structures during a 25 year, 24-hour rainfall event.
5. Spacing of the tank relative to other tanks, dike, and property lines shall follow NFPA 30. In general, there should be no less than 3 feet between the bulk tank and other tanks or the dike wall; 20 feet between the bulk tank and any property line that is or can be built upon; and 5 feet between the bulk tank and the nearest side of any public way or from the nearest important building on the same property.
6. Slope the floor of the dike to a sump large enough to permit withdrawal of liquid in the dike.
7. Avoid trapping liquid between the tank and the dike floor by setting tanks on a raised firm foundation within the dike, such as concrete or ring filled with pea gravel or oiled sand.
8. Use a vendor familiar with industry standard designs and procedures to construct containment.
9. Avoid passing piping through dike walls. Run piping within the dike wall rather than along the top of the wall.
10. Hydrostatically test new containment prior to installing the tank.

Bulk Tank

Bulk Tank Requirements for Telone®, Curfew®, and InLine® Products

1. Underground tanks are not permitted.
2. Stainless steel tanks are preferred for most products. See product specific addendums for acceptable materials of construction.
3. Metal tanks must be of welded construction, designed and built in accordance with good engineering standards.
4. Bottom-loading tanks are recommended. Top-loading tanks must have a dip tube to prevent product free-fall. The dip tube must be supported to suppress vibration and shall incorporate a siphon-breaker (unless top unloading) just below the tank entry point to prevent siphoning from the tank. The lower end of the load dip tube shall be within 6 inches of the tank bottom. This is recommended for all tanks, but required for products with flash point less than 200ºF (93.3°C). This avoids static charging, air entrainment and foaming.
5. Tanks holding products with flash points below 200ºF (93.3°C) must be electrically grounded. (It is *recommended* that *all* tanks be grounded.)
6. Circulation capability is recommended for all tanks for use flexibility, but is required for products as noted the "Bulk Tank Mixing" section of this guide.
7. Tank material of construction must comply with the information in the product-specific Supplements to this Guide. Mild steel or polyethylene tanks are not allowed.

Special Tank Requirements for Products with Flash Point below 200°F (93.3°C)

8. Polyethylene bulk tanks are not allowed due to National Fire Protection Association Code 30 "Flammable and Combustible Liquids Code". Tanks must be welded construction, designed and built in accordance with good engineering standards.
9. If the flash point is less than 110ºF (43.3°C), the tank must be built and marked to a recognized appropriate engineering standard, such as API or UL or other recognized body. As an alternative to a code tank, the owner may provide a letter from a certified Professional Engineer stating that the tank meets the requirements of use, and a letter from the state fire marshal or other authority having jurisdiction approving use.
10. If the selected code is designed for products of specific gravity equal to or less than water, documentation declaring suitability for higher specific gravity products must be obtained. For example, exemptions are available from UL 142 tanks for materials with a specific gravity greater than water if the tank manufacturer submits design calculations and drawings for review by UL. API 650 standards or an approved equivalent may also be used.

Bulk Tank Recommendations

1. Select and install tanks with cleaning, inspection, or repair in mind. Design to minimize heel volume and include an access man-way for cleaning and inspection.
2. If the tank is exposed to sun, paint the bulk tank white to minimize the internal temperature changes that occur. The reduced expansion and contraction of the contents will decrease vapor losses This will also decrease demand for inert gas or dry air, where used.
3. Internal tank linings or coatings (if used) should be selected with caution as stored products may cause deterioration. Contact Teleos Ag Solutions before attempting to use internal tank linings or coatings.
4. Maintain tanks above the product's minimum storage temperature.
5. Cone bottom tanks are recommended where codes permit.
6. Purchase tanks which have openings large enough for attaching emergency vents to assure future flexibility for use of the tank. (Emergency vents are required for products with flash point less than 200°F (93.3°C.)
7. Bulk tanks should have a thorough inspection by knowledgeable professionals as prescribed by the requirements of the code to which it was built. As an alternative, follow guidance in STI SP001-03, Standard for Inspection of In-service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids. STI-SP001-03 is available from the Steel Tank Institute (http://www.steeltank.com)

Bulk Tank Venting, Inerting, and Air Drying

Notes about Tank Breathing, Corrosion, and Vents

Moisture and oxygen in storage tanks will greatly accelerate tank corrosion. The bulk storage tank will "inhale" moisture and oxygen from the atmosphere because of temperature changes of the liquid and whenever the contents are being removed. A dry atmosphere in the tank is vital for long tank life and to maintain product quality.

Carbon steel tanks will corrode as a fairly uniform, rust-like scale. Corrosion will be most severe at the liquid level and in the vapor space. The product may need to be filtered to avoid plugging application equipment.

Stainless steel tanks are subject to grain boundary corrosion in the presence of chlorides. This corrosion may be evidenced by pitting that is small and hard to see, or internal in the metal, and can rapidly lead to small leaks. Therefore, stainless steel does not eliminate the need to maintain an inert or dry atmosphere in the tank head space.

The most common emergency relief vent (ERV) design in use with Telone®, Curfew® and InLine® fumigants is a spring- loaded weight with a gasket. These typically seal well, but cost more than "long bolt" weighted man-ways.

Long bolt systems may not be practical in some cases because a great deal of weight is needed to achieve a full seal, especially on nitrogen padded systems. Weak-roof-to-shell seam designs are permitted outdoors, but not encouraged because they are not self-closing.

Lowest cost systems may not seal well, increasing nitrogen losses or demand on air driers. Work with the device vendor to select an emergency relief design.

Requirements

1. Open vents must not be used. The bulk tank must have a pressure/vacuum relief vent (PVRV) (breathing vent).
2. The tank must have an ERV or equivalent for pressure relief in case of fire. Note that some states require the ERVs on tanks containing flammable or combustible products to have an UL or API certification and be stamped with rated flow capacity.
3. Indoor tanks must comply with state or federal regulations for venting. Most states require inside tanks holding products with flash point less than 200º F must have the vapors from the PVRV and ERV vented to outside the building, and released at least 12 feet above ground level in an area where vapors are not trapped by overhangs or other building structures.
4. Use calculations per NFPA 30 or other appropriate code to determine size and capacity of ERV and PVRV vents. The equipment vendor can assist in sizing and selection.
5. Nitrogen padding is required on all new bulk tanks. This will limit high concentrations of moisture and oxygen in the tank and help maintain product quality.
6. Nitrogen cylinders must be secured at all times, and must be capped during transport. Follow manufacturer's instructions for safe handling. Understand and protect against nitrogen's potential to kill by asphyxiation.

Recommendations

1. Maximize the differential between nitrogen pressure and relief settings to avoid nitrogen loss; i.e. keep nitrogen pressure low and relief setting high. Make sure the PVRV does not exceed the working pressure of the tank, and the ERV is below the test pressure of the tank.
2. Keep a written record of the pressure and vacuum settings, and model numbers of all vent devices.
3. Inspect vents annually to assure gaskets are in good condition, weights are not corroded in place, and the units are free of dirt and debris.
4. Use commercially designed nitrogen pad systems. Pressure will be more constant and controllable.
5. Install a nitrogen low-level alarm.
6. A carbon adsorption system may be used to decrease product vapor emissions.
7. When commissioning a new tank or after maintenance or inspection, check the dew point and oxygen levels to confirm they are within spec (- 40 C Dew Point)

Piping, Hoses and Valves

Requirements

1. No underground piping is allowed.
2. The system must be equipped with vapor exchange capability.
3. Pump, meter, and plumbing to and from the tank must be dedicated to the product.
4. Piping and hoses must be compatible with the product. (See the Material/Product Compatibility section in the Stewardship Guide.)
5. Do not use plastic valves, fittings, or connections on stationary bulk storage tanks or piping systems attached to the tanks.
6. Threaded fittings and valves may continue to be used for existing facilities, provided that Teflon tape, Loctite® 570 or equivalent is used on threaded fittings. Welded and flanged pipe is required for liquid lines. Nitrogen and vapor lines may use threaded pipe.
7. Thread sealants must be compatible with the product. Teflon tape is acceptable for all systems. Blue Silicone caulks are allowed, but must be cured before exposure to product. Medium strength Loctite PST brand thread locker is preferred for stainless steel piping.
8. The hose pressure rating must be above the maximum pump pressure.
9. Each opening below the liquid surface must have (a) a normally closed remotely activated valve; (b) an automatic-closing, heat activated valve; or, (c) another approved device. That valve must be placed as close as possible to the tank wall, and be rated as a fire-tested valve per API607 or other recognized standard.
10. In addition to the automatic valve above, the first control valve next to the tank must be lockable stainless steel.
11. Gaskets used in rigid flanges next to tank must be fire-resistant.
12. Do not use expansion joints unless discussed with Teleos Ag Solutions and a specific situation warrants their use. In such case, a documented preventive maintenance program must be in place to reduce risk of leakage.
13. Piping must be tested for leaks after construction and before being placed in service (150% of maximum pump output pressure). The lines must be free of moisture (- 40 C dewpoint) before use.
14. All handling system components, storage tanks, and transport equipment must be electrically bonded or grounded. Bonding cables must be available at all loading stations.
15. The system must allow a way to obtain a representative product sample. Preferably, a sampling port is installed on the pumping system.
16. Select pipe for 1,3-dichloropropene service based on the following chart:

Material of Construction	Pipe Diameter < 2”	Pipe Diameter > 2”
Carbon Steel	Schedule 80	Schedule 40
Stainless Steel	Schedule 40S	Schedule 10S[1]

[1]No threaded connections are permitted with Schedule 10S pipe.

® Loctite® is a registered trademark of Henkel Corporation.

Recommendations

1. All lines slope to low points which have drains to allow for easy inspection, cleaning, and maintenance.
2. Do not leave piping hydrostatically full. Telone® and InLine® fumigants have a relatively high coefficient of thermal expansion. Rigid piping sections closed at both ends and completely filled with liquid can develop a high hydrostatic pressure. These pressures may cause leaks from packing, gaskets, and seals.
3. Line sizes should be selected based on product flow rate, system design and pump specifications. Normally, 2" diameter liquid lines and 1.5” diameter vapor lines are used to receive bulk deliveries.
4. Hoses with a braided cross-linked polyethylene or nylon liner are preferred. Empty hoses after each use. Flexible corrugated metal hoses of steel, or stainless steel are also satisfactory.
5. All connections, drains, and sample ports should be capped or plugged when not in use.
6. Loading and unloading risers and lines should be identified by color, markings, or mechanical interlocks to identify product and avoid cross contamination.

7. Flange-mounted external fire-safe ball valves equipped with spring return handles and fusible links are preferred over internal tank valves. Many of the internal valves leak around the stem packing. If the packing is tightened enough to stop the leak, the valve may not automatically close. If such valves are used, packing should be replaced regularly.
8. Valve packing should be nylon, Viton®, Teflon®, or braided Teflon. Ball and plug valves have a Teflon seat.

Pumps, Meters and Scales

Requirements

1. Electrical motor switch and wiring meet National Electrical Code requirements where applicable. Electrical installations must comply with Article 500 of the National Electrical Code #70. At a minimum, the area within, and below, the top edge of the dike is considered a Hazardous Zone, as well as the area within 3 feet of where connections are made. The pump motor, scales, wiring, and switches must meet the current National Electrical Code or other codes of the authority having jurisdiction.
2. Meters or scales must meet local, state, and federal regulations concerning weights and measures if used for retail billing.
3. Do not use positive-displacement pumps. Bypass or relief valves may fail to operate properly due to the corrosive nature of these products. Hoses and other components would be subject to over-pressurization and rupture.
4. Internal combustion engines are not allowed for use at fixed installations unless adequate electrical power is not available. Follow specific recommendations in NFPA 30. If a gasoline engine is used, it must have a spark-arresting intake and exhaust. The exhaust must be placed so there will be no heating or impinging of any parts of the transfer system. Regulations also call for safety measures regarding the ignition system, emergency shut-off switch, spill shielding, and vapor intake prevention. The exhaust gases or the exhaust system must not interfere with the operator making the transfer (NFPA 385). Kits to modify conventional gasoline engines are available through most franchised dealers for the engines or motor/pump combinations.
5. Automatic dike sump pumps are prohibited.

Recommendations

1. Size the pump to meet the transfer requirements. Product temperature, viscosity, and specific gravity must be considered when sizing the pump and motor.
2. Do not operate pumps with the discharge line closed (dead head). Add a high temperature shutoff to the pump to protect against unintentional dead head events.
3. Self-priming centrifugal pumps with stainless steel impeller shafts, brass impellers, and double mechanical seals are recommended. Mild steel may be used but will rust and may cause premature seal failure.
4. Meters should be suitable for non-lubricating product service.
5. Elevate the pump within the containment area to avoid submersion in rainwater or spills.

Couplers and Other Equipment

Requirements

1. Use a female (coupler end) Model 1772-D dry-disconnect coupler from OPW/Civacon on the hose used to connect common carrier tank truck for receiving bulk shipments. In most areas of the country this should be a 3" fitting. A few areas use 2" systems. Consult Teleos Ag Solutions before setting up a bulk site.
2. Customers may select other couplers for dispensing from the bulk tank into their own fleets, as long as the coupler meets requirements in the product label and this Guide. All connection points for product transfer must be equipped with dry-disconnect fittings or combinations of equipment and procedures which meet or exceed the performance of a dry disconnect device.
3. Sight gauges on bulk tanks are not permitted by EPA after August 2011. Existing sight gauges may not use glass tubes, and must use a self-closing valve. Alternatives include float level devices, meter readings, ultrasonic level instrument, or other devices which do not allow for cross-contamination.

Recommendations

1. Dry-disconnect maintenance should be done according to manufacturer's instructions and includes visual inspection before each transfer, and replacement of seals if damage is apparent or significant leaking occurs.
2. Replace polyethylene sight gauge tubes at least twice a year. Product exposure will discolor and make polyethylene brittle. Nylon tubing may be used. Do not use Tygon® (PVC) tubing. It will dissolve.
3. Provide protection against overfill of the bulk tank with a high liquid level detection device interlocked with the appropriate pump or valve.
4. A 40-80 mesh strainer placed ahead of the pump is recommended. Strainers may be brass, steel, ductile iron, or cast iron with stainless steel, Monel® alloy, or nylon screens.
5. Strainers, valves, and couplings are rated for a minimum of 150 psig.
6. Use dry-disconnect on all liquid lines, vent lines are not required to be dry-disconnect as there should be no liquid present.
7. If a filter is used, a high volume, low-pressure drop filter placed ahead of the meter is recommended. The housing should be steel or stainless steel. Filter elements should be cotton-wound over a steel or stainless-steel mesh core. Filters should have valve and vent connections for easy draining prior to servicing. Bag elements with Nomex®, nylon, or cotton can also be used. Elements with 150-mesh maximum are recommended.
8. Strainers use a stainless-steel screen ahead of the meter. The mesh size of the screen should be specified by the meter manufacturer, but should not be finer than 40 mesh.

Monel® is a registered trademark of International Nickel Corporation.
Tygon® is a trademark of Norton Company.
Nomex® is a registered trademark of I.E. DuPont Canada.
Viton® and Teflon® are registered trademarks of Dupont Corporation.

Bulk Tank Labeling

Each bulk tank must have the following:

- Product label and booklet combo provided by Teleos Ag Solutions.
- The proper EPA Establishment Number and Net Contents noted on the label.
- NFPA 704 diamond label (on tank, building, or dike area as required by local or state regulation).
- Other tank labels required by federal, state, or local regulations must also be attached.

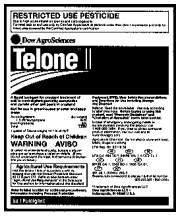
Obtain the product label and NFPA diamond label through the tank label/DOT literature and placards section at www.telone.com, or call your Teleos Ag Solutions Telone® Specialist at 1-800-258-3033.

Bulk Tank Label Instructions

1. Remove old bulk tank labels BEFORE affixing the new bulk tank label to the bulk tank.
2. Affix the product label/booklet combo onto the tank in an easily visible location near the tank outlet.
3. Write the net contents and EPA Establishment Number on the label.
4. Add a NFPA 704 diamond label to the tank, building, or dike area as required by local or state codes.

Example Label

The Teleos Ag Solutions product label / booklet combo incorporates a product booklet and tank label in a single, adhesive backed design.

	EPA Product Label / Booklet Combo	**NFPA Diamond**
Example Only: (Actual documents may vary by product)	 Place near the tank outlet valve.	 Place in a visible area on side of the tank.

Net Contents and EPA Establishment Number

EPA requires that net contents in the tank at the time of last shipment be recorded on the tank. This number need not be changed as product is withdrawn unless required by state law.

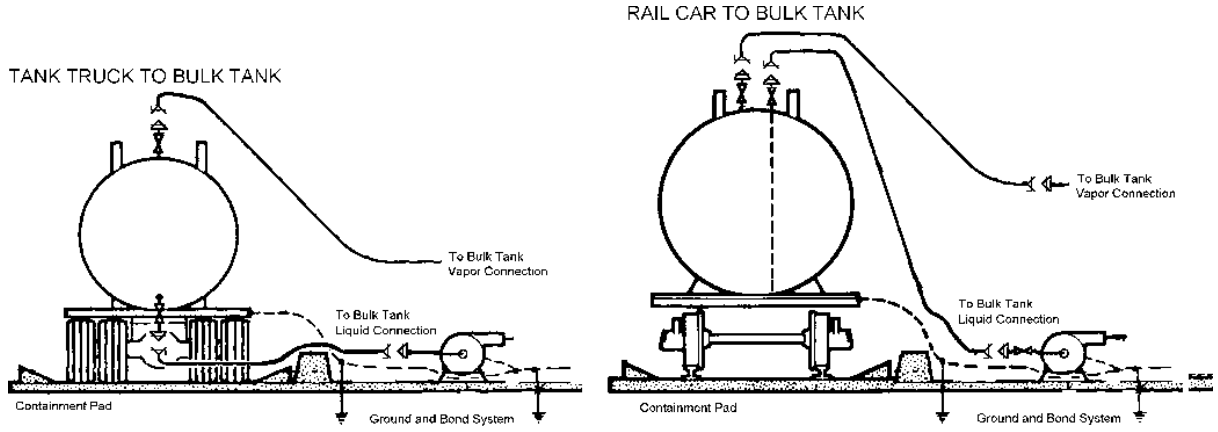
For bulk storage tanks, check or write the EPA Establishment Number of the producing facility (i.e. the Teleos Ag Solutions manufacturing location), on the product label.

For refillable containers (e.g. cylinders, nurse trucks, field storage tanks), write in the EPA Establishment Number of the repacking or refilling facility, on the product label.

Bulk Tank Filling from Truck or Rail

General Requirements for Bulk Tank Filling

1. Transfer procedures must follow the practices by the DOT, CFR 49, Chapter 1, Part 174, Subpart C, 174.67.
2. For truck shipments from Teleos Ag Solutions or its terminals, the driver and at least one qualified employee of the receiver shall be present and attentive to the operation as long as the truck is connected to the system. Rail car unloading requires two qualified and attentive persons to be present.
3. Product from such trucks or from a railcar should be transferred directly into Teleos Ag Solutions approved bulk tanks and is not to be directly loaded into other trucks, cylinders, or other portable containers.
4. Personnel conducting the unloading operation must wear protective clothing as required by the product label. They must understand the safety precautions and know the location and how to use the eye washes, emergency showers, and fire extinguishing equipment.
5. Do not off-load product directly from Teleos Ag Solutions delivery trucks into portable refillable containers (cylinders). Product should be transferred directly into stationary bulk tanks located within a diked area.
6. If the unloading process is suspended, all valves and openings on the delivering container must be securely closed and disconnected from the unloading system.
7. A nitrogen pad is added to the shipment from Teleos Ag Solutions production facilities or terminals. Receiving sites must protect the integrity of this nitrogen pad by vapor exchanging if the receiving bulk tank is nitrogen padded or providing make-up nitrogen to the headspace of the delivering vehicle.
8. Dry disconnects are required on all product transfer hoses for bulk deliveries. See the section on piping and hoses in this Guide for details on style and size.
9. Personnel conducting the transfer operation must wear Personal Protective Equipment (PPE) as specified on the product label. The label specifies PPE requirements for everyone within proximity of transfer activity as well as workers opening or closing valves, hatches, or other closures that could release product liquid or vapor.
10. Permanent truck loading/unloading platforms, ladders, or other fall protection are to be used for any work above ground level.
11. Do not use the truck pump and hose unless specifically approved. Air unloading is strictly prohibited.
12. All product transfers must use connecting hoses, pipes, and/or couplings sufficiently tight to prevent workers or other persons from coming in contact with product.
13. All hoses, piping and tanks used in connection with product shall be rated for the pressure and vacuum conditions to be encountered.



General Procedure for Filling Bulk Tanks from Trucks (Cargo Tanks)

The facility should use the below example to create site-specific procedures. Format and content will vary according to site needs and requirements.

1. Spot the truck on a loading/unloading containment pad. Chock wheels and set brakes. Secure ignition key, or place placard in windshield with notice: DO NOT MOVE TRUCK DURING UNLOADING.
2. Post signs which state NO SMOKING WITHIN 50 FEET along with required traffic barricades.
3. Connect grounding and bonding cables.
4. Inspect the truck, check flanges, piping, and valves for tight seal. Examine the dry disconnect fittings for good condition and good gaskets. Visually check the truck for any other hazards.
5. Verify the contents (material and quantity) by the bill of lading and outlet tag. Inspect for intact seals and record seal numbers.
6. Verify bulk tank has the current label with the EPA Establishment Number corresponding to the location where product was produced. If not, attach the Teleos Ag Solutions supplied bulk tank labels per the Bulk Tank Label Requirements section of this Guide.
7. Check and record the receiving tank contents and initial level. With bill of lading, verify the tank will contain contents of full truck without overflow and the truck unloading line is dedicated and in good condition (no external cracks). Verify that the unloading line is labeled and goes to the proper tank.
8. If a vapor return line is used, connect it to the truck. Open valves in the vapor line between the truck and bulk tank. If the truck supplies its own nitrogen make-up gas supply (or any other system), follow the carrier's procedure.
9. Connect the liquid transfer hose between the truck and the pump suction connection. Open the proper valves on the truck and tank to transfer.
10. Prime and start the pump. Double check the lines, truck, and tank for leaks and proper alignment. If leaks are discovered, stop the operation and repair. During transfer, verify that the bulk tank level is increasing and the vent is functioning.
11. When transfer is complete, elevate the hose and "walk" it toward the pump suction. Pump the hose dry. Close the liquid line valves, starting from the truck toward the bulk tank. Shut down the transfer pump.
12. Disconnect the transfer hose from the truck. Close vapor line valves and disconnect the vapor line.
13. Check that the volume increase in the bulk tank is equal to the billed truck contents.
14. Ensure that transfer lines are not hydrostatically filled with product.
15. Cap or plug all connections on the bulk tank, hose, and truck. Stow the transfer hose.
16. Remove wheel chocks, ground cable, signs, and barricades. Return ignition key or remove windshield placard and release truck for departure.

General Procedure for Filling Bulk Tanks from Tank Cars (Rail)

The facility should use the below example to create site-specific procedures. Format and content will vary according to site needs and requirements.

1. Spot and protect the rail car with derails or switch closure and blue flags or blue lights. Blue flags are required for rail car loading/unloading per DOT or NTA regulations. Chock wheels in both directions and set hand brakes, if applicable.
2. Post signs which state NO SMOKING WITHIN 50 FEET along with required traffic barricades.
3. Connect grounding and bonding cables.
4. Properly position the gangway or loading platform, if present.
5. Inspect the rail car, check flanges, piping, and valves for tight seal. Examine the dry disconnect fittings for good condition and good gaskets. Visually check the rail car for any other hazards.
6. Verify the contents (material and quantity) by the bill of lading and outlet tag or rail car commodity stenciling. Inspect for intact seals and record seal numbers.
7. Verify bulk tank has the current label with the EPA Establishment Number corresponding to the location where product was produced. If not, attach the Teleos Ag Solutions supplied bulk tank labels per the Bulk Tank Label Requirements section of this Guide.
8. Check and record the receiving tank contents and initial level. With bill of lading, verify the tank will contain contents of full rail car without overflow and the rail car unloading line is dedicated and in good condition (no external cracks). Verify that the unloading line is labeled and goes to the proper tank. High liquid level detection should be interlocked to avoid overfilling tanks.
9. If a vapor return line is used, connect it to the rail car. Open valves in the vapor line between the rail car and bulk tank. If vapor exchange is not used, the rail car must be supplied with nitrogen make-up gas supply.
10. Connect the liquid transfer hose between the rail car and the pump suction connection. Open the proper valves on the rail car and tank to transfer.
11. Prime and start the pump. Double check the lines, rail car, and tank for leaks and proper alignment. If leaks are discovered, stop the operation and repair. During transfer, verify that the bulk tank level is increasing and the vent is functioning. Reminder: Rail car unloading requires two qualified persons to be present and attentive during entire transfer.
12. When transfer is complete, elevate the hose and “walk” it toward the pump suction. Pump the hose dry. Close the liquid line valves, starting from the rail car toward the bulk tank. Shut down the transfer pump.
13. Disconnect the transfer hose from the rail car. Close vapor line valves and disconnect the vapor line.
14. Confirm that residual excess pressure is not present in the rail car. A slight (<1 psig) pressure is preferred.
15. Check that the volume increase in the bulk tank is equal to the billed rail car contents.
16. Ensure that transfer lines are not hydrostatically filled with product.
17. Cap or plug all connections on the bulk tank, hose, and rail car. Stow the transfer hose.
18. Make final visual check of rail car valves, rupture disc, safety vents, gauging devices, internal valve rod packing gland, and caps. Gauging devices and thermowell covers must be tightened against O-ring seal. All other plugs and fittings must be tight.
19. Assure placards are in place. If appropriate, reverse DOT placards to show residue on cars that have been unloaded of DOT-regulated products.
20. Raise or clear any loading platform or gangway.
21. Remove derails, blue flags, and chocks. Release hand brakes. Remove ground cable, signs, and barricades.
22. Release rail car for departure.

Bulk Tank Cleaning

Bulk tank cleaning can be done safely, but requires experienced personnel and proper equipment. Teleos Ag Solutions recommends hiring a commercial tank cleaning company.

In-tank cleaning of bulk tanks must be performed only by persons specifically trained according to OSHA guidelines described in 29 CFR 1910.146.

A written cleaning plan that addresses, but is not limited to, the following considerations should be created.

- Telone® II and Telone® C-17 are typically flammable in air. Methods to control ignition sources and/or flammable vapor levels during all steps. These may include ventilation, water flooding, non-spark producing tools, and checking of atmospheric vapors with an explosimeter or oxygen sensor.
- Telone®, Curfew® and InLine® fumigants are considered moderately toxic when exposures are acute. Adequate measures must be taken to protect personnel from excessive exposure by vapor inhalation and skin contact. Compliance with PPE requirements of the specimen label is required at all times.
- Written procedures for entering, isolating, and rescue must be in place prior to entry. All tank entry operations must follow OSHA 29 CFR 1910.146. For instance, only personnel, including rescuers, with proper respiratory and PPE, including a harness and safety line, may enter the tank. Another person must attend the safety line and a third person must be within hailing distance.
- Remove as much product as possible prior to start of cleaning. This material may be used for application according to labeled Telone® rates, if state rules allow.
- The plan should include predetermined methods for collection and disposal of any waste (flush material, corrosion products, sludge, etc.)
- The inside of the cleaned tank must be absolutely dry and free of loose scale or solids prior to putting it back into service for Telone® products. Water will react with these products to form acid, which can attack mild or stainless steel.
- Before placing the tank back into service, any fittings removed and electrical service disconnected should be replaced and restored. Also, the tank should be tested and inspected as required by any applicable codes prior to filling the tank.
- If the tank is to be used for other products, EPA required clean out limits for product integrity must be met per PR Notice 96-8. In addition, Teleos Ag Solutions minimum requirements for product integrity must be followed.

TRUCKS AND RAIL CARS

This section applies to trucks and rail cars. Trucks (a.k.a. cargo tanks, tank trucks, nurse trucks) include any tank vehicles with or without motor power, equipped with a mounted cargo tank and used to transport Telone® or InLine® fumigants. This includes tank trucks, nurse tanks, and ISO containers. Certain parts also apply to vehicles carrying non-bulk containers, such as 110-gallon DOT 4BW cylinders.

Caution: Do not use equipment that contains magnesium, zinc, cadmium, aluminum, or alloys of aluminum or magnesium for parts that may come into contact with Telone® products and their vapors when purchasing equipment. Confirm the absence of these metals when equipment is delivered. Study the Material/Product Compatibility section of the *Stewardship Guide for Telone®, Curfew® and InLine® Fumigants* for other material compatibility information.

General Requirements

1. All trucks and rail cars must comply with this Guide, the *Transportation Guide*, and the *Stewardship Guide* for these products.
2. To prevent corrosion, containers must be thoroughly clean internally and externally, free of rust and debris, and dry before use.
3. Equipment and procedures must comply with all applicable DOT regulations, such as *NFPA 385: Tank Vehicles for Flammable and Combustible Liquids*. All other federal, state, and local laws and regulations must also be followed.
4. Trucks must carry, at a minimum, equipment specified by Federal Motor Carrier Safety Regulations specified in 49 CFR 393.95. This includes a fire extinguisher rated at 10 B:C or more; and three bi-directional emergency reflective triangles to be used as warning devices for a stopped vehicle.
5. Regulations require documentation, labeling, marking, placarding, and package/container approval for Telone® and InLine® fumigants. Consult the *Transportation Guide* from Teleos Ag Solutions for information about DOT Proper Shipping Name, labeling, and placarding.
6. The carrier and Teleos Ag Solutions will assure that Telone® II and Telone® C-17 are properly loaded into tanks suitable for transportation from the Teleos Ag Solutions manufacturing or storage facility.
7. The carriers and their drivers have responsibility for safe transport and unloading operations. Respect for the nature of the cargo, knowledge of emergency procedures, and the availability of protective equipment will reduce the chances of injury from an accident or malfunction.
8. Each driver must read the safety and handling information and emergency instructions for the product being transported. Verbal clarification will be made by a responsible Teleos Ag Solutions employee, if requested.
9. Because of incompatibility of Telone® II and Telone® C-17 with other chemicals, such as fertilizers, dedicated use of trucks for Telone® II and Telone® C-17 is recommended.
10. Positive displacement pumps are not to be used.

Safety Equipment On Board Trucks

Trucks must carry, at a minimum, equipment specified by Federal Motor Carrier Safety Regulations specified in 49 CFR 393.95. This includes a fire extinguisher rated at 10 B:C or more; and three bi-directional emergency reflective triangles to be used as warning devices for a stopped vehicle.

It is recommended that each truck carry a safety kit, which includes the following: (However, no person should attempt a clean-up or rescue without proper training and use of personal protective equipment.)

- A half-face respirator, approved for organic vapors, with a new (unused) cartridge or canister for Telone® II or a full-face respirator, approved for organic vapors, with a new (unused) cartridge or canister for Telone® C-17.
- If a full-face respirator is not used, a face shield or safety glasses with brow and temple shields. Do not wear chemical goggles as the only means of protection.
- A portable eye wash bottle (full of potable water or saline wash fluid).
- Chemical resistant gloves and chemical resistant footwear plus socks, such as heavy rubber or neoprene. (Do not use leather items.)
- Coveralls.
- Chemical-resistant apron of rubber, neoprene, or polyethylene.
- Safety and emergency procedures summary printed (on durable stock).
- DOT Emergency Response Guide book.
- Shovel for diverting leaks or spills.

Although practices may vary by site, drivers should be aware that the Teleos Ag Solutions production facilities or terminals may ask them to sign and date statements that they:

- Have read and understand the handling and emergency instructions on the product SDS.
- Have the prescribed safety equipment on board and understand its use and operation.
- Have a copy of the SDS for attachment to the bill of lading, and an Emergency Response Guide Book in the vehicle.

Filling Trucks (Cargo Tank Vehicles)

Filling trucks (a.k.a. tank vehicles, cargo tanks), should be done in accordance with this Guide and *NFPA 385: Tank Vehicles for Flammable and Combustible Liquids*. Tank vehicle design and use must comply with this Guide, the *Transportation Guide*, and the *Stewardship Guide* from Teleos Ag Solutions, the product label and all federal, state, and local laws and regulations.

General Requirements

1. The driver and at least one qualified employee of the facility shall be present and attentive to the operation as long as the truck is connected to the system.
2. Telone® II and Telone® C-17 must be transferred through hoses, pipes, and couplings sufficiently tight to prevent personnel from coming into contact with Telone® II or Telone® C-17.
3. Pumps, hoses, and other fittings on the truck are in good condition. Hoses must have dry-disconnect couplings.
4. Shut-off devices must be installed on the end of all hoses and at all disconnect points, to prevent leakage of Telone products when the transfer is stopped and hose is removed or disconnected.
5. The truck must have a "safety package" as indicated in this Guide.
6. The tank vehicle must be properly labeled for Telone II or Telone C-17 and placarded to meet DOT standards.
7. The tank must be clean and absolutely dry unless the previous product was the same as being filled. Small amounts of water can initiate corrosion.
8. Ensure that no aluminum, magnesium, zinc, cadmium, or alloy containing aluminum or magnesium is present in any part of the system that will contact product. This includes galvanized materials. Plastic tanks are not approved for use with Telone®, Curfew® and InLine® fumigants for transport containers.
9. A bonding cable must be used for loading and unloading trucks.

General Recommendations

1. The driver and at least one qualified employee of the facility shall be present and attentive to the operation as long as the truck is connected to the system. For Teleos Ag Solutions carriers and terminal operations, this is a requirement.
2. The transfer should comply with NFPA 30 sections on transfers. In part, this includes use of a pre-settable shutoff or other positive means to load a predetermined quantity, together with a secondary automatic shutoff control to prevent overfill when bottom loading a truck. This secondary automatic shutoff should prevent further product transfer by interlock with a valve or the transfer pump. (Example: Preset meter and high-level probe with alarm or shut-off.)
3. A means of liquid level detection in addition to overfill protection on the truck is recommended.
4. The truck should be nitrogen padded prior to transfer and a vapor exchange line between the truck and source tank should be used during transfer.

General Procedure for Loading Trucks (Cargo Tanks)

The facility should use the below example to create site-specific procedures. Format and content will vary according to site needs and requirements.

1. Spot the truck on containment which meets the requirements in the containment section of this guide. Shut down the engine, remove the keys, and chock the wheels.
2. Connect the ground or bonding cable. Bond portable tanks to the truck chassis also.
3. Check the area for and remove ignition hazards. Post the area against ignition hazards: NO SMOKING WITHIN 50 FEET.
4. **Don PPE as required by the product label (e.g. respirator, eye protection, gloves…) for all subsequent steps.**
5. Check operation of gauges and overfill protection, if applicable, on the truck and bulk storage tank. Note the bulk tank reading, and calculate the level to be reached when loading is finished.
6. Remove plugs or caps from load connections on the truck. Residue from a previous load may be trapped behind plugs or caps.
7. Connect the liquid line from the pump to the loading connection. Connect the vent to a line leading down and away from work areas, or if receiving vehicle is nitrogen-padded, establish vapor exchange with the bulk tank. Open vent line connections.
8. Set the meter, if used, for the delivery quantity. Align the valves in the pump station for delivery. Open the main valve from the bulk storage tank.
9. Start the pump. Watch for leaks. Start delivery of product by activating the truck's internal valve or meter mechanism. If leaks are detected, shut down the operation for repair.
10. Give constant attention to the truck level. Do not overfill the truck.
11. When filling is complete, shut off the flow at the dry-disconnect, or at the meter, before shutting off the pump. Close the truck tank valve. NOTE: If draining the hose is desired, a preferred method is nitrogen purging via appropriate valving to push the liquid into the receiving truck or back to the source tank.
12. Align the pumping system valves to "off". Shut off the bulk storage tank valve. Close the vent valve.
13. Read and record the gauge readings.
14. Disconnect hoses and plug or cap all openings.
15. Disconnect the grounding or bonding wire.
16. Return the keys to the truck and release the truck for departure.

REFILLABLE CONTAINER (CYLINDER) HANDLING

DOT Transport Regulations

Each shipper and carrier is required to know whether a product is regulated by U.S. Department of Transportation (DOT). If the product is regulated for transport by DOT, each shipper and carrier is required to assure that

- each package is approved,
- the proper shipping papers are prepared,
- packages are marked and labeled appropriately, and
- the vehicle is properly marked or placarded.

The Hazardous Material Shipping Description is listed in section 14, "Transport Information", of the SDS. Because shipping descriptions may change from time to time, refer to the current SDS for each product. Consult the Code of Federal Regulations.

Air and Vessel Shipments: Some DOT regulated products are specifically prohibited from air or vessel shipments. Teleos Ag Solutions recommends avoiding air shipments even where it is allowed. Consult DOT experts and/or the SDS before shipping by air or vessel.

General Requirements

Caution: Do not use equipment that contains magnesium, zinc, cadmium, aluminum, or alloys of aluminum or magnesium for parts that may come into contact with Telone® products and their vapors when purchasing equipment. Confirm the absence of these metals when equipment is delivered. Study the Material / Product Compatibility section of the *Stewardship Guide* for other material compatibility information.

To prevent corrosion, containers must be thoroughly clean internally and externally, free of rust and debris, and dry before use.

Cylinder and mini-bulk design and use must comply with this Guide, the *Transportation Guide*, and the *Stewardship Guide* from Teleos Ag Solutions, the product label and all federal, state, and local laws and regulations.

1. Comply with all federal, state, and local codes, laws, and ordinances including, but not limited to, those issued by the EPA, DOT, and OSHA. Containers must be inspected, tested, and marked to meet regulations as required by DOT. These inspections, tests, marking, and documentation are the responsibility of the mini-bulk owner; however, no shipper may offer any container for transport if it is not in compliance with regulations. (Note: Current DOT rules require DOT 4BW cylinders to be retested within 5 years. Check the date stamp on the cylinder to confirm compliance before filling.)
2. Containers must be either (a) dedicated or (b) thoroughly cleaned prior to refilling according to applicable laws and regulations and this Guide's container cleaning procedures in order to prevent any cross-contamination.
3. Each container should be inspected by the Repackager prior to filling to assure it is clean and free of contaminants (including water). If contaminants are present, the tank must be cleaned in accordance with this Guide's container cleaning procedures.
4. Filling and cleaning of refillable containers must take place on a rigid, liquid-tight containment pad.
5. Containers must be stored within a diked area if required by state or local regulations.
6. A current Teleos Ag Solutions repackaging agreement must be in place, unless the site is 100% custom application.
7. Container repackaging complies with the Teleos Ag Solutions repackaging agreements.
8. Container filling system must be dedicated, or have written rededication procedures in place.
9. Containers must be compatible with the product, and allowed by DOT regulations and NFPA. NFPA #30 prohibits storage of flammable products in large plastic storage or transport tanks.
10. Liquid connections must have couplers which comply with the "Couplers and Other Equipment" section of this guide. In most cases, this will mean use of closed end couplers (dry disconnect or hydraulic couplers). As an

alternative, cylinder liquid connections may consist of equipment and procedures that meet or exceed the performance of a dry disconnect device, such as purging prior to disconnect.

11. Telone® fumigants are heavier than water. Make sure containers are rated for the weight of the product.
12. Only use containers allowed by 49 CFR 173.243, allowing for any Special Provisions as required by DOT, or containers allowed by specific DOT Exemption for Telone® II and Telone® EC.
13. Only use containers allowed by 49 CFR 173.244, allowing for any Special Provisions as required by DOT, or containers allowed by specific DOT Exemption for Telone® C-17, Telone® C-35, Curfew® or InLine®.
14. Bottom filling and unloading is preferred. Top loading is acceptable if a dip tube is used. In either case, the filling or unloading should be done without opening a hatch or port.
15. Use grounding cables during product transfers.
16. Do not allow Telone® vapors or liquids to backflow into nitrogen bottles. If possible, dedicate nitrogen bottles to Telone® use only. Teleos Ag Solutions recommends placing a check valve between the nitrogen regulator and the Telone® container. Instruct users to open nitrogen valve prior to opening nitrogen regulator, and never to empty nitrogen bottles to avoid backflow.

Recommendations

1. DOT 4BW cylinders are the most common choice for containers with less than 1000-pound water capacity. We recommend consulting with Teleos Ag Solutions before using any other container.
2. Each opening has a one-way check valve or a tamper evident device to prevent unauthorized filling. Note that the EPA Pesticide Container and Containment Rule requires this by August 16, 2011 for containers which are not DOT specification cylinders.
3. Outdoor filling of cylinders and IBCs is recommended due to additional safety requirements and costs for indoor filling. Work closely with the local or state fire marshal or inspector before setting up an indoor facility. NFPA 30 requirements for inside filling of Class 1C flammables include which differ from outdoor filling include, but are not limited to:
    - Continuous exhaust ventilation systems must be continuous with at least 1 ft3/min per sq. ft of flow area. An alarm should be in place to signal ventilation failure.
    - Expanded hazard zone for electrical wiring. This will typically mean a more expensive electrical installation.
    - Emergency pump shut off shall be in place in the event of a spill.
    - Requirements for processing buildings to be fire-resistive or noncombustible construction unless building is equipped with a fire control system (e.g. sprinkler, foam)
    - Three-hour fire rated walls and doors at separations of dispensing area from other building areas.
    - Limits on dispensing of Class 1 liquids in cutoff rooms or attached buildings of certain size.

Cylinder and IBC Labeling & Repackaging Requirements

Department of Transportation regulations require documentation, labeling, marking, placarding, and package approvals for regulated materials. In most cases, these requirements will be met by the location filling containers, but anyone who offers for transport or ships regulated product(s) is responsible for compliance.

Refer to the *Transportation Guide* for these products, which is available from Teleos Ag Solutions.

Filling Cylinders and IBCs

A corrosion inhibitor is part of the product formulation. Careless handling of the system (e.g. allowing water to enter) may deplete the inhibitor. Once the inhibitor is consumed, degradation products may form that cancause pitting inside the tanks and eventual tank failure.

Container design and use must comply with this Guide, the *Transportation Guide*, and the *Stewardship Guide* from Teleos Ag Solutions, the product label and all federal, state, and local laws and regulations.

The best way to fill containers is to use a weigh scale system that shuts off flow when the desired target weight is achieved. It is possible to use manual shutoff, but special attention must be given to avoid overfilling. The general procedure outline below assumes a manual shutoff. Site-specific filling procedures must be created.

DO NOT LEAVE THE FILL PROCESS UNATTENDED AT ANY TIME.

1. Establish the target weight. Specific considerations for establishing the target weight should normally include:
    - Whether or not the cylinder contains a product heel, and the volume of the heel (usually 0.5 gallon will remain after cylinders have been emptied in the field).
    - The weight of the nitrogen bottle (for cylinders) and whether it is filled or not.
    - The weight of cylinder attachments (valves, etc.).
    - The weight of the product transfer hose and vapor return line. Hoses should be supported in the same manner during each filling operation.
    - Whether container is being filled to net or gross weight.
2. Place the container on the scale and attach the fill and vapor exchange lines and grounding cable.
3. Open the vapor exchange valve(s) on the container (if applicable) and the fill lines.
4. Open the liquid valves on the fill lines.
5. Start the pump. Watch the scale display and slow the pump flow slightly before the target weight is reached. IMMEDIATELY CLOSE THE FILL VALVES, starting with the fill lines, then the container valve when the target weight is reached. Purge line with nitrogen if so equipped.
6. Close the vapor exchange valves. Remove the fill and vapor lines.
7. Record the gross and net container weights (without lines attached) and the date in a production log. Also include cylinder number, product name, and initials of the operator.

Cylinder and IBC Cleaning

Cleaning containers for Telone®, Curfew or InLine® fumigants can be performed safely if proper procedures and precautions are followed; otherwise, injury and/or property damage may result. Teleos Ag Solutions recommends hiring a commercial tank cleaning company. Contact Teleos Ag Solutions for an outline that can be used in discussions with a tank cleaning company. If the facility will perform cleaning, the facility should use the below information to create site-specific cleaning procedures. Format and content will vary according to site needs and requirements.

Requirements

1. Personnel involved in tank cleaning must be familiar with these products. This includes flammability limits, toxicity, physical properties, and personal protective equipment.
2. Cleaning equipment and PPE must be in working order. Personnel must be instructed in the proper use of this equipment and be informed of the hazards involved with tank cleaning.
3. Do not work alone. Use the "buddy system" during all phases of the tank-cleaning operation.
4. Personal protective equipment as required by the label must be worn.
5. If equipment, such as fans, pumps, or vacuum trucks are used, place them away and upwind from the work area.
6. Do not release large volumes of vapor into the atmosphere. If necessary, consider carbon adsorption of vapors.
7. Vapor concentrations should be continually monitored, and when concentrations approach the flammable range, work must be stopped until vapor concentrations are reduced to a safe level.

At certain concentrations, Telone®, Curfew® and InLine® products are flammable in air. See SDS for flammable ranges but note that the range increases at higher temperatures. Flammable gas detectors are used to check equipment or areas for flammable atmospheres containing Telone®, Curfew® or InLine® fumigants. Often, fire departments will provide this service.

Telone®, Curfew® and InLine® products are considered to be moderately toxic when exposures are acute. Take measures to protect personnel from excessive exposure by vapor inhalation and skin contact.

Welding on DOT containers can only be performed by a certified welder and are governed by DOT rules and regulations.

Make necessary repairs (especially welding) only after the tank is clean and dry. It is essential that the inside of the cleaned tank be absolutely dry and free of loose scale prior to putting it back into service. Water will react with these products to form acid, which can attack mild or stainless steel. Install all valves and fittings, and pad the tank with nitrogen prior to putting the tank back into Telone® service.

Elements of a Cleaning Procedure

Any cleaning procedure should address, but not be limited to, the following elements:

- Warnings and cautions about product flammability and toxicity.
- Equipment and facilities needed.
- External inspection items and considerations.
- Procedures for valve and another appurtenance opening; along with any heel removal.
- Procedures for internal cleaning, including method to fully dry the interior.
- Label removal and exterior painting, if appropriate.
- Reassembly of components, including proper torque of closures.
- Relabeling, if appropriate.
- Waste collection and disposal plans and considerations.
- Documentation of cleaning.

Cylinder and IBC Storage

Cylinder and IBC storage and use must comply with this Guide, the Transportation Guide, and the Stewardship Guide from Teleos Ag Solutions, the product label and all federal, state, and local laws and regulations.

1. Unless other statutory or regulatory requirements conflict, follow requirements of NFPA 30: Flammable and Combustible Liquids Code as you store these products. NFPA 30 addresses, among other things:
   - Design and construction of inside storage areas for flammable liquids. This includes fire ratings of walls and doors, plus electrical requirements.
   - Storage limits such as number of containers per pile, maximum pile height, distance between piles, and maximum total quantity that can be stored indoors.
   - Limits on outdoor storage include: distance from roads, buildings, property lines; maximum containers and volume per pile; maximum distance between piles; grading to divert spills; and protection of the area against trespassers.
2. Store containers on a firm foundation to avoid shifting or sinking.
3. Secure storage areas from entry by animals and unsuspecting or unauthorized individuals.
4. Train employees in the area of product properties and handling. This includes emergency procedures, use of safety equipment including safety showers and eye baths, and personal hygiene requirements.
5. Prepare a written warning and evacuation plan and train employees.
6. Access to safety showers and eye baths are recommended.
7. Keep the local fire department up-to-date on the storage floor plan and the characteristics of each material stored.
8. DO NOT store these products:
   - With food, feeds, drugs, clothing, seeds, fertilizers, or plants;
   - In other than original containers;
   - In containers with aluminum, magnesium, zinc, cadmium, or galvanized parts, or
   - In below-grade areas such as basements or pits.

Refillable Container (Cylinder) Transport

Refillable containers must be secured during transport according to the Federal Motor Carrier Safety Regulations (FMCSR) and DOT requirements.

OPTION A: The vehicle must have sides, sideboards or stakes, and a rear-end gate. These components must be strong and high enough so that the containers will not fall from the vehicle. There should be no opening large enough to allow a container to pass through it.

OPTION B: The motor vehicle shall have at least one tie-down assembly every ten linear feet of lading. Additional tie-downs may be required to meet the load requirements. Tie-downs include chains, cables, steel straps, and webbing material. Tie-downs must have a working load limit 1-1/2 times the weight of the cargo being secured. Check Section 393 of the FMCSR for size and working load limit requirements.

The above requirements apply to all highway operations. This includes common or contract carriers, customer pick-ups, and all truck types: tractors, semi-trailers, full trailers, or pole trailers.

Teleos Ag Solutions prefers a combination of Option A and Option B. Option B alone is permitted in conjunction with blocking or bracing secured to the trailer deck. This will prevent load shifting off the vehicle edge. Examples include timbers or channel iron secured to the deck.

The facility should develop checklists for vehicle loading and securing. Checklist should include, but not necessarily be limited to, identification of person loading, container inspection, vehicle immobilization and inspection, placards and shipping papers, blocking and bracing, load compatibility, post-loading container inspection, and emergency equipment on board.

REFERENCES

Bulk Facility Inspections & Assessments

Retail Facility Checklist. and
Manual for Conducting Retail Bulk Facility Site Environmental and Safety Inspections
American Agronomic Stewardship Alliance (AASA).
Washington, D.C. 20005
(202) 833-4480. Online at http://aginspect.com/

Security Vulnerability Assessment Tool.
Web-based tool for security assessment of retail facility and transportation practices. Sponsored by Agribusiness Security Working Group, comprised of Agricultural Retailers Association (ARA), CropLife America (CLA) and The Fertilizer Institute [TFI]) in cooperation with Asmark Inc.
Online at www.aradc.org
or call ARA at (202) 457-0825

Bulk Facility Planning & Operation

NFPA 30: Flammable and Combustible Liquids Code (~$40)
NFPA 70: National Electric Code (~$60)
National Fire Protection Association
Quincy, MA 02269
(800) 344-3555 www.nfpa.org

Guidelines to Help Ensure a Secure Agribusiness
Report by Ag Retailers Association, CropLife America, and The Fertilizer Institute. Request a copy from one of these organizations.

Environmental Handbook for Fertilizer and Agricultural Dealers (~$75)
Tennessee Valley Authority (TVA)
National Fertilization and Environmental Research Center; Muscle Shoals, AL 35662
(256) 386-2872

Designing Facilities for Pesticide and Fertilization Containment. Publication # *MWPS-37* (~$20)
Midwest Plan Services, Iowa State University
Ames, IA 50011
(515) 294-4337

Bulk System Vendors (List below should not be considered an endorsement. Others may be used.)

Chemical Containers Inc. 2003
Lakes Wales, FL 33859
(800) 346-7867 www.chemicalcontainers.com

FarmChem Corporation
Floyd, IA 50435
(800) 247-1854; www.farmchem.com

Murray Equipment Inc.
Fort Wayne, IN 46808
(800) 348-4753; www.murrayequipment.com

Westheffer Company
Lawrence, KS 66044
(800) 362-3110. www.westheffer.com

Worker Protection

40 CFR Part 170 Worker Protection Standard. Online at Government Printing Office homepage

https://www.ecfr.gov/cgi-bin/text-idx?mc=true&node=pt40.24.170&rgn=div5

More information at EPA website www.epa.gov

Recognition and Management of Pesticide Poisoning.
EPA's Office of Pesticide Programs. Online at
https://www.epa.gov/sites/production/files/2015-01/documents/rmpp_6thed_final_lowresopt.pdf

Emergency Response Information

For all products, call CHEMTREC at 1-800-424-9300.