Department of Licensing and Regulatory Affairs, Bureau of Fire Services, Storage Tank Division

P.O. Box 30033, Lansing, MI 48909 Phone 517-241-8847, Fax 517-332-1428

APPLICATION FOR INSTALLATION OF HYDROGEN STORAGE SYSTEMS

This information is required under Act 207 of the Public Acts of 1941, as amended, being Section 29.5c of the Michigan Compiled Laws Annotated. Any owner who knowingly fails to notify or submits false information shall be subject to a misdemeanor and/or civil penalties not to exceed $200 per violation

INSTRUCTIONS: The item numbers are referenced in the attached typical installation of a Hydrogen Storage Tank. The system must be in compliance with the Storage and Handling of Liquefied and Gaseous Hydrogen (H2) Rules, 2007 AACS R 29.7001 et seq. The manufacturer and part number must be indicated next to the appropriate item. For emergency generator containers please see Part 5 of the FL/CL Rules for additional requirements. Please direct any questions to the Bureau of Fire Services, Storage Tank Division, at 517-241-8847. For detailed instructions, see Page 7.

FACILITY NAME	NEW ASSIGNED CONTAINER NUMBER(S)		**FACILITY ID NUMBER**
FACILITY STREET ADDRESS (P.O. BOX NOT ACCEPTABLE)	CONTACT PERSON, TRAINED		AREA CODE & TELEPHONE NUMBER ( )
CITY	COUNTY	STATE MI	ZIP CODE
OWNER NAME	OWNER ADDRESS		AREA CODE & TELEPHONE NUMBER ( )
CITY	STATE		ZIP CODE
SUBMITTER'S NAME/COMPANY	STREET ADDRESS		AREA CODE & TELEPHONE NUMBER ( )
CITY	STATE		ZIP CODE

SECTION I **The following section applies to container installations of the H2 Rules.**

ITEM	DESCRIPTION	MANUFACTURER & PART NO.	ITEM	DESCRIPTION	MANUFACTURER & PART NO.
1.	**CONTAINER LOCATION:** Section 3-2.2 & Table 3-2.2: To buildings, property lines, roadways, railways, adjacent flammable or combustible liquid and LPG tanks. Away from overhead power lines.		5.	**CONTAINER SUPPORTS/ FOUNDATIONS:** Section 2-1.2: Firm foundation of noncombustible material, substantial supports. Foundation/supports in contact with cryogenic fluid must withstand temperature effects.	
2.	**CONTAINER DESIGN/ CONSTRUCTION:** Section 2-1: Title 49 CFR, and ASME standards; Dimension & capacity. Underground: ASME vacuum jacket; burial depth, Back fill material.		6.	**PIPE SUPPORTS:** Part 2, Section 2-3.1.2: Constructed of non-combustible material. Part 3, Section 2-3.4: Protection from cryogenic exposure.	
3.	**CORROSION PROTECTION:** Section 2-1.2: Container must be protected against corrosion. Section 2-1.8: Composite containers must be protected from UV radiation. Section 5: Underground containers must be protected from corrosion.		7.	**HOSE/PIPING MATERIAL:** Section 2.3: No cast-iron, no aluminum with liquid H_2, protected against corrosion, suitable for pressures & temperatures, supported and protected against corrosion & physical damage, must conform to ASME B31.3 Marked with product and flow direction. Section 2-3.10: Underground must be at proper depth, & vacuum jacketed.	
4.	**COMPRESSOR, GAS PROCESSING EQUIPMENT** Part 2, Section 1-8.1, 2-7.1 & Part 3, Section 1-5.1, 2-9.1: Size of compressor, psig and scf. Listed and approved. Section 2-10 Gauge on each discharge.		8.	**NORMAL VENTS:** Section 2.2: Steel aboveground. Relieve excessive internal pressure. Terminate outdoors. Sign warning not to spray water in vent opening. Vents terminate outdoors.	

(Continued on Page 2)

APPLICATION FOR INSTALLATION OF HYDROGEN STORAGE SYSTEMS

(Continued from Page 1)

ITEM	DESCRIPTION	MANUFACTURER & PART NO.	ITEM	DESCRIPTION	MANUFACTURER & PART NO.
9.	**CONTAINER VALVES:** Part 2, Section 2-4.8 Independent fill line must have backflow check valve as close as practical to container to prevent uncontrolled/accidental release.		15.	**OVERFILL PROTECTION:** Part 3, Section 2-1.8: Approved means to prevent overfill of container.	
10.	**PRESSURE RELIEF:** Section 2-2, 7-2.8: Installed per ASME standards. Arranged to discharge upward & unobstructed. Designed & located to prevent moisture and freezing. Gaseous service shall not have manual relief.		16.	**ANCHORAGE:** Section 2-1.2: Anchorage in areas subject to buoyant forces; each container shall be safeguarded against movement by anchoring or other secure means.	
11.	**AREA MARKING:** Section 6-3.1: Area shall be marked “No Open Flames” “Nonodorized Flammable Gas.” Storage site shall be fenced & posted “Liquefied Hydrogen Flammable Gas No Smoking – No Open Flames,” or according to NFPA 704.		17.	**UNLOADING/LOADING RISER LOCATION:** Section 3-2.3: Fixed piping, between riser & container and master shutoff and check valves. Separation per Table 3-2.2. Section 2-3.8: Backflow check valve at container Section 2-7: Static protection. Section 5-1: ESD in pipe transfer within 10 feet of hose/arm for lines 3 inches or more diameter.	
12.	**FIRE PROTECTION AND IDENTIFICATION:** Part 2, Section 2-5, & Part 3, Section 2-1.3: Container labeled 3-inch letters, "Gaseous Hydrogen-Flammable Gas,” or “Liquefied Hydrogen-Flammable Gas”.		18.	**VACUUM/LIQUID LEVEL MONITORING:** Part 3, Section 2-1.9: Means to indicate vacuum degradation within the vacuum jacket of underground container.	
13.	**PHYSICAL PROTECTION:** Sections 2-1.5 & 2-1.6: Guard posts must be in accordance with section specifications, or other means to protect system from vehicular damage. Section 2-4.3: Protect system against tampering. Section 3-1.9: Aboveground system must be fenced & posted.		19.	**EMERGENCY SHUTOFF VALVES:** Section 2-4: Auto-fire valve located at building where pipe enters, & in piping to equipment. Section 3-2.3: Emergency shutoff. Manually operated in path of egress Part 3, Section 2-2.12: Not between pressure relief and device or containers unless locking type. Section 2-4.4: Auto shutoff in liquid withdrawl line as close as practical to container.	
14.	**VAPORIZER:** Part 3, Section 2-6: Anchored, low temperature shutoff in discharge piping, relief valve on heated vaporizer. Monitor outlet temperatures.		20.	**CANOPY:** Section 4-5: The lowest elevation of the roof or canopy shall not be less than 4 feet (1.8 meters) from the top of the container. Vent(s) extended through the roof or canopy. Constructed to not allow vapors to accumulate under the canopy or roof. Constructed of noncombustible materials.	

APPLICATION FOR INSTALLATION OF HYDROGEN STORAGE SYSTEMS

SECTION II **The following section applies to hydrogen <u>motor vehicle fueling</u>.**

ITEM	DESCRIPTION	MANUFACTURER & PART NO.	ITEM	DESCRIPTION	MANUFACTURER & PART NO.
1.	**TYPE OF DISPENSING STATION**: Attended, unattended, self-service, inside building, marina service station.		7.	**HAZARD ANALYSIS:** Section 7-2: Emergency plan designed by a qualified H_2 engineer.	
2.	**LOCATION OF DISPENSER:** Sections 3-4 & 7-2: Minimum 10 feet from property lines, building, 20 feet from fixed source of ignition, not under power line. Within 100 feet of emergency shutoff switch. In clear view of attendant.		8.	**EMERGENCY BREAKAWAY DEVICE:** Section 3-5 & 5-1: Installed on each hose that dispenses a liquid into motor vehicles. Designed to retain liquid on both sides of the breakaway point.	
3.	**DISPENSING DEVICE:** Section 2-12: Must be listed and identify product dispensed. Section 7-2.5: Equipped to allow control of flow. Device in liquid service to prevent internal or external icing. Section 3-4: Protect against collision. Securely bolt in place.		9.	**FIRE EXTINGUISHER:** Part 2, Section 6-4 & Part 3, Section 6-3: At least one listed 40-BC or two 20-BC within 75 feet of dispensers, fill pipes, and dispensing area.	
4.	**BONDING:** Part 2, Section 5-5 & Part 3, Section 5-4: Static protection between dispenser and vehicle. Transfer surface must be concrete with resistivity not exceeding API-RP 2003, or connection is in continuous metallic contact.		10.	**PHYSICAL PROTECTION:** Section 3-4 & 7-2.2: Secure against unauthorized use and vehicular collision. Section 7-2.3: check valve or pressure regulating valve under the dispenser.	
5.	**EMERGENCY SHUTOFF DEVICE:** Section 7-6: ESD or electric disconnect must be at least 10 feet and not more than 100 feet from dispensing area, along means of egress. Shall shut down all pumps & compressors, fuel supply, transfer equipment.		11.	**SIGNS:** Section 7-2: Warning signs posted: "No Smoking," "No Open Flames," "Stop Motor." "No filling of portable containers in or on a motor vehicle. Non-Odorized Flammable Gas, Cryogenic Liquid or Cold Gas, in 3-inch red letters on white background. Remain in attendance outside of the vehicle in view of the nozzle." Section 5-1.9: Dispensing instructions posted.	
6.	**DISPENSING NOZZLE:** Section 7-2: Automatic stop flow at temperature-corrected pressure. Shall prevent escape of H_2. Section 5-1.8: Must have interlock or self-closing ends.				

APPLICATION FOR INSTALLATION OF HYDROGEN STORAGE SYSTEMS

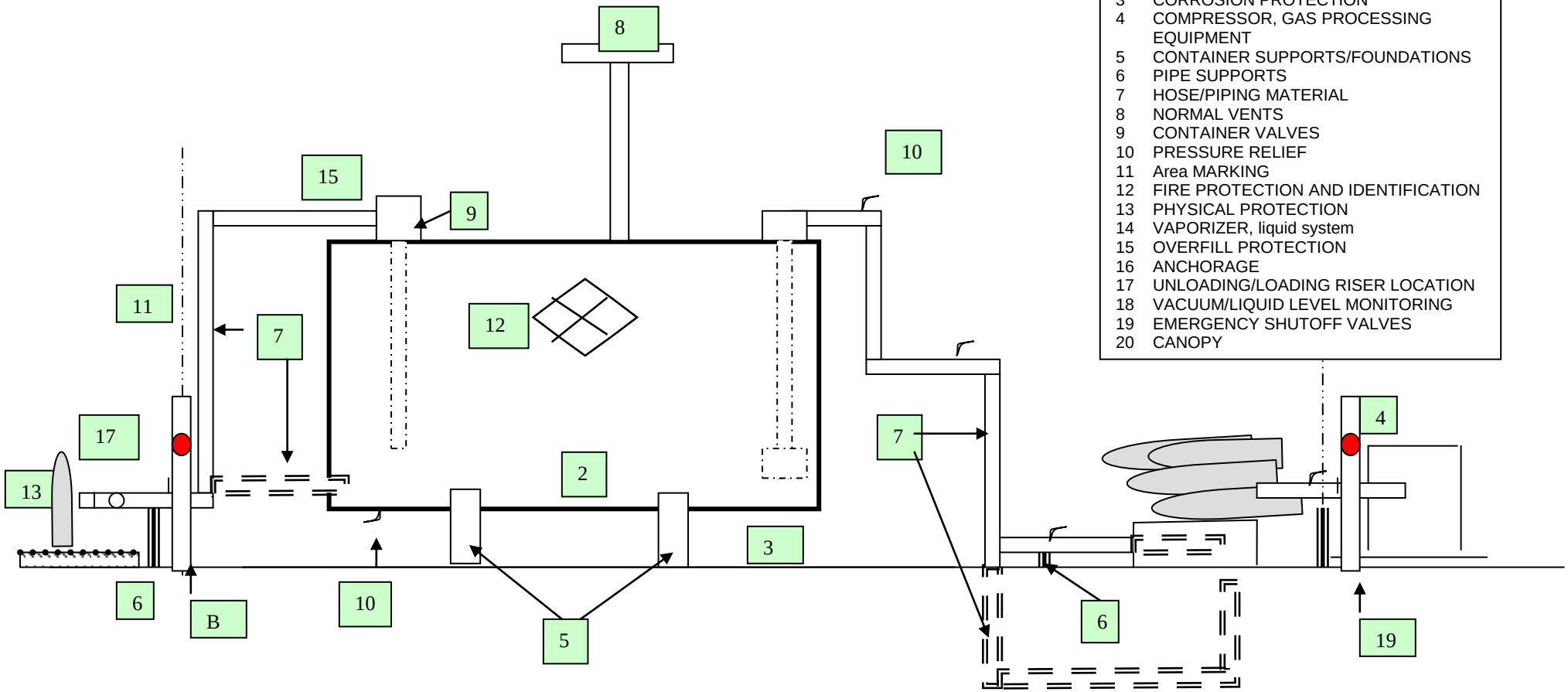
(In addition to requirements from Page 3)

SECTION III **The following section applies to indoor hydrogen motor vehicle fueling, must have prior approval from department.**

ITEM	DESCRIPTION	MANUFACTURER & PART NO.	ITEM	DESCRIPTION	MANUFACTURER & PART NO.
1.	**VENTILATION:** Section 4-2: Vent to outdoors, inlet within 18 inches of floor on exterior wall, outlet at high point in exterior wall or roof.	_____	5.	**SIGNS:** Section 4-3.8: At access doors, "No Smoking, Non-Odorized Flammable Gas, No Open Flames", 1-inch red letters on white background.	_____
2.	**ROOM CONSTRUCTION:** Section 4-3.1: At least 2-hour fire rating with at least one exterior wall.	_____	6.	**DETECTION SYSTEM:** Section 4-3.9: Dispenser must have gas/leak/fire detection system.	_____
3.	**AUTO VALVE:** Section 4-6.1: Auto valve between storage & dispensing which closes when ESD is activated or loss of power.	_____	7.	**MANUAL SHUTOFF VALVE:** Section 4-6.2: Manual shutoff valve must be upstream of breakaway unless dispenser has self-closing valve. Valve must close when power is cutoff or ESD activated.	_____
4.	**SPACING:** Section 4-7.6: Spacing between vehicle fueling appliances must be at least 3 feet. No manifolding.	_____	8.	**STATIC PROTECTION:** Section 4-8.2: Must be in place at load/unload riser location.	_____

TYPICAL INSTALLATION OF HYDROGEN STORAGE SYSTEM

(Numbers correspond to the item numbers on the application)



PART I – ITEMS

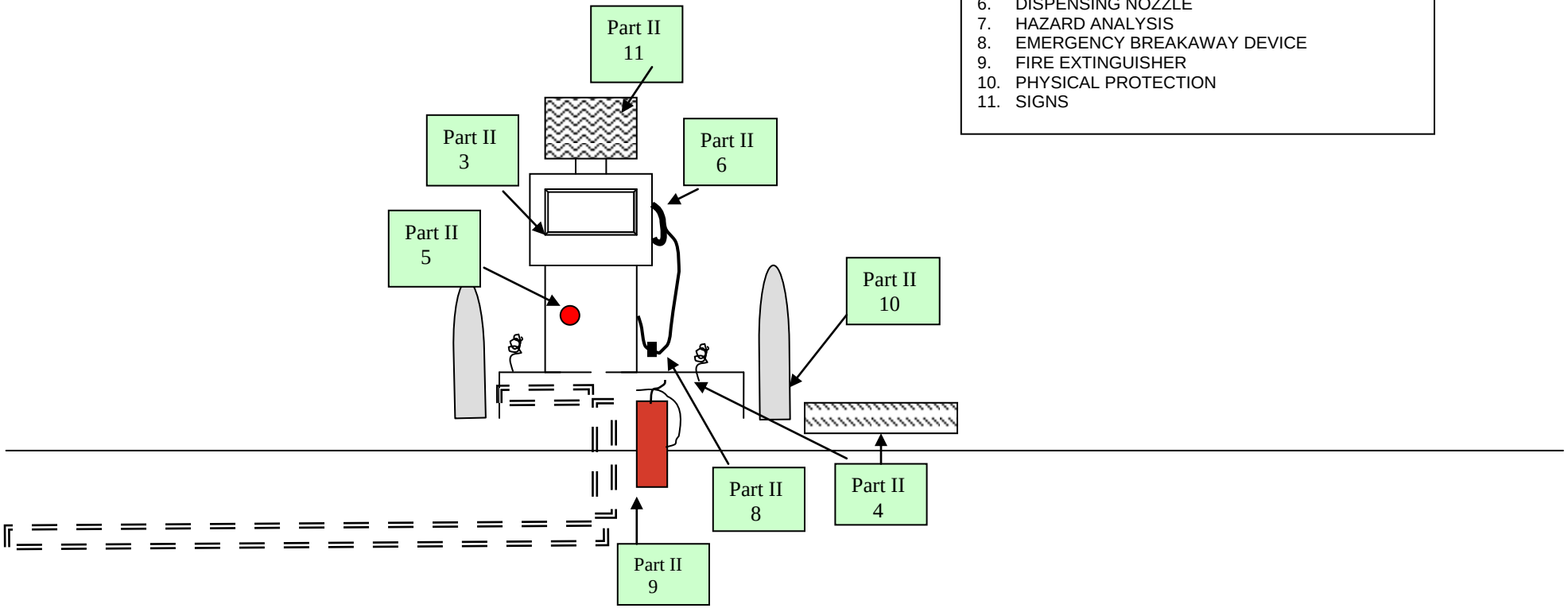
1. CONTAINER LOCATION
2 CONTAINER DESIGN/CONSTRUCTION
3 CORROSION PROTECTION
4 COMPRESSOR, GAS PROCESSING EQUIPMENT
5 CONTAINER SUPPORTS/FOUNDATIONS
6 PIPE SUPPORTS
7 HOSE/PIPING MATERIAL
8 NORMAL VENTS
9 CONTAINER VALVES
10 PRESSURE RELIEF
11 Area MARKING
12 FIRE PROTECTION AND IDENTIFICATION
13 PHYSICAL PROTECTION
14 VAPORIZER, liquid system
15 OVERFILL PROTECTION
16 ANCHORAGE
17 UNLOADING/LOADING RISER LOCATION
18 VACUUM/LIQUID LEVEL MONITORING
19 EMERGENCY SHUTOFF VALVES
20 CANOPY

TYPICAL INSTALLATION OF HYDROGEN DISPENSING SYSTEM

(Numbers correspond to the item numbers on the application)

PART II – ITEMS

1. TYPE OF FACILITY
2. LOCATION OF DISPENSER
3. DISPENSING DEVICE
4. BONDING
5. EMERGENCY SHUTOFF
6. DISPENSING NOZZLE
7. HAZARD ANALYSIS
8. EMERGENCY BREAKAWAY DEVICE
9. FIRE EXTINGUISHER
10. PHYSICAL PROTECTION
11. SIGNS



Department of Licensing and Regulatory Affairs, Bureau of Fire Services, Storage Tank Division
P.O. Box 30033, Lansing, MI 48909
Phone 517-241-8847, Fax 517-332-1428

APPLICATION FOR INSTALLATION OF HYDROGEN STORAGE SYSTEMS

A plan review must be completed on any hydrogen storage container system of 400 scf or more, where less than 400 scf systems are less than five feet apart, or any container filling location. A request for plan review must include:

1) Size of proposed container(s). The material of construction, the dimension, and the capacity of each container.
2) Type of venting, pressure relief, and compressor size.
3) A completed parts and materials list for each container with vent manufacturer, model number and flow rate (gpm, SCFH) as appropriate.
4) A plot map showing all of the following information within 100 feet of the proposed system:
   a) Location of buildings, public roadways, railroad mainlines, public sidewalks, and property lines.
   b) Overhead power lines.
   c) Proposed location of the container(s) and loading/unloading risers.
   d) Location of all existing tanks, above and under ground, storing flammable/combustible liquids or gases.
   e) Location of all fuel dispensers and canopy footings.
4) A separate piping diagram for each container with pipe, vent and valve specification identified on the diagram. Include manufacturer and model numbers where appropriate.
5) Section II shall be completed for motor fueling facilities.
6) Each installation of 26,000 scf gaseous storage capacity, or increment thereof, shall be considered a container.
7) A plan review fee of $203 <u>per</u> container. Make checks payable to the "State of Michigan".
   Mail the completed application with fee to:

LARA Cashiers Office – UST/AST P.O. Box 30033 Lansing, MI 48909	**<u>Overnight mail to</u>:** LARA Cashiers Office UST/AST 525 West Allegan Lansing, MI 48909

The facility cannot be operated without approval from the Bureau of Fire Services. Please direct any questions to the Bureau of Fire Services, Storage Tank Division, at 517-241-8847.