

Safe Use of Vacuum Trucks	Document No.: RSW-SAF-058-DT	Approval Date: 04-06-20	Page 1 of 10
	Revision No.: 18	Next Revision Date: 04-06-25	
	Document Custodian: Environmental, Safety and Security		

1.0 PURPOSE

This work instruction defines and establishes requirements related to the safe use of vacuum trucks on MPC LLC, Michigan Refining Division property. Documentation shall be completed and filed with the owning department and applies to all employees, contractors, visitors and vendors.

2.0 SCOPE

This procedure applies to all persons working on MRD property, including contractors and visitors.

3.0 RESPONSIBILITES

3.1 Contract Vacuum Truck Supervision

- 3.1.2 Observe field activities periodically to ensure compliance with this procedure.
- 3.1.3 Train vacuum truck operators in the proper transfer, handling, and transportation of flammable and combustible liquids and hazardous materials, including proper method of checking continuity of grounding.
- 3.1.4 Post vehicle specifications for weight (full and empty), height size, etc. inside the truck cab within view of the driver.
- 3.1.5 Ensure daily inspections of the equipment are conducted with appropriate documentation completed, including a test of the electrical continuity of the bonding or grounding cables provided with the truck.

3.2 Vacuum Truck Operators

- 3.2.1 Follow the requirements specified by this procedure.
- 3.2.2 Perform all DOT required inspections on the vehicle and maintain a copy in the cab as required by DOT.
- 3.2.3 Be knowledgeable about required PPE, be trained in its use and wear it correctly.
- 3.2.4 Have as a minimum a class B CDL with hazardous materials and tank truck qualifications.
- 3.2.5 Be knowledgeable about the safe operation and shutdown systems of the vacuum truck to be operated.
- 3.2.6 Have a thorough understanding of grounding and bonding as required by this procedure.
- 3.2.7 Have current certification as a HAZMAT technician before working at a release of hazardous materials.
- 3.2.8 Know what material was last contained in the vacuum truck and inform the permit writer if it is not compatible with the material to be loaded.

- 3.2.9 Obtain a safe work permit before vacuuming, unloading, or pumping hydrocarbon or unknown materials.
 - 3.2.10 Understand how to safely operate the fire extinguisher located on the truck.
 - 3.2.11 Monitor all operations, remain within 25 feet of the vehicle during all operations and be able to stop the pump if necessary.
 - 3.2.12 Be trained in the operation and emergency shutdown procedures of the truck.
 - 3.2.13 Be aware of the overall height, width, and approximate weight of their truck (empty and loaded) and operate them safely around stationary equipment, overhead piping, and other hazards.
 - 3.2.14 All personnel shall leave the truck cab during loading and unloading.
- 3.3 MPC Contractor Coordinator
- 3.3.1 Ensure that all contractors required to operate equipment are informed of and meet or exceed the requirements of this procedure.
- 3.4 Permit Writer
- 3.4.1 Issue permits in accordance with the Safe Work Permit work instructions and ensure a joint job site visit is conducted per SAF-006 Safe Work Permit Procedure.
 - 3.4.2 Discuss the material that was last contained in the tank with the vacuum truck operator to ensure that it is compatible with the material to be vacuumed.

4.0 REQUIREMENTS

- 4.1 Permitting
- 4.1.1 A Hot Work Safe Work Permit must be completed anytime that a vacuum truck is used in a process area.
 - 4.1.2 A Waste Slop Generation form ([REW-WG-001-FORM03-DT](#)) must also be completed for anyone generating waste or slop in the refinery and offering it for vacuum truck transfer.
 - 4.1.3 During the joint job site visit consideration must be given to where the vacuum pump exhaust will discharge.
 - 4.1.3.1 The permit writer will perform and initial test of the atmosphere (gas test).
 - 4.1.3.2 Together the Operations representative and the vacuum truck operator will discuss and decide the best location for the exhaust hose. The hose will be placed in such a manner so as to vent it downwind from where personnel are working and what (if any) barricading is needed.

4.2 Vacuum Trucks

- 4.2.1 Trucks shall be equipped with runaway protection for diesel engines.
- 4.2.2 Wheels shall be chocked while the truck is vacuuming.
- 4.2.3 Vacuum truck cargo tanks must be equipped with a properly maintained and accurate level indicator to prevent overloading and gauges to monitor vacuum and pressure inside of the tank.
- 4.2.4 Hydrocarbons or Flammables
 - 4.2.4.1 A separate conductor must connect the truck frame and the work to achieve an electrical bond. (In the case of a metal container or piece of work i.e. metal tank, sump, etc. the conductor must be clamped directly to the work). If a metal drain pan or container is used, it must be grounded or bonded to the plant grounding system.
 - 4.2.4.2 In the case of a nonmetal container such as plastic containers, open unlined or concrete sump, ditch, etc., a metal rod shall be placed in the liquid being vacuumed, with a conductor ran from the rod to the truck frame.
 - 4.2.4.3 Bonding ground wires shall be sized to provide adequate electrical and mechanical strength to sustain harsh abuse without suffering appreciable damage.
 - 4.2.4.4 An ohm meter shall be used to verify that less than 10 ohms exists between the truck and plant ground. This check shall be performed by an individual competent at operating an Ohm Meter.
 - 4.2.4.5 Quick disconnects of heavy construction such as Camlock Welding, Burndy Ground, "C" type clamp or similar connectors shall be permitted to allow for ease of disconnection and connection of the truck ground for unloading. The continuity check shall be performed each time the truck is disconnected.
 - 4.2.4.6 Light weight stamped steel alligator type connectors shall not be used.
 - 4.2.4.7 A recheck of the resistance shall be necessary when suspected damage has occurred to the bonding ground wire or attachment point or each time the Hot Work Permit is renewed.
- 4.2.5 A liquid ring vacuum truck must be used to vacuum naphtha or other light end products with flash point of 140 degrees or below. The use of vacuum trucks for LPG is prohibited.
- 4.2.6 When vacuuming sour water, spent acids, spent catalyst, and other similar materials a JSA shall be completed to review hazards and handling.

4.3 Conductive Hoses

- 4.3.1 Only vacuum hoses constructed of conductive material or thick walled hoses with imbedded conductive wiring shall be used when transferring flammable and combustible liquids.
 - 4.3.2 Hoses made of nonconductive material must have an internal ground wire integral with the construction of the hose or an external grounding wire or braid that is integral with the construction of the hose. It must be attached to the end couplings, fittings and/or flanges and be in contact with the hose material.
 - 4.3.3 Hoses and fittings when connected together shall form an electrically continuous path from the working end of the hose to the plant ground. Hoses that have broken ground wires or that cannot form an electrically continuous path shall not be used. They shall either be discarded or repaired such that they do form the electrically continuous ground path.
 - 4.3.4 Conductive hose sections shall not be required to have additional grounds.
- 4.4 Nonconductive Hoses
- 4.4.1 If nonconductive hose must be used the following conditions shall be met:
 - 4.4.1.1 Hoses and fittings when connected together shall form an electrically continuous path from the working end of the hose to the plant ground. If the normal connection of any end coupling; fitting and/or flange (beware of insulated types) does not provide this continuous path that connection must be bonded.
 - 4.4.1.2 A drilled/tapped hole on each fitting should allow for a ground cable with lugs on each end to be secured to the coupling.
- 4.5 Bonding and Grounding
- 4.5.1 A recheck of the resistance shall be necessary when suspected damage has occurred to the bonding ground wire or attachment point, hose is reattached or each time the Safe Work Permit is renewed.
 - 4.5.2 Light weight stamped steel alligator type connectors shall not be used.
 - 4.5.3 An ohm meter shall be used to verify that less than 10 ohms exists between the working end of the hose and the work. This check shall be performed by an individual competent in the operation of the Ohm meter.
 - 4.5.4 Conductive hoses securely attached to properly grounded structural steel shall be considered bonded to plant ground.
 - 4.5.5
 - 4.5.6 Quick disconnects of heavy-duty construction such as Camlock Welding, Burndy ground, "C" type clamp or similar connectors shall be permitted to allow for ease of disconnection and connection of the hose to truck ground for unloading.
- 4.6 Safe Handling of Hoses

- 4.6.1 Never attempt to dislodge material from the vacuum hose opening by hand before shutting off vacuum.
 - 4.6.2 Never test for a vacuum by placing your hand near the hose opening.
 - 4.6.3 The recommended practice for movement of the vacuum hose is through the use of ropes or a pole attached near the hose opening.
- 4.7 Draining into Totes, Drain Pans and Other Containers Prior To Vacuuming
- 4.7.1 Drain pans, totes, and buckets should be metal with no internal coating or paint. (Galvanized metal containers are approved for use).
 - 4.7.2 Totes, pans, buckets or other containers shall be bonded to the piping, vessel or fill spout with approved bonding jumpers. Bonding wire shall be tight and secure on both ends.
 - 4.7.3 In all cases bonding wires shall be in good condition and secure on both ends. The size of these bonding wires and jumpers is dictated by mechanical strength rather than by current carrying capacity. The bonding wires are made to have enough strength to sustain some physical abuse without suffering appreciable damage.
- 4.8 Off Loading Product From Vacuum Trucks
- 4.8.1 Vacuum truck operators and Owing Department operators shall be aware of the hazards involved in the transfer of materials, particularly the risk of creating a vapor-air atmosphere in the flammable range inside equipment when transferring hydrocarbons.
 - 4.8.2 Consideration shall be given to the method of off-loading vacuum trucks to mitigate the formation of a pressurized flammable vapor-air mixture inside the cargo tank. The approved off-loading methods are gravity, pressure, and pump-off. Pressure off-loading of flammable material (Flash Point 140 degrees F or lower) directly from the vac truck to any piece of equipment is prohibited.
 - 4.8.2.1 Gravity Method – When feasible, gravity off-loading is the safest and preferred method.
 - 4.8.2.2 Pressure Method – Pressure off-loading with air is accomplished by reversing the vacuum pump on the truck. The use of external sources of compressed air to pressurize the cargo tank is prohibited. Pressure off-loading of combustibles, flammables, or materials that are reactive to air or moisture shall be performed with nitrogen. The pressure shall not exceed the pressure relief valve setting, or maximum allowable working pressure indicated by the vacuum truck cargo tank data plate.
 - 4.8.2.3 Pump-Off Method – An external pump may be used to off-load products which are difficult or infeasible to transfer by pressure or gravity.

- 4.8.3 When offloading is performed into a vessel or tank containing a liquid level, a check valve shall be installed to prevent the risk of backflow from the tank into the vacuum truck.
- 4.8.4 When offloading, initial discharge shall be at a slow speed until the end of the discharge hose or intake nozzle is submerged to minimize splashing and prevent static buildup and excessive vapors.
- 4.8.5 Vacuum hoses shall be equipped with a bleeder when connected directly to piping or a vessel to provide a means to verify that the hose is drained and does not contain pressure prior to disconnecting the hose from the piping/vessel.
- 4.8.6 When off loading from a truck into a tank/vessel both shall be bonded together and grounded with an approved grounding method (approved clamp and wire). The product is contained inside the hose and flow rates are usually low. The bonding wire shall be tight and secure on both ends.

4.9 Vapor Control and Recovery

- 4.9.1 When flammable or toxic liquids are loaded, the vacuum pump exhaust shall be vented downwind of the truck by attaching a length of hose sufficient to reach an area that is free from hazards and personnel.

4.10 Special Precautions

- 4.10.1 All vacuum trucks used in the refineries must meet API RP-2219 and shall have a specification plate or other means of certification with the truck.
- 4.10.2 Decontamination procedures must be utilized where necessary, (e.g. Sulfuric Acid, Caustic, Benzene, etc.).
- 4.10.3 Do not add liquids together where steam could be produced inside of the vacuum truck (e.g. hot product into water (180° F)).
- 4.10.4 Do not add materials with differing pH, which may cause an exothermic reaction inside of the vacuum truck.
- 4.10.5 Combustible liquids transferred at or above their flash point temperatures must be handled as if they were flammable liquids.
- 4.10.6 Toxic vapors that are not hazardous prior to handling may become concentrated, and thereby hazardous, at or near the discharge port of the vacuum pump.
- 4.10.8 Whenever non-flammable materials such as produced water or spent acid that has the potential to contain trace amounts of hydrocarbon, condensate, or H₂S are placed under a vacuum, flammable vapors and toxic gasses can be released, creating potential ignition and toxic exposure hazards.
- 4.10.9 Material compatibility, reactivity, toxicity, and temperature must be considered and care must be taken to assure the materials being loaded are compatible with

materials previously loaded and that mixing of these materials will not present a hazard.

- 4.10.10 Sources of ignition that must be considered include vacuum truck engine and exhaust heat, pump overheating, faulty electrical equipment on the truck, static electrical discharges, and motor vehicles in the area.
- 4.10.11 Physical entry into a vacuum truck is considered confined space entry. The keys for the truck must be placed in a lock box and the door must be held open by a locking mechanism or a substantial (at least 4x4 lumber) block placed in the gap.

5.0 **DEFINITIONS**

- 5.1.1 Bonding – Prevents the formation of different electrostatic potentials between vacuum trucks and pumps and the source or receiving tank, container or vessel by bringing all parts of the connected system to an equivalent electrical potential.
- 5.1.2 Dry-Vac - Vacuum Truck - A vacuum truck equipped with a bag house to filter solid material and reduce the amount of particulate emitted to the atmosphere.
- 5.1.3 Grounding - Minimizes the electrical potential differences between objects and the earth to prevent a static charge. Grounding brings all parts of any system to zero electrical potential by allowing electrical currents to dissipate to earth ground.
- 5.1.4 Liquid Ring - Vacuum Truck - A vacuum truck that uses water to lubricate and create a seal to decrease the amount of hydrocarbon vented to the atmosphere. This is the type of truck preferred for use for vacuuming hydrocarbons (Attachment 1).
- 5.1.5 Vacuum Truck - A transportable vacuum system consisting of a positive displacement vacuum pump, vacuum cargo tank and accessory equipment mounted on a motor vehicle.
- 5.1.6 Wet Vac - Vacuum Truck - A vacuum truck that is designed to vacuum liquid and has an automatic shut off when liquid full. This is the type of truck commonly used when vacuuming sewage and other non hydrocarbon materials (Attachment 2).

6.0 **Training**

- 6.1.1 All employees who may be exposed to vacuum trucks must be trained in these associated instructions. The training should encompass provisions contained in this procedure.

5.0 **REFERENCES**

- 5.1 API PUBL 2219 Safe Operation of Vacuum Trucks in Petroleum Service-Second Edition
- 5.2 Water Jet Technology Association: Recommended Practices for the Use of Industrial Vacuum Equipment
- 5.3 Environmental Waste Handling & Disposal Procedure [REW-WG-001-DT](#)

5.4 Waste Slop Generation Form [REW-WG-001-FORM03-DT](#)

6.0 ATTACHMENTS

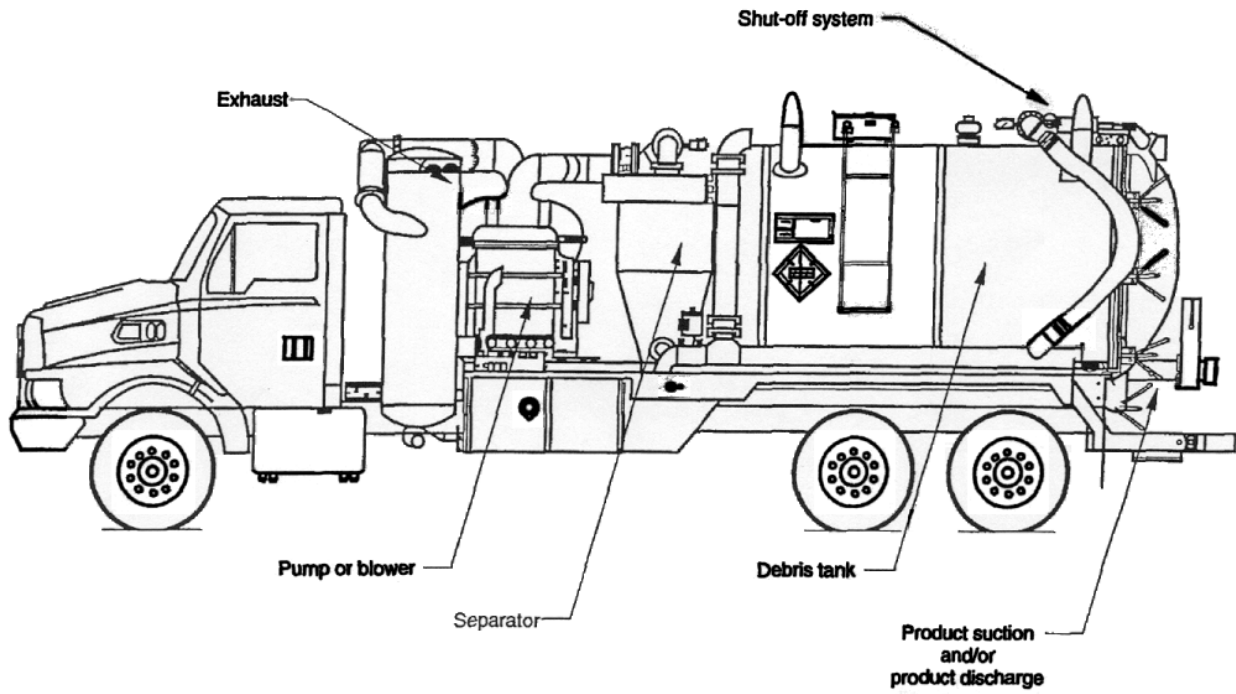
6.1.1 [Attachment 1](#)

6.1.2 [Attachment 2](#)

7.0 REVISION HISTORY

Revision number	Description of change	Written by	Checked by	Effective date
13	Updated to change incorrect number of 50 ohms continuity test level for grounding/bonding to the correct number of 10 ohms as recommended by API.	A. Tys	S. Windom	10-15-13
14	Scheduled review updated header per RGD-1051-DT, revisions to permitting section, bonding and grounding and special precautions section	E. Neubauer	J. Rabideau	08/19/2015
15	Updated procedure to include Waste Slop Generation form link.	A. Hetu	J. Rabideau	3/1/17
16	Updated 3.2.9 language with unloading and pumping.	T. Brown	A. Morales	4/6/20
17	Per PSA 20-01, added language to section 4.2.5 prohibiting the use of vacuum trucks for LPG	J. Taggart	A. Morales	5/6/20
18	Per PSA 20-02, added language to Section 4.8.2. Last sentence.	J. Taggart	A. Morales	12/22/20

Attachment 1 Typical Liquid Ring Vacuum Truck



Attachment 2 Typical Wet Vac Vacuum Truck

