



RAILWASH

ENVIRONMENTAL SERVICES

Strataflex CTE 8000 Cleaning Procedures

Introduction

- CTE 8000 is a cleaning procedure developed by Strataflex Midstream for the purpose of cleaning railroad tank cars that have been hauling crude oil to a standard that makes them suitable for hauling ethanol or other products without the additional expense of requiring cars to receive a sand- or media-blast.

Safety and Environmental

- Safety of personnel and the environment are of the utmost importance
- Vapors from the tank car will be subsumed into water through the steaming process and removed via vacuum truck into appropriate waste containment according to Federal, State and Local regulations

CONFIDENTIAL INFORMATION

- Disposal of all wastewater, solids, condensates and particulate matter will be handled as follows:
 - Liquids - oily water will be contained in a storage tank until such time that it will be transported to a recycle facility by a company certified for such transport
 - Solids - sludge and other solids will be stored in a roll-off box until such time that it can be transported to a legal disposal facility for such material

Cleaning Criteria

- Tank car to be clean, dry and odor free - including tank, top valves and bottom valve
- To ensure suitability of tank for Ethanol service, all interiors and valves must be clean and free of all residues
 - Generally speaking, if material can be removed with a hand scraper, it should not be in the car

Acceptance Procedures

- Prior to beginning any operation verify that the derailleurs are in place and locked and Blue Flag Protection has been established.
- Perform arrival inspection on the railcar. Immediately notify supervisor upon the discovery of any condition that may present a safety hazard.
- Verify the railcar handbrake has been set, and wheel chocks have been placed on the rail car wheels to prevent movement in both directions.
- Upon satisfactory inspection and verification of Safety Data Sheet (SDS), ground the railcar utilizing a ground rod and purposed grounding clamps.
- Position a primary and secondary containment under the railcar.

CONFIDENTIAL INFORMATION

Opening Procedures

- Climb to the top of the railcar via the ladder using three points of contact. Attach the safety harness to the handrail and then position upwind and remove the cap or plug from the vent valve to relieve pressure or vacuum from the car while wearing a full face respirator.
- Once pressure has equalized, open manway cover and position steam tee in car and secure man way cover as per instructions.

Steaming

- Steam the car to: clean the car, assure a safe working environment within the car, open the pores of the car to allow product to flow from the pores
 - **Note:** This process may be done with steam alone, with steam and an appropriate chemical product through a "vapor-phase" treatment, or by steaming through diesel or other chemical to "vapor phase" the diesel or chemical into the steaming process
 - Steam is generally introduced into the car using an aluminum steam T integrated through a manway cover. The cover is secured to the manway utilizing the eyebolts and a gasket.
 - Steam with the liquid valve and eduction pipe valve placed in the $\frac{3}{4}$ -open position to allow steam to move around the ball and clean valve cavity.
 - Make sure BOV stays completely closed until ready to remove product at which time BOV valve will be completely opened

Draining the Car

- Open the bottom valve and lock it in the open position
- Suction off any residual material into the vacuum truck

CONFIDENTIAL INFORMATION

Testing the Environment

- After the car has been steamed, drained and allowed to cool
- Use a four-gas monitor to assure safety of the environment within the car
 - From the top of the open manway, lower monitor into the car pausing at various levels checking for striations of gases within the car
 - If there are no readings of hazardous gases and the oxygen levels are acceptable, an entrant should take the monitor into the car
 - The entrant will walk from end to end within the car holding the probe in front of him to assure that there are no pockets of gases within the car
- Only after this process has been completed should a car be considered safe for manned entry cleaning procedures to begin

Cleaning Process

(To be completed with the bottom valve fully open)

*(**Note:** any or all of the following processes may be used, depending on the needs of each particular car.)*

- The car will be scraped with sharp-edged scraping tools paying particular attention to the "bathroom ring" portion of the car which is generally in the 3:00 to 9:00 positions and downward. Additionally, extra attention will be paid from the 5:00 to 7:00 position as this floor portion of the car is sometimes problematic.
- **Note:** Occasionally an extra scrape will be required.
 - This is typically necessary for cars that have been in service for an extended period of time without being cleaned and seems to be more prevalent in cars that have carried Bakken crude.
 - The resultant layers of coked-on product must be removed in layers. As such, the initial scrape will happen and then another application of degreaser will be required as described in the first bullet statement of the subsequent section.

CONFIDENTIAL INFORMATION

- Following the application and agitation of the degreaser the extra product is scraped again.
- **This additional scraping is not part of the typical process and as such will incur an "add-on" charge above the bid price.**
- A commercial degreaser will be sprayed on the interior of the car and stiff brushes will be used to agitate the degreaser product onto the walls of the car and into any product that may be remaining on the car.
- Assure that degreaser is sprayed on the underside of all valves that can be seen from inside the tank
- A pressure washer will be used to pressure wash valves, doghouse area, manway area, education tube and ladder area of car
- Pressure washing valves - with valve 3/4 open, pressure wash such that the valve and the cavity behind the ball are cleaned. Upon completion the white valve seals should be white with no staining or residue visible under bright light inspection
- Leave the valves in the 3/4 open position until the drying process is complete
- **NOTE: Strataflex is not a certified repair facility. We will clean the valves thoroughly but Strataflex WILL NOT remove valves for cleaning, replacement, gasket change, or any other purpose. If customer wishes to have the valves removed, Strataflex will coordinate the services of a mobile repair unit to accomplish the task.**
- Once inside the car, pressure wash the bottom outlet valve in the three-fourths cocked position and then have someone cycle the valve while continuing the wash process.
- For particularly dirty bottom valves the following procedure may be used:
 - Apply detergent or solvent with 4" belly cap affixed and open bottom valve partially to allow cleaning solution to move around the ball and cavity of the valve.
 - Allow to set for 15 to 30 minutes, cycle the valve during this time period.

CONFIDENTIAL INFORMATION

- After completing this, drain solvent or cleaning solution, and pressure wash through BOV, have someone outside cycle the valve.
- Deliberately pressure wash the thread area of the bottom valve. This is an approximately 3/16" gap between the bottom valve and the car body surrounding the flange of the bottom valve. (This is a place that often harbors dirt, product, rust and other undesirable material within the car.)
- Pressure wash the bottom of the valve housing and pressure relief valves or any other valves that can be seen from inside the car.
- Inside the tank car begin on the A end:
 - Pressure wash the tank end with the bottom valve totally opened.
 - Pressure wash the ceiling area of the car from approximately the 10:00 to 2:00 position from the end to the middle of the car making sure to clean past the bottom outlet valve.
 - Pressure wash from the 10:00 to 7:00 position moving from the tank end to past the bottom outlet valve.
 - Return to the tank end and pressure wash from the 2:00 to 5:00 position moving from the tank end to past the bottom outlet valve.
 - Return to the tank end and pressure wash from the 5:00 to 7:00 position. Be deliberate in this process as this is the floor of the car and is sometimes neglected because of the amount of water still in this area. By beginning at the tank end and working toward the BOV, the pressure washer will push any material and water that has accumulated in this area of the tank toward the BOV
- Repeat the above process for the B end

Drying Procedures

- Dry car using an air mover through the man-way.

Caution – After steaming and cleaning cars, DO NOT close up (seal) the tank. Leave top and bottom valves partially open, until the tank has cooled down. While cooling to protect interior from dust and debris, lower multi housing cover over valves and partially prop the lid up. This allows the car to vent and cool without potentially pulling a vacuum and destroying the tank car.

CONFIDENTIAL INFORMATION

- Dry interior and valves completely before inspecting interior

Post Drying Procedures

- After the car has dried following the above procedures a Quality Assurance inspector will don booties and a clean safety harness and enter the car with a white light, a black light, a hand scraping tool (such as a five-way tool), and a white cloth
- Using the black light assure that no product or degreaser will fluoresce. Pay particular attention to:
 - Underside of valve dome
 - Along weld seams at tank ends
 - Along weld seams within other sections of the tank
 - On manway
 - Under the education tube bracing
- Using the white light with the beam shining parallel with the car (for example have the light lying on the floor shining toward the end cap) assure that there is nothing on the tank that casts a shadow in this light
- Using the hand scraper assure that there is no product or rust that will scrape off of the walls of the car
- Because these are clean carbon steel tanks and there is oxygen and moisture found in the air, the tanks will rust. However, some rust scrapes off the car easily. If rust is found inside the car that will scrape off easily, follow this procedure:
 - (Note: Wear dust masks or respirators during this process as rust particles will be floating in the air)
 - Cover the bottom valve with a clean cloth to assure that no material will get on the valve that could damage the ball and that no material will fall into the crevice around the valve threads.
 - Using a clean, sharp scraping tool that has not been used on crude or other material scrape the walls of the tank car from the middle toward the ends

CONFIDENTIAL INFORMATION

- This rust is typically being seen from the 3:00 to the 9:00 position within what is often known as the "bathtub ring"
- Do not neglect the rust on the bottom of the car. As you scrape down, you will bury any rust attached to the bottom of the car and, as such, it could be ignored.
- Once all rust has been scraped down, sweep from the bottom valve area toward the tank ends
- Use a broom and dustpan to gather all scraped material and place it in a 5-gallon bucket to be removed through the manway

Acceptance Criteria

- The cleaning is accepted when:
 - No fluorescent areas, streaks, or spots are found during the black light inspection.
 - All particulate matter/sand has been removed from the service equipment, eduction pipe and tankcar interior.
 - The tankcar interior, eduction pipe, and service equipment are clean, dry and odor free.
 - Note: With changes in humidity levels, elevation, and temperatures some moisture may accumulate in the car. Strataflex assures that the car was dry during the Quality Assurance inspection, but cannot guarantee that the car will remain dry after it is closed.

Documentation

- Strataflex Midstream will provide a cleaning certificate stating that the car is free of all crude oil, sand, particulate matter and that it is dry and odor free at time of inspection.
- Strataflex Midstream will provide requisite photographs.

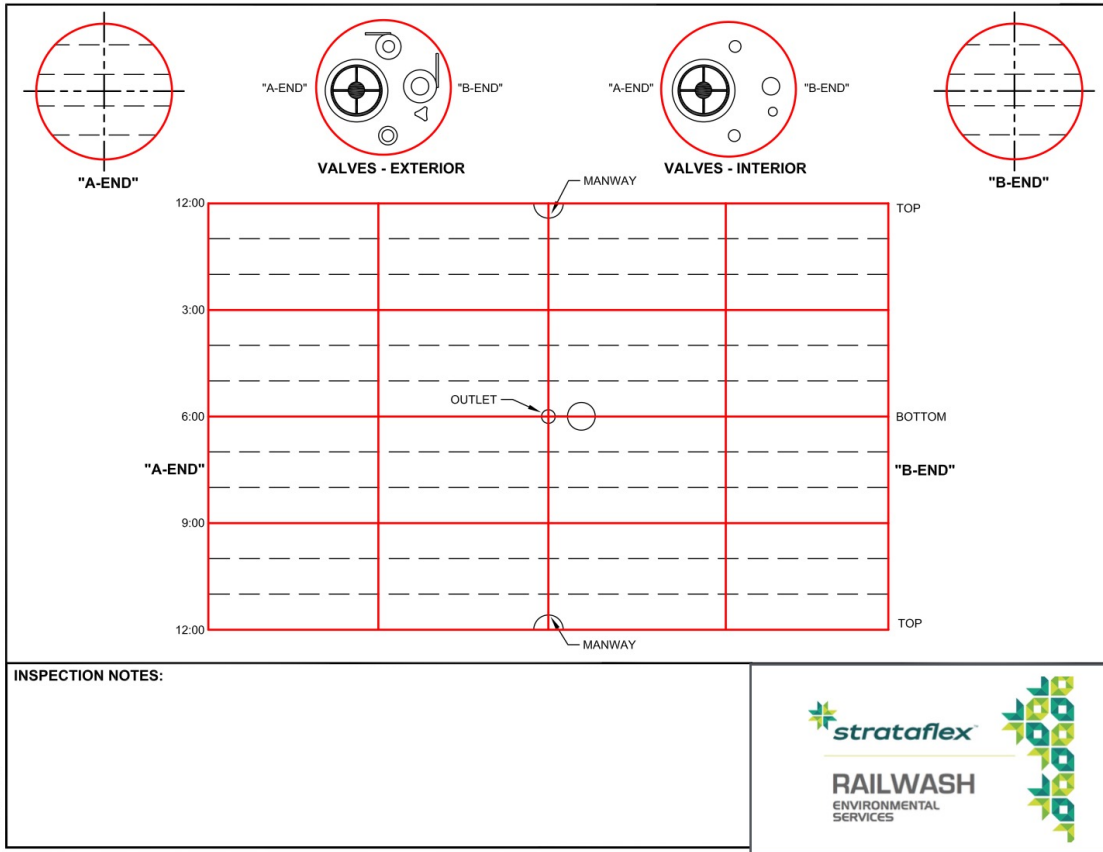
CONFIDENTIAL INFORMATION

Summary

- Make car safe for entry.
- Remove all liquids, solids, and sludge.
- Make sure car has been steamed properly to remove any residual oils from the pores of the metal and interior of the valves.
- Walls, floors have been scraped and anything that could be removed by hand tools has been removed.
- Clean top and bottom valves, education pipe.
- Dry the car properly.
- Inspect to customer criteria and until your QA confirms it meets this criteria. (Clean, Dry, and Odor Free) .
 - Key:
 - If inspector can remove anything off the wall, floor with hand tool or broom, the car is not clean.
 - If car will not pass a black light test, car is not clean.
 - If car valves have trash, debris on the ball, or any evidence of product on the inside of the valves or education pipe, car is not clean.

CONFIDENTIAL INFORMATION

Appendix A: Tank Car Interior Inspection Diagram



CONFIDENTIAL INFORMATION

Appendix B: Example photographs of hydrocarbons fluorescing within a tank car. All photographs show unacceptable results.



Figure 1



Figure 2

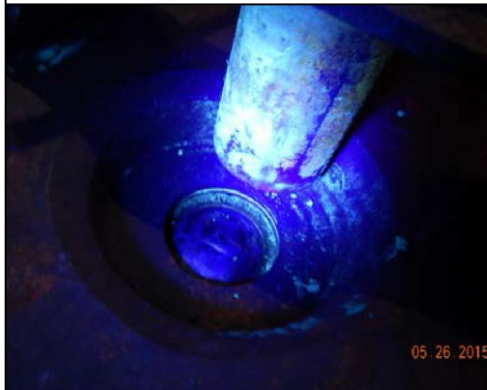


Figure 3



Figure 4

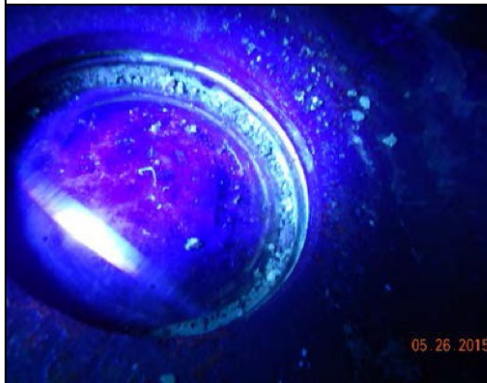


Figure 5

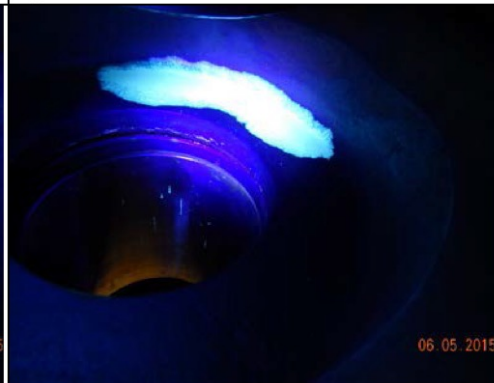


Figure 6

CONFIDENTIAL INFORMATION

Appendix C: Photographs of valves showing unacceptable results in the left column and acceptable results in the right column.



Figure 7

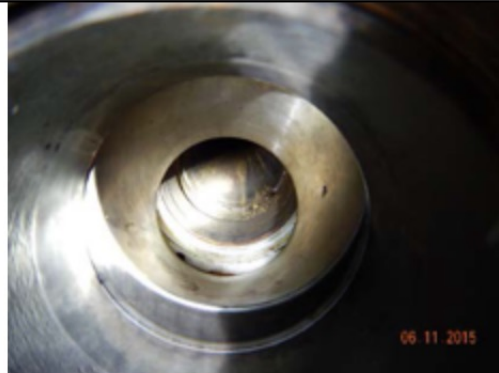


Figure 8



Figure 9



Figure 10



Figure 11



Figure 12

CONFIDENTIAL INFORMATION

Appendix D: Photographs of bottom valve from within the tank.
Photographs on the left are unacceptable and photographs on the right are acceptable results.

Not Acceptable

Acceptable



Figure 13



Figure 14



Figure 15



Figure 16

CONFIDENTIAL INFORMATION

Appendix E: Photographs of the education tube. Photographs on the left are unacceptable and photographs on the right are acceptable results.

Not Acceptable

Acceptable



Figure 17

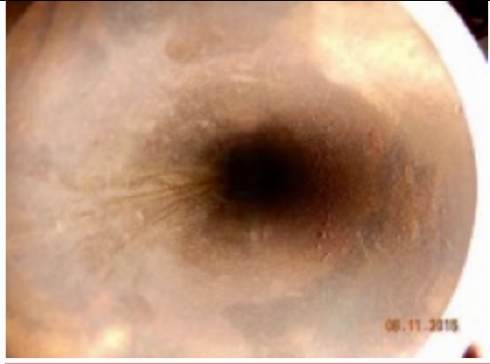


Figure 18

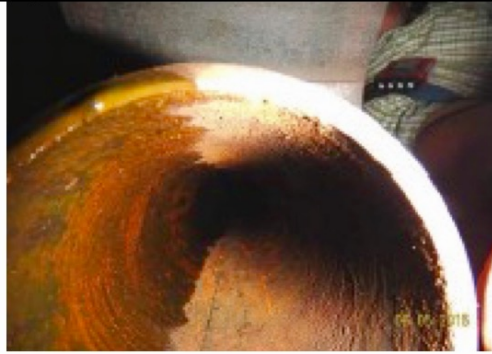


Figure 19

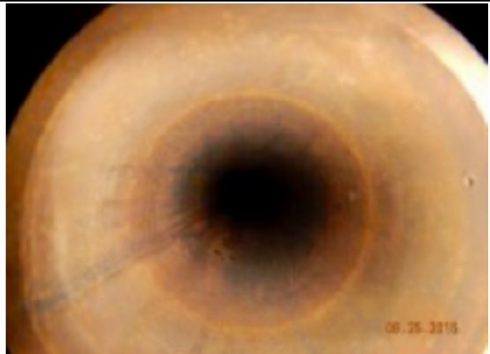


Figure 20



Figure 21



Figure 22

CONFIDENTIAL INFORMATION

Appendix F: Photographs of ceiling, floor, and wall surfaces of the tank car interior. Photographs on the left show unacceptable amounts of product left

Not Acceptable

Acceptable



Figure 23



Figure 24



Figure 25



Figure 26



Figure 27

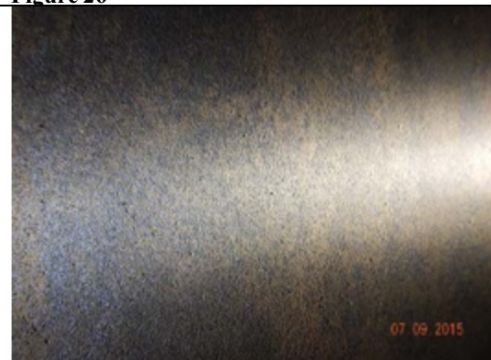





Figure 28

on the surface. Photographs on the right show acceptable results.

CONFIDENTIAL INFORMATION

Appendix G: Photographs of problematic areas and recommendations for alleviating problem.

Not Acceptable	Recommendations
 <p data-bbox="329 789 427 821">Figure 35</p>	<p data-bbox="823 468 1274 657">Use steel or brass tile scraper with long handle to scrape interior tank wall. Sweep particulate matter away from bottom outlet and remove via dust pan. Prevent hard particulate matter from accumulating in bottom outlet seat.</p>
 <p data-bbox="329 1178 427 1209">Figure 36</p>	<p data-bbox="823 856 1274 1045">Use steel or brass tile scraper with long handle to scrape interior tank wall. Sweep particulate matter away from bottom outlet and remove via dust pan. Prevent hard particulate matter from accumulating in bottom outlet seat.</p>
 <p data-bbox="329 1566 427 1598">Figure 37</p>	<p data-bbox="823 1245 1307 1465">Hand tool shown for reference only. Use steel or brass tile scraper with long handle to scrape interior tank wall. Sweep particulate matter away from bottom outlet and remove via dust pan. Prevent hard particulate matter from accumulating in bottom outlet seat.</p>

CONFIDENTIAL INFORMATION

Not Acceptable

Recommendations



Figure 35

Use steel or brass tile scraper with long handle to scrape interior tank wall. Sweep particulate matter away from bottom outlet and remove via dust pan. Prevent hard particulate matter from accumulating in bottom outlet seat.

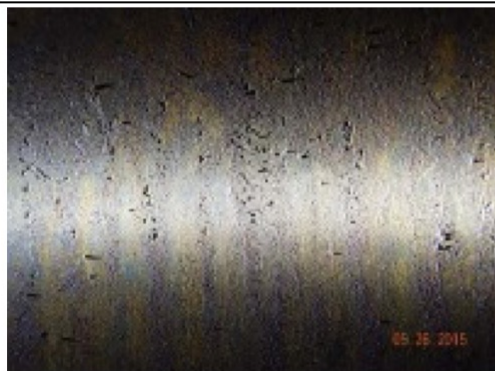


Figure 36

Represents a partial scrape. Use steel or brass tile scraper with long handle to fully scrape the interior tank wall. Sweep particulate matter away from bottom outlet and remove via dust pan. Prevent hard particulate matter from accumulating in bottom outlet seat.



Figure 37

Sweep particulate matter away from bottom outlet and remove via dust pan. Prevent hard particulate matter from accumulating in bottom outlet seat.