
DoH Comments on NCTF-RH Tank Cleaning Verification Plan
February 8, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

General Comments

1. Does the Navy Closure Task Force – Red Hill (NCTF-RH) plan to conduct any bench studies or proof of concept activities on the proposed visual water beading inspection to determine whether it will be effective on the various tank surfaces?

Response: The Navy is considering validation methods and would like to further discuss at the upcoming Tank Cleaning Verification Forum on 20-21MAR. The Navy is also looking for any specifications the DoH may be able to provide in order to provide clear evaluation criteria for validation methods.

2. Is the NCTF-RH confident that the visual water beading inspection will not produce false determinations of “clean,” more so than other methods considered? Explain why or why not.

Response: The Navy is confident that by adhering to the API Standard 2015, NFPA 326, and UFGS 33 the tanks will be thoroughly cleaned. Additionally, the Navy’s contractor has successfully used this proposed method of cleaning verification on past Red Hill tank clean, inspect and repair projects. This method has been proven effective when utilized as surface preparation prior to applying coatings in the tanks. It should be noted that water beading is simply a subset of rinsing. The standards indicate to rinse until clean, 2 to 3 times if required - using a pressure wash with detergent to eliminate any remaining fuel and residue on the tank.

Specific Comments

Tank Cleaning Quality Verification Methods

1. Step One:

- a. Provide a detailed procedure for gas-free certification.

Response: As stated in paragraph 4.2.1 on page 12 of the project work plan (Revision 0 dated December 2023), tank access (including gas-free certification) will be conducted in accordance with API Standard 2015: Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks and API Recommended Practice 2016: Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks. As stated in paragraph 4.1.3.3 of the project work plan (Revision 0 dated December 2023), the confined space entry permit will be authorized by the contractor’s confined space entry supervisor prior to tank entry. A multi-gas instrument will be used to test the atmosphere inside the tank and confirm it is safe for personnel entry at the beginning of each work day. The instrument will test for five different gasses including hydrogen sulfide, carbon monoxide, lower explosive level, volatile organic carbons and oxygen.

DoH Comments on NCTF-RH Tank Cleaning Verification Plan
February 8, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

- (1) Why is Step one considered part of tank cleaning verification? This step will occur before cleaning. We also understand the tanks will be ventilated while workers are inside cleaning, which does not represent the conditions in the tank after closure. If something similar to Step 1 is conducted after tank cleaning (and without ventilation), that would be more appropriate for consideration as a cleaning verification method.

Response: The Navy considers Step One (Gas certification) to be a part of Tank Cleaning because API 2015 (paragraph 4.5.1.b, 4.5.3.j, 5.1) indicates it is the first step. Additionally, API indicates it is an on-going process (API 2015 -4.5.3.k). Lastly API, and UFGS 33.01.50.55 indicates it will be tested at the very end. Removal of fuel will provide a measurement of clean. Ongoing cleaning will produce better measurements. And lastly there will be a measurement at the end, API 2015 (include inspections and safety checks to ensure that the tank is clean and free of waste and debris); thus gas certification is an integral part of the cleaning process. The NCTF protocol follows the API & UFGS scripts; testing of a gas free atmosphere before, during, and after cleaning. The final levels measured will be submitted to DoH and EPA as part of the tank cleaning validation report.

2. Step Two:

- a. Define “an excessive amount of water beading on the surface.” How will the degree of “excessive water beading” be quantified?

Response: Water beading is one of the standard practices to determine if additional rinsing is required. Inspection will consist of visually inspecting that there is no sheen, looking at the water beading and touching the tank for residue. In accordance with NFPA 326, the above inspection is used to determine if the contractor needs to conduct a 2nd or 3rd rinse.

- b. How will the water be applied? There are many variables that could interfere with producing a representative sample, such as water pressure, distance, angle, volume, etc. How will these variables be controlled or accounted for?

Response: Paragraph 4.2.4.1 on pages 19-21 of the project work plan (Revision 0 dated December 2023) discusses the means and methods by which the Navy’s contractor will clean the interior of each Red Hill tank. The Navy’s contractor has successfully used these means and methods in past Red Hill tank clean, inspect and repair projects.

- c. Will the hydrophobic coating on the tank walls affect this method?

Enclosure (1)

DoH Comments on NCTF-RH Tank Cleaning Verification Plan
February 8, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

Response: The Navy does not expect the hydrophobic coating to impact the cleaning verification methodology.

d. How will this beading test be quality validated (QVed), considering the tanks will be dry by the time third party quality validators inspect the tanks? What will be documented; will there be video, photos, etc. of the water beading test?

Response: Pictures and or video of each cleaning phase will be gathered and submitted as part of each tanks' closure report and documentation. Note, the water beading process is only a single step in the tank cleaning quality validation. The 3rd party validator will be an integral part throughout the tank cleaning process providing 3rd party validation of each step.

3. Step three:

a. Describe in detail how "APTIM will visually confirm the product and sludge has been removed from the interior surface of each tank." For example, does "the interior surface" mean one hundred percent of surfaces inside the tank? And how will these areas be viewed?

Response: As described in paragraph 4.2.4.1 on pages 20 and 21 of the project work plan (Revision 0 dated December 2023), as tank pressure washing is initiated, the contractor's quality control processes will be applied to ensure that all areas of the tank shell and appurtenances are thoroughly cleaned. The tanks will be inspected daily by the contractor's quality control manager. Areas that require additional cleaning will be rewashed. 100% of the interior tank surface will be visually inspected. The Navy's QA and QV team will also inspect that the product and sludge has been removed. Pictures and/or video evidence of an empty and clean tank will be provided. Both the EPA and DoH will be invited to conduct an inspection on each tank before finalizing closure. A final report documenting that the tanks have been cleaned will include photographic evidence and documentation.

b. Describe in detail how "NCTF-RH [Navy Closure Task Force – Red Hill] QA [quality assurance] will inspect the inside of each tank to confirm APTIM has successfully removed all product and sludge." How will this inspection differ from APTIM Quality Control's (QC's) inspection?

Response: The plan for removal of sludge will involve four parties being involved – contractor QC, NCTF-RH QA, 3rd party QV, and the regulators all viewing and seeing all product and sludge has been removed. Before and after pictures of sludge being present, sludge being removed, as well as the tanks being empty and cleaned will be kept, shared daily if possible and

Enclosure (1)

DoH Comments on NCTF-RH Tank Cleaning Verification Plan
February 8, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

a part of the final report. This differs from the contractor in that largely the NCTF-RH team will involve QA personnel, as well as their 3rd party QV and the EPA and DoH. This trilateral oversight (Navy, 3rd party, Regulators) will ensure and certify that the tanks are empty and clean.

- c. For APTIM QC and NCTF-RH QA, how will difficult-to-clean areas (e.g., around the towers) be inspected?

Response: Areas around the tower will be visually inspected to confirm they are clean.

4. Step four:

- a. Similar to the tank beading proposal, there are variables that could interfere with producing a representative sample, such as wipe pressure. What is the standardized method for the wipe test?

Response: The Navy is still researching a standardized method of wipe testing. The Navy believes spot checks using wipe testing or another approved method are an effective means of confirming surfaces are free of product, sludge, and fuel. The Navy is looking for DoH to provide any and all specifications that would assist with further refining verification approaches.

(1) States, “[t]he surface wipe test is only intended to be applied in areas with limited visibility such as weld beads and structural members inside the tank.” Has the NCTF-RH considered performing wipe tests on some of the non-limited visibility areas to confirm Steps 1-3 are effective? Will wipe tests also be conducted within the standpipe and nozzles?

Response: The Navy will consider utilizing wipe or another approved alternative test on non-limited visibility areas. Wipe tests cannot be performed inside the nozzle beyond arm’s length as personnel cannot enter the standpipe and nozzle due to the limited diameter.

- b. **Flow chart:** The flow chart describes Step 2 as “confirm there is no presence of water beading[.]” while page 1 says “not an excessive amount of water beading[.]” What is the Standard?

Response: The flow chart is a summary of deciding if a “triple rinse” is required. The “triple rinse” test details deciding if a 2nd or 3rd or 4th etc. rinse is required through visually inspection, checking water beading, and touching the surfaces; to reiterate this is in alignment with aforementioned standards.

Enclosure (1)

DoH Comments on NCTF-RH Tank Cleaning Verification Plan
February 8, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

Tank Cleaning Quality Verification Tiers

a. **Tier 2:** States, “QA will occur continuously throughout the tank cleaning process.” Does this mean a QA person will be in the basket with the cleaner? If not, how will the QA person get close enough to the surfaces to visually inspect? How will the QA person determine whether there is residue present?

Response: The Navy QA team will be present daily. The QA team will collect evidence mainly through visual inspection and the Navy and contractor will decide on photographic documentation.

b. **Tier 3:** Describe in detail how “[t]he third party QV contractor will visually inspect the interior of the tanks to confirm interior tank surfaces are free from product, sludge[,] and residue.”

Response: The Navy third party QV contractor will visually inspect the entire interior surface of each tank to confirm each tank is clean. The inspector will complete this inspection by visually inspecting the entire surface from the suspended scaffolding to confirm the entire interior surface of each tank meets the cleanliness standard. Photographic evidence of each cleaned tank will be provided and will be incorporated in the final report.

c. **Tier 4:** As discussed in meetings with the NCTF-RH, the DoH should be able to complete inspections in one day, as proposed in the NCTF-RH’s December 15, 2023 submission, provided that we have sufficient time to review supporting documentation beforehand.

Response: The Navy’s intent is to keep DoH involved each step of the way at a minimum through weekly calls to be augmented by photographic evidence at each milestone. The Navy will work with the contractor to provide supporting documentation in a timely manner as possible to allow DoH and EPA adequate time to review supporting documentation.

Enclosure (1)

EPA Comments on NCTF-RH Tank Cleaning Verification Plan
February 14, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

1. Gas Free Tank Certification: Ventilation is required for the safe entry and occupancy of the tanks during the cleaning process. EPA understands that a marine chemist will certify that each tank is gas free prior to entry. While this is a critical step in ensuring the health and safety of personnel, it does not necessarily demonstrate the removal of vapors during the cleaning process. How will Navy confirm fuel product vapors have been removed following the completion of tank cleaning and discontinuation of ventilation?

Response: A multi-gas instrument will be used to test the atmosphere inside the tank and confirm it is safe for personnel entry at the beginning of each work day. The instrument will test for five different gasses including hydrogen sulfide, carbon monoxide, lower explosive level, volatile organic carbons and oxygen. After cleaning and drying of the tank, the Navy will re-measure inside each tank to confirm fuel vapor does not exist. The final levels measured will be submitted to DoH and EPA as part of the tank cleaning validation report.

2. Water Beading Inspection.

a. Navy has not clearly stated what the criteria are for a passing inspection. The Verification Plan does not explain what constitutes “excessive water beading” on a surface with residual fuel product versus water beading indicative of a clean surface. Without an agreed upon definition of a passing inspection, it is unclear how the independent QV tiers will reach an agreement on whether a tank has been sufficiently cleaned.

Response: The Navy is cleaning the tanks in accordance with regulations API 2015, NFPA 326, UFGS 01 33.50.55, and API 1604. This will result in a tank that is free from fuel residual and foreign matter that will eliminate further risk to the environment and public health. The water beading inspection is conducted during the pressure washing phase of the cleaning process in order to determine if an additional rinse is required. Evaluation of the water beading and touching of the tank to ensure if any residue exists determines if 2nd, 3rd, 4th, etc rinses are required. Once rinsing is completed, documentation through pictures and or video will be completed as evidence cleaning is completed. The final inspection completed by the Navy’s quality assurance inspector and third-party quality validation inspector is intended to confirm the tank meets the cleanliness standard and are ready for final inspection by DoH and EPA.

b. Navy has not provided a specified testing protocol. Variables such as the volume of water used during the test, the distance at which the surface is sprayed, the type of nozzle used for rinsing, the angle and size of the surface, among other factors, may impact the outcome of the inspection. A clear, reproducible, and justifiable testing protocol needs to accompany any validation method.

Response: One of the objectives of the Tank Cleaning Forum on March 20-21 is to reach agreement with the EPA and DoH on the cleaning verification testing protocol that is clear

EPA Comments on NCTF-RH Tank Cleaning Verification Plan
February 14, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

and reproducible and justifiable. Per the standards guiding the cleaning process, clean is being defined as tanks free of sludge, residual product, and vapors. The Navy provided the details of nozzle size, pressure, and distance during previous correspondence. The Navy's proposed starting basis for the discussion for cleaning verification protocol that will occur during March 20 and 21 is:

- (1) Removal of all Sludge – visual inspection by the Navy, 3rd party QV entity, DoH, and EPA
- (2) Removal of all vapor – atmospheric testing within the tank after drying
- (3) Removal of all residual product – visual inspection by the Navy, 3rd party QV entity, DoH, and EPA visual inspection.

Note: The steps of gas free, rinsing, and visual check are all documented in the guidelines and recommended practices (UGFS, API). The Navy believes these are sufficient. However, the Navy is reviewing and would like to discuss with EPA if additional validation is required. The Navy is considering a wipe test and will discuss this methodology at the NCTF Cleaning forum, March 20 and 21. The Navy would also like to discuss other validation methods that EPA or DoH has previously implemented.

c. The water beading inspection does not appear to consider the various surfaces that will be encountered. Interior sections of the sumps, surge tanks, and bulk fuel storage tanks may be coated to varying degrees. The type of surface will likely affect the way water beads. Please describe how “excessive water beading” will be evaluated on bare steel compared to fully or partially coated interiors.

Response: Based on past cleanings the Navy does not expect visual verification to be significantly impacted by the different types of coatings within the tanks being cleaned. Note, water beading is an interim evaluation in order to determine if a 2nd or 3rd or 4th etc. rinse is required - it is a part of the visual inspection along with touching the surfaces of the tank to determine if another rinse is needed. The end state is to provide a clean tank however many rinses it takes.

d. The plan does not state whether a water beading inspection will be conducted on piping and appurtenances in addition to tank interiors. Navy proposes a wipe test for low visibility areas such as welds and structural members but does not mention piping. Please clarify how piping and other appurtenances will be evaluated.

Response: The approach for piping and appurtenances will be to use visual and touch evaluation of water beading where practical and wipe or other approved alternative tests for

EPA Comments on NCTF-RH Tank Cleaning Verification Plan
February 14, 2024 Letter to Rear Admiral Stephen Barnett
Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Pearl Harbor, Oahu, Hawaii

pipng and/or appurtenances when unable to conduct visual and touch water beading evaluation.

3. Tank Cleaning Verification Process Flow Chart – EPA’s role in the verification process is not clear from this figure. The figure does not appear to show EPA participating in the water beading inspection or wipe test. Please modify the flow chart to clarify how regulators will participate in this process.

Response: The Navy will keep EPA and DoH involved every step of the way. The Navy wished to discuss the verification process during the forum on 20 and 21 March and to provide details to the regulators on how we intend to provide evidence and keep the regulators involved with each milestone. In summary, all equity holders will be involved in declaring the tanks are clean: the Navy, the 3rd party QV, DoH, and EPA.

4. EPA and DoH Final Inspection – EPA concurs with Navy’s plan to conduct an in-person inspection where feasible and provide a video inspection of areas that are inaccessible to regulators due to safety concerns. Prior to the first inspection, EPA will coordinate with Navy to ensure that filming of the interior of the tank is conducted in a manner that will allow regulators to certify the tanks are clean while meeting the health and safety requirements of the facility.

Response: Understood and thank you.

5. Tank Cleaning Verification Documentation. “Documentation for Items 1, 3 and 4 above will include plate layout diagrams of the interior of each tank showing the date each panel was cleaned and rinsed” – A plate layout diagram documents when the panels were cleaned but does not provide any information on how well they were cleaned. Related to comment 2a above, please develop passing criteria for the proposed visual inspection and determine how NCTF-RH will document this information with respect to Items 1, 3, and 4.

Response: Tank cleaning verification documentation will be provided to confirm the contractor has cleaned all interior surfaces of each tank. Each individual tank cleaning report will document how many rinses occurred, video and/or photographic evidence (before and after) demonstrating and providing evidence of clean. The Navy intends to use the cleaning validation forum scheduled for March 20th and 21st to determine and confirm additional details. EPA and DoH will be a part of each tank final cleaning inspection.