BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

November 21, 2016

Mr. Bob Pallarino
EPA Red Hill Project Coordinator
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

and

Mr. Steven Chang, P.E.
DOH Red Hill Project Coordinator
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Messrs. Pallarino and Chang:

Subject: Board of Water Supply Comments to the Tank Inspection, Repair and Maintenance (TIRM) Report Being Developed Under the Red Hill Bulk Fuel Storage Facility (RHBFSF) Administrative Order on Consent (AOC) Statement of Work (SOW) Section 2

The Board of Water Supply (BWS) offers the following comments and recommendations to the subject report.

Overall, we appreciate the information about TIRM and the Tank 5 Lessons Learned provided in this Report with 21 chapters. We also acknowledge the Navy and Defense Logistics Agency's (DLAs) efforts to supplement the TIRM Report with supporting documentation (Attachments A-BP). While the TIRM Report clarifies many of the questions that we have previously posed regarding TIRM practices at RHBFSF, it continues to overlook select comments and recommendations made previously by the BWS in relation to inspection and repair history, non-destructive examination (NDE), and the condition of Tank 5.

Piping

The BWS has previously expressed concern over the condition of the RHBFSF piping (Lau 2015; Lau 2016a; Lau 2016b; Lau 2016c). Consequently, we have repeatedly recommended that the TIRM Report include a description of any leaks, inspections, and repairs that have been performed on this piping. The current TIRM Report still fails to provide a clear picture of the extent to which the facility piping has been inspected and/or repaired or when this piping is scheduled for reinspection. In addition, this section does not clearly delineate when it discusses piping if this piping is tank piping, tunnel piping, or both. Pressure test failures for Tank 5 piping are only mentioned in brief (Section 4-6.3 on p. 4-22); there is no indication in the body of the TIRM Report that other tank piping has been pressure tested. References to prior contracts involving pipe inspection (e.g., Section 10-4.4 on p. 10-12 and 10-13, Section 10-5.1 on p. 10-14) do not appear to be accompanied by actual inspection results either in the body of the TIRM Report or its attachments.

Attachment BD, the Draft Specification for future Red Hill Tank Inspections appears to constrain inspection to nozzle, steam, and drain piping (see Section 1.6.7.1 of that document), to only hydrostatic testing despite the fact that in-line inspection (ILI) of the lower access tunnel piping has been previously performed and resulted in the discovery of hundreds of external and internal metal loss locations, laminations, and dents (Regin 2008). Hydrostatic testing alone, as proposed for issue and receipt piping for the tanks (not tunnel piping) in Section 1.6.7.5 of the draft specification, will not provide information about the extent of corrosion and/or mechanical defects on these lines, i.e., hydrotested lines could contain defects that are almost through-wall in depth but would not leak at the subject hydrotest pressures.

Inspection/Repair History

We appreciate the Navy/DLA providing ten (10) API 653 inspection reports as attachments to the TIRM Report. However, inspection reports for the remaining ten (10) tanks (including four of which were inspected in the 1995 to 2012 timeframe) have yet to be provided (see Table 1). If the Navy does not have copies of those inspection reports, knows that they were not inspected in the stated years, or knows that they were not subjected to modified API 653 inspections, then the TIRM Report should clearly indicate that to be the case.

Table 1. Itemized list of inspected tanks with reference information for the available API 653 inspection reports.

Tank No.	Date of Last Inspection from TIRM Report Table 19-1	API 653 TIRM Attachment Status
1	2007[1]	Not found in SOW Section 2.2

2	2008	TIRM Attachment N
3	1983	Not found in SOW Section 2.2
4	1983	Not found in SOW Section 2.2
5	In progress	TIRM Attachment T
6	2006	TIRM Attachment K
7	1998	TIRM Attachment G
8	1998	TIRM Attachment H
9	1995	Not found in SOW Section 2.2
10	1998	TIRM Attachment F
11	1981	Not found in SOW Section 2.2
12	1995	Not found in SOW Section 2.2
13	1995	TIRM Attachment E
14	1982	Not found in SOW Section 2.2
15	2005	TIRM Attachment L
16	2006	TIRM Attachment J
17	2012	Not found in SOW Section 2.2
18	1960	Not found in SOW Section 2.2
19	1989[2]	Not found in SOW Section 2.2
20	2008	TIRM Attachment O

[1] Elsewhere in available documentation (Naval Audit Service 2010), Tank 1 is indicated as having been inspected in 2007.

[2] Elsewhere in available documentation (Naval Audit Service 2010), Tank 19 is indicated as having been inspected in 1989.

We reiterate our recommendation that the Navy/DLA include a table in the TIRM Report that clearly shows the date of last tank API 653 inspection, bibliographic information regarding where the complete API 653 information is available for review, and what percentage of the top dome, bottom dome, and tank barrel area was inspected (i.e., an expanded version of Table 19-1). Statements in the TIRM Report continue to potentially mislead readers into thinking certain tanks have been subjected to 100% inspection. For example, Attachment K of the TIRM Report clearly states that only "eighty percent of the entire tank [6] area" underwent non-destructive examination. The bullets below indicate what additional columns should be added to Table 19-1:

- Bibliographic information regarding where the API 653 information can be found;
- What percentages of the top dome, bottom dome, and tank barrel areas were inspected?
- What percentage of repair welds were vacuum tested?
- What piping going into and out of the tanks was not inspected?

- What NDE techniques were used to inspect the various piping going into and out of the tanks?

Current and Future Inspection Status

We appreciate the TIRM Report addressing the methodology used to select the next tanks for inspection and repair, as well as when future inspections and repairs will occur. Based on the information available in TIRM Report Section 19-6 (repeated here as
Table **2**), our questions and comments are as follows:

- As we mentioned in the most recent meeting we attended, we believe Tank 5 provides a unique opportunity for obtaining additional information on tank condition and defect size probability of detection as (1) it is currently unfilled and (2) it was recently inspected with current NDE inspection procedures and techniques. However, we understand that Tank 5 is not available for destructive testing due to concerns about voiding the inspection and repair warranty. We believe that the TIRM Report should acknowledge this reason for the unavailability of Tank 5.
- According to TIRM Report Table 19-1, Tank 17 was last inspected in 2012. We understand from TIRM Report Section 1-3.13, however, that the API 653 inspection on Tank 17 was not completed. The TIRM Report should describe which aspects of the inspection were not completed, what percentage of the tank was inspected, where the completed inspection results are reported, and why the inspection was not completed.
- TIRM Report Section 19 should explicitly address why the Navy has failed to comply with the inspection frequencies in API Standard 653 with respect to Tanks 18, 11, 14, 4, and 3. The failure to inspect Tank 18 since 1960 is an egregious violation of industry standards and best practices. API 653 first became a standard in 1991, and it was revised in 1992, 1995, 2001, 2009, and 2014. It is the industry standard around the world. Later versions of the standard allow longer intervals between inspections, but that is only recommended for tanks with known corrosion rates. If an API 653 has never been performed for the tank, then there is no tank-specific established baseline corrosion rate. The principles of similar service in the standard can apply, but that risk is unacceptable for 75-year old tanks. The Navy/DLA needs to provide information as to whether inspections for these tanks were scheduled but not performed, discussed but not implemented, etc.

- Tank 18, which was reportedly last inspected in 1960, has not been selected to be inspected and repaired in 2017. Currently, the Navy has selected Tanks 5, 13, 14, and 17 to be inspected and repaired in 2017. How does the Navy justify excluding Tank 18, which was last inspected 35 to 52 years prior to the last inspections for Tanks 5, 13, 14, and 17?
- Since tanks should be inspected in an order based on last inspection date, what is the basis for prioritizing the (re-)inspection of Tank 17 before the inspection of Tanks 18, 4, 3, etc.?
- Since tanks should be inspected in an order based on last inspection date, what is the basis for inspecting Tank 11 (last inspected in 1980/1981) after Tanks 3 and 4 (last inspected in 1983)?
- How has the Navy/DLA reconciled historic repair practices with the proposed future inspection schedule? TIRM Report Attachment F indicates that 0.12-inch deep pits on the ascending plates of the Tank 10 lower dome were not repaired in 1998. For unrepaired pits identified in past inspections, has the Navy/DLA performed remaining life calculations to determine fitness for service up through the next proposed inspection date?

Table 2. Itemized list of date of last inspection and date of next scheduled inspection as summarized in TIRM Report Table 19-1.

Tank No.	Date of Last Inspection from TIRM Report Table 19-1	Date of Next Scheduled Inspection from TIRM Report Table 19-1
5	In progress	2017
13	1995	2017
14	1982	2017
17	2012	2017
4	1983	2018
18	1960	2018
3	1983	2019
11	1981	2020
12	1995	2020
8	1998	2021
9	1995	2021
7	1998	2023
10	1998	2023
15	2005	2023
2	2008	2024

6	2006	2024
16	2006	2024
20	2008	2026
1	n/a	n/a
19	n/a	n/a

Non-Destructive Examination

The BWS is pleased to see the TIRM Report now includes the explicit statement that reliability of detection has not been quantified for the NDE techniques at RHBFSF (Section 17-2.2.4 on p. 17-4). The TIRM Report also appears to acknowledge the contractual failure to require documentation on the reliability and quality of the tank plate and weld-scanning detection for Tank 5 (Section 15-2 on p. 15-1).

Attachment BD, the Draft Specification for Red Hill Tank Inspection, appears suitable as a starting point for addressing our prior recommendations regarding non-destructive examination.

In summary, conservative estimates about the likely reliability of detection should be used when evaluating the risk of leaks in tanks that have been previously inspected and repaired.

Tank 5 Lessons Learned and Historic Tank Repair Practices

We appreciate the TIRM Report content regarding the Tank 5 observations and incident investigation. We note that the TIRM Report indicates that "the installation of the [gas test] holes is industry standard per API RP 2510" (Section 5-6.1 on p. 5-8). It further states that "The WGS procedure was not to fill the gas test hole with weld metal, but instead, to cover it with a seal welded patch plate" (Section 9-2.1.3 on p. 9-8; "WGS" stands for Willbros Government Services, LLC). We appreciate that the corrective action moving forward appears to be welding closed all gas test holes with weld metal (Section 9-5 on p. 9-18), but remain unclear as to whether previously-repaired tanks contain similar unfilled test holes.

Based on the information available in TIRM Report, our comments and questions are as follows:

- How has the Navy/DLA confirmed that gas test holes drilled during the inspection/repair of other RHBFSF tanks do not pose a similar integrity threat? If the installation of gas test holes is industry standard per API RP 2510 (see next bullet), how has the Navy confirmed that holes in other tanks have been filled?

- Please explain the relevance of API RP 2510 "Design and Construction of LPG Installations" to the inspection of the RHBFSF tanks.
- The Navy/DLA should provide information in the TIRM report that estimates the amount of fuel that is expected to leak through a ¼- to ½-inch diameter hole (per day, year, etc.) and compare those leak rates with the detection capabilities currently employed. The Naval Audit Service has previously opined that the Navy would have difficultly detecting slow, chronic leaks such as those with release rates under approximately 10 gallons per minute (Naval Audit Service 2010). The audit states: "In the absence of a permanent system capable of real-time detection of both large and slow, chronic leaks, there is no assurance that fuel releases will be detected and that the risk of further contamination has been mitigated."
- Please provide additional information on the diameters of the holes drilled in Tank 5 by WGS. Section 5-6.1 (p. 5-8) indicates that WGS drilled ¼-inch diameter holes, whereas Section 9-2.1.3 (p. 9-8) indicates that WGS drilled ½-inch diameter holes. Were both diameters used?
- The Navy/DLA should confirm that repairs performed as part of prior tank inspection and repair contracts were subjected to vacuum box leak testing. The Navy/DLA should list the tanks in which such vacuum testing was not performed.
- The TIRM Report should acknowledge that both vacuum leak testing and pipe hydrotesting will only indicate that welds/piping are not currently leaking and provide no guarantee that leaks will not develop prior to the next scheduled inspection period.
- How has the Navy/DLA confirmed that repairs performed as part of prior tank inspection and repair contracts was subjected to sufficient magnetic particle weld testing?

Additional TIRM Report Specific Comments

Page 1-3 The increased corrosion rate associated with salt water, as documented with the tell-tales, occurred over nearly 20 years, until new tell-tales were installed between 1960 and 1962. Twenty years is a long time in the life of a tank, and the condition had to affect all twenty tanks. The report contains little to no information regarding repairs being made to the tell-tales and the water drain lines, the tank bottoms that were also exposed to salt water, or the frequency of draining of water from the bottom of the tanks. The report also does not mention when and how the tell-tales were removed or taken out of service in each of the tanks.

Page 1-4 Tanks 5, 6, and 12 during 1970 and 1972, and Tanks 1-16 between 1978 and 1984 were cleaned, inspected, repaired, and coated with polyurethane. They were all inspected by government inspectors working for the Navy's Officer in Charge of Construction. The report should describe the experience, knowledge, and qualifications of these government inspectors.

Page 1-5 The TIRM report describes destructive testing of coupons from the lower wall and bottom plate that indicated the backsides of the steel plates were in good condition. There was no mention about how these coupons were selected, the number of coupons examined, the size of the samples, the type and depth of corrosion found, if coupons were taken from each of the 16 tanks under inspection, and where the reports that describe this sampling and testing can be located. The 2010 Audit report stated this about Tank 16 and backside corrosion: "Until the current inspection cycle is completed, any previously undetected areas of exterior corrosion may continue to worsen, may cause the remaining tanks to be susceptible to through-holes, and could potentially result in future fuel releases."

Page 1-6 Same comment as page 1-4 about the experience, knowledge, and qualifications of the government inspectors for the 1994 to 1996 work.

Page 1-6 For the repair work in 1997 to 1998, why did Tank 6, and perhaps others, get a second API 653 inspection within three years? Are there any indications that the tanks repaired in this time period were affected by the same type of repair quality issues noted for Tank 5?

Page 1-6 & 1-7 Tanks 1, 15, 6, and 16 are mentioned in the heading for Contract No. N62742-03-C-1402. Only Tank 1 was cleaned. Tanks 6, 15, and 16 received extensive testing with inert gases and low-frequency electro-magnetic scanning as part of API 653 inspection and testing. Why did Tank 6 get a third API 653 inspection within six years of the previous test? Why did Tank 16 get a second API 653 inspection within six years of the previous test?

Page 1-8 There was no mention of API 653 inspections being performed for Tanks 1, 3, 4, 11 and 18 in Section 1-3, History of TIRM at Red Hill. Tank 17 had a partial API 653 inspection in 2012. As we stated earlier, this should be fully explained. Have complete API 653 inspections been performed on these tanks?

Page 2-8 Where is the rinsate and sludge transported after leaving the property in totes and drums, and where are the water bottoms transported for treatment or disposal after being drained from the tanks from the existing slop lines? How frequently is water from the bottoms drained and what is the volume of water?

Page 3-1 Section 3-2.2 mentions daily reports noting areas of disbonding and blistering of the coating system on Tank 5. Did daily reports generated as part of other tank inspection/repair projects contain similar statements? If so, please provide additional details.

Page 3-2 Section 3-3.3 stated that TesTex returned to Tank 5 to remark indications and prove-ups that were removed from the high-pressure wash performed by WGS. Did TesTex remark every indication and prove-up that was removed from the high-pressure wash?

Page 4-2 - 4-18 The repairs needed that were identified by WRS were significant, and any one, or some combination, of the items listed in Table 7.1 could have been a source of release.

Page 4-22 The two failed pressure tests on the 32" main line internal connection flange along with the failed sample lines and slop/drain lines elevate concern about the integrity of similar nozzles in the other 19 tanks. The Navy/DLA should discuss this issue more fully in the TIRM report.

Page 5-5 Section 5-4.2 states: "During initial tank entry the coating was observed to have several major areas of deterioration and concern. The majority of the bottom dome and up several of the lower shell courses had major deterioration, flaking, disbonding and missing in large areas." Additionally, the coating continued to dry out and additional disbanding and flaking occurred. Approximately 70-80% of the interior coating had been deteriorated. This creates a concern about the condition in the other 19 tanks.

Page 5-6 The repair recommendations in the WGS Inspection Reports stated that there were 800+ indications and flaws found during the API 653 inspection and NDE examinations, including two through the wall holes in Tank 5. The tank was declared not suitable for service until all items were repaired. Tank 5 had never had a previous API 653 inspection, and the other tanks that have not been subjected to API 653 inspections have similar risks based on similar service.

Page 5-7 Section 5-5.2 states: "What was identified by WGS as "back-seepage" or "release" from outside the tank shell was in actuality fuel which had become trapped between the tank shell and a cover channel, and had seeped back into the tank through the hole in the cover channel." Regardless of the characterization, fuel still escaped the tank, indicating that there was at least one through the wall hole in Tank 5.

Page 5-8 Section 5-5.2 c. states there were through the wall indications in the upper dome above the maximum fill height. While this poses a lesser risk, it gives cause for concern and, as mentioned above, there were obviously through-wall holes below that level.

Page 5-8 Section 5-6.1 describes the gas test holes in the tank to test for hydrocarbon vapors behind the "tank shell to concrete interstice." This is a mischaracterization of the concrete behind the steel primary tank. An interstice can be integrity tested for tightness, and is the space between a primary tank and a release prevention barrier. This is not the case at Red Hill. The space between the steel tank and exterior concrete has never been tested for integrity, and, therefore cannot be considered an interstice. If there is a crack in the concrete, any fuel that escapes could potentially leak to the environment and the aquifer. Another problem that needs to be considered is condensate between the outer wall of the steel tank and the concrete.

Page 6-1 Section 6-2.b. states that the investigation found the release of product from Tank 5 was due to defects in workmanship. The next sentence relates to the unrepaired gas test holes. Clarification is needed to differentiate between defects in workmanship during the original construction versus those defects during the repair process.

Page 6-1 Section 6-2.c. mentions a search for free product in the "interstitial space." Again, the same comments about this characterization that were mentioned regarding page 5-8 above apply. It cannot be called an interstitial space because the "space" has never been integrity tested.

Page 6-2 Section 6-3. The same concerns about the term "interstitial space" apply, along with a question about how the entire space between the steel primary tank and the concrete outside of the primary tank was tested.

Page 8-6 40CFR 280 also requires that all new and replacement tanks have secondary containment. It is recommended that this requirement be added to the report.

Page 8-9 The abbreviated maintenance checklist indicates that API 653 inspections are to be performed <u>every ten years</u> or as recommended by the previous API 653 Inspection Report. This frequency has not or is not being followed for all the Red Hill tanks. This discrepancy should be explained and justified in the TIRM report.

Page 9-4 & 9-5 WGS's quality control manual did not adhere to United States Army Corps of Engineers (USACE) quality control requirements. The TIRM Report

recognizes this failure, but it calls to question previous work with API 653 inspections on other tanks.

Page 9-7 Why wasn't the conflict of interest about the failure to have a separate Quality Control Manager discovered when the Navy reviewed the WGS work plan? Catching this deficiency early could have prevented the release. The report should include a description of the Navy's Quality Assurance work on Tank 5 and what improvements will be taken. During our discussions on the AOC, the Navy mentioned that their personnel may have inspected the work on Tank 5 twice during construction.

Page 9-9 Why did the Navy accept a Suitability for Service statement that had not been signed by a Professional Engineer? It may not have prevented the release, but it may have prevented the adverse outcome as a result of additional scrutiny.

Page 9-12 The failure to perform a post-repair API 653 inspection is significant and should have been discovered before accepting the Suitability for Service statement. Is it possible that this could have happened with any of the previous API 653 inspections?

Page 9-20 This Section states that: "Since 2007, six Red Hill tanks have been inspected using very similar means and methods, and identical methodologies, technologies, and personnel. Of the six, only Tank 5 experienced failures that resulted in a fuel release. This does not address the twelve to thirteen tanks that received API 653 inspections between 1994 and 2007. This should be explained.

Page 9-21 This page states that: "Corrosion was not the underlying cause or a contributory factor to the release." However, through tank corrosion holes were found during the inspection and nearly 800 indentations and flaws, and the previously mentioned back flow of fuel into the emptied tanks, should imply that corrosion was a contributing factor along with the other specified underlying causes. The report should clearly state that the original flaws that were repaired may have been the result of leaks, whereas after repair the primary cause of leaks was improper inspection.

Page 15-2 Section 15-3 calls for the reinstallation of tell-tales. The BWS disagrees with this effort and expense, and recommends that the focus of work going forward be towards preventive technologies in the form of secondary containment with interstitial monitoring. The tell-tales have had limited effectiveness through the years, were removed in the early 1980s, and are an outdated technology for single-wall systems.

Page 17-15 Along with the coating problems discovered in Tank 5, Section 17-6.1.1 references Tank 17 and Tank 20 coating failures. How many of the other tanks have

similar conditions, and how will single-wall technologies prevent current or future releases?

Page 17-16 Section 17-6.1.3 lists the tanks that have been cleaned, inspected, and repaired since 1994 (Tanks 2, 4, 5, 6, 7, 8, 10, 14, 15, 16, 17, and 20). This list appears to conflict with the information in Table 19-1. For instance, Table 19-1 says Tank 4 was last inspected in 1983 and Tank 14 was last inspected in 1982.

Page 17-25 The BWS is against the use of tell-tales and prefers preventive technologies in the form of secondary containment with interstitial monitoring.

Page 18-1 The TIRM report should clearly describe from where in Tank 16 the plate that currently resides in Pittsburgh with TesTex was taken.

Page 19-1 Section 19-2.2 discusses extending API 653 inspection intervals to 27 to 30 years if the system has a coating system or release prevention barrier. The RHBFSF tanks have coating systems, but the TIRM Report discusses instances of coating failures. There is no release prevention barrier at any of the 20 tanks. The tanks are 75 years old, and the minimum API 653 inspection interval should be maintained for the tanks.

Page 19-4 The BWS disagrees with the proposed extended risk-based inspection alternatives 2, 3, and 4. See our comment regarding Section 19-2.2.

Page 20-2 Investigating the Vista system as an interim solution is worthwhile, albeit temporary.

Page 21-3 The BWS disagrees with the installation of the tell-tale system.

If you have any questions, please feel free to contact me at 808-748-5061.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Mr. Jimmy Miyamoto
Deputy Operations Officer
NAVFAC Hawaii
400 Marshall Road
JBPHH, Hawaii 96860

Mr. Steve Turnbull
Red Hill Program
NAVFAC HI OPDC, N4
850 Ticonderoga Street, Suite 110
JBPHH, Hawaii 96860

References Cited

Lau, E. Y. W. (2015). Board of Water Supply Comments on the Proposed Administrative Order on Consent (AOC) and Attachment A, Statement of Work (SOW) on the Red Hill Bulk Fuel Storage Facility, (EPA-R09-UST-2015-0441-0559.pdf), July 20.

Lau, E. Y. W. (2016a). Letter to Mr. Bob Pallarino, United States Environmental Protection Agency (EPA), Mr. Steven Y.K. Chang, State of Hawaii, Department of Health, and Mr. Jimmy Miyamoto, NAVEAC Hawaii regarding: Board of Water Supply (BWS) Recommendations for Inclusion into the Red Hill Bulk Storage Fuel Facility Administrative Order on Consent (AOC) Work Plans, April 25.

Lau, E. Y. W. (2016b). Board of Water Supply (BWS) List of Data Gaps and Recommendations for AOC SOW Sections 2 Through 5 and 8. Follow-Up from Meetings on May 10-12, 2016, Letter to Mr. Bob Pallarino, United States Environmental Protection Agency, San Francisco, California and Mr. Steven Y.K. Chang, State of Hawaii, Department of Health, Honolulu, Hawaii, May 27.

Lau, E. Y. W. (2016c). Board of Water Supply (BWS) Comments on the Red Hill Bulk Fuel Storage Facility (RHBFSF) Administrative Order on Consent (AOC) Work Plans and Associated Scoping Meetings, Letter to Mr. Bob Pallarino, United States Environmental Protection Agency, San Francisco, California and Mr. Steven Y.K. Chang, State of Hawaii, Department of Health, Honolulu, Hawaii, October 3.

Naval Audit Service (2010). Audit Report N2010-0049: Department of the Navy Red Hill and Upper Tank Farm Fuel Storage Facilities, August 16, Naval Audit Service, Washington Navy Yard, DC (Naval Audit Service FOIA case number -AUD-2015-0004).

Regin, T. M., et al. 2008. "Internal Inspection of 813 Mm (32-Inch) Red Hill Diesel Pipeline, FISC Pearl Harbor, Hawaii," in CORROSION 2008.