



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY - REGION II

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JUN 20 1996

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

S. J. Peña
Commander, CEC, U.S. Navy
Public Works Officer
U.S. Naval Station Roosevelt Roads
TSC 1008 Box 3001
Code NO
FPO AA 34051-3001

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To <i>Corcen Casadei</i>	From <i>Art Wells</i>	
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Re: Tow Way Fuel Farm (SWMU #7) - Free Product Recovery System
U.S. Naval Station Roosevelt Roads
RCRA/HSWA Permit No. PR2170027203

Dear Commander Peña:

The United States Environmental Protection Agency (EPA) Region II has completed its review of the November 3, 1995 Free Product Recovery System Specification document prepared by Blasland, Bouck, & Lee, Inc. (the Specification document), and the May 17, 1996 Free Product Recovery System Workplan prepared by PDG Environmental Services, Inc. (the Workplan). Both documents were submitted on May 30, 1996 as attachments to the RFI Quarterly Progress Report for February 1, 1996 - April 30, 1996, transmitted by your consultant (Baker Environmental, Inc.). EPA, after its review of these two documents, has concluded that they do not constitute a fully acceptable, over-all free product recovery plan, as will be discussed below.

As stated in my letters of May 24, 1996 and April 4, 1996 to you, EPA has found that Roosevelt Roads, by its failure, to date, to fully implement the Corrective Action Plan (submitted by Commander L.V. Marchette's letter of December 16, 1994) in compliance with the Interim Measures requirements of Condition E.4 of Module III of the November 28, 1994 Final RCRA Permit (the Permit), is in non-compliance with the Permit's requirements. As stated in my letter of May 24, 1996, EPA will not initiate Enforcement Action for non-compliance at this time; however, failure to have an acceptable free product recovery system in full operation at Tow Way Fuel Farm/SWMU #7 by September 30, 1996, will result in EPA initiating Enforcement Action for failure to comply with the requirements of the Permit.

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After reviewing the Specification document and the Workplan, submitted as attachments to the RFI Quarterly Progress Report for February 1, 1996 - April 30, 1996, transmitted May 30, 1996 by your consultant (Baker Environmental, Inc.), EPA's finding regarding non-compliance has not changed. However, subject to the Navy adequately addressing and/or complying with the terms of the following comments, EPA conditionally accepts the free product recovery system as proposed in the above two documents, pursuant to the requirement of Condition E.4(a) of Module III of the Permit. This, however, does not relieve the Navy of its obligation under the Permit to have submitted a free product recovery work plan for Tow Way Fuel Farm (SWMU #7) within 30 calendar days following the November 28, 1994 effective date of the Permit, i.e. by December 27, 1994.

EPA has the following comments on the Free Product Recovery System Workplan and the Specification document now submitted:

1. No currently accurate isopach [thickness map] of the entire free phase product plume is included with either document. Though figures C-1 and C-2 of the Specification document contain contours labeled "product plume" (i.e., thickness, but units unspecified) for a portion of the southeastern and northwestern areas of the free phase product plume respectively, the plume portrayal on those figures does not cover the entire known extent of the plume, and is not currently accurate as to the eastern limits of the plume. Recent product thickness measurements in wells UGW-19 and UGW-21 show that the free phase product plume has spread/migrated to these wells; yet Figure C-1 of the Specification Document (and Figure C-4 of the Workplan) show the eastern limit of the plume to be just east of well UGW-17, even though wells UGW-19 and UGW-21, located approximately 120 feet and 225 feet respectively, east of well UGW-17, have both contained measurable free product during recent measurements reported in the monthly Free Product Removal reports prepared by Terra Vac, Inc. [reference Table One (product thickness measurements) of the April 1996 report, submitted by Mr. Sindulfo Castillo's (Director, Environmental Engineering Division, Public Works Department, Naval Station Roosevelt Roads) letter of May 16, 1996].

In addition, EPA questions the accuracy of the portrayal of the free phase product plume in Figures C-1 and C-2 of the Specification document, which are based on the April 1994 Site Characterization Report (the SCR) prepared by Blasland, Bouck, & Lee, Inc., (reference Figure 3-1) [submitted to EPA by Commander L.V. Marchette's letter of December 16, 1994]. Current (and for most of the time since September 1994) free product measurements indicate that well UGW-4 contains the thickest free phase product

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layer in the plume, with 11.51 feet reported in well UGW-4 on April 25, 1996 (reference Table One of the April 1996 monthly Free Product Removal report prepared by Terra Vac, Inc.). Yet Figures C-1 and C-2 of the Specification document and Figure 3-1 of the SCR show the thickest part of the plume to be centered significantly south/southeast of well UGW-4.

In the SCR the results from 4 product bail down tests conducted in November 1993 were described as indicating dramatically thinner free phase product layers in the aquifer than those measured in the 4 wells tested (UGW-4, 5, 12, and 17), based on the methodology described in Testa and Paczkowski (1989). For example, in well UGW-4, a free product thickness of 14.83 feet was measured on November 10, 1993 (reference Table 3-3 of the SCR); yet based on the [24 minute] product bail down test conducted on this well on November 13, 1993, the SCR concluded that the product thickness in the aquifer surrounding well UGW-4 was in-fact only 0.21 feet (2.5 inches), meaning there is a 7000% expansion in thickness of the free product layer in the well bore. Similar reductions were then extrapolated to all wells.

Since the portrayal of the free phase product plume in the Specification Document is based on the results and conclusions of the SCR, EPA has reviewed these, and questions the accuracy of the application and/or interpretation of the product bail down test methodology results. The methodology utilized is described in the referenced article "Volume Determination and Recovery of Free Hydrocarbon" by Stephen M. Testa and Michael Paczkowski (Ground Water Monitoring Review, Winter 1989). However, in that article, the authors state that "Although bail-down testing is a relatively simple field procedure, the analysis and evaluation of the data is speculative" [our emphasis]. Further, they state that "Although discussion of the validity of bail-down testing to determine true thickness is beyond the scope of this paper, this procedure remains essentially unproven" [our emphasis].

While EPA recognizes that the absence of a capillary fringe in a well bore results in a greater thickness of the pure free product layer than is present in the aquifer (where instead a mixed free product/water filled capillary fringe occurs between the water table and the pure free product layer), EPA, nonetheless, requests submission of a detailed discussion/explanation of the phenomenon of how a 0.21 foot (2.5 inches) free product layer in the aquifer could be responsible for a 14.83 foot free product layer in the well bore of well UGW-4, as concluded in the SCR.

This possibly erroneous portrayal of the free phase product plume extent and volume, in both the SCR and the Specification document, could materially impact the adequacy of the system proposed in the Workplan, as regards its capacity to recover the

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maximum volume of free phase product in place, and, of more immediate concern, to prevent/control further migration. Since the SCR is indisputably outdated as to distribution of free phase product on the southeast flank of the plume (near wells UGW-19 and UGW-21), EPA requests submission of a current free phase product isopach and volumetric calculation of the entire free phase product plume.

2. There is no potentiometric map/ground water gradient map included with either document. Such a map is necessary to assess the ability of the proposed system to fully recover the free phase product, and even more importantly to assess the proposed system's ability to control further spreading/migration of the plume. A potentiometric map/ground water gradient map covering the entire Tow Way Fuel Farm area must be submitted.

3. EPA is concerned that further migration of free phase product east of well RW-6, the most easterly recovery well proposed (refer to Figure C-4 of the Workplan), will not be adequately controlled, nor free product in that area fully recovered, with the system proposed in the Workplan. Existing wells UGW-17, UGW-19, and UGW-21 (refer to Figure B-2 of the Specification document), located between 180 feet (well UGW-17) and approximately 380 feet (well UGW-21) east of proposed recovery well RW-6, contained 4.01, 3.40, and 1.55 feet respectively, of free phase product as of April 25, 1996 based on measurements reported in the April 1996 Free Product Removal Report prepared by Terra Vac. It should further be noted that the thickness of free phase product in the two most easterly wells, UGW-19 and UGW-21, has significantly increased since September 1994 (from 0.59 feet to 3.40 feet in UGW-19, and from zero to 1.55 feet in well UGW-21) as indicated by data in the April 1996 Free Product Removal Report prepared by Terra Vac. This increasing free phase product thickness, and the elongate shape of the southeast flank of the plume, clearly indicate the plume is migrating in that direction. My letter of April 5, 1996 to you had previously noted EPA's concern with lack of migration control on the southeast flank of the plume. The proposed system must be expanded to fully control migration on the southeast flank of the plume, east of proposed well RW-6.

4. Neither the text nor the two well completion diagrams (Typical Recovery Well and well to be installed in UGW-22) included with the Workplan (refer to Figure P-2) indicate the anticipated position(s) of the submersible pump(s) and the well screen(s) relative to the top of the free phase layer and the water/product interface (i.e. top of the water table). The Workplan should include such information, either in the text or on Figure P-2.

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5. The text of the Workplan (section 1.2.6) states that "A total of eight ... pumps will be installed, one within each of the six new recovery wells, one in existing well UGW-22 [shown on Figure C-4 as RW-1] and one in the collection trench standpipe." Figure C-4 of the Workplan shows only 5 recovery wells to be newly drilled (RW-2, 3, 4, 5, and 6), while RW-1 is shown as in existing well UGW-22. Therefore, the Workplan must be revised to either indicate only 7 pumps are to be installed (5 new wells, RW-1/UGW-22, and in the collection trench standpipe), or clearly indicate where the eighth pump is to be installed.

6. There is no discussion of predicted individual well recovery rates or total system rates; no projection of anticipated cumulative recovery and elapsed time to recover all recoverable free-phase; no quantification of the estimated ultimate volume of free-phase to be recovered by the system as proposed, and its relationship to the volume of free-phase in place. The need for such predicted performance criteria was suggested (but not explicitly required) in my letter of July 27, 1995 to Mr. S. Castillo's (Director, Environmental Engineering Division, Public Works Department, Naval Station Roosevelt Roads). Such predicted performance data must be submitted as part of an acceptable over-all free product recovery plan.

7. Although section 1.2.10 of the Workplan is titled Operation and Maintenance, there is no Operation and Maintenance (O & M) or similar plan included with the documents submitted. Section 1.2.10 of the Workplan merely states that "The Navy will be responsible for collection, disposal, or recycling of recovered product." As discussed in my July 27, 1995 letter to Mr. S. Castillo, an O & M plan is needed as part of the over-all free product recovery plan. Therefore, an acceptable O & M plan must be submitted, though it may be a "stand alone" document.

8. There is no discussion of steps to prevent or minimize groundwater being produced with the free product. If groundwater is produced, the disposal method discussed in section 3.3 and Table 3.1 of the Workplan ["contaminated water (i.e. water only with no product or visible sheen) may be disposed in the immediate vicinity of the source of water if water readily infiltrates the local ground surface (i.e. infiltrates with no ponding, no run-off to surface water courses, and no run-off to storm drains or sanitary sewers)"] is not completely acceptable. Pursuant to 40 CFR § 261, the media (here groundwater) must be evaluated for Toxicity Characteristics pursuant to §261.24. If the groundwater fails the test for Toxicity Characteristics due to Hazardous Waste Codes D018 through D043 only, it may, pursuant to § 261.4(b)(10), be disposed of according to the method cited above. Failure for other waste codes pursuant to §261.24, requires that the recovered groundwater be managed/disposed of as

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a hazardous waste. This information must be included with the work plan. Also, if groundwater is planned to be disposed through the wastewater treatment plant, the work plan must contain a statement as to the acceptability of such action under the facility's existing NPDES permit(s).

9. Likewise, excavated soils must be evaluated pursuant to the requirements of 40 CFR § 261.24. Those soils that fail the test for Toxicity Characteristics due to Hazardous Waste Codes D018 through D043 only, may, pursuant to § 261.4(b)(10), be disposed of according to the soil disposal method described in section 3.3 and Table 3.1 of the Workplan. Failure for other waste codes pursuant to §261.24, requires that the excavated soil be managed/disposed of as a hazardous waste. This information must be included with the work plan.

10. The line representing "approximate extent of free product plume" portrayed on figure C-4 of the Workplan (and the zero product line on figure C-1 of the Specification document) are grossly inaccurate as to the eastern extent/limits of the free product plume, as discussed in 3 above. Since the correct estimation of the current extent of the free phase product plume (especially east of proposed recovery well RW-6) has material bearing on the adequacy of the recovery system proposed, this inaccuracy must be corrected (and the implications addressed, as discussed in 3 above).

11. The text in section 1.2.3 of the Workplan (and the note on figure P-2 of the Workplan) which states that "the [proposed collection] trench will extend [be excavated] a minimum of 3 feet below groundwater surface..." is not entirely clear. In order for EPA to accept this depth of excavation, the term "groundwater surface" must be clearly defined/specified in this section (and note on Figure P-2) as the free phase/water interface. Or conversely, the Workplan should state that the trench will be excavated a minimum of 3 feet below the base of the free phase product layer measured at the time of construction.

12. The September 1995 Free Product Removal report, prepared by the Navy's consultant, Terra Vac, stated that "...free product in UGW-25 has slowly increased over the past 9 months...[and] The installation of a recovery system should be evaluated at this time as a method to halt the advancing free product plume in this [UGW-25] area." As previously discussed in my April 5, 1996 letter to you, EPA [still] requests an explanation of why this recommendation is not being implemented in the proposed system.

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Subject to the Navy submitting, within 45 days of your receipt of this letter, an acceptable written response and/or revised workplan, adequately addressing and/or meeting the terms of the above comments, the free product recovery system as proposed in the above two documents is conditionally approved. However, as noted above, if Roosevelt Roads fails to have an acceptable free product recovery system, adequately addressing EPA's above comments, on-line at Tow Way Fuel Farm/SWMU #7 by September 30, 1996, EPA will consider taking additional action.

Please contact Mr. Tim Gordon of my staff, at (212) 637-4167 if there are any questions.

Sincerely yours,


Andrew Bellina, P.E.
Chief, Hazardous Waste Facilities Branch

cc: Mr. Sindulfo Castillo, NAVSTA Roosevelt Roads
Mr. Israel Torres, EQB
Mr. Art Wells, LANTDIV Code 1823

Response to EPA Comments

General Response to Comment No. 1, 2, 3, 6 and 10

The Navy acknowledges EPA's concern regarding the development of a current and accurate portrayal of light non-aqueous phased liquid (LNAPL) at the Tow Way Fuel Farm (TWFF), at the Roosevelt Roads Naval Station, in Puerto Rico. The Navy also acknowledges EPA's concern regarding the development of a current potentiometric map covering the entire Tow Way Fuel Farm.

Comprehensive ground-water level/free product measurements will be collected and bail-down tests will be conducted during the month of August 1996. An updated plume map, LNAPL isopach map, a potentiometric map and results of the bail down tests will be provided to EPA for review in October of 1996. It is believed that bail down tests although not 100% accurate, provide a more realistic representation of "apparent" LNAPL available for recovery in a well, compared to straight interface probe thickness measurements (see two attached references). A discussion of the mechanisms affecting both forms of LNAPL measurement at the TWFF will be provided in the October 1996 submittal.

Light non-aqueous phase liquid viscosity tests will be run on a select number of wells to assess potential oil migration rates and LNAPL density tests will be performed to correct water table elevations for the potentiometric map. In addition, historic LNAPL

and ground-water level measurements over time, will be further evaluated to identify trends in free product movement and to establish whether specific recovery performance criteria can be scientifically predicted with any degree of accuracy.

Where necessary, recovery well locations described in the TWFF Work Plan will be modified to address current plume conditions.

It should be noted that although the Navy will make every effort to satisfy EPA's requests for additional evaluations, apparent LNAPL thicknesses and predictions of recovery system performance are rarely estimated with any high degree of accuracy until a recovery system is installed and monitoring begins. Estimations become even less accurate in settings such as the TWFF due to variable conditions such as stratigraphy (heterogeneity of site soils and or fill material), groundwater fluctuations caused by tidal influences, and variable physical properties of the LNAPL. Although additional assessment and modeling at the TWFF has the potential to improve the accuracy of such predictions, the Navy believes that there is no substitute for moving forward with remedial action as generally described below:

- 1) Establishing an acceptable flow rate based on actual pumping (which in this case is based on the Terra-Vac interim product recovery rates);
- 2) Positioning recovery wells in the areas of the thickest product (based on the most updated information as described above);

- 3) Beginning remedial actions with a sound operation and monitoring program and;
- 4) Refining (or tweaking) the recovery system to maximize performance. This could include adding additional recovery wells if necessary, changing pump settings or enhancing overall recovery using techniques such as pneumatic fracturing.

As emphasized in the Navy's previous responses to EPA, we are not proponents of "over-assessment" when funds are limited and we are mandated to focus our time and energy on remedial action.

Response to Comments 4,5,7,8 and 9

Response to EPA Comment No. 4

The Workplan indicates the method for positioning the pumps in Technical Specification 11317, Product Recovery Pumps. The following is the paragraph from the specification which provides direction for pump positioning:

PART 3 EXECUTION

3.1 INSTALLATION

The product recovery pumping equipment shall be installed in accordance with written manufacturers' procedures and recommendations.

Product/groundwater interface shall be measured and recorded prior to setting of the skimmers/pumps. Setting of the skimmers shall be overseen by personnel knowledgeable in the installation and operation of product recovery systems.

Response to EPA Comment No. 5

The Workplan will be revised to indicate the correct number of wells to be installed.

Response to EPA Comment No. 7

An Operation and Maintenance (O&M) Manual will be prepared and submitted to the Navy within 30 days of start-up of the product recovery system. It is not possible to submit a specific O&M Manual at this time as no equipment has been purchased nor has the system been constructed.

Response to EPA Comment Nos. 8 & 9

The pumps specified for this project are equipped with a specific gravity skimmer float. The skimmer inlet floats above groundwater at the product/water interface. This permits the skimmer to collect only product, thereby minimizing the collection of groundwater. In addition, a high water indicator will be added to detect water in the product tank.

Section 3.0, Waste Stream Management Plan, of the Workplan will be revised to specifically indicate wastes, including collected groundwater and excavated soils, will be tested pursuant to 40 CFR 261. Revisions will also be made to the Workplan to comply with the requirements for storage and disposal of the wastes based on analytical testing results.

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Response to EPA Comment No. 11

Section 1.2.3 of the Workplan will be revised to indicate the trench will be excavated to a minimum depth of 3 feet below the base of the free phase product layer measured at the time of construction.

All changes indicated in the above responses will be incorporated into a revised Workplan to be submitted to the Navy in the near future.