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**Baker**

January 21, 2000

US Environmental Protection Agency  
Region II  
290 Broadway - 22<sup>nd</sup> Floor  
New York, NY 10007-1866

Attn: Ms. Nicoletta DiForte  
Chief, Caribbean Section  
RCRA Programs Branch

Re: Contract N62470-89-D-4814  
Navy CLEAN, District III  
Contract Task Order (CTO) 0277  
U.S. Naval Station Roosevelt Roads, Puerto Rico  
RCRA/HSWA Permit No. PR2170027203  
Revised Draft CMS-Task I Report and Response to Comments  
Received In EPA Letter Dated June 30, 1999.  
Tow Way Fuel Farm (SWMU 7/8)

Dear Ms. DiForte:

Baker Environmental, Inc. (Baker), on behalf of the Navy, is pleased to provide you with three copies of the Revised Draft CMS-Task I Report for the Tow Way Fuel Farm. Additional distribution has been made as indicated below.

This submission is in accordance with the Navy letter to the EPA dated January 13, 2000. The Navy's response to EPA comments (dated June 30, 1999) on the Draft CMS Task I Report, revised Section 3.0 of April 21, 1999 are included as part of this letter. This letter and accompanying attachment provide the Navy's response to the comments. Please note that the EPA comments are included in *Italics* before each response for ease of review.

**EPA Comment**

*Tow Way Fuel Farm CMS Task I Report - Section 3.0 Establishment of Corrective Action Objectives (Revised April 21, 1999)*

*EPA's contractor, Booz Allen, has reviewed the revised Section 3.0, and as discussed in the enclosed technical review, concludes that - with one exception, which is discussed in 2) below, derivation of the proposed clean-up levels given in Table 3-2 generally appears to be based on appropriate application of the principles regarding health-based selection of constituent of potential concern (COPQ), and derivation of risk and hazard-based clean-up levels. While Booz Allen's review indicates that the Navy's proposed clean-up levels (given in Table 3-2) are targeted to achieve a protectiveness standard of a 10-4 risk level, or better, EPA has concerns about certain exposure assumptions. Such a protectiveness standard might be acceptable for this site, assuming acceptable site-specific exposure scenarios and pathway assumptions are used in deriving the clean-up levels; however, this is not always clear. For example:*



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- a) *The proposed soil clean-up levels are based on a site specific "military residential scenario" (assumed exposure duration of 4 years) with accidental ingestion and dermal contact pathways evaluated; yet no documentation of the basis for this limited exposure duration is provided.*

#### **Navy Response**

The normal tour of duty at Roosevelt Roads is three years (personal communication with Ms. Madeline Rivera, RCRA Program Manager for Roosevelt Roads), but a fourth year has been added for conservatism. After this period the personnel are moved to a different base to begin another tour. This information will be added to Section 3.0.

The risk assessment performed for the derivation of clean-up goals at the Tow Way uses a four-year exposure period scenario. The "extra" year is added for conservatism. This approach best describes the most conservative (albeit unlikely) future potential land use of the TWFF. Land use scenarios will be supported by the addition of site specific information to Section 2.1 of the CMS report. In addition, proposed corrective measures will be coupled to likely land use scenarios and potential human receptors through a corrective action objectives section, which will be moved from Section 3.3 to Section 3.1 in text.

#### **EPA Comment**

- b) *The benzene clean-up level for groundwater is based on the "military residential" exposure duration, with non-potable usage of groundwater exposure pathways (accidental ingestion and dermal contact during usage of groundwater for watering lawns and washing cars) evaluated; yet the other groundwater clean-up levels are based on a [temporary] construction worker scenario, which has an assumed exposure duration of [only] one year. An explanation is required.*

#### **Navy Response**

Clean up levels were established considering the most likely current potential land use at NSRR. Based on an evaluation of residual risk, use of the construction worker scenario clean up level for benzene will not provide adequate protection for future military residential land use. Therefore, the more conservative military resident groundwater clean up level (800 ug/L) was selected for benzene to be adequately protective of human health when volatilization and the inhalation pathway is considered.

However, a property use restriction can be used to prevent future military residential development of the property. As a result, the clean up level for construction workers will be established for benzene in groundwater at the TWFF and institutional controls will be established as part of the selected corrective measure to be adequately protective of human health. This provides a more consistent application of the corrective action objectives, which are intended to protect human health under current use and most likely future land use scenarios. This information will be presented more clearly in the revised CMS report.

#### **EPA Comment**

- c) *In addition, no permanent on-site worker exposure scenario, with a long term (greater than one year) exposure duration, was evaluated for any of the media.*

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**Navy Response**

Acknowledged. A future commercial/utility worker scenario has been added to Section 3.0, which evaluates the potential for on-site workers to be exposed to soil contaminants 250 days per year for 25 years.

**EPA Comment**

*EPA requests that Section 3.0 be revised to assess an exposure scenario for permanent on-site workers (long term exposure duration); including an evaluation of inhalation exposure (including volatiles stemming from shallow groundwater, as discussed below), and also to address comments in a) and b) above. However, General Comment No. 4 (regarding groundwater usage, etc.) of the enclosed Booz Allen comments does not have to be addressed at this point, as the exact mechanism for groundwater usage restriction and/or documentation of its non-usability, can be discussed in the Final CMS report.*

**Navy Response**

The commercial/utility worker scenario has been added to section 3.0 of the CMS. Inhalation pathways were evaluated which consider the potential emission of benzene from groundwater through cracked foundations (residents and commercial utility workers) and the emission of benzene from both subsurface soil and groundwater (construction workers). Clean up levels derived for benzene in both soil (345 mg/Kg) and groundwater (800 ug/L) are protective of all potential human receptors when the inhalation pathway is considered. This information will be reevaluated and presented more clearly in the revised CMS report.

**EPA Comment**

- 2. The exception to comment 1 above is that inhalation exposures of construction workers ["commercial workers" assumed by Booz Allen to mean construction workers] are evaluated based on particulate emissions from subsurface soils only, and do not include an evaluation of inhalation of volatiles stemming from shallow groundwater. EPA requests that Section 3.0 be revised to assess this exposure pathway.*

**Navy Response**

The inhalation pathway produced no unacceptable human health risks in the baseline risk assessment. However, all means of inhalation exposures were not evaluated at that time. The CMS examined the potential for benzene to volatilize and affect human receptors exposed to both indoor air and ambient outdoor air. In addition, a construction worker inhalation scenario was added to this version of the CMS which evaluated the potential emissions of benzene from subsurface soil and groundwater and the associated risk to the construction worker exposed during excavation activities. Benzene clean up levels established for both soil and groundwater are protective of all potential human receptors and likely property use scenarios at the TWFF.

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**EPA Comment**

- 3. Booz Allen also stresses in their enclosed comments that the stand-alone revised Section 3.0 of the CMS Task I Report, submitted by Baker's April 21, 1999 letter, provides inadequate data to allow for independent assessment of the adequacy of the proposed clean-up levels given in Table 3-2. While EPA does not necessarily wish to revisit old issues, EPA does wish to have a complete stand-alone CMS Task I document that provides sufficient data to allow for independent assessment of the adequacy of the proposed clean-up levels. In order to address this comment, and all the other deficiencies and/or concerns noted by Booz Allen in their enclosed technical review, and in comments 1) and 2) above, please submit within 40 days of your receipt of this letter, a revised, complete CMS Task I document that provides sufficient data to allow for independent assessment of the adequacy of the proposed clean-up levels. Until these issues are resolved, EPA is not prepared to approve any of the proposed clean-up levels.*

**Navy Response**

Agreed. A complete stand alone CMS Task I document providing sufficient data to allow for independent assessment of the adequacy of the proposed clean up levels is submitted in the attached report.

**Booz Allen Comment****GENERAL COMMENTS.**

- 1. In general, the revised Section 3.0 (dated April 21, 1999) Establishment of Corrective Action Objectives, Tow Way Fuel Farm Corrective Measures Study Report (CMS), appears to apply the appropriate basic principles regarding health-based selection of constituents of potential concern (COPC) and derivation of risk- and hazard-based clean-up levels (preliminary remediation goals). However, the amount of information within the revised Section 3.0 does not provide sufficient data regarding the nature and extent of contamination at the Tow Way Fuel Farm. This information is necessary to complete a defensible review of the development of corrective action objectives and is presumably contained within the referenced baseline human health risk assessment.*

**Navy Response**

Agreed. Information from the RFI and baseline Human Health Assessment will be added to Sections 2.0 and 3.0 of the CMS to create a "stand alone" document and support the development of clean up goals. Information concerning current property use, potentially exposed populations and other important demographic data will be added to support the development of corrective action objectives, which will be prioritized in Section 3.0 (see previous comment responses) of the CMS.

**Booz Allen Comment**

- 2. This review of the revised Section 3.0 (dated April 21, 1999) is limited to an analysis of the methodology by which preliminary remediation goals were calculated. This review does not extend to the baseline risk assessment. Booz Allen assumes that all previous reviews were appropriate and resulted in defensible positions, and that this CMS is an extension of a defensible risk assessment. In fact, initial indications suggest that this is the case, although the general guidance upon which the preliminary remediation goals is predicated appears somewhat dated*

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*(e.g., use of the 1989 Exposure Factors Handbook rather than the 1997 version). With the notable exception of the omission of an evaluation of inhalation exposures of volatiles from shallow groundwater, the generation of clean-up levels derived in Section 3.0 of the CMS Report, appears to have a relatively conservative basis, given the receptor group at issue. However, comments A through D, below discuss potential data gaps associated with the review of this single document without review of the associated background documents (e.g., Baseline Human Health Risk Assessment).*

- A. *This document, as part of a greater report, provides an incomplete basis for the review of appropriately protective health-based standards as the basis for preliminary remediation goals or clean-up levels. The document does not provide an effective discussion of the selection of COPCs. Selection of COPCs appears to be simply based on comparison to the USEPA Region III Risk-Based Concentrations (RBC) and to a lesser extent on USEPA's Maximum Contaminant Levels (MCL) for drinking water sources. This document does not provide a complete discussion of non-anthropogenic inorganic background levels, nor does it provide a discussion of data quality or validation. A discussion of sample quantitation limits (SQL) or treatment of elevated detection limits is not provided. Without an effective discussion of the data treatment it is not possible to determine whether COPCs have been adequately and accurately identified. Without this information it is impossible to determine whether all relevant exposure pathways (e.g., ingestion, inhalation, dermal contact) have been considered. As a result, it is not possible to evaluate fate and transport considerations and the subsequent identification of potentially impacted media.*

#### **Navy Response**

Information from the RFI and baseline Human Health Assessment will be added to Sections 2.0 and 3.0 of the CMS to create a "stand alone" document and support the development of clean up goals. Information concerning current property use, potentially exposed populations and other important demographic data will be added to support the development of corrective action objectives, which will be prioritized in Section 3.0 of the CMS.

A section concerning data quality will also be added to Section 3.0 to discuss the analytical methods, data quality and quantitation limits of the reported data. Background data were not used in the Draft CMS to limit the number of COCs. A discussion of background data will also be added to Section 3.2 Clean up Goals if inorganic COCs are identified in the next revision of the CMS report.

#### **Booz Allen Comment**

- B. *Without additional information, it is impossible to determine whether groundwater COPCs were screened in an appropriately conservative manner. Use of MCLs can be limiting in that these federally promulgated levels are limited in number and are not available for all compounds commonly associated with hazardous waste sites. In addition, MCLs may be based on target risk or hazard levels in excess of  $10^{-4}$  or 1.0, respectively. Likewise, the MCLs are influenced factors other than a health basis, such as economic cost-to-clean constraints treatment technology limitations. Where MCLs are available, they constitute, important applicable or relevant and appropriate requirements (ARAR), but are not effective when implemented as health-based screening levels in the interests of calculating baseline risk; nor should they implicitly be used to screen a given contaminant from further consideration at the Corrective Measures (CMS) or remedial stage.*

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**Navy Response**

Agreed. MCLs were cited in the Draft CMS because they are important ARARs but they are not selected as clean up goals because groundwater is not used as a potable supply. They are included for comparative purposes with other clean up goals and evaluation of corrective measures.

**Booz Allen Comment**

C. *The document does not provide an adequate discussion of the current or future proposed land uses. Without this information, and additional information regarding the surrounding land use, it is not possible to evaluate the applicability of the receptor populations, exposure routes and pathways outlined for discussion. It is unclear why the sole receptor population considered is a transient population - the on-site construction worker - exposed under subchronic to chronic conditions. Contrary to the position proffered in the document, exposures characterized as occurring over the course of 180 days cannot be considered acute. Likewise, it is not possible to evaluate the applicability of selected exposure parameter values used in the calculations of site-related risks and/or hazards, or the back-calculation of clean-up levels. For example, it is not possible to evaluate the applicability of an exposure frequency of 180 days/year or an incidental (rather than accidental as written) soil ingestion rate of 480 mg/day.*

**Navy Response**

Agreed. Current exposure is limited to military residents and construction workers at the TWFF. A commercial/utility worker has been added to the Section 3.0 to evaluate longer duration worker exposures.

**Booz Allen Comment**

D. *The proffered clean-up levels are specific only to a current or future construction worker, not to an on-site worker who might be reflective of exposures typified by a generic commercial/industrial worker. This is illustrated by the calculated soil remedial goal of 345 mg/kg for benzene, as compared to the Region III industrial RBC of 200 mg/kg. By extension, this level is clearly not protective of generic residential exposures.*

**Navy Response**

Agreed. The site specific soil clean up level of 345mg/kg is 1.725 times greater than the Region III industrial RBC of 200 mg/kg. The Region III RBC value is established at target risk of  $1 \times 10^{-6}$ . By convention, establishing a site specific clean up level of 345 mg/kg results in a  $1.7 \times 10^{-6}$  residual risk, well within USEPA's generally acceptable risk range. Groundwater clean up levels established for the construction worker would increase the risk to both future military residents and residential use scenarios occurring under generic conditions. As a result, property use restrictions will be employed as part of the corrective measure to prevent future property uses for which residual risks are unacceptable.

**Booz Allen Comment**

3. *Although EPA's National Oil and Hazardous Substances Pollution Contingency Plan (NCP) specifies an acceptable risk range of  $10^{-6}$  to  $10^{-4}$ , an acceptable carcinogenic risk level is usually determined by the Agency on a site-specific basis. The CMS does not provide extensive information regarding cumulative estimates of risk upon which remedial decisions may be based.*

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*However, the presented values are reflective of the preeminent risk drivers. Additional additive input from COPCs excised from the detailed discussion are likely to be negligible (or at least unlikely to result in an order of magnitude difference). It appears that the facility is targeting a remedial strategy designed to ensure that risk estimates do not exceed the  $10^{-4}$  threshold, assuming that this upper bound level is applicable under current and future use conditions. A broader review of information not presented within this document is necessary to determine the applicability of allowable risks in the mid or upper  $10^{-5}$  range. The risk assessment appears, however, to have been predicated on some relatively conservative standard default assumptions (e.g., an incidental soil ingestion rate of 480 mg/day).*

#### **Navy Response**

Comment Acknowledged.

#### **Booz Allen Comment**

- 4. The CMS does not discuss in sufficient detail a vehicle to preclude use of groundwater. Low yield and availability of a secondary water source do not render additional use of the underlying shallow aquifer wholly impractical. There is no discussion of a deeper aquifer and no discussion of whether the shallow groundwater contamination may be capable of migrating off-site. As part of the decision rationale, this section should present a discussion of whether the shallow aquifer is underlain by an aquitard/confining layer or could potentially be in hydraulic contact with a deeper or bedrock aquifer. The facility does recognize that institutional controls such as implementation of a restrictive covenant on the deed of the facility are necessary to achieve the corrective action objective, given the current and predicted/likely future land use. Without such a vehicle, the future use of the property for residential/military residential or use other than current industrial activities, however unlikely or impractical, is not rendered impossible. Thus land use and access to groundwater must be restricted in support of the protection of public health.*

#### **Navy Response**

Agreed. Low groundwater yield (i.e., yields of less than 150 gallons per day) can be used as a criterion for classifying aquifers as non-potable (USEPA, 1988). In general relatively poor groundwater quality at NSRR results in the use of surface water bodies as potable supplies. Additional information regarding shallow and deeper groundwater aquifers will be added to the revised CMS report. In addition, the ability of contaminated groundwater to migrate vertically and horizontally will be discussed in Section 2.0 of the report. Institutional controls will also be established as part of corrective measures to protect future potential human receptors from exposure to affected groundwaters if residual risk values are unacceptable.

#### **Booz Allen Comment**

##### **SPECIFIC COMMENTS**

*Section 3.2, Page 3-3, Last Complete Paragraph: Identification of Media of Concern/Contaminants of Concern (COCs) as Determined by the Human Health Risk Assessment*

- 1. This paragraph implies that filtered groundwater samples were used. EPA typically does not support the use of filtered groundwater samples, preferring instead to use unfiltered samples as more representative of total contaminant concentrations. Arsenic is eliminated as a contaminant of concern (COC) in groundwater because it was detected in only one dissolved groundwater*

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*sample and because it was attributed to naturally occurring concentrations. It is unclear why an environmental sample of this nature should be discounted in this manner, unless significant uncertainty was associated with the laboratory result. One reason for discounting this finding could be discrepancies with regard to duplicate analysis or analysis of split samples submitted for total contaminant concentration (unfiltered) which were returned at non-detect or significantly lower levels. Information of this nature is not provided in Section 3.0 of the CMS Report.*

#### **Navy Response**

Inorganic concentrations, both total and dissolved, will be re-evaluated in the revised CMS report. Data quality will also be evaluated to determine whether any uncertainty exists in the laboratory result. Because of the nature of monitoring well construction and sampling techniques employed to collect environmental samples, total results for inorganics may be elevated because of the presence of solids collected with the groundwater. As a result, total and dissolved results for inorganics will be provided in the revised CMS for risk management decision making and the selection of a corrective measure.

#### **Booz Allen Comment**

##### **Section 3.4.2, Page 3- 7: Human Health Risk-Based Preliminary Clean-up Goals**

- 2. This section refers to evaluation of the inhalation pathway for commercial workers. It is assumed that this is a typographical error and the facility originally meant to refer to construction workers. Inhalation exposures of construction workers are evaluated based on particulate emissions arising from subsurface soil, but do not extend to an evaluation of inhalation of volatiles stemming from shallow groundwater. Volatile organic compounds (VOC) were detected in the shallow groundwater including benzene, toluene, ethylbenzene and xylene (BTEX) compounds. As a result, an evaluation of inhalation exposures based on volatiles stemming from shallow impacted groundwater is necessary to advance estimates of aggregate carcinogenic risk upon which to base preliminary remediation goals.*

#### **Navy Response**

Volatilization from both soil and shallow groundwater and exposure through the inhalation of outdoor and indoor air was evaluated. In addition, a conservative evaluation of construction workers potentially exposed to benzene - which may volatilize from subsurface soil and groundwater was also added to Section 3.0.

#### **Booz Allen Comment**

*It should be noted that although VOCs were not detected in soil, benzene was retained as a soil COPC and is evaluated based on the Farmer volatilization from soil model. This exercise appears to have been unnecessary in that the facility already had an indication that benzene was not detected at elevated levels in soil, based on comparison to residential RBCs.*

#### **Navy Response**

The model was run in response to a previous EPA comment.

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**Booz Allen Comment**

**Section 3.4.3, Page 3-8, Second Complete Paragraph: Selection of Clean-up Levels**

3. *This section of the document refers to inhabitants. It is assumed that the facility is referring to on-site construction workers. This should be verified.*

**Navy Response**

This section is referring to the residual risk to future residents posed by the inhalation of volatilized benzene if a clean up level of 345 mg/Kg is employed. Text will be clarified to indicate future military residents rather than inhabitants.

**Booz Allen Comment**

**Section 3.4.3, Page 3-9, Second Complete Paragraph: Selection of Clean-up Levels**

4. *Construction worker exposures incurred over 180 days cannot be considered acute. Exposures over this duration should be considered chronic. Also, this paragraph seems to imply that because of the duration of exposure, clean-up goals will only be generated for noncarcinogenic compounds; yet Table 3-2 presents clean-up goals for benzene in groundwater, based on construction worker exposures. Footnote 1 from this Table indicates that the 800 ug/L level is based on military residential exposures attributable to volatilization of benzene from both subsurface soil and groundwater. This is not discussed within the text. Construction workers are expected to be exposed to volatilization of contaminants from subsurface soil and groundwater. The text, however, lists no volatile COPCs in subsurface soil and fails to discuss inhalation of volatiles by a construction worker stemming from impacted shallow groundwater or subsurface soil - either in the ambient air breathing zone within overlying buildings, unbroken soils, or during subsurface intrusive construction activities.*

**Navy Response**

Text for the second complete paragraph on page 3-9 will be added to clarify the selection of the groundwater clean up level for benzene. Because benzene is a carcinogen, the construction worker clean up goal of 2,100 ug/L is not adequately protective of human health when the inhalation pathway is considered. As a result, institutional controls will be implemented as part of the corrective measure to be adequately protective of the military resident.

Although BTEX were not detected in TWFF subsurface soils, they were detected in groundwater. It is unlikely given the nature and extent of contamination at the TWFF that these contaminants would not be present at levels that could produce unacceptable human health risks. As a result, they were retained in the development of clean up levels for both media at this site.

**Booz Allen Comment**

**Appendix A-2**

5. *This table tends to indicate that on-site construction workers are exposed to subsurface soil only, rather than a composite of surficial and subsurface soil. It is unclear why the facility would make such an assumption, unless contamination increases with depth and in this treatment of the data set, the facility sought to generate what they felt was a more appropriately conservative basis for the exposure point concentration.*

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**Navy Response**

This is correct. Contaminant concentrations appear to be more significant at depth and the most likely current and future potential human receptor to subsurface soil contamination would be construction workers.

Please do not hesitate to call me at (412) 269-2009 or Mr. Christopher T. Penny, the Navy's Technical Representative, at (757) 322-4815, if you have any questions.

Sincerely,

BAKER ENVIRONMENTAL, INC.



Mark E. Kimes, P.E.  
Activity Coordinator

cc: Mr. Tim Gordon – USEPA Region II (3 copies)  
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