



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



BUREAU OF WATER MANAGEMENT
Permitting, Enforcement & Remediation Division

February 18, 1997

Mr. John Barrett
USA COE
Attention CRMRO-ED-EA
215 North 17th St.
Omaha, NB, 68101-0103

RE: Stratford Army Engine Plant Remedial Investigation

Dear Mr. Barrett:

DEP staff have reviewed the draft final report titled "Phase II Remedial Investigation Report; Stratford Army Engine Plant, Stratford, CT", which was prepared for USAEC by Woodward Clyde and is dated April 1996. DEP staff have also reviewed the associated baseline risk assessments and the precursor Phase I investigation report. In addition, DEP has reviewed the October sampling proposal prepared by ABB and an undated partial draft of the Phase III RI/RFI SAEP SOW for further investigations at the site. The comments below for the most part restate and formalize verbal comments provided at several BCT meetings. They are intended to identify further data collection and data evaluation objectives for the site characterization. General comments regarding the Human Health Risk Assessment are also provided. Comments regarding the Ecological Risk Assessment will be separately provided as necessary in follow-up to the December BCT meeting regarding ecological risk.

In general the reports which were reviewed appear to adequately identify areas of concern and document the magnitude of contamination which is present at the site but they do not completely characterize the degree and extent of soil pollution associated with each of these areas. The risk evaluation is incomplete because it is based on this site investigation data. Additionally, because the risk evaluations were conceived prior to BRAC listing, the range of potential uses envisioned for the plant was limited and should be expanded. Because of these issues neither the characterization of the site nor the evaluation of human health risk are complete and further work is necessary for evaluation with respect to Connecticut's Remediation Standard Regulations (RSRs) which have been promulgated since the investigations were designed. A more detailed discussion is provided below.

Site Soil Characterization

DEP recommends further site soil characterization and data evaluation be designed to focus on areas identified in the Environmental Baseline Study as "category 7", indicating further study is needed. The unresolved issues which result in category 7 classification can be broadly grouped into several classes of uncertainty, each of which is discussed below.

- 1) Areas where there are significant data gaps regarding the potential for soil pollution require further "phase 2" testing to determine if a release has occurred.

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Most of these are addressed in the October ABB sampling proposal and draft Phase III SOW, however some are not, or cannot be clearly identified as fully covered. The next sampling efforts should also include testing for identification of releases and environmental evaluation of the following areas, extracted from table 5-1 of the EBS

- parcel 1: possible lagoons or pits
- parcels 5, 8, 15, 16, 27, 29: "probable" soil contamination
- parcel 26 fuel storage area
- parcel 9 edge of dike, some parcel 12 areas (heat treat, oil wrap, B-63) (these may be covered however the ABB proposal does not clearly indicate this by using the same terminology as the EBS)

In addition, the investigation should ensure it includes evaluation of all documented current *and former* degreaser locations, and also all known current *and former* oil-containing sumps, to verify there is no non-aqueous phase pollution below these units, and that the indoor air quality is not potentially impaired by any localized releases. (See also comments related to groundwater, soil gas, and volatilization criteria below.)

- 2) Areas of concern (AOCs) with identified or presumed releases exist at the SAEP and require further characterization, evaluation, and comparison to remedial criteria found in the RSRs.

DEP recommends that, first, the existing soil analytical data from identified areas of concern be specifically evaluated in comparison to the RSRs to determine on a preliminary basis if soil clean-up at an AOC may be needed. Such comparisons should be made for the GB Pollutant Mobility Criteria and also for both the industrial and residential Direct Exposure Criteria, in order to present a complete summary of site conditions. In some cases the existing data may indicate clearly that no mitigation is necessary, or that a presumptive remedy could be implemented (e.g.: removal of a small area of concern exceeding direct exposure criteria or installation of a localized soil vapor extraction system) without further pre-remedial study. In other cases, SAEP may find that further data collection is necessary because existing data cannot be confidently viewed as reflecting the highest levels of pollution at an area, or because the range of analytes or the sensitivity of analytical detections is not sufficient for making meaningful comparisons to the RSR criteria. SAEP should fully document this data evaluation and all decisions based on existing data, especially for those AOCs where SAEP recommends no further evaluation.

Where the screening data indicate the RSRs are exceeded, the existing data should be reviewed to determine what additional information is necessary for remedial decision-making. Further soil-based data collection for each area of concern should be focused on defining the extent and degree of soil contamination, to the extent necessary to either determine the remedial activity required, or document conclusively that contamination levels are below remedial criteria. This level of data acquisition is not generally addressed, for many areas of "known soil contamination", by the October proposal for further investigation, however further limited work at some AOCs is included in the ABB document. It is necessary to develop and articulate a reasonable understanding of the nature of contamination associated with each AOC to have a sound basis for remedial

decision-making, especially if SAEP expects to use an alternative means for demonstrating compliance with the RSRs. Note, however, that many areas with an expected need for remediation could perhaps better be characterized during remedial design, therefore their inclusion in this study phase may not be necessary.

DEP expects that the site will eventually be transferred with Environmental Land Use Restrictions (ELURs) which limit disturbance of inaccessible soil. Therefore, DEP recommends that, where screening identifies an AOC as possibly exceeding direct exposure criteria, further evaluations be initially focused on accessible soils, as defined in the RSRs. This approach would allow those areas which may require remediation to move forward more quickly towards remedial design. Note that sufficient data regarding inaccessible soils must also eventually be gathered to form a basis for defining the soils subject to an ELUR.

In complement to the above focus on accessible soils, site investigation should also focus, through soil gas screening or soil sampling, on defining areas with soils which may be a potential source of volatile organic constituents affecting indoor air quality.

Please note that the RSR Pollutant Mobility Criteria for soil address identification of pollutant source areas which require mitigation to limit further pollution of the State's groundwaters, regardless of groundwater goals established for a site. Data regarding even the environmentally isolated soils under the buildings and their potential for pollution if exposed must eventually be gathered, in a complete site soil characterization, to provide a basis for an ELUR.

If the screening evaluation of existing data indicates soil pollution exceeds the RSR Pollutant Mobility Criteria established for a Class GB area, DEP, based on experience, recommends that SAEP's further investigation of pollutant mobility be based on analytical results from SPLP testing. Metals data can be compared directly to the pollutant mobility criteria, however organic constituent leach results must be compared to ten times the groundwater protection criteria tabulated in the RSRs.

Within the framework of the RSRs, compliance with the pollutant mobility criteria can be evaluated using several different approaches, including statistical methods, and the investigative design should ensure flexibility in subsequent data evaluation is not compromised. As a result the use of composite samples in this stage of investigation should be carefully evaluated to determine if all data objectives would be met. In addition, if SAEP expects to seek an alternative pollutant mobility criterion, the full extent and site specific mobility of the pollutant for which such a criterion would be sought must be determined.

- 3) Many AOCs are chemical/waste storage and handling areas, including satellite accumulation areas, chemical storage areas, and ASTs, where chemical handling could have resulted in a release. At these the actual release status should be clearly documented, and some of these AOCs may require further confirming sampling.

Although worksheet A of the EBS identifies these areas, it does not indicate the specific data or observations used in confirmation of no release at each area. (Note that the numbering between worksheets A, where releases are noted, and B, which apparently

reviews release reports, is inconsistent, and releases noted on either should be evaluated.) In addition, as subgrade process and waste lines are closed out their potential for a release should be evaluated. DEP recommends that the status of the chemical management areas be resolved in conjunction with Allied Signal as they vacate the facility, and unless a release appears likely, that only limited effort should be made prior to this event.

Site closure must eventually be based on documentation of the specific no-release status of each area, after the area is no longer used. Evaluation of the type of material handled, the nature of the containers, and the potential release pathways should be included as a basis for close-out evaluation. DEP has a guidance document regarding closure of RCRA generator storage areas. For other AOCs SAEP can typically use professional judgement to determine the nature of the necessary documentation, which can vary depending on the type of waste and the potential release pathways. If the existing data do not support a no-release conclusion when a critical evaluation of the data is documented, additional sampling is necessary. Where releases are identified, release characterization and comparison to remediation criteria to determine necessary mitigation, as discussed above, are necessary.

Details of the process for documenting the status of each area without known releases should be included as a section in the next version of the BCP; rather than in the Phase III investigation plan. However, the time-line for evaluations of these areas should provide for ready identification of release areas which require further characterization, and SAEP may wish to presumptively include some areas in the Phase III.

A subset of the universe of chemical management areas is the universe of USTs, especially those formerly used USTs where documentation of releases and remedial efforts is not complete, such as those in parcels 4,30,31,and 33. In conjunction with the RI Phase III, a focused UST field investigation using direct push technology, microwells, and soil gas techniques is recommended, to resolve status of the USTs, once the tank areas are accessible. The presence or absence of non-aqueous phase liquids should be determined to comply with the RSRs.

- 4) Other environmental issues also exist which require resolution to lift the category 7 classification. Worksheet C of the EBS identifies other environmental issues such as lead paint, asbestos, radiation, PCBs and explosives. Although most of these issues are not particularly soil-release-related issues relevant to an RI Phase III, they eventually must be evaluated in sufficient detail to allow the uncertainties resulting in listing as category 7 to be resolved. The proposed radiation survey and asbestos survey should substantially address many of these data requirements, the others must also be documented as resolved prior to closure, and the process should be incorporated in the next BCP.

DEP's RSRs require evaluation of all areas where PCB leaks or retro-filling activity may have resulted in the release of any PCBs at levels in excess of 1 ppm. Areas with the potential for such release should be identified and evaluated in conjunction with the RI Phase III.

- 5) Identified areas of groundwater pollution contribute to the category 7 classification of several parcels. Groundwater issues are discussed separately below.

Groundwater Quality

Further evaluation of groundwater quality on the site is needed to determine compliance with the Surface Water Protection Criteria and the Volatilization Criteria in the RSRs. Such evaluation should be receptor focused. It is best based on a three dimensional perspective towards groundwater flow and contaminant distribution and transport, and should also include a determination of the tidal, seasonal, and long-term trends in water quality.

DEP recommends an initial integrated examination of existing data from the principally source-focused monitoring network to develop or refine the site-wide hydrogeologic conceptual framework to best focus any further investigation of groundwater impacts on the environment (both ecological effects and building interior air quality) and to direct collection of any additional data needed for evaluation of the need for groundwater remediation.

To the extent that the integrated groundwater data can also be interpreted to identify local sources of pollution which contribute to unacceptably degraded site groundwater quality, these sources should be targeted for further investigation and mitigation as discussed for identified release areas above.

Volatilization and Soil Gas Criteria

Shallow groundwater which flows under the site should be compared to both the industrial and residential volatilization criteria, and areas which exceed these criteria should be identified on a map. Exceedences of the criteria exist, and SAEP should plan to evaluate soil gas quality, relative to the soil gas criteria. A mobile lab to determine soil gas analytical results may be useful in construction of an isoconcentration map of soil gas criteria exceedences by focusing investigative efforts with real-time data interpretation. (Such soil gas data may also be useful in targeting future investigation or remediation efforts on apparent source areas.)

Should significant soil gas or volatilization criteria nonconformance be identified, SAEP may wish to consider the need for passive controls or interior air monitoring, as provided in the RSRs. Additionally, site specific soil gas criteria for data reinterpretation could be back-calculated from the indoor air quality targets in the RSRs. Any alternative assumptions used in such calculations should be based on the broadest range of potential future uses and configurations of the site. DEP recommends preliminary Departmental review of any alternative assumptions before extensive calculations are conducted.

Surface Water Protection Criteria

Because of the site's hydrogeologic setting, DEP also requests that the hydrogeologic investigation initially determine the groundwater pollutant flux to the tidal flat area, the Marine Basin, and Frash Pond. SAEP should determine groundwater flow rates and the identity and concentrations of pollutants. Initially, SAEP should compare the estimated groundwater quality which is discharging in the subsurface across the shoreline to the tidal flat, and across the property boundaries to other receptor water bodies, with the state's adopted surface water quality standards for chronic saltwater toxicity. For those pollutants with significant exceedences, SAEP should present groundwater isoconcentration maps and cross sections which identify areas where these criteria are exceeded. It may be necessary to obtain additional data using more sensitive test methods, with detection limits allowing meaningful comparisons to the surface water criteria.

Where exceedences of the criteria exist, the need for, or scope of, any groundwater renovation must be determined through a more specific ecological risk evaluation which incorporates site specific hydrogeologic factors as well. Such factors would include development of a site specific dilution factor, taking into account surface water hydrologic factors, for the receptor areas with indicated water quality degradation.

Human Health Baseline Risk Assessment

The Human Health Baseline Risk Assessment is not consistent with DEP's policies for risk assessment as detailed in the Connecticut RSRs. These regulations should serve as the basis for any risk evaluations conducted within Connecticut. The RSRs provide default tabulated remediation criteria for many contaminants. These criteria address exposure to soils and groundwater as well as air which has been impacted by the volatilization of contaminants from groundwater or soils. Each of these pathways need to be included in the risk assessment. The Human Health Baseline Risk Assessment can typically take two forms - either a simple comparison to the risk based criteria contained in the RSRs or a detailed site specific analysis. For site specific evaluations, sufficient justification must be provided to indicate the reasons for which the criteria contained in the regulations are not appropriate for the site.

At this time, DEP recommends that SAEP revise the Human Health Baseline Risk Assessment to encompass a comparison of site conditions with the criteria in the RSRs, although the option to conduct a site specific evaluation remains available. One exception to this is the consideration that the waterfront area may be developed into a public bicycle path/recreational area. SAEP should consider calculating site specific values to evaluate risk associated with potential exposures associated with this use. All potential exposure pathways and receptors should be included. Examples of specific exposure pathways to be considered in association with this use are direct human contact with contaminated sediments and the potential for exposure through ingestion of fish or shellfish collected at the site. Prior to conducting the risk assessment, SAEP should submit a proposal to DEP for review and comment which outlines the exposure scenarios to be used in this evaluation.

Independent of whichever approach is taken for evaluating risks at the site, there are several fundamental considerations which must be reflected in the risk assessment but were not addressed in the document submitted. These include:

Cancer risk shall be evaluated at a $10E-6$ level for individual chemicals and a $10E-5$ level for chemical mixtures.

Risk based criteria shall be calculated for any pollutants present at the site for which no criteria are available in the RSR. The RSR should be consulted for the formulae and exposure assumptions necessary to derive the additional criteria.

In order to conduct the risk assessment, potential future uses of the site must be identified in order to properly select from the residential or commercial/industrial criteria provided in the RSRs.

Complete environmental data based upon a full characterization of the nature and extent of contamination present at the site is necessary for a successful risk evaluation.

Toxicity information is available for lead and should be incorporated into risk assessments.

Ecological Baseline Risk Assessment

DEP discussed further data needs regarding ecological risk evaluation of shore, surface water, and sediment areas at the December BCT meeting, comments are not incorporated in this letter. DEP will separately forward more detailed comments on the Ecological Risk Assessment.

Additional specific comments

Please also consider the following specific comments in any revisions to the reviewed documents or, if more expedient, in subsequent phases of site investigation:

The groundwater use survey should be supplemented by Stratford Health Department data which have been developed in conjunction with the Raymark site evaluation.

The sediment data at TE3 seem anomalously inverted; could the samples have been mislabeled?

The range of pollutants typically associated with fire training areas such as that on the causeway is wider than those which were analyzed, further testing should be inclusive.

The specific nature and composition of fill material, especially the original causeway, should be evaluated to ensure that Raymark-derived waste is not present, additional analytes may be necessary.

Mercury must be evaluated at areas of the site where there are potential or documented releases.

While it is appropriate to limit the target analytes at an AOC on the basis of waste handled, implementation of this limitation at the plating area is not correct. All constituents which have not been ruled out at the main site should be included at the plating area, which is a subset of the main site. The appropriate response is to add those constituents of unique concern in the plating area.

In evaluation of water quality in the tidal inlet, WWTP flow cannot be considered as clean dilution water since it has a pollutant load itself.

If the Army expects to establish an alternative clean-up criteria based on background, the determination of background should be more rigorous, including statistical evaluation of analytical data, from local areas of similar geology which are unaffected by the facility, to document a confidence limit for the background values. At the December BCT meeting EPA data gathered during the Raymark investigations was discussed as an additional source of background information.

When evaluating soil boring information, samples taken at the top elevation of the water table, regardless of depth below ground surface, are most appropriate for many interpretations, and should be collected, in addition to any near-surface or subslab samples, especially where NAPLs may be present. More than one sample per boring may also be appropriate based on microstratigraphic features, such as subslab sand layers, and their potential control on contaminant migration, as interpreted by the on-site geologist.

Analysis of composite samples should be limited to preliminary evaluations. DEP's RSRs provide for compliance evaluation using averaged data but require evaluation at a 95% confidence limit, which must be calculated from a discrete set of data for an area of concern.

Some data interpretations are based on an assumption of log normal distribution for data, yet there is no documentation that this assumption was tested and verified.

Detection of pollutants in blanks does not negate the need for evaluation. Risk evaluation must consider pollutants which are detected in blanks by evaluating reported sample levels in excess of blank levels.

The estimation of leaching potential is not complete because not all areas of greatest contaminant concentration identified in phase I were evaluated. In addition, the mobility of volatile organic compounds was not evaluated.

DEP does not consider the advective dispersive modeling used to evaluate potential water quality as appropriately implemented. The model does not reflect a completely defined hydrogeologic framework as discussed above, and it does not reflect the maximum potential source which might be contributory to site groundwater quality. Also, the model's response and sensitivity to parameter estimates used in calculation have not been evaluated.

DEP recommends that groundwater sampling use low flow techniques to most accurately evaluate mobil pollutant levels, especially for metals.

Risk assessments may need to calculate additional benchmarks as needed.

Summary of RI Phase III Objectives

The general objective of further soil environmental investigations at SAEP should be to, as necessary, supplement the existing environmental data set to fully document the environmental status of all areas of concern identified in the EBS in table 4-1. Critical evaluation of the existing data set can define, for each AOC, the specific further data acquisition needs. To resolve the status of these AOCs it may be necessary to gather additional data to:

- 1) evaluate areas identified in the EBS as still needing determination of whether a release is present, and, if a release has occurred, determine its extent;
- 2) define the extent and degree of soil contamination, for all AOCs, including all those identified as having actual or potential soil releases, and thereby allow, through comparison to the RSRs, either determination of the necessary remedial activity, or conclusive determination that no remediation (or further remediation) is needed;
- 3) document that all AOCs which are chemical handling areas without indication of release, including those which are satellite accumulation areas or ASTs, are fully closed out when the plant is vacated;
- 4) document the adequacy of past activity at all AOCs which are USTs with incomplete closure records;

- 5) characterize areas which are either inaccessible or environmentally isolated to support the filing of an ELUR; and
- 6) evaluate soil remedial requirements driven by ecological risk (not discussed above specifically).

The general objective of further groundwater environmental investigations at SAEP should be to, as necessary, supplement the existing environmental data set to fully evaluate impacts on indoor air quality and ecological receptors. Critical evaluation of the existing data set can define the specific further data acquisition needs; it may be necessary to gather additional data to:

- 1) identify any significant sources contributing to groundwater degradation;
- 2) define groundwater impact on soil gas and indoor air quality for comparison to the RSRs to determine necessary remedial activity for groundwater to mitigate this impact; and
- 3) define groundwater pollution migrating from the site in order to evaluate impact on ecological receptors and evaluate the need for mitigation of this impact.

I recommend that, due to the complexity of the issues which need to be resolved through further investigation, SAEP consider implementation of a multi part RI phase III consisting of several small focused investigations rather than one comprehensive study. Such focused studies would allow many of the localized soil-related issues to be resolved fairly quickly, allowing earlier release of much of the property for re-use. At the same time, groundwater-related issues and sediment-related issues, which are more site-wide, and will eventually drive the site remediation requirements; can be carefully evaluated to develop a protective and cost-effective mitigation approach.

Please refer also to my earlier comments on the Environmental Baseline Survey and the BRAC Cleanup Plan, which discussed the same concepts. If you have any questions or wish to further discuss these issues please contact me.

Sincerely,



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