Environmental
Resources
Management

1777 Botelho Drive
Suite 260
Walnut Creek, CA 94596
(925) 946-0455
(925) 946-9968 (Fax)

14 January 2000

Mr. Richard Hegarty
BRAC Environmental Coordinator
Fleet Industrial Supply Center Oakland - Alameda Annex
United States Navy
950 West Mall Square, Suite 200
Alameda, CA 94501-7552

Mr. Steven Edde
BRAC Environmental Coordinator, Alameda Point
United States Navy
950 West Mall Square, Suite 200
Alameda, CA 94501-7552

Subject: Proposed Ground Water Sampling Approach for
Fleet Industrial Supply Center Warehouse and Installation
Restoration Site 02 Areas and
Alameda Point East Housing Area
Alameda, California

Dear Mr. Hegarty and Mr. Edde:

On behalf of Catellus Development Corporation (Catellus), Environmental Resources Management (ERM) presents this proposed ground water sampling approach for obtaining additional ground water data from the Warehouse and Installation Restoration (IR) Site 02 areas of the Fleet Industrial Supply Center (FISC) and the East Housing Area of Alameda Point. The objectives of the proposed investigation are to:

- Broaden the scope of the existing human health risk assessment to include characterization of exposure pathways related to potential ground water contamination;
- Evaluate the degree to which benzene concentrations in ground water within IR Site 02 of the FISC may attenuate vertically upward away from the marsh crust; and
- Collect additional data soil data in support of efforts to map the marsh crust horizon across the FISC and Alameda Point.

The following activities will be implemented during this investigation:

- Ground water grab sampling to characterize the presence of volatile organic compounds (VOCs) within the Warehouse and East Housing areas in support of Catellus' analysis of risks associated with proposed unrestricted residential reuse of these areas;
- Ground water grab sampling at five locations within IR Site 02, where some of the highest concentrations of benzene have been detected, to evaluate the degree to which benzene concentrations in ground water may attenuate vertically upward from the marsh crust;
- Chemical evaluation of soil for polynuclear aromatic hydrocarbons (PAHs) at various locations in the northern East Housing Area, the Warehouse area, and IR Site 02 in support of efforts to map the marsh crust horizon across the FISC and Alameda Point; and
- Updating the risk assessment associated with unrestricted residential reuse, currently being performed independently by Catellus, to address additional ground water data generated as a result of this investigation.

Details associated with these activities are summarized below. A discussion of data quality objectives for the project and our proposed implementation schedule is also presented.

PROPOSED SCOPE OF WORK

This section presents our proposed approach to perform the actions and achieve the goals outlined above.

Supplemental Ground Water Grab Sampling

The following is a discussion of our proposed approach to ground water grab sampling at the Warehouse and IR Site 02 areas of the FISC and the East Housing area of Alameda Point.

Ground Water Investigation in Warehouse and East Housing Areas

Evaluation of potential risks to human health associated with proposed unrestricted residential reuse of the East Housing and Warehouse Areas suggests that a complete pathway may exist for benzene diffusion into residential breathing space. Furthermore, the Department of Toxic

Substances Control (DTSC), which is the regulatory agency overseeing site closure, has indicated that the existing (1996) risk assessment for the site did not adequately address baseline risk conditions associated with ground water (specifically, benzene in ground water). As a result of these developments, Catellus proposes additional ground water investigation to evaluate VOCs concentrations in ground water in the Warehouse and East Housing areas.

ERM proposes collecting ground water grab samples (via HydroPunch or equivalent technique) from the top of the water table at 10 locations within the Warehouse Area and another 10 locations within the East Housing Area in support of completing the baseline risk assessment addressing unrestricted residential use for these areas. Figure 1 shows the locations of these 20 proposed borings, which will be advanced using direct-push technology. Four of these locations are near historical drum storage areas investigated for soil impacts during Catellus' May 1999 soil investigation (borings W-2, W-3 and W-7). Three locations (near W-4, W-8, and W-10) were based on sampling data generated during previous investigations. The remaining 13 locations were based on the need for geographic distribution of sampling locations across the entire site.

All ground water sampling activities will be performed by ERM in accordance with industry standard operating procedures. The purpose of these sampling locations is to evaluate the potential presence of VOCs, and of benzene in particular, at concentrations above acceptable residential exposure levels. The samples collected in this investigation will be analyzed for halogenated and aromatic volatile organic compounds (HVOCs and AVOCs, respectively) in accordance with United States Environmental Protection Agency (USEPA) Method 8021 (USEPA Method 8010/8020 equivalent).

Ground Water Investigation at IR Site 02

During a 12 October 1999 BRAC Closure Team (BCT) meeting, DTSC suggested that even though benzene may occur in high concentrations in ground water near the marsh crust at the FISC and surrounding areas, there is some mechanism (e.g., biodegradation, low vertical permeability, etc.) preventing benzene vapors from migrating to the surface. That such a preventive mechanism exists is supported by overall low benzene concentrations detected in shallow soil gas across the areas where the highest concentrations of benzene are detected in shallow ground water. During the BCT meeting, DTSC requested implementing a study

addressing the stratification of benzene in shallow ground water in relation to the marsh crust that underlies much of the FISC and surrounding areas.

Catellus agreed with DTSC to characterize benzene concentrations vertically in ground water at several locations across the site. To do this, ERM proposes collecting up to three ground water grab samples from each boring at five locations across IR Site 02. Four of the proposed locations are in areas where benzene concentrations have been detected in ground water, while the remaining location will be strategically placed in the northern portion of IR Site 02, in an area outside the known benzene plume. Using the HydroPunch or equivalent technique, ERM will collect a shallow ground water sample at the water table (5 to 6 feet below ground surface [bgs]), a second sample at approximately 10 feet bgs, and a third sample at the interface between the fill and native bay muds (the presumed location of the marsh crust) at approximately 14 feet bgs. Analytical results will be used to evaluate the degree to which benzene concentrations in ground water may attenuate vertically upward away from the marsh crust.

All ground water grab sampling for this benzene stratification study will use the same methodologies and analyses as described above.

Supplemental Risk Analysis

Based on analytical results from Catellus' previous soils investigation, as well as applicable data from previous investigations performed by the Navy, ERM has already completed an analysis of risks to human health associated with soil contaminants under a residential reuse scenario. As discussed above, that analysis did not address potential exposure to VOCs vapors in breathing space within residences. The supplemental ground water data to be generated during implementation of the proposed investigation will be used to revise the existing risk analysis to include this pathway. This new analysis will augment current baseline risk assessment efforts by the Navy, and will provide background for Catellus' future decisions regarding the potential use of vapor barriers beneath the proposed residences. The proposed additional risk analysis will be in complete accordance with all applicable DTSC and USEPA guidance on baseline risk assessments.

Disposal of Waste Materials

Catellus plans to appropriately characterize and dispose of all wastes generated as a result of the actions proposed herein. Anticipated waste products include soil cores and associated cuttings, decontamination water, and excess ground water. Any such wastes will be contained and properly labeled in 5-gallon pails or 55-gallon drums, and stored on site pending analytical results. The waste products will then be profiled and disposed of in accordance with applicable regulations.

DATA QUALITY AND QUALITY ASSURANCE OBJECTIVES

Quality objectives ensure that data collected are sufficient to meet the intended project goals. Quality objectives are pre-established goals or benchmarks used to monitor and assess the progress and quality of the work performed. It is essential that quality objectives be defined prior to initiation of the project to ensure that work activities yield data sufficient to meet the project objectives.

Quality objectives are divided into two categories: data quality objectives (DQOs) and quality assurance objectives (QAOs). DQOs apply to overall project objectives associated with data collection. QAOs ensure data quality by defining acceptance limits for project-generated data.

Development of Data Quality Objectives

Project personnel develop DQOs to specify the quality and quantity of data from a particular data collection activity in support of specific decisions or regulatory actions. Physical characteristics measured and/or observed in the field and analytical results from samples collected will be evaluated during the characterization process.

The seven-step process for developing DQOs as described in *Data Quality Objectives Process for Superfund* (USEPA, 1993) is as follows:

- **Step 1: State the Problem.** Summarize the contamination problem that will require new environmental data, and identify the resources available to resolve the problem.
- **Step 2: Identify the Decision.** Identify the decision that requires new environmental data to address the contamination problem.

- **Step 3: Identify Inputs to the Decision.** Identify the information needed to support the decision, and specify which inputs require new environmental measurements.
- **Step 4: Define the Study Boundaries.** Specify the spatial and temporal aspects of the environmental media that the data must represent to support the decision.
- **Step 5: Develop a Decision Rule.** Develop a logical "if...then..." statement that defines the conditions that would cause the decision-maker to choose alternative actions.
- **Step 6: Specify the Limits on Decision Errors.** Specify the decision-maker's acceptable limit on decision errors, which is used to establish performance goals for limiting uncertainty in the data.
- **Step 7: Optimize the Design for Obtaining Data.** Identify the most resource-effective sampling and analysis design for generating data that will satisfy the DQOs.

Data Quality Objectives

The seven-step process was used to develop project-specific DQOs for ground water grab sampling and soil sampling in the Warehouse Area, East Housing Area, and IR Site 02. The DQOs for the project are:

- To ensure that analytical detection limits meet the regulatory criteria to which analytical results may be compared; and
- To collect data of sufficient quantity and quality to perform an evaluation of exposures to potential receptors and conduct a risk assessment addressing the proposed unrestricted residential use scenario.

Appropriate Analytical Reporting Levels

The intended use of the data, as defined by the DQOs and the decision types, dictates the appropriate analytical reporting level and the corresponding type of analysis. For this project, we will use Level II standard documentation with the option of requesting Level IV documentation from the laboratory if deemed necessary. All analyses are performed in an off-site analytical laboratory following standard analytical protocols. Quality control (QC) samples usually include method blanks, matrix spikes, laboratory control samples, and laboratory duplicates. Upon request the laboratory can provide Level II data in

Level IV format, commonly referred to as "CLP" (USEPA Contract Laboratory Program), and characterized by rigorous quality assurance/quality control (QA/QC) documentation.

Concentrations of Concern and Analytical Detection Limits

The concentration of concern specifies a concentration range above which some action may need to be taken. In general, concentrations of concern are site-specific issues and relate to site characterization and assessment, as well as established regulatory criteria. The selected concentration of concern directly affects data quality requirements. The sampling and analysis methods used must be appropriate for the concentration of concern. The analytical technique chosen must have a detection limit below the level of concern. Detections that are reported near the practical quantitation limit (PQL) or between the PQL and method detection limit can be subject to error related to electronic noise, misidentification, or other factors, which can result in the reporting of both false positive and negative detections. Low concentration detections near or below the PQL or samples with the potential for low concentration detections will be fully investigated by the laboratory to ensure that false positive or negative detections are identified.

For the proposed investigation, a combination of analytical methods has been chosen to meet the varying concentrations of concern related to the project. Methods were chosen on the basis of sensitivity (low reporting limits) and list of target analyses. The list of target compounds and PQLs for the target analytes are listed in the attached Tables 1 and 2. Each method should be sufficient to meet project DQOs.

Data Quantity Needs

Data needs are determined to meet the overall project objectives, confirm suspected source areas, and to quantify the vertical and horizontal extent of chemicals of potential concern for the purposes of developing a statistically valid risk assessment. ERM's Senior Risk Assessor has indicated that data (specifically, benzene) from 20 locations, in addition to limited existing ground water data for these areas, would provide adequate data from which a baseline risk assessment consistent with all applicable DTSC and USEPA guidelines could be completed.

Quality Assurance Objectives

Data are potentially subject to sampling and data reduction errors. QAOs are established to control the sources of errors and quantify the errors whenever possible. QC procedures are designed to improve sample data quality and to identify and help interpret discrepancies in results. QAOs are both quantifiable and qualifiable data expressed in terms of accuracy, precision, completeness, comparability, and representativeness. Definitions and descriptions of these terms are provided below.

Accuracy

Accuracy is defined as the degree of agreement of a measurement (or an average of measurements of the same type) with the accepted reference or true value. Accuracy is monitored through the use of matrix spike, blank spike, standard reference materials, and Performance Evaluation sample analyses. Matrix spike samples measure biases in sample matrices and laboratory accuracy. Blank spike sample analyses are commonly referred to as Laboratory Control Samples. Performance Evaluation and Laboratory Control samples measure laboratory accuracy without the potential interference of a sample matrix.

Accuracy goals depend on the sample media and the type of analysis. The intention of these goals is to demonstrate the laboratory's ability to successfully perform analyses. Accuracy is calculated as follows:

$$\text{Percent Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spiked Added}} \times 100$$

Accuracy goals for each method used for the proposed investigation are listed in Tables 1 and 2.

Precision

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. The measurement of precision will be monitored through the use of duplicate or replicate samples collected at regular, specified intervals, and duplicate sample analyses performed on two aliquots taken from the same sample. Duplicate samples are ideally expected to contain similar chemical concentrations; therefore, it is assumed that any variability in results is introduced by sampling, handling, or laboratory

procedures. Duplicate soil, HydroPunch ground water, and vapor samples that tend to be heterogeneous will mainly be utilized as measures of contaminant heterogeneity and/or stratification. Duplicate ground water samples collected from monitoring wells and composited soil samples will be used to measure sampling, handling, and laboratory precision.

The goal of laboratory duplicate analyses is to demonstrate the laboratory's ability to acceptably reproduce analytical measurements. Relative Percent Difference (RPD) is used as the measure of precision between matrix spike duplicates. The formula utilized to calculate RPD is as follows:

$$RPD = \frac{(SPL1 - SPL2)^*}{\text{Mean of SPL1 and SPL2}} \times 100$$

where: SPL1 = first sample analysis, and
SPL2 = duplicate sample analysis
* = absolute value

Precision goals for each method used in this investigation are listed in Tables 1 and 2.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that could be obtained under optimum conditions. Amounts of data to be collected were defined above. Completeness goals must be realistically developed such that unattainable goals do not impede the progress of the project as a whole. Goals should include a small portion of data that may not be usable due to unforeseen events, while providing adequate data for decision-making purposes. The completeness objective for this project has been set at 90 percent.

Overall completeness is composed of field completeness and laboratory completeness. Field completeness is based on the number of samples or field tests planned and the actual number collected or performed. Laboratory completeness is based on the number of valid sample results achieved as compared to the actual sample results produced. If the completeness objective is not met, additional field work or analysis may be required.

Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability is a qualitative, not quantitative, measurement as in the case of accuracy and precision. Comparability is assessed by reviewing results or procedures for potential data that do not agree with expected results. Strict adherence to QA/QC and sampling procedures will produce more comparable data. To ensure comparability of a data set, the laboratory is required to perform the following activities:

- Demonstrate traceability of standards to National Institute of Standards and Technology (NIST) or USEPA sources;
- Use standard and approved methodologies;
- Use standardized units of measure;
- Use standardized QC acceptance criteria; and
- Participate in interlaboratory studies to demonstrate laboratory performance.

Representativeness

Representativeness is the degree to which a set of data accurately represents the characteristics of a population, a process condition, or an environmental condition. Data will be considered representative if the sample distribution is within statistically defined bounds of the population mean and variance. Representativeness is similar to comparability in that it is a qualitative, not quantitative, goal.

DOCUMENTATION AND RECORDS

This section summarizes the field documentation requirements for the proposed sampling program and describes sample handling procedures.

Sample Collection and Delivery

Under the direction of a California-registered geologist, an on-site geologist will collect, log, and containerize ground water samples obtained via HydroPunch and soil samples obtained from the direct-push sampling cores. ERM will record general information regarding sampling activities as well as soil descriptions using the unified soil

classification system . Samples will be immediately chilled on ice in a cooler following their collection, and transferred daily to the laboratory (by courier) under complete chain-of-custody (COC) documentation. COC procedures provide an accurate written record that documents the sample identification, time, date, and analyses requested for each enclosed sample, and traces the possession of individual samples from the time of field collection through laboratory analysis. A COC form will accompany each cooler containing samples.

Sample Preservation and Holding Times

Methods of sample preservation are relatively limited and are generally intended to (1) retard biological degradation, (2) retard chemical degradation, and (3) reduce container adsorption effects. The ground water and soil samples will be preserved with ice. Upon taking custody of the samples, the laboratory will make every effort to analyze all samples within the specified holding times for each analytical method.

Data Review and Quality Control

Analytical data will be reviewed and validated by the ERM Project Chemist or qualified designee for precision, accuracy, completeness, representativeness, and comparability based on procedures and guidance presented in the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA, 1994) and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA 1994) or updated versions, as appropriate. Data qualifiers that may be applied to data generated during the proposed investigation are listed below:

U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N: The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

JN: The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R: The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.

The application of nonstandard qualifiers may be deemed necessary and used for atypical situations such as contamination of samples from a preservative. As indicated above, the data collected for the proposed investigation will be reported under Level II requirements. A QA/QC review will be prepared including a written and tabular assessment of the data. The assessment will include an explanation for the application of any ERM-applied data qualifiers.

PROPOSED SCHEDULE

Pending your review of this sampling plan, ERM plans to complete the proposed field investigation by 28 January 2000, and anticipates completing a data summary of results by 25 February 2000. We appreciate your prompt review and approval of the proposed approach. If you have any questions or comments regarding this submittal, please contact one of the undersigned at (925) 946-0455.

Sincerely,

James E. McLaughlin
Project Scientist

Michael E. Quillin, R.G.
Program Director

Enclosures: Figure 1
Tables 1 and 2

JEM/MEQ/jem/3421.00

cc: Ms. Marti Buxton, Catellus
Mr. James Adams, Catellus
Mr. Jeffrey Bond, City of Alameda

bcc: Mr. Tom Trapp, Landels, Ripley & Diamond

Table 1 Accuracy, Precision, and PQL Limits for Method 8021 Aqueous Samples Warehouse and East Housing Areas

Target Analytes	PQL µg/l	Accuracy Limits (a) Blank Spike/LCS	Precision Limits (a) Matrix Spike	Precision Limits (a) LCS	Completeness (%)
Chloromethane	1.0				90
Vinyl Chloride	1.0				90
Bromomethane	1.0				90
Chloroethane	1.0				90
Trichlorofluoromethane	0.5				90
1,1-Dichloroethene	0.5	65 - 135	25	25	90
Methylene Chloride	5.0				90
trans-1,2-Dichloroethene	0.5				90
1,1-Dichloroethane	0.5				90
2,2-Dichloropropane	0.5				90
cis-1,2-Dichloroethene	0.5				90
Chloroform	0.5				90
Bromochloromethane	0.5				90
1,1,1-Trichloroethane	0.5				90
1,1-Dichloropropene	0.5				90
Carbon Tetrachloride	0.5				90
1,2-Dichloroethane	0.5				90
Trichloroethene	0.5	70-130	25	25	90
1,2-Dichloropropane	0.5				90
Bromodichloromethane	0.5				90
Dibromomethane	0.5				90
cis-1,3-Dichloropropene	0.5				90
trans-1,3-Dichloropropene	0.5				90
1,1,2-Trichloroethane	0.5				90
1,3-Dichloropropane	0.5				90
Tetrachloroethene	0.5				90
Dibromochloromethane	0.5				90
1,2-Dibromoethane	0.5				90
Chlorobenzene	0.5	70-130	25	25	90
1,1,1,2-Tetrachloroethane	0.5				90
Bromoform	0.5				90
1,1,2,2-Tetrachloroethane	0.5				90
1,2,3-Trichloropropane	0.5				90
Bromobenzene	0.5				90
2-Chlorotoluene	0.5				90
4-Chlorotoluene	0.5				90
1,3-Dichlorobenzene	0.5				90
1,4-Dichlorobenzene	0.5				90
1,2-Dichlorobenzene	0.5				90
1,2-Dibromo-3-chloropropane	0.5				90
1,2,4-Trichlorobezene	0.5				90
Hexachlorobutadiene	0.5				90
1,2,3-Trichlorobenzene	0.5				90
Methyl tert-butyl ether	2.5				90
Benzene	0.5	70-130	25	25	90
Toluene	0.5	70-130	25	25	90
Ethylbenzene	0.5				90
m,p-Xylene	0.5				90
o-Xylene	0.5				90
Styrene	0.5				90
Isopropylbenzene	0.5				90
n-Propylbenzene	0.5				90
1,3,5-Trimethylbenzene	0.5				90
tert-Butylbenzene	0.5				90
1,2,4-Trimethylbenzene	0.5				90
sec-Butylbenzene	0.5				90
p-Isopropyltoluene	0.5				90
n-Butylbenzene	0.5				90
Naphthalene	0.5				90

PQL - Practical Quantitation Limit

LCS - Laboratory Control Sample

RPD - Relative Percent Difference, a measure of precision

(a) - Precision and accuracy limits should be viewed as goals and not as means of accepting or rejecting data based on matrix spike results.

µg/l - micrograms per liter

All acceptance limits and PQLs from Sequoia Analytical Laboratory, Walnut Creek, CA

Table 2 Accuracy, Precision, and PQL Limits for Modified Method 8270 with SIM for Soil Samples (PAHs) Warehouse and East Housing Areas

Target Analytes	PQL µg/kg	Accuracy Goals (a) (Percent Recovery Limits) Matrix Spike	LCS	Precision Goals (a) (RPD) Matrix Spike	LCS	Completeness (%)
Naphthalene	6.7					90
2-Methylnapthalene	6.7					90
2-Chloronaphthalene	6.7					90
Acenaphthylene	6.7					90
Acenaphthene	6.7	34 - 115	40 - 197	35	30	90
Fluorene	6.7					90
Phenanathrene	6.7					90
Anthracene	6.7					90
Fluoroanthene	6.7					90
Pyrene	6.7	28 - 143	42 - 112	35	30	90
Benzo(a)anthracene	6.7					90
Chrysene	6.7					90
Benzo(b)fluoranthene	6.7					90
Benzo(k)fluoroanthene	6.7					90
Benzo(a)pyrene	6.7					90
Indeno(1,2,3-cd)pyrene	6.7					90
Dibenzo(a,h)anthracene	6.7					90
Benzo(g,h,i)perylene	6.7					90

PAHs - Polynuclear Aromatic Hydrocarbons

SIM - Selective Ion Monitoring

PQL - Practical Quantitation Limit

LCS - Laboratory Control Sample

RPD - Relative Percent Difference, a measure of precision.

Recovery is a measure of accuracy.

(a) - Precision and recovery limits should be viewed as goals and not as means of accepting or rejecting data based on matrix spike results.

µg/kg - micrograms per kilogram

Compounds listed in italics may not be included in the PAH list for all laboratories.

Results should be reported on a dry weight basis, unless otherwise specified.

CAD File: G:\3421\00\34210009.dwg
Drawn By: D. Ludlam
Date: 12/18/99
Project No. 3421.00

WAREHOUSE AREA

EAST HOUSING

IR SITE 02

COLLEGE OF ALAMEDA
555 ATLANTIC AVENUE

Legend:

- PROPOSED GROUND WATER GRAB SAMPLE LOCATIONS
- PROPOSED BENZENE VERTICAL STRATIFICATION SAMPLING LOCATION
- PROPOSED DUAL PURPOSE GROUND WATER GRAB AND BENZENE STRATIFICATION SAMPLE LOCATION

0 300
FEET

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Figure 1

Proposed Supplementary Ground Water Investigation Sample Locations
Fleet Industrial and Supply Center-Warehouse Area and IR Site 02,
and Alameda Point East Housing Area
Alameda Annex Site
Alameda, California

ERM 12/99