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NSY PORTSMOUTH
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DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
10 INDUSTRIAL HIGHWAY
MAIL STOP, #82
LESTER, PA 19113-2090

IN REPLY REFER TO

5090
Code 1823/JMC

SEP 12 1996

Ms. Meghan Cassidy
U.S. Environmental Protection Agency New England Region
JFK Federal Building, Mailcode HBT
Boston, MA 02203-2211

Ms. Nancy Beardsley
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333-0017

Subj: GROUNDWATER AND SEEP SAMPLING WORK PLANS, PORTSMOUTH NAVAL SHIPYARD, KITTERY, ME

Dear Ms. Cassidy and Ms. Beardsley:

The responses to comments on the Draft Seep Sampling Work Plan are at enclosure (1). Responses to follow-up comments on the Groundwater Investigation and Monitoring Plan are at enclosure (2).

Please provide any comments you have on these responses within 30 days of receipt. If you have any questions on this matter please call me at (610) 595-0567 extension 117.

For the Community Restoration Advisory Board (RAB) members; if you have any comments or questions on these issues, they can be provided to the Navy at a RAB meeting, by calling the Public Affairs Office at (207) 438-1140 or by writing to:

Portsmouth Naval Shipyard
Code 121.10 Bldg 44
Attn Marty Raymond
Portsmouth, NH 03804-5000

Sincerely,

Jim Conroy

JAMES M. CONROY, PE
LT, CEC, USN
Remedial Project Manager
By direction of the
Commanding Officer

Encl: 1) Response to comments, Draft Seep Sampling Work Plan
2) Responses to follow-up comments, Groundwater Investigation and Monitoring Plan

Distribution:
NOAA (K. Finkelstein)
US Fish & Wildlife Service (K. Munney)
ME Dept. of Marine Resources (D. Card)
NH Fish & Game (J. Nelson)
PNS (Code 121.10, M. Raymond)
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Mr. Phil McCarthy
Mr. Guy Petty
Ms. Cathy Wolff
Mr. Doug Bogen
Ms. Michele Dionne
Ms. Mary Marshall
Mr. Jack McKenna
Mr. Onil Roy
Shipyard (100PAO) w/o encl
Brown and Root Environmental (L. Klink, B. Horne)

RESPONSE TO EPA COMMENTS DATED JUNE 24, 1996
DRAFT TECHNICAL MEMORANDUM ON SEEP SAMPLING
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

EPA GENERAL COMMENTS

1. **Comment:** The report is not clear on whether the stations that were sampled in the Spring and Fall of 1993 will be re-sampled in this program since the station numbers are different. Clarify whether all previously sampled locations will be resampled.

   Response: All 8 seep stations, sampled in the Spring of 1993 by UNH, will be resampled. The 5 seeps, sampled by URI in the Fall of 1993 correlate with UNH stations. To clarify this, the stations will be correlated by the addition of the following in-text table:

Seep/Mussel Station	*McLaren/Hart Station Number*	*URI Seep Station Number*	*UNH Seep Station Number*
A	—	—	*1001* *1002*
B	—	—	*1003*
C	—	—	*1004*
D	*S1, S2, S3*	*7152* *7252*	*1006* *1007*
E	—	*7151, 7251, 7351*	*1008*

2. **Comment:** Analysis for both dissolved and total suspended solids would provide a more complete picture of contaminant loading.

   Response: Agree. Analysis for both dissolved and total suspended solids will be conducted for the seeps.

3. **Comment:** It would be helpful to coordinate seep sampling and groundwater sampling activities. Additionally, analytical COC parameters should be the same for both seep and groundwater sampling, unless rationale can be shown to support different analytical programs. This would be useful in trying to establish a complete picture of contaminant transport.

   Response: Seep sampling will be coordinated with groundwater sampling, resolution of regulatory agency comments permitting. There is no reason to sample for TCL volatiles (plus Freon), TPH (gasoline range), TPH (diesel range), phenols, or TOX since these are not off-shore concerns. However, the analysis will be expanded to include the following water quality parameters from Table 4-2 of the groundwater monitoring plan: TOC,

chloride, sulfate, pH, and alkalinity. Additionally, as provided in the groundwater monitoring plan, salinity, specific conductance, and oxidation reduction potential (and temperature and dissolved oxygen in response to MEDEP Specific Comment 10; TSS and TDS in response to EPA General Comment 2) will be included as field measurements. Also, as requested by the MEDEP Specific Comment 9, nitrate and bromide analysis will be conducted.

4. **Comment:** Sediment sampling down gradient of the seeps is not imperative, but concurrent sediment sampling would show whether seep discharges are contaminating sediments or are simply being diluted by receiving waters. Additionally, it is always preferable to obtain simultaneous analytical data for mixed media rather than relying on past COC concentrations for certain media, especially if solid/liquid partitioning factors are going to be calculated from the data.

   Response: Agree to expand the scope of work to include sediment sampling at each seep sample location and collected concurrently.

5. **Comment:** Though it is not clear from the text, EPA assumes that all standard water quality parameters should be measured. These measurements include pH, temperature, conductivity, salinity, redox, and dissolved oxygen. The addition of anion analysis would also provide information that could be used to differentiate sources of seep water. However, it is not clear if these anions are included in the groundwater monitoring plan.

   Response: The plan will be revised to include water quality parameters, as discussed in the response to EPA General Comment 3.

6. **Comment:** Quarterly sampling should be considered for at least one year. This would be beneficial to determine seasonal and tidal trends. Significant storm events may also influence seep discharges.

   Response: Regarding tidal trends, seep sampling will always be conducted at low tide for the following reasons: (1) most if not all seeps are only visible during low tide, and (2) at low tide, contaminant concentrations are expected to be at a maximum, therefore, providing conservative data (at high tide, inflow of "clean" water would potentially dilute the contaminants).

   Regarding significant storm events, seep sampling will occur at least 48 hours after a significant storm event. This statement will be added to the text.

   Long-term sampling requirements would be as determined by a Record of Decision (ROD).

EPA SPECIFIC COMMENTS

1. **Comment:** Section 4.1, Sampling Locations : It is unclear whether the proposed sampling includes Jamaica Island as an area to be sampled. This area must be included since "Jamaica Island seep/mussel stations had the highest metals levels for all metals except for Hg."

   Response: All existing seep stations will be sampled. Additionally, new seep sampling locations will be selected in consultation with the regulators following a site visit to identify any new seeps. The number of seeps selected for sampling will be dependent on feasibility of sampling (access), proximity to other seeps, past sampling, flow volume, proximity to contamination sources, etc.

2. **Comment:** Section 4.1, Sampling Locations: All the observed seeps should be sampled to better evaluate the impact to pelagic, epibenthic and infaunal communities. Limiting the sampling to 20 locations is premature at this stage in the process.

   Response: Twenty seep locations were estimated for budgetary purposes only; references to 20 locations will be removed from the plan. However, it is expected that 20 locations is a conservative number, based on previous seep sampling events.

3. **Comment:** EPA suggests that seep sampling during the winter be considered since AVS conditions make this the worst-case scenario for exposure.

   Response: AVS analysis is not being considered for seep sampling, but will be included for sediment sampling occurring concurrent with the seep sampling. Although the first event may not happen to occur in the winter, at least one of the seep/sediment sampling rounds will be conducted during the winter to determine the lowest expected AVS/metal levels in sediment which would correspond with the highest expected metal concentrations in surface water.

RESPONSE TO MEDEP COMMENTS DATED JUNE 10, 1996
DRAFT TECHNICAL MEMORANDUM ON SEEP SAMPLING
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MEDEP GENERAL COMMENTS

1. **Comment**: Meaningful assessment of contaminant migration at the seeps will require concurrent collection of seep water and sediment for each sampling event. See Specific Comment 3.

   Response: Agree to add sediment samples to the scope of work to be used in developing empirical partitioning K_d coefficients for on-shore/off-shore modeling purposes. Note that for the off-shore work to date, literature values of K_d were utilized. It had been planned to once again use literature values for the modeling efforts, as well as previous sediment sampling data to develop empirical partitioning coefficients.

   Sediment samples will be collected at each location of seep sampling and analyzed for TCL semivolatiles, TCL pesticides/PCBs, TAL metals, pH, TOC, and AVS. Changes will be required throughout the text. Additionally, the B&R Environmental SOP for sediment sampling will be included as an appendix (see attached).

2. **Comment**: Assessment of seep volume calculations will require determining the surface area of seeps as well as flow rates. See Specific Comment 8.

   Response: Agree that the net discharge of groundwater to the surface water is important to the on-shore/off-shore modeling effort. It was planned to measure seep flow rates by making a rough approximation of the amount of groundwater discharging to the surface water. The measured seep flow rate, however, only represents the groundwater flow discharging to the surface water body above the elevation of the surface water. Based on the potentiometric surface elevation of the groundwater table, groundwater may also discharge to the surface water body below the elevation of the surface water. It is agreed that the measurement of the seep flow rate cannot alone quantitatively estimate the total flow of groundwater to the surface water. In addition, determination of the seep surface area (needed to estimate the seep flow) will be difficult in some areas (e.g., where the seep surfaces from beneath a rock covered slope). This difficulty will increase the uncertainty in the measurement of the seep flow. Since flow of groundwater to the surface water cannot be accurately measured and the inherent uncertainty in relating the seep flow to the total groundwater flow, quanititative measurement of seeps will be deleted from the plan; however, during the planned site visit, a qualitative estimate of the seep flow rates will be attempted.

   As outlined in the on-shore/off-shore modeling Work Plan, the following text describes how net discharge of groundwater to surface water will be estimated. This information is not integral to the seep sampling plan and so will not be included.

   The total flow of groundwater to the surface water will be quantified using two methods. The first method consists of estimating the total flow of groundwater toward the surface

water body using a simple groundwater flow equation (i.e., Darcy's Law). The total flow of groundwater will be estimated outside of the range of tidal influence. The groundwater flow within the tidal influence zone is complicated due to the cyclic flow of surface water into and out of the ground. The groundwater flow toward the surface water body outside the area of tidal influence must eventually enter the surface water body due to conservation of mass (based on the groundwater flow directions it cannot go elsewhere). The groundwater flow outside the tidal influence zone is the net flow of groundwater to the surface water. Based on data currently available (e.g., hydraulic conductivity, groundwater surface elevations, and geologic cross sections) the total flow of groundwater to surface water can be quantitatively estimated. The second method will consist of performing a water budget. It is anticipated that there is less uncertainty in using Darcy's Law than the water budget. Regardless, there is uncertainty in each method and, hopefully, using both will decrease the uncertainty through confirmation.

3. **Comment**: Seep sample analyses should include all parameters proposed as part of the groundwater monitoring plan for the Jamaica Island Landfill (Table 4-2[1]). See Specific Comment 9.

   Response: There is no reason to sample for TCL volatiles (plus Freon), TPH (gasoline range), TPH (diesel range), phenols, or TOX since these are not off-shore concerns. However, the analysis will be expanded to include the following water quality parameters from Table 4-2 of the groundwater monitoring plan: TOC, chloride, sulfate, pH, and alkalinity. Additionally, as provided in the groundwater monitoring plan, salinity, specific conductance, and oxidation reduction potential (and temperature and dissolved oxygen in response to MEDEP Specific Comment 10; TSS and TDS in response to EPA General Comment 2) will be included as field measurements. Also, as requested, nitrate and bromide analysis will be conducted.

4. **Comment**: Seep sampling data collected by McClaren/Hart must be included in this report.

   Response: Seep sampling data collected by McClaren/Hart will be included as an appendix to the seep sampling plan. In referring to the appendix, the text will note that ..."As identified in the McLaren/Hart Phase I Report, deficiencies in the collection methods contribute to difficulties in evaluating the data. The McLaren/Hart data indicated elevated concentrations of lead, mercury, zinc, chromium, and copper collected from the back side of the Jamaica Island Landfill (Sample number S2). The elevated aluminum, iron, and manganese concentrations could reflect that sediment was present in the seep sample. Subsequent seep sampling by UNH in the same area using improved methodologies did not confirm the McLaren/Hart results." Refer to the attached data.

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[1]Brown and Root Environmental, op. cit.

5. **Comment**: Seep identification numbers for the three seep sampling events; McClaren/Hart, UNH, and URI, should be correlated. The numbering scheme differs for each event even though the locations appear similar.

Response: Seep identification numbers for the previous seep sampling events will be correlated by the addition of the following in-text table:

Seep/Mussel Station	*McLaren/Hart Station Number*	*URI Seep Station Number*	*UNH Seep Station Number*
A	—	—	*1001* *1002*
B	—	—	*1003*
C	—	—	*1004*
D	*S1, S2, S3*	*7152* *7252*	*1006* *1007*
E	—	*7151, 7251, 7351*	*1008*

6. **Comment**: To conserve resources, please print on both sides of the page.

Response: The memorandum is copied double-sided (cover and title page are single sided and each major section begins on a new page) in accordance with the Navy Style Guide dated October 1995. Single sided pages are present because three of the four major sections are one page or less in length. No changes will be made in order to maintain a consistent format among documents prepared by the Navy.

7. **Comment**: The final document must be signed and/or stamped by a Maine Certified Geologist.

Response: The final document will be signed by a Maine Certified Geologist.

MEDEP SPECIFIC COMMENTS

1. **Comment**: 2.0 Background, Page 2-1, Paragraph 3

"A work plan for the follow-on sampling..."

Proposed "follow-on" sampling should be described. I don't believe the MEDEP has received a copy of the Offshore Interim Monitoring/Verification and Data Gap Studies. The relationship between the Offshore Interim Monitoring/Verification and Data Gap Studies report and the Offshore Rough Draft Work Plan is unclear. Please clarify and

consider rewriting the paragraph. The first two sentence of this paragraph don't appear to be relevant.

Response: References to the Offshore Interim Monitoring/Verification and Data Gap Studies or the Offshore Rough Draft Work Plan will be removed.

2. **Comment**: 2.0 Background, Page 2-1, Paragraph 4

"With two exceptions, this technical memorandum..."

The MEDEP has not received the Rough Draft Offshore Interim Monitoring/Verification etc. report and therefore cannot comment on the accuracy of these statements. Is the report a "Rough Draft ..." as stated in this paragraph, or an "Offshore Interim..." as stated in the previous paragraph? Consider rewriting the paragraph.

Response: References to the Offshore Interim Monitoring/Verification and Data Gap Studies or the Offshore Rough Draft Work Plan will be removed.

3. **Comment**: 3.0 Objectives, Page 3-1, Paragraph 4

"Contaminant-specific solid/liquid partitioning coefficients and retardation factors can be estimated using the seep concentrations and available sediment concentrations that have been measured around the same area as the seeps."

The development of solid/liquid partitioning coefficients and retardation factors is useful for the estimation of adsorptive properties of ions relative to a solid matrix. While this is an important consideration when assessing contaminant migration, of equal importance are the changes in aqueous chemistry within the landfill groundwater and Clark Cove as a result of the mixing of fresh and saltwater. Changes in ionic strength, pH, and redox conditions which occur through this mixing and groundwater emergence from the landfill can result in precipitation or dissolution of metal ions. The associated chemistry is dependent on the thermodynamic equilibrium of the system and rate of reactions between constituents which may not be easy to predict. However, reliable data must be available for a reasonable estimation of adsorption or solution/solid phase equilibrium.

Meaningful assessment of contaminant migration at the seeps will require concurrent collection of seep water and sediment at the seep locations for each sampling event. At a minimum, sediment samples should be analyzed for TAL metals, SVOCs, and pesticides. If possible, seeps, sediment at seep locations, and groundwater should be sampled concurrently.

Response: Refer to the response to MEDEP General Comment 1 agreeing to add concurrent sediment samples to the scope of work and identifying TCL semivolatiles, TCL pesticides/PCBs, TAL metals, pH, TOC, and AVS analysis for sediments. If possible, seep/sediment and groundwater will be sampled concurrently, depending on the timing of regulatory comment resolution.

4. **Comment**: Table 4-1 Seep Sampling Locations and Analytical Parameters, PNS, Kittery, Maine, Page 4-3

a. "Station Number[2]: Clark Cove - 8, 1004, 1004.8; Sullivan Point - 9; Back Channel - 19, 167"

Would it be possible to assign sample location designations that are less cryptic. (e.g., a simple sequential alphanumeric numbering scheme).

Response: Sample location designations for previously sampled seeps cannot be changed in order to maintain consistency (also requested by NOAA, see NOAA Comment CL-2). Additionally, Figure 4-2 will be revised to show all previous seep sampling locations.

Future sampling designations will be revised. A new section on sample ID numbers (similar to the text in the Groundwater Investigation and Monitoring Plan) will be added. Basically, the UNH station location (1001, 1002, etc.) will be retained with other identifiers to indicate that the sample is a seep sample and to indicate the round of sampling. New seep locations would expand on the UNH station numbering system.

The following text will be added: *"Each sample collected will be assigned a unique sample tracking number. The sample tracking number will consist of a two-segment, alpha-numeric code that identifies the sample medium and location, and sample round identifier. Any other pertinent information regarding sample identification will be recorded in the field log books.*

The alpha-numeric coding to be used in the sample system is explained in the diagram and the subsequent definitions:

(AA[N])	***(NNNN)***	***(AANNNN)***
(Station ID)	*(Sample Location)*	*(Medium & Sampling Date)*

Character Type:
A = Alpha
N = Numeric

Station ID:
BC = Back Channel
CC = Clark Cove
SP = Sullivan Point

Sample Location:
Seep Sample = UNH Station No. (1001, 1002, etc.)
Sediment Sample = UNH Station No. (1001, 1002, etc.)

Media:

SP = Seep
SD = Sediment

Sampling Date:

Month and Year

For example, a seep sample collected from Station 1005 during September 1996 would be designated as BC-1005-SP-0996.

Field quality control (QC) samples will be designated using a different coding system. The QC code will consist of a two-segment, alpha-numeric code that identifies the sample medium (for duplicates only), QC type, and date. The sample medium codes will be used as for the standard environmental sample (i.e., SP). The QC types are identified as:

RB = Rinsate Blanks
FB = Field Blanks
FD = Field Duplicates

For example, a duplicate of a seep sample obtained on September 4, 1996 would be designated as: SPFD-090696. This allows duplicates to be submitted as "blind" samples to the analytical laboratory. Sample log sheets, not received by the analytical laboratory, will document duplicate sample location.

Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples will be designated on the field documentation forms and sample labels. MS/MSDS are collected at a frequency of 1 per 20 samples per matrix and double or triple volumes of sample are required for analytical purposes.

The sampling time recorded on the chain-of-custody form for duplicate and matrix spike/matrix spike duplicate samples will be 00:00 so that the samples are "blind" to the laboratory. Notes detailing the sample number, time, date, and type will be recorded in the field log book and on sample log sheets. A separate sample log sheet will be completed for duplicate samples sent blind to the laboratory."

b. "(4) Flow rates may be measured at additional seeps, if identified, as discussed in Section 4.0."

This is not referenced to any statement in Table 4-1.

Response: Flow rates will no longer be measured as stated in the response to MEDEP Specific Comment 8. The footnote will be removed from Table 4-1.

5. **Comment**: 4.1 Sampling Locations, Page 4-2, Paragraph 1

"As part of the seep sampling task, current and previous storm sewer outfalls will be compared with all seep locations to ensure that sampling is not being conducted at a storm sewer outfall, unless appropriate (i.e., infiltration occurring)."

What method will be used to determine if groundwater infiltration is occurring into a storm sewer outfall?

Response: The following text will be added: "Storm sewer outfalls will be observed following an extended period (at least 48 hours) of dry weather when no stormwater flow would be expected. Therefore any flow would be attributed to groundwater infiltration. In support of investigating storm sewers, a records review is planned, followed by a camera survey inspection and mapping effort."

6. **Comment**: 4.2 Sample Collection Procedures, Page 4-4, Paragraph 2

"The sampling device will be installed by excavating soils/fill from the side of the band at the seep location and inserting the capped well screen into the hole. The space around the well screen would then be filled in."

The area around the well screens must be filled using appropriate sized filter sand to prevent clogging of the screen.

Response: The sampling device is pre-packed with sand to prevent clogging. This sentence will be added to the text.

7. **Comment**: 4.2 Sample Collection Procedures, Page 4-4, Paragraph 3

"The seep sampling device with the pre-packed well screen..."

Does this mean the interior portion of the well screen will be packed with filter sand?

Response: Yes, the area between the outer and inner well screen is packed with sand. This explanation will be added to the text.

8. **Comment**: 4.2 Sample Collection Procedures, Page 4-4, Paragraph 5

"Flow rates will be measured for all seep locations where sampling devices have been installed. Flow rates will be measured by placing a vessel of known volume (e.g., graduated cylinder of 5 gallon bucket) and measuring the time it takes to fill the vessel. The flow rate will be used to approximate the seep flow velocity."

Measurement of flow rates in this manner assumes that the total volume of the seep water will flow through the sampling device, which is very unlikely. Perhaps a two dimensional measurement rather that a volume measurement would provide more reliable results. For

example, the physical timing of a liquid or solid tracer may be effective in estimating seep flow rates. Regardless of the measurement method, the seep surface area must be determined to estimate the total seep volume.

Response: Refer to the response to MEDEP General Comment 2. Quantitative measurement of seeps will be deleted from the plan (although during the site visit, a qualitative estimate of the seep flow rates will be attempted). Instead, Darcy's Law and a water budget will be used during the on-shore/off-shore modeling effort.

9. **Comment**: 4.3 Analytical Testing Parameters, Page 4-7, Paragraph 2

"The selected parameters are the COCs identified in the EERA and the Human Health Risk Assessment (McLaren/Hart, 1994) or are crustal metals (Fe, Al, and Mn) useful for comparison."

The MEDEP believes there is a discrepancy between the parameters proposed for the Draft Groundwater Investigation and Monitoring Plan[2] and those proposed for the analysis of seep samples. The seeps will provide information regarding groundwater which is being released directly to the Piscataqua River. The MEDEP proposes seep sample analyses include all parameters proposed as part of the groundwater monitoring plan for the Jamaica Island Landfill (Table 4-2[3]). The rationale behind this is based on the assumptions used for the proposed groundwater analyses at the JILF.

The MEDEP proposes that, in addition to the proposed TAL inorganic analyses included groundwater monitoring plan[4], the major anions (Cl^-, So_4^{2-}, NO_{3-}, Br^-, and alkalinity) be analyzed for each seep sample. Inclusion of these additional anions in the monitoring plan would provide complete major ion chemistry for each monitoring location. The MEDEP sees the following benefits for performing these additional analyses:

- Results from comprehensive major ion analyses would provide a general chemical characterization of seep quality relative to groundwater conditions within the JILF;
- Comparison of total ion chemistry using stiff and/or piper diagrams may reveal common or distinct sources of groundwater between groundwater and seep monitoring locations and dilution effects by intrusion of river water within tidal portions of the aquifer;
- Charge balances can be performed on total ion chemistry to assess the quality of laboratory results; and

[2]Brown and Root Environmental, Draft Groundwater Investigation and Monitoring Plan for Portsmouth Naval Shipyard, Kittery, Maine, April 1996.

[3]Brown and Root Environmental, op. cit.

[4]Brown and Root Environmental, op. cit.

- Finally, geochemical modeling can be performed on total ion chemistry and field parameters (e.g. Eh, DO, pH) using equilibrium computer models such as MINTEQ or PHREEQE. The models have the ability to assess aqueous speciation and possible precipitation of inorganic components for groundwater under equilibrium conditions. Higher ion strength solutions (greater than 0.5 M) may require expansion of the activity coefficient equations[5]. This may be helpful in determining the groundwater transport of metals within the aquifer.

Response: Refer to response to MEDEP General Comment 3 concerning parameters included for seep samples.

Although it is agreed that the collection of water quality parameters can be used qualitatively to aid in fate and transport analysis, geochemical modeling will add insignificant value to the project when direct measurements of contaminant concentrations are available. Geochemical modeling will not be included. Geochemical modeling of the fate of contaminants in the natural environment is best used to interpret field and/or laboratory measurements. However, the uncertainty of typical geochemical modeling is still too high to be used alone as a predictive tool for remedial decision making in complex environments.

Most geochemical models require data from a typical chemical analysis (i.e., the concentrations of various elements or species). Other inputs such as alkalinity, pH, Eh, temperature, and solution density are also required, as well as specification of the aqueous species needed to balance the charge and ensure electrical neutrality. In general, two types of codes are used to model aqueous and solution geochemistry: distribution-of-species codes, which represent the thermodynamics of a static system, and reaction-progress codes, which examine the consequences of an evolving system in which various phases in a system react with one another. The comment suggests the use of distribution-of-species codes assuming the site is under equilibrium conditions. However, under steady-state equilibrium conditions, the direct measurements of contaminant concentrations in groundwater and seep samples will reflect the effects of all the on-going geochemical processes between the source and discharge point. Therefore, the measured contaminant concentrations will provide all the necessary information for risk assessment purposes. Geochemical modeling can only confirm the direct measurements.

10. **Comment**: 4.3 Analytical Testing Parameters, Page 4-7, Paragraph 2

"Salinity will be measured in the field."

Field parameters including pH, specific conductance, temperature, dissolved oxygen, and Eh should also be measured in the field.

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[5]Allison, J.D., et. al., Minteqa2/Prodefa2, A Geochemical Assessment Model For Environmental Systems: Version 3.0 User's Manual, Environmental Research Laboratory, Office of Research and Development, USEPA, Athens, Georgia, March 1991.

Response: Specific conductance, pH, temperature, dissolved oxygen, and Eh will be added to the list of field parameters.

11. **Comment**: Appendix A, Previous Seep Sampling Information, Table 5-6, Page 5-91

Mean results values reported for sample locations 1006 and 1007 are exactly the same with the exception of Mn. Review of the raw data indicates this is probably a transcription error in the table.

Response: Agree. NCCOSC has provided a corrected version of the table which will replace the existing table of Appendix A.

RESPONSE TO NOAA COMMENTS DATED MAY 17, 1996
DRAFT TECHNICAL MEMORANDUM ON SEEP SAMPLING
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

CL-1 Cover Letter Comment: Previously, 8 seep samples were collected in the Spring of 1993 and another 5 in the fall of 1993. In this workplan, the Navy is committing to only 6 seep locations although they mention that "up to 14 additional seep locations may be identified during field activities." I am puzzled why all the seep locations previously sampled in 1993 are not included as definite sampling locations.

Response: Seep sampling locations will be selected in consultation with the regulators following a site visit to identify seeps. The number of seeps selected for sampling will be dependent on feasibility of sampling (access), proximity to other seeps, past sampling, flow volume, proximity to contamination sources, etc.. The 20 seep sampling locations were used for budgetary purposes only and the actual number of seep samples is expected to be lower based on previous seep sampling events; references to 20 seep sampling locations will be removed from the plan.

Although 6 seep sampling locations were planned under future off-shore monitoring activities, it is agreed that to begin with, all 8 stations (UNH) should be sampled regardless of previous results. The plan will be revised to incorporate the 2 additional locations. The 5 samples collected in the fall of 1993 (by URI) were not collected at new stations.

CL-2 Cover Letter Comment: Some of the seep location numbering is confusing. Spring 1993 seep samples at Sullivan Point were numbered 1001, 1002, and 1003. Now the sample number is 9. In addition, Back Channel seep location numbers are shown as #s 16 and 167. Do they correspond with Spring/1993 seep sample locations 1005, 1006, or 1007? It would be wise to reoccupy previous seep locations (e.g., as was done for seep location #1004 in Clark Cove) keeping the numbering consistent and all new locations (and new location numbers) as appropriate.

Response: Agree. Numerous sample location designations have been previously used, as well as identification of seeps by biota sampling location. The plan will be revised to identify sample location designations for previously sampled seeps as 1001, 1002 ... 1008 based on the UNH identification system. New seep stations will continue with 1009, etc.

RESPONSE TO EPA FOLLOW-UP COMMENTS DATED AUGUST 9, 1996
DRAFT GROUNDWATER INVESTIGATION AND MONITORING PLAN
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

EPA found the Navy's responses satisfactory, but continues to recommend the following:

1. **Follow-up to Specific Comment No. 4 (09Aug96)**: (Page 1-4, Section 1.3, part 4); The Plan should acknowledge that additional rounds of water levels may be required to properly characterize groundwater flow patterns and dynamics.

   Follow-up Response: The following sentence will be added: *"In the future, additional rounds of water levels may be required to properly characterize groundwater flow patterns and dynamics."*

2. **Follow-up to Specific Comment No. 5 (09Aug96)**: (Page 1-4, Section 1.3, part 4); The Plan should include provisions to install additional monitoring wells, if necessary, to characterize the extent of potential LNAPL contamination, before designing a removal system. This would allow the development of a better design, potentially reducing the costs of remediation significantly.

   Follow-up Response: The following sentence will be added: *"The first event analytical results may identify "hot spot" or other interest zones where more frequent monitoring is required in the future."*

3. **Follow-up to Specific Comment No. 6 (09Aug96)**: (Page 3-1, Section 3.1); The Navy is strongly encouraged to install piezometers to characterize groundwater levels and flow patterns more completely than can be done with water levels measured only at perimeter monitoring wells.

   Follow-up Response: The following sentence will be added: *The first event water level measurements may identify areas where piezometers should be installed to more completely characterize groundwater levels and flow patterns."*

4. **Follow-up to Specific Comment No. 10 (09Aug96)**: (Page 4-1, Sampling and Analysis); Although we understand that the Navy wants to limit the number of parameters tested for at this stage of the project, we continue to suggest that the design could be expedited if data for design of the treatment system were collected now. One possible way of doing this would be to review the data collected from the first round of sampling, and determine whether or not the design could be expedited by sampling specific wells for design-related parameters as part of the second round of sampling.

   Follow-up Response: The following text will be added: *"Subsequent to the first sampling event, design-related parameters may be included in the future to expedite any groundwater remediation design, if any. It is currently unknown whether any groundwater*

remediation is required; this decision depends on the results of the contaminant fate and transport modeling."

5. **Follow-up General Comment (09Aug96)**: EPA also requests that the Navy forward a schedule for the groundwater monitoring program to our office. This will ensure that EPA can provide oversight during the first sampling event.

Follow-up Response: The EPA (and MEDEP) will be informed of all groundwater sampling events, including the pilot test for low flow sampling. The field work will be scheduled after resolution of regulatory agency comments on the subject planning document.

RESPONSE TO MEDEP FOLLOW-UP COMMENTS DATED JULY 16, 1996
DRAFT GROUNDWATER INVESTIGATION AND MONITORING PLAN
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MEDEP GENERAL FOLLOW-UP COMMENTS

- **MEDEP Follow-up Comment:** The Navy's response refers to the following comment from the MEDEP review of the initial Draft Interim Groundwater Monitoring Plan dated May 1995:

  [Comment no. 17 from MEDEP 7/3/95 letter repeated below]

  17.) 4.3.4 Well Purging, Page 4-24, Paragraph 5

  "Prior to obtaining samples, water levels will be measured and the wells will be purged using a dedicated bailer or a 2-inch submersible pump or a peristaltic pump." "Low flow sampling will be employed if possible."

  To ensure comparability of groundwater data, sample collection methods should be consistent between all monitoring wells. The protocol for collecting low-flow samples presented in the GMP must be consistent with EPA procedures. The following EPA documents are attached for guidance in developing low-flow sampling procedures for the GMP.

- EPA, RCRA Groundwater Monitoring: Draft Technical Guidance, Office of Solid Waste, USEPA, Washington, DC., November 1992.

- EPA, Groundwater Sampling Procedures Low Flow Purge and Sampling; SOP# GW 0001, Draft Final, August 10, 1994.

- EPA, Low Flow Purge and Sample Data Sheet, Revised June 30, 1995.

The primary concern of the MEDEP in the initial draft work plan was the proposed use of bailers for the collection of groundwater samples. Our comment could have been more specific in this regard, but given the preliminary stage of the monitoring plan, the MEDEP believed that at that point we must emphasize the importance of consistency in sample collection methodology and compliance with EPA procedures. In order to avoid future misinterpretations, the MEDEP requests that the Navy communicate with the MEDEP if questions arise stemming from any of the MEDEP's comments.

The Navy initiated a conference call with the MEDEP on June 6,1996 to discuss our May 15, 1996 comment concerning the use of peristaltic pumps at low yielding wells. During the conference call the MEDEP expressed concerns that low-flow sampling using a bladder pump may not be effective in low yielding wells. The Navy noted that the use of a peristaltic pump may cause a potential loss of volatile organic compounds from groundwater samples. The MEDEP indicated it was our understanding that the loss of volatiles would be minimal and that a peristaltic pump could be used to meet drawdown and turbidity requirements if bladder pumps were unable to do so. The Navy indicated

that they intend to have peristaltic pumps on hand for the pilot study, and will use these pumps at the low K wells, if the requirements of low-flow sampling cannot be met using the bladder pumps.

The MEDEP is committed to assessing advances in Low-Flow sampling technology. The most current Low-Flow sampling information is outlined in EPA's Groundwater Issue Document on Low-Flow Sampling[1] and the DEP Information Sheet on Low-Flow Groundwater Sampling[2]. It is the MEDEP understanding that the use of peristaltic pumps, though not considered optimal, is not discouraged if conditions are not conducive to the use of bladder of submersible pumps (e.g. low hydraulic conductivity's and shallow groundwater).

- **Navy Follow-up Response:** As stated previously, the Navy's original intent on this Plan (May 1995 initial Draft Interim Groundwater Monitoring Plan) was to use peristaltic pumps on shallow monitoring wells (less than 20-feet) and wells which exhibited slow recovery; while installing low-flow submersible pumps in the remaining wells. However, the MEDEP commented (Comment no. 18) that "use of a peristaltic pump is limited to wells with water levels of approximately 20-feet or shallower. Therefore, submersible pumps designed for use in 2-inch diameter wells are preferable to maintain sampling consistency between wells." The Navy has since committed to installing low-flow submersible pumps into as many wells as possible for the sake of consistency. Peristaltic pumps will only be used in monitoring wells which exhibit slow recovery or a lack of sufficient groundwater to submerge the pump in during the low-tide cycle.

MEDEP SPECIFIC FOLLOW-UP COMMENTS

9. **MEDEP Follow-up Comment: 3.3 Surveying, Page 3-7, Paragraph 2:** The MEDEP was not aware of the Navy's intention to use GIS at PNS. The MEDEP believes the use of GIS is important for the assessment of contaminant distribution on both the off-shore and on-shore environment at PNS. The MEDEP has already located the monitoring wells at PNS by digitizing figures provided with the RFI Data Gap Report. The MEDEP requested the survey information for comparison to digitized locations. Sediment sample locations have also been located using latitude/longitude data provided with the off-shore databases. The MEDEP has been using, and will continue to use, GIS to assess historical and future sample data. Any information the Navy can contribute will be appreciated.

   Navy Follow-up Response: As additional data becomes available, it will be provided to MEDEP.

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[1]Puls, Robert, W., Michael J. Barcelona, EPA Groundwater Issue, Low-Flow (Minimal Drawdown) Groundwater Sampling Procedure.

[2]MEDEP, DEP Information Sheet, Low-Flow Groundwater Sampling; issued: June 1996.

12. **MEDEP Follow-up Comment: 3.4.1 Available Groundwater Monitoring Data, DRMO Salvage Yard, Page 3-8, Paragraph 3:** This response does not address the issue. If DW-4 and DW-10B are contaminated due to tidal effects as indicated in Section 3.4.1, then they re not appropriate upgradient wells for the DRMO.

Navy Follow-up Response: The intent of the initial groundwater monitoring is to collect groundwater data to establish conditions for subsequent sampling; not to establish which monitoring wells are positioned upgradient at the DRMO. If and when additional fieldwork is performed at the DRMO, gradient may be established based on existing and future data. All existing monitoring wells are included in the monitoring program.

19. **MEDEP Follow-up Comment: Tables 4-1 thru 4-5, Rational for Selection of Analytes, Groundwater Monitoring, PNS, Kittery, Maine, Pages 4-5 thru 4-14:** As stated in the initial comments, the MEDEP believes the use of geochemical equilibrium computer models may be helpful in assessing the aqueous characteristics of metal contaminants. These models require the input of inorganic analysis results for filtered groundwater samples. The current proposal limits the number of filtered inorganic analysis to approximately 15% of the total number of samples collected. In order to use geochemical models effectively, monitoring wells where metal contamination is a concern (e.g. JILF) should be sampled and analyzed for both filtered and unfiltered inorganic constituents.

Navy Follow-up Response: The Navy disagrees with the reliance on geochemical modeling. Geochemical modeling of the fate of contaminants in the natural environment is best used to interpret field and/or laboratory measurements. However, the uncertainty of typical geochemical modeling is still too high to be used alone as a predictive tool for remedial decision making in complex environments.

Currently not enough data exists to complete geochemical modeling. After completion of the interim groundwater monitoring and seep/sediment sampling programs, more data for geochemical modeling will be available, however, not all. Most geochemical models require data from a typical chemical analysis (i.e., the concentrations of various elements or species). Other inputs such as alkalinity and solution density are also required, as well as specification of the aqueous species needed to balance the change and ensure electrical neutrality. In general, two types of codes are used to model aqueous and solution geochemistry: distribution-of-species codes, which represent the thermodynamics of a static system, and reaction-progress codes, which examine the consequences of an evolving system in which various phases in a system react with one another. Assuming steady-state equilibrium conditions (static system), the direct measurements of contaminant concentrations in groundwater and seep samples will reflect the effects of all the on-going geochemical processes between the source and discharge point. Therefore, the measured contaminant concentrations will provide all the necessary information for risk assessment purposes. Geochemical modeling can only confirm the direct measurements.

Geochemical modeling can only add insignificant value to the project since limited data presently exists to complete geochemical modeling and once the analytical results of the interim groundwater monitoring and seep/sediment sampling programs are available,

the measured contaminant concentrations will provide all of the information necessary for risk assessment purposes.

34. **MEDEP Follow-up Comment: Data Management and Reporting, Page 6-2, Paragraph 1:** The MEDEP maintains that inclusion of field parameters in the database is important for it's overall usefulness. Comparison of field parameters such as pH, Eh, dissolved oxygen, and turbidity are important factors in controlling the characteristics of groundwater chemistry. Comparison of these parameters to other chemical constituents is only complicated if they are not included with the original database.

Navy Follow-up Response: The Navy will make modifications to the data base to allow for the incorporation of the field parameters (i.e.; pH, specific conductance, temperature, dissolved oxygen, Eh, and turbidity).