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LETTER REGARDING THE TRANSMITTAL OF PRELIMINARY DATA QUALITY OBJECTIVES FOR SITE 32 NSY PORTSMOUTH ME
11/29/2001
TETRA TECH NUS

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PITT-11-1-050

November 29, 2001

Project Number 4088

Ms. Meghan Cassidy
Environmental Protection Agency
Region I (Mail Code: HBT)
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Mr. Iver McLeod
Maine Department of Environmental Protection
State House Station 17
Augusta, Maine 04333-0017

Reference: Contract No. N62472-90-D-1298 (CLEAN)
Contract Task Order No. 824

Subject: Preliminary Data Quality Objective (DQO) Data Package, Site 32 (Topeka Pier)
Portsmouth Naval Shipyard (PNS), Kittery, Maine

Dear Ms. Cassidy/Mr. McLeod:

On behalf of the U.S. Navy, Tetra Tech NUS, Inc. is pleased to provide to the U.S. Environmental Protection Agency Region I (USEPA) and to the Maine Department of Environmental Protection (MEDEP) 4 copies each of the Preliminary DQO Data Package in preparation for the upcoming meeting on December 6 and 7, 2001.

If additional information is required, please contact Mr. Fred Evans at (610) 595-0567, extension 159.

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 106.3R Bldg. 44
Attn: Marty Raymond
Portsmouth, NH 03804-5000

Sincerely,

Pradeep Kumar for
Deborah Cohen, P.E.
Project Manager

DC/kf
Enclosure

EFANE, (Code 1823/FE, F. Evans) (4 copies)
PNS (Code 106.3R, M. Raymond) (4 copies) + 3 copies (new RAB members)
NOAA (K. Finkelstein) (w/o enclosure)
ME Dept. of Marine Resources (D Card)
Mr. Doug Bogen
Ms. Michele Dionne
Ms. Mary Marshall
Mr. Jack McKenna
Dr Roger Wells
Mr. Onil Roy
PNS Code 100PAO (w/o enclosure)
A. Colby, Katahdin Analytical Services
US Fish & Wildlife Service (K. Munney) (w/o enclosure)
NH Fish & Game (C. McBane)

Mr. Jeff Clifford
Mr. Phil McCarthy
Mr. Jim Horrigan (SAPL)
Ms. Carolyn Lepage
COMSUBGRU TWO (R. Jones)
C. Race, TINUS

Preliminary Data Quality Objectives (DQOs) for Site 32
Portsmouth Naval Shipyard, Kittery, Maine

The following provides the Navy's preliminary Data Quality Objectives (DQOs) for the Remedial Investigation (RI) of Site 32, Topeka Pier, at Portsmouth Naval Shipyard (PNS), Kittery, Maine. The preliminary DQOs were developed using the U.S. Environmental Protection Agency (USEPA) DQO process. This process requires a concise description of the problem to be solved, a specification of the decisions that must be made to solve the problem and a formulation of the data collection approach necessary to provide inputs for making the decisions. When appropriate, a statistically based specification of the tolerance for making decision errors is also undertaken.

The Navy's preliminary outputs for DQO steps 1 through 4 are provided herein to support the December 6 and 7, 2001 technical meeting on the DQOs for Site 32. The DQOs will be revised/completed based on input from the regulators and Restoration Advisory Board (RAB) at this technical meeting. Once the DQOs for the Site 32 RI are developed, the Quality Assurance Project Plan (QAPP) for the investigation will be prepared.

Data Quality Objective Step 1: State the Problem

Participants in DQO Development:

- *Navy (EFANE):* Fred Evans (Remedial Project Manager, Engineer), Debbie Felton (Environmental Engineer), David Grasso (Chemist), Jason Speicher (Risk Assessor, Biologist), Lisa Yeutter (Environmental Engineer)
- *TtNUS (Navy Consultant):* Aaron Bernhardt (Ecological Risk Assessor), Debbie Cohen (Project Manager, Engineer), Tom Johnston (DQO Facilitator, Chemist), Mark Jonnet (GIS, Database), Charles Race (Maine Certified Geologist), Jeff Schubert (Hydrogeologist), Angie Scheetz (Project Chemist), LeeAnn Sinagoga (Human Health Risk Assessor)

(USEPA, Maine Department of Environmental Protection (MEDEP), and RAB participants in DQO development for Site 32 will be added after the December 6 and 7, 2001 technical meeting.)

Regulatory Environment:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly referred to as Superfund)

Site History:

- Around the year 1900, Jenkin's gut (southwest side of Site 32) was filled in. The majority of Site 32 was filled in between 1902 to 1942. Between 1942 to around 1945 the remainder of Site 32 was filled in. Fill material from various locations on and directly offshore of PNS were deposited at Site 32.

[Additional information on site history is provided in the Site Screening Report for Site 30 (Building 184), Site 31 (West Timber Basin), and Site 32 (Topeka Pier), TtNUS, March 2000.]

Previous Investigations at/offshore of Site 32:

- Estuarine Ecological Risk Assessment (for Operable Unit 4) (sampling in 1991 to 1993) included sampling locations in the offshore area near Site 32 referred to as the Back Channel Area of Concern (AOC).
- RCRA Facilities Investigation (RFI) Data Gap investigation and 1996/1997 groundwater monitoring included the FA monitoring well cluster
- 1996/1997 seep/sediment monitoring included locations in the intertidal area offshore of Site 32
- Site 32 Site Screening Investigation (SSI) (1998) included soil and groundwater sampling at Site 32
- A geophysical survey (MTADS) was conducted for a portion of the site in October 1998
- Interim Offshore Monitoring (Rounds 1 through 4, 1999 to 2001) includes a monitoring station offshore of Site 32.

The Site 32 SSI was conducted to document the release or potential release of hazardous substances that may be present at the site and make recommendations for further action (i.e., an RI) and to eliminate from further investigation those portions of the site which may pose no appreciable risk to the environment or human health. Accordingly, the sampling and analytical rationale targeted source areas, that is sampling locations were targeted that were most likely to be contaminated by Site 32 activities. Based on exceedances of risk screening levels, it was determined that a release of hazardous substances may have occurred and that an RI was required for Site 32. The recommendations based on the Site 32 SSI (Field Investigation Report, TtNUS, March 2000) is that additional investigation is necessary to define the nature and extent of contamination near Building 154 and Building 158. The rationale for this recommendation is based on the detection of lead and arsenic contamination in soil and groundwater at levels exceeding facility background concentrations and EPA Region III risked-based concentrations. Also, elevated levels of PCBs and PAHs were also detected in the soil near Building 158. The report indicates that additional sampling to address surface soil contamination at other locations would also be considered (as part of the DQOs for the RI investigation).

The MTADS survey was conducted on the portion of the site that was accessible (approximately a quarter to a third of the site). Significant portions of the site were inaccessible because of equipment, fenced laydown areas, railroad tracks, and other structures. The MTADS showed buried utility lines throughout the Site 32 area. Unidentifiable buried objects were not as extensive as those shown for the other area surveyed by MTADS (the JILF).

The offshore area adjacent to Site 32 is part of the Back Channel Area of Concern (AOC) of Operable Unit 4 (OU4). Risks associated with OU4 have been evaluated as part of the Human Health Risk Assessment for Offshore Media (HHRA, McLaren/Hart, 1994) and the Estuarine Ecological Risk Assessment (EERA, NCCOSC, 2000). The HHRA evaluated OU4 as one unit, whereas the EERA evaluated OU4 by AOCs. Based on the Interim Record of Decision (ROD) for OU4, only offshore ecological risks pose a current concern for OU4. Specifically for the Back Channel AOC, intermediate risk for sediment was identified. As part of the interim offshore monitoring program for OU4 (TtNUS, October 1999), it was determined that sediment monitoring was required for OU4, which includes sediment offshore of Site 32. The sediment data from the Rounds 1 through 4 data for monitoring stations in the Site 32 offshore area show exceedances of the Interim Remediation Goals for OU4 (IRGs) for copper and nickel. Organic concentrations overall appear to be low in relation to the IRGs. During Round 4, foundry slag that is high in metals concentrations was found along the Site 32 shoreline. It is believed that

the metals concentrations are from the slag, rather than from groundwater migration from Site 32. The consistent IRG exceedances for copper and nickel noted in the sediment at Site 32 suggests that sediment concentrations are above acceptable risk-based concentrations

Historical Site Chemical Data:
Based on site history and past investigation, the chemical mix is potentially varied. In particular, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals were more frequently identified in soil/fill material at the site. (See attached soil and groundwater data summary tables that include potential screening levels for Site 32.)

Site Geology/Hydrogeology:

- The thickness of fill is 2 to 15 feet across the site,
- Fill is underlain by natural marine and glaciomarine silt/clay (7 to 35 feet thick)
- Silt/clay is underlain by glacial till
- Bedrock ranges from 15 to 57 feet below ground surface (bgs) and slopes toward the offshore (Back Channel).
- Groundwater flow is toward the offshore (Back Channel)
- Groundwater is tidally influenced.
- The majority of the groundwater at the site appears to be saline/brackish; however, fresh groundwater is present in the southeastern portion of the site.

Assumption: the fill is relatively permeable (i.,e. groundwater flow ranges from 2 to 20 feet per day or more). Slug tests of the FA-01 well cluster indicated hydraulic conductivity of 1300 feet/day and 0.03 to 0.06 feet/day in bedrock (RFI Data Gap Report).

Potential contaminant migration mechanisms:

- Groundwater transport from onshore to offshore (including through sediment, seeps, and possibly sewer system)
- Erosion of shoreline to offshore areas
- Most of the site is paved or covered by buildings so infiltration of precipitation is not likely to be a significant current migration mechanism

Storm Sewer Discharge Information:
Before 1970, waste discharged through sewers and sewers may have leaked into surrounding soil, which in turn, may have leached chemicals into groundwater. Some sewers are below the groundwater table and could leak directly into groundwater. Some buildings have basements pumped continuously to the storm sewer system. Additional information on the storm sewer system is needed to understand where the sewers and outfalls are located and how the storm sewer system impacts groundwater flow (including seeps). Methods for tracing the storm sewer flow may be necessary.

It is believed that seeps in the intertidal area of the site may be the outlets for some storm sewers although this has not been confirmed. Furthermore, there is a suspicion that water from building basements is being pumped through the storm sewer system to the offshore. One indication that this suspicion is true is a "gusher" seep that has an extraordinarily high flow rate (approximately 40 gallons per minute), which appears to be a storm water outfall regulated under PNS' storm water permit. Groundwater may also be infiltrating the storm sewer system in locations other than building basements. Given the potentially complex mixing situation, it is

believed not to be cost-effective to try to separate the relative flow contributions from the various potential seep water sources at this time. Therefore, all seep water will be assumed to be groundwater for planning purposes. If any corrective actions are required at Site 32, a more detailed analysis of storm water flows and potential mixing with seeps may be warranted.

Land Use (current):
PNS is a military facility with restricted access. The current land use for Site 32 is office and maintenance, parking (about 50 percent), storage, vehicle and rail car maintenance, transducer repair, boat launch, and temporary housing (H23, in the southeast corner, is used for transient Navy personnel). Based on the age of the site, archaeological resources may need to be considered in the area of investigation. The Shipyard historian needs to be contacted to determine any constraints or requirements during investigation.

Land Use (future):
The site uses are likely to remain as it is currently. However, unrestricted residential, recreational, commercial, or industrial use of the site may be possible scenarios if the Shipyard were to close.

Risk Conceptual Site Model for Site 32:

Onshore: There are no ecological receptors on site exposed to soil and groundwater because the site is covered with pavement/asphalt or buildings. Human exposure to site materials through air, groundwater, and soil exposure are considered (see Figure 1 for the conceptual site model).

Air exposure pathway – soils are covered with asphalt or other materials such as buildings so there is not a concern for current recreational or occupational worker exposure, but based on hypothetical future removal of the pavement/asphalt, future exposure pathway for all site users needs to be considered. The current exposure pathway for a construction worker digging at the site needs to be considered.

Groundwater exposure pathway – Current exposure to groundwater at the site may be from the construction worker digging at the site at or below the groundwater table and the excavated area being partially filled with shallow groundwater. Therefore, for the current exposure for the construction worker, exposure to all shallow groundwater is considered. Groundwater at the site appears to be mostly saline/brackish water with some pockets of fresh water near the original shoreline. Groundwater at PNS is not used for drinking; however, for future hypothetical residential exposure pathway, a resident putting in a drinking water well in the fresh groundwater needs to be considered. Therefore for this future exposure pathway, only fresh groundwater at the site is considered.

Soil – The only current scenario is for that of a construction worker because the site is covered and other receptors would not be exposed to surface soil contaminants. Any other human receptors will be considered for potential future risk scenarios.

Offshore: The area offshore of Site 32 is currently included as part of OU4; however, for the RI investigation, the offshore area that may be impacted by Site 32 will be included as part of the investigation. For ecological offshore exposure, risks have been evaluated and it was determined that interim monitoring of sediment was warranted for the sediments in OU4, including the offshore area of Site 32. Although actions to be taken based on the interim monitoring for OU4 have not been identified (actions will be identified as part of the 5-year

review), high concentrations of metals (based on exceedances of interim remediation goals (IRGs) for copper and nickel) have been detected in the sediments in the intertidal area. The source of the metals concentrations are thought to be from foundry slag found in the sediments and soil along the shoreline of Site 32. The high metals concentrations is not believed to be from migration of Site 32 groundwater to the offshore; however, this needs to be evaluate. For human health, exposure for a person recreating in the intertidal area of Site 32 has not been evaluated and this exposure pathway will be evaluated as part of Site 32. Therefore, there is overlap between the conceptual risk model for Site 32 and OU4 risks. The conceptual model reflects the overlap to provide a comprehensive understanding of risks for the Site 32 onshore and offshore areas.

Sediment exposure pathway – A person residing at Site 32 (under hypothetical future residential exposure scenario) or residing at PNS (current or future) may recreate in the intertidal area of Site 32 and be exposed to surface sediment in this area.

Surface water exposure pathway – A person residing at Site 32 (under hypothetical future residential exposure scenario) or residing at PNS (current or future) may recreate in the intertidal area of Site 32 and walk in shallow surface water in this area. The person may be exposed to water in the river and/or the seep water depending on whether the tide is in or out (the seep water is generally only exposed between mid and low tide). (Seep water at several seeps may have very low flow that form very thin sheet flow. Sampling methods and sample management methods will need to be considered to ensure that the analytical data for the seep water reflects the chemicals present in the seep water and not sediment entrained in the seep water because of sampling method so that exposure to seep water can be evaluated.)

Problem Statement

Human exposure to onsite contaminants and to contaminants in the offshore intertidal area are a concern, and offshore ecological exposure to contaminants in the offshore area is a concern. For humans we are concerned about potential health risk; for the ecology we are concerned about the potential for Site 32 contaminants to have an adverse impact on the ecology, by mobilizing through groundwater transport after the asphalt cover and buildings are removed. Potential current impacts to the offshore from Site 32 are being evaluated as part of the interim offshore monitoring program for OU4 (through sediment monitoring and trending).

In the intertidal area of Site 32 (part of OU4), elevated metal concentrations (relative to ecological concerns, if the metals are bioavailable) were observed and tentatively associated with a slag pile. The presence of more slag is suspected along the Site 32 shoreline. The extent of this metals contamination is unknown. We will combine the investigation of this concern with the risk assessments. A primary concern to support a potential remedial action for the metals source is determining the extent of metals contamination associated with the slag.

Onshore:

An SSI was conducted and, based on that investigation, the site was recommended for a RI under CERCLA because there is a human health risk concern for humans exposed to site contaminants onshore at Site 32.

Offshore:

A concern exists that humans could be exposed to offshore sediments and seep water in the intertidal area of Site 32 in ways that would adversely affect their health. Current OU4 offshore ecological risks have been characterized under the EERA. Interim offshore monitoring offshore

of Site 32 (Rounds 1 through 4) indicates elevated metals concentrations (exceedances of the IRGs for copper and nickel) Therefore, only *future ecological* risks (from migration of chemicals from Site 32 to the offshore) need to be evaluated (based on modeling of contaminant transport from onshore to the offshore area).

Support of for Site 32 FS:
We would like to collect data during the Site 32 RI to support any feasibility study (FS) for Site 32 that might be necessary, insofar as the additional data can be collected efficiently and cost-effectively.

Specific information needs to support an FS for the Site 32 offshore area relate to defining the nature and extent of the elevated metals concentrations in sediment. Sampling and analysis as part of the Interim Offshore Monitoring Program revealed elevated concentrations (i.e., exceeding OU4 Interim Remediation Goals or IRGs) of copper and nickel in the sediment in the intertidal area of Site 32. The elevated metal concentrations appear to be associated with slag in the intertidal area of Site 32 and appear to be confined to a small area but this has not been verified. Furthermore, the bioavailabilities of the metals appear to be low, which indicates the existence of limited or no ecological risks associate with these metal contaminants. Low bioavailabilites have not been confirmed. In addition the spatial distribution of the elevated metals concentrations is not known. Additional evaluation may be required to understand bioavailability to determine risk.

Data Quality Objective Step 2: State the Decision(s)

Principal Study Questions:

1. Are current or future potential risks from Site 32 contaminants unacceptable for humans onshore or in the intertidal zone.
2. Could Site 32 contaminants migrate at levels that could cause a future adverse impact to the offshore ecology if the site configuration changes (e.g., lifting the asphalt "cap")?

Secondary Study Question:

3. Is sufficient information available to support a comprehensive FS to address all Site 32 risks identified to be unacceptable both onshore and offshore? Sufficient information as related to Site 32 includes:
   - Establishing a link between source of contamination and contamination in the media sampled
   - Determining the nature and extent of contamination sufficiently to evaluate potential remedies

Potential Actions for Principal Questions:

If unacceptable risks based on Principal Questions 1 and/or 2 - Implement an FS that would consider the following (and possibly more) remedies:

- Limited action (monitoring and land use controls)
- Soil cap to prevent exposure of receptors to contaminants
- Installation of a hazardous waste cap to prevent infiltration of precipitation and exposure of receptors to contaminants

- Installation of a cut off barrier or hydraulic barrier to prevent contaminant migration (and associated groundwater extraction and treatment)
- Limited excavation to remove contamination, especially the most contaminated areas
- *Exsitu* treatment – biological, soil washing/separation or other
- *Insitu* treatment – bioremediation, soil washing, fixation/stabilization or other (e.g., funnel and gate)

If acceptable risks based on Principal Questions 1 and 2 - No Further Action (NFA) for onshore area.

Note: Treatability studies may be necessary to complete an FS.

Potential Actions for Secondary Question:

FS Support

- Go to an FS if sufficient information available
- Develop DQOs for collecting additional data to support an FS if additional information is necessary to support the FS.

Decision Statements:

Note: Two principal decision statements are presented below. The term "No Further Action" applies to each decision statement individually. No further action is required at Site 32 as a whole only if *all* decision statements yield an NFA condition.

Principal Decisions

1. Determine whether current OR future potential risks from Site 32 contaminants are unacceptable for humans. If either the current OR future potential risk is unacceptable, an FS is required; otherwise NFA in response to this question. (Current risks will be estimated for onshore, construction workers, and intertidal area recreationers. Future risks will be estimated for onshore hypothetical civilian residents, occupational worker, construction risk, and onshore/intertidal recreationers.)

2. Determine whether an unacceptable future potential adverse impact from Site 32 contaminants exists for ecological receptors in the Site 32 offshore area (by predicting furture potential surface water and sediment concentrations). If it does, FS is required; otherwise take NFA in response to this question. (Adverse impact will be evaluated using a comparison of predicted chemical concentrations to IRGs or screening levels (e.g., ER-Ms) for sediment and Ambient Water Quality Criteria (AWQC) for surface water.)

Secondary Decision

3. Having decided that an FS is necessary, determine whether sufficient information is available to support an FS? If yes, move to the FS. If no, collect develop DQOs for collecting additional data to support the FS. After collecting the necessary data to support the FS, conduct the FS.

Data Quality Objective Step 3: Specify Inputs to the Decision(s)

Assumption: Any of the chemicals previously detected at the site could be anywhere at the site, therefore we would want the same analyses at all areas of the site.

Decision Inputs:

All Decisions:

- Land survey including the offshore area
- Water levels (wells)
- pH, and well stabilization parameters, some of which may be needed for the modeling.
- Background analyte concentrations for media of interest: Facility background exists for most analytes in all media of interest (except for dioxin, which does not appear to be an analyte of concern for this site – see discussion below).

It is likely that existing data combined with the new data would be used to make the decision for Site 32 where existing and new sampling locations do not overlap. It is likely that where the locations overlap, only the new data would be used. However, the specific management of the data would need to be determined for each decision and for each media.

Decision Statement 1 (human health risks):

- Risk models for receptors of interest, both current and future, as applicable
- Measurements:
  - SVOCs including PAHs.
  - PCBs
  - Target Analyte List (TAL) metals. For groundwater and seep water total and dissolved metals.
  - Pesticides analysis is generally included with PCBs so even though low pesticides concentrations were detected at the site, we would include pesticides in the analytical scheme for the RI since there is really no extra analytical cost to do the pesticide analysis. However, there are extra costs for data management and evaluation. Therefore, pesticide analysis at select locations should be considered during the development of the sampling plan.
  - Dioxin/furan analyses does not appear to be necessary. Although ash was evident in the old timber basin, the basin was filled prior to 1945, which appears to be prior to use of chlorinated chemicals. Therefore, dioxin/furans should not be a concern for Site 32.
  - Available data for soil and groundwater **do not** suggest a problem with VOCs, cyanide, or chromium (hexavalent and trivalent). These analytes were investigated at locations most likely to be contamination source (as part of the SSI) and we would have found these analytes at levels of concern if they were present.
  - Human health action level – cumulative excess lifetime cancer risk for reasonable maximum exposure (RME) = 1 x 10-5 or noncancer hazard index (HI) based on target organ = 1 (evaluate each receptor based on this), and lead exposure action limits based on modeling of blood lead levels. Exceeding any of these limits will trigger an FS.
  - Sediment data from the interim offshore monitoring program and may be sufficient to support the risk assessment for human health
  - Oil and oil sheen observed in some soil borings during the previous investigation. Based on the analytical data, VOC were very infrequently detected and at low concentrations. PAHs were detected. The individual chemicals that are included in petroleum hydrocarbon mixtures such as diesel range organics (DRO) or gasoline range organics (GRO) have risk-based concentrations limits, whereas risk-based concentrations are not

available for the petroleum hydrocarbon mixtures. Therefore, data for the petroleum hydrocarbon mixtures is not required to support risk assessment.

Decision Statement 2 (Future predicted offshore impact):

- Fate and transport modeling protocol.
- physical parameters (pH, TOC, CEC), some of which may be needed for the modeling.
- Adverse impact triggers: IRGs in sediment and AWQCs in surface water.
- Analytes for Decision Statement 1
- Predicted surface water (at the end of the mixing zone) and sediment chemical concentrations used in estimating future impact will be based on modeling of groundwater and its interaction with onshore soil and offshore sediment. No data will need to be collected in the offshore area to support modeling.

Decision Statement 3 (Sufficient information for FS):

- Results of Interim Offshore Monitoring Program 5-year review for stations offshore of Site 32
- Toxicity tests??
- Other data??
- Some chemistry and physical data will be required and the data to be collected will be determined by the ecological risk assessors.
- metals in sediment (likely screening analysis such as XRF would be appropriate for determining extent)

- Sampling and Measurement Methods:
  - Sampling:
    - Groundwater sampling - low flow for groundwater wells, temporary wells if possible for the additional wells (in addition to existing monitoring wells). Consider temporary wells (hydropunch) wherever possible and try to limit addition of new monitoring wells.
    - Soil sampling - likely geoprobe not feasible because of possibility of hitting debris like bricks
    - sediment - same as previous sediment sampling (grab samples from 0 to 10 cm).
    - seep water– need to identify appropriate method to sample the water to reduce entrainment of sediment particulates and also identify appropriate sample handling to remove particulates (filtration for metals and centrifugation for organics).

  - Analyses:
    We will use CLP methods if detection limits are low enough (particularly related to seep water and sediment). We would not want to use NOAA methods just to be consistent with past analyses if the CLP methods provide adequate performance. The ICP-MS may be able to meet the necessary detection limits – but we need to discuss more. We need to evaluate detection limit versus screening levels/action limits for making decisions 1 and 2. Screening levels for modeling are the surface water and sediment limits (e.g., AWQC and IRGs). May want to development site-specific screening levels for seep and groundwater for human exposure. Attachment 1 tables includes some possible screening levels for soil and groundwater.

Modeling – The specific modeling method needs to be determined. Previous modeling for PNS used a worst case fate and transport model based on maximum observed chemical concentrations and other conservative factors was used to estimate screening level exceedances. This method could be used initially to estimate potential AWQC exceedances in surface water and IRG exceedances in sediment. However, if there are predicted exceedances, a second phase of modeling using a more realistic model would be conducted (e.g., using more realistic source factors such as average or 95% UCL concentration and source distance from shoreline and considering dispersion, adsorption, and other such factors that affect chemical migration).

Data Quality Objective Step 4: Establish the Study Boundaries

Most of the current and short term future ecological risks for the offshore area are currently being addressed under OU4. The following table summarizes the various receptors, the temporal risk considerations and whether the risk will be evaluated for onshore or offshore areas as part of the RI for Site 32. Particular environmental media of interest for the various receptors are also indicated.

Average depth to water table is expected to be 10 feet. Fill depth is about 15 feet. We will need data to the bottom of the fill material for modeling transfer of contaminants from fill to groundwater.

	Current Risk	Future Risk
Onshore	• Construction worker (Shallow GW and soil to WT)	• Hypothetical civilian residents (0-2 ft below subbase plus any fresh GW present at site.) • Recreationers (0-2 ft below subbase) • Construction worker (Shallow GW and soil to water table or 10 ft, whichever is shallower) • Occupational worker (0-2 ft below subbase)
Offshore	• Recreationers (0-10 cm only in SD and surface water/sediment) •	• Hypothetical civilian resident (0-10 cm in intertidal SD, and surface water/sediment during recreation) • Recreationers (0-10 cm in intertidal SD and surface water/sediment) •

This table is explained in more detail in the text below.

Decision Statement 1:
Current and Future Potential Human health risk assessment boundaries (onshore and offshore) –The boundary of Site 32 onshore area includes the fill area between the original shoreline to the current shoreline. The offshore area extends from mean high tide to mean low tide as determined by NOAA. It should be understood that any decision unit should represent a typical decision unit and does not necessarily delineate an actual physical boundary of residential plots.

- Current and future construction worker (onshore only – The study area is all soils over all of Site 32 down to the groundwater table or 10 feet below the asphalt subbase, whichever is shallower, and includes shallow groundwater). The entire onshore area will be the exposure unit for this receptor.
- Current recreational – offshore sediment (0 to 10 cm deep) and surface water, over the entire Site 32 offshore area. This area will be a single decision unit. We assume there will be seven recreational events per year to be conservative.
- Future recreational – same as current recreational scenario, plus soil 0 to 2 feet below asphalt subbase over the entire Site 32 onshore area.
- Future resident – same as current recreational scenario plus: surface soil 0 to 2 feet below asphalt subbase, 1-acre decision units representing typical shorefront or near-shorefront properties, and inclusive of any fresh groundwater under the site, if present.
- Future occupational worker – Soil 0 to 2 feet below asphalt subbase, whole onshore Site 32 area

Storm sewer outfalls that appear as seeps will not need to be sampled explicitly to characterize risk, but they could be needed to support an FS by helping to identify contaminant sources. Therefore they will be sampled as a separate stratum.

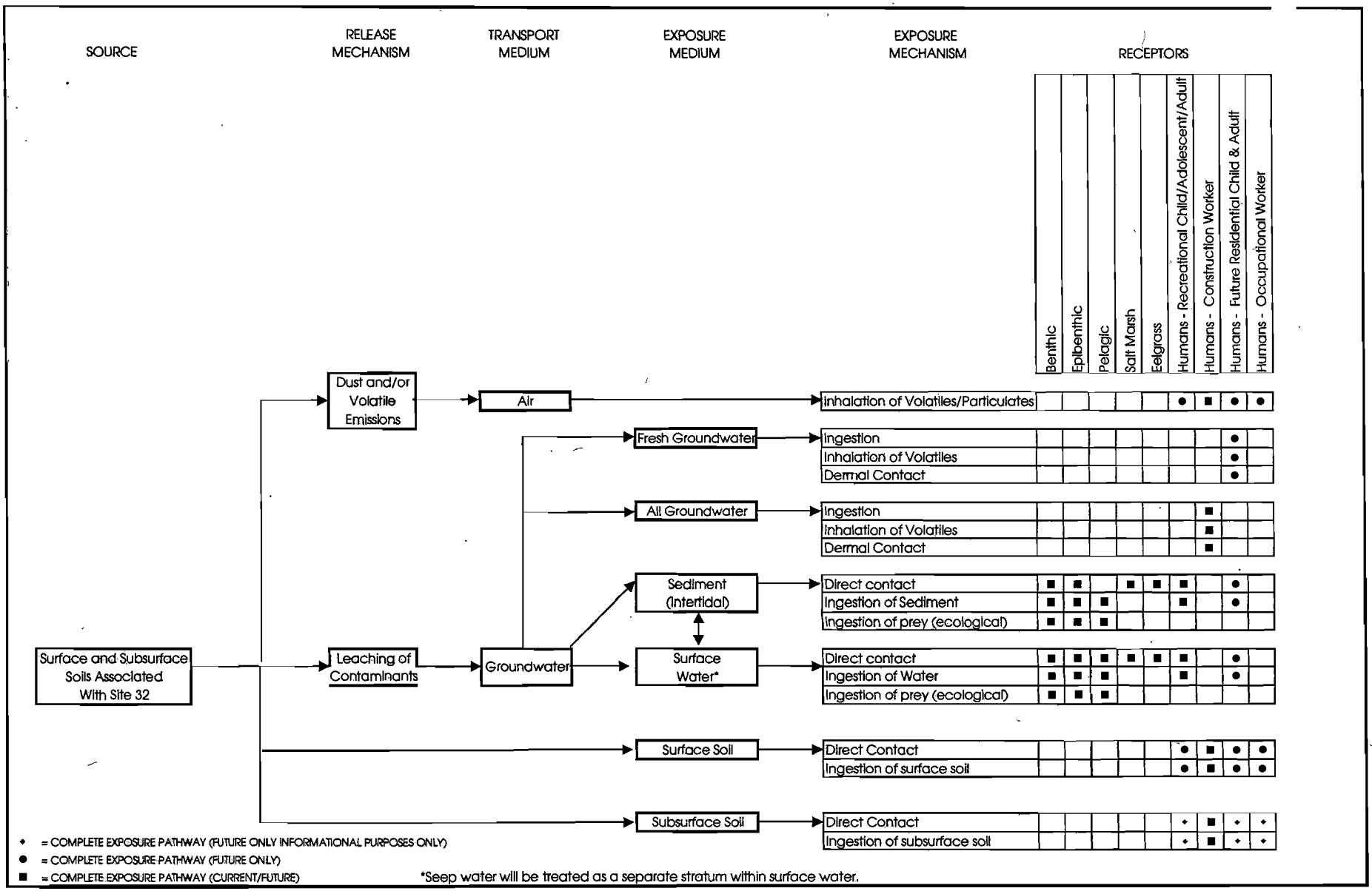
Decision Statement 2:
Future Potential Impact to the Offshore
For the first stage of modeling (the very conservative 1-D model that assumes that the maximum concentration is the concentration for the source area right offshore impact exists, then NFA for future potential ecological risk (management of migration for eco risk). If unacceptable future potential ecological risk, we need to evaluate more realistic model for migration at site (3-D modeling versus 1-D modeling or more realistic concentration inputs). The specific modeling approach needs to be determined. The 1-D modeling approach could be the same approach that was used in previous modeling at PNS.

Onshore soil and groundwater data will be used as inputs to the model that will be used to predict offshore future worst case concentrations in sediment and surface water. Input boundaries will be all soil and groundwater underneath the onshore footprint. The offshore boundaries for sediment will extend from the shoreline of Site 32 out to the extent of sediments modeled in the previous modeling as "near shore sediment". Surface water will be the water immediately downstream of the mixing zone.

The time frame considered to be the future will need to be determined.

Decision Statement 3:
FS Support:
The spatial bounds on information to be gathered extend across all of Site 32 and the offshore data collected under the Interim Offshore Monitoring Program that are judged to be related to Site 32. The entire Site 32 offshore intertidal area that may be affected by the slag piles or by runoff from slag piles. Depth of concern for sediment is from surface to about 1 foot deep to understand extent of contamination for possible depth of remediation.

Data Quality Objective Step 5: State the Decision Rule; Data Quality Objective Step 6: Establish the Decision Error Tolerances; and Data Quality Objective Step 7: Select the Sampling Design. TO BE COMPLETED



CONCEPTUAL SITE MODEL
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KETTERY MAINE

ATTACHMENT 1 – SCREENING TABLES

TABLE 1-1

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN SURFACE SOIL TO BACKGROUND AND REGION 9 PRGs
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Site-Specific Background[4]	Region 9 Residential Soil PRGs [2]		Region 9 Industrial Soil PRGs [3]		SSLs (DAF 1)[5]		Exceeds Criteria ? Yes or No
Volatile Organic Compounds (mg/kg)													
2-BUTANONE	5/14	0.002 J	0.004 J	0.011-0.01	TP-SS09-0001-98-D	—	730	N	2800	N	—	N	No
CHLOROFORM	1/14	0.002 J	0.002 J	0.01-0.012	TP-SS12-0001-98	—	0.24	C	0.52	C	0.03	C	No
FREON-113	1/14	0.003 J	0.003 J	0.01-0.012	TP-SS07-0001-98	—	—	N	—	N	—	N	No
TOLUENE	3/13	0.001 J	0.002 J	0.011-0.01	TP-SS02-0001-98, TP-SS09-0001-	—	52	N	52	N	0.6	N	No
TRICHLOROETHENE	1/14	0.002 J	0.002 J	0.01-0.012	TP-SS15-0001-98	—	2.8	C	6.1	C	0.003	C	No
XYLENES, TOTAL	3/13	0.002 J	0.007 J	0.011-0.01	TP-SS09-0001-98-D	—	21	N	21	N	10	N	No
Semivolatile Organic Compounds (mg/kg)													
1,2-DICHLOROBENZENE	1/14	1.7 J	1.7 J	0.33-6.9	TP-SS06-0001-98	—	37	N	37	N	9	N	No
2-METHYLNAPHTHALENE	4/14	0.024 J	0.14 J	0.36-6.9	TP-SS09-0001-98-D	—	—	N	—	N	—	N	No
4-METHYLPHENOL	1/14	0.019 J	0.019 J	0.33-6.9	TP-SS15-0001-98	—	31	N	440	N	—	N	No
ACENAPHTHENE	2/14	0.064 J	0.46	0.33-6.9	TP-SS15-0001-98	—	370	N	3800	N	—	N	No
ACENAPHTHYLENE	2/14	0.026 J	0.044 J	0.33-6.9	TP-SS15-0001-98	—	—	N	—	N	—	N	No
ANTHRACENE	6/14	0.022 J	0.58	0.33-6.9	TP-SS15-0001-98	—	2200	N	39000	N	—	N	No
BENZO(A)ANTHRACENE	12/14	0.027 J	1.8	0.36-6.6	TP-SS15-0001-98	—	0.62	C	2.9	C	0.08	C	Yes; Y1,4
BENZO(A)PYRENE	12/14	0.022 J	1.7	0.36-6.6	TP-SS15-0001-98	—	0.062	C	0.29	C	0.4	C	Yes; Y1,2,4
BENZO(B)FLUORANTHEN	13/14	0.024 J	2.1	6.6	TP-SS15-0001-98	—	0.62	C	2.9	C	0.2	C	Yes; Y1,4
BENZO(G,H,I)PERYLENE	10/14	0.036 J	1.8 J	0.33-6.6	TP-SS02-0001-98	—	—	N	—	N	—	N	No
BENZO(K)FLUORANTHEN	12/14	0.018 J	1.2	0.36-6.6	TP-SS15-0001-98	—	6.2	C	29	C	2	C	No
BIS(2-ETHYLHEXYL)PHTH	1/14	0.43	0.43	0.073-6.9	TP-SS01-0001-98	—	35	C	180	C	—	C	No
BUTYLBENZYL PHTHALA	4/14	0.023	0.076 J	0.33-6.9	TP-SS11-0001-98	—	1200	N	10000	N	800	N	No
CARBAZOLE	7/14	0.019 J	0.54	0.33-6.9	TP-SS15-0001-98	—	24	C	120	C	0.03	C	Yes; Y4
CHRYSENE	13/14	0.035 J	2.1	6.6	TP-SS15-0001-98	—	62	C	290	C	8	C	No
DIBENZO(A,H)ANTHRACE	6/14	0.035 J	0.36	0.33-6.9	TP-SS15-0001-98	—	0.062	C	0.29	C	0.08	C	Yes; Y1,2,4
DIBENZOFURAN	3/14	0.029 J	0.3 J	0.33-6.9	TP-SS15-0001-98	—	29	N	510	N	—	N	No
DI-N-BUTYL PHTHALATE	5/14	0.018 J	0.051 J	0.33-6.9	TP-SS17-0001-98	—	610	N	8800	N	3	N	No
FLUORANTHENE	13/14	0.034 J	3.8	6.6	TP-SS15-0001-98	—	230	N	3000	N	200	N	No
FLUORENE	4/14	0.02 J	0.48	0.33-6.9	TP-SS15-0001-98	—	260	N	3300	N	30	N	No
INDENO(1,2,3-CD)PYRENI	10/14	0.025 J	0.93	0.36-6.9	TP-SS15-0001-98	—	0.62	C	2.9	C	0.7	C	Yes; Y1,4
NAPHTHALENE	3/14	0.021 J	0.25 J	0.33-6.9	TP-SS15-0001-98	—	5.6	N	19	N	4	N	No
PHENANTHRENE	12/14	0.033 J	3.1	0.36-6.6	TP-SS15-0001-98	—	—	N	—	N	—	N	No
PYRENE	13/14	0.034 J	2.4	6.6	TP-SS15-0001-98	—	230	N	5400	N	200	N	No

TABLE 1-1

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN SURFACE SOIL TO BACKGROUND AND REGION 9 PRGs
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Site-Specific Background[4]	Region 9 Residential Soil PRGs [2]		Region 9 Industrial Soil PRGs [3]		SSLs (DAF 1) [5]		Exceeds Criteria ? Yes or No
Pesticides/PCBs (mg/kg)													
4,4'-DDD	6/13	0.0021 J	0.07 J	.0034-0.03	TP-SS01-0001-98	—	2.4	C	17	C	0.8	C	No
4,4'-DDE	12/13	0.0074	0.3	.0038-0.01	TP-SS17-0001-98	—	1.7	C	12	C	3	C	No
4,4'-DDT	12/13	0.014 J	0.67	.0038-0.02	TP-SS17-0001-98	—	1.7	C	12	C	2	C	No
ALDRIN	1/14	0.0016 J	0.0016 J	.0018-0.01	TP-SS10-0001-98	—	0.029	C	0.15	C	600	C	No
AROCLOR-1260	1/14	0.21 J	0.21 J	0.034-0.3	TP-SS04-0001-98	—	0.22	C	1	C	—	C	No
ENDOSULFAN SULFATE	3/13	0.0065 J	0.012	0.0034-0.0	TP-SS10-0001-98	—	—	N	—	N	—	N	No
Inorganics (mg/kg)													
ALUMINUM	14/14	5520	21100	—	TP-SS17-0001-98	20284	7600	N	10000	N	—	N	Yes; Y1,2,3
ANTIMONY	1/7	5 J	5 J	0.3-1.2	TP-SS05-0001-98	4.7	3.1	N	82	N	0.3	N	Yes; Y1,3,4
ARSENIC	13/14	7.5 J	16.9	2.4	TP-SS17-0001-98	14.3	0.39	C	2.7	C	1	C	Yes; Y1,2,3,4
BARIUM	14/14	31.2	87.2	—	TP-SS15-0001-98	86	540	N	10000	N	80	N	Yes; Y3,4
BERYLLIUM	12/14	0.45 J	0.98 J	0.24-0.5	TP-SS03-0001-98	0.82	15	N	2200	C	3	N	Yes; Y3,4
CADMIUM	7/14	0.52 J	1.3	0.34-0.5	TP-SS15-0001-98	2.1	3.7	N	81	N	0.4	N	Yes; Y4
CALCIUM	14/14	1470 J	6270 J	—	TP-SS02-0001-98	2006	—	N	—	N	—	N	Yes; Y3
CHROMIUM (Total)	14/14	18.8 J	100 J	—	TP-SS15-0001-98	68	210	C	450	C	2	N	Yes; Y3,4
COBALT	14/14	7.6	20.9	—	TP-SS02-0001-98	11.8	470	N	10000	N	2	N	Yes; Y3,4
COPPER	14/14	21.9	223 J	—	TP-SS04-0001-98	86	290	N	7600	N	—	N	Yes; Y3
IRON	14/14	12600	32600	—	TP-SS02-0001-98	23479	2300	N	10000	N	—	N	Yes; Y1,2,3
LEAD	13/14	15.7	916 J	21.2	TP-SS10-0001-98	326	400	N	750	N	—	N	Yes; Y1,2,3
MAGNESIUM	14/14	3920	9810	—	TP-SS17-0001-98	7948	—		—		—		Yes; Y3
MANGANESE	14/14	130 J	536	—	TP-SS11-0001-98-D	330	180	N	3200	N	—	N	Yes; Y1,3
MERCURY	11/14	0.01 J	16.3 J	0.01-0.13	TP-SS09-0001-98	0.57	2.3	N	61	N	7	N	Yes; Y1,3,4
NICKEL	14/14	20.9	67.6 J	—	TP-SS02-0001-98	42	160	N	4100	N	—	N	Yes; Y3
POTASSIUM	14/14	1160	3070	—	TP-SS02-0001-98	1772	—		—		0.3		Yes; Y3
SILVER	1/14	0.93	0.93	0.25-0.64	TP-SS03-0001-98	—	39	N	1000	N	2	N	No
SODIUM	10/14	239	936	95.4-110	TP-SS01-0001-98	1370	—		—		—		No
THALLIUM	1/14	0.81 J	0.81 J	0.51-1.4	TP-SS09-0001-98	0.23	—	N	—	N	—	N	Yes; Y3
VANADIUM	14/14	31.3	93.9	—	TP-SS15-0001-98	57	55	N	1400	N	300	N	Yes; Y1,3
ZINC	14/14	55.2 J	597 J	—	TP-SS15-0001-98	150	2300	N	10000	N	600	N	Yes; Y3

TABLE 1-1

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN SURFACE SOIL TO BACKGROUND AND REGION 9 PRGs
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Site-Specific Background[4]	Region 9 Residential Soil PRGs [2]		Region 9 Industrial Soil PRGs [3]		SSLs (DAF 1) [5]		Exceeds Criteria ? Yes or No
Total Petroleum Hydrocarbons (mg/kg)													
DIESEL RANGE ORGANIC	10/12	19	3900	140-190	TP-SS06-0001-98	---	---		---		---		No
GASOLINE RANGE ORGA	3/12	3.9 J	40 J	2.5	TP-SS06-0001-98	---	---		---		---		No
Miscellaneous (mg/kg)													
CYANIDE	1/13	4.6	4.6	2	TP-SS11-0001-98-D	---	120	N	1800	N	---	N	No
pH (unitless)	14/14	6	8.5	---	TP-SS02-0001-98	---	---		---		---		---
TOTAL ORGANIC CARBO	14/14	9100	81000	---	TP-SS06-0001-98	3	---		---		---		Yes; Y3

1 - Samples included in this data set: TP-SS01-0001-98, TP-SS02-0001-98, TP-SS03-0001-98, TP-SS04-0001-98 TP-SS05-0001-98, TP-SS06-0001-98. TP-SS07-0001-98, TP-SS08-0001-98, TP-SS09-0001-98/TP-SS09-0001-98-D, TP-SS10-0001-98, TP-SS11-0001-98/TP-SS11-0001-98-D, TP-SS12-0001-98, TP-SS15-0001-98, and TP-SS17-0001-98. Field duplicate pairs are counted as one sample.
2 - USEPA, November 9, 1999. "Region 9 Residential Preliminary Remediation Goals (PRGs)".
3 - USEPA, November 9, 1999. "Region 9 Industrial Preliminary Remediation Goals (PRGs)".
4 - Tetra Tech NUS, January 1999. "Draft Facility Background Development" Draft; Only background values for inorganic constituents were considered during the screening process.
5 - USEPA, November 9, 1999. "Region 9 Soil Screening Levels (SSLs) (DAF = 1)."
Note: 1/10th PRG value used for noncarcinogens.
PRG - Preliminary Remediation Goal.
SSL - Soil Screening Levels.
NA - Not Applicable; No Non-Detects.
---PRGs and/or Site-Specific background values are not available for this compound.
Y1 - Maximum concentration exceeds the Region 9 Residential PRGs.
Y2 - Maximum concentration exceeds the Region 9 Industrial PRGs.
Y3 - Maximum concentration exceeds Site-Specific Background value.
Y5 - Maximum concentration exceeds Region 9 Soil Screening Levels (DAF = 1).
N - Noncarcinogenic.
C - Carcinogenic.

TABLE 1-2

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN SUBSURFACE SOIL TO BACKGROUND AND REGION 9 PRGs
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Site-Specific Background[4]	Region 9 Residential PRGs[2]		Region 9 Industrial PRGs[3]		SSLs (DAF1)[5]		Exceeds Criteria ? Yes or No
Volatile Organic Compounds (mg/kg)													
2-BUTANONE	12/46	0.001 J	0.042	0.004-0.065	TP-SB06-1315-98	—	730	N	2800	N	—	N	No
2-HEXANONE	1/44	0.001 J	0.001 J	0.01-0.058	TP-SB07-1820-98	—	—	N	—	N	—	N	No
ACETONE	20/48	0.08	14 J	0.011-3.4	TP-SB13-0709-98	—	160	N	620	N	0.8	N	Yes; Y4
BENZENE	1/46	0.002 J	0.002 J	0.01-0.058	TP-SB05-0810-98	—	0.67	C	1.5	C	0.002	C	No
CARBON DISULFIDE	20/46	0.001 J	0.022	0.011-0.058	TP-SB05-0810-98	—	36	N	72	N	2	N	No
CHLOROFORM	1/46	0.008 J	0.008 J	0.01-0.058	TP-SB14-0709-98	—	0.24	C	0.52	C	0.03	C	No
ETHYLBENZENE	2/44	0.004 J	0.018	0.01-0.058	TP-SB05-0810-98	—	23	N	23	N	—	N	No
FREON-113	3/46	0.011 J	0.046 J	0.01-0.058	TP-SB05-0810-98	—	—	N	—	N	—	N	No
METHYLENE CHLORIDE	5/48	0.052	170	0.011-0.07	TP-SB13-0709-98	—	8.9	C	21	C	0.001	C	Yes; Y1,2,4
TETRACHLOROETHENE	3/44	0.001 J	0.009 J	0.01-0.058	TP-SB09-0305-98	—	5.7	C	19	C	0.003	C	Yes; Y4
TOLUENE	2/44	0.001 J	0.003 J	0.01-0.058	TP-SB05-0810-98	—	52	N	52	N	0.6	N	No
TRICHLOROETHENE	4/46	0.001 J	0.002 J	0.011-0.058	TP-SB08-0305-98, TP-SB08-0507-98, TP-SB11-0709-98	—	2.8	C	6.1	C	0.003	C	No
XYLENES, TOTAL	6/44	0.001 J	0.018	0.01-0.058	TP-SB11-1315-98	—	21	N	21	N	10	N	No
Semivolatile Organic Compounds (mg/kg)													
1,2,4-TRICHLOROBENZENE	1/49	0.051 J	0.051 J	0.33-1.9	TP-SB06-0507-98	—	65	N	300	N	0.3	N	No
1,2-DICHLOROBENZENE	2/49	0.72 J	0.73	0.33-0.53	TP-SB06-0507-98	—	37	N	37	N	9	N	No
1,3-DICHLOROBENZENE	2/49	0.11 J	0.13 J	0.33-0.53	TP-SB06-0507-98	—	1.3	N	5.2	N	—	N	No
1,4-DICHLOROBENZENE	3/49	0.096 J	0.12 J	0.33-0.46	TP-SB14-0709-98	—	3.4	C	8.1	C	1	C	No
2,4-DIMETHYLPHENOL	1/49	0.24 J	0.24 J	0.33-1.9	TP-SB14-0709-98	—	120	N	1800	N	4	N	No
2-METHYLNAPHTHALENE	22/49	0.019 J	0.47	0.36-1.9	TP-SB05-0810-98	—	—	N	—	N	—	N	No
ACENAPHTHENE	20/49	0.02 J	2.4	0.36-1.9	TP-SB02-0911-98	—	370	N	3800	N	—	N	No
ACENAPHTHYLENE	9/49	0.022 J	2.7	0.36-1.9	TP-SB14-0709-98	—	—	N	—	N	—	N	No
ANTHRACENE	30/49	0.026 J	7.1	0.36-1.9	TP-SB02-0911-98	—	2200	N	39000	N	—	N	No
BENZO(A)ANTHRACENE	40/49	0.026 J	9.1 J	0.36-0.46	TP-SB02-0911-98	—	0.62	C	2.9	C	0.08	C	Yes; Y1,2,4
BENZO(A)PYRENE	40/49	0.021 J	5.7 J	0.36-0.46	TP-SB02-0911-98	—	0.062	C	0.29	C	0.4	C	Yes; Y1,2,4
BENZO(B)FLUORANTHENE	41/49	0.029 J	6 J	0.36-0.46	TP-SB02-0911-98	—	0.62	C	2.9	C	0.2	C	Yes; Y1,2,4
BENZO(G,H,I)PERYLENE	31/49	0.024 J	1.9	0.36-1.9	TP-SB05-0305-98	—	—	N	—	N	—	N	No
BENZO(K)FLUORANTHENE	38/49	0.021 J	6.3	0.36-0.53	TP-SB02-0911-98	—	6.2	C	29	C	2	C	Yes; Y1,4
BIS(2-ETHYLHEXYL)PHTHALATE	3/47	0.44	0.97	0.026-1.9	TP-SB15-0709-98	—	35	C	180	C	—	C	No
BUTYLBENZYL PHTHALATE	3/47	0.02 J	0.043 J	0.33-1.9	TP-SB14-1315-98	—	1200	N	10000	N	800	N	No
CARBAZOLE	20/49	0.021 J	1.7	0.36-1.9	TP-SB02-0911-98	—	24	C	120	C	0.03	C	Yes; Y4
CHRYSENE	41/49	0.032 J	9.6 J	0.36-0.46	TP-SB02-0911-98	—	62	C	290	C	8	C	Yes; Y4
DIBENZO(A,H)ANTHRACENE	24/49	0.021 J	1.8 J	0.36-1.9	TP-SB02-0911-98	—	0.062	C	0.29	C	0.08	C	Yes; Y1,2,4
DIBENZOFURAN	17/49	0.019 J	1	0.36-1.9	TP-SB02-0911-98	—	29	N	510	N	—	N	No
DI-N-BUTYL PHTHALATE	12/49	0.02	0.062	0.36-1.9	TP-SB13-1315-98	—	610	N	8800	N	3	N	No
FLUORANTHENE	41/49	0.036 J	16 J	0.36-0.46	TP-SB02-0911-98	—	230	N	3000	N	200	N	No

TABLE 1-2

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN SUBSURFACE SOIL TO BACKGROUND AND REGION 9 PRGs

SITE 32 - TOPEKA PIER

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Site-Specific Background[4]	Region 9 Residential PRGs[2]		Region 9 Industrial PRGs[3]		SSLs (DAF1)[5]		Exceeds Criteria ? Yes or No
FLUORENE	23/49	0.022 J	2.1	0.36-1.9	TP-SB02-0911-98	—	260	N	3300	N	30	N	No
INDENO(1,2,3-CD)PYRENE	40/49	0.022 J	3.1 J	0.36-0.46	TP-SB02-0911-98	—	0.62	C	2.9	C	0.7	C	Yes; Y1,2,4
NAPHTHALENE	23/49	0.024 J	1.4	0.36-1.9	TP-SB02-0911-98	—	5.6	N	19	N	4	N	No
PHENANTHRENE	41/49	0.03 J	13	0.36-0.46	TP-SB02-0911-98	—	—	N	—	N	—	N	No
PHENOL	1/49	0.2 J	0.2 J	0.33-1.9	TP-SB14-0709-98	—	3700	N	10000	N	5	N	No
PYRENE	42/49	0.019 J	19 J	0.36-0.46	TP-SB02-0911-98	—	230	N	5400	N	200	N	No
Pesticides/PCBs (mg/kg)													
4,4'-DDD	1/43	0.0051 J	0.0051 J	0.0023-0.068	TP-SB15-1315-98	—	2.4	C	17	C	0.8	C	No
4,4'-DDE	9/45	0.0025 J	0.018 J	0.0034-0.068	TP-SB15-0305-98	—	1.7	C	12	C	3	C	No
4,4'-DDT	8/45	0.0027 J	0.069	0.0034-0.068	TP-SB15-0305-98	—	1.7	C	12	C	2	C	No
ALDRIN	1/44	0.002 J	0.002 J	0.0012-0.035	TP-SB05-0305-98-D	—	0.029	C	0.15	C	600	C	No
ALPHA-CHLORDANE	1/45	0.021	0.021	0.0018-0.035	TP-SB14-0709-98	—	1.6	C	11	C	—	C	No
AROCLOR-1260	7/45	0.047	42	0.034-0.074	TP-SB14-0305-98	—	0.22	C	1	C	—	C	Yes; Y1,2
DIELDRIN	1/45	0.16	0.16	0.0034-0.068	TP-SB14-0709-98	—	0.03	C	0.15	C	2	C	Yes; Y1,2
ENDOSULFAN SULFATE	3/44	0.0054	0.022	0.0034-0.068	TP-SB05-0507-98	—	—	N	—	N	—	N	No
Inorganics (mg/kg)													
ALUMINUM	46/46	2360	29000	—	TP-SB01-0305-98	20284	7600	N	10000	N	—	N	Yes; Y1,2,3
ANTIMONY	6/26	0.36 J	18 J	0.3-2	TP-SB06-0507-98	4.7	3.1	N	82	N	0.3	N	Yes; Y1,3,4
ARSENIC	46/46	4.4 J	25.8 J	—	TP-SB08-0305-98	14.3	0.39	C	2.7	C	1	C	Yes; Y1,2,3,4
BARIUM	46/46	8.8	458	—	TP-SB06-1315-98	86	540	N	10000	N	80	N	Yes; Y3,4
BERYLLIUM	32/46	0.21	3.1	0.08-0.52	TP-SB01-0305-98	0.82	15	N	2200	C	3	N	Yes; Y3,4
CADMIUM	22/46	0.54 J	15.6	0.21-0.58	TP-SB06-1315-98	2.1	3.7	N	81	N	0.4	N	Yes; Y1,3,4
CALCIUM	46/46	789	57200 J	—	TP-SB08-1820-98	2006	—	N	—	N	—	N	Yes; Y3
CHROMIUM (Total)	46/46	15.6	144 J	—	TP-SB02-1517-98	68	210	C	450	C	2	C	Yes; Y3,4
COBALT	46/46	2.8	45.8	—	TP-SB14-0709-98	11.8	470	N	10000	N	2	N	Yes; Y3,4
COPPER	45/46	6.4 J	30600 J	5.3	TP-SB11-1315-98	86	290	N	7600	N	—	N	Yes; Y1,2,3
IRON	46/46	8350	234000	—	TP-SB06-0507-98	23479	2300	N	10000	N	—	N	Yes; Y1,2,3
LEAD	40/46	7.4 J	2720 J	3.8-23.4	TP-SB06-1315-98	326	400	N	750	N	—	N	Yes; Y1,2,3
MAGNESIUM	46/46	1320	13300	—	TP-SB13-0709-98	7948	—		—		—		Yes; Y3
MANGANESE	46/46	59.4	1580	—	TP-SB14-0305-98	330	180	N	3200	N	—	N	Yes; Y1,3
MERCURY	36/46	0.03 J	10.8 J	0.01-0.08	TP-SB14-0709-98	0.57	2.3	N	61	N	—	N	Yes; Y1,3
NICKEL	45/46	13.6	1540	16.3	TP-SB14-0709-98	42	160	N	4100	N	7	N	Yes; Y1,3,4
POTASSIUM	46/46	460	6330	—	TP-SB01-0305-98	1772	—		—		—		Yes; Y3
SELENIUM	1/46	7	7	0.48-24.5	TP-SB09-0810-98	0.53	39	N	1000	N	0.3	N	Yes; Y3,4
SILVER	10/46	0.56 J	6	0.11-2.8	TP-SB04-0709-98	—	39	N	1000	N	2	N	Yes; Y4
SODIUM	39/46	169	5740	126-347	TP-SB08-1820-98	1370	—	N	—	N	—	N	Yes; Y3
VANADIUM	46/46	8.9 J	85.3	—	TP-SB01-0305-98	57	55	N	1400	N	300	N	Yes; Y1,3
ZINC	46/46	15 J	9630 J	—	TP-SB11-1315-98	150	2300	N	10000	N	600	N	Yes; Y1,3,4

TABLE 1-2

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN SUBSURFACE SOIL TO BACKGROUND AND REGION 9 PRGs
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Site-Specific Background[4]	Region 9 Residential PRGs[2]		Region 9 Industrial PRGs[3]		SSLs (DAF1)[5]		Exceeds Criteria ? Yes or No
Total Petroleum Hydrocarbons (mg/kg)													
DIESEL RANGE ORGANICS	37/47	7.5	6200	5.5-2000	TP-SB02-1113-98	—	—		—		—		No
GASOLINE RANGE ORGANICS	12/49	2.8 J	61 J	2.5-3	TP-SB05-0810-98	—	—		—		—		No
Miscellaneous (mg/kg)													
CYANIDE	2/41	7.6	10	2	TP-SB11-0305-98	—	120	N	1800	N	—	N	No
HEXAVALENT CHROMIUM	1/7	0.5 J	0.5 J	0.55-2.2	TP-SB08-0305-98	—	30	C	64	C	2	C	No
pH (unitless)	45/45	6.2	9.6	—	TP-SB14-1315-98	—	—		—		—		—
TOTAL ORGANIC CARBON	41/41	380	160000	—	TP-SB14-0709-98	3	—		—		—		Yes; Y3

1 - Samples included in this data set: TP-SB01-3505-98; TP-SB01-0810-98; TP-SB01-1214-98; TP-SB02-0305-98; TP-SB02-0911-98; TP-SB02-1113-98;TP-SB02-1517-98; TP-SB-03-0305-98;TP-SB03-0507-98; TP-SB03-1315-98; TP-SB03-1305-98-D; TP-SB03-2325-98; TP-SB04-0305-98; TPSB04-0709-98; TP-SB04-1315-98/TP-SB04-1315-98-D; TP-SB05-0305-98/TP-SB05-0305-98-D; TP-SB05-0507-98; TP-SB05-0810-98; TP-SB05-0305-98; TP-SB06-0507-98; TP-SB06-1315-98; TP-SB07-0305-98; TP-SB07-0709-98; TP-SB07-0709-98/TP-SB07-0709-98-D; TP-SB07-1820-98; TP-SB08-0305-98; TP-SB08-1820-98; TP-SB09-0305-98; TP-SB09-0507-98; TP-SB09-1315-98; TP-SB10-0305-98; TP-SB10-0709-98; TP-SB10-0911-98; TP-SB11-0305-98; TP-SB11-0709-98; TP-SB11-1315-98; TP-SB12-0507-98; TP-SB13-0305-98; TP-SB13-0709-98; TP-SB13-1315-98; TP-SB14-0305-98; TP-SB14-0709-98; TP-SB14-1315-98; TP-SB15-0305-98; TP-SB15-0709-98; TP-SB15-1315-98/TP-SB15-1315-98-D; TP-SB16-0305-98; TP-SB16-1719-98; TP-SB17-0305-98; TP-SB17-0709-98; TP-SS01-0001-98; TP-SS02-0001-98; TP-SS04-0001-98; TP-SS05-0001-98; TP-SS06-0001-98; TP-SS07-0001-98; TP-SS08-0001-98; TP-SS09-0001-98/TP-SS09-0001-98-D; TP-SS10-0001-98P TP-SS11-0001-98/TP-SS11-0001-98-D; TP-SS12-0001-98; TP-SS14-000-98; TP-SS17-0001-98.
Note that field duplicate pairs are counted as one sample.
2 - USEPA, November 9, 1999. "Region 9 Residential Preliminary Remediation Goals".
3 - USEPA, November 9, 1999. "Region 9 Industrial Preliminary Remediation Goals".
4 - Tetra Tech NUS, January 1999. "Draft Facility Background Development" Draft. Only background values for inorganic constituents were considered during the screening process.
5 - USEPA, November 9, 1999. "Region 9 Soil Screening Levels (SSLs) (DAF = 1)".
Note: 1/10th PRG value used for noncarcinogens.
PRG - Preliminary Remediation Goal.
SSL - Soil Screening Level.
NA - Not Applicable; No Non-Detects.
— PRGs and/or Site-Specific background values are not available for this compound.
Y1 - Maximum concentration exceeds the Region 9 Residential PRGs.
Y2 - Maximum concentration exceeds the Region 9 Industrial PRGs.
Y3 - Maximum concentration exceeds Site-Specific Background value.
Y4 - Maximum concentration exceeds Region 9 Soil Screening Levels (DAF = 1).
N - Noncarcinogen.
C - Carcinogen.

TABLE 1-3

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN GROUNDWATER
TO REGION 9 PRGs AND BACKGROUND
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Region 9 Tap Water PRGs [2]		Site-Specific Background Freshwater[3]	Site-Specific Background Saline Water[3]	Chronic AWQC	Exceeds Criteria? Yes or No
Semivolatile Organics (µg/L)											
BIS(2-ETHYLHEXYL)PHTHAL	1/7	1 J	1 J	10-12	TP-MW-05-11	4.8	C	12	---	---	No
DI-N-BUTYL PHTHALATE	1/6	0.8 J	0.8 J	10-12	TP-MW-05-11	360	N	---	---	---	No
FLUORANTHENE	1/6	0.6 J	0.6 J	10-12	TP-MW-03-11	150	N	---	---	11	No
Inorganics (µg/L)											
ALUMINUM	1/10	2770	2770	10-3610	TP-MW-05-11	3600	N	1020	65	87	Yes: Y2,3,4
ARSENIC	2/10	19.6 J	41.2 J	2.5-37	TP-MW-02-11	0.045	C	10	ND	36	Yes; Y1,2,3,4
BARIUM	8/10	12.5 J	128 J	16.6-17.45	TP-MW-03-11	260	N	41.6	80.3	---	Yes; Y2,3
CALCIUM	10/10	122000	376000	---	TP-MW-07-11	---	N	48415	130000	---	Yes; Y2,3
CHROMIUM (TOTAL)	1/10	2.3 J	2.3 J	0.68-23.8	FA-01-GW-10	---	N	1.4	3.2	50	Yes: Y2
COPPER	2/10	14.7 J	496	2.7-154.95	TP-MW-05-11	140	N	2.6	4.2	3.7	Yes: Y1,2,3,4
IRON	6/10	282	17000 J	116-2360	TP-MW-06-11	1100	N	678	728	1000	Yes: Y1,2,3,4
LEAD	4/10	1.7 J	195 J	1.3-26.2	TP-MW-06-11	---	N	2.3	2.7	8.5	Yes: Y2,3,4
MAGNESIUM	10/10	19600	1230000	---	TP-MW-07-11	---		5942	23100	---	Yes: Y2,3
MANGANESE	9/10	196 J	1070 J	3	TP-MW-06-11	88	N	3140	340	120	Yes: Y1,3,4
MERCURY	4/10	0.03 J	0.46 J	0.01-0.07	TP-MW-02-11	1.1	N	0.1	0.06	1.1	Yes: Y2,3
NICKEL	4/10	3.2 J	128	9.4-63.9	TP-MW-06-11	73	N	3.1	4.2	8.3	Yes: Y1,2,3,4
POTASSIUM	10/10	10200	448000	---	TP-MW-07-11	---		5180	17200	---	Yes: Y2,3
SILVER	2/10	1.4 J	6.2 J	2.7-10.7	FA-01-GW-10	18	N	---	---	2.2	Yes: Y4
SODIUM	10/10	137000	9580000	---	TP-MW-07-11	---		122482	15400	---	Yes: Y2,3
THALLIUM	1/10	66.1 J	66.1 J	3.2-64.4	TP-MW-07-11	---	N	5	ND	---	Yes: Y2,3
VANADIUM	1/10	0.68 J	0.68 J	0.55-22.6	FA-01-GW-10	26	N	1.9	0.87	---	No
ZINC	1/10	532	532	3.3-165	TP-MW-05-11	1100	N	20.1	15.7	86	Yes: Y2,3,4
Dissolved Metals (µg/L)											
CALCIUM	1/1	356000	356000	---	TP-MW-05-11-F	---		48415	130000	---	Yes: Y2,3
COPPER	1/1	45.4	45.4	---	TP-MW-05-11-F	140	N	2.6	4.2	3.1	Yes: Y2,3,4
MAGNESIUM	1/1	1020000	1020000	---	TP-MW-05-11-F	---		5942	23100	---	Yes: Y2,3
MANGANESE	1/1	429	429	---	TP-MW-05-11-F	88	N	3140	340	120	Yes: Y1,3,4
POTASSIUM	1/1	401000	401000	---	TP-MW-05-11-F	---		5180	17200	---	Yes: Y2,3
SODIUM	1/1	8200000	8200000	---	TP-MW-05-11-F	---		122482	15400	---	Yes: Y2,3
ZINC	1/1	248	248	---	TP-MW-05-11-F	1100	N	20.1	15.7	81	Yes: Y2,3,4
Total Petroleum Hydrocarbons (µg/L)											
DIESEL RANGE ORGANICS	5/10	70	200	50-100	TP-MW-05-11	---		200	190	---	Yes: Y3
Miscellaneous (mg/L)											
BROMIDE	9/10	11	51.5	2	P-MW-04-11-AV	---		5	9.8	---	Yes: Y2,3
CARBONATE ALKALINITY	10/10	97	340		TP-MW-06-11	---		205	220	---	Yes: Y2,3
CHLORIDE	10/10	250 J	19000 J		FA-01-GW-10	---		180	440	---	Yes: Y2,3
NITRATE, AS NITROGEN	6/10	0.054 J	4.6 J	0.05	TP-MW-01-11	0.58	N	6.2	3.4	---	Yes: Y1,3
pH	10/10	7.3	7.9	---	FA-01B-GW-10	---		---	---	---	No
SALINITY	7/7	0.79	25	---	TP-MW-04-11-AVG TP-MW-05-11	---		---	---	---	---

TABLE 1-3

RISK SCREENING - COMPARISON OF POSITIVE DETECTIONS IN GROUNDWATER
TO REGION 9 PRGs AND BACKGROUND
SITE 32 - TOPEKA PIER
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Frequency of Detection[1]	Minimum Detection	Maximum Detection	Range of Non-Detects	Location of Maximum Detection	Region 9 Tap Water PRGs [2]	Site-Specific Background Freshwater[3]	Site-Specific Background Saline Water[3]	Chronic AWQC	Exceeds Criteria? Yes or No
SULFATE	10/10	150	2200	---	TP-MW-04-11-AVG, TP-MW-07-11	---	39	67	---	Yes: Y2,3
TOTAL ORGANIC CARBON	10/10	1.4	8.4	---	TP-MW-06-11	---	2.9	8	---	Yes: Y2,3

1 - Samples included in this data set: TP-MW-01-11, TP-MW-02-11, TP-MW-03-11, TP-MW-04-11/TP-MW-04-11-D, TP-MW-05-11, TP-MW-06-11, and TP-MW-07-11. Note that field duplic as one sample.
2 - USEPA, November 9, 1999. "Region 9 Tap Water Preliminary Remediation Goals".
3 - Tetra Tech NUS, January 1999. "Draft Facility Background Development." Only background values for inorganic constituents were considered during the screening process.
Note: 1/10th PRG value used for noncarcinogens.
PRG - Preliminary Remediation Goal.
NA - Not Applicable, No Non-Detects.
--- PRGs and/or Site-Specific background values are not available for this compound.
Y1 - Maximum concentration exceeds Region 9 PRGs.
Y2 - Maximum concentration exceeds the Site-Specific Freshwater Background.
Y3 - Maximum concentration exceeds the Site-Specific Saline water Background.
Y4 - Maximum concentration exceeds the chronic AWQC values.
ND - Not Detected
N - Noncarcinogen
C - Carcinogen
AVG - The average field duplicate concentration was used for screening as per Section 2.7.1