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NSY PORTSMOUTH
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LETTER REGARDING HANDOUTS AND AGENDA FOR TECHNICAL MEETING ON 5 MARCH 1998 NSY PORTSMOUTH ME
2/26/1998
NAVFAC NORTHERN

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/FE
20 FEB 1998

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

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

Subj: AGENDA FOR MARCH 5, 1998 TECHNICAL MEETING AT PORTSMOUTH NAVAL SHIPYARD, KITTERY, ME

Dear Ms. Cassidy/ Mr. McLeod:

The March 5, 1998 Technical Meeting will begin at 9:00 am in the Family Housing Office at Portsmouth Naval Shipyard. The proposed topics to be discussed for Operable Unit 4 (Offshore Area) are:

Site Conceptual Models
Remedial Action Objectives
General Response Actions

I am enclosing some information to assist us in our discussions at the technical meeting.

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

If additional information is required, please contact Ms. Marty Raymond at 207-438-2536 or myself at 610-595-0567, x159.

Sincerely,

Frederick J. Evans

FREDERICK J. EVANS, P.E.
Remedial Project Manager
By direction of the
Commanding Officer

Subj: AGENDA FOR MARCH 5, 1998 TECHNICAL MEETING AT PORTSMOUTH NAVAL SHIPYARD, KITTERY, ME

Copy to:

NOAA (K. Finkelstein)
ME Dept. of Marine Resources (D. Card)
PNS (Code 106.3R, M. Raymond)
Ms. Juanita Bell
Mr. Jeff Clifford
Ms. Eileen Foley
Mr. Phil McCarthy
Mr. Guy Petty
Mr. Peter Vandermark
PNS (Code 100PAO) w/o encl
Brown and Root Environmental (L. Klink, B. Horne)
US Fish & Wildlife Service (K. Munney)
NH Fish & Game (J. Nelson)
COMSUBGRU TWO (R. Jones)
Mr. Doug Bogen
Ms. Michele Dionne
Ms. Mary Marshall
Mr. Jack McKenna
Mr. Onil Roy
Ms. Carolyn Lepage

PORTSMOUTH NAVAL SHIPYARD
INSTALLATION RESTORATION PROGRAM
MARCH 5, 1998
TECHNICAL MEETING HANDOUT

OVERVIEW AND RATIONALE

Investigations at Portsmouth Naval Shipyard (PNSY), including human health and ecological risk assessments, have been conducted for off-shore areas. These investigations have determined there are currently no high risk areas for either human health or ecological receptors that warrant a *time-critical action.* However, it is apparent monitoring may be a part of any final decision for the off-shore to:

(1) Verify the results of the risk assessments;
(2) Verify the contaminant risk driver; and
(3) Verify the potential contaminant transport from on-shore source areas.

This document presents:

(1) A discussion of on-shore investigations which have been conducted, are currently being conducted, or will be conducted in the future which address potential contaminant transport pathways.
(2) A summary of the ecological and human health risk assessments with recommendations as to how the findings should be incorporated into the monitoring program, and
(3) The proposed objectives of the interim monitoring program

The goal of this document is to aid in developing a consensus approach to serve as a roadmap in making risk management decisions, for the off-shore areas.

I. ON-SHORE INVESTIGATIONS

Background: Previous studies have characterized the contaminant sources on Seavey Island which are the result of past waste disposal practices by Portsmouth Naval Shipyard. The results of these studies were used to determine potential risks to evaluate the need for remedial action. Under CERCLA, the Navy evaluated potential risks to humans and ecological components associated with chemicals present in the off-shore marine environment. While off-shore risks have been characterized, the relative contribution of risk from the various on-shore sources to the off-shore environment have not been determined. This is because the off-shore environment receives or has received chemical inputs from a number of potential sources, not just those sites from the Shipyard.

Comparison of Historical & Current Studies: Although contaminant inputs may come from surface water runoff and erosion near the shoreline, the conceptual model suggests the most significant current transport mechanism from on-shore sources to off-shore ecological receptors is via groundwater. This is because large areas of the Shipyard have been paved or capped which increases surface water runoff and decreases erosion and transport of eroded contaminated soil particles (e.g. capping of the DRMO). To examine the groundwater pathway, the Navy has collected four rounds of low flow groundwater monitoring data from more than 60 wells located throughout the Shipyard. These data are being utilized in a groundwater fate and transport analytical model to estimate mass flux of contaminants into the Piscataqua River. In addition, the Navy has collected four rounds of seep and sediment data from the northern and eastern shorelines of Seavey Island. Although these data were originally intended to develop site specific sediment partitioning coefficients, it may also be used to correlate contaminant transport from groundwater and soils to sediments in order to verify an on-shore to off-shore pathway. If such a pathway can be established, potential remedial actions to address this pathway will be evaluated in the on-shore feasibility study.

Future studies: The Navy will perform site characterizations for additional areas of the Shipyard in summer 1998. These areas include the West Timber Basin, teepee incinerator site, former waste battery acid storage tank area, and Topeka Pier. A fifth area, Oil Gasification Plant (Building 62), will be investigated in the future. Additional well and soil characterizations planned for these areas should indicate whether any previously uncharacterized source areas exist and whether transport is likely to the Piscataqua River (as evidenced by significant hits in the groundwater and sufficient mass flux to the marine environment). For example, the Topeka Pier site should prove to be an excellent site for examination of potential chemical inputs into the back channel if it is determined to have elevated chemical concentrations as a result of former storage/disposal operations. Because the site is located adjacent to the back channel, it may be possible to correlate groundwater, soil, seep, and sediment data and then track contaminants from an area of origin to its receptor.

Conceptual Model for Sites at the Shipyard

Several figures are provided and illustrate the conceptual models used in the analytical groundwater fate and transport model developed for Portsmouth Naval Shipyard. A site specific model was developed for three of the operable units. A site specific model has not yet been developed for the Back Channel but would probably look similar to the general "*On-shore To Off-shore Model*" enclosed.

Site Specific Information

Back Channel & Jamaica Cove:

- Topeka Pier site characterization will be conducted this year to determine if site is a likely contributor to risk in the Back Channel and if further study is required to verify these inputs.
- Sediment samples collected in 1997 indicated higher concentrations than from other stations in the risk assessment (eg. PCB concentration in sediments were several times higher in stations BC1017 and BC1018).
- DDT and PAH levels in sediments at BC 1018 suggest continued monitoring in this area.
- Metals were detected in the seeps with minor exceedances as compared to AWQCs without mixing.

Clark Cove & Sullivan Point

- Minor exceedances of AWQC values without mixing for some metals occurred in seep samples. The largest exceedances were for zinc, which is not considered an off-shore risk driver at this time.

Dry Dock:

he four rounds of seep and sediment sampling collected in 1996 through 1997 did not include the shoreline areas of the DRMO and areas adjacent to the industrial waste outfall areas. Because these outfalls were not operated after 1975, it is likely the contamination present in the sediments is from previous releases or other sources. Monitoring wells and borings planned for these sites in the next year may provide additional information on potential contaminants that may impact the dry dock area. At least initially, well samples collected from the DRMO do not seem do not seem to correlate to all the contaminants present in the dry dock area. Also because shoreline seep and sediment samples can't be collected from this area, it may prove difficult to develop a definitive link between on-shore contamination and off-shore risk.

General Approach for Evaluating Background Conditions

In order to make effective environmental risk management decisions for the Installation Restoration Program, especially for the off-shore, an understanding of Great Bay Estuary watershed issues, goals, and policies is needed. It would not be cost effective to do active remediation in areas which will be re-contaminated by background sources or which are short term in nature. From a more general standpoint, it is important to make risk management decisions which are consistent with watershed goals and policies.

This is important in establishing priorities for risk management consideration, which relate to assessment endpoints, risk drivers, and source control measures.

II. SUMMARY OF THE ECOLOGICAL AND HUMAN HEALTH RISK ASSESSMENTS

Summary of ERA Results and Conclusions

The Estuarine Ecological Risk Assessment for Portsmouth Naval Shipyard, using a weight of evidence approach, determined ecological risk exists in some areas of concern (AOCs). Assessment endpoints to be evaluated in the ecological risk assessment (ERA) were identified by defining the potential stressors, ecological effects and ecosystems at risk. An assessment endpoint is a component of the ecosystem, which could be impacted by the contaminants of concern, has high ecological and societal value and represents a component of the ecosystem that can be protected. Measurement endpoints are representative measurable components of the assessment endpoints. Assessment endpoints, receptors of concern and measurement endpoints are shown on Table 1.

TABLE 1
ASSESSMENT ENDPOINTS WITH ASSOCIATED RECEPTORS OF CONCERN AND MEASUREMENT ENDPOINTS

Assessment Endpoint	Receptors of Concern	Measurement Endpoints
Vitality of Pelagic Community	winter flounder phytoplankton community blue mussel sea urchin	flounder condition and histology phytoplankton standing crop (Chlorophyll a) water toxicity to deployed mussel physiology water toxicity to sea urchin gametes and larvae
Vitality of Epibenthic Community	Lobster fucoid algae blue mussel winter flounder	lobster abundance and condition fucoid algae abundance mussel abundance and condition
Vitality of Infaunal Benthic Community	Infaunal benthic community Amphipods	species richness, abundance and eveness sediment toxicity to amphipods
Vitality of Eelgrass	Eelgrass	eelgrass abundance and morphometrics
Vitality of Salt Marsh Community	salt marsh community cord grass/salt hay	invertebrate abundance cord grass/salt hay abundance and morphometrics
Vitality of Avian Community	avian herbivores and predators	tissue concentrations in prey species

Risk definitions were developed to interpret outcomes of exposure and effects measurements in terms of risk. The risk definitions considered the following factors:

- amount of evidence (preponderance)
- degree of exposure of effect evidence (magnitude)
- spatial extent of measured impacts (extent)
- strength of relationship between exposure and effects information (causation)

A determination of negligible risk was associated with lack of evidence of effect and negligible or low evidence of exposure or some evidence of potential effects and negligible evidence of exposure. Negligible risk suggested no impacts based on the general lack of evidence.of exposure and effects in the field data. With a determination of negligible risk generally, no further action is recommended.

Low risk was defined as having no evidence of effect and elevated or high exposure, evidence of potential effect and low exposure, or evidence of probable effect and negligible or low exposure. Low risk suggested limited impact based on the lack of demonstrable correlations between exposure and response. With a determination of low risk, development of preliminary remediation goals (PRGs) and conducting a Feasibility Study are recommended.

A determination of intermediate risk resulted from no evidence of effects and evidence of adverse exposure levels, evidence of potential effects and evidence of elevated to high exposure, or evidence of probable effect and evidence of elevated exposure. Intermediate risk was associated with field data that lacked quantitative exposure and response correlations and the spatial extent of impacts appeared to be localized. A determination of intermediate risk was suggested when potential impacts were associated with multiple exposure and effects measures. With a determination of intermediate risk, development of PRGs and conducting a Feasibility Study are recommended.

High risk was defined if evidence of potential effect and adverse exposure, or evidence of probable effects and evidence of high to adverse exposure was present. The finding of high risk would be associated with quantitative exposure and response relationships inn the filed data and the spatial extent and impact would be large and persistent. Because multiple measures of exposure and effects indicated risk, the determination of high risk would likely suggest probable impacts. With a determination of high risk, development of PRGs and conducting a Feasibility Study is highly recommended, and in certain cases, removal actions may be warranted.

Six areas of concern (AOCs) were selected for evaluation in the off-shore ecological risk assessment for Portsmouth Harbor: Clark Cove, Sullivan Point, DRMO storage yard, dry docks, back channel, Jamaica Cove.

Using the weight of evidence approach, ecological risk was determined to exist in some of the AOCs (see Table 2):

- Intermediate risk was determined for benthic receptors at Sullivan Point, the dry docks, and the back channel, for eelgrass in Clark Cove and the back channel and for salt marsh receptors at Sullivan Point.
- Low risk was determined for epibenthic receptors for all areas of concern. Low risk was also determined for pelagic receptors in Clark Cove and Portsmouth Harbor, for benthic receptors in Clark Cove, for eelgrass at Sullivan Point, the dry docks, and Jamaica cove, and for salt marsh receptors in Clark Cove, the back channel, and Jamaica Cove.

TABLE 2. SUMMARY OF POTENTIAL ON-SHORE SOURCES IDENTIFIED FOR AOCS

AOC	Assessment Endpoint	Risk Category	Confidence in Conclusions	COPCs	Potential Source Areas (SWMU #)
Clark Cove	pelagic	low	medium	Cu, Ni, Zn, Pb	5, 6, 8, 9, 11
	epibenthic	low	medium	Cu, Ni, Hg, Zn, Pb, Cr, Ag, PAHs	
	benthic	low	high	Cu, Pb, Hg, Cr, Cd, As, Ag	
	eelgrass	intermediate	medium	As, Cr, Hg, Ni	
	salt marsh	low	medium	Cu, Ni	
Sullivan Point	pelagic	negligible	medium	Cu, Hg, Zn	5, 6, 8, 9, 10, 11, 26, 27
	epibenthic	low	medium	PAHs, Hg, Cr, Pb, Cu	
	benthic	intermediate	high	As, Cr, Pb, Hg, Ag, DDT, Ni	
	eelgrass	low	medium	Pb, Hg, Cr, Pb, As, Hg	
	salt marsh	intermediate	medium	DDT, Ni, As, Cd, Cr, Cu, Pb	
DRMO SY	pelagic	negligible	medium		
	epibenthic	low	medium	Cu, Pb	
Dry Docks	pelagic	negligible	medium		5, 6, 8, 9, 10, 11, 26, 27
	epibenthic	low	medium	Phen, Pb, Ag, Cu, Cr, Ni, Hg, As	
	benthic	intermediate	high	Pb, Zn, DDT As, Cd, Cr, Ag, Ni, Cu, Hg	
	eelgrass	low	medium	Pb, Hg, Cr, Cu	
Back Channel	pelagic	negligible	medium	Pb, Cd, Cu, Ni	5, 6, 8, 9, 11, 26, 27
	epibenthic	low	medium	Pb, Ni, Cr, PCB, PAHs	
	benthic	intermediate	high	Phen, Anth, Fluoran, Pyrene, DDT, Pb, Hg, Cd	
	eelgrass	intermediate	medium	Pb, Cd, Cu, Hg, Cr	
	salt marsh	low	medium	Cr, Cu, Ni, Pb, Zn, Ag, Cr	
Jamaica Cove	pelagic	negligible	medium	Cu, Ni, Zn, Pb	5, 6, 8, 10, 11
	epibenthic	low	medium	Pb, Cu, Ni, Zn, Hg	
	benthic	negligible	high	PAHs, As, Cr, Pb, Hg, Ni, PCBs, Ag, Cd	
	eelgrass	low	medium	Pb, Hg, Cu, Cr	
	salt marsh	low	medium	Pb, Zn	
Portsmouth Harbor	pelagic	low	medium	Zn, Fluorene, Anth	
	epibenthic	low	medium	PAHs, Hg, Pb	
	avian	negligible	medium	DDT, methyl-Hg, Cr	

- Negligible risk was determined for pelagic receptors at Sullivan Point, DRMO storage yard, the dry docks, the back channel, and Jamaica Cove, and for benthic receptors in Jamaica cove.
- Negligible exposure was also determined for avian receptors in Portsmouth Harbor.

No area of concern was identified as having high risk to any of the assessment endpoints evaluated.

Uncertainties are associated with each of the exposure assessment, ecological effect assessment and risk characterization activities. Sources of uncertainty include: errors in assumptions, errors in measurements and analyses, and the natural variability in the components of the ecosystem that were studied. In addition to the uncertainties associated with the exposure assessment, effects assessment, and risk characterization, other limitations of the assessment include:

- lack of adequate information and studies on COC effects on appropriate receptors for this estuary
- lack of connection between requirements for determining ecological risk and the indicator receptors necessary to demonstrate that risk
- inadequate sampling of the links between potential shipyard sources and the estuarine ecosystem

Overall, the Off-Shore ERA did not detect severe impacts. Although there were indications of intermediate risk for benthic endpoints, salt marsh endpoints, and eelgrass in some AOCs, the assessment showed that most of the estuarine habitats around the shipyard were healthy and productive.

Human Health Summary

A human health risk assessment which evaluated risks from exposures to off-shore media and associated biota (i.e. mussels, flounder, and lobster) was conducted. Risks from ingestion of and dermal contact with surface water and sediment during recreational exposures were below regulatory guidelines. Risks from ingestion of seafood were found to exceed the regulatory guidelines. Due to the specialized nature of evaluating risks from ingestion of seafood, the State of Maine conducted a more specific evaluation. Their finding was that no additional human health based action (in the form of an advisory or ban) was necessary for Portsmouth Harbor or the Piscataqua River area. A primary reason was that these areas have the same or lower levels of contaminants compared to other areas in the state. Nevertheless, it is not possible at this time to relate the contamination found in the biota to specific areas under investigation.

III. OBJECTIVES OF THE MONITORING PLAN

The monitoring plan should have relatively narrow and specifically defined objectives. Once these objectives have been defined and agreed upon, a sampling plan can be designed that will provide data tailored to support those objectives. Identification and application of appropriate strategies will avoid the tendency to collect voluminous amounts of data that are difficult to interpret and offer little added value to the decision making process.

Potential primary goals of the Monitoring Plan are to:

- Verify the conclusions regarding off-shore media and increase the confidence in the risk characterizations; and
- Verify the spatial and temporal extent of risk in the off-shore
- Confirm the recovery potential of off-shore areas

In conjunction with the results of fate and transport studies, the monitoring plan should provide information to aid in:

- Verifying the conceptual models from the on-shore to off-shore
- Confirming the lack of association between on-shore sources and off-shore risks.
- Refining PRGs, as necessary.
- Support Finalizing the ROD.

The monitoring plan will draw upon the results of previous studies, including the Off-shore Ecological and Human Health Risk Assessment and the fate and transport modeling to tailor the data gathered to provide

information to assist in risk management decisions. Efforts will be focused on sampling in areas, and for COPCs that have been previously identified as potential risk drivers. Measurement endpoints will be selected that show a high correlation to demonstrated risks identified in each area and that will provide high confidence in the results. For results with low/medium confidence levels, the monitoring plan should attempt to provide data that will increase the reliability of the conclusions using methods that support the weight-of-evidence approach. As greater confidence in results is obtained, measurement endpoints that are most the responsive to changes in inputs from COPCs directly linked to sites will be preferentially utilized as indicator species.

Considerable uncertainty still exists regarding the sources of measured risks. Data derived from the monitoring plan should enable some differentiation between contaminants that are a result of continuing shipyard sources, historical shipyard inputs, or other industries in the area. After linking contaminants of concern (COCs) from sources to exposure areas, attempts to correlate the level of input from known shipyard sources and the response observed from specific receptors should be made. Information of this type will aid in determining whether localized remedial actions would result in measurable benefits (risk reductions) to off-shore receptors.

For areas identified as having low/intermediate risks, the monitoring program will attempt to determine whether those areas are able to recover over time or whether a more aggressive remedial response is necessary or beneficial (this would be weighed in relation to contaminant inputs from other sources). This is done through establishing baseline conditions in the off-shore environment and then performing trends analysis of the subsequent data.

Basic Concepts

To insure the monitoring plan produces results that meet the defined objectives, three main concepts will be used to direct the format and structure of sampling.

1. Decision-tree: A decision tree will provide the basic structure of the monitoring plan. This decision-tree will define how decisions will be made and provide pre-determined conditions that will result in an action or change in frequency or scope of the sampling. Potential decision points include:

    - when remedial action should be evaluated,
    - when and how refinement of the sampling program would occur, and
    - what conditions must be met for eventually termination of monitoring.

    Decision rules will be written in the form of concise if/then statements that specify the conditions under which a specific action will be taken or a decision will be made.

Narrowing focus: As confidence in the results increases, the scope and frequency of sampling will be reduced to reflect a collection of information that provides the highest quality data and greatest correlation to indicating the health of the system. Narrowing the focus of the sampling could include things such as spatial or temporal reductions in sampling, and elimination of receptors, media, or analytes from the sampling protocols. For example, when the results of previous studies are verified and confidence in those results is increased, sampling locations or rounds may be dropped. This reflects the reduced benefit that is derived from continuing to collect that data and serves to optimize the monitoring plan's effectiveness. The method for determining how the focus of the monitoring plan will be narrowed will be defined within the structure of the decision tree.

Threshold values: Threshold values will be determined based on the cumulative results of previous studies as well as other available scientific literature. Threshold values represent conditions or occurrences that when met, may instigate a change in strategy or approach to the site. Threshold values can be represented as a calculated contaminant level that when exceeded, will cause evaluation of the remedy's effectiveness. Allowing sampling results not just to demonstrate trends but the significance of these trends, such as whether or not an increase in contaminant levels or change in conditions should result in additional action.

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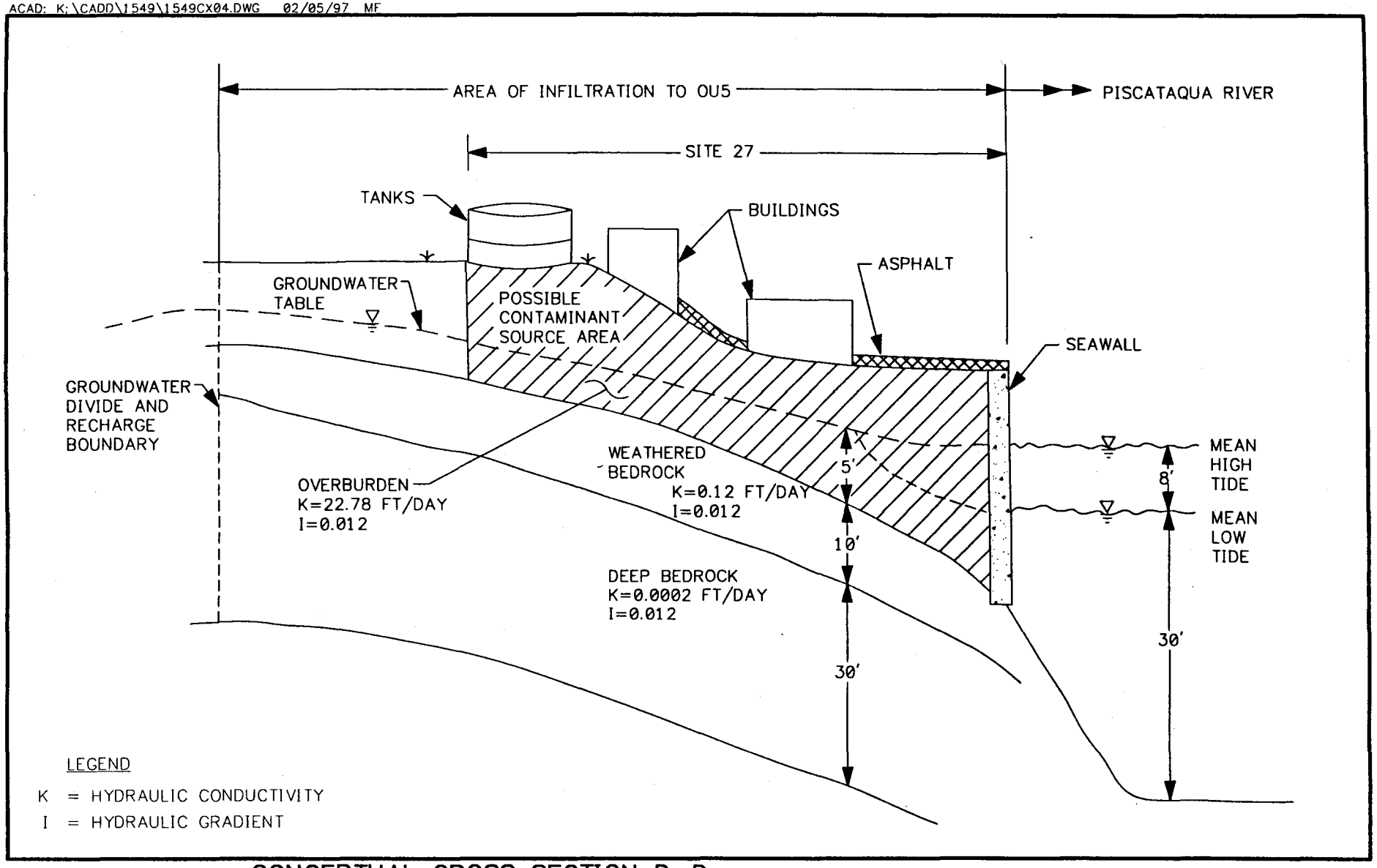

CONCEPTUAL CROSS SECTION D-D
OPERABLE UNIT 5 (INDUSTRIAL AREA AT BERTH 6)
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
NOT TO SCALE

FIGURE 6-9

Brown & Root Environmental

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6-25

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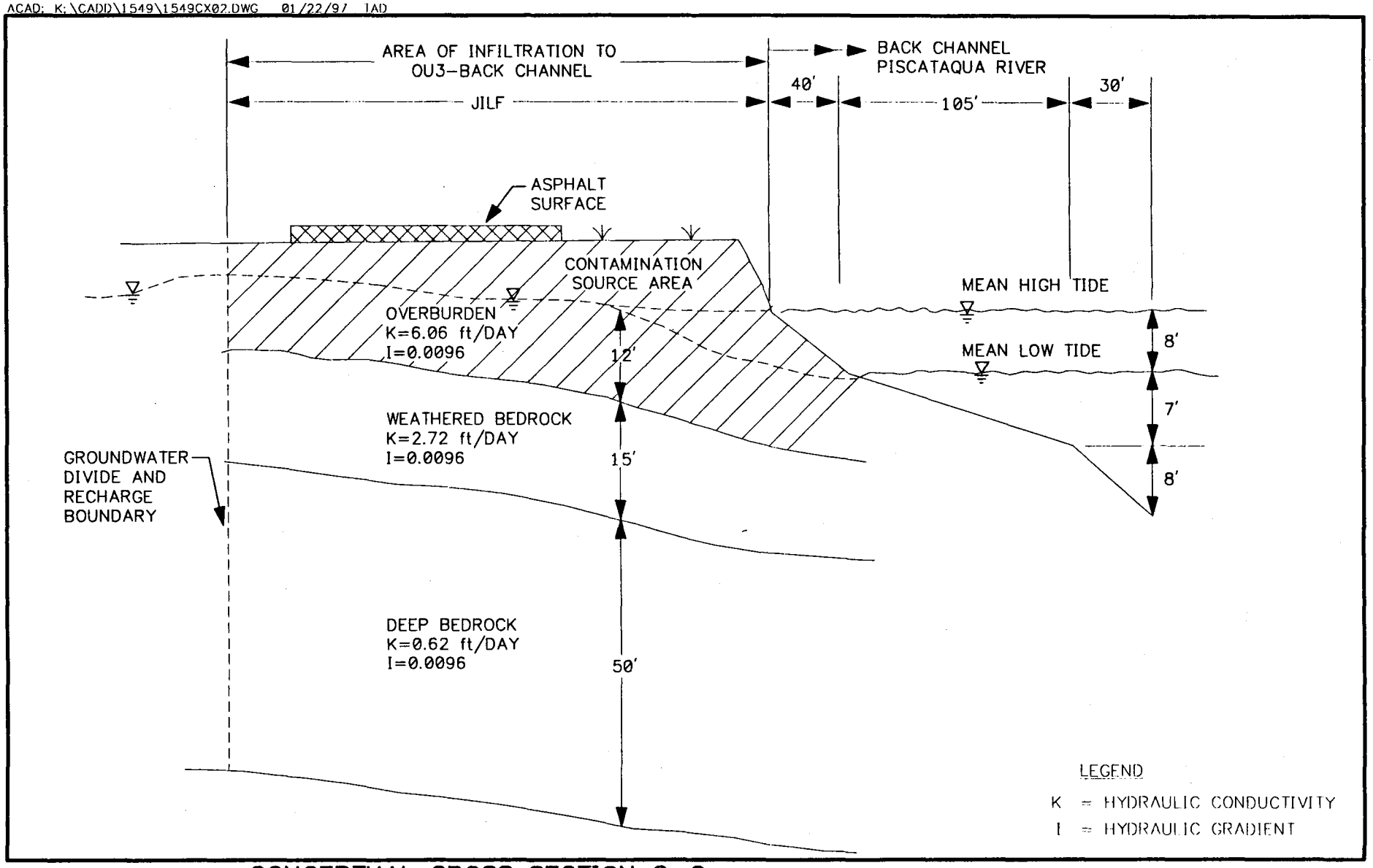

CONCEPTUAL CROSS SECTION C-C
OPERABLE UNIT 3 GROUNDWATER FLOW TO BACK CHANNEL
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
NOT TO SCALE

FIGURE 6-7

Brown & Root Environmental

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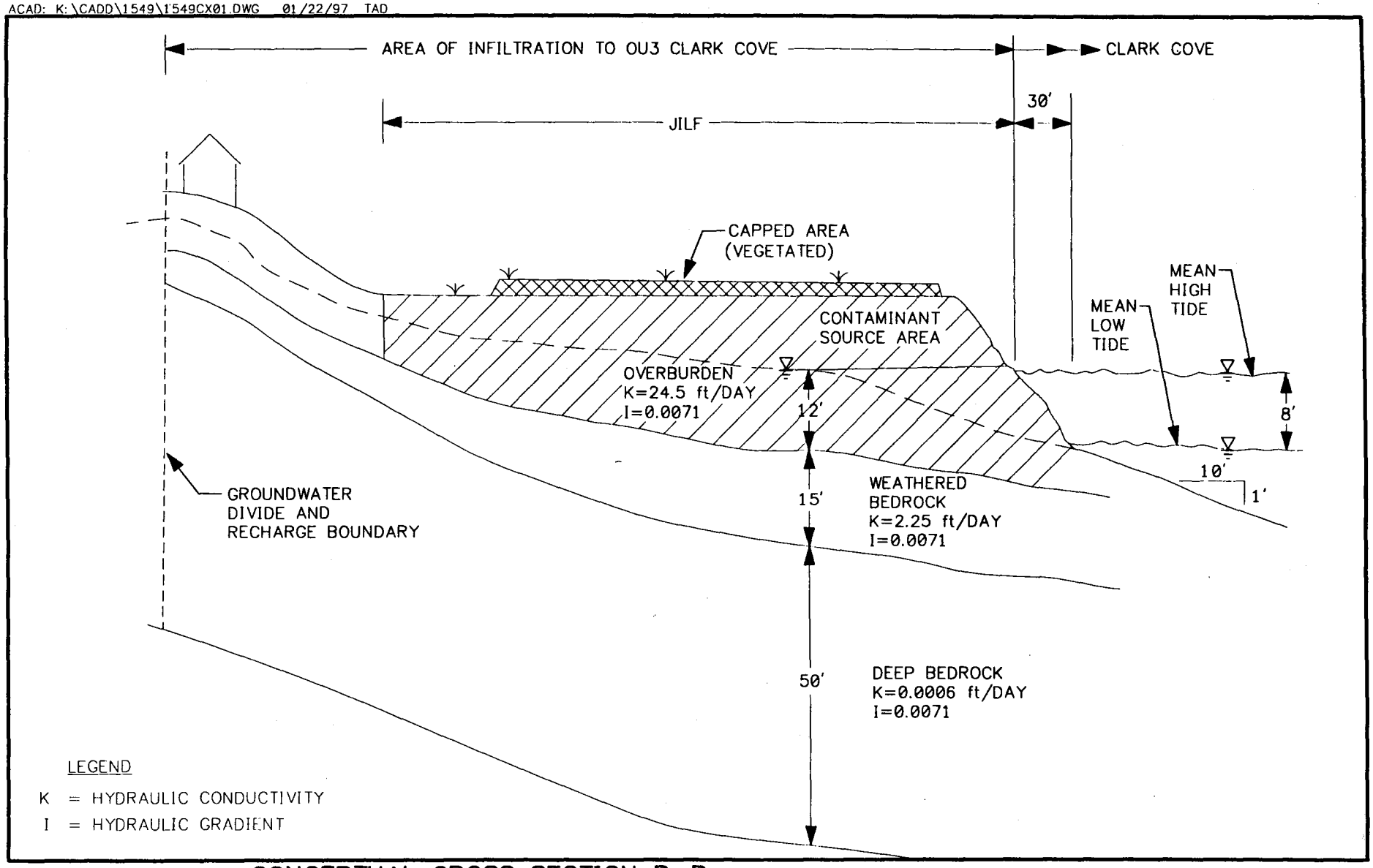

CONCEPTUAL CROSS SECTION B-B
OPERABLE UNIT 3 GROUNDWATER FLOW TO CLARK COVE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
NOT TO SCALE

FIGURE 6-6

Brown & Root Environmental

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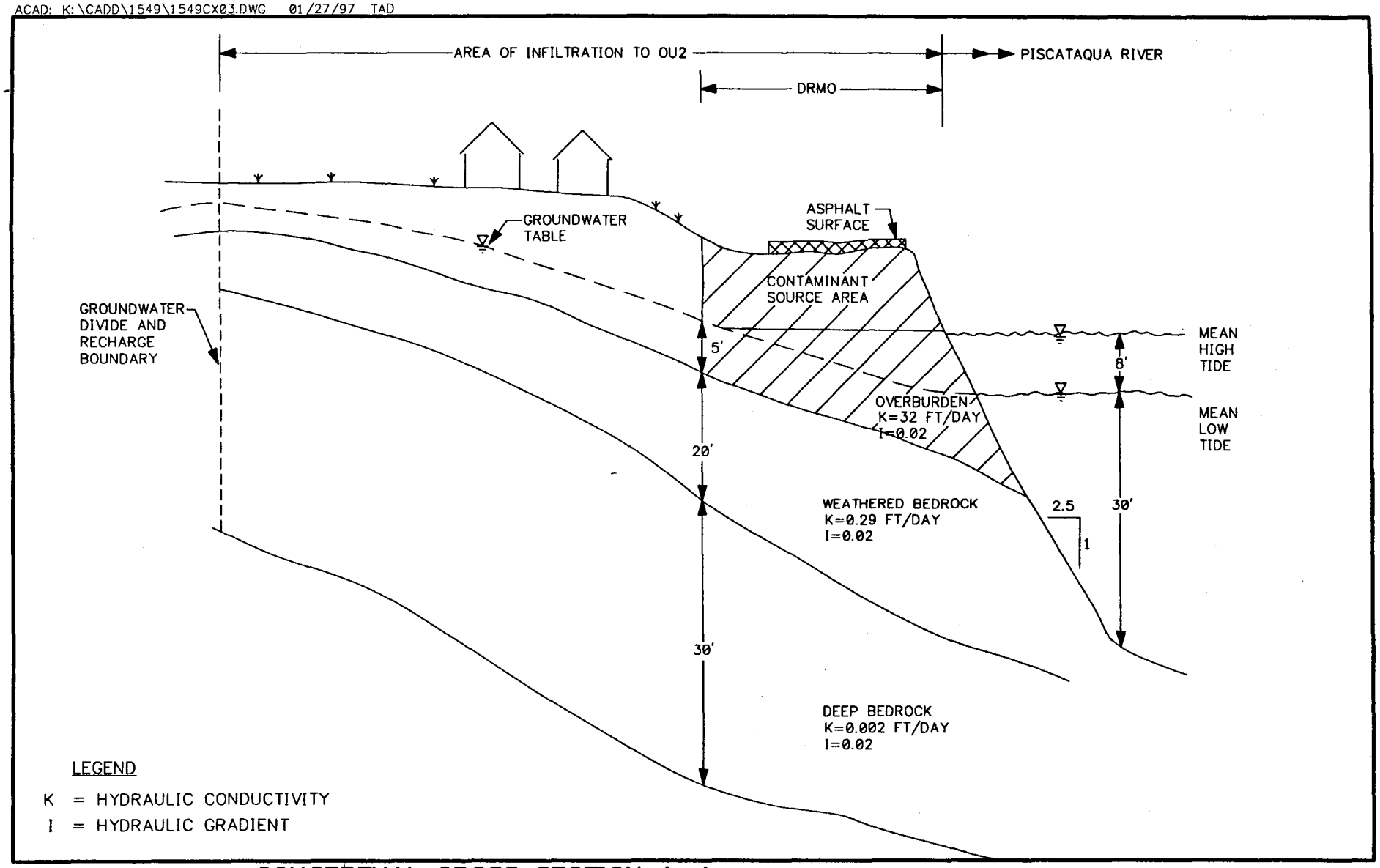

CONCEPTUAL CROSS SECTION A-A
OPERABLE UNIT 2 (DRMO)
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
NOT TO SCALE

FIGURE 6-4

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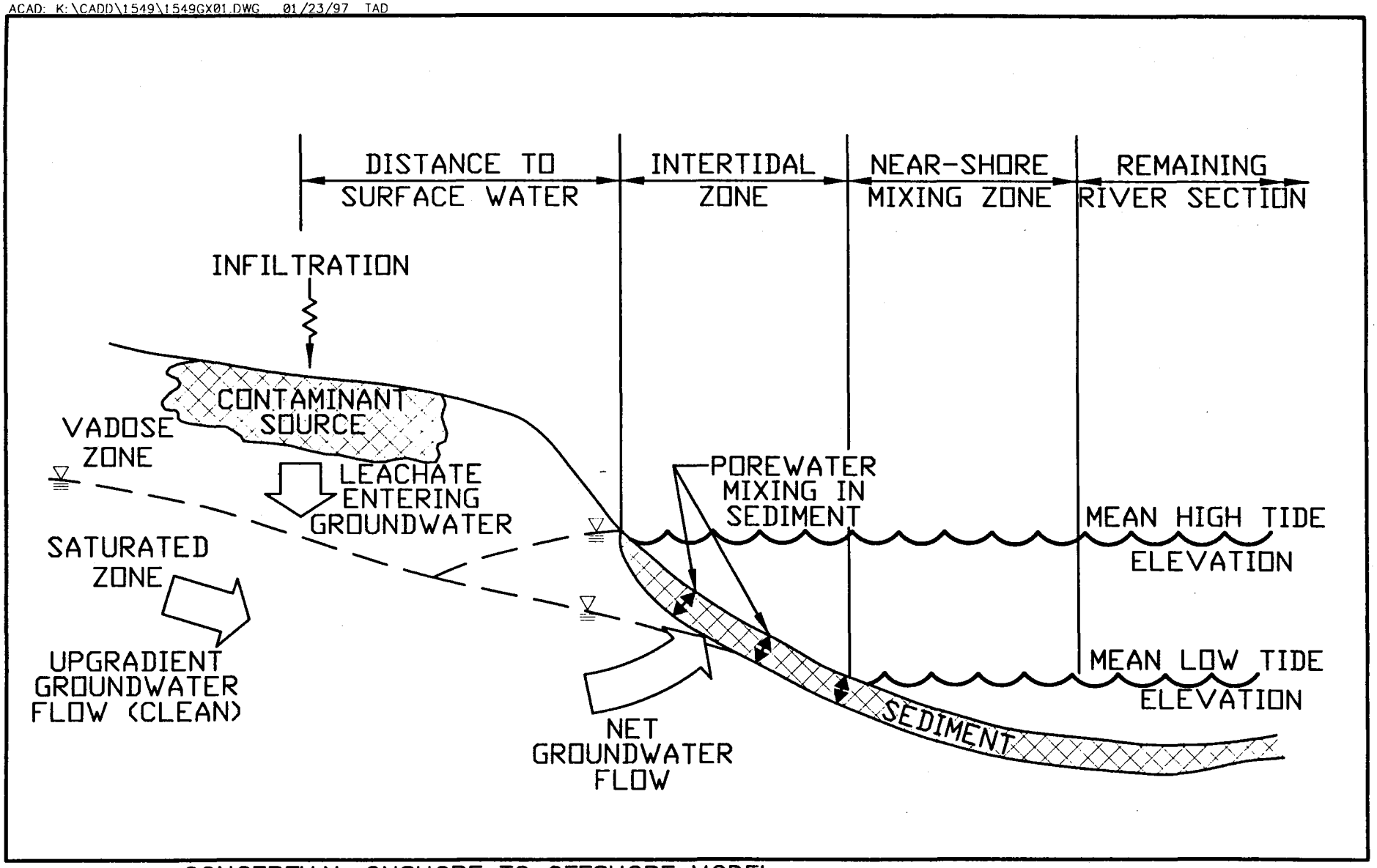

CONCEPTUAL ONSHORE TO OFFSHORE MODEL
PORTSMOUTH NAVAL SHIPYARD (PNS)
KITTERY, MAINE
NOT TO SCALE

FIGURE 6-10

Brown & Root Environmental

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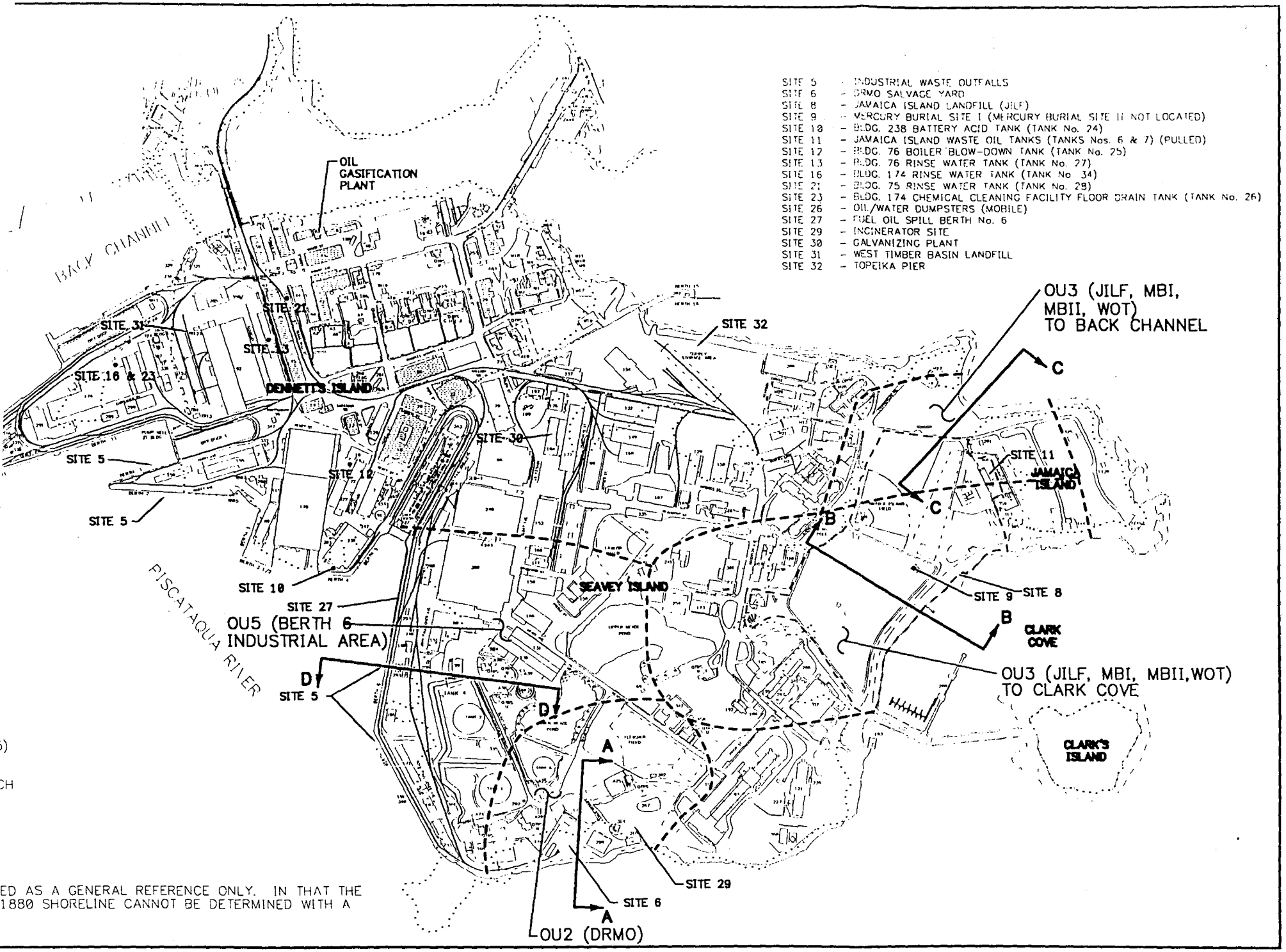

ED AS A GENERAL REFERENCE ONLY. IN THAT THE
1880 SHORELINE CANNOT BE DETERMINED WITH A