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MEMORANDUM

Date: August 24, 1999

To: Mark Evans, Northern Division Naval Facilities Engineering Command

From: Greg Tracey, SAIC

Subject: Final Work Plan for Evaluation of Chemical Data for the Pier 1 Marine Railway, Naval Submarine Base New London, Groton, Connecticut.

Enclosed please find the Final Work Plan for Evaluation of Chemical Data for the Pier 1 Marine Railway, Naval Submarine Base New London, Groton, Connecticut.

Please feel free to contact me if you have questions regarding this report.

**WORK PLAN
FOR
EVALUATION OF CHEMICAL
DATA FOR THE
PIER 1 MARINE RAILWAY,
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CT**

Final

**Submitted to:
Northern Division
Naval Facilities Engineering Command (NAVFAC)
10 Industrial Highway, Mail Stop #82
Lester, PA 19113-2090**

**Submitted by:
Science Applications International Corporation
221 Third St.
Newport, RI 02840**

**CONTRACT NUMBER N47408-97-D-0410
DELIVERY ORDER NUMBER 0012**

August 1999

1.0 INTRODUCTION

This Work Plan has been prepared under Contract Number N47408-97-D-0410, Delivery Order Number 0012. The statement of work requires Science Applications International Corporation (SAIC) to provide chemical assessment support services to evaluate chemical relationships for sediments at the Pier 1 Marine Railway, Naval Submarine Base, to define an area of possible contamination and to assist with the evaluation of remedial alternatives. This Work Plan outlines the requirements and describes the procedures for performing evaluations at the Pier 1 Marine Railway and the methods that will be used.

The purpose of this Work Plan is to describe the methodology to evaluate chemical relationships for sediments around the Pier 1 Marine Railway. The evaluation will provide the necessary information for SAIC to develop a report of preliminary findings and conclusions regarding the degree and extent of chemical contamination and possible ecological risk associated with the Pier 1 Marine Railway.

1.1 SITE-SPECIFIC INVESTIGATION OBJECTIVES

The objectives of this investigation are the following:

- establish contaminants of concern (CoCs) for the Pier 1 Marine Railway sediments;
- describe the extent of chemical contaminants in the Pier 1 Marine Railway sediments; and
- derive some preliminary conclusions about the likelihood of environmental impact from CoC concentrations.

1.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

SAIC will be responsible for the overall technical and fiscal management of the project including the field collection and laboratory analyses activities described below. NFESC personnel will be responsible for overall program management and technical oversight and coordination among federal and state regulatory agencies. NORTHDIV personnel will be responsible for on-site activities and coordination between SAIC and NFESC.

Key Navy personnel for this project are:

Barry Orlando, NFESC Contracting Officer's Representative (COR)

Ruth Owens, NFESC Technical Point of Contact (POC)

Mark Evans, NORTHDIV Technical Representative, NTR

Key SAIC personnel supporting the project include:
Gregory Tracey, Program Technical Lead for Ecological Risk

Chemical analyses will be subcontracted and are supported by the following:
Helder Costa, Woods Hole Group Environmental Laboratories.

1.3 PROJECT DELIVERABLES

In addition to this Work Plan, project deliverables to be submitted for this project are shown below.

Draft Report (5 - 10 pages) that will include:

- Summary of previously described site conditions and chemical data;
- Detailed description of methods for field sampling, sample manipulations, and chemical analyses;
- Assessment of primary CoCs relative to ecological benchmarks.
- Appendix data will be provided in a format appropriate for Tier 3 data validation.

A Final Report will be prepared that incorporates Navy and interested agency comments.

1.4 PROJECT SCHEDULE

The following schedule is proposed for this project that is based upon approval of the final work plan submitted by SAIC.

Submission of Final Work Plan	5 work days after receipt of Government comments
Completion of Sample Collection	within 20 work days of work plan approval
Completion of Chemical Analyses	within 40 work days of collection of sediment samples
Submission of Draft Report	within 50 work days of completion of sample collection
Submission of Final Report	within 10 work days after receipt of comments

2.0 BACKGROUND INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The Pier 1 Marine Railway is located in the southwestern portion of the Naval SubBase-New London (Figure 2-1). It is located along the shore in the Thames River. The area surrounding the Pier 1 Marine Railway generally does not have emergent vegetation and it is not used for drinking water by wildlife as the water is too brackish. It does support benthic macroinvertebrate communities, possibly small fish, and shellfish. The area also supports avian predators. A portion of this Marine Railway has been backfilled for the construction of a new building (Figure 2-2).

2.2 PREVIOUS SITE INVESTIGATIONS

Previously, Phase I and Phase II Remedial Investigations (RIs) were conducted at Naval Submarine Base New London (NSB-NLON) in Groton, Connecticut (Atlantic Environmental Services, 1992; Brown and Root, 1996a, 1997). The RIs determined that hazardous materials were present at several sites which represented potential risks to human health and the environment. However, data were not collected around the Pier 1 Marine Railway.

Currently, construction is underway on a new building adjacent to the Marine Railway. During building construction, visual evidence of blasting grit was apparent in excavated soils. Odor from petroleum contaminants was also evident (R. Conant, pers. comm.). Soil stockpiles were tested for chemistry, and elevated concentrations of lead were discovered. In two samples, lead concentrations were 9.45 mg/L and 11.34 mg/L, respectively, as compared to the EPA TCLP benchmark for lead of 5 mg/L. In another instance, a soil stockpile had a total lead concentration of 3370 mg/Kg. In addition, soil samples taken from silt bags on the ramp of the Marine Railway of Pier 1 revealed elevated concentrations of mercury, chromium and lead (R. Conant, pers. comm.). These sample results prompted the need for an investigation to examine the sediments adjacent to the Pier 1 Marine Railway. This sampling plan was devised to determine 1) whether the observed contamination extends into the marine portion of the railway; and 2) if so, the extent of contamination.

3.0 SAMPLE DESIGN, COLLECTION, TESTING, AND ANALYSIS

This section describes the design for sample collection and the rationale and methods for chemical analysis and data interpretation.

3.1 SAMPLE DESIGN AND COLLECTION

The design of the sampling program was established to characterize the spatial distribution of sediment contaminants in the depositional portion of the Pier 1 Marine Railway area. It is also the intent of the study to perform a limited characterization of the vertical distribution of CoCs, *i.e.*, across apparent lithological layers within the sediment that may relate to patterns of deposition.

To address these data needs, 6 stations from the Pier 1 Marine Railway, New London, CT (Figure 2-2) will be sampled for chemical content. Three surface grab samples (0-15 cm depth) will be taken within a 3 meter distance of the station location. The grab samples will be composited, and one liter of sediment will be retained at each station and placed in precleaned glass containers. Care will be taken to prevent loss of fines as well as to minimize the entrainment of excess water into the sample.

In addition to surface grabs, subsurface samples will be collected as sediment cores at 2 stations (Figure 2-2) for characterization of vertical CoC distribution in relation to possible CoC sources. Cores will be collected at a depth of one meter or refusal, whichever occurs first. The bottom 20 cm of the depositional portion of the core will be composited, retained, and placed in precleaned glass containers.

In total, six composited surface grab samples and 2 composited core sections will be packed and mailed for overnight delivery to the Woods Hole Group Environmental Laboratories for chemical analyses (see Table 1 for list of analytes). TOC analyses will also be conducted.

4.0 REPORTING

A brief report summarizing the measured analytical data at each location will be prepared. A limited discussion of the measured values with respect to NOAA ER-L/ER-M benchmarks will be included so as to ascertain potential ecological risks.

5.0 REFERENCES

Atlantic Environmental Services. 1992. Phase I Remedial Investigation, Naval Submarine Base - New London, Groton, Connecticut.

Brown & Root Environmental. 1996. Preliminary Evaluation of Ecological Risk-Based Remedial Action Objectives for Goss Cove Sediments and Comparison with Human Risk-Based Remedial Action Objectives.

Brown & Root Environmental. 17 March 1997. Phase II Remedial Investigation (RI), Naval Submarine Base - New London, Groton, Connecticut.

National Oceanic and Atmospheric Administration. 1998. Sampling and Analytical Methods of the National Status and Trends Program Mussel Watch Project: 1993-1996 Update, NOSS Technical Memorandum NOS ORCA 130.

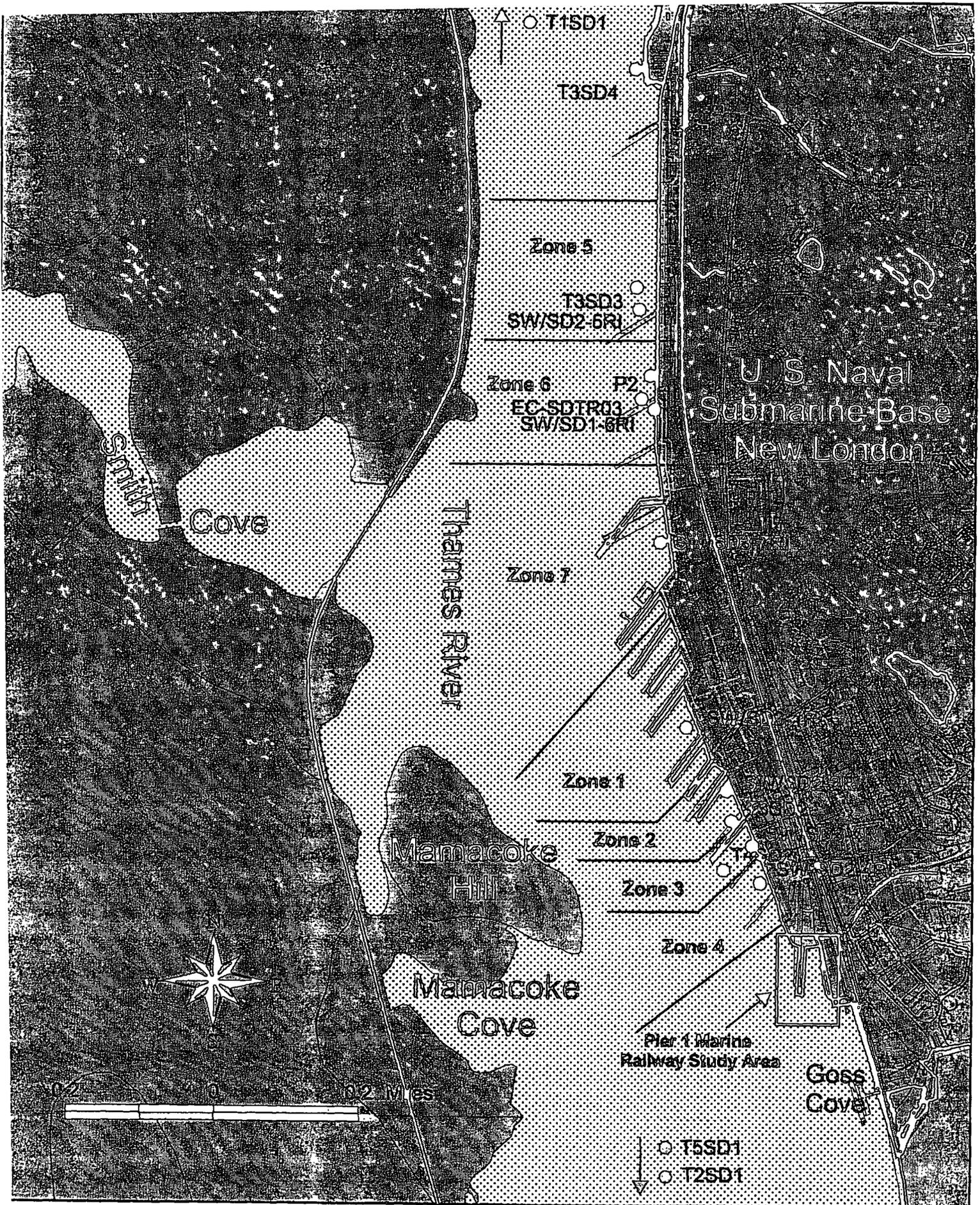


Figure 2-1. Location of bulk sediment chemistry sample sites in the Thames River.

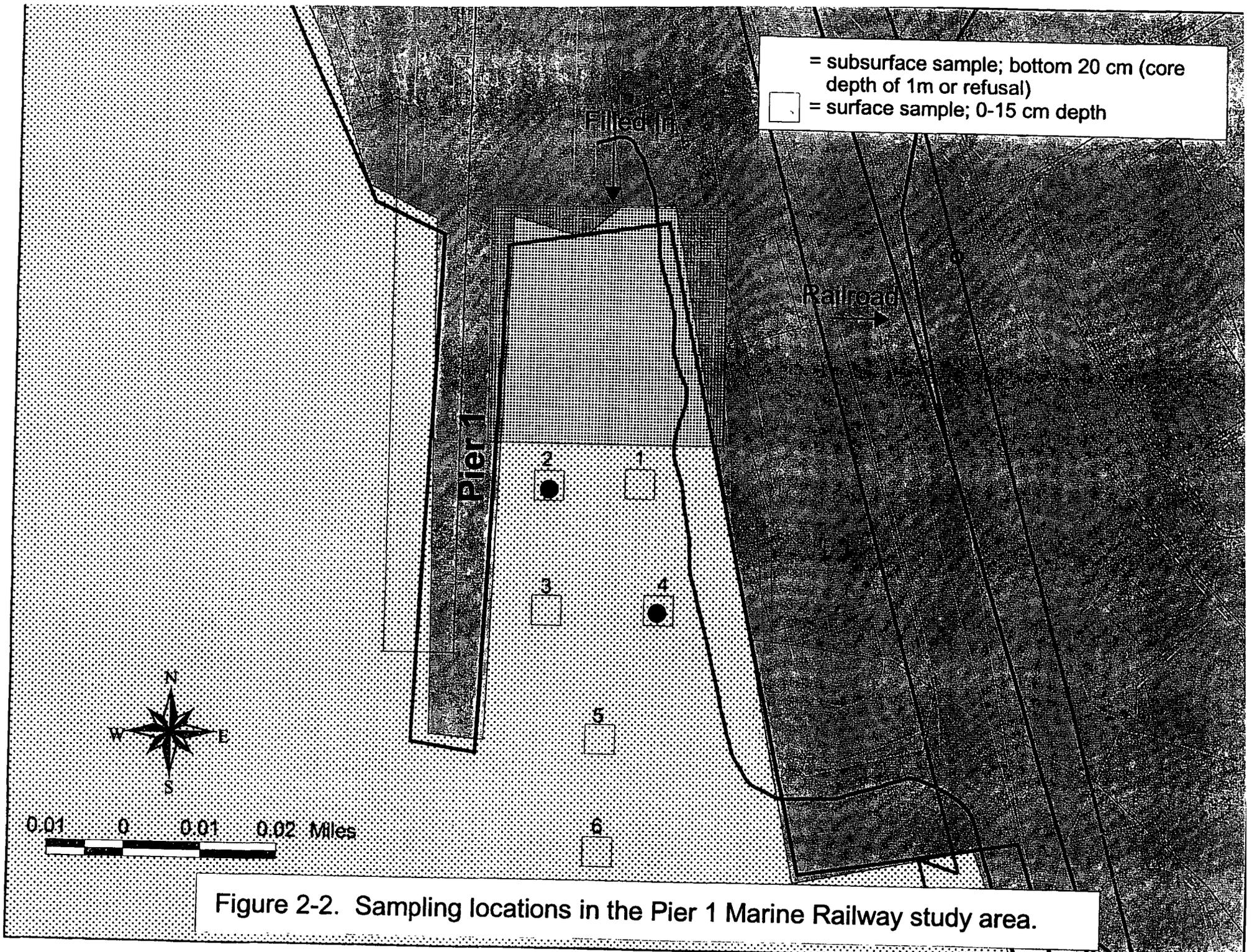


Figure 2-2. Sampling locations in the Pier 1 Marine Railway study area.

Tabl 1. List of analytes for chemical analysis.

M tals

Reporting Name	Analyte	CAS NO	Sediment Analysis Method	Sediment MDL mg/Kg dry	Sediment Reporting Limit mg/Kg dry
As	Arsenic	7440-38-2	GFAA 7060	0.04	0.5
Cd	Cadmium	7440-43-9	GFAA 7131	0.06	0.2
Cr	Chromium	7440-47-3	ICP 6010B	0.34	1.0
Cu	Copper	7440-50-8	GFAA 7211	0.1	0.5
Pb	Lead	7439-92-1	GFAA 7421	0.14	0.2
Hg	Total Mercury (cold vapor)	7439-97-6	CVAA 7471	0.005	0.006
Ni	Nickel	7440-02-0	ICP 6010B	1.2	2.0
Ag	Silver	7440-22-4	GFAA 7761	0.03	0.2
Zn	Zinc	7440-66-6	ICP 6010B	0.43	2.0

PAHs

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry	Sediment Reporting Limit ug/Kg dry
T167NAP	1,6,7-Trimethylnaphthalene	2245387	0.10	2
M1NAPH	1-Methylnaphthalene	90120	0.11	2
M1PHEN	1-Methylphenanthrene	832699	0.16	2
D26NAPH	2,6-Dimethylnaphthalene	581420	0.17	2
M2NAPH	2-Methylnaphthalene	91-57-6	0.19	2
ACENAPH	Acenaphthene	83-32-9	0.14	2
ACENAPL	Acenaphthylene	208-96-8	0.13	2
ANTHRAC	Anthracene	120-12-7	0.23	2
BENAAN	Benzo(a)anthracene	56-55-3	0.19	2
BENAPYR	Benzo(a)pyrene	50-32-8	0.065	2
BENBFLU	Benzo(b)fluoranthene	205-99-2	0.34	2
BENEPYR	Benzo(e)pyrene	192972	0.19	2
BGHIPER	Benzo(g,h,i)perylene	191-24-2	0.19	2
BENKFLU	Benzo(k)fluoranthene	207-08-9	0.47	2
BIPHEN	Biphenyl	92524	0.46	2
CHRYSEN	Chrysene	218-01-9	0.18	2
DBAHANT	Dibenz(a,h)anthracene	53-70-3	0.26	2
FLUORAN	Fluoranthene	206-44-0	0.22	2
FLUOREN	Fluorene	86-73-7	0.082	2
I123CDP	Indeno(1,2,3-cd)pyrene	193-39-5	0.093	2
NAPH	Naphthalene	91-20-3	0.28	2
PERYL	Perylene	198550	0.13	2
PHENAN	Phenanthrene	85-01-8	0.22	2
PYRENE	Pyrene	129-00-0	0.24	2

Methods follow NS&T Program guidelines, and SW-846 Method 8270 Modified. Reporting limits based on 20-g sample, 50% moisture content, and 2-mL final extract volume.

Tabl 1. c ntinu d.

PCB congeners

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry	Sediment Reporting Limit ug/Kg dry
PCB008	8 (2 4)	34883437	0.063	1
PCB018	18 (2 2'5)	37680652	0.29	1
PCB028	28 (2 4 4')	7012375	0.025	1
PCB029	29 (2 4 5)	15862074	NA	1
PCB044	44 (2 2'3 5')	41464395	0.18	1
PCB050	50 (2 2' 4 6)	62796650	NA	1
PCB052	52 (2 2'5 5)	35693993	0.083	1
PCB066	66 (2 3'4 4')	32598100	0.030	1
PCB077	77(3 3' 4 4')	32598133	0.047	1
PCB087	87(2 2' 3 4 5')	38380028	0.063	1
PCB101	101 (2 2'4 5 5')	37680732	0.086	1
PCB104	104 (2 2' 4 6 6')		NA	1
PCB105	105 (2 3 3'4 4')	32598144	0.040	1
PCB118	118 (2 3'4 4'5)	31508006	0.046	1
PCB126	126 (3 3' 4 4' 5)	57465288	0.060	1
PCB128	128 (2 2'3 3'4 4')	39380073	0.15	1
PCB138	138 (2 2'3 4 4'5)	35065282	0.075	1
PCB153	153 (2 2'4 4'5 5')	35065271	0.069	1
PCB154	154(2 2 4 4' 5 6')		NA	1
PCB170	170 (2 2'3 3'4 4'5)	35065306	0.14	1
PCB180	180 (2 2'3 4 4'5 5')	35065293	0.058	1
PCB187	187 (2 2'3 4'5 5'6)	52663680	0.046	1
PCB188	188 (2 2' 3 4' 5 6 6')		NA	1
PCB195	195 (2 2'3 3'4 4'5 6)	52663782	0.052	1
PCB200	200 (2 2' 3 3' 4 5 6 6')		NA	1
PCB206	206 (2 2'3 3'4 4'5 5'6)	40186729	0.050	1
PCB209	209 (2 2'3 3'4 4'5 5'6 6')	2051243	0.075	1

Methods follow NS&T Program guidelines and SW-846 Method 8082 Modified. Reporting limit based on 20-g sample, 50% moisture, 2-mL final extract volume; lower reporting limits may be achieved if required by the project QAPjP.

NA – Not available, congener not included in most recent MDL study.

Tabl 1. continued.

OCPs

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry	Sediment Reporting Limit ug/Kg dry
ABHC	Alpha-BHC	319846	0.014	1
ACHLOR	Alpha-Chlordane	5103719	0.022	1
BBHC	Beta-BHC	319857	0.026	1
DBHC	Delta-BHC	319868	0.017	1
DIELDRIN	Dieldrin	6057	0.049	1
ENDOSFN1	Endosulfan I	959988	0.022	1
ENDOSFN2	Endosulfan II	33213659	0.031	1
ENDOSO4	Endosulfan Sulfate	1031078	0.059	1
ENDRIN	Endrin	72208	0.039	1
ENDRINAD	Endrin Aldehyde	7421934	0.048	1
GBHC	Gamma-BHC(Lindane)	58899	0.014	1
GCHLOR	Gamma-Chlordane	5103742	0.030	1
HPTCHLOR	Heptachlor	76448	0.037	1
HPTEPOX	Heptachlor Epoxide	1024573	0.032	1
MTXYCHLR	Methoxychlor		0.23	5
TOXPHE	Toxaphene	8001352	NA	10
ALDRIN	Aldrin	309002	0.012	1
HCB	Hexachlorobenzene	118-74-1	NA	1
MIREX	Mirex	2385855	NA	1
DDD_PP	p,p'-DDD	72548	0.026	1
DDE_PP	p,p'-DDE	72559	0.033	1
DDT_PP	p,p'-DDT	50293	0.030	1
DDD_OP	o,p'-DDD	3424826	NA	1
DDE_PP	o,p'-DDE		NA	1
DDT_PP	o,p'-DDT		NA	1

Methods follow NS&T Program guidelines and SW-846 Method 8081 Modified. Reporting limit based on 20-g sample, 50% moisture, 2-mL final extract volume; lower reporting limits may be achieved if required by the project QAPJP.

NA – Not available, pesticide not included in most recent MDL study.

Butyltins

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry
MBT	Monobutyltin		11.316
DBT	Dibutyltin		12.674
TBT	Tributyltin		10.720
TTBT	Tetrabutyltin		9.590