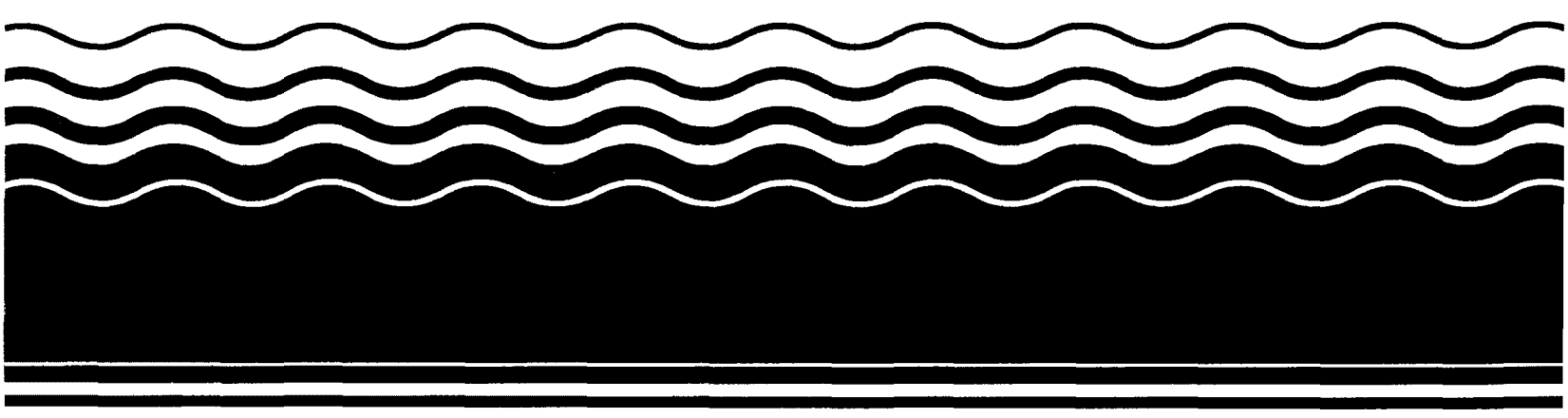
PB98-964018
EPA 541-R98-074
October 1998

EPA Superfund
Record of Decision:

Pensacola Naval Air Station OU 17
Pensacola, FL
9/25/1998



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303-8909

SEP 2 5 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4WD-FFB

Commanding Officer
Naval Air Station Pensacola
190 Radford Boulevard
Pensacola, Florida 32508-5217

SUBJ: Record of Decision - Operable Unit 17
NAS Pensacola NPL Site
Pensacola, Florida

Dear Sir:

The U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the above subject decision document and concurs with the selected remedy for the Remedial Action at Site 42. This remedy is supported by the previously completed Remedial Investigation and Baseline Risk Assessment Reports.

The selected remedial alternative is no further action. This involves taking no further remedial actions at the site and leaving the environmental media as they currently exist. This remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective.

EPA appreciates the coordination efforts of NAS Pensacola and the level of effort that was put forth in the documents leading to this decision. EPA looks forward to continuing the exemplary working relationship with NAS Pensacola and Southern Division Naval Facilities Engineering Command as we move toward final cleanup of the NPL site.

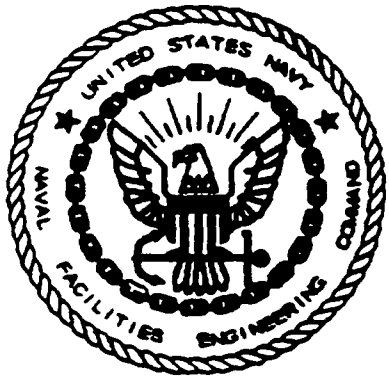
Sincerely,

Richard D. Green
Director
Waste Management Division

cc: Elsie Munsell, Deputy Assistant Secretary of the Navy
Ron Joyner, NAS Pensacola
Bill Hill, SOUTHDIV
David Grabka, FDEP

bcc: Allison Abernathy, FFRRO/OSWE

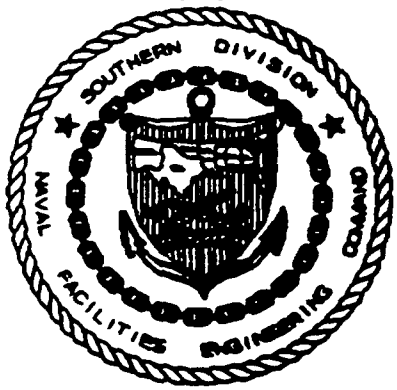
FINAL RECORD OF DECISION
OPERABLE UNIT 17
SITE 42 – PENSACOLA BAY
NAS PENSACOLA
PENSACOLA, FLORIDA



SOUTHNAVFACENGCOM
Contract Number: N62467-89-D-0318
CTO-083

Prepared for:

Comprehensive Long-Term Environmental Action Navy (CLEAN)
Naval Air Station Pensacola
Pensacola, Florida



Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962

May 6, 1998

Florida Department of Environmental Protection

Response to Technical Comments

Final Record of Decision

Operable Unit 17 (Site 42), NAS Pensacola

Comment 1

The last paragraph of Section 6.3 (Baseline Risk Assessment Conclusions) needs to be modified. It discusses ecological risk related to Site 2 rather than Site 42. Comparison to the risk assessment at Site 2 is appropriate, but the ecological risk should be correlated to Site 42. I suggest the following wording:

"Ecological Risk at Site 42 was assessed in comparison to HQs which showed adverse effects to the environment at Site 2, which is another Operable Unit in Pensacola Bay and was investigated separately from Site 42. The environment at Site 42 was similar and comparable to the Site 2 area. The HQs at Site 42 were lower than those which showed adverse effects at Site 2, except for the area around the barge loading dock. The constituents of concern at the barge loading dock were PAHs which are likely from petroleum products unloaded at the dock. This contamination will be further investigated under Florida's petroleum program."

Response:

Agreed. The last paragraph of Section 6.3 has been modified to the above language.

FINAL RECORD OF DECISION
OPERABLE UNIT 17
SITE 42 – PENSACOLA BAY
NAS PENSACOLA
PENSACOLA, FLORIDA

SOUTHNAVFACENGCOM
Contract Number: N62467-89-D-0318
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Comprehensive Long-Term Environmental Action Navy
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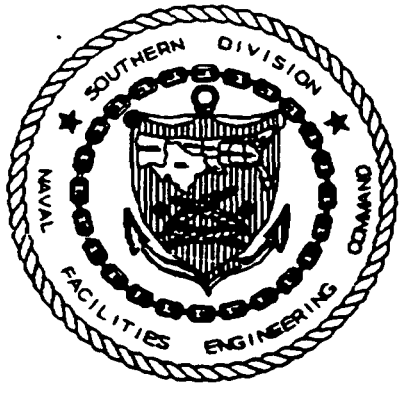

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Memphis, Tennessee 38134
(901) 372-7962

May 6, 1998

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List of Abbreviations

The following list contains may of the abbreviations, acronyms, and symbols used in this document. A glossary of technical terms is provided in Appendix A.

ARAR	Applicable or Relevant and Appropriate Requirements
BEHP	bis(2-ethylhexyl)phthalate
BRA	Baseline Risk Assessment
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Chemical of Concern
COPC	Chemical of Potential Concern
E/A&H	EnSafe/Allen & Hoshall
E&E	Ecology & Environment, Inc.
ERA	Ecological Risk Assessment
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
ICW	Intercoastal Waterway
ILCR	Incremental Lifetime Excess Cancer Risk
IWTP	Industrial Wastewater Treatment Plant
MCL	maximum contaminant level
mg/kg	milligram per kilogram
MSL	Mean Sea Level
NAS	Naval Air Station
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PBS	Pensacola Bay System

List of Abbreviations (continued)

PCB	Polychlorinated Biphenyl
PEL	Probable Effects Level
ppb	part per billion
ppm	part per million
PRAP	Proposed Remedial Action Plan
PRG	Preliminary Remediation Goal
QA	Quality Assurance
QC	Quality Control
RA	Risk Assessment
RAB	Restoration Advisory Board
RBC	Risk-based Concentration
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SQAG	Sediment Quality Assessment Guideline
SSV	Sediment Screening Value
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
tPAH	Total polyaromatic hydrocarbon
TAL	Target Analyte List
TCL	Target Compound List
TEL	Threshold Effect Level
TOC	Total Organic Carbon
TRC	Technical Review Committee
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
μg/kg	Micrograms per kilogram

DECLARATION OF THE RECORD OF DECISION

Site Name and Location

Operable Unit 17
Site 42 — Pensacola Bay
Naval Air Station Pensacola
Pensacola, Florida

Statement of Purpose

This decision document (Record of Decision), presents the selected remedial action for Operable Unit 17 (Site 42, Pensacola Bay) at Naval Air Station Pensacola, Pensacola, Florida, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 *et seq.*, and to the extent practicable, the National Contingency Plan (NCP), 40 Code of Federal Regulations Part 300. This decision is based on the administrative record for Operable Unit 17 at the Naval Air Station Pensacola.

The United States Environmental Protection Agency and the Florida Department of Environmental Protection concur with the selected remedy.

Description of the Selected Remedy

This action is the first and final action for the operable unit. The remedial investigation and the human health and ecological risk assessment conducted for Operable Unit 17 support a no-action remedial alternative. The remedial investigation and risk assessment addressed all media at the site, and therefore, no other actions will be considered for Operable Unit 17.

Declaration Statement

No remedial action is necessary to ensure protection of human health and the environment. The selected remedy complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective.

CAPT, USN

Captain J.M. Denkler, Commanding Officer
NAS Pensacola

6 MAY 98

Date

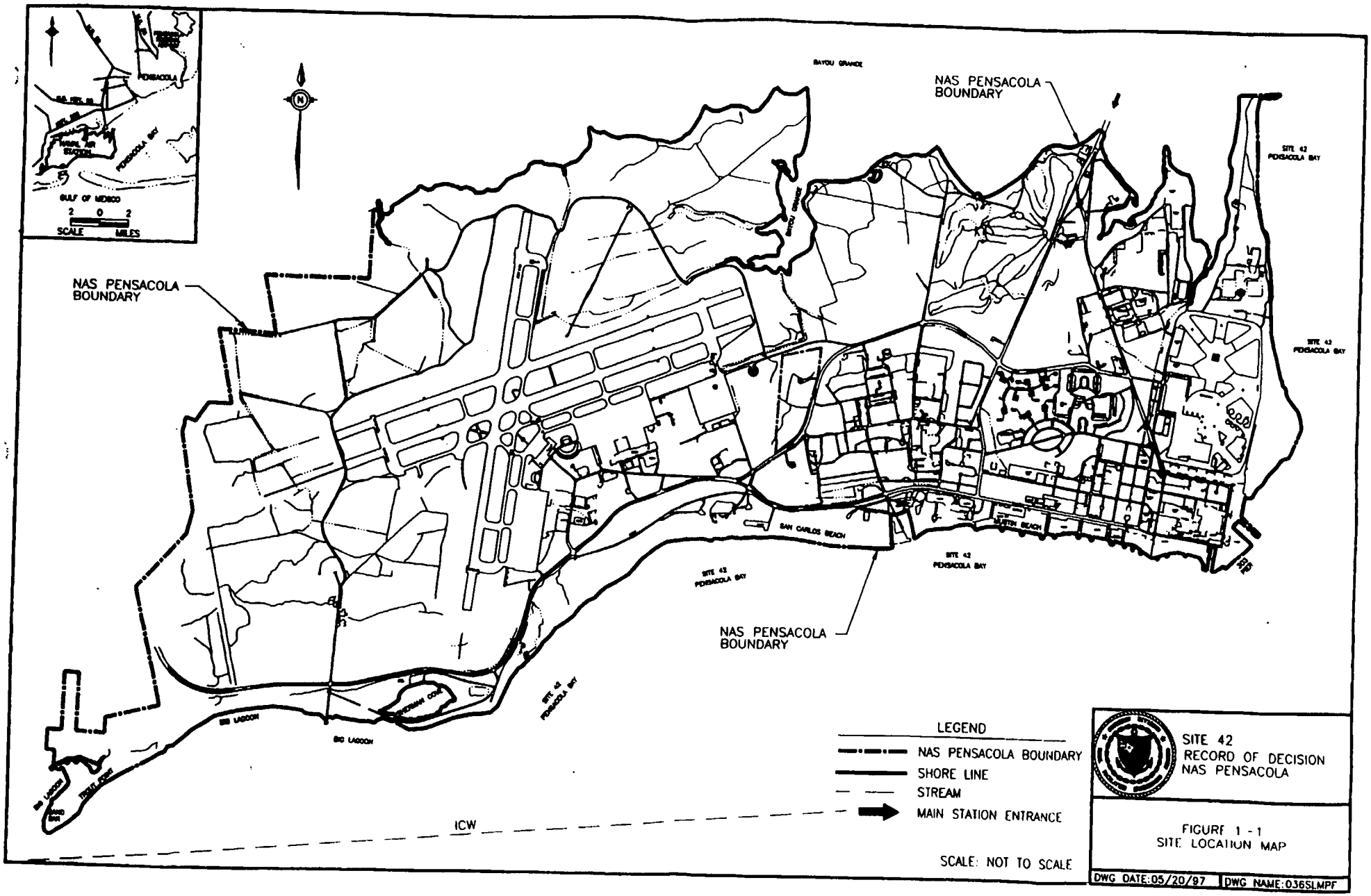
1.0 SITE NAME, LOCATION AND DESCRIPTION

Operable Unit (OU) 17 is Pensacola Bay (Site 42), an estuarine water body adjacent to the eastern and southern borders of Naval Air Station (NAS) Pensacola in Escambia County. It includes the Intercoastal Waterway (ICW) from Trout Point, east to NAS Pensacola's Pier 303, and terminating at the mouth of Bayou Grande. Primarily situated in Escambia County, Pensacola Bay occupies approximately 52 square miles of surface area. Approximately 10 miles of Pensacola Bay coastline border NAS Pensacola property (Figure 1-1). The Florida Department of Environmental Protection (FDEP) has classified Pensacola Bay as Class III waters, indicating its use for recreation and maintaining a well-balanced fish and wildlife population.

NAS Pensacola land surface elevation ranges from 0 to approximately 40 feet above mean sea level (msl). The most prominent topographic feature at NAS Pensacola is a bluff paralleling the southern and eastern shorelines. Between the bluff and the shoreline, a nearly level marine terrace is at approximately 5 feet above msl. Gently rolling uplands reach elevations of up to 40 feet above msl landward of the bluff.

Surface soil at NAS Pensacola is primarily highly permeable sands limiting stream formation. Several naturally occurring intermittent streams and numerous man-made drainage ditches flow south into Pensacola Bay. The mean depth of Pensacola Bay in the NAS Pensacola area is 10 feet.

The depth to groundwater at NAS Pensacola ranges from less than 1 foot to approximately 20 feet below land surface, depending upon land surface elevation and proximity to surface water bodies, including Pensacola Bay. Groundwater is not currently used as a potable water source at NAS Pensacola. Potable water for NAS Pensacola is received from Corry Station, approximately 4 miles north. Three NAS Pensacola supply wells on the facility are used for backup supplies only during periods of peak demand. The zone in which the supply wells is screened is protected from surface contamination by a 12- to 15-foot thick, low-permeability clay layer. Groundwater contamination has not been detected in this zone.


NAS PENSACOLA BOUNDARY
NAS PENSACOLA BOUNDARY
NAS PENSACOLA BOUNDARY
BAYOU GRANDE
SITE 42 PENSACOLA BAY
SITE 42 PENSACOLA BAY
SITE 42 PENSACOLA BAY
SITE 42 PENSACOLA BAY
SAN CARLOS BEACH
SANTA ROSA ISLAND
BIG LAGOON
BIG LAGOON
ICW
PENSACOLA
GULF OF MEXICO
2 0 2
SCALE MILES
LEGEND
NAS PENSACOLA BOUNDARY
SHORE LINE
STREAM
MAIN STATION ENTRANCE
SCALE: NOT TO SCALE
SITE 42
RECORD OF DECISION
NAS PENSACOLA
FIGURE 1 - 1
SITE LOCATION MAP
DWG DATE:05/20/97
DWG NAME:036SLMPF

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 General Site History

NAS Pensacola was placed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List (NPL) in December, 1989. The Federal Facilities Agreement (FFA), signed in October 1990, outlined the regulatory path to be followed at NAS Pensacola. NAS Pensacola must complete not only the regulatory obligations associated with its NPL listing, but also must satisfy the ongoing requirements of a Resource Conservation and Recovery Act (RCRA) permit issued in 1988. That permit addresses the treatment, storage, and disposal of hazardous materials and waste and also the investigation and remediation of any releases of hazardous waste and/or constituents from solid waste management units (SWMUs). RCRA governs ongoing use of hazardous materials, and the rules of the operating permit. RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigations and actions are coordinated through the FFA, streamlining the cleanup process.

2.2 Site-Specific History

Since the early 1950s, numerous investigations have been conducted in and around the Pensacola Bay System (PBS) to monitor the ecological health of the bay and determine the impact of commercial, industrial, and municipal activities. Previous investigations have documented Navy industrial activities discharging to Pensacola Bay. Other studies have been associated with industrial activities of the entire PBS.

Since a complete list of hazardous substances managed or disposed of at Site 42 was not available, a preliminary survey and Phase I sediment mapping were conducted in February 1995 to identify potential sampling locations for further investigation. Sampling locations within Pensacola Bay were selected based on a contaminant source diagram developed to evaluate sources of contaminant input to Pensacola Bay. The contaminant source diagram, Figure 2-1, provides a

Please contact Region 4 to obtain Figure 2-1

(Contaminant Sources and Ecologically Sensitive Areas)

overview of all identified RI sites, spill locations, and petroleum sites assessing the most likely point(s) of discharge into the bay. Pertinent information is summarized in Table 2-1.

Collard (1991) summarizes the environmental-biological history of the PBS, documenting published as well as previously unpublished data from numerous studies conducted from the 1950s to the present. These studies, which were conducted to identify biological trends and help understand the current status of the PBS, have been performed with varying sampling methods, locations, and analytical procedures. They were presented in the work plan for Sites 40 and 42. Collard's biological trends analysis concluded: (1) the data did not support distinct, discernible trends and (2) future investigations should not attempt to evaluate existing data for these trends because of significant database deficiencies.

Pensacola Bay Studies

1984 **Thompson Engineering & Testing** — Sediment samples were collected along the four edges of the turning basin for analysis of grain size, polychlorinated biphenyls (PCBs), oil and grease, and total and volatile solids. PCBs were not detected and metals concentrations were considered representative of natural conditions.

1984 **Geraghty & Miller** — Sediment samples were collected from storm sewer outfalls approximately 300 feet offshore of the facility's southeastern waterfront. Trace amounts of arsenic were detected in some samples, but the method used was inappropriate for assessing the total contaminant burden to sediment.

Table 2-1
NAS Pensacola Sites Related to
Assessment Zones in Pensacola Bay

Assessment Zone	Potential Source	Pathway Descriptions	Suspected Contaminants
5	OU 10	Groundwater discharge into bay	Metals, VOCs, SVOCs, Pest/PCBs
	13	Groundwater discharge into bay	Metals, VOCs, SVOCs, Pest/PCBs
	14	Surface water discharge outfalls (2)	Metals, PCBs, PAHs
	30	Groundwater discharge	Metals, VOCs, SVOCs, Pest/PCBs
6	18	Surface water runoff	PCBs
	38	Groundwater discharge	VOCs
	2	Resident sediment from past discharges	Metals, SVOCs
	28	Surface water runoff	PCBs
	21[a]	Surface water runoff	Fuel
7	39	Groundwater discharge	Metals, VOCs
	4	Surface water runoff through Wetlands 56, 57, 58 (Site 41)	Metals, SVOCs
8	Barge Fuel Loading Dock[b]	Potential Spills	Fuel
9	3[a]	Groundwater and surface water flow through Wetland 52 (Site 41)	Metals, VOCs, SVOCs

Notes:
[a] = Petroleum site
[b] = Not an IRP site
NA = Not applicable
OU 10 = Operable Unit 10

1982-1985 **Florida Department of Environmental Protection (FDEP)** — Sediment samples collected from Pensacola Bay's turning basin south of the waterfront, Big Lagoon, and the mouth of Bayou Grande showed elevated concentrations of mercury and lead. Ratios of Total Kjeldahl Nitrogen to total organic carbon (TOC) indicated nitrogen-enriched sediments in the turning basin and at the mouth of Bayou Grande.

1986 **U.S. Navy** — Water and sediment samples collected from the turning basin were analyzed for heavy metals during an environmental impact study. Results are considered suspect because laboratory quality assurance/quality control (QA/QC) data were not provided. According to the consultant's report, chromium and zinc concentrations were elevated.

1991 **E&E** — A Phase I Contamination Assessment/Remedial Activities Investigation was conducted at Site 2, the waterfront sediment, to identify source areas and contaminants of concern and to provide recommendations for the next phases of the investigation. Results indicated metals, volatile organic compounds (VOCs), total recoverable petroleum hydrocarbons, and polycyclic aromatic hydrocarbons (PAHs).

Site 2 (OU 3) was investigated as a separate remedial investigation (RI). The description is provided here because Site 2 is within Site 42. At Site 2, most of the contamination appeared related to the historical discharge of untreated industrial waste from outfalls on the eastern end of the waterfront, specifically from Building 71 (Site 38, OU 11). Other sources possibly contributing to the sediment contamination cited above are operations at the aircraft carrier berth and naval boatyard, commercial shipping, and private industrial facilities discharging effluent to the bay.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Throughout the site's history, the community has been kept abreast of activities in accordance with CERCLA Sections 113(k)(2)(B)(i-v) and 117. In January 1989, a Technical Review Committee (TRC) was formed to review recommendations for and monitor progress of the investigation and remediation efforts at NAS Pensacola. The TRC was made up of representatives of the Navy, USEPA, FDEP, and the local community. In addition, a mailing list of interested community members and organizations was established and maintained by the NAS Pensacola Public Affairs Office. In July 1995, a Restoration Advisory Board (RAB) was established as a forum for communication between the community and decision-makers. The RAB absorbed the TRC and added members from the community and local organizations. Its members work together to monitor progress of the investigation and to review remediation activities and recommendations at NAS Pensacola. RAB meetings are held regularly, advertised, and are open to the public.

After finalizing the RI report, the preferred alternative for OU 17 was presented in the Proposed Remedial Action Plan (PRAP), also called the Proposed Plan. A copy was sent to everyone on the NAS Pensacola mailing list. The notice of availability of the Proposed Plan and RI documents was published in the *Pensacola News Journal* on December 12, 1997, followed by a public comment period from December 8, 1997 to January 22, 1998, to encourage public participation in the remedy-selection process. The opportunity for a public meeting was provided during the comment period.

4.0 SCOPE AND ROLE OF THE OPERABLE UNIT

The proposed remedial action identified in this document is the "no action alternative." No action is proposed for OU 17 sediment, because it does not pose an excess risk to human health and the environment. This remedy is the first and final remedial action planned for OU 17.

This is the only Record of Decision (ROD) contemplated for OU 17. Operable Unit 17, which consists of Site 42, is one of 13 operable units within NAS Pensacola. The purpose of each operable unit is defined in the *FY 1998 Site Management Plan* (SOUTHNAVFACENGCOM, 1997) for NAS Pensacola, which is in the Administrative Record. Separate investigations and assessments are being conducted for the other operable units at NAS Pensacola in accordance with CERCLA. Therefore, this ROD applies only to OU 17.

5.0 SITE CHARACTERISTICS

5.1 Nature and Extent of Contamination

In accordance with the Site 42 Phase II work plan and SAP, 141 locations were sampled along approximately 10 miles of coastline. The Phase II sampling targeted the fine-grain sediments and areas of high TOC identified during Phase I sampling. Phase I assessed areas of deposition and erosion by mapping sediment types. TOC analysis was used to determine that the adsorptive capacity of sediments were low. Figure 5-1 depicts the sediment sampling locations. This section discusses the nature and extent of the analytes detected during the Phase II investigation.

Metals

Site 42 sediment samples were analyzed for 23 metals. Table 5-1 lists the frequency of detection, range of nondetected upper bounds, range of detected concentrations, and average detected concentrations. Frequency of detection is a ratio of detections to total samples analyzed. The range of nondetects describes the range of nondetects in the sampling set as a minimum and maximum. The range of detected concentrations shows the minimum and maximum concentrations detected. The average detected concentration is the arithmetic mean of only the detected concentrations. Nondetected concentrations were not included in this calculation to give an accurate measure of what was detected.

As shown in Table 5-1, every metal on the list was detected. The frequency of detection was as few as two in 141 and as much as 141 in 141. Not surprisingly, the primary seawater constituents calcium, magnesium, potassium, and sodium were detected in every sample.

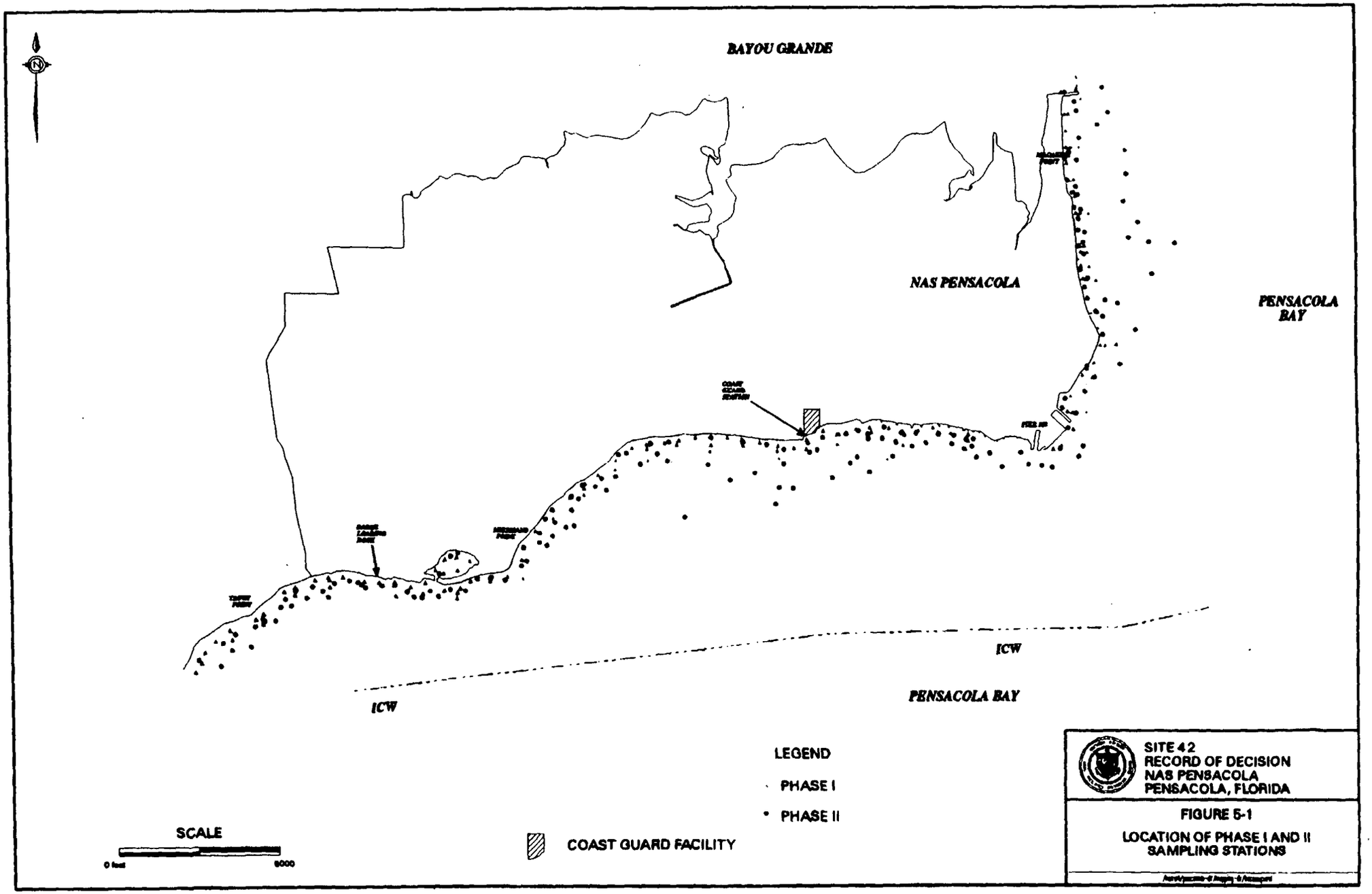

BAYOU GRANDE
NAS PENSACOLA
PENSACOLA BAY
ICW
ICW
PENSACOLA BAY
LEGEND
PHASE I
PHASE II
COAST GUARD FACILITY
SCALE
0 feet
6000
SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 5-1
LOCATION OF PHASE I AND II
SAMPLING STATIONS

Table 5-1
Detected Inorganics in Sediment (mg/kg)

Inorganics	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
Aluminum (Al)	137/141	12.2 - 52.0	17.6 - 15,900	1,308
Antimony (Sb)	2/141	0.11 - 1.4	0.21 - 0.45	0.33
Arsenic (As)	98/141	0.12 - 3.1	0.12 - 22.3	2.25
Barium (Ba)	133/141	0.12 - 0.9	0.07 - 99.3	2.75
Beryllium (Be)	19/141	0.06 - 0.55	0.09 - 1.1	0.559
Cadmium (Cd)	7/141	0.12 - 1.6	0.21 - 0.92	0.546
Calcium (Ca)	141/141	N/A	67.2 - 47,400	3,674
Chromium (Cr)	77/141	0.31 - 4.4	0.39 - 84	7.36
Cobalt (Co)	27/141	0.12 - 1.6	0.15 -3.8	1.46
Copper (Cu)	101/141	0.22 - 0.3	0.25 - 30.4	2.79
Iron (Fe)	139/141	45.8 - 76.3	19.3 - 26,700	2,107
Lead (Pb)	86/141	0.07 - 11.0	0.15 - 43.9	3.74
Magnesium (Mg)	141/141	N/A	111.1 - 10,800	984
Manganese (Mn)	139/141	0.4 - 0.44	0.19 - 677	28.7
Mercury (Hg)	7/141	0.05 - 0.5	0.08 - 0.64	0.21
Nickel (Ni)	24/141	0.54 - 6.6	0.71 - 10.8	4.33
Potassium (K)	140/141	81.1 - 81.1	36. - 3,560	326
Selenium (Se)	14/141	0.17 - 1.60	0.22 - 1.2	0.630

Table 5-1
Detected Inorganics in Sediment (mg/kg)

Inorganics	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
Silver (Ag)	2/141	0.22 - 1.1	3.6 - 14.8	9.2
Sodium (Na)	141/141	N/A	714 - 36,800	3,735
Thallium (Tl)	11/141	0.17 - 1.6	0.31 - 1.3	0.720
Vanadium (V)	129/141	0.12 - 0.14	0.13 - 37.4	3.63
Zinc (Zn)	82/141	0.21 - 3.6	0.23 - 84.4	10.05

Notes:
N/A = Not applicable
mg/kg = milligrams per kilogram

Pesticide/PCBs

Twenty-two pesticide/PCB-type compounds were detected in Site 42 samples. Table 5-2 shows the frequency of detection, range of nondetected upper bounds, range of detected concentrations, and average detected concentration. The frequency of detection was less than a third of the total number of samples.

Semivolatile Organic Compounds (SVOCs)

Twenty-three SVOCs were detected in the 141 Site 42 samples. From Table 5-3, the frequency of detection ranges from one to 34 detections in 141 samples.

Volatile Organic Compounds

Nine VOCs were detected in the 141 samples collected at Site 42. Table 5-4 displays the frequency of detection, range of nondetected upper bounds, range of detected concentrations, and average detected concentration. The frequency of detections is less than 7% of the total number of samples analyzed.

No sediment quality screening values are available for VOCs in sediments. Areas of high TOC and fine grained sediment such as Trout Point, barge fuel dock, concrete seawall and quay, and industrial wastewater treatment plant (IWTP) show some or all of these VOCs just above the detection limit.

Conclusions

All sample locations at which contamination was detected were surrounded by locations at which no contamination was found. Thus, the areal extent of contamination is easily discernible from the sampling data. The analytical data identified metals, pesticides, PCBs, SVOCs, and VOCs at Site 42. Areas of greater contaminant detections compared to other areas sampled include the

Table 5-2
Detected Pesticides in Sediment (μg/kg)

Pesticides	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
4,4'-DDD	12/141	0.19 - 3.3	0.19 - 1.2	0.5208
4,4'-DDE	8/141	0.19 - 3.3	1.2 - 1.1	0.5363
4,4'-DDT	16/141	0.19 - 3.3	0.21 - 6.0	0.9444
Aldrin	8/141	0.093 - 1.6	0.11 - 1.0	0.4313
Aroclor-1242	4/141	2. - 33.0	4.7 - 8.1	6.375
Aroclor-1254	16/141	3. - 33.0	1. - 26.0	5.8375
Aroclor-1260	20/141	2.0 - 28.3	0.52 - 10.0	3.1085
Dieldrin	5/141	0.19 - 3.3	0.22 - 0.78	0.476
Endosulfan I	34/141	0.1 - 1.6	0.1 - 0.7	0.2868
Endosulfan II	2/141	0.19 - 3.3	0.2 - 0.53	0.365
Endosulfan sulfate	1/141	0.19 - 3.3	0.24 - 0.24	0.24
Endrin	9/141	0.19 - 3.3	0.13 - 0.61	0.2944
Endrin aldehyde	6/141	0.19 - 3.3	0.2 - 0.61	0.3333
Endrin ketone	1/141	0.19 - 3.3	0.26 - 0.26	0.26
Heptachlor	4/141	0.093 - 1.6	0.14 - 0.45	0.2625
alpha-BHC	47/141	0.093 - 1.6	0.1 - 8.8	1.4519
alpha-Chlordane	9/141	0.098 - 1.6	0.11 - 0.46	0.2022
beta-BHC	5/141	0.093 - 1.6	0.12 - 0.24	0.16

Table 5-2
Detected Pesticides in Sediment (µg/kg)

Pesticides	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
delta-BHC	6/141	0.093 - 1.6	0.11 - 0.4	0.2183
gamma-BHC (Lindane)	29/141	0.093 - 1.6	0.11 - 1.3	0.3721
gamma-Chlordane	1/141	0.093 - 1.6	0.15 - 0.15	0.15

Note:
All results are in micrograms per kilogram (µg/kg).

Table 5-3
Detected SVOCs in Sediment (µg/kg)

SVOCs	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
2,2'-oxybis(1-Chloropropane)	1/141	360. - 1,700.0	84. - 84.0	84.0
4-Methyl phenol (p-Cresol)	1/141	360. - 1,700.0	120. - 120.0	120.0
Acenaphthylene	2/141	37. - 1,700.0	28. - 92.0	60.0
Anthracene	4/141	36. - 170.0	51. - 650.0	220.75
Benzo(a)anthracene	18/141	36. - 170.0	21. - 1,800.0	174.5
Benzo(a)pyrene	15/141	36. - 480.0	25. - 1,100.0	156.7333
Benzo(b)fluoranthene	25/141	36. - 170.0	24. - 1,700.0	164.32
Benzo(g,h,i)perylene	10/141	36. - 170.0	27. - 470.0	98.5
Benzo(k)fluoranthene	13/141	36. - 170.0	21. - 870.0	126.3846
Butylbenzylphthalate	5/141	360. - 1,700.0	20. - 55.0	30.6
Carbazole	2/141	360. - 1,700.0	53. - 100.0	76.5
Chrysene	20/141	36. - 170.0	23. - 2,500.0	220.4
Di-n-butylphthalate	34/141	360. - 1,700.0	20. - 82.0	30.2059
Diethylphthalate	2/141	360. - 1,700.0	21. - 170.0	95.5
Fluoranthene	25/141	36. - 170.0	19. - 2,600.0	218.16
Fluorene	3/141	17. - 84.0	31. - 63.0	46.6667
Indeno(1,2,3-cd)pyrene	10/141	36. - 170.0	21. - 480.0	94.9
Naphthalene	2/141	36. - 170.0	23. - 41.0	32.0

Table 5-3
Detected SVOCs in Sediment (µg/kg)

SVOCs	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
Pentachlorophenol	1/141	0. - 4,200.0	21. - 21.0	21.0
Phenanthrene	16/141	36. - 170.0	21. - 410.0	97.375
Phenol	7/141	360. - 1,700.0	24. - 71.0	39.0
Pyrene	23/141	36. - 170.0	22. - 2,300.0	215.6522
bis(2-Ethylhexyl)phthalate	12/141	350. - 1,700.0	52. - 1,400.0	279.0

Note:
µg/kg = micrograms per kilogram

Table 5-4
VOCs Detected in Sediment (µg/kg)

Volatiles	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average Detected Concentration
2-Butanone (MEK)	62/141	11. - 59.0	8. - 99.0	38.8333
Bromoethane	1/141	11. - 59.0	4. - 4.0	4.0
Carbon disulfide	10/141	11. - 59.0	3. - 42.0	15.6
Chlorobenzene	7/141	11. - 59.0	2. - 9.0	5.4286
Chloromethane	3/141	11. - 59.0	5. - 30.0	16.6667
Tetrachloroethene	1/141	11. - 59.0	2. - 2.0	2.0
Toluene	6/141	11. - 59.0	1. - 3.0	1.3333

Note:
µg/kg = micrograms per kilogram

barge loading dock, Coast Guard Station, concrete seawall and quay, and the IWTP. Contamination in these areas is related to the discharges from these facilities.

5.2 Fate and Transport

Metals, VOCs, SVOCs, and pesticide/PCBs were found in Site 42 sediments. The marine environment encourages the assimilation of these contaminants into sediment, which is transported by currents and often deposited, unaffected by currents, for long periods of time. The chemistry of seawater does not encourage contaminants to dissolve and, if they are dissolved, seawater dilution prevents measuring their contribution to the sea.

The proximity of NAS Pensacola to the bay suggests some impact is occurring. Humans would be exposed possibly by consumption of seafood, because the Bay seawater is not a source of bathing or potable water. The ecological receptors affected by sediment contamination observed will be sessile benthic macroinvertebrates such as oysters and barnacles, and mobile species closely associated with the sediments such as crab, shrimp, and flounder. An edible crab tissue study at Site 2 (within Site 42) did not detect any contaminants at a concentration causing a risk to humans for consumption.

6.0 SUMMARY OF SITE RISKS

During the RI, a baseline risk assessment (BRA) evaluating excess human health risk and excess ecological risk were conducted to evaluate the actual or potential risks to human health or the environment resulting from the no-action scenario at Site 42. It is incorporated into Section 10 of the RI report. The BRA represents an evaluation of the no action alternative, because it identified the risk present if no remedial action is taken. The assessment considers environmental media and exposure pathways that could result in an unacceptable levels of exposure now or in the foreseeable future. Data collected and analyzed during the RI provided the basis for the risk evaluation.

Since Site 42 is a marine environment, the ecological risk assessment, which is a component of the BRA, compared observed sediment concentrations to sediment screening values considered to be critical exposure levels for marine fauna. The approach used to assess human health is a preliminary screening, evaluating exposure potential based on Site 42 physical characteristics.

BRA Objectives

- Characterize the source media and determine the chemicals of potential concern (COPCs) for Site 42 at NAS Pensacola.

- Identify potential receptors and quantify potential exposures under current and future conditions.

- Qualitatively and quantitatively evaluate the adverse effects associated with the site-specific COPCs.

6.1 Ecological Risk Assessment

The ecological risk assessment (ERA) is a key component of the BRA. It develops a qualitative and/or quantitative ecological appraisal of the actual or potential effects of Site 42. The assessment considers environmental media and exposure pathways potentially resulting in unacceptable concentrations of exposure to flora and fauna now or in the foreseeable future.

6.1.1 Problem Formulation

This section uses basic information about the site setting, COPCs, potential receptor species, and assessment endpoints to assess the environmental threat present. This assessment uses a qualitative weight-of-evidence approach to judge the validity of a pathway to a receptor. To describe qualitative risk, the terms "low," "medium," and "high" are used. These terms are not quantitative but are useful in comparing one area or sample location to another.

Potential Receptors

Species with the highest potential for contamination effects are sessile benthic macroinvertebrates such as oysters and barnacles, and mobile species closely associated with the sediments such as crab, shrimp, and flounder.

Assessment Endpoints

The potential for negative effects to benthic communities from site-related contamination was the primary assessment endpoint selected for the screening-level assessment for the site. The work plan outlined a phased approach to assess ecological risks from site contamination. The phased approach included a preliminary screening assessment in which concentrations were compared to benchmark effects levels. If the screening assessment had exhibited a high potential for effects, the subsequent phases (acute toxicity tests, diversity tests, or bioassays) would have been conducted.

6.1.2 Preliminary Risk Characterization

To characterize risk to receptors, contaminant concentrations have been compared to sediment quality guidelines. For assessment, the benchmark effects levels used to assess the potential effects to benthic species are the USEPA Region IV Sediment Screening Values (SSVs) and the FDEP Sediment Quality Assessment Guidelines (SQAGs).

SSVs

SSVs are based on contaminant concentration associated with a low probability of unacceptable risks to ecological receptors. The Office of Health Assessment has developed these for use at Region IV hazardous waste sites. Because these numbers are based on conservative endpoints and sensitive ecological effects data, SSVs represent a preliminary screening of site contaminant levels to determine whether further investigation is needed. Ecological screening values are not remediation levels. SSVs are derived from statistical interpretation of effects databases obtained from the literature as reported in publications from the State of Florida, the National Oceanic and Atmospheric Administration, and a joint publication by Long et al. (1995). These values are based on observations of direct toxicity when available.

SQAGs

The preliminary SQAGs developed by McDonald (1994), are guidelines for evaluating sediment contamination in coastal ecosystems. Defining the range of sediment contamination is a two-step process. First, detected parameters are compared to the threshold effects level (TEL), the upper limit of the range of sediment contaminant concentrations dominated by no effects data entries (i.e., a minimal effects range). Within this range, sediment concentrations are not considered to represent a hazard to aquatic organisms. Next, they are compared to the probable effects level (PEL), which defines the lower range of contaminant concentrations that are usually associated with adverse biological effects. The SQAGs do not address the potential for bioaccumulation of persistent toxic chemicals and potential adverse effects on higher trophic levels of the food web.

Contaminant Results and Effect Characteristics

The following paragraphs discuss the contaminants detected in sediment collected from the 141 sample locations along approximately 10 miles of shoreline as described in Section 5.0, Site Characteristics, above (Figure 5-1). Each contaminant is discussed by major contaminant type: metals, pesticide/PCBs, VOCs, and SVOCs. Of the metals, only one detection of silver exceeded the PEL. Of the organic constituents detected, one sample with DDT, two samples with lindane, and one sample with PAHs exceeded the PEL.

Arsenic

Arsenic was frequently detected across Site 42 (98 detections in 141 samples). Only ten locations exceeded the SSV and SQAG-TEL of 7.24 mg/kg (Table 6-1). No concentrations exceeded the SQAG-PEL. The detected range for arsenic was 0.12 to 22.3 parts per million (ppm).

Cadmium, Chromium, and Copper

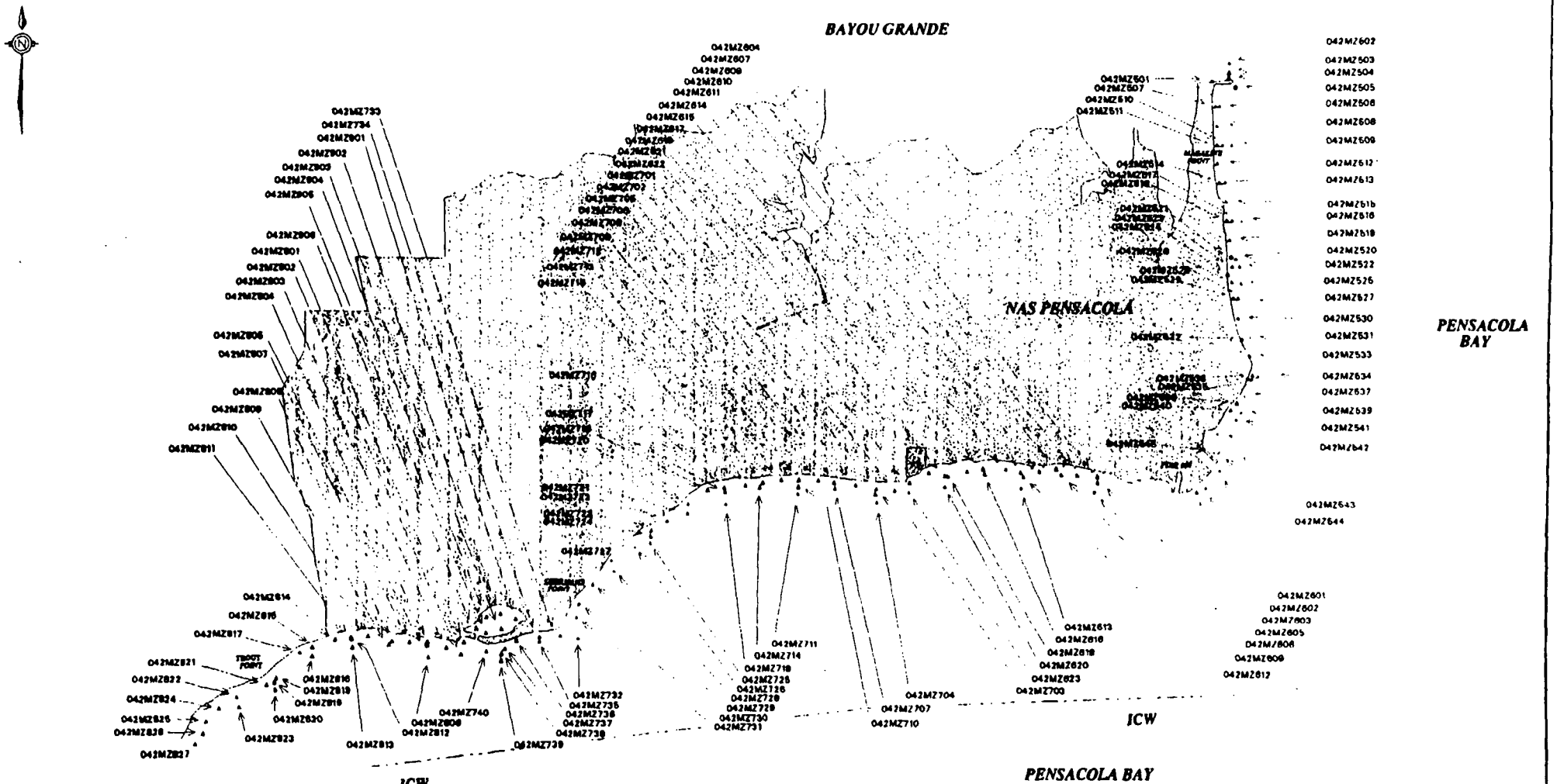
None of these metals exceeded the SQAG-PEL (See Table 6-1).

Mercury

The range of detected mercury was from 0.08 to 0.64 ppm. Only seven locations had mercury above the SQAG-TEL. This small population suggests a low risk to ecological receptors. No concentrations exceeded the FDEP SQAG PEL (see Table 6-1).

Silver

Silver was only detected at two locations; both exceeded the SQAG-TEL and SQAG-PEL. No other detections of silver were found. Their locations suggest a relationship to the IWTP, which has had a history of silver discharge. The limited extent alone (see Figure 6-1) suggests a low risk to ecological resources (See Table 6-1).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TROUT POINT
SEMINOLE POINT
FISHER AM
SCALE
0 feet
5000
COAST GUARD FACILITY
LEGEND
▲ NONDETECT (139)
DETECTED (0)
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (2)
SCREENING LEVEL = 0.733 ppm
SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 6-1
NATURE AND EXTENT
SILVER

Table 6-1
Site 42 Inorganics Exceeding Benchmark Levels

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
Arsenic (As)	042MZ543	16.3	7.24	7.24	41.6	2.3
	042MZ601	19.6				2.7
	042MZ603	8.8				1.2
	042MZ603	17.3				2.4
	042MZ616	12.0				1.7
	042MZ805	10.8				1.5
	042MZ807	10.8				1.5
	042MZ823	17.3				2.4
	042MZ826	22.0				3.0
	042MZ827	22.3				3.1
Cadmium	042MZ827	0.9	1.0	0.676	4.21	1.3
	042MZ901	0.92				1.4
Chromium	042MZ901	84.0	52.3	52.3	160	1.6
Copper	042MZ603	30.4	18.7	18.7	108	1.6
	042MZ901	18.9				1.0
Lead	042MZ603	43.9	30.2	30.2	112	1.4
Mercury	042MZ543	0.17	0.13	0.13	0.696	1.3
	042MZ601	0.64				4.9
	042MZ611	0.14				1.1
	042MZ816	0.14				1.1
	042MZ903	0.13				1.0
	042MZ906	0.17				1.3

Table 6-1
Site 42 Inorganics Exceeding Benchmark Levels

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
Silver	042MZ505	3.6	2.0	0.733	1.77	4.9
	042MZ521	14.8				20.2

Notes:
SSV = USEPA Region 4 Sediment Screening Value
SQAG = Florida Department of Environmental Protection — Sediment Quality Assessment Guideline
TEL = Threshold Effects Level
PEL = Probable Effects Level
HQ = Hazard Quotient; Concentration/Effects Level.

Dieldrin

Dieldrin exceeded its SQAG-TEL of 0.715 μg/kg at only one location (see Table 6-2) and it did not exceed the SQAG-PEL or the SSV.

4,4'- DDT

For Site 42, three locations exceeded the SQAG-TEL of 1.19 μg/kg (Table 6-2 and Figure 6-2).

Gamma-BHC (Lindane)

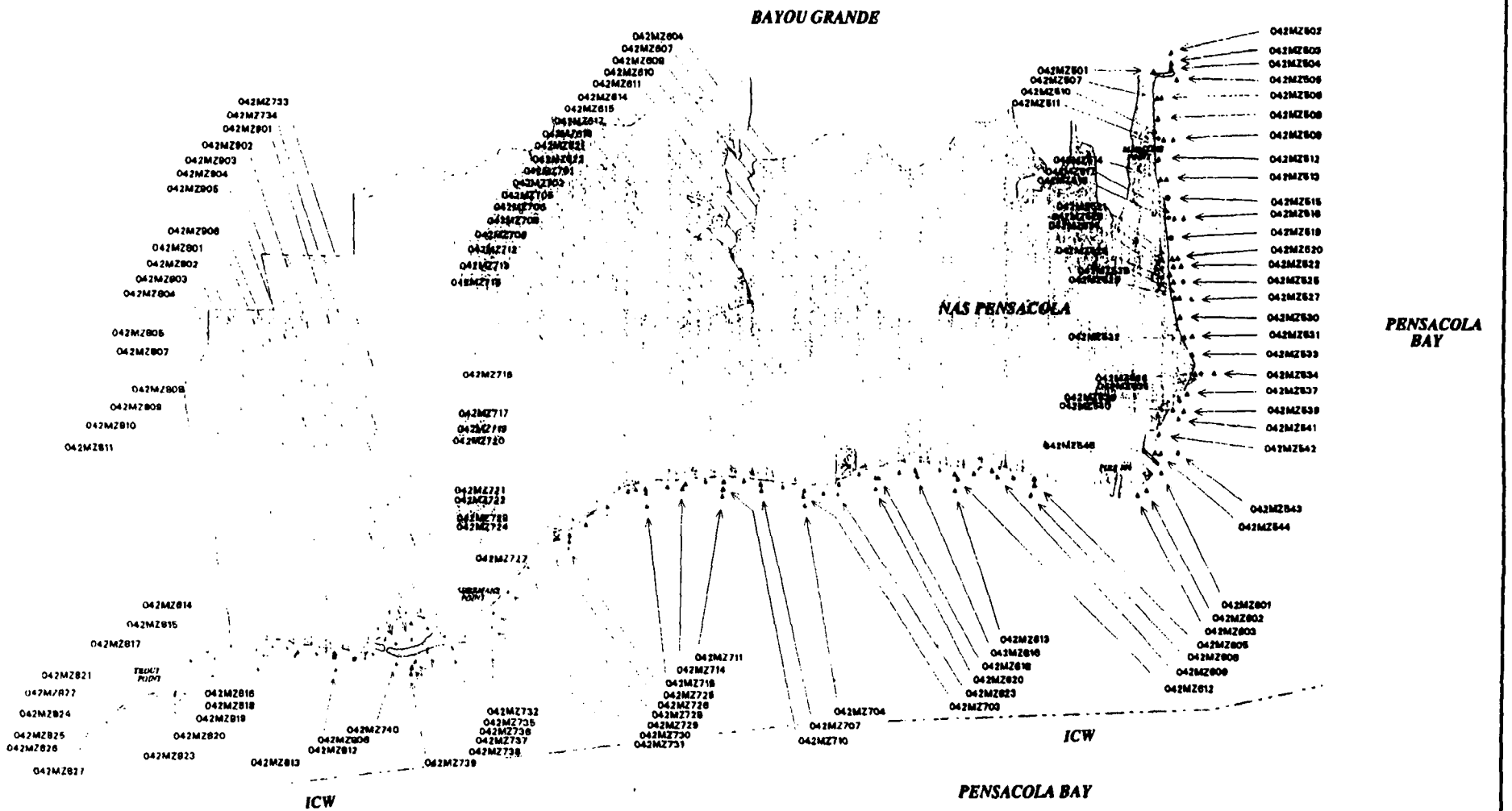
Lindane was detected above screening levels at 12 of the 141 locations in Site 42 (see Table 6-2 and Figure 6-3).

Aroclor-1254

Aroclor-1254 was detected at 16 locations across the site. Of these, only two exceeded the TEL and none exceeded the PEL (see Table 6-2). The limited distribution suggests limited risk to ecological receptors.

Polycyclic Aromatic Hydrocarbons

Most SVOCs detected were PAHs, a general term applied to a group of compounds with two or more benzene rings. They occur in the environment as a result of the incomplete combustion of hydrocarbons, major constituents of petroleum and its derivatives. Oil spills and refinery effluents are major sources of PAH contamination. In addition, storm water runoff from urban areas is known to contain PAHs. The PAH content in storm water suggests hydrocarbon fuels and asphalts associated with roadways as the source. During the sampling of Site 42, field crews observed "tar balls" in dredge samples from the ICW.



LEGEND

- ▲ NONDETECT (125)
- · DETECTED (13)
- ● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (3)

SCREENING LEVEL = 1.19 ppb

SCALE

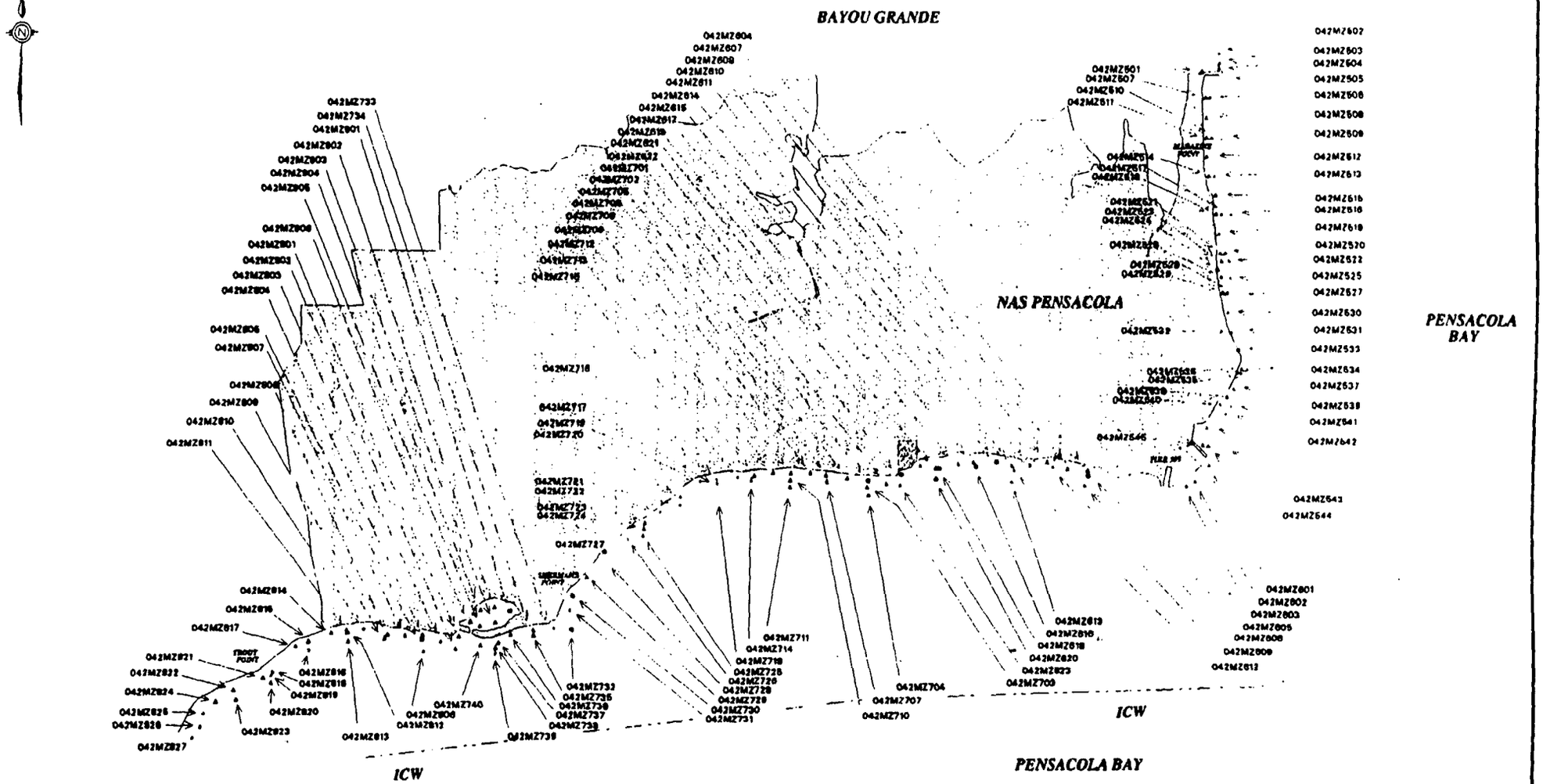
0 feet 5000

COAST GUARD FACILITY

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-2

NATURE AND EXTENT
4,4-DDT



LEGEND

- ▲ NONDETECT (112)
- • DETECTED (17)
- ● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (12)

SCREENING LEVEL = 0.32 ppb

COAST GUARD FACILITY

SCALE

0 feet 5000

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-3

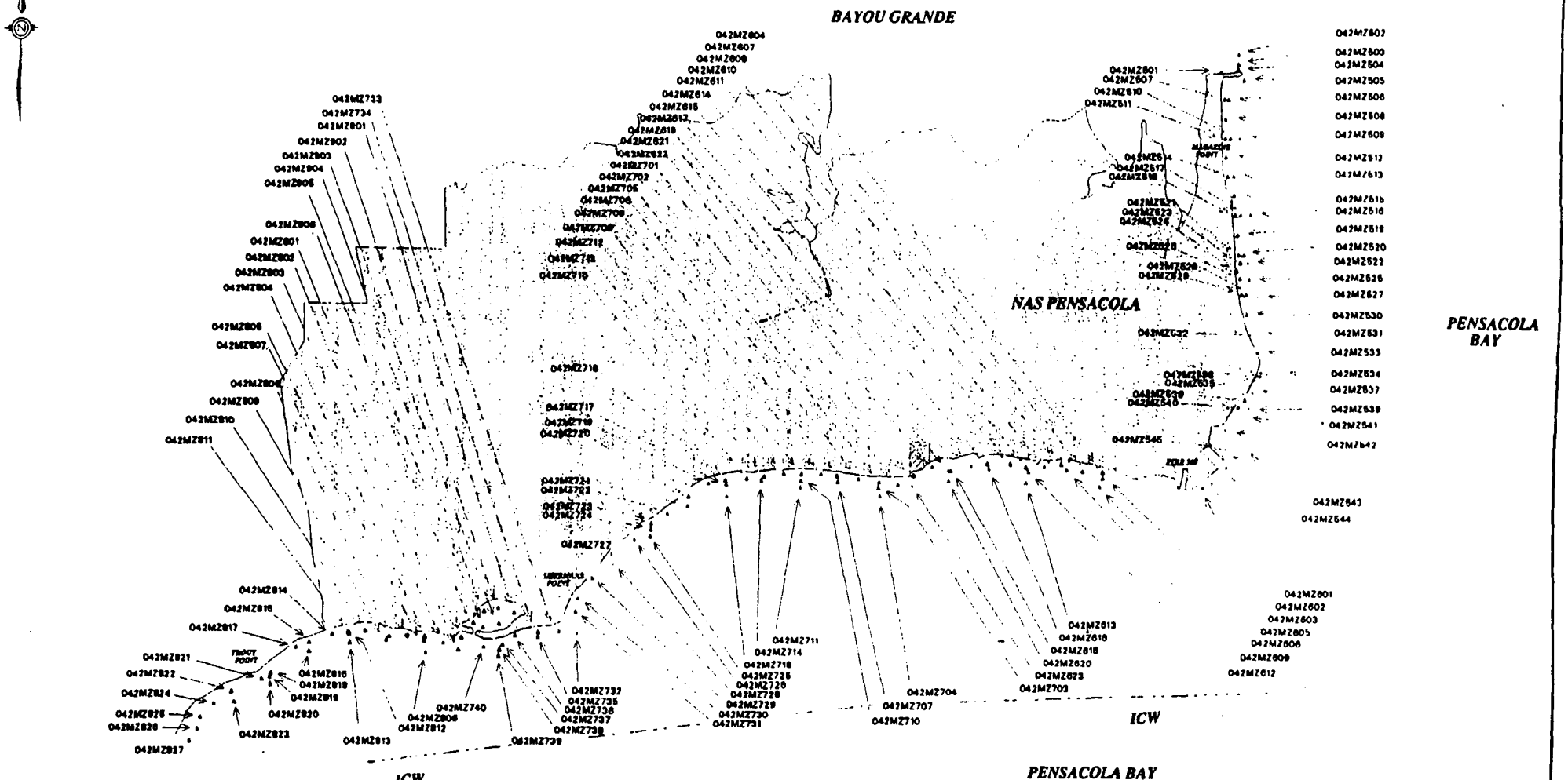
NATURE AND EXTENT
GAMMA-BHC (LINDANE)

Table 6-2
Site 42 Pesticide/PCB Concentrations Exceeding Benchmark Levels

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
4,4'-DDT	042MZ515	6.0	3.3	1.19	4.77	5.0
	042MZ519	1.6				1.3
	042MZ803	1.2				1.0
Aroclor-1254	042MZ515	26.0	33[1]	21.6[1]	189[1]	1.2
	042MZ519	23.0				1.1
Dieldrin	042MZ519	0.78	3.3	0.715	4.3	1.1
gamma-BHC (Lindane)	042MZ605	1.3	3.3	0.32	0.99	3.8
	042MZ614	0.4				1.3
	042MZ616	0.85				2.7
	042MZ618	0.85				2.7
	042MZ619	0.48				1.5
	042MZ620	1.2				3.8
	042MZ622	0.52				1.6
	042MZ702	0.46				1.4
	042MZ727	0.41				1.3
	042MZ730	0.4				1.2
	042MZ732	0.47				1.5
	042MZ901	0.32				1.0

Notes:
SSV = USEPA Region 4 Sediment Screening Value
SQAG = Florida Department of Environmental Protection — Sediment Quality Assessment Guideline
TEL = Threshold Effects Level
PEL = Probable Effects Level
1 = Represents effects level for total PCBs.
HQ = Hazard Quotient; Concentration/Effects Level.

PAHs were detected at most of the locations sampled within Site 42, but they only exceeded the total PAH (tPAH) SSV and TEL of 1,684 μg/kg at two of these. Fluoranthene exceeded its screening level at 11 of the 141 sampling locations. All other individual compounds exceeded their respective screening concentrations at fewer locations. Concentrations for locations where screening concentrations were exceeded are listed in Table 6-3 and depicted in Figures 6-4 through 6-12.



SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

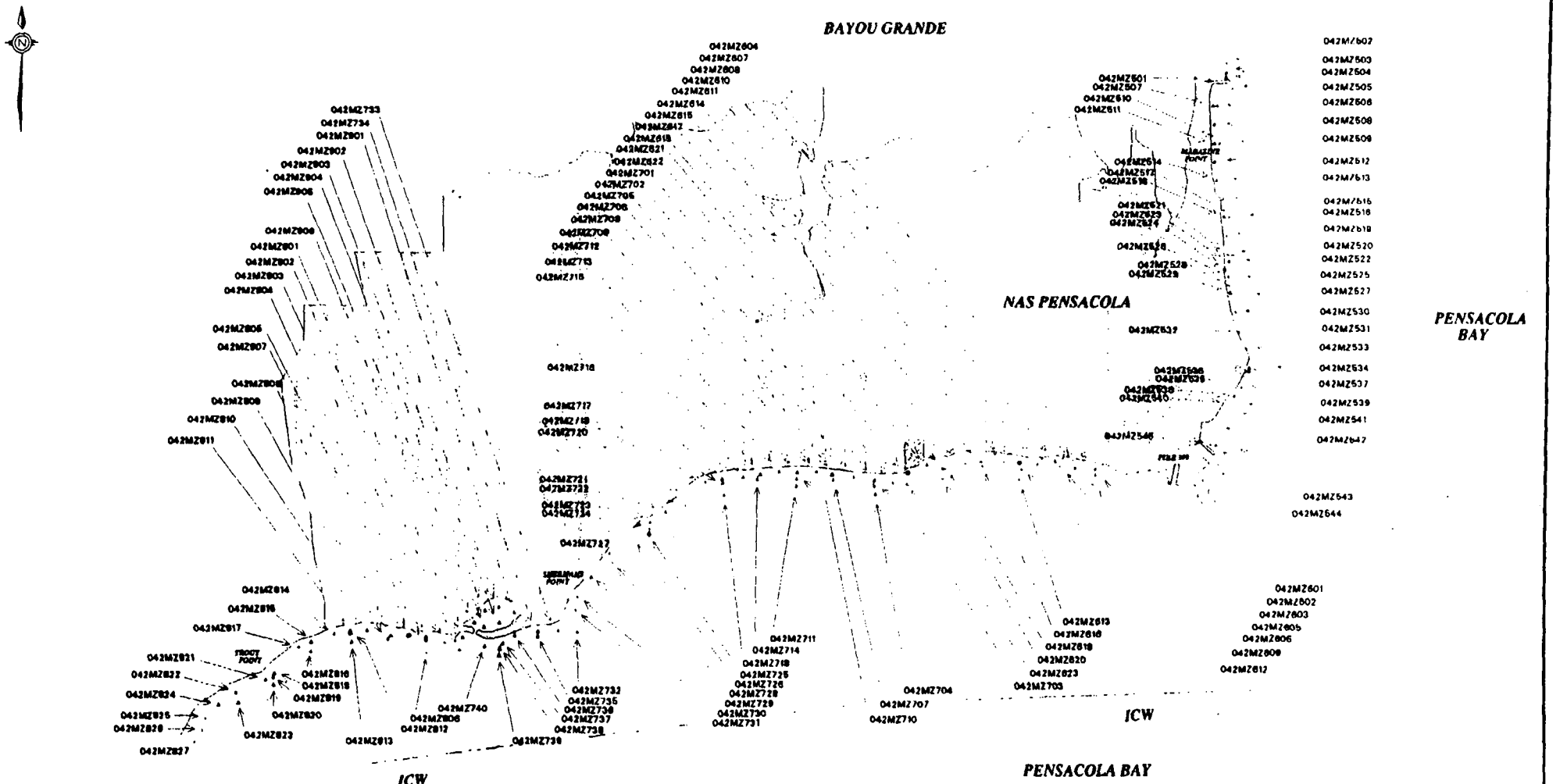
- ▲ NONDETECT (139)
- DETECTED (0)
- ● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (2)

SCREENING LEVEL = 5.87 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-4

NATURE AND EXTENT
ACENAPHTHYLENE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042MZ818
042MZ819
042MZ820
042MZ821
042MZ822
042MZ823
042MZ824
042MZ825
042MZ826
042MZ827
042MZ806
042MZ812
042MZ813
042MZ711
042MZ714
042MZ718
042MZ725
042MZ726
042MZ728
042MZ729
042MZ730
042MZ731
042MZ704
042MZ707
042MZ710
042MZ501
042MZ507
042MZ510
042MZ511
042MZ514
042MZ517
042MZ519
042MZ521
042MZ523
042MZ524
042MZ526
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042MZ606
042MZ608
042MZ609
042MZ612
042MZ613
042MZ615
042MZ616
042MZ618
042MZ620
042MZ623
042MZ703
042MZ601
042MZ602
042MZ603
042MZ605
042MZ606
042MZ609
042MZ612
042MZ613
042MZ616
042MZ618
042MZ620
042MZ623
042MZ703
042MZ502
042MZ503
042MZ504
042MZ505
042MZ506
042MZ508
042MZ509
042MZ512
042MZ513
042MZ515
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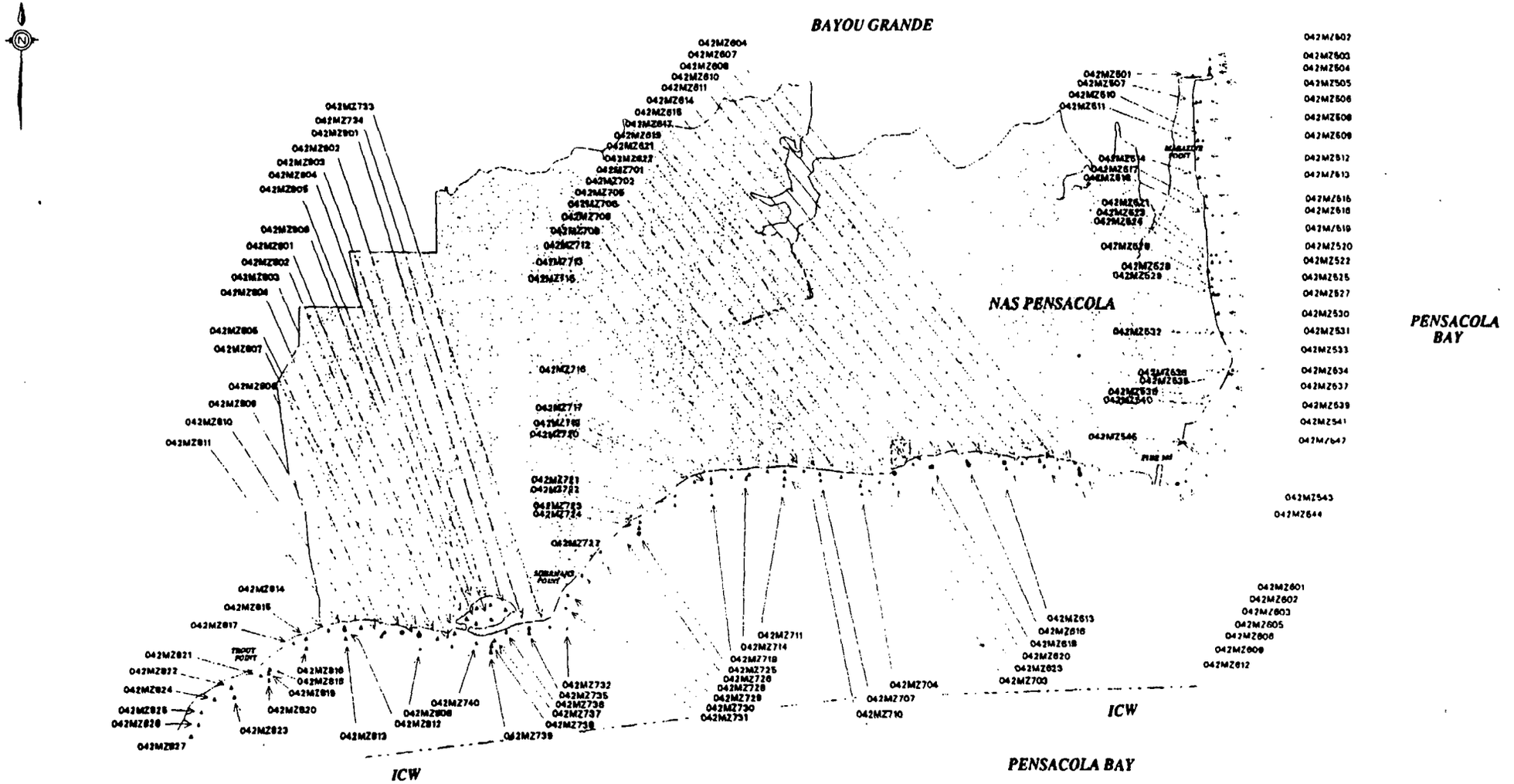
042MZ522
042MZ525
042MZ527
042MZ530
042MZ531
042MZ533
042MZ534
042MZ537
042MZ539
042MZ541
042MZ542
042MZ543
042MZ544
FROST POINT
SHELLMAN POINT
PENSACOLA BAY
SCALE
0 feet
5000
COAST GUARD FACILITY
LEGEND
▲ NONDETECT (137)
DETECTED (0)
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (4)
SCREENING LEVEL = 46.9 ppb
SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 6-5
NATURE AND EXTENT
ANTHRACENE



LEGEND

- ▲ NONDETECT (123)
- DETECTED (9)
- ● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (9)

SCREENING LEVEL = 74.8 ppb

SCALE

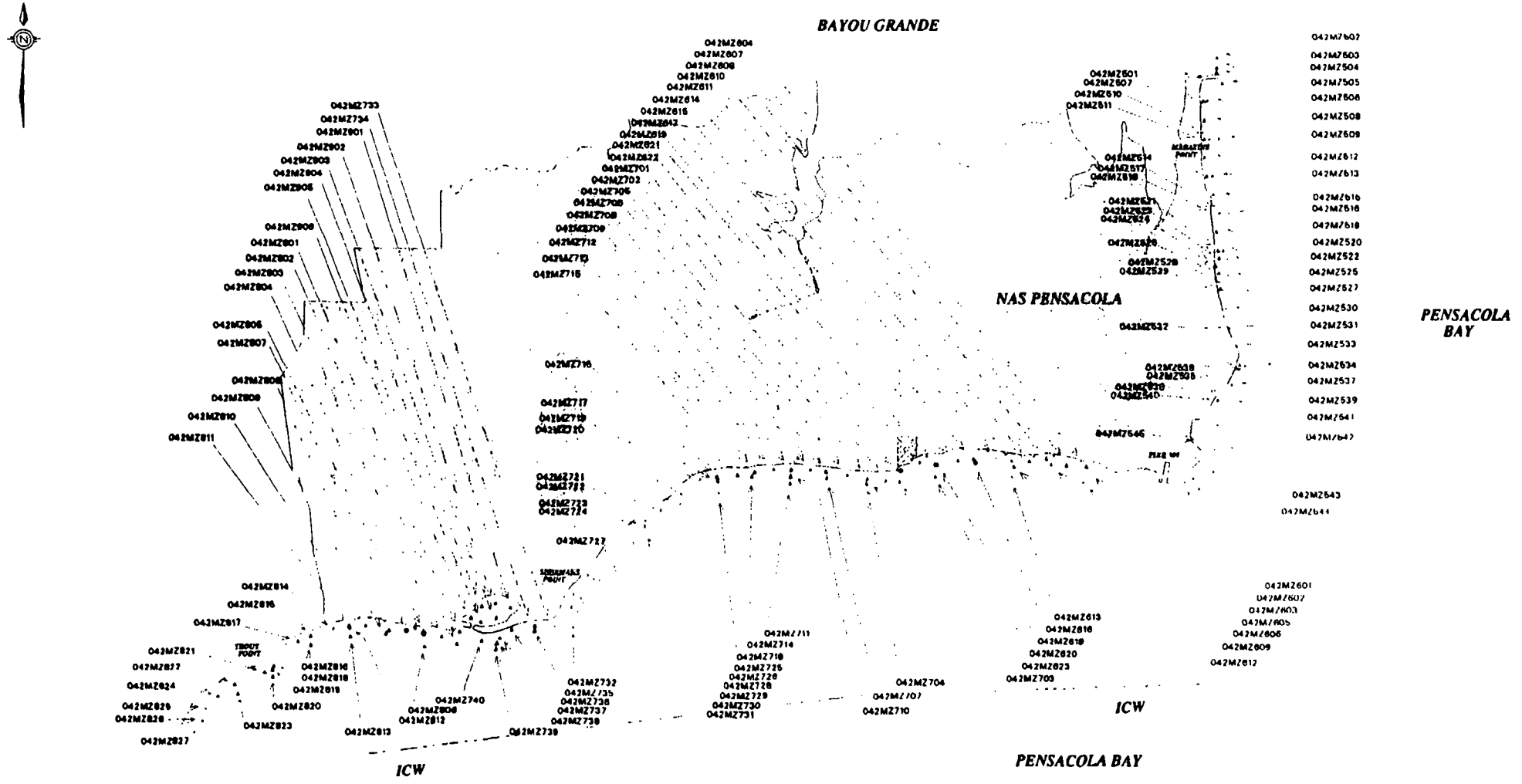
0 1 mi 6000

COAST GUARD FACILITY

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-6

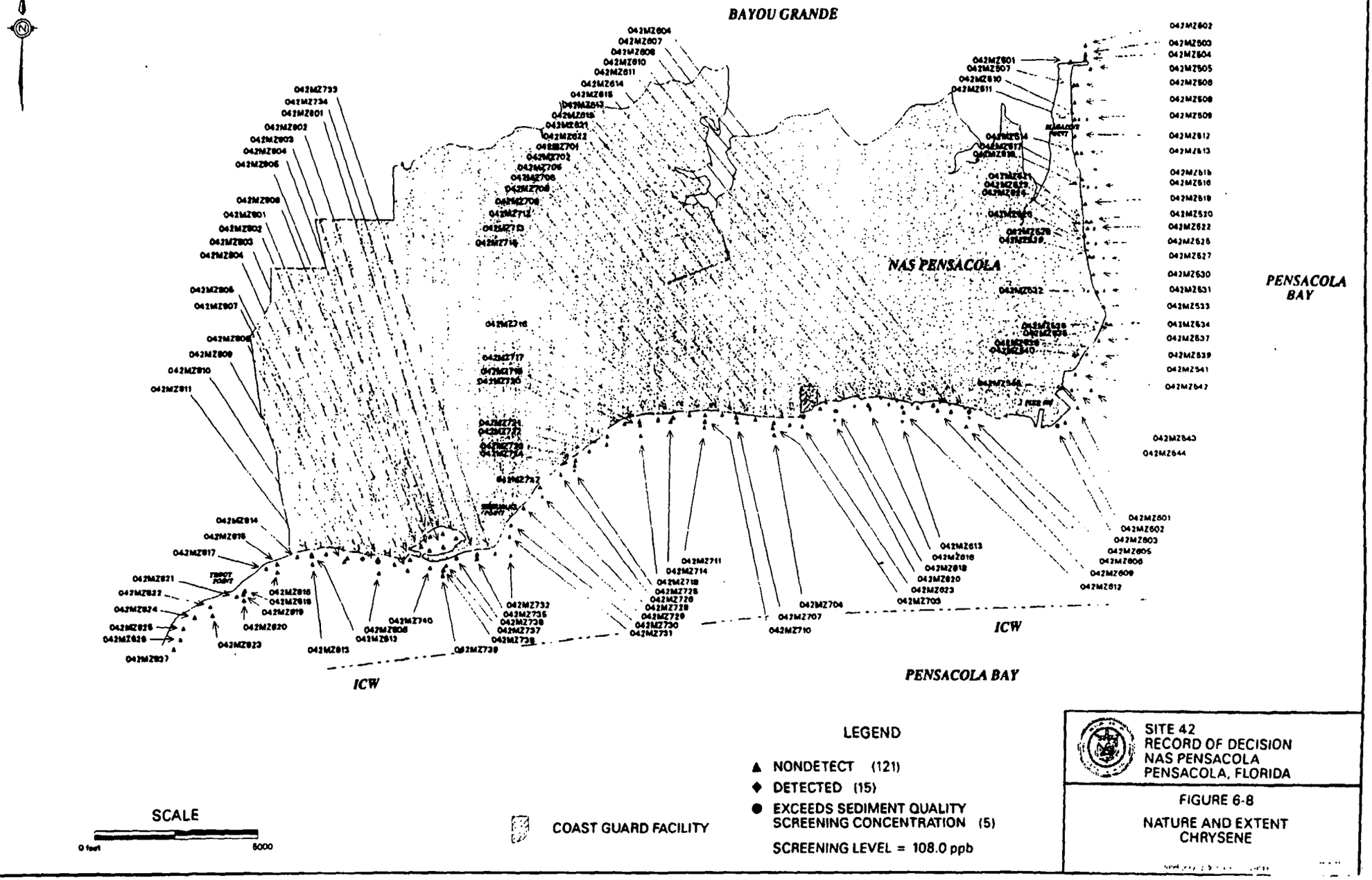
NATURE AND EXTENT
BENZO(A)ANTHRACENE



SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-7

NATURE AND EXTENT
BENZO(A)PYRENE


BAYOU GRANDE
NAS PENSACOLA
PENSACOLA BAY
ICW
ICW
PENSACOLA BAY
042MZ604
042MZ607
042MZ608
042MZ610
042MZ611
042MZ614
042MZ615
042MZ733
042MZ734
042MZ801
042MZ802
042MZ803
042MZ804
042MZ805
042MZ808
042MZ801
042MZ802
042MZ803
042MZ804
042MZ806
042MZ807
042MZ808
042MZ809
042MZ810
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042MZ821
042MZ822
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042MZ825
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042MZ827
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042MZ819
042MZ818
042MZ813
042MZ740
042MZ808
042MZ739
042MZ732
042MZ735
042MZ738
042MZ737
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042MZ809
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042MZ620
042MZ619
042MZ616
042MZ615
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042MZ604
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042MZ624
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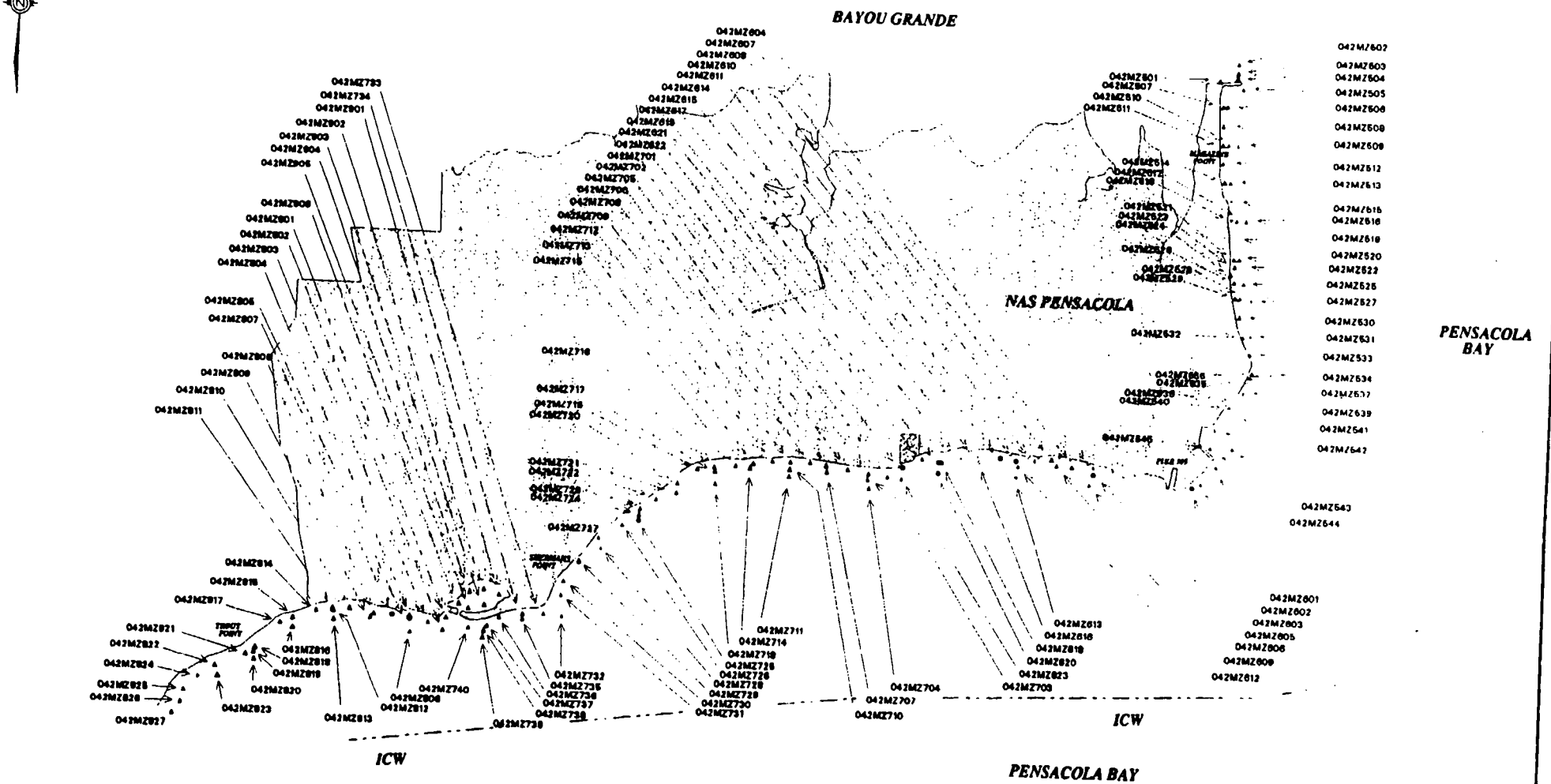
042MZ716
042MZ717
042MZ719
042MZ720
042MZ721
042MZ722
042MZ724
042MZ727
042MZ716
042MZ713
042MZ712
042MZ708
042MZ709
042MZ706
042MZ705
042MZ702
042MZ701
042MZ615
042MZ614
042MZ611
042MZ610
042MZ607
042MZ604
SCALE
0 feet
5000
COAST GUARD FACILITY
LEGEND
▲ NONDETECT (121)
◆ DETECTED (15)
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (5)
SCREENING LEVEL = 108.0 ppb
SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 6-8
NATURE AND EXTENT
CHRYSENE



SCALE

0 feet 8000

COAST GUARD FACILITY

LEGEND

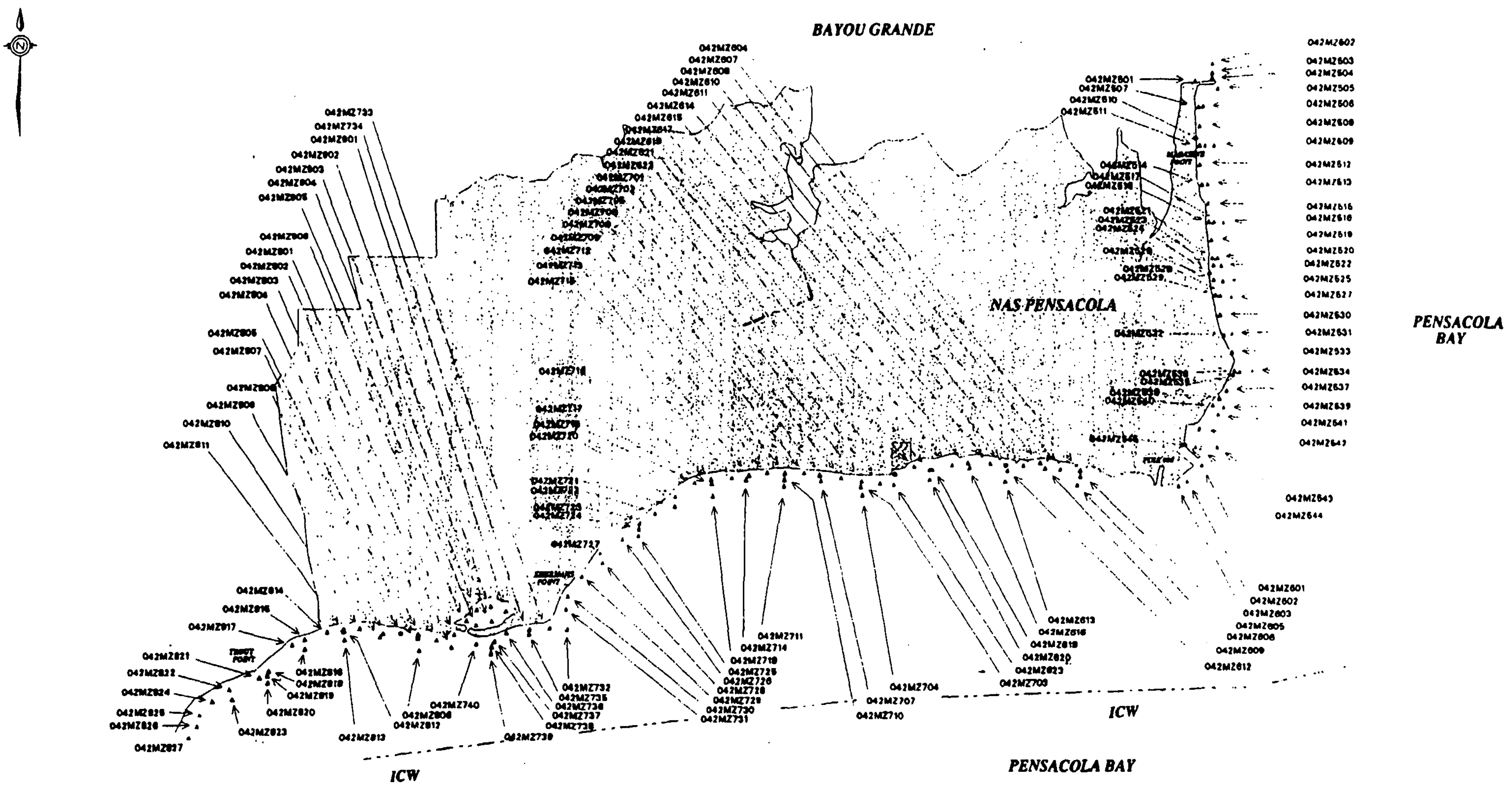
- ▲ NONDETECT (116)
- ◆ DETECTED (14)
- ● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (11)

SCREENING LEVEL = 113.0 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-9

NATURE AND EXTENT
FLUORANTHENE



SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

▲ NONDETECT (138)

◆ DETECTED (0)

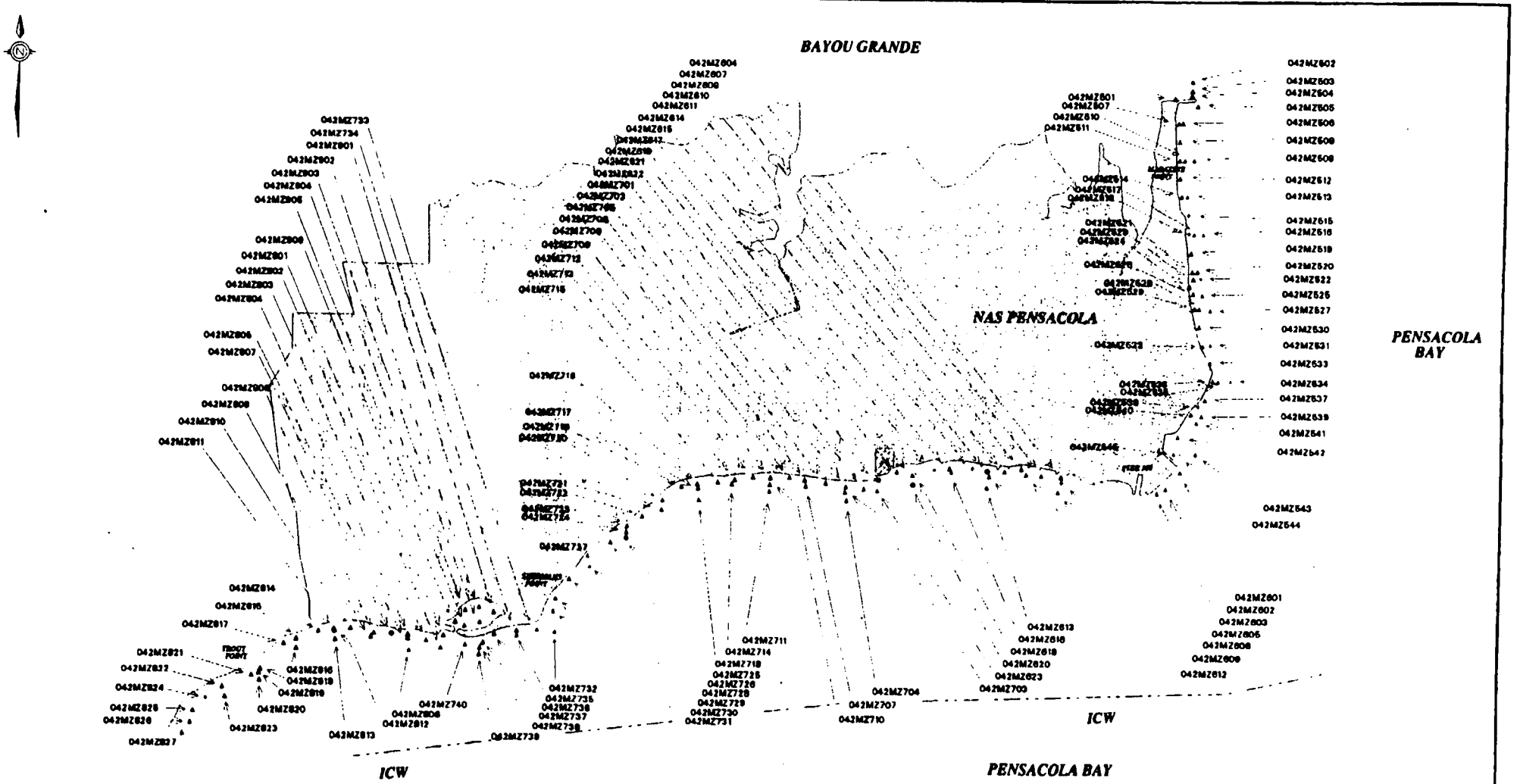
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (3)

SCREENING LEVEL = 21.2 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-10

NATURE AND EXTENT
FLUORENE



SCALE

0 feet 6000

COAST GUARD FACILITY

LEGEND

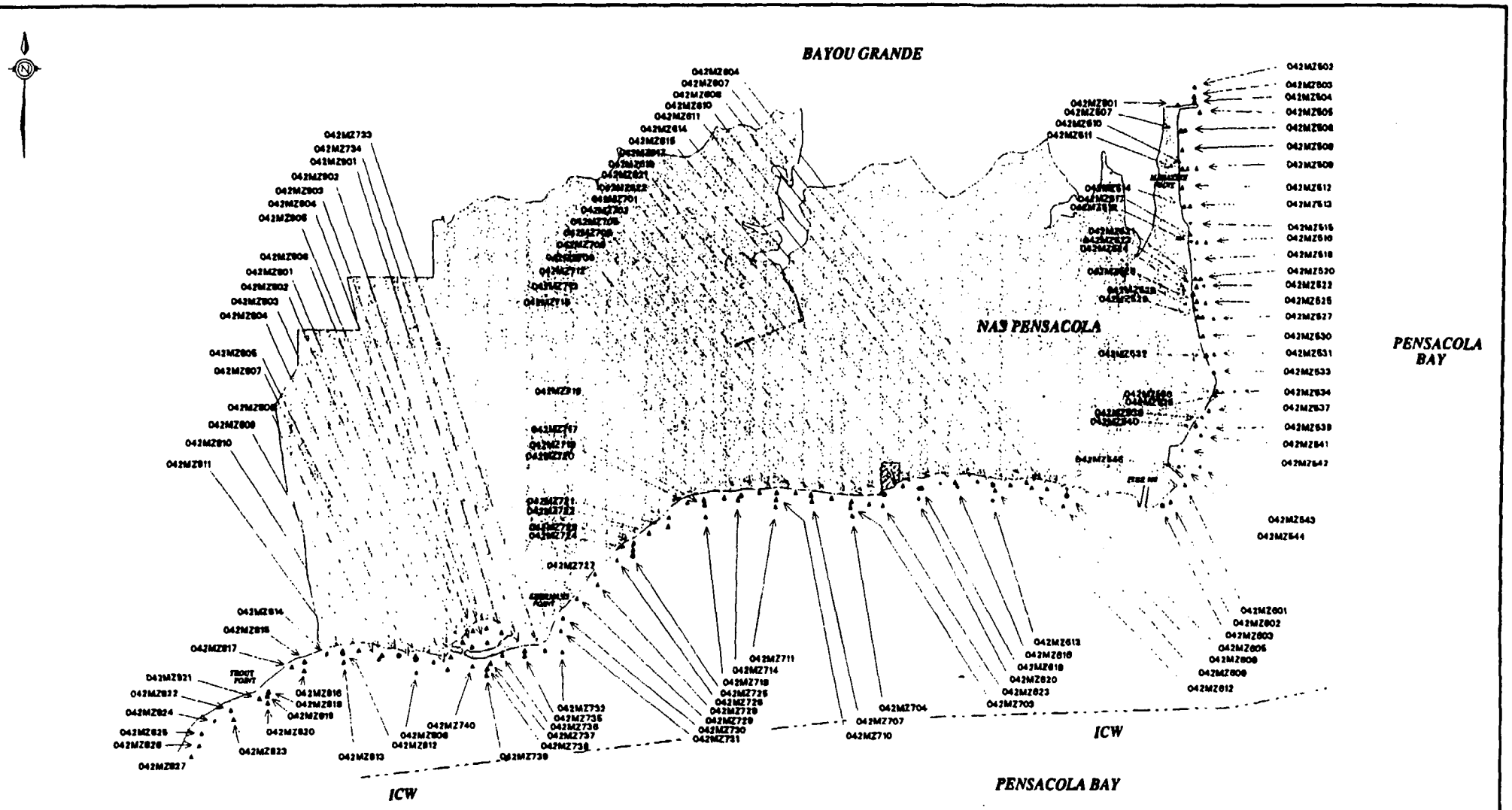
- ▲ NONDETECT (125)
- ◆ DETECTED (11)
- ● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (5)

SCREENING LEVEL = 86.7 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-11

NATURE AND EXTENT
PHENANTHRENE


BAYOU GRANDE
NAS PENSACOLA
PENSACOLA BAY
ICW
ICW
PENSACOLA BAY
FERRY POINT
FERRY POINT
042MZ733
042MZ734
042MZ901
042MZ902
042MZ903
042MZ904
042MZ905
042MZ906
042MZ907
042MZ908
042MZ909
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042MZ616
042MZ618
042MZ620
042MZ623
042MZ703
042MZ601
042MZ602
042MZ603
042MZ605
042MZ606
042MZ608
042MZ609
042MZ612
SCALE
0 feet
5000
COAST GUARD FACILITY
LEGEND
▲ NONDETECT (118)
◆ DETECTED (15)
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (8)
SCREENING LEVEL = 153.0 ppb
SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 6-12
NATURE AND EXTENT
PYRENE

Table 6-3
SVOC Concentrations Exceeding Screening Criteria

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
Acenaphthylene	042MZ622	28	330	5.87	128	4.8
	042MZ807	92				15.7
Anthracene	042MZ611	52	330	46.9	245	1.1
	042MZ622	130				2.8
	042MZ725	51				1.1
	042MZ807	650				13.9
Benzo(a)anthracene	042MZ603	130	330	74.8	693	1.7
	042MZ605	95				1.3
	042MZ611	85				1.1
	042MZ616	89				1.2
	042MZ618	84				1.1
	042MZ622	310				4.1
	042MZ725	80				1.1
	042MZ805	120				1.6
	042MZ807	1,800				24.0
Benzo(a)pyrene	042MZ616	110	330	88.8	763	1.2
	042MZ619	140				1.6
	042MZ622	330				3.7
	042MZ805	140				1.6
	042MZ807	1,100				12.4
Chrysene	042MZ603	160	330	108	846	1.5
	042MZ604	120				1.1
	042MZ622	520				4.8
	042MZ805	240				2.2
	042MZ807	2,500				23.1
Fluoranthene	042MZ603	190	330	113	1494	1.7
	042MZ605	130				1.2
	042MZ611	220				1.9
	042MZ614	140				1.2
	042MZ618	150				1.3
	042MZ619	120				1.1
	042MZ620	120				1.1
	042MZ622	730				6.5
	042MZ725	210				1.9
	042MZ805	210				1.9
	042MZ807	2,600				23.0

Table 6-3
SVOC Concentrations Exceeding Screening Criteria

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
Fluorene	042MZ611	31	330	21.2	144	1.5
	042MZ622	46				2.2
	042MZ807	63				3.0
Naphthalene	042MZ901	41	330	34.6	391	1.2
Phenanthrene	042MZ611	260	330	86.7	544	3.0
	042MZ620	98				1.1
	042MZ622	410				4.7
	042MZ725	95				1.1
	042MZ807	260				3.0
Pyrene	042MZ603	200	330	153	1398	1.3
	042MZ605	160				1.0
	042MZ611	160				1.0
	042MZ618	160				1.0
	042MZ622	680				4.4
	042MZ725	190				1.2
	042MZ805	230				1.5
	042MZ807	2,300				15.0
total PAHs	042MZ622	3,184	1,684	1,684	16,770	1.9
	042MZ807	11,365				6.7
bis(2-ethylhexyl)phthalate	042MZ622	1,100	182	182	2647	6.0
	042MZ718	1,400				7.7

Notes:
SSV = USEPA Region 4 Sediment Screening Value
SQAG = Florida Department of Environmental Protection — Sediment Quality Assessment Guideline
TEL = Threshold Effects Level
PEL = Probable Effects Level
HQ = Hazard Quotient; Concentration/Effects Level.

Phthalate Esters

Bis(2-ethylhexyl)phthalate (BEHP) exceeded the SSV and TEL of 182 μg/kg at two locations (see Table 6-3). No obvious source for this organic constituent was identified for either location. Because of the frequent use in vacuum pumps and plastics in the laboratory, BEHP is considered a common laboratory contaminant. However, these concentrations were not rejected during data validation for BEHP.

Volatile Organic Compounds

No sediment screening values are present for VOCs. Detected concentrations are presented in Section 5. The limited distribution and low values detected suggest a limited risk to ecological receptors. VOCs are extremely mobile. At the concentrations observed, the VOCs would be solutes in seawater or the sediment interstitial fluids.

6.1.3 Preliminary Exposure Estimate

The use of screening values for comparison of observed contaminant concentrations necessitates an assumption that benthic associated fauna will use the area surrounding a sample location exclusively for feeding and other life requisites. Also, this screening approach assumes that 100% of the contaminant concentration found will be bioavailable to those benthic organisms found at at the location. By applying both of these assumptions in the screening assessment, a very conservative estimate of a chemical's potential effects is made.

6.1.4 Preliminary Risk Calculation

Based on the exposure estimate (100% of contaminant concentration) for benthic infauna associated with the sample location, and by applying the most conservative effects benchmark, a hazard quotient can be determined for each sampling location (see Tables 6-1 through 6-3). The hazard quotient method compares the estimated exposure concentrations to the measured or

predicted threshold value for effect. Equation 1 presents the calculation method with explanation of the variables used.

Equation 1 Hazard Quotient (HQ) = $\frac{\text{Sediment Concentration}}{\text{SQAG Threshold Effect Level}}$

An HQ of more than 1 is interpreted as a level at which there is a potential for adverse ecological effects. An HQ of less than 1 does not indicate a lack of risk, but should be interpreted based on the severity of the effect reported and the magnitude of the calculated quotient.

For Site 42, HQs were determined only for those contaminants exceeding the SQAG-TEL. Thus, all quotients for the locations presented will exceed 1 and those locations not presented in the table will be below 1. The following paragraphs discuss exceedances and spatial relevance, along with an interpretation of the number of exceedances relative to the sample size.

Metals

HQs for arsenic, cadmium, chromium, copper, lead, and mercury were all less than 5 (see Table 6-1). Anthropogenic input of metals into sediments near NAS Pensacola has occurred, but specific sources of these metals are difficult to determine. The limited distribution of exceedances and the low HQ values suggest a low risk to ecological receptors.

Of the two screening level exceedances for silver, one had a HQ of 20.2. The proximity of the elevated silver concentrations detected suggests the IWTP is the source. The limited extent suggests a low risk to ecological resources.

Pesticides/PCBs

For the three pesticides and one PCB detections listed in Table 6-2, all HQs were 5 or less, and most were less than 2. Only 15 of the 141 locations sampled had pesticide/PCB concentrations

above screening values and no spatial pattern was evident. Based on the limited distribution and HQ values less than 5, risk to ecological receptors is low.

PAHs

Results for 10 PAH compounds were compared to screening values and values for total PAHs (tPAH). Except for two locations, the HQs for all compounds did not exceed 3. For tPAHs, these same two locations were the only ones with concentrations above the tPAH screening value of 1,684 μg/kg. This suggests the U.S. Coast Guard Station and the barge fueling pier are sources of petroleum-related PAHs. The barge fueling pier will be investigated under the auspices of the Florida petroleum program. Both facilities are permanent; it is expected operations will continue in the future. These concentrations suggest moderate risk to ecological receptors in these areas.

BEHP

The HQs for two locations exceeding the screening value were 6 and 7.7. With only two of 141 locations exhibiting elevated concentrations, it is predicted risk to ecological receptors is limited.

6.1.5 Uncertainties

All sampling programs may produce unavoidable variations to the design. Below are uncertainties related to field conditions, laboratory procedures, or other circumstances are likely to have influenced the investigation and risk assessment.

- Analytical matrix interferences due to excess organic material in sediment. Sampling in the grass beds near Trout Point required sampling roots and other benthic organisms with the sediment sample.

- The lack of criteria or screening values for some chemicals increases the uncertainty for screening level assessments.

- The hazard quotient approach lacks the consideration for natural metal concentrations, and sediment grain-size and TOC effects as they relate to bioavailability. HQs calculated using EPA's guidance are typically more conservative than field exposure scenarios indicate. For example, at Site 2, Near-Shore Sediments in Pensacola Bay, no distinguishable changes in benthic assemblages were distinguishable below an HQ of 10.0.

- The dynamic nature of a marine ecosystem provides natural variability not considered in receptor exposure scenarios.

6.1.6 Ecological Risk Summary

Sediment chemistry results show concentrations for arsenic, cadmium, chromium, copper, lead, mercury, and silver are above TELs. Only one sample of silver exceeded a PEL. Hazard quotients calculated for these metals did not show any significant potential risk to receptors. The limited detections and distribution suggest a limited risk to ecological receptors.

PAHs appear to be the most significant organic contaminants found at the site. PAHs at Site 42 area are attributable to past practices, but recent oil spills and asphalt road runoff may have also contributed to sediment loads. Samples taken near the barge loading dock and the Coast Guard Station represent all the detections for PAHs exceeding the PEL. This suggests that sediments near these sample locations are of moderate risk to ecological receptors. Both of these facilities are permanent and it is expected that operations will continue in the future. The barge loading dock will be investigated under the auspices of the Florida petroleum program. Pesticides, PCBs, and phthalate esters were detected in a limited number of samples and did not exceed a PEL. The

limited distribution and detections suggest a low risk to ecological receptors; therefore, additional phases of investigation were not performed.

6.1.7 Conclusions

Apparent anthropogenic effects on sediment quality at Site 42 was detected during the RI. Contaminant classes included metals, pesticides and PCBs, PAHs, and phthalates. Although calculated hazard quotients within each class of contaminants exceeded unity (suggesting a potential risk), the calculated HQs were generally low (less than 10) and the areal distribution of the contaminant was generally limited. These factors combine to suggest the detected contamination presents a low risk to ecological resources at Site 42.

One noted exception to this is the PAH contamination at the barge fueling pier. This contamination will be addressed under the auspices of Florida's petroleum program.

6.2 Human Health Exposure Assessment

This assessment examines the potential for excess human exposure to the contaminants detected at Site 42.

Current Use

NAS Pensacola Site 42, near the industrial portion of the base, is currently limited to boating activities. Human contact with site media will occur only due to activities associated with the Rescue Training School (short duration swimming), and a public beach at Mustin Beach, west of the Coast Guard Station. Otherwise, swimming is not authorized anywhere else within Site 42.

Exposure Scenarios

Exposure to media at Site 42 appears to be limited. Rescue Training activities involve training students in the bay for a single class. This exposure is to the surface water only and does not

constitute a significant route and thus no surface water samples were collected during the RI. Contact with media near the developed portion of the base is limited by security, sediment depth, and reduced adsorption of sediment to skin. Table 6-4 lists the common scenarios for exposure routes. Mustin Beach samples had lower concentrations of contaminants than samples from other areas, due to the strong surf and tidal currents in this area of Site 42.

Swimming

Except for the activities of the rescue swimming school and Mustin Beach, swimming is not allowed at Site 42. The site is monitored by the U.S. Navy and Coast Guard. The Navy monitors the seawall and quay, while the U.S. Coast Guard monitors boating traffic near the ICW. Therefore, frequent human exposure to site sediments is not possible. Occasional trespassing is possible, although trespassers would likely be arrested. Prudent individuals also would not risk the physical hazards associated with swimming in the swift currents of the shipping channel.

Sediment

In addition to the security patrolling Site 42 and the surrounding area, other issues limit human exposure to Site 42 media. Many samples were collected during the RI that would be deeper than most swimmers could reach without diving equipment. If direct exposure were possible, sediment near the shipping channel would be expected to contain chemicals of concern. However, direct, frequent exposure to sediment is unrealistic because sediment is submerged year round. In addition, sediment would wash off of skin rather than adsorbing, as is assumed for soil exposure. Sediment is submerged year round.

Table 6-4
Summary Justification for Eliminating Human Exposure Pathways — Site 42
NAS Pensacola
Pensacola, Florida

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation	Reason for Selection or Exclusion
Current and Future Site Users	Air — Inhalation of gaseous contaminants emanating from soil	No	Site 42 contains no soil. No VOC concentrations were reported in sediment exceeding their corresponding soil risk based concentrations (RBCs).
	Air — Inhalation of chemicals entrained in fugitive dust	No	Site 42 contains no soil. Site 42 sediment is submerged year-round. Consequently, assessing sediment exposure as if it were soil would not be appropriate. This exposure pathway was eliminated in accordance with USEPA Region IV's Supplemental Guidance to RAGS *Bulletin 3, Exposure Assessment.*
	Groundwater — Ingestion of contaminants during potable or general use	No	Groundwater is below the aquitard in Pensacola Bay.
	Groundwater — Inhalation of volatilized groundwater contaminants	No	Groundwater is below the aquitard in Pensacola Bay.
	Surface water — Ingestion of contaminants during swimming	No	Swimming is allowed only at Mustin Beach. Surface water was not considered to be a possible source of contaminants. Consequently, this medium was not analyzed.
	Surface water — Inhalation of volatilized groundwater contaminants	No	Swimming is allowed only at Mustin Beach. Surface water was not considered to be a possible source of contaminants. Consequently, this medium was not analyzed.
	Soil — Incidental ingestion	No	Site 42 contains no soil.
	Soil — Dermal contact	No	Site 42 contains no soil.
	Sediment — Incidental ingestion	No	Swimming is allowed only at Mustin Beach. Site 42 sediment is submerged year-round. Consequently, assessing sediment exposure as if it were soil would not be appropriate. This exposure pathway was eliminated in accordance with USEPA Region IV's Supplemental Guidance to RAGS *Bulletin 3, Exposure Assessment.*

Table 6-4
Summary Justification for Eliminating Human Exposure Pathways — Site 42
NAS Pensacola
Pensacola, Florida

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation	Reason for Selection or Exclusion
	Sediment — Dermal contact	No	Swimming is allowed only at Mustin Beach. Site 42 sediment is submerged year-round. Consequently, assessing sediment exposure as if it were soil would not be appropriate. This exposure pathway was eliminated in accordance with USEPA Region IV's Supplemental Guidance to RAGS *Bulletin 3, Exposure Assessment.*
	Wild game or domestic animals — Ingestion of tissue impacted by media contamination	No	Fishing and crabbing do occur in this area. A study conducted at Site 2 (OU 13) concluded that there was no excess risk from consuming edible crab tissue.
	Fruits and vegetables — Ingestion of plant tissues grown in media	No	Site 42 contains no soil. Aquaculture is not a proposed land use and would not be expected to be a concern at this site, relative to direct exposure pathways considered. In addition, these activities would be prohibited in the ICW by the U.S. Coast Guard.

Surface Water

Surface water samples taken for Site 2 (OU 13) indicate trace amounts of PAHs, VOCs, and the usual metals associated with seawater. Only two compounds exceeded the federal or state criteria in surface water. Silver exceeded the criteria in 18 of the 21 samples. However, the detections may be the result of the natural salinity. The other chemical (2,4,6-trichlorophenol; 10 ppb) was detected and exceeded its criteria of 6.5 ppb in only one of the 21 samples, indicating it is not widespread. Exposure to surface water would be limited to swimming trespassers, due to the stringent security enforced by the U.S. Navy and Coast Guard. Pensacola Bay seawater is not potable because of the natural salinity.

Fishing and Crabbing

Fishing and crabbing are allowed and can be observed daily in Site 42. The most likely route of exposure for contaminants to humans is via fishing and crabbing. During the Site 2 RI, edible crab tissue was collected in Site 42 and Site 2. The study concluded that there is no excess risk from the consumption of edible crab tissue. The results of that study are summarized in Section 6.2.2, below.

Future Land Use

These submerged lands are owned by the State of Florida. Future land use at NAS Pensacola Site 42 will be limited to boating, and exposure will be limited by the physical factors discussed above.

6.2.1 Carcinogenicity and Noncancer Effects

The USEPA has established a classification system for rating the potential carcinogenicity of environmental contaminants based on the weight of scientific evidence. The cancer classes are described below. Cancer weight-of-evidence class "A" (human carcinogens) means that human toxicological data have shown a proven correlation between exposure and the onset of cancer (in varying forms). The "B1" classification indicates that some human exposure studies have implicated the compound as a probable carcinogen. Weight-of-evidence class "B2" indicates a possible human carcinogen, a description based on positive laboratory animal data (for carcinogenicity) in the absence of human data. Weight-of-evidence class "C" identifies possible human carcinogens, and class "D" indicates a compound not classifiable with respect to it carcinogenic potential. The USEPA has established slope factors (SF) for carcinogenic compounds as a "plausible upper-bound estimate of the probability of a response (cancer) per unit intake of a chemical over a lifetime."

In addition to potential carcinogenic effects, most substances can also produce systemic toxic responses at doses greater than experimentally derived threshold levels. For these substances, the USEPA has derived Reference Dose (RfD) values. A chronic RfD is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime." These toxicological values are used in risk formulae to assess the upper-bound level of cancer risk and noncancer hazard associated with exposure to a given contamination concentrations.

For carcinogens, the potential risk posed by a chemical is computed by multiplying the chronic daily intake (CDI, as mg/kg-day) by the SF (in reciprocal mg/kg-day). The hazard quotient (for noncarcinogens) is computed by dividing the CDI by the RfD. The USEPA has set standard limits (or points of departure) for carcinogens and noncarcinogens to evaluate whether significant risk is posed by a chemical (or combination of chemicals). For carcinogens, the point-of-departure range is $1x10^{-6}$ with a generally excepted range of $1x10^{-4}$ to $1x10^{-6}$. These risk values correlate with 1 in 10,000 and 1 in 1 million excess cancer incidence resulting from exposure to xenobiotics.

For noncarcinogens, other toxic effects are generally considered possible if the hazard quotient (or sum of hazard quotients for a pathway – that is, the hazard index) exceeds unity (a value of 1). Although both cancer risk and noncancer hazard are generally additive (within each target organ/effect group) only if the target organ is common to multiple chemicals, a most conservative estimate of each may be obtained by summing the individual risks or hazards regardless of target organ. This BRA has taken the universal summation approach for each class of toxicant.

6.2.2 Tissue Pathway

During the Site 2 RI, edible crab tissue was collected in Site 42 and Site 2. That data is summarized in Table 6-5. Exposure to this tissue was evaluated under one scenario: current and future site nonsubsistence fisherman ingesting shellfish 20 g/day for 175 days per year.

Table 6-6 presents the calculated risk and hazard for the tissue exposure pathways. As shown in the tables below, an ILCR of $3x10^{-6}$ (rounded) was identified for the possible carcinogens detected onsite. Hazard indices (HIs) of 0.7 and 0.2 were calculated for child and adult exposure to Site 2 tissues, respectively. The primary contributor to ILCR was heptachlor epoxide, and the primary contributor to HI was copper. No chemicals of concern (COCs) were identified for this exposure pathway. Because the ILCR for heptachlor epoxide exceeded $1x10^{-6}$, it is important to note that the calculations were based on the maximum concentration detected in Site 2 blue crab tissues. An ILCR based on the arithmetic average tissue concentration reported for heptachlor epoxide (0.00092 mg/kg) would not exceed the most stringent USEPA and FDEP threshold ($1x10^{-6}$).

6.2,3 Conclusions

The human health exposure assessment for Site 42 indicates that a complete human health risk assessment was not required for the site due to a general lack of completed exposure pathways. Without complete exposure pathway, no risk to human health can be associated with the contamination.

The one exception to the lack of complete pathways is the ingestion of edible crab tissues collected from the Bay. Although no specific investigation of this pathway was included in the Site 42 RI, an exhaustive evaluation performed for Site 2 included data from crab collected from Site 2. The results of that evaluation indicate no unacceptable risk is associated with the ingestion of crab tissue from Pensacola Bay.

Table 6-5
Chemicals Detected in Crab Tissue Samples (in mg/kg)
NAS Pensacola, Site 2
Pensacola, Florida

Chemical	Frequency of Detection	Default Concentrations	Range of Detected Concentrations	Screening Value	Reference Concentration	Notes
Calcium	5/5	NA	678 - 5,370		1,764	3
*Copper	1/5	4.85	14.5	5	ND	
Magnesium	5/5	NA	362 - 682		722	2,3
Mercury	5/5	NA	0.15 - 0.21	0.41	0.4	1,2
Potassium	5/5	NA	2,600 - 2,970		5,260	2,3
Selenium	5/5	NA	0.7 - 1.5	0.68	1.74	2
*Silver	1/5	0.495	1.1	0.68	ND	
Sodium	5/5	NA	3,470 - 3,730		8,040	2,3
*Zinc	5/5	NA	28.7 - 59.1	41	58.4	
*4,4'-DDD	1/5	0.00056	0.00056	0.013	ND	1
4,4'-DDE	5/5	NA	0.00073 - 0.00065	0.0093	0.0026	1
*d,d'-DDT	5/5	NA	0.0019 - 0.0096	0.0093	0.0026	
Aldrin	3/5	NA	0.00049 - 0.00093	0.00019	0.00128	2
Endrin	3/5	0.00023	0.00023 - 0.00059	0.041	ND	1
*Heptachlor epoxide	5/5	NA	0.00026 - 0.0025	0.00035	0.00074	

Notes:
* = Retained as a chemical of potential concern based on comparison to screening value and reference concentration.
1 = Does not exceed the screening value.
2 = Does not exceed the reference concentration.
3 = Chemical is considered an essential human nutrient.
NA = Not applicable.
ND = Not detected.

Table 6-6
Risk Projections for COPCs Based on Tissue Ingestion
NAS Pensacola — Site 2
Pensacola, Florida

			Potential Future Use		
Chemical	RfD used (mg/kg-day)	SF used (mg/kg-day)	HQ Child — nc	HQ Adult — nc	ILCR lwa — c
Copper	0.0371	NA	0.2	0.09	NA
Silver	0.005	NA	0.1	0.05	NA
Zinc	0.3	NA	0.1	0.05	NA
4'4'-DDD	NA	0.24	NA	NA	1.4E-08
4'4'-DDT	0.0005	0.34	0.01	0.005	3.3E-07
Heptachlor epoxide	0.000013	9.1	0.1	0.05	2.3E-06
Hazard Indices			0.7	0.2	
Sum ILCR					3E-06

Notes:
HQ = Hazard quotient
ILCR = Incremental lifetime excess cancer risk
LWA = Lifetime weighted average
child = Childhood exposure assumptions
adult = Adult exposure assumptions
nc = Noncarcinogen-based exposure assumptions
c = Carcinogen-based exposure assumptions
SF = Slope factors

In summary, the only complete human exposure pathway identified at Site 2 was the ingestion of crab tissue. No unacceptable risks were associated with this potential exposure and no other completed pathways were identified at the site. Therefore, Site 2 in not considered to present an unacceptable risk to human health.

6.3 Baseline Risk Assessment Conclusions

Risk management decisions for NAS Pensacola Site 42 based on preliminary human health risk assumptions are not warranted for sediment because of a lack of complete exposure pathways. The only complete pathway to humans is through the consumption of seafood collected from Site 42. A study completed for Site 2 concluded that there is no excess risk from consumption of

edible crab tissue. Site 2 consists of the near-shore sediments in an area where untreated industrial wastewater had previously been discharged within Site 42. As such, it is considered to have a much higher potential for unacceptable risk than Site 42 in general and it is appropriate to utilize risk determinations from Site 2 in addressing Site 42.

Site 42 ecological risk was assessed by comparing HQs which showed adverse effects to the Site 2 environment, another operable unit in Pensacola Bay, that was investigated separately from Site 42. The Site 42 environment is similar and comparable to the Site 2 area. Site 42 HQs were lower than those that showed adverse effects at Site 2, except for the area around the barge loading dock. The constituents of concern at the barge loading dock are PAHs which are likely from petroleum products unloaded at the dock. This contamination will be further investigated under Florida's petroleum program.

7.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the human health risks associated with Site 42, and public and state comments, the Navy has selected the "No Action" alternative as the preferred remedial action alternative for this site. Based on the results of the Remedial Investigation, no remedial action is necessary to control residual risks associated with the site. Risks to human health are minimal due to a lack of completed exposure pathways to the contamination. The only completed pathway identified was exposure to edible crab tissue. No unacceptable risk is associated with this pathway. Similarly, no unacceptable ecological risk is associated with the contamination detected at Site 42. Ecological hazard quotients are generally low and areas of potential ecological risk are sparsely distributed.

As described in the preceding sections, this determination is based on both current and reasonable maximum exposure scenarios under pre-existing institutional controls (a ban on swimming in the area). An area of PAH contamination at the barge loading pier will be separately addressed under Florida's petroleum program.

The selected alternative will attain all federal and state ARARs, is cost-effective, and uses permanent solutions to the extent practicable.

Based on the information available at this time, the remedy represents the best balance among the criteria used to evaluate remedies. The remedy is believed to be protective of human health and the environment, will attain ARARs, will be cost-effective, and will use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

8.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, 42 U.S.C. § 9621, the Navy must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA prefers remedies employing treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as its principal element. The following sections discuss how the selected remedy at Site 42 meets these statutory requirements.

8.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment. Based on current and reasonable future maximum exposure scenarios, no unacceptable human health or ecological risks are associated with existing conditions at Site 42.

8.2 Attainment of the ARARs

Pursuant to CERCLA Section 121(d), the remedial action for Site 42 must comply with federal and state environmental laws that are either applicable or relevant and appropriate to the circumstances of the release. Applicable requirements are those standards, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those that, while not legally applicable, still address problems or situations sufficiently similar to those encountered onsite that their use is well-suited to the particular site. Additional criteria to be considered (TBCs) are unpromulgated advisories and guidance that are not legally binding, but provide pertinent guidance which should be considered in determining the necessary level of cleanup to protect health or the environment.

ARARs are generally considered in three distinct categories, although there is often some overlap among the three:

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely on the basis of location. Examples of location-specific ARARs include state and federal requirements to protect floodplains, critical habitats, and wetlands, along with solid and hazardous waste facility siting criteria. No location-specific ARARs or TBCs were are identified for the selected remedy..

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial site, various requirements can be ARARs. No action-specific ARARs or TBCs were identified for the selected remedy.

Chemical-specific ARARs are specific numerical quantity restrictions on individual chemicals in specific media. Examples of chemical-specific ARARs include the Maximum Contaminant Levels (MCLs) specified under the Safe Drinking Water Act. Since there are usually numerous chemicals of concern for any remedial site, various numerical quantity requirements can be ARARs. Chemical-specific ARARs and TBCs for the selected remedy are presented in Table 8-1.

Table 8-1
ARARs and TBCs for Selected Remedy

Status	Citation
Applicable	FDEP's Class III Waters designation (applicable within Pensacola Bay)
TBC	*Supplemental Guidance to RAGS: Region 4 Bulletins - Ecological Screening Values (Sediment Screening Values)*, USEPA Region IV, Atlanta, GA, November 1995.
TBC	*Approach to the Assessment of Sediment Quality in Florida Coastal Waters*, FDEP Office of Water Policy, Tallahassee, FL,, November, 1994.

The selected remedy complies with all ARARs and TBCs identified in Table 8-1. There are no action- or location-specific ARARs with which the selected remedy need comply.

8.3 Cost-Effectiveness

The "No Action" alternative is cost effective.

8.4 Use of Permanent Solutions to the Maximum Extent Practicable

The Navy, with USEPA and Florida concurrence, has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner for final remediation of Site 42 at NAS Pensacola. The Navy, with USEPA and Florida concurrence, has determined that this selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; and cost, while also considering the statutory preference for treatment as a principal element and consideration of state and community acceptance. The selected remedy provides for long-term effectiveness and permanence; is easily implemented; reduces toxicity, mobility, or volume; and is cost-effective.

8.5 Preference for Treatment as a Principal Element

The selected remedy does not utilize treatment as a principal element of the remedial action. In this instance, the data generated during the RI/FS indicate no further action is necessary to reduce contamination to acceptable risk-based concentrations in a timely manner. The statutory preference for remedies that employ treatment as a principal element does not require treatment under these circumstances.

9.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The proposed plan for OU 17 released on December 8, 1997 identified the no-action alternative as the preferred alternative. The no-action alternative presented in the proposed plan is the same as the no-action alternative described in this ROD. No comments were received during the public comment period.

10.0 REFERENCES

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Southern Division, Naval Facilities Engineering Command. (1997). *FY 1998 Site Management Plan of the Installation Restoration Program for the Naval Air Station Pensacola, Pensacola, Florida.*

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Appendix A
Glossary

This glossary defines terms used in this record of decision describing CERCLA activities. The definitions apply specifically to this record of decision and may have other meanings when used in different circumstances.

ADMINISTRATIVE RECORD: A file which contains all information used by the lead agency to make its decision in selecting a response action under CERCLA. This file is to be available for public review and a copy is to be established at or near the site, usually at one of the information repositories. Also a duplicate is filed in a central location, such as a regional or state office.

AQUIFER: An underground formation of materials such as sand, soil, or gravel that can store and supply groundwater to wells and springs. Most aquifers used in the United States are within a thousand feet of the earth's surface.

BASELINE RISK ASSESSMENT: A study conducted as a supplement to a remedial investigation to determine the nature and extent of contamination at a Superfund site and the risks posed to public health and/or the environment.

CARCINOGEN: A substance that can cause cancer.

CLEANUP: Actions taken to deal with a release or threatened release of hazardous substances that could affect public health and/or the environment. The noun "cleanup" is often used broadly to describe various response actions or phases of remedial responses such as Remedial Investigation/Feasibility Study.

COMMENT PERIOD: A time during which the public can review and comment on various documents and actions taken, either by the Department of Defense installation or the USEPA. For example, a comment period is provided when USEPA proposes to add sites to the National Priorities List.

COMMUNITY RELATIONS: USEPA's, and subsequently Naval Air Station Pensacola's, program to inform and involve the public in the Superfund process and respond to community concerns.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a trust fund, commonly known as "Superfund," to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Under the program the USEPA can either:

- Pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work.

- Take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT (DERA): An account established by Congress to fund DOD hazardous waste site cleanups, building demolition, and hazardous waste minimization. The account was established under SARA.

DRINKING WATER STANDARDS: Standards for quality of drinking water that are set by both the USEPA and the FDEP.

EXPLANATION OF DIFFERENCES: After adoption of final remedial action plan, if any remedial or enforcement action is taken, or if any settlement or consent decree is entered into, and if the settlement or decree differs significantly from the final plan, the lead agency is required to publish an explanation of any significant differences and why they were made.

FEASIBILITY STUDY: See Remedial Investigation/Feasibility Study.

GROUNDWATER: Water beneath the earth's surface that fills pores between materials such as sand, soil, or gravel. In aquifers, groundwater occurs in quantities sufficient for use as drinking water, irrigation, and other purposes.

HAZARD RANKING SYSTEM (HRS): A scoring system used to evaluate potential relative risks to public health and the environment from releases or threatened releases of hazardous substances. USEPA and states use the HRS to calculate a site score, from 0 to 100, based on the actual or potential release of hazardous substances from a site through air, surface water, or groundwater to affect people. This score is the primary factor used to decide if a hazardous site should be placed on the NPL.

HAZARDOUS SUBSTANCES: Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

INFORMATION REPOSITORY: A file containing information, technical reports, and reference documents regarding a Superfund site. Information repositories for Naval Air Station Pensacola are located at the John C. Pace Library, University of West Florida; and the NAS Pensacola Library, Building 633, Naval Air Station, Pensacola, Florida.

MAXIMUM CONTAMINANT LEVEL: National standards for acceptable concentrations of contaminants in drinking water. These standards are legally enforceable standards set by the USEPA under the Safe Drinking Water Act.

MONITORING WELLS: Wells drilled at specific locations on or off a hazardous waste site where groundwater can be sampled at selected depths and studied to assess the groundwater flow direction and the types and amounts of contaminants present, etc.

NATIONAL PRIORITIES LIST (NPL): The USEPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from the trust fund. The list is based primarily on the score a site receives from the Hazard Ranking System. USEPA is required to update the NPL at least once a year.

PARTS PER BILLION (ppb)/PARTS PER MILLION (ppm): Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene in a million ounces of water is 1 ppm; 1 ounce of trichloroethylene in a billion ounces of water is 1 ppb. If one drop of trichloroethylene is mixed in a competition-size swimming pool, the water will contain about 1 ppb of trichloroethylene.

PRELIMINARY REMEDIATION GOALS: Screening concentrations that are provided by the USEPA and the FDEP and used to assess the site for comparison before remedial goals are set during the baseline risk assessment.

PROPOSED PLAN: A public participation requirement of SARA in which the lead agency summarizes for the public the preferred cleanup strategy, and the rationale for the preference, reviews the alternatives presented in the detailed analysis of the remedial investigation/feasibility study, and presents any waivers to clean up standards of Section 121(d)(4) that may be proposed. This may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under agency consideration.

RECORD OF DECISION (ROD): A public document that explains which cleanup alternative(s) will be used at NPL sites. The Record of Decision is based on information and technical analysis generated during the remedial investigation/feasibility study and consideration of public comments and community concerns.

REMEDIAL ACTION (RA): The actual construction or implementation phase that follows the remedial design and the selected cleanup alternative at a site on the NPL.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS): Investigation and analytical studies usually performed at the same time, and together referred to as the "RI/FS." They are intended to: (1) gather the data necessary to determine the type and extent of contamination at a Superfund site; (2) establish criteria for cleaning up the site; (3) identify and screen cleanup alternatives for remedial action; and (4) analyze in detail the technology and costs of the alternatives in detail.

REMEDIAL RESPONSE: A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious, but dose not pose an immediate threat to public health and/or the environment.

REMOVAL ACTION: An immediate action performed to address a release or threatened release of hazardous substances.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA): A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent new, uncontrolled hazardous waste sites.

RESPONSE ACTION: As defined by Section 101(25) of CERCLA, a response action means remove, removal, remedy, or remedial action, including enforcement activities related thereto.

RESPONSIVENESS SUMMARY: A summary of oral and written public comments received by the lead agency during a comment period on key documents, and the response to these comments prepared by the lead agency. The responsiveness summary is a key part of the ROD, highlighting community concerns for USEPA decision-makers.

SECONDARY DRINKING WATER STANDARDS: Secondary drinking water regulations are set by the USEPA and the FDEP. These guidelines are not designed to protect public health;

instead they are intended to protect "public welfare" by providing guidelines regarding the taste, odor, color, and other aesthetic aspects of drinking water which do no present a health risk.

SUPERFUND: A trust fund established by CERCLA that can be drawn on to plan and clean up past hazardous waste disposal sites and current releases or threats of releases of non-petroleum products. Superfund is often divided into removal, remedial, and enforcement components.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA): The public law enacted on October 17, 1986, to reauthorize the funding provisions, and to amend the authorities and requirements of CERCLA and associated laws. Section 120 of SARA requires that all federal facilities "be subject to and comply with, this act in the same manner and to the same extent as any non-governmental entity."

SURFACE WATER: Bodies of water that are aboveground, such as rivers, lakes, and streams.

VOLATILE ORGANIC COMPOUND: An organic (carbon-containing) compound that evaporates (volatilizes) readily at room temperature.

RESPONSIVENESS SUMMARY

Overview

At the time of the public comment period, the U.S. Navy had selected a preferred remedy to address sediment and surface water contamination at Site 42 on NAS Pensacola. This preferred remedy was selected in coordination with the USEPA and the FDEP. The NAS Pensacola Restoration Advisory Board, a group of community volunteers, reviewed the technical details of the selected remedy and raised no fundamental objections to its selection.

The sections below describe the background of community involvement on the project and comments received during the public comment period.

Background of Community Involvement

Throughout the site's history, the community has been kept abreast of site activities through press releases to the local newspaper and television stations reporting site activities. Site-related documents were made available to the public in the administrative record at information repositories maintained at the NAS Pensacola Library and the John C. Pace Library of the University of West Florida.

In December 1997, newspaper announcements were placed to announce the public comment period (December 8, 1997 through January 22, 1998), present the opportunity for a public meeting, and included a short synopsis of the proposed plan. These advertisements ran in the *Pensacola News Journal* on December 12, 1997. In conjunction with these newspaper announcements, addresses on the Site 42 mailing list were sent the proposed plan.

Appendix B

Responsiveness Summary

Summary of Comments Received During the Public Comment Period

No comments were received during the public comment period.