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

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Table of Contents

List of Figures

List of Tables

List of Appendices

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 fur 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 fur 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

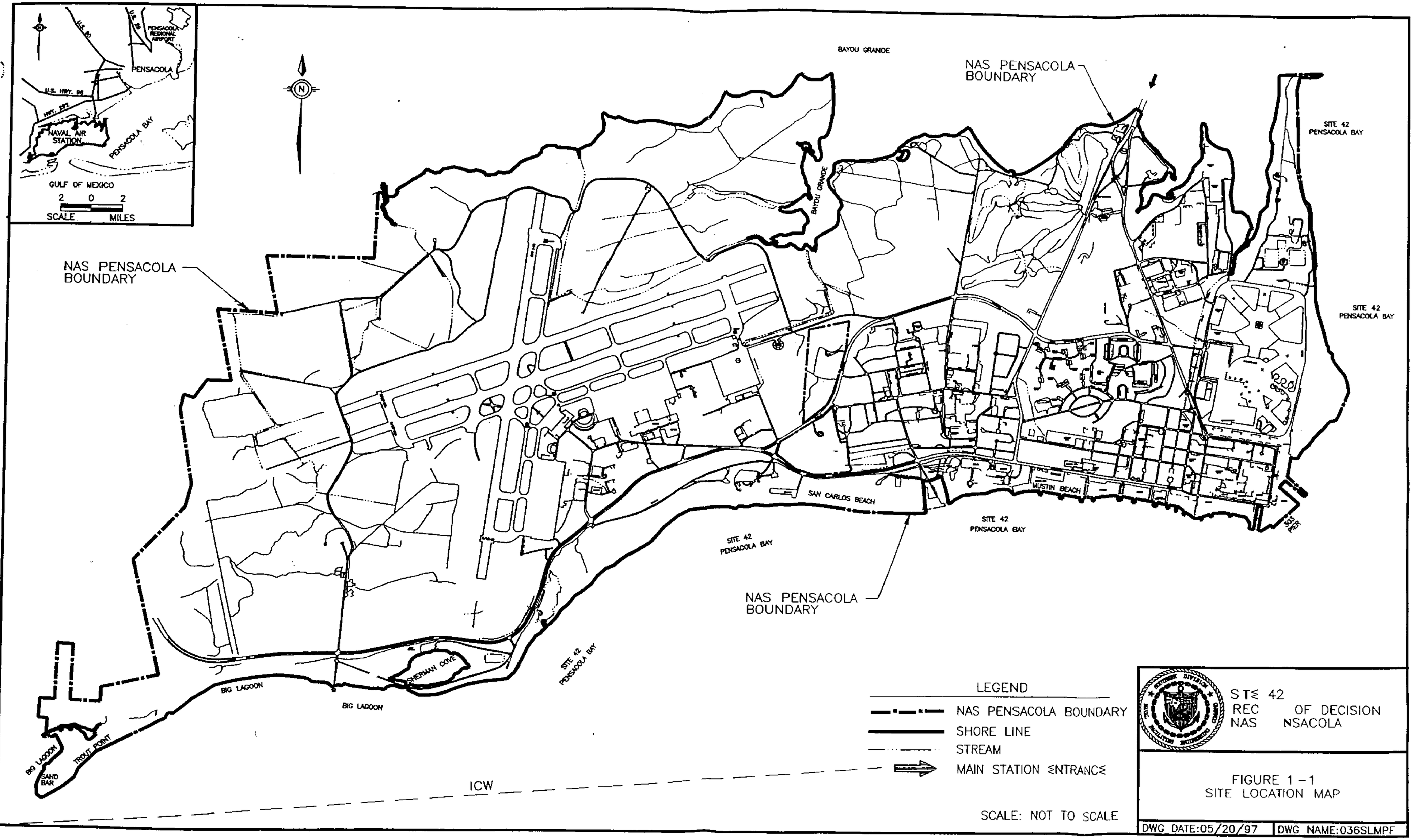
1.0 SITE NAME, LOCATION AND DESCRIPTION

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 Pensacda 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 Pensacda 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.


U.S. 90
U.S. 29
PENSACOLA REGIONAL AIRPORT
PENSACOLA
U.S. HWY. 98
HWY. 292
NAVAL AIR STATION
PENSACOLA BAY
GULF OF MEXICO
2 0 2
SCALE MILES
N
BAYOU GRANDE
NAS PENSACOLA BOUNDARY
SITE 42 PENSACOLA BAY
SITE 42 PENSACOLA BAY
SAN CARLOS BEACH
MUSTIN BEACH
SITE 42 PENSACOLA BAY
SITE 42 PENSACOLA BAY
NAS PENSACOLA BOUNDARY
NAS PENSACOLA BOUNDARY
SHERMAN COVE
BIG LAGOON
BIG LAGOON
BIG LAGOON
TROUT POINT
SAND BAR
ICW
LEGEND
NAS PENSACOLA BOUNDARY
SHORE LINE
STREAM
MAIN STATION ENTRANCE
SCALE: NOT TO SCALE
SITE 42
REC OF DECISION
NAS NSACOLA
FIGURE 1-1
SITE LOCATION MAP
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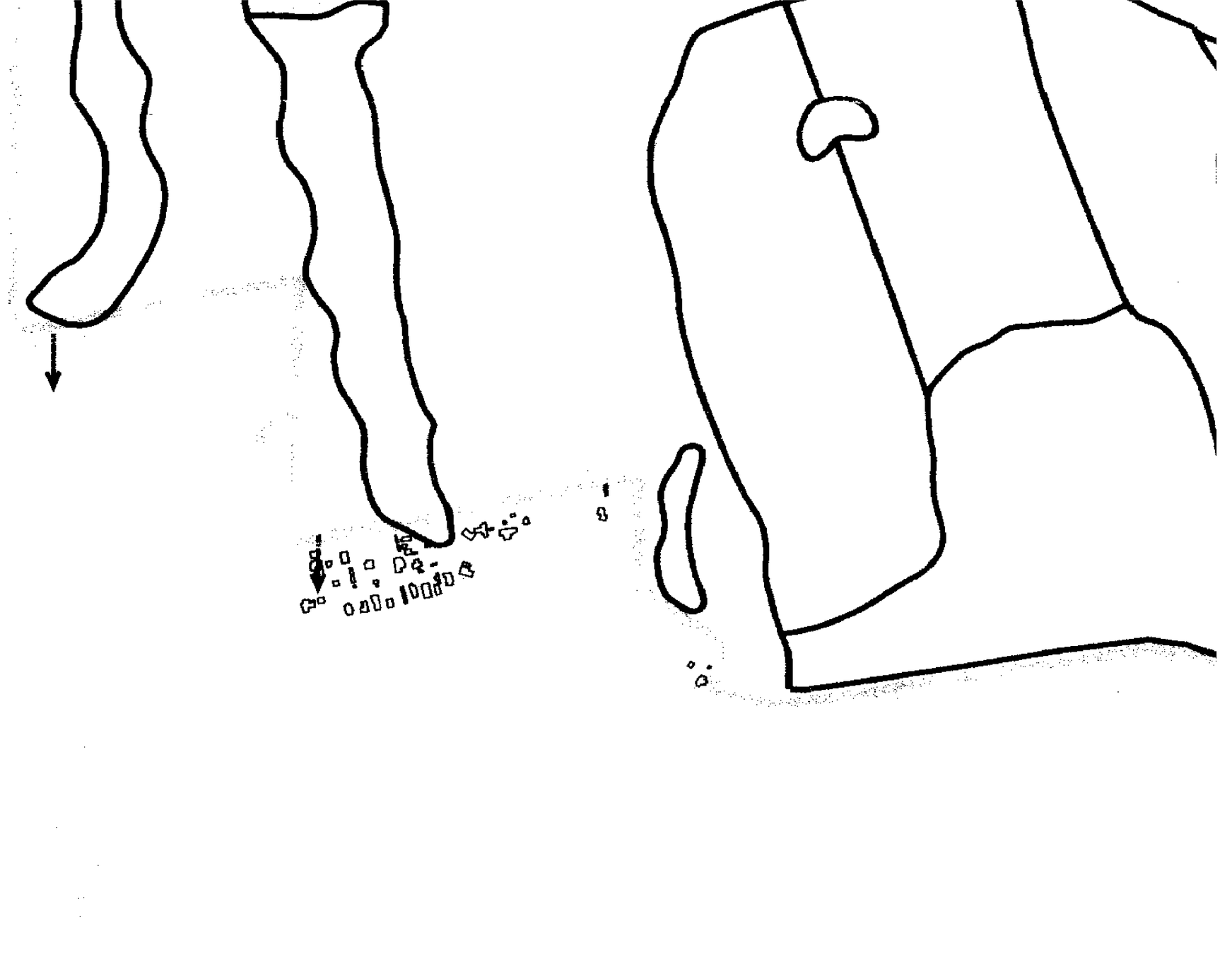


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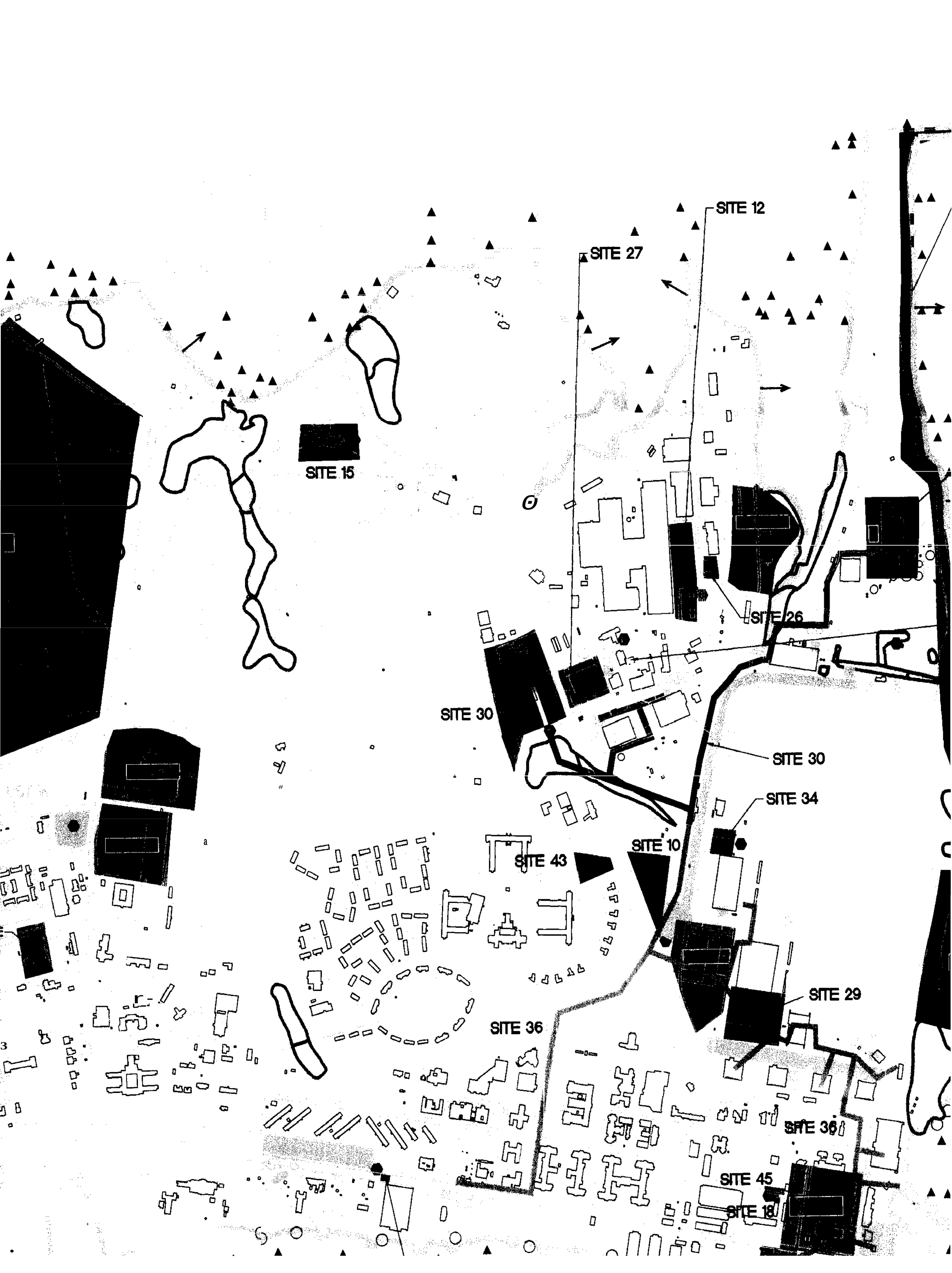
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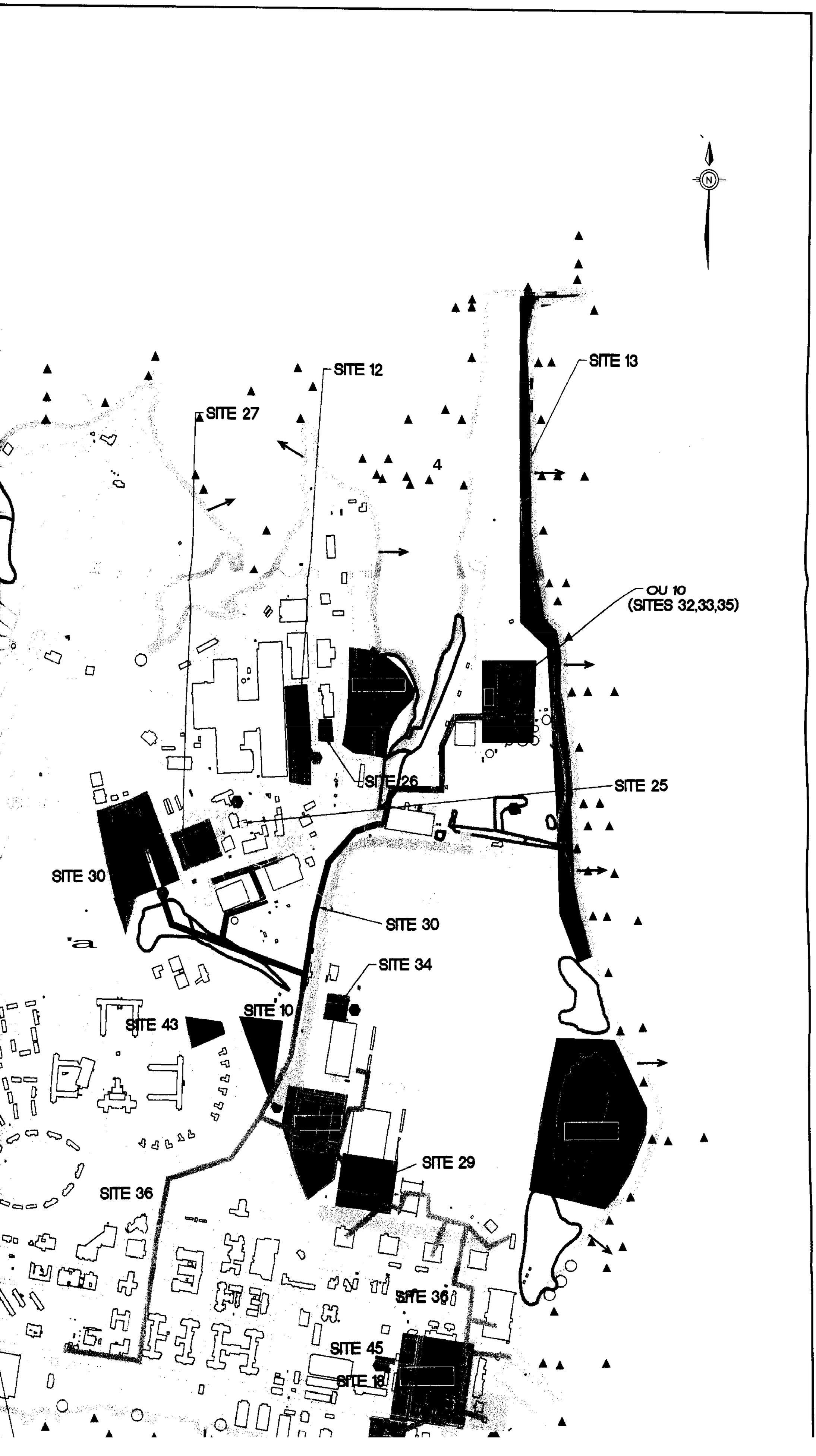
SITE 18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(SITES 32,33,35)
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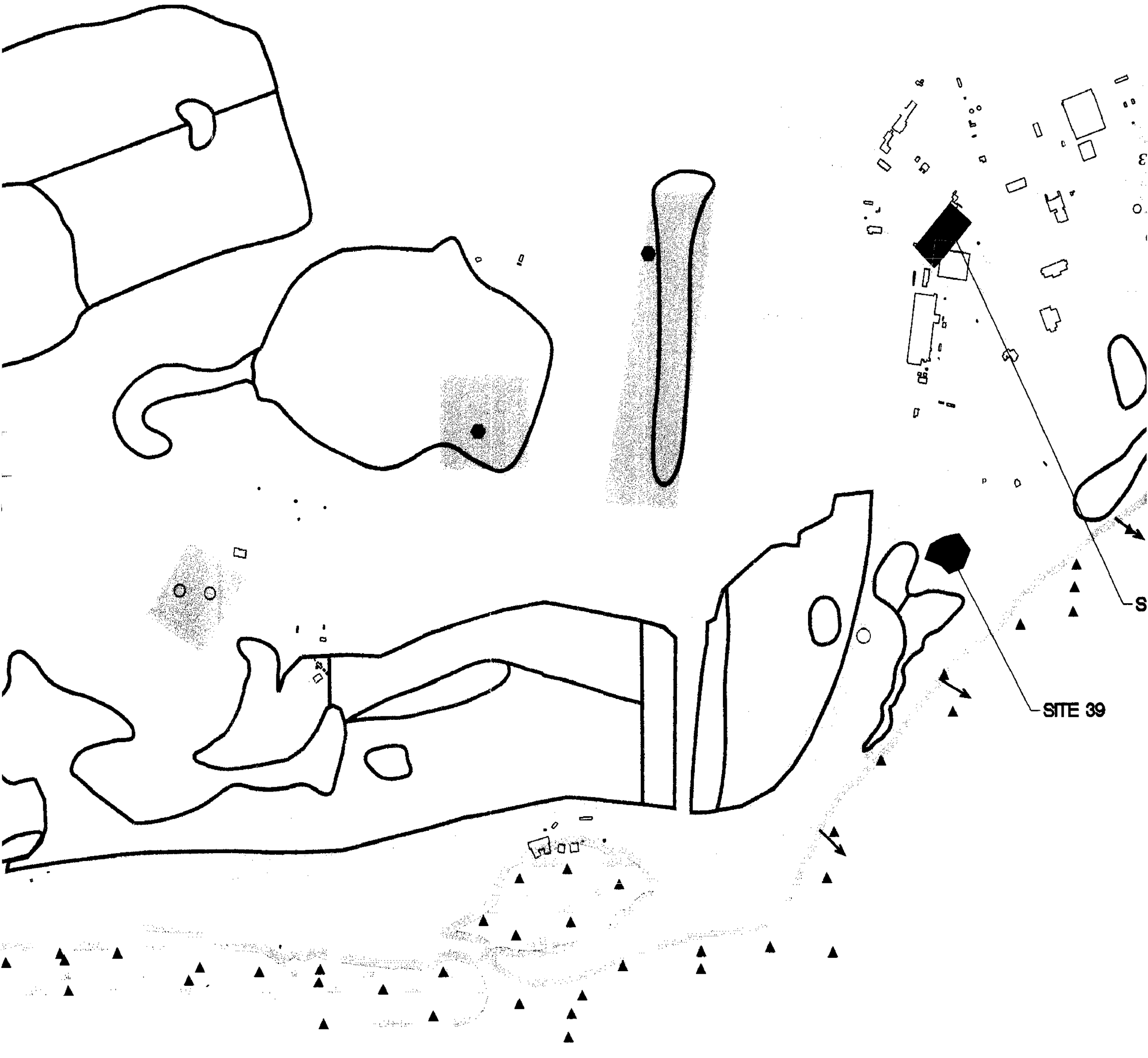
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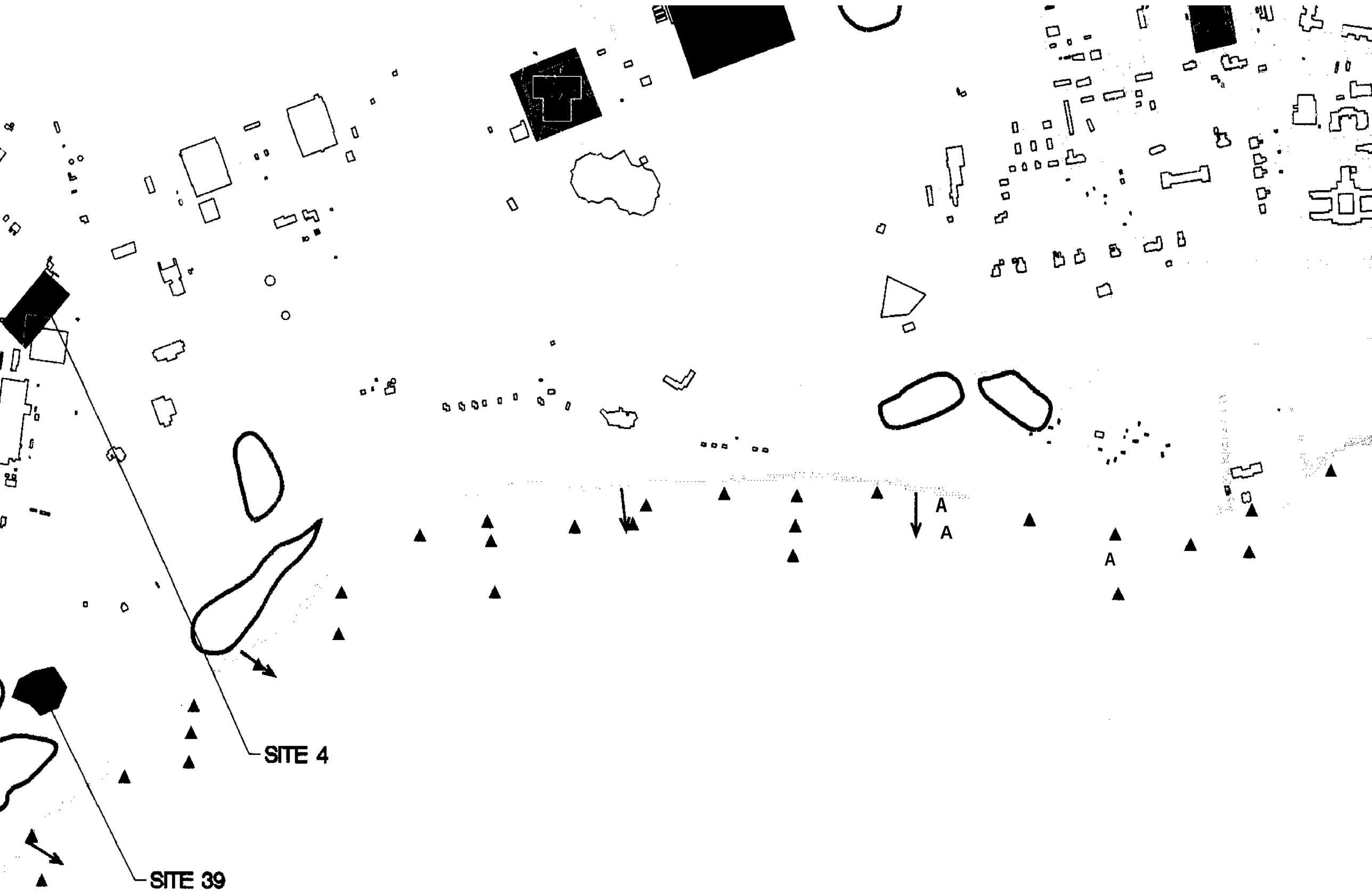
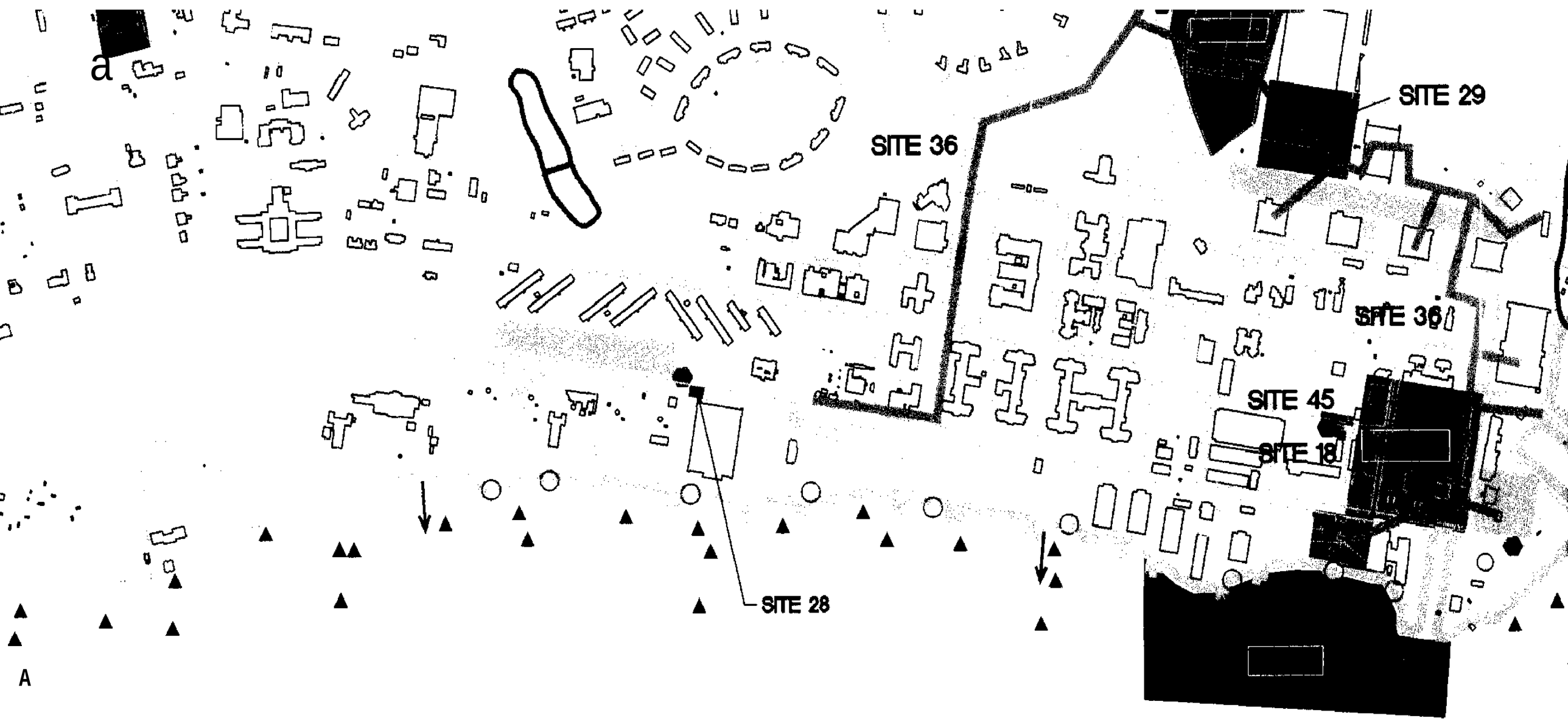


MAP LABEL	SITE NAME	TANKS/SIZE	CONTENTS	GROUNDWATER CONTAMINANTS
UST A	3221SW	1/1000 GAL.	WASTE OIL, PD-680	TCE, PCE, METHYLENE CHLORIDE
UST B	PWC SITE 4	SLUDGE DISPOSAL	WASTE OIL, JET FWEL	PETROLEUM HYDROCARBONS
UST C	PWC SITE 1	PIPELINE	JP-5	PETROLEUM HYDROCARBONS
UST D	BUILDING 604	UNKNOWN	TCE	CHLORINATED SOLVENTS
UST E	DFM PIPELINE	PIPELINE	DIESEL	NONE
UST F	607NE	2/500 GAL.	WASTE OIL, JET FUEL	LEAD
UST G	2662W	1000 GAL.	USED OIL, JP-5	NONE
UST H	3557	2/500 GAL.	WASTE OIL	
UST I	3220	MULTIPLE TANKS/UNKNOWN SIZE	DIESEL, WASTE OIL, TCE	UNKNOWN
UST J	2450W	MULTIPLE/1000 GAL.	GASOLINE	UNKNOWN
UST K	PWC SITE 3/3810N	1/500 GAL.	FUEL OIL	TRPHs, PAHs
UST L	3644	2/8000 GAL	DIESEL	PETROLEUM HYDROCARBONS
UST M	709N,S	2/2000 GAL:	FUEL OIL	UNKNOWN
UST N	647, 648, 649, 692	3/1000 GAL., 3/500 GAL.	WASTE OIL, KEROSENE	UNKNOWN
UST O	UST 18	OPEN PITS	JET FUEL, WASTE OIL	BTEX, LEAD
UST P	SITES 1 TO 13	AVGAS LINE AND 12 TANKS/500 GAL.	JET FUEL	LEAD, PETROLEUM HYDROCARBONS
UST Q	RADAR SITE 3255	1/300 GAL.	DIESEL	PETROLEUM HYDROCARBONS
UST R	3221NE	1/500 GAL.	WASTE OIL, WATER TAINTED JP-5	NONE
UST S	SITE 18	PIPELINE	JET FUEL	PETROLEUM HYDROCARBONS
UST T	SITE 20	1/1,511,580 GAL., AST	JP-5	PETROLEUM HYDROCARBONS
UST U	SITE 26	UNKNOWN	JET FUEL	PETROLEUM HYDROCARBONS
UST V	SITE 23	UNKNOWN	JET FUEL	PETROLEUM HYDROCARBONS
UST W	SITE 26	UNKNOWN	JET FUEL	PETROLEUM HYDROCARBONS
UST X	SITE 27	UNKNOWN	JET FUEL	PETROLEUM HYDROCARBONS

POTENTIAL IMPACTS TO PENSACOLA BAY FROM SOIL/GROUNDWATER [2] CONTAMINANTS AT NAS PENSACOLA SITES INVESTIGATED BY E/A&H

SITE	SOIL CONTAMINANTS	GROUNDWATER CONTAMINANTS	IMPACT
1	METALS, PCBs, SVOCs	METALS, SVOAS, VOAs	BAYOU GRANDE
3	METALS, PESTICIDES, SVOCs, VOCs	METALS, SVOAs, VOAs	PENSACOLA BAY, BAYOU GRANDE (FROM STORM DRAINS)
5	(NO EXCEEDANCES)	METALS	BAYOU GRANDE
8	METALS, PESTICIDES, SVOCs	METALS	BAYOU GRANDE (FROM STORM DRAINS)
9	METALS, PESTICIDES, SVOCs	METALS	BAYOU GRANDE
10	PESTICIDES, SVOCs	METALS	BAYOU GRANDE
11	METALS, PCBs, SVOCs	METALS, PESTICIDES	BAYOU GRANDE
12	METALS, PESTICIDES, PCBs, SVOCs	METALS, PESTICIDES	BAYOU GRANDE
13	METALS	METALS	PENSACOLA BAY
14	METALS	METALS	PENSACOLA BAY
15	METALS,PBS,SVOCs	METALS	BAYOU GrW O E
16	METALS, PESTICIDES, SVOCs	METALS	BAYOU GRANDE
17	METALS, PESTICIDES, PBS, SVOCs	METALS,	BAYOU GRANDE (FROM STORM DRAINS)
18	METALS, PBS, SVOCs	METALS	PENSACOLA BAY
24	METALS, PESTICIDES, PBS, SVOCs	METALS	BAYOU GRANDE (FROM STORM DRAINS)
25	METALS, PESTICIDES	METALS	BAYOU GRANDE
26	SVOCs	METALS, SVOAs, VOAs	BAYOU GRANDE
27	METALS, PESTICIDES, SVOCs	METALS, RADIATION	BAYOU GRANDE
28	METALS, SVOCs	METALS, SVOAs, VOAs	PENSACOLA BAY
29	METALS, PESTICIDES, SVOAs	(GW NOT INVESTIGATED)	BAYOU GRANDE
30	METALS PESTICIDES, PBS, SVOCs	METALS, PESTICIDES	BAYOU GRANDE
31	METALS, SVOCs, PESTICIDES	METALS, PESTICIDES, SVOAs, VOAs	PENSACOLA BAY, BAYOU GRANDE
32	METALS, SVOCs, PESTICIDES	METALS, VOLATILES	PENSACOLA BAY, BAYOU GRANDE
33	METALS, SVOCs, PESTICIDES	METALS, VOLATILES	PENSACOLA BAY, BAYOU GRANDE
34	(NO SURFACE SOIL CONTAMINANTS)	METALS, SVOAs	
38	METALS, PESTICIDES, PBS, SVOCs	METALS, SVOCs, VOAs	PENSACOLA BAY
39			PENSACOLA BAY



TER CONTAMINANTS
THYLENE CHLORIDE
YDROCARBONS
YDROCARBONS
SOLVENTS
YDROCARBONS
LEUM HYDROCARBONS
HYDROCARBONS
HYDROCARBONS
YDROCARBONS
YDROCARBONS
YDROCARBONS
YDROCARBONS
NDE (FROM STORM DRAINS)
M DRAINS)
A DRAINS)
A DRAINS)
NDE
NDE
NDE

SPILLS FROM NAS PENSACOLA ENVIRONMENTAL SITES [3]

SITE	NATURE OF SPILL	YEAR
3	FUEL FROM THE CRASH CREW TRAINING AREA	1955–PRESENT
15	PESTICIDE RINSATE FROM THE GOLF COURSE	1963–1979
17	PCBs FROM TRANSFORMERS STORED AT SITE	ONGOING
18	PCBS FROM A RUPTURED TRANSFORMER	1967
19	FUEL OIL FROM A PIPELINE BREAK	1958
20	FUEL OIL FROM A PIPELINE LEAK	1981
22	DISPOSAL OF FUEL FROM REFUELER TRUCKS	1958–1977
23	FUEL OIL FROM A PIPELINE BREAK	1965
24	PESTICIDES FROM A DDT MIXING AREA	1960s
25	WASTE FROM RADIUM REMOVAL	1978
26	LEAKS FROM CHEMICAL CONTAINERS	1956–1964
28	TRANSFORMER FEED FROM A TRUCK AND LEAKED	7969
29	SKIN BURNS FROM A SUBSTANCE IN SOIL	1981
OU–10	80,000 GALLONS OF INDUSTRIAL WASTE	1979
	SULFURIC ACID SPILL	1989
	FUEL OIL FROM THE BILGE WATER PLANT	1992
30	WASTE DUMPED INTO NEARBY WETLANDS	1940s–
34	SOLVENT DETERGENT SPILL	1960s
44	PAINTS/SOLVENTS STORED AT BUILDING 3380	1972–1981
38	SOLVENTS/METAL PLATING WASTES	1972–1979

REFERENCES:

1. PETROLEUM SITE INFORMATION BASED ON REPORTS FROM ABB ENVIRONMENTAL SERVICES, INC. AND PUBLIC WORKS CENTER, NAS PENSACOLA.
2. IRP AND OTHER ENVIRONMENTAL SITE INFORMATION BASED ON ENSAFE/ALLEN & HOSHALL REPORTS.
3. SPILLS INFORMATION BASED ON NEESA, 1983 AND HISTORICAL DATA COMPILED IN E/A&H SITE SPECIFIC RI REPORTS.

– IRP SI

– PETRO STORAG

– WETLA

– SURFA BASED

– STORM

– SURFA

– SEDIM

– ESTUA

– SITE

80

SCA

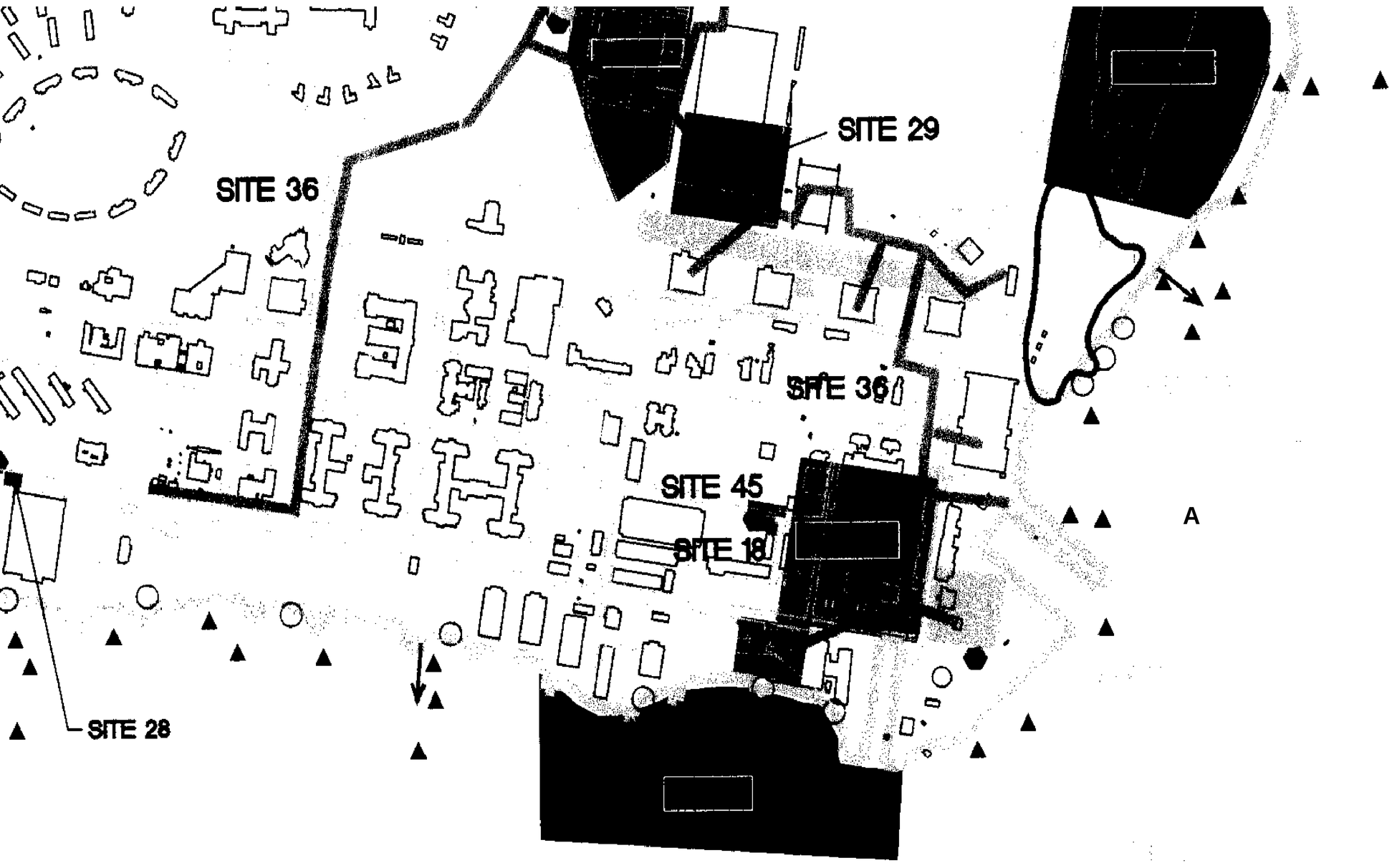
SITE
RECO
NAS
PENA

CO
ECO

Dr by: K. BRONSON

Ck by: C. TRIPLETT

Date: 02/02/98



PENSACOLA ENVIRONMENTAL SITES [3]	
TURE OF SPILL	YEAR
C CRASH CREW TRAINING AREA	1955–PRESENT
ATE FROM THE GOLF COURSE	1963–1978
ANSFORMERS STORED AT SITE	ONGOING
RUPTURED TRANSFORMER	1967
A PIPELINE BREAK	1958
A PIPELINE LEAK	1981
UEL FROM REFUELER TRUCKS	1958–1977
A PIPELINE BREAK	1965
M A DDT MIXING AREA	1960s
ADIUM REMOVAL	1978
HEMICAL CONTAINERS	1956–1964
TELL FROM A TRUCK AND LEAKED	1969
OM A SUBSTANCE IN SOIL	1981
S OF INDUSTRIAL WASTE	1979
SPILL	1989
THE BILGE WATER PLANT	1992
INTO NEARBY WETLANDS	1940s–
GENT SPILL	1960s
S STORED AT BUILDING 3380	1972–1981
PLATING WASTES	1972–1979

LEGEND

- IRP SITE
- PETROLEUM SITE OR UNDERGROUND STORAGE TANK
- WETLAND
- SURFACE DRAINAGE DISCHARGE POINT, BASED ON DRAINAGE BASIN ANALYSIS
- STORM WATER OUTFALL PIPE
- SURFACE SPILL
- SEDIMENT SAMPLE.
- ESTUARINE AQUATIC BED
- SITE 36

EFERENCES:

ETROLEUM SITE INFORMATION BASED ON EPORTS FROM ABB ENVIRONMENTAL SERVICES, INC. ND PUBLIC WORKS CENTER, NAS PENSACOLA.

RP AND OTHER ENVIRONMENTAL SITE INFORMATION ASED ON ENSAFE/ALLEN & HOSHALL REPORTS.

PILLS INFORMATION BASED ON EESA, 1983 AND HISTORICAL ATA COMPILED IN E/A&H ITE SPECIFIC RI REPORTS.

800 0 800

SCALE FEET

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2–1
CONTAMINANT SOURCES AND
ECOLOGICALLY SENSITIVE AREAS

Dr by: K. BRONSON	Tr by: 0036-00138	
Ck by: C. TRIPLETT	App by: S. PARKER	Sheet 1
Date: 02/02/98	DWG Name:0083M001	Of 1

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 tor 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 Zon ∃ in Pensacola Bay

Assessment Zone	Potential ırce	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	Groundωater discharge	Metals, VOCs, SVOCs, Pest/PCBs
6	18	Surface water rω₁off	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	Groundωater discharge	Metals, VOCs
	4	Surface ωater runoff through Wetlands 56, 57, 58 (S te 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:
- ▪ = Petroleum site
- ᵇ = Not an IRP site
- NA = Not applicable
- O$_H$ 10 = Operable Unit 0

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 tu 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

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 Pensacoh, 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

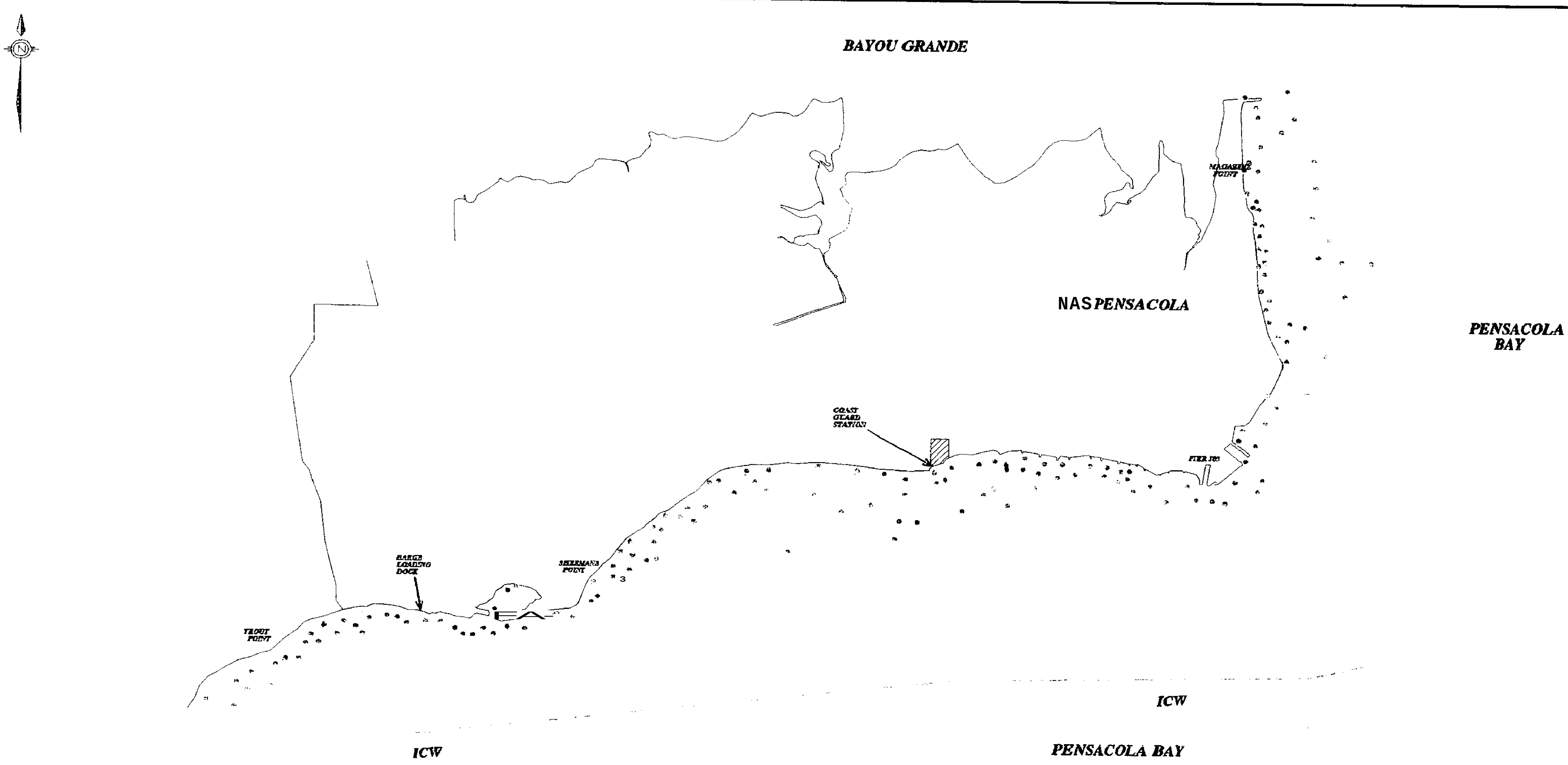
5.1 Nature and Extent of Contamination

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.



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 Sed mt (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	4,308
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 - 1.4	0.559
Cadmium (Cd)	7/141	0.12 - 1.6	0.21 - 0.92	0.546
Calcium (Ca)	141/141	N/A	57.2 - 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	11.1 - 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 (TI)	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. 944
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
Endosulfon 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 5	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	2/14	360. - 1,700.0	53. - 100.0	76.5
Chrysene	20/141	36. - 170.0	23. - 2,500.0	220.4
Di-n-butylphthalate	34/14	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 -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-ofevidence 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 fur 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 tu 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 tu 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 nut considered to **represent** a hazard tu 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 SS'V 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

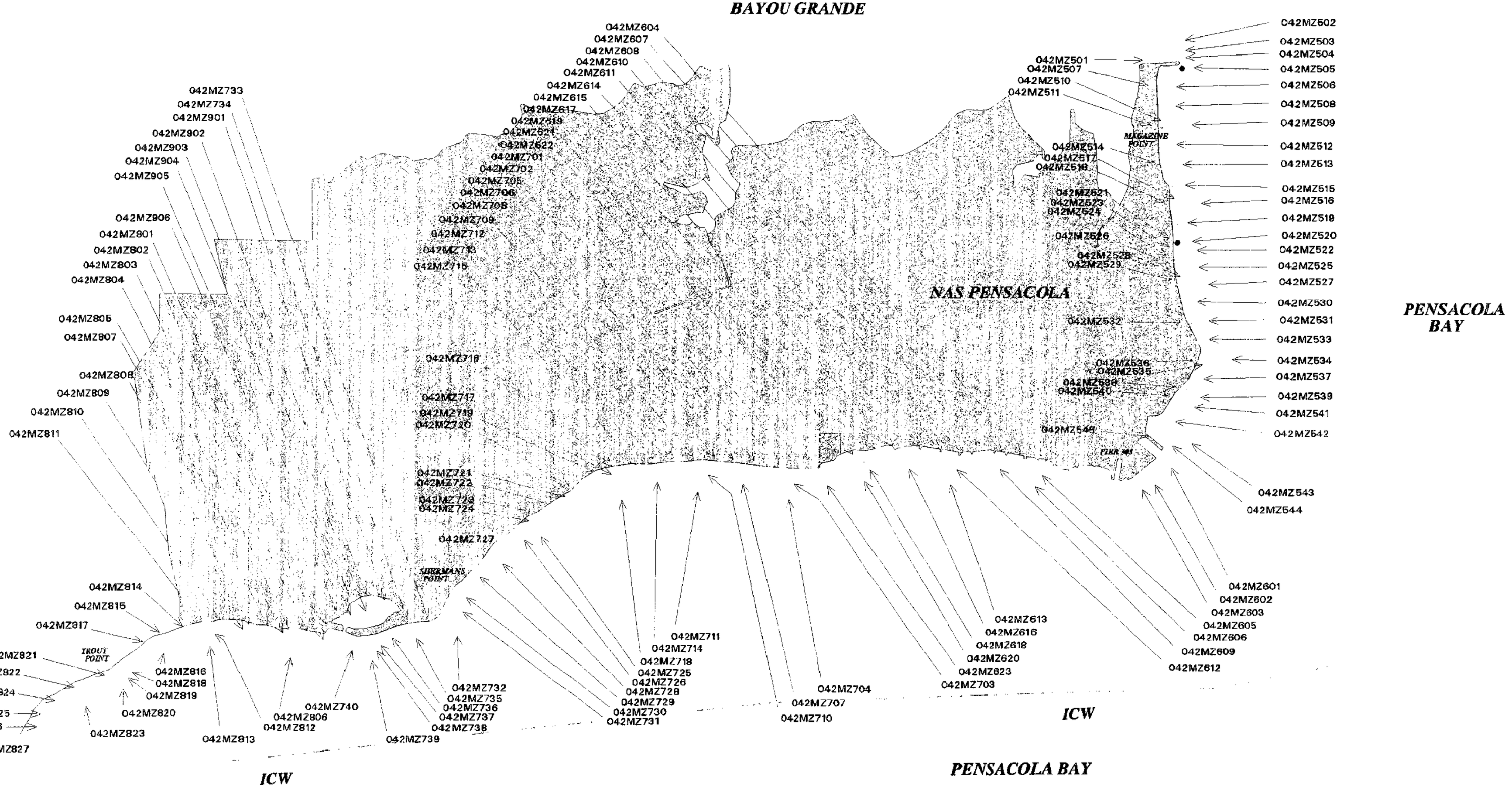
None of these metals exceeded the SQAG-PEL (See Table 6-1).

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. The limited extent alone (see Figure 6-1) suggests a low risk to ecological resources (See Table 6-1).



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 XTENT
SILVE

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Table 6-1
Site 42 Inorganics Exceeding Benchmark Levels

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
Arsenic (As)	042MZ5 3	6.	7.24	7.24	41.6	2.
	042MZ601	9.				2.
	042MZ603	8.				2.
	042MZ603	7.				2.
	042MZ616	2.				1.
	042MZ805	0.				1.
	042MZ807	0.				1
	042MZ823	7.				2.
	042MZ826	2				3
	042MZ827					3.
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	042 Z543	17	0.13	0.13	0.696	1.3
	042MZ601	0.64				4.9
	042MZ611	0.14				1.1
	042MZ816	a				1.1
	042MZ903	0.13				1.0
	MZ906	0. 7				1 3

Table 6-1
Site 42 Inorganics Exceeding Benchmark Leeels

Contaminant	Sample ID	Concentration	SSV	SQAG TEL	SQAG PEL	HQ
Silver	42MZ5)5	3.6	2.0	0.733	1.77	4.9
	42MZ521	14.8				20.2

Notes:
SSV = U SEPA Region 4 Sedin nt Screening V alue
SQAG = Florida Department of Environmental P otection — Sediment Quality Assessment Guideline
TEL =
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)

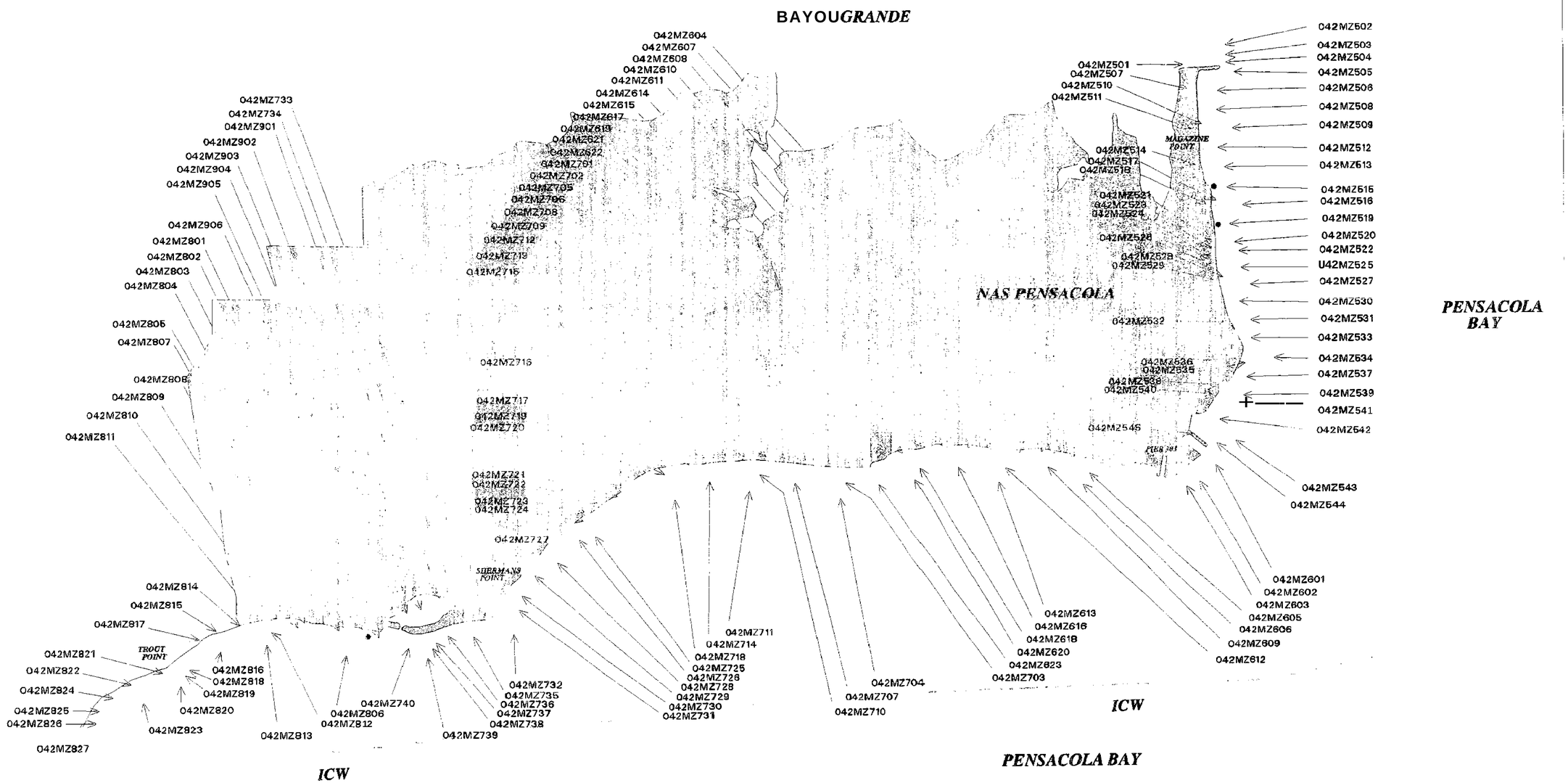
Lindane was detected above screening levels at 12 of the 141 locations in **Site 42 (see** Table 6-2 **and** Figure **6-3).**

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.



SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

NONDETECT (125)

DETECTED (13)

● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION *(3)*

SCREENING LEVEL = 1.19 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-2

NATURE AND EXTENT
4,4-DDT

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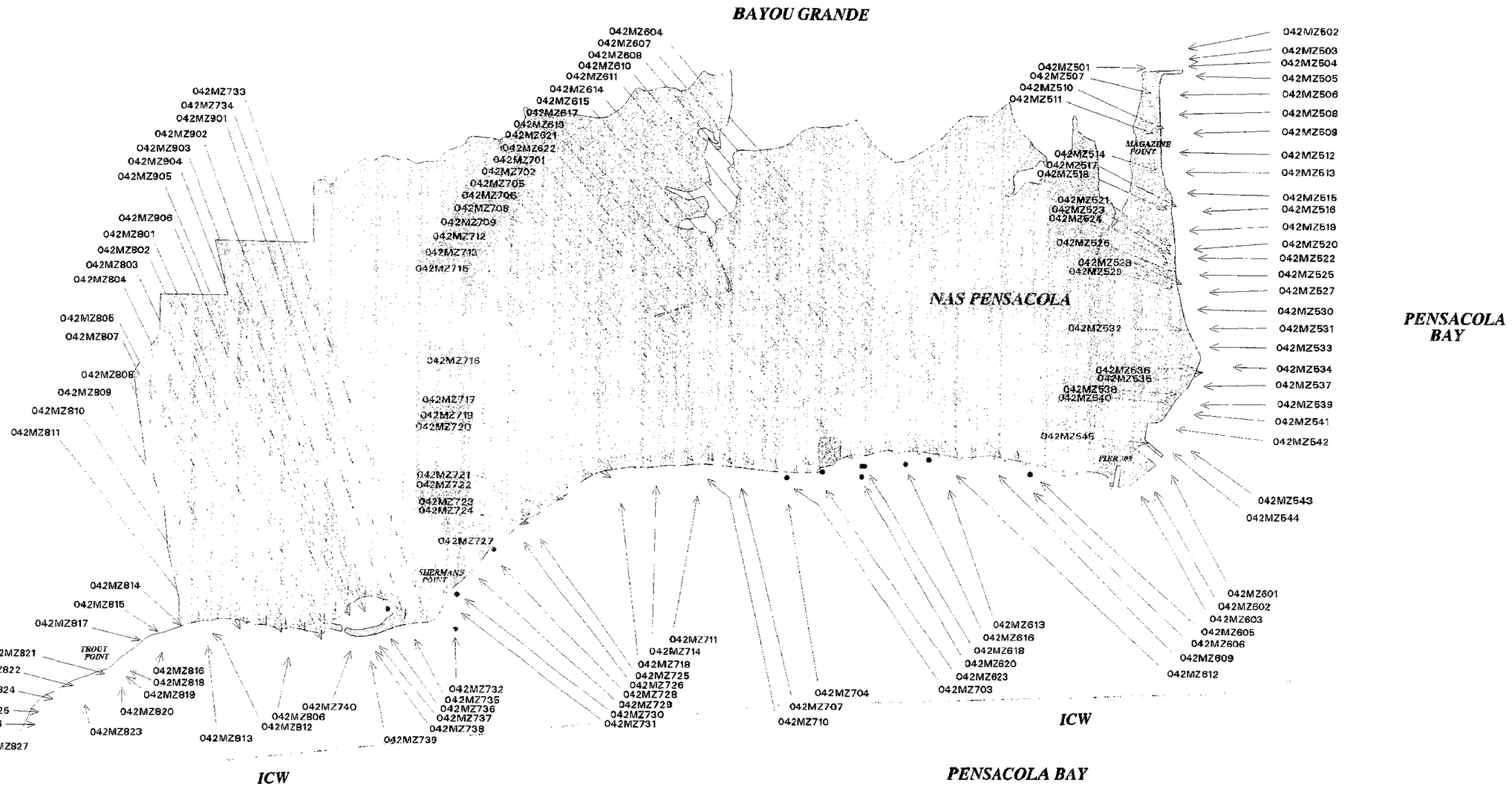

SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

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

SCREENING LEVEL = 0.32 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-3

NATURE AND EXTENT
GAMMA-BHC (LINDANE)

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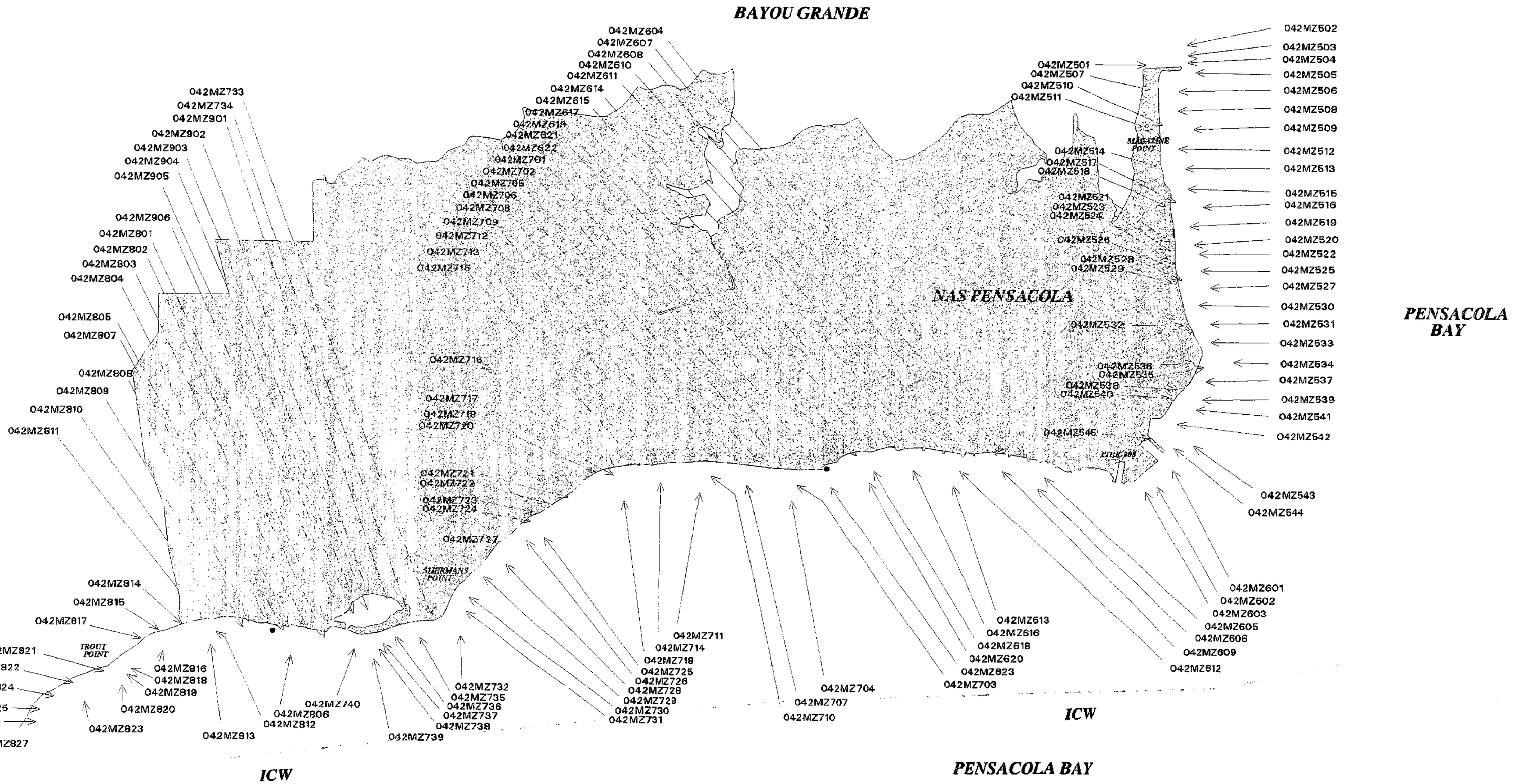
Table 6-2
Site 42 Pesticide/PCB Concentrations Exceeding Benchmark Levels

Contaminant	Sample ID	Concentration	SQAG 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
	042MZ515	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 1I **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)

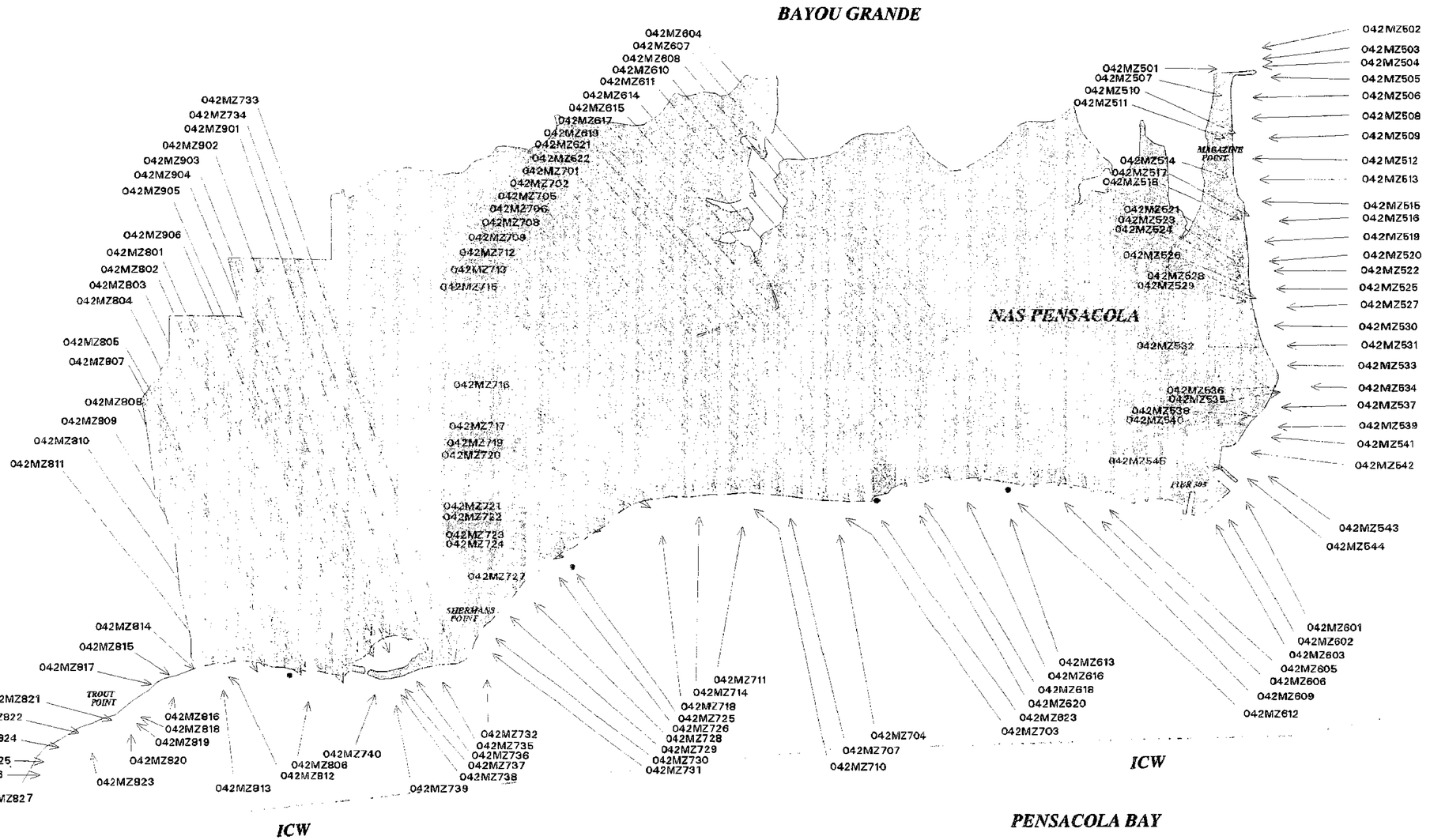
SCREENING LEVEL = 5.87 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-4

NATURE AND EXTENT
ACENAPHTHYLENE

/home4/pensacola-dir/mapping-dir/mxd/nat.mxd



SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

NONDETECT (137)

DETECTED (0)

● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (4)

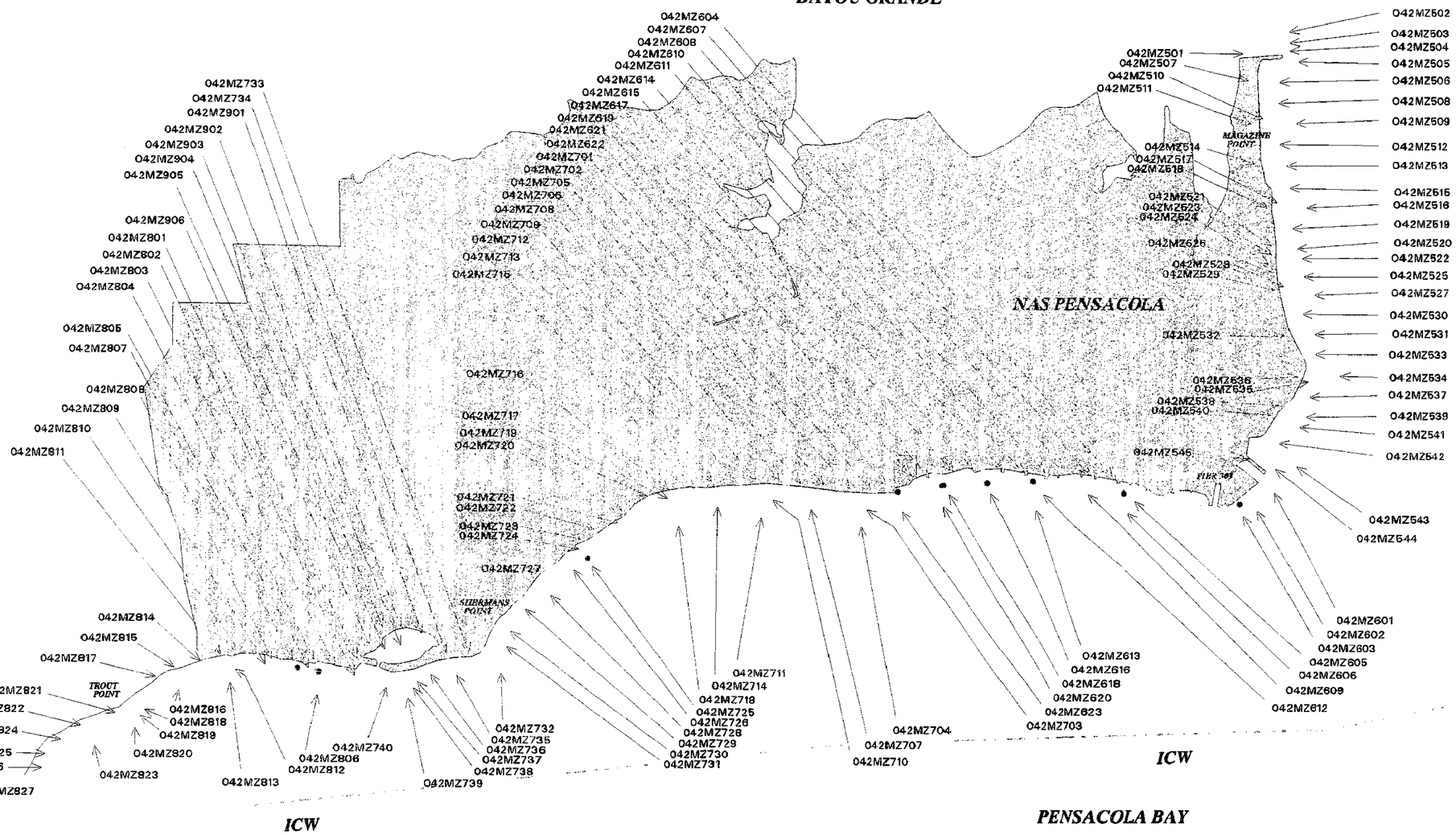
SCREENING LEVEL = 46.9ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-5

NATURE AND EXTENT
ANTHRACENE

/nome4/pensacola-s1/mapping-dir/manad.dgn



SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

NONDETECT (123)

DETECTED (9)

EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (9)

SCREENING LEVEL = 74.8 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-6

NATURE AND EXTENT
BENZO(A)ANTHRACENE

/home4/pensacola-fs/mapping-fs/mainxl.aml

SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

NONDETECT (126)

DETECTED (10)

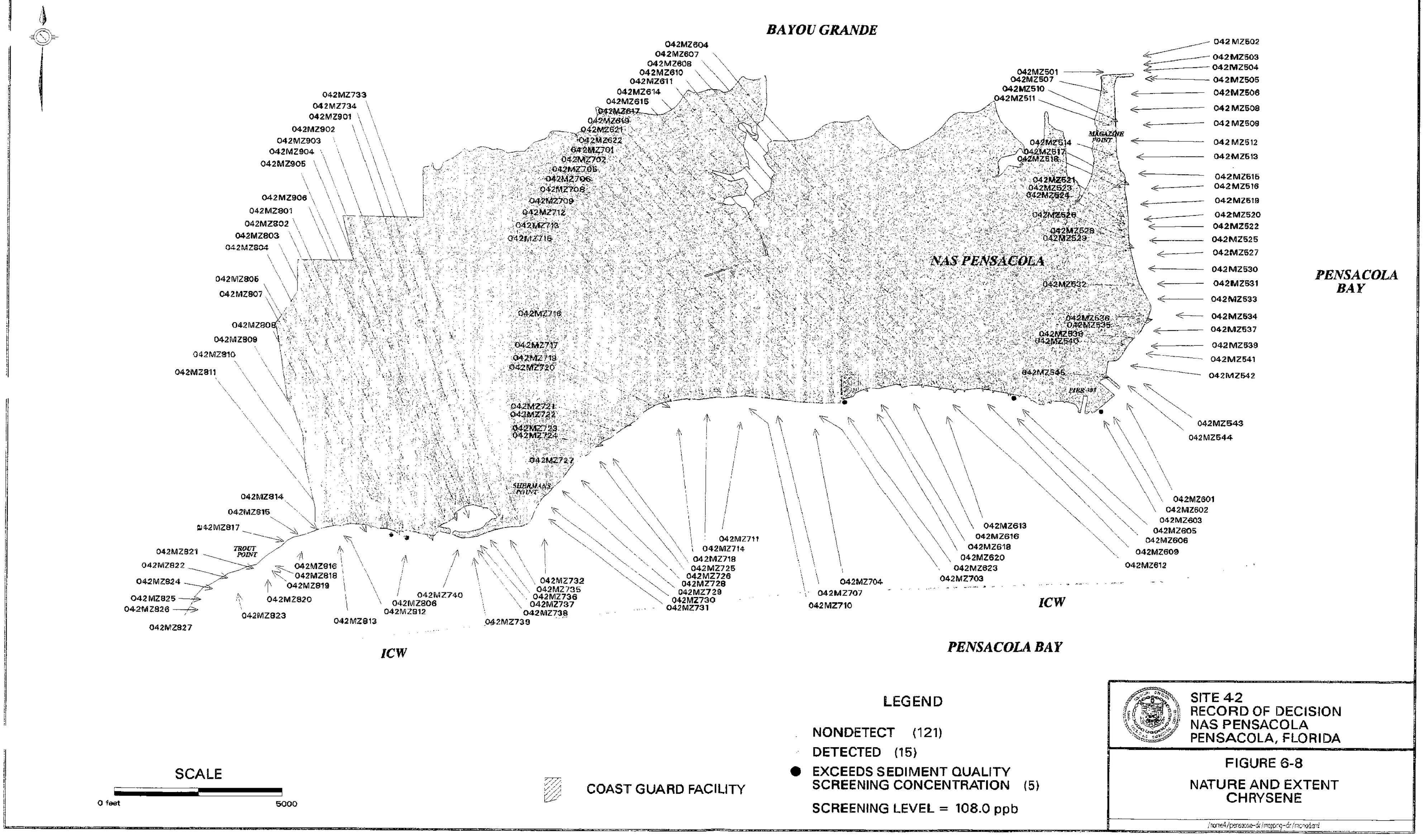
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (5)

SCREENING LEVEL = 88.8 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-7

NATURE AND EXTENT
BENZO(A)PYRENE


BAYOU GRANDE
042MZ604
042MZ607
042MZ608
042MZ610
042MZ611
042MZ614
042MZ615
042MZ617
042MZ619
042MZ621
042MZ622
042MZ701
042MZ702
042MZ705
042MZ706
042MZ708
042MZ709
042MZ712
042MZ713
042MZ715
042MZ716
042MZ717
042MZ719
042MZ720
042MZ721
042MZ722
042MZ723
042MZ724
042MZ727
SHERMANS POINT
042MZ733
042MZ734
042MZ901
042MZ902
042MZ903
042MZ904
042MZ905
042MZ906
042MZ801
042MZ802
042MZ803
042MZ804
042MZ805
042MZ807
042MZ808
042MZ809
042MZ810
042MZ811
042MZ814
042MZ815
042MZ817
042MZ821
042MZ822
042MZ824
042MZ825
042MZ826
042MZ827
TROUT POINT
042MZ816
042MZ818
042MZ819
042MZ820
042MZ823
042MZ813
042MZ740
042MZ806
042MZ812
042MZ739
042MZ732
042MZ735
042MZ736
042MZ737
042MZ738
042MZ711
042MZ714
042MZ718
042MZ725
042MZ726
042MZ728
042MZ729
042MZ730
042MZ731
ICW
NAS PENSACOLA
042MZ501
042MZ507
042MZ510
042MZ511
042MZ502
042MZ503
042MZ504
042MZ505
042MZ506
042MZ508
042MZ509
MAGAZINE POINT
042MZ512
042MZ513
042MZ515
042MZ516
042MZ519
042MZ520
042MZ522
042MZ525
042MZ527
042MZ530
042MZ531
042MZ533
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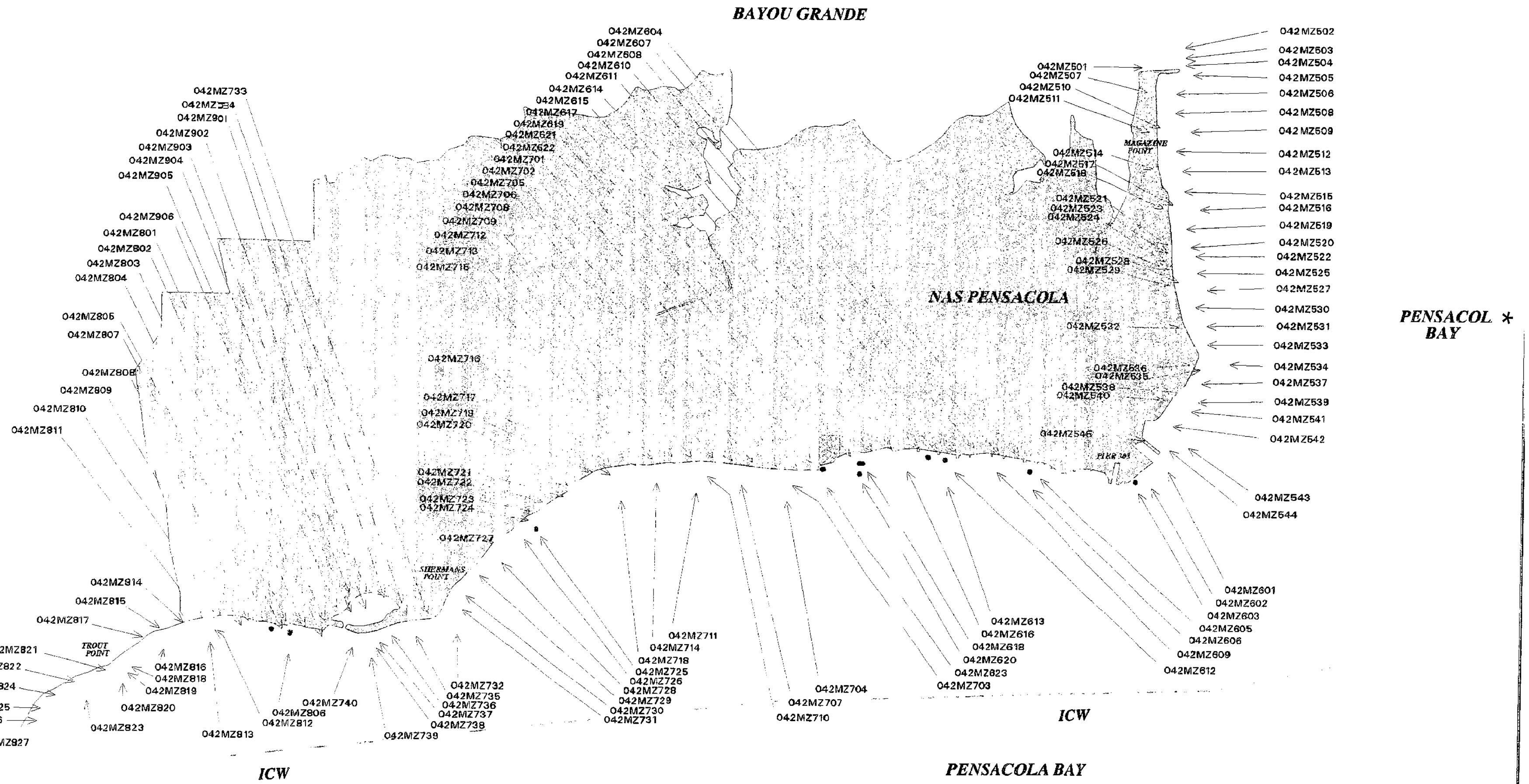
042MZ538
042MZ540
042MZ545
PIER 193
042MZ704
042MZ707
042MZ710
042MZ613
042MZ616
042MZ618
042MZ620
042MZ623
042MZ703
042MZ601
042MZ602
042MZ603
042MZ605
042MZ606
042MZ609
042MZ612
ICW
PENSACOLA BAY
PENSACOLA BAY
SCALE
0 feet
5000
COAST GUARD FACILITY
LEGEND
NONDETECT (121)
DETECTED (15)
EXCEEDS SEDIMENT 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
/home4/pensacse-d/mapping-dr/mxd/arf



SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

NONDETECT (116)

DETECTED (14)

EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (11)

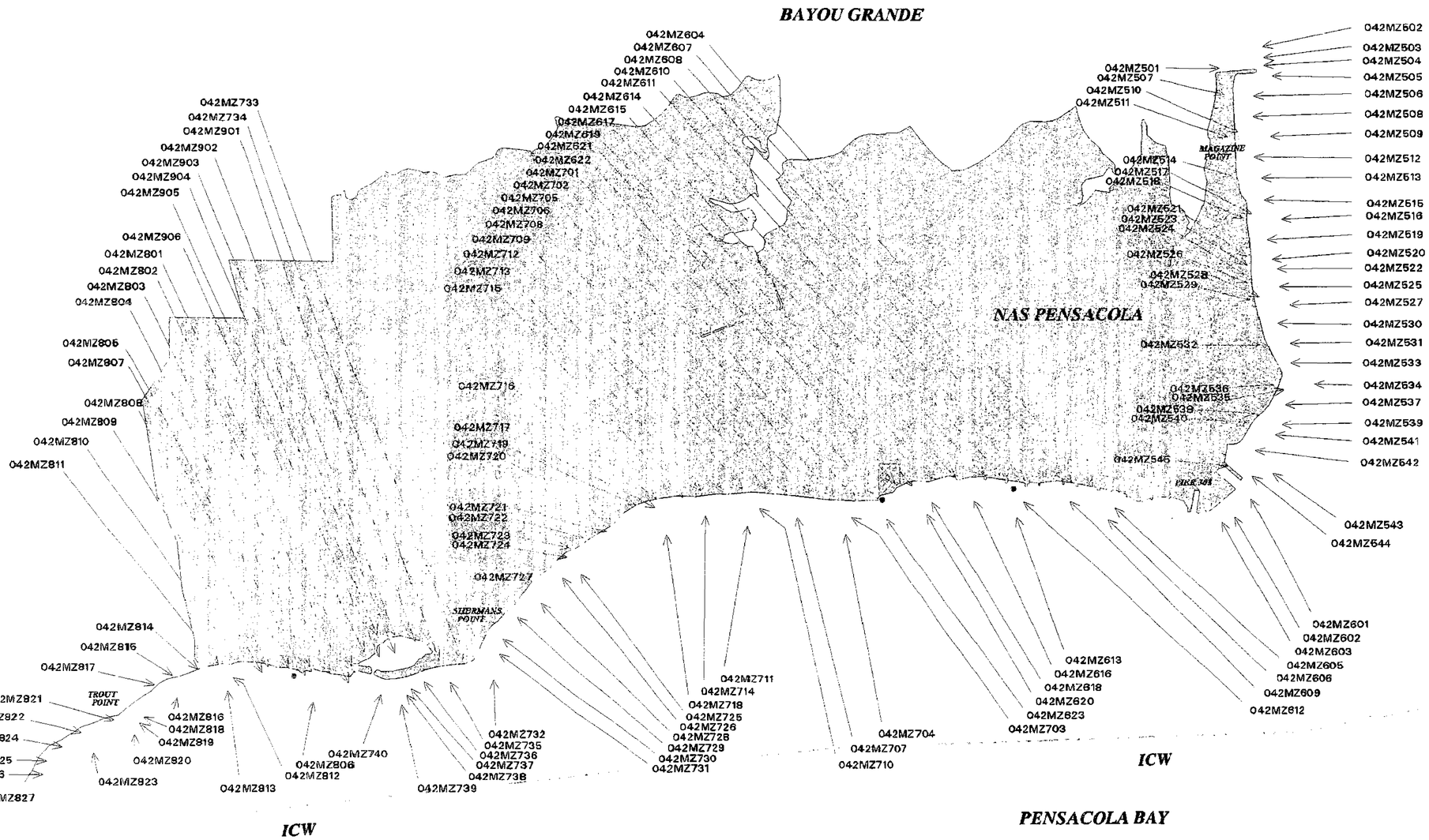
SCREENING LEVEL = 113.0 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-9

NATURE AND EXTENT
FLUORANTHENE

/home4/pensacola-9/mapping-3/mapped.cgm



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

/home4/pensacola-d/mapping-d/marea1.ai

SCALE

0 feet 5000

COAST GUARD FACILITY

LEGEND

NONDETECT (125)

DETECTED (11)

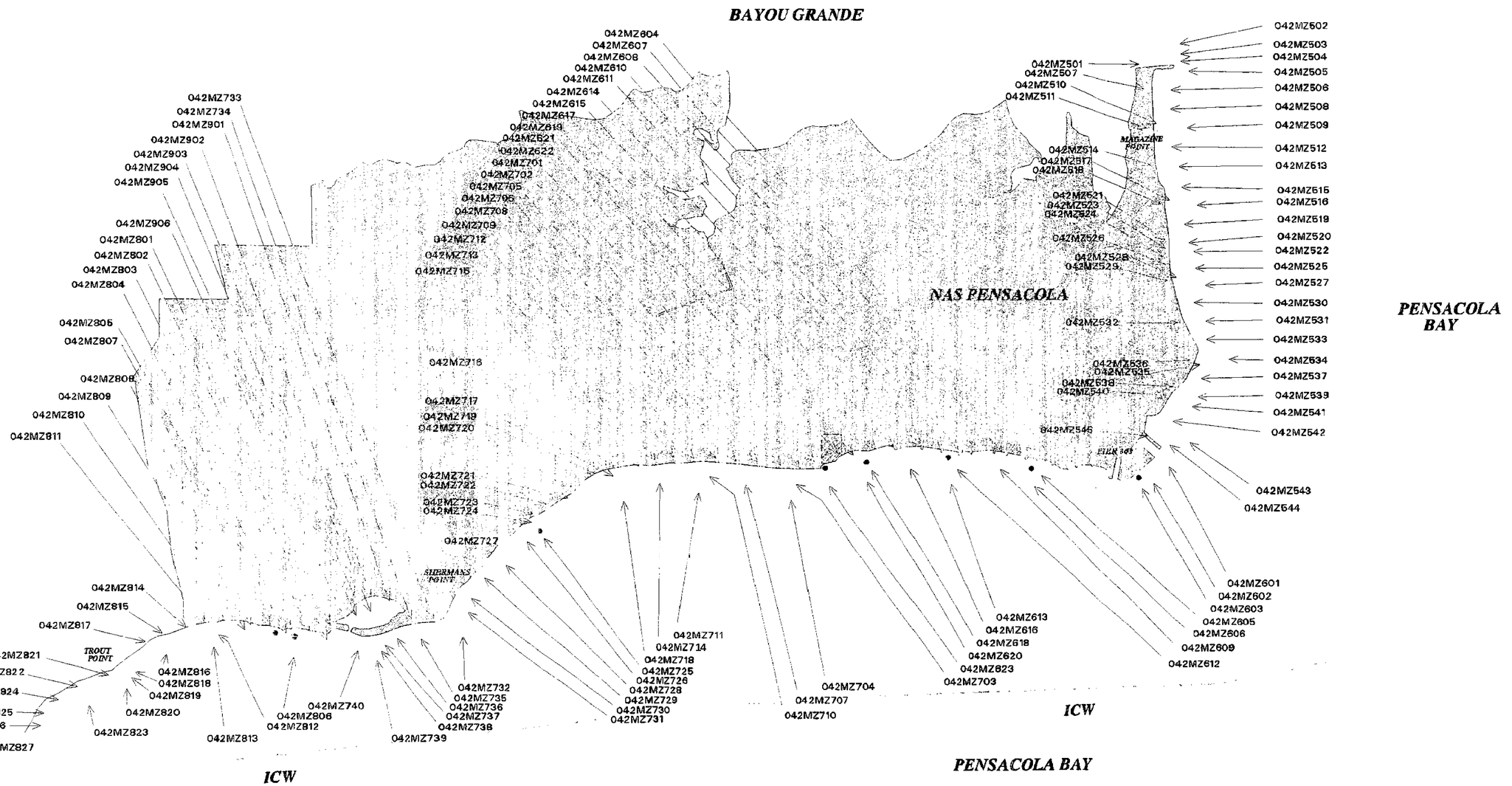
● EXCEEDS SEDIMENT QUALITY SCREENING CONCENTRATION (5)

SCREENING LEVEL = 86.7 ppb

SITE 42
RECORD OF DECISION
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 6-11

NATURE AND EXTENT
PHENANTHRENE



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

/home4/pensacola-ds/mapping-ds/manod.aml

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**	1393	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 must 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 limited extent suggests a low risk to ecological resources.

PesticidestPCBs

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 fur 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 tu 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 tu *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) arid 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 nut

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 fur 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 **43** sediment is submerged year-round. Consequently, assessing **sediment exposure as** if it were soil would **riot 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 **contarninants. 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) indicâte 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 (fur 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-ofdeparture 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 3x106 (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 tu 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	0.0003	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**. **Appl**icable 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 axe 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 IIE **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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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 hanardous 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;** I 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.

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.

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.

Appendix B

Responsiveness Summary

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.

Summary of Comments Received During the Public Comment Period

No comments were received during the public comment period,