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CONTAMINATION ASSESSMENT/ REMEDIAL ACTIVITIES INVESTIGATION WORK PLAN - GROUP C NAVAL AIR STATION PENSACOLA PENSACOLA, FLORIDA

Waterfront Sediments (Site 2)
Magazine Point Rubble Disposal Area (Site 13)
Dredge Spoil Fill Area (Site 14)

July, 1990

Prepared for:

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1. INTRODUCTION

The purpose of this work plan is to outline the procedures and methodologies to be used in conducting a Contamination Assessment/ Remedial Activities Investigation at the Waterfront Sediments Site (Site 2), Magazine Point Rubble Disposal Area (Site 13), and the Dredge Spoil Pill Area (Site 14), located at the Naval Air Station (NAS) in. Pensacola, Escambia County, Florida. This work plan has been prepared by Ecology and Environment, Inc. (E & E) for the Southern Division, U.S. Navy, Naval Facilities Engineering Command, under Contract No. N62467-88-C-0200. The work plan has been developed based on information and file documents provided by the Navy and on information gathered by E & E during preliminary site inspections conducted during January of 1989.

E & E has developed a phased approach for performing the NAS Pensacola site investigations. Phase I (Field Screening) is directed toward identifying the principal area(s) and primary contaminants of concern at a site, thereby providing a mechanism for focusing of the sampling and analytical efforts during subsequent phases of the investigation. Phase II (Characterization) is directed toward the formal confirmation and quantification of the full spectrum of site contaminants (if any), thereby alloving determination of whether further investigation is varranted. Thus, the necessity of implementing Phases III and IV (Extent Delineation) will be dependent on the results of Phases I and 11. Phases III and IV, if required, will be directed not only toward fully identifying the horizontal and vertical extents of contamination, but also tovard providing the quantitative data base necessary to support the screening and evaluation of potential remedial alternatives. The main objectives/advantages of this phased approach are as follovs:

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- Efficient identification of those sites where environmental contamination has actually occurred as a result of past and/or present operations, thereby alloving non-contaminated sites to be eliminated from the prograa in the most environmentally sound, cost-effective, and timely manner possible;

- Focused placement of sampling locations and focused selection of analytical parameters in later phases of the investigation, thereby alloving full characterization of site contamination in the most environmentally sound, cost-effective, and timely manner possible; and

- Early screening of potential remedial alternatives, vhich, in turn, allows critical parameters necessary to the evaluation of these alternatives to be incorporated into the analytical program in later phases of the investigation.

It is anticipated that some of the NAS Pensacola sites may not require investigation beyond Phase II and hence will comprise Contamination Assessment-type investigations. On the other hand, sites which have documented contamination will likely require the additional phases of vork, and hence will comprise a full-scale CERCLA Remedial Investigation/Feasibility Study (RI/FS). For simplicity, the investigations for all NAS Pensacola sites will be referred to as Contamination Assessment/Remedial Activities Investigations. The final results of site investigations that do not require study beyond Phase II will be incorporated into a Contamination Assessment Report. If appropriate, these sites will be recommended for No Further Action. The final results of site investigations that require vork beyond Phase II will be incorporated into a Remedial Investigation Report, vhich will provide all the information necessary for the development and completion of a Feasibility Study.

Sites 13 and 14 and their surrounding vicinities likely [do] not contain potentially hazardous materials and contamination. Consequently, it is probable that the scope-of-vork at these sites will not encompass a full-scale RI/FS effort. Site 2, hovever, has been found to contain potentially hazardous materials. Consequently, it is probable that the scope-of-vork at this site will encompass a full-scale RI/FS effort.

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2. SITE DESCRIPTION

The Naval Air Station (NAS) Pensacola facility occupies approximately 5,589 acres on a peninsula in southern Escambia County, five miles southvest of the City of Pensacola. This peninsula is bounded on the north by Bayou Grande and on the east and south by Pensacola Bay.

Three sites, each along the Pensacola Bay waterfront of NAS Pensacola, have been considered as one group in this workplan package (see Figure 2-1). These three sites will be considered separately in each of the workplan sections as described below.

2.1 Site 13 - Magazine Point Rubble Disposal Site

The Magazine Point Rubble Disposal Site (Site 13) is located on the east side of a north to south-oriented peninsula on the eastern border of NAS Pensacola. Site 13 extends north from the northeast corner of Chevalier Field along Pensacola Bay to Magazine Point (see Figures 2-1 and 2-2). The site covers approximately half of the land on the northern portion of the peninsula. The southern end of the site extends west from the waterfront to the edge of Chevalier Field. The site has little topographic relief, even after years of building material disposal, and there are no surface water bodies or monitoring wells found on site.

A road that traverses the entire length of the site is clay-surfaced except €or the southern portion which is paved. The *rest* of the site *is* undeveloped and covered primarily by shrubs and small stands of deciduous and pine trees. Soils are primarily sands with packed clay on the unpaved road.

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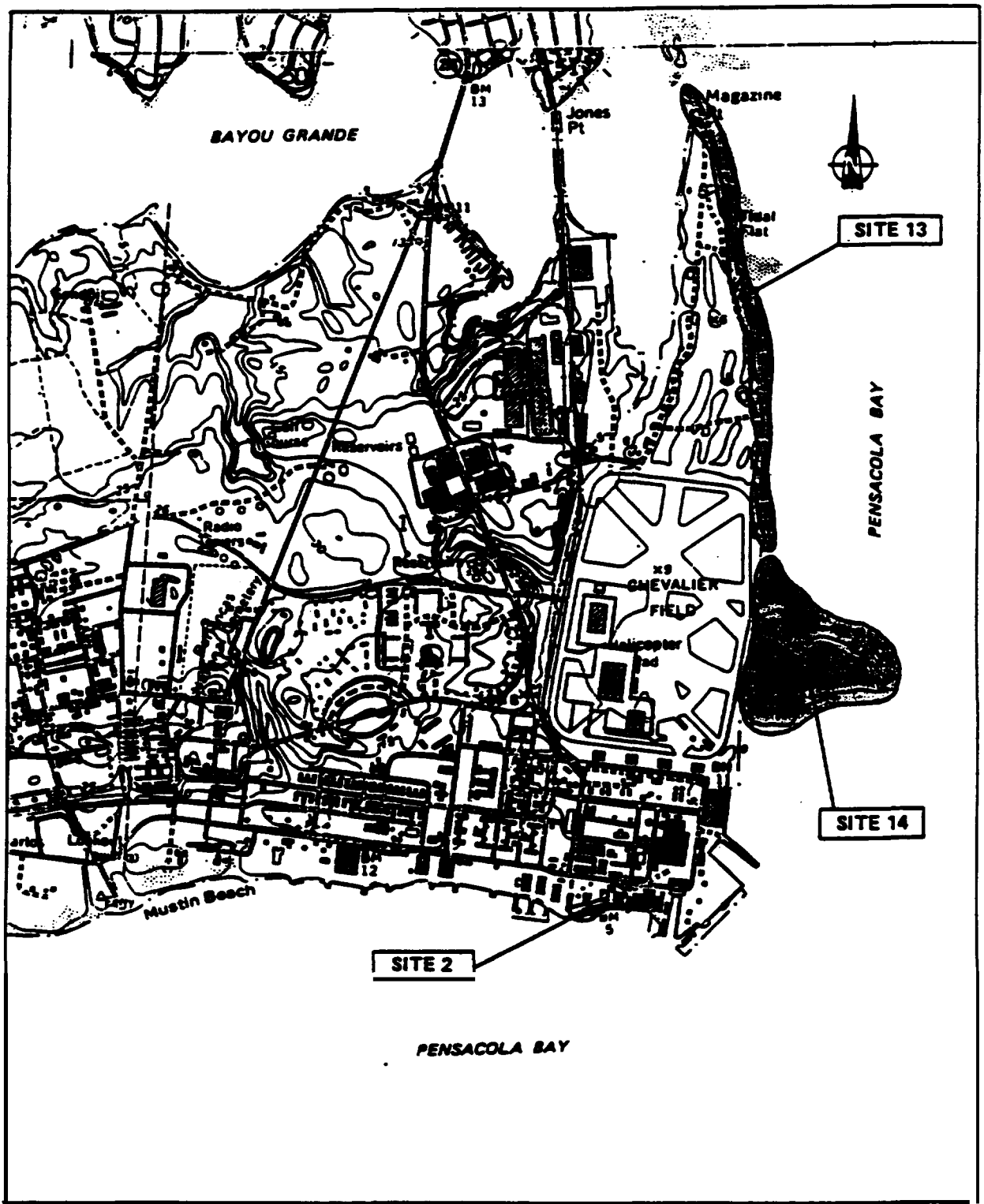

SOURCE: U.S.G.S. 7.5 Minute Series (Topographic) Quadrangle Fort Barrancas, Fla. 1970 and West Pensacola, Fla. 1970, Photorevised 1987

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Figure 2–1 LOCATION MAP – NAS PENSACOLA – SITES 2, 13, and 14

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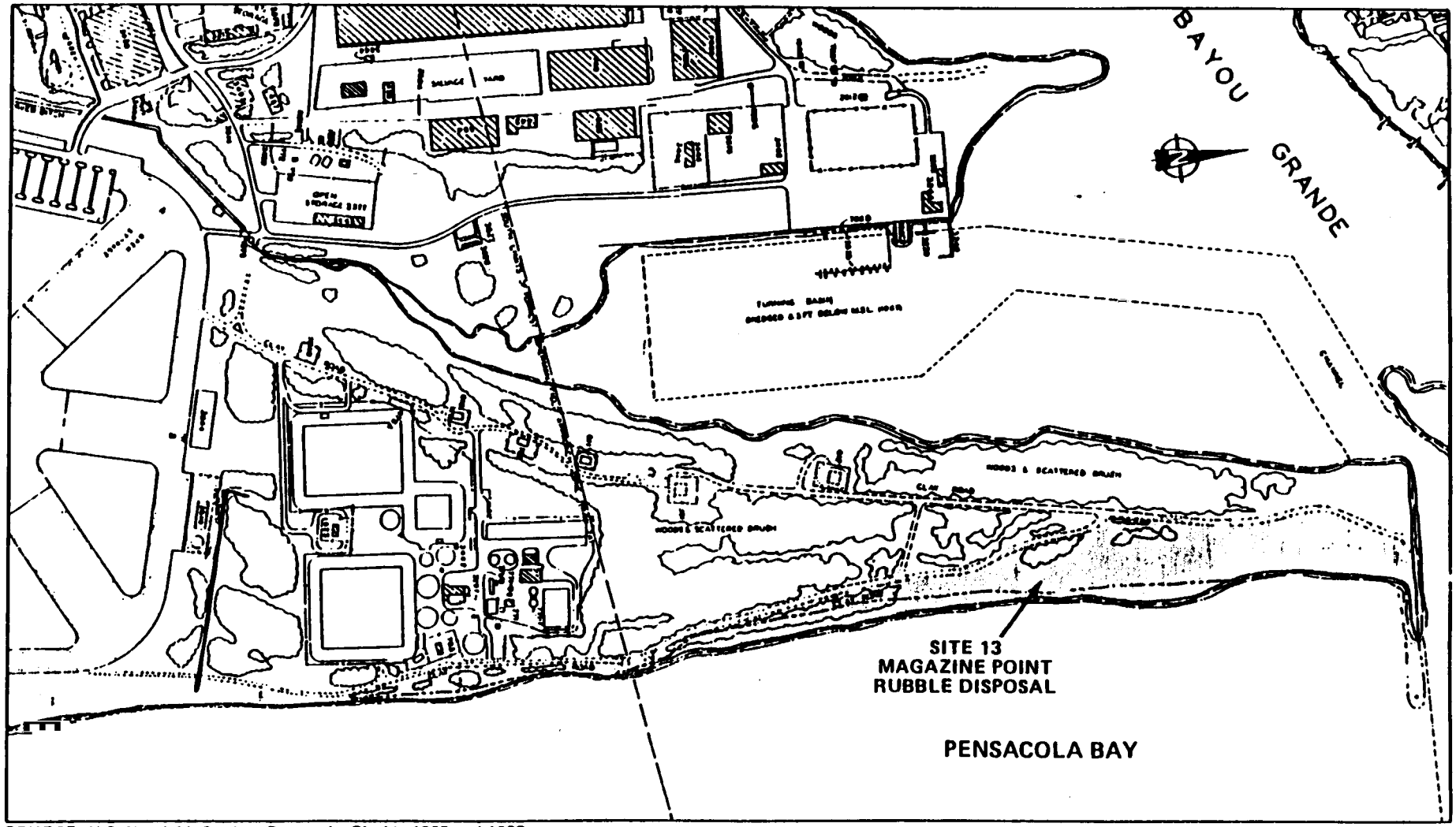

SOURCE: U.S. Naval Air Station, Pensacola, Florida 1987 and 1988.

SCALE
0 200 400 600 800 1000 FEET

Figure 2–2 SITE MAP – NAS PENSACOLA SITE 13

There are several sites located in the vicinity of Site 13. Site 14, the Dredge Spoil Fill area, is located approximately 200 feet from the southernmost extent of Site 13. The sites which are identified as part of the Industrial Wastewater Treatment Plant (IWTP) include: Site 32--IWTP Sludge Drying Beds, Site 33--IWTP Ponds, and Site 35--Miscellaneous IWTP SWMUs, are located approximately 200 to 300 feet vest of Site 13, and north of Chevalier Field. Site 11, the North Chevalier Field disposal area, is located approximately 1,000 feet to the vest of Site 13, dong the waterfront of Bayou Grande.

2.2 Site 14 - Dredge Spoil Pill Area

The Dredge Spoil Pill Area (Site 14) lies along the waterfront east of Chevalier Field approximately 200 feet south of the southern edge of Site 13 (see Figures 2-1 and 2-3). The east side of Site 14 is bordered by Pwacola Bay. The site area was created by the dredging activities conducted in the late 1970s to create an aircraft carrier turning basin and port. Since this arm of land was created by dredge spoil materials fra the Bay, it is considered state-ovned land and not Navy property (NEESA 1983).

There are no buildings, monitoring wells, or paved areas found on site. Two major depressions are found within the site, one in the northern area and a larger one along the southern edge of the site (see Figure 2-3). It is speculated that these depressions were created during the disposal of dredge material to control runoff during spoil discharge. These depressions have acted, to some degree, as settling basins for turbid runoff associated with dredging activities. Grassy vegetation currently occupies the bottom of each depression. The spoil areas around these depressions are approximately 10 feet above mean sea level.

2.3 Site 2 - The Waterfront Sediment Site

The Vaterfront Sediment Site (Site 2) is located on the southeastern corner of the NAS Pensacola facility (see Figures 2-1 and 2-4). This site is the area of nearshore sediment along the vaterfront, adjacent to the base of the storm sever outfalls. These outfalls range in size from six to thirty-six inches in diameter and emptied hazardous vastes into

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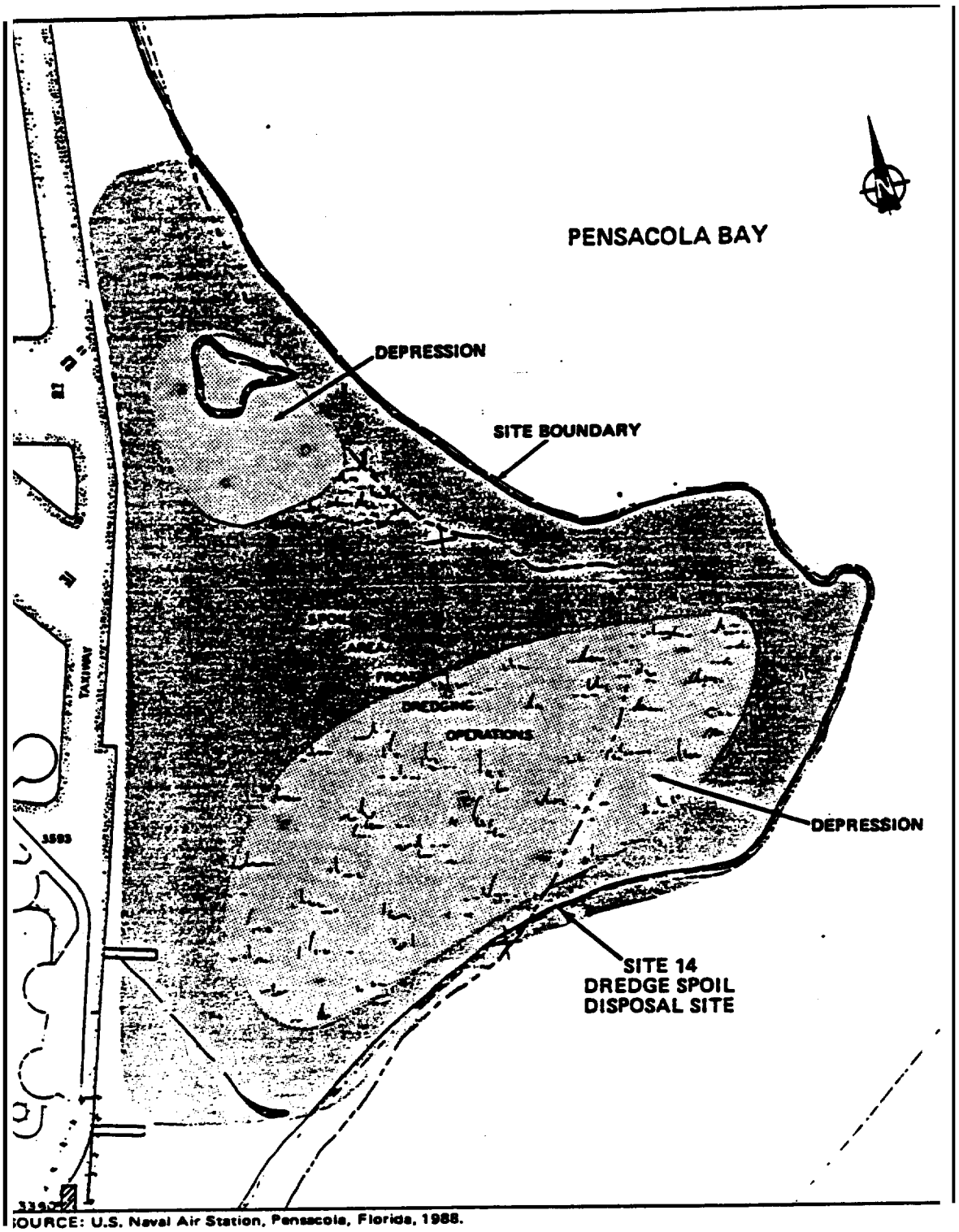


SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1988.

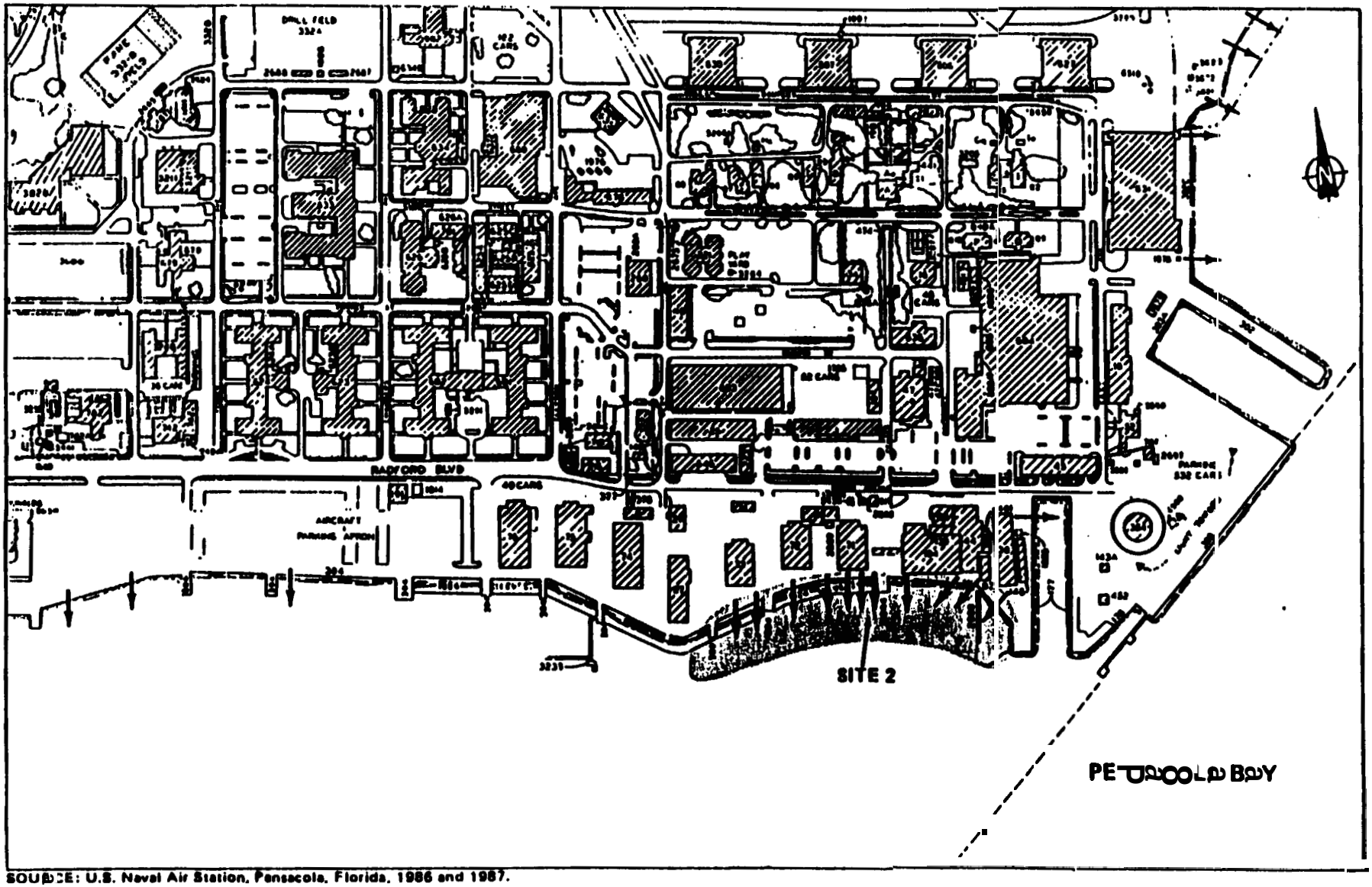
SCALE

0 200 400 600 800 FEET

KEY:

Grasses

Figure 2-3 SITE MAP – NAS PENSACOLA SITE 14



SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1986 and 1987.

KEY:
→ Storm Sewer Outfalls

SCALE
0 200 400 600 800 FEET

Figure 2–4 SITE MAP – NAS PENSACOLA SITE 2

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Pensacola Bay from approximately 1935 to 1973 (NEESA 1983). The outfalls are located from Building 632 east past the dock for the USS Lexington and north to the waste water treatment plant discharge outfalls (Figure 2-4).

An extensive concrete levee **has** been constructed along the southeastern portion of the base that extends underwater into Pensacola Bay. The levee was constructed to protect the NAS facility perimeter from wave action associated with the bay. **It** consists of a vertical seawall 3 to 4 feet high built on top of a concrete platform which covers the Bay bottom and extends out into the subtidal zone of the Bay. Storm sever outlets are located along the vertical seawall (see Figure 2-4) and empty an unknown amount of storm water runoff into Pensacola Bay (Geraghty and Hiller **[G & M]** 1986).

The nearshore sediments have been described in a Gulf Homeporting study conducted by the Navy for facility expansion in 1986 (Navy 1986). Although few sediment samples were taken immediately offshore from the **NAS** facility, other Bay studies have found the bottom to consist of fine sands to a depth of 30 feet and from 30 feet to the deepest portions of the shipping channel, the sediments range from silty sands to fine muds (Navy 1986).

Five hundred feet to the north of Site 2 lies Site 18--PCB Spill Area, and approximately 500 feet to the northeast, along the berthing pier, lies Site 20--Pier Pipe Leak. Approximately 1,000 feet vest of the westernmost storm sewer outfall lie Site 21, Sludge at the Fuel Tanks, and Site 28, the Transformer Accident.

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3. SITE HISTORY

3.1 Site 13 - Magazine Point Rubble Disposal Site

Site 13 was used for the deposition of clean fill materials for an unknown period of time. Host of the materials disposed at this site consist of building rubble, bricks, metal, concrete, and wood. Materials were primarily disposed from the clay road east to the vaterfront and in some places in the water close to shore. It is not known how many cubic yards of the material were disposed on site. According to the IAS completed by the Navy, no hazardous wastes were disposed on this site (NEESA 1983).

3.2 Site 14 - Dredge Spoil Fill Area

As discussed in Section 2, Site 14 was created by disposing dredge material from Pensacola Bay along the shorefront east of Chevalier Field. This area of land was at one time the site of state-owned submerged lands and is presently not considered Navy property. Dredge material was disposed between 1975 and 1977 from dredging operations for the aircraft carrier turning basin (NEESA 1983). Contaminants that may be found in the dredge material are unknown. It is probable that whatever compounds were present in the marine sediments offsore of NAS Pensacola are still present in these dredge sediments.

3.3 Site 2 - Waterfront Sediment Site

Beginning in 1939, untreated industrial wastes from the Naval Aviation Depot (NADEP) and the Naval Air Rework Facilities (NARF) operations were discharged directly into Pensacola Bay. At least 83 million gallons of untreated waste [consisting] of paint, paint solvents and thinners, ketones, trichloroethylene, Alodine, mercury, radium paint, and concentrated plating wastes (primarily chromium, cadmium, lead, nickel,

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and cyanide) were disposed into the Bay until 1973 when the industrial waste treatment plant was put into operation (G & M 1984).

Environmental studies of Site 2 were first conducted under the direction of the Navy Assessment and Control of Installation Pollutants (NACIP) Department (NEESA 1983). During this study, sediment samples were collected and analyzed with EP toxicity methods (see Table 3-1 for analytical results). Elevated levels of lead (11 and 5 ppm) and chromium (8 ppm) were detected in nearshore sediments. Methodologies for these studies did not utilize the current methods approved by the Florida Department of Environmental Regulation (FDER)(Schropp and Windom 1988). FDER has developed a two-acid digestion protocol as a first step in an atomic absorption technique for analyzing total metals concentrations in marine sediments (essentially modified EPA SW 846 methods). Results are then compared to a set of background data to determine whether the concentration of certain metals is elevated in the sediments.

A study conducted in 1984 by Thompson Engineering and Testing, Inc. (TET) collected four sediment samples along the four edges of the turning basin (see Figure 3-1) and analyzed them for sediment grain size, metals, PCBs, and other organic compounds. [The sediments at the northeastern side of the turning basin are sandy silt, clayey silt vith sand, and silty clay and are characterized as fine-grained. The sediments at the southvestern side of the turning basin are fine sands and fine sands vith silts and are characterized as coarse-grained.] No elevated levels of metals or PCBs were detected; however, some of the analytical methods used in the study were not the currently approved methods for marine sediment analysis.

G & M (1984, 1986) conducted a verification and characterization study at the NAS facility that examined Site 2. Six sediment samples were collected approximately 300 feet offshore [from] the storm sewer outfalls in about 30 feet of water (see Figure 3-1). These samples were analyzed with EP toxicity methods, but the laboratory analysis table in the report indicated that the samples were first filtered and then

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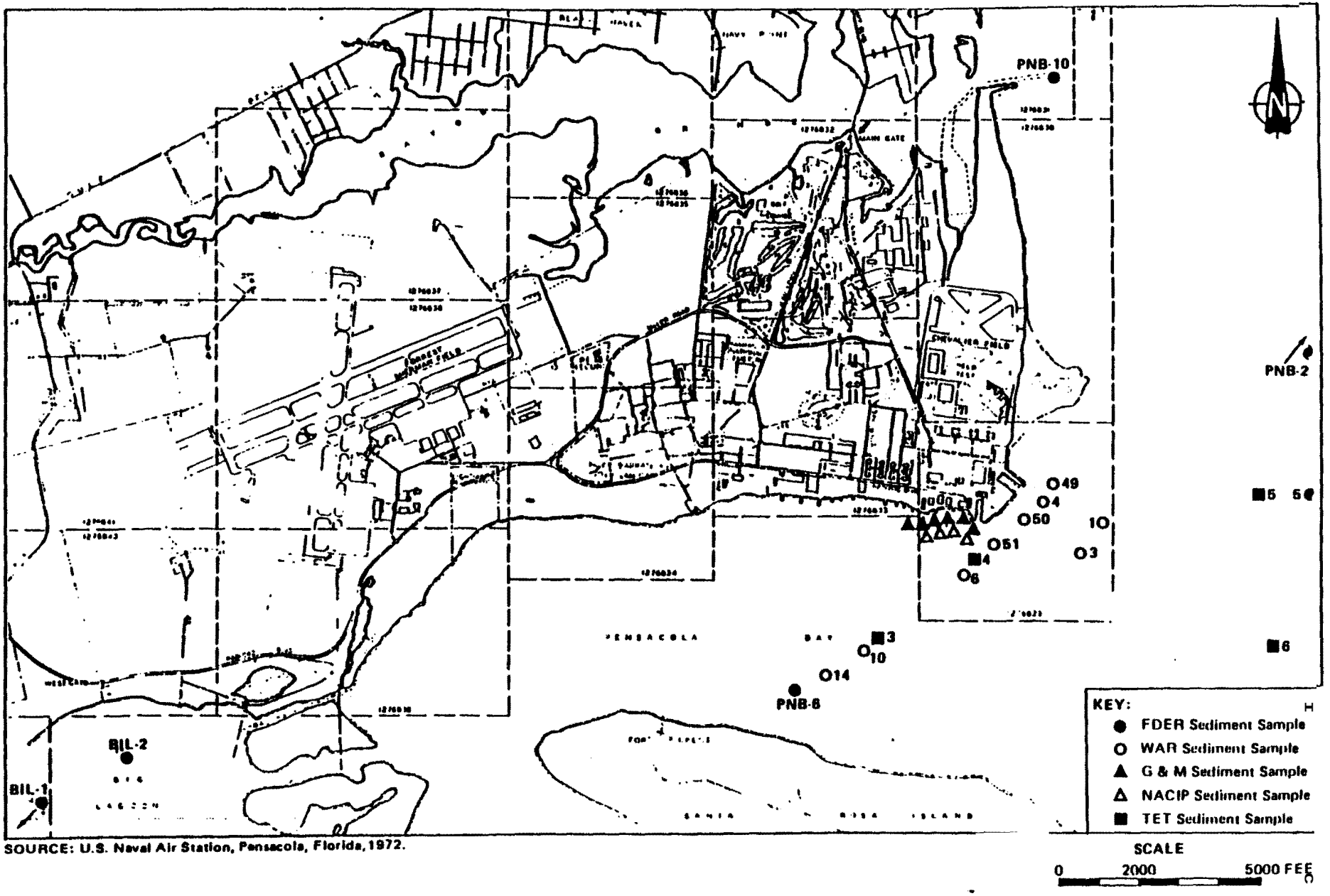
TABLE 3-1

METALS CONCENTRATIONS IN MARINE SEDIMENTS
NEAR NAS PENSACOLA

Station Number	Date	Study	Metal Concentrations (mg/kg dry weight)							
			Cd	Cr	Hg	Ni	Pb	Al	Zn	As
2	1/82	NACIP *	0.37	3.1	0.006	1.4	11	-	-	-
3			ND	8.0	0.022	-	-	-	-	-
4			0.13	1.1	0.01	-	-	-	-	-
5			0.12	0.69	0.031	0.06	5.0	-	-	-
1A	4/84	G&M **	<.01	<.01	<.005	<.1	<.1	-	-	<.001
1B			<.01	<.01	<.005	<.1	<.1	-	-	0.002
1C			<.01	<.01	<.005	<.1	<.1	-	-	<.001
1D			<.01	<.01	<.005	<.1	<.1	-	-	<.001
1E			<.01	<.01	<.005	<.1	<.1	-	-	0.003
1F			<.01	<.01	<.005	<.1	<.1	-	-	<.001
3	11/84	TET	0.007	1.82	0.096	0.63	0.7	920	1.9	-
4			0.032	6.94	<.02	3.99	1.9	4,320	7.7	-
5			0.094	60.2	<.02	20.9	17.4	30,900	47.8	-
6			0.080	44.9	0.062	13.4	8.9	21,700	32.5	-
1	3/86	WAR ***	0.25	91.7	0.175	-	2.1	34,400	56.4	-
3			0.06	28.0	<.1	-	<1.	10,835	15.8	-
6			<.05	3.15	0.125	-	<1.	1,385	4.1	-
8			<.05	3.36	<.1	-	<1.	565	2.8	-
10			<.05	2.41	<.1	-	<1.	284	2.1	-
49			0.09	40.9	0.12	-	<1.	14,850	68.3	-
50			0.08	4.27	<.1	-	1.1	3,595	14.0	-
51			0.06	33.0	<1	-	<1.	13,795	26.5	-
BIL-1	7/85	FDER	0.89	-	0.43	-	16.7	55,333	103.3	10.0
BIL-2	7/85		0.53	-	0.27	-	10.9	47,667	83.3	8.9
PNB-2	4/82		0.16	-	0.78	13.7	19.3	59,333	57.0	-
PNB-5	9/82		0.21	-	0.18	6.8	8.9	6,767	9.5	-
PNB-6	9/82		0.17	-	0.05	3.1	15.3	2,033	5.7	-
PNB-10	7/85		0.02	-	0.05	-	0.62	260	1.0	0.25

- = Not analyzed.
* EP Toxicity Analytical Methods.
** EP Toxicity Analytical Methods, results reported in mg/L.
*** Unknown analytical methods.

[Bold *items* enclosed in brackets denote changes from original text]



SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1972.

Figure 3 - 1 SEDIMENT SAMPLING LOCATIONS FROM PREVIOUS STUDIES CONDUCTED BY NAS PENSACOLA

extracted for metal concentrations. Trace amounts of arsenic (0.002 and 0.003 ppm) were detected in two samples. The laboratory results are reported in mg/L and not mg/kg; therefore, it is suspected that an elutriate test was performed on the sediment samples instead of a metals extraction test.

A study in support of an environmental impact statement was conducted in 1986 by the Navy, regarding the feasibility of expanding the facilities at NAS Pensacola. Water and sediment samples were collected in the turning basin and analyzed for heavy metals (see Figure 3-1 and Table 3-1). Even though the FDER recommended methodology was employed to evaluate the sediment data, the results for both water and sediments are suspect because several metals were analyzed with the wrong analytical methods, and detection limits and laboratory QA/QC data are not provided. According to their report: stations 49 and 51 sediments had elevated levels of chromium and zinc; stations 1 and 3 sediments had elevated levels of chromium; and station 50 sediments had elevated levels of zinc. Analytical methods reportedly used for analysis of samples for Chromium, polynuclear aromatic hydrocarbons, PCBs, phenols and other analytes were incorrect for marine sediments.

To determine if sediments have been enriched with anthropogenic sources of nitrogen (both organic and ammonia nitrogen) ratios of total Kjedahl nitrogen (TKN) to total organic carbon (TOC) concentrations were examined. If sediments are enriched with organic or ammonia nitrogen, the ratio will exceed 0.13; if not enriched, the ratio will be less than 0.13. WAR Station 10 was found to have TKN:TOC ratios exceeding that of natural sediments. Water quality data could not be evaluated from their report because the station numbers from their figure and analytical table did not match, and the methodologies for TOC and TKN were incorrect for marine sediments (WAR 1986).

FDER has collected sediment data from all of Pensacola Bay and has made this information available to E & E. Analytical results and sample station locations from FDER's study within Bayou Grande and the turning basin are given in Figure 3-1 and Table 3-1. The two stations located

southwest of the storm water outfalls, BIL-1 and BIL-2 in Big Lagoon, contained elevated levels of mercury, as did Station PNB-2, northeast of the turning basin (see Figure 3-1). Stations located east of the turning basin, PNB-5 and PNB-6, had elevated levels of lead. Ratios of TKN:TOC indicated nitrogen enriched sediments at stations PNB-5, PNB-6, and PNB-10 (FDER 1988).

From all of these studies it can be concluded that inadequate sampling was performed near the storm sewer outfalls (improper analytical methods), and not all suspected pollutants were analyzed for in the sediment analysis (metals analysis only). The levels of heavy metals found near NAS Pensacola indicate some possible contamination problem in the nearshore Bay sediments; however, the data base at hand does not indicate a clear source of the contamination. None of these studies addressed the bioaccumulation which may be occurring [in] shellfish in the area adjacent to the NAS facility. The concentrations of contaminants in the shellfish may be higher than those of the surrounding sediments due to bioaccumulation. The potential [for] human health effects from [ingestion of] contaminated shellfish [in] intertidal waters near NAS Pensacola exists, and therefore warrants further investigation of nearshore sediments.

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4. CLIMATOLOGY

The NAS Pensacola is located in an area that typically experiences a mild, subtropical climate. This climate is a result of the latitude (approximately 30° North) and the stabilizing effect of the adjacent Gulf of Mexico (Wolfe et al. 1988). The average annual temperature ranges from 55° Fahrenheit (F) in the winter to 81° F in the summer. Although the annual temperature range is fairly stable, actual daily values can be more extreme, ranging from less than 7° F in the winter to more than 102° F in the summer. Thunderstorms occur during approximately half of the days during the summer months and can cause a 10° to 20° F drop in temperature in only a few minutes (Wolfe et al. 1988).

Precipitation rates in the NAS Pensacola vicinity are relatively high with an average annual rainfall of approximately [60] inches. Rainfall amounts are highest in July and August during almost daily thunderstorms (averaging [7] inches per month) and lowest during spring and fall (averaging [4] inches per month)([Kennedy 1982]). High intensity thunderstorms are common, producing as much as three to four inches of rainfall during a single hour. Evaporation rates are also highest in the summer months, which reduces the potential recharge resulting from heavy summer rains. Spring and fall rains are generally less intense, but longer in duration, producing less surface runoff and higher rates of infiltration and net recharge.

Wind velocities are generally moderate except during thunderstorms (Carlisle 1960). Prevailing winds are northerly during the winter and southerly during the summer. An ocean-land temperature differential produces a daily clockvise rotation of the surface wind direction near

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the coast, commonly known as the sea-breeze effect (Flood and Associates 1978). Hurricanes and tornadoes are infrequent but can cause substantial damage to the nearshore environment. Six hurricanes have passed within 50 miles of Pensacola since 1980.

5. BIOLOGICAL RESOURCES

The NAS Pensacola facility consists of approximately 5,800 acres and encompasses approximately 15 terrestrial and aquatic habitats. The majority of the land on the eastern side of the facility is developed for military use or is designated as a historical or cultural resource. However, the NAS Pensacola installation has approximately 3,500 acres in natural or semi-natural (plantation) condition, primarily in the western portion of the facility.

5.1 Regional Biological Resources

5.1.1 Terrestrial

Vegetation. The primary vegetated communities of the NAS Pensacola facility can be considered one of two types: north Florida coastal strand communities; and sand pine scrub communities. The north Florida coastal strand communities are stabilized coastal dunes with a sand substrate, vegetatively characterized by the plants Uniuola paniculata (sea oats), Eydrocotyle bonariensis (beach pennywort), Ipomea stolonifera (beach morning-glory), Coccoloba uvifera (sea grape), Ouercus geminata (twin live *oak)*, and the stunted shrubs species Yucca aloifolia (yucca), Opuntia, and Cereus. This community type has been ranked by the Florida Natural Areas Inventory (FNAI) as locally restricted and vulnerable to extinction due to developmental activities. This community type can have 3 to 5 distinct habitat types (Wolfe et al. 1988).

The sand pine scrub community is a more upland coastal community characterized by coastal dune formations from an older geologic age with deep, fine white sand substrate and the plants Pinus clausa (sand pine),

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Quercus spp. (scrub oak species, geminata, champanii, myrtifolia, and inopina), Cladonia species, and Ceratiola ericoides (rosemary). This community type has been ranked by FNAI as imperiled statewide because of its rarity and because of its vulnerability to extinction due to some man-made or biological factor. This community type can have 3 to 5 distinct habitats (Wolfe et al. 1988).

Two other community types may be found in the western portions of the NAS Pensacola facility. These are flatwoods and sandhill vegetative communities. Platwoods vegetation occupies areas which were ocean bottoms in recent geologic times. Primary overstory vegetation is dominated by Pinus palustris (longleaf pine), Pinus elliottii (slash pine), and Serenoa repens (saw palmetto). Flatvoods communities also occupy areas of low depressions and small creeks and drainage courses, but the overstory vegetation is usually replaced by Taxodium ascendens (pond cypress), Cliftonia monophylla (black titi), Cyrilla racemiflora (swamp titi), and other hydric or riparian species. Open moist savannah areas within flatwoods are dominated by the herbaceous plants Pinguicula spp. (butterwort), Sarracenia spp. (pitcher-plants), Uticularia spp. (bladderworts), Polygala spp. (milkworts), and Drosera spp. (sundews)(Wolfe et al. 1988).

Sandhill communities are found in dry soils which are lower in fertility than flatwoods soils. The overstory of this community type is dominated by Pinus palustris (longleaf pine), Quercus laevis (turkey *oak)*, Q. marilandica (bluejack *oak)*, Q. stellata (post *oak)*, and Q. falvata (southern red *oak).* The understory is dominated by Diospyros virginiana (wild persimmon) and Crataegus lacrimata (Pensacola hawthorn). The more abundant herbaceous plants found in moist areas are Pteridium aquilinum (bracken fern) and Aristida stricta (wire grass). These habitats were verified with walk-through surveys and ground truthing by the Navy in March of 1986 (Navy 1986).

Freshwater Wetland Vegetation. Much of the geological material underlying the NAS Pensacola facility is deep, porous sand often containing relatively impermeable clay lenses. In combination with high

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annual rainfall, this geologic condition causes the formation of small areas of perched groundwater. In areas with relatively steep slopes, groundwater seepage escapes into well-defined stream channels called steepheads as found near Site 30. In gently sloping areas, the presence of perched groundwater conditions results in the formation of wetland bogs, as found near Sherman Field. Wetland or seepage bogs are characterized by herbaceous plant species as described in the sections above for flatwoods and sandhill communities. Most of these communities and other vegetative communities east of Sherman Field have been considerably altered by development on the base that has changed surface and/or groundwater flow (NEESA 1983).

Shrub bogs are found within flatwoods, downslope of herbaceous bogs. These evergreen bogs are dominated by Cliftonia monophylla (black titi), and/or, Cyrilla racemiflora (swamp titi). Associated species include Clethra almifolia (sweet pepperbush), Ilex cassine (dahoon holly), and Lyonia spp. (fetterbushes)(Wolfe et al. 1988).

Intermittent streams found on NAS Pensacola have lost most of the original vegetation associated with this habitat. For example, at Site 30, the stream that empties the small swamp into Bayou Grande has lost a considerable amount of vegetation along the stream banks and near Bayou Grande as a result of base development. In areas unaffected by development, hardwoods dominate the canopy around the stream. Such species as Magnolia virginiana (sweetbay), Illicum floridanum (star anise), and Smilax bona-nox (spiked cat brier) are dominants of seepage or steephead streams (Wolfe et al. 1988).

Biota surveys must be conducted for any wetland or stream habitat that is influenced by a site, to determine which specific flora and fauna may be affected by site activities.

Birds. A literature search reveals 250 possible bird species associated with the area. Thirteen of these species are endangered and seven are species of concern (see Appendix C). In March 1986, the Navy conducted a survey and found 23 species of birds on the NAS Pensacola facility.

[Bold items *enclosed* in brackets denote *changes* from original text)

The Navy recorded moderate size rookeries of the great blue heron and found large numbers of nesting osprey in the southwestern portions of the NAS Pensacola facility. Because of the large number and diversity of habitats found around the facility and considering that the survey was conducted during a predominantly non-mating season, it is likely that there are more species of birds using the facility and surrounding waters as feeding and nesting sites than have been found.

Reptiles and Amphibians. During the 1986 survey conducted by the Navy, only four out of a possible 30 species of reptiles and amphibians associated with the area were identified on the NAS Pensacola facility, none of which are endangered. A recent check of the FNAI files confirms that the presence of the gopher tortoise, Gopherus polyphemus, can most likely be found in suitable habitats on the western portions of the facility (see Appendix C). Most all of the reptiles and amphibians that may be found on the facility can be expected to use the surface water bodies in some stage of their life cycle. Any contamination of surface water bodies can be detrimental to existing populations of reptiles and amphibians utilizing that water body.

5.1.2 Aquatic

Freshwater. Little is known of the flora and fauna inhabiting the streams, swamps, and bogs found on NAS Pensacola. These habitats may have been significantly altered for drainage control and base development. Some of the species associated with aquatic habitats are Sernotilus atromaculatus (creek chub), Gambusia affinis (mosquitofish), and Etheostoma sp. (darters). Birds, mammals, reptiles, and amphibians that associate with aquatic habitats may also be found in and around those sites with surface waters (Wolfe et al. 1988).

Coastal Vetlands. There are no reported coastal marshes or estuarine wetlands around the NAS Pensacola facility, principally along the low energy shores of Bayou Grande. The habitat type is usually dominated by saltmarch cordgrass (Spartina alternaflora) or black needlerush (Juncus roemarianus). A biota survey of these and other potential habitat areas will be conducted to determine the extent of estuarine flora and fauna.

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Seagrass beds are reported to be present within Big Lagoon along the southwestern portion of the NAS facility. These grassbeds are composed primarily of Thalassia testudinum, Syringodium filiforme, and Eialodule beaudettei. Seagrass beds in the area surrounding the facility have not been historically mapped and very little is known of their composition, locality, or aerial extent. Grass beds of unknown species composition extending along the north shore of Pensacola Bay in the 1950s disappeared by 1961. *An* examination of historical aerial photographs (see Section 12) may elucidate past distributions of seagrasses.

Plankton. The only existing study of the phytoplankton and zooplankton in the waters surrounding the NAS Pensacola facility was conducted by the Navy in Harch of 1986. The phytoplankton has been characterized as low in productivity (as compared to other Gulf coast estuaries), and mainly dominated by the diatoms Navicula tripuncata, Bacteriastrum spp., Chaetocerus spp., Thalassionema tzschoides, and Hemiaulus spp. The zooplankton is primarily dominated by Calonoid copepods and benthic invertebrate larvae. This study is very limited by the fact that samples were collected with undefined methods and only during the early spring. This sampling protocol does not define population fluctuations that are characteristic of low population abundances commonly found in estuaries during the summer months. Examination of the zooplankton data results in the same conclusions. It should be pointed out that any contamination entering Pensacola Bay from either groundwater or surface water sources may be accumulated in the invertebrate larvae that predominate most estuarine water bodies.

Benthos. Harine soft-sediment communities are found adjacent to the northern, eastern, and southern areas of the NAS Pensacola facility in Pensacola Bay. Although no intensive benthic surveys were conducted along the perimeter of the facility, surveys at nearby sites by the Florida Department of Environmental Regulation (FDER) and the Navy have described the benthic communities within Pensacola Bay as a vhole.

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FDER collected benthic samples in most of Pensacola Bay and found that the sediments were dominated by polychaetes (Aricidea spp., Capitella spp., various spionids and Haploscoloplos spp.) and bivalves (Anodontia alba and Tellina spp.) during most of the year. FDER samples collected along the wastewater treatment plant outfall show a drastic drop in species abundance and diversity close to the sewage outfall (Navy 1986). This indicates that the benthic community may have been negatively influenced by the sewage outfall.

Samples collected by the Navy (1986) indicate a low density yet moderate diversity of benthic infuanal organisms when compared to other estuarine systems within and around the turning basin. A complete comparison of the Navy's data can not be made to other literature at this time because their data is not given in numbers per unit area. However, the Navy's data reveals that very few deep dwelling organisms reside in the areas around the turning basin, and a lack of deep dwelling benthic organisms may be an indication of a benthic community under stressed conditions (Luckenbach et al. 1988).

Fish and Shellfish. Early studies of Pensacola Bay have identified 180 bony fish species and 7 cartilaginous fish species (Cooley 1978). The 13 most abundant species were spot (Leiostomus xanthurus), pinfish (Lagodon rhomboides), atlantic croaker (Micropogonias undulatus), gulf menhaden (Brevoortia patronus), bay anchovy (Anchoa mitchilli), longspine porgy (Stenotus caprinus), silver perch (Bairdiella chrysoura), southern hake (Urophycis floridana), inshore lizardfish (Synodus foetens), gafftopsail catfish (Bagre marinus), sand seatrout (Cynoscion arenarius), and spotted hake (Urophycis regia) (Heil 1988).

Fish diversity was highest in the more saline waters near the NAS Pensacola facility during spring and summer. In the less saline waters of East Bay, diversity was lowest in summer and highest during the winter months. Fish population density was the highest in the more saline waters, with peaks throughout the summer (Cooley 1978).

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Moderate densities of the blue crab (Callinectes sapidus), shrimp (Penaeus duorarum, P. setiferus, and P. aztecus), and oysters (Crassostrea virginica) have been collected throughout Pensacola Bay (Heil 1989). Shrimp are caught in greater abundances near NAS because of the higher salinities. Blue crabs and oysters are more readily caught in the East Bay area. In fact, the only legal shellfishing areas recognized by PDNR are in the East Bay area. Scallops (Aequipecten irradians) are collected only within grassbed areas. No information is available at this time on where scallops are collected by the general public and how many are removed. The nearest seagrass beds to the NAS facility are located in the Big Lagoon along the southwest portion of the facility.

Sport **and Commercial** Fishing. A moderate amount of commercial fishing occurs in Escambia county, accounting for 2% of the total Florida landings for 1980-85 (Navy 1986). The dominant finfish species in terms of total weight was the black mullet. The most economically important species of finfish was the red snapper. E & E examined the commercial landing data for Escambia county for 1987 and 1988 (Heil 1989) and found that the most important commercial species by weight were: black mullet (24% of county landings), brown shrimp (21%), vermillion snapper (19.5%), red snapper (7.6%), porgies (4.7%), and amberjack (4%). Other less important commercial fish caught were spanish mackerel, sand seatrout, black grouper, spotted seatrout, bluecrabs, and squid. This data, as well as the Navy's data, also suggests that a significant tuna fishery may be developing in the Pensacola Bay area (0 pounds landed in 1983, 1,582 pounds in 1987).

Sport Fisheries data is not available in the state of Florida at this time due to the lack of a state saltwater fishing license (Heil 1989). A telephone survey conducted by the U.S. Fish and Wildlife Service ranks the spotted seatrout as a primary fish species sought by fisherman in 1987. Following this species were: king mackerel, red drum, Spanish mackerel, groupers, red snapper, flounders, and sand seatrout. It is likely that the sport fishing catch equals or exceeds commercial landings for species sought by both interests (Navy 1986).

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The estuarine system is a very important element in the life history of most of the commercial and sport fishing species sought. Between 65 and 90 percent of all commercially valuable fish species are estuarine dependent during some phase of their life cycle. Shrimp, bluecrab and shellfish are known to release larvae that feed in and around estuaries until settlement. During early life history stages the juveniles reside within seagrass beds or other protected habitats until maturity. Any contamination of the water or sediments around NAS Pensacola could be detrimental to fish and shellfish population structure, or could be accumulated by the organisms residing near the facility.

Marine Mammals. Few mammals have been sighted within the area of the NAS Pensacola facility, most of the 13 species of mammals reported for the northeastern Gulf of Mexico stay predominantly in Gulf waters. The atlantic bottlenose dolphin (Tursiops truncatus), however, has been sighted regularly off the NAS Pensacola facility. Manatees have been sighted irregularly, with one recent sighting in the area recorded by the FNAI in October 1988. A goosebeaked whale (Ziphius cavirostris) was reported stranded on Santa Rosa Island, and a pilot whale (Globicephala macrorhynchus) was found stranded on a beach near Pensacola (Navy 1986).

Although no surveys of marine mammals have been conducted, it can be assumed that they are are quantatively ranked as uncommon to common in abundance within the waters surrounding the NAS Pensacola facility.

Threatened and Endangered Species. A number of threatened and endangered species (listed in Appendix C) have been identified in the vicinity of the NAS Pensacola facility. Many rare, threatened, and endangered species are associated with the wetland or bog habitats found on NAS Pensacola. A total of 57 occurrences for six plant species were recorded in an inventory conducted by FNAI (1988b) of the NAS Pensacola facility (see Appendix C). Most of these plants were found in the area around Sherman Field and habitats to the west. Any site remediation and, more importantly, any assessment of environmental endangerment, must consider the water level requirements of rare and endangered plant species, the foraging activities of birds in the waters surrounding the

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NAS Pensacola facility, as well as nesting and feeding animals on the facility grounds. Complete biotic surveys may be necessary to determine the presence of threatened or endangered species and potential pathvays of contamination to these species.

52 Site-Specific Biological Resources

Habitats within Sites 13 and 14 have been disturbed to varying degrees by base activities. Site 13 has a vegetative community dominated by pioneer-stage understory shrub-species and some associations of longleaf-slash pines. Mammals, amphibians, reptiles, and birds associated with coastal vegetated communities, as well as waterfront habitats, could be found in and around this site. Waterfront and wading birds may also utilize this site for resting areas. Site 14 is dominated by coastal dune grasses and some shrubs. Since the site is essentially a created sand dune area, it is expected that fauna associated with this coastal habitat may utilize this site for feeding, resting, and/or nesting. Site 2 can most likely support large numbers of waterfowl during the migration periods of October through Harch, and wading birds throughout the year. These bird species will be feeding on marine organisms and plants that may have been in contact with contaminated sediments around the NAS Pensacola facility. Site 2 would not directly affect any of the reptiles or amphibians found in this area except for the American alligator (Alligator mississippiensis) which feeds on fish and birds possibly contaminated by ingestion of sediments.

Site 2 may have some impact on the production of invertebrate larvae and their survival if contamination exists in the nearshore sediments. This site may also have affected the benthic populations adjacent to NAS Pensacola in some vay. Sediment samples taken near the storm water outfalls have been shown to contain various levels of heavy metals. These metals can bioaccumulate within benthic polychaetes and bivalves, and [can] then be consumed by other organisms higher in the food chain (e.g., shrimp, flounder, blue crabs, coastal birds); or these metals may have had an immediate toxicological effect [on] the structures of these benthic populations, thereby reducing the food resource found near the NAS Pensacola facility.

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6. SURFACE WATER HYDROLOGY

6.1 General Occurrence and Significance of Surface Water

The NAS Pensacola facility is located on a coastal peninsula bounded by Bayou Grande to the north, Pensacola Bay to the south and east, and Big Lagoon to the southwest. Pensacola Bay and Big Lagoon are partially separated from the Gulf of Mexico by Santa Rosa Island and Perdido Key, both of which are barrier islands.

Surface soils consist primarily of permeable sands which allow rapid infiltration of precipitation. This direct infiltration limits stream formation and constitutes the major source of recharge to the underlying Sand-and-Gravel Aquifer.

There are no naturally occurring perennial streams on NAS Pensacola; however, there are approximately 10 naturally occurring intermittent streams and numerous man-made drainage pathways which include many stormwater outfalls. Discharge is mainly to the south into Pensacola Bay, however, some small intermittent streams discharge into Bayou Grande to the north from Sherman Field and Chevalier Field (USGS 1970a and b).

The southwestern and northern portions of NAS Pensacola contain areas of freshwater wetlands. These are particularly sensitive areas formed by the intersection of the water table vith the land surface. These systems are defined by and dependent upon a dynamic vater-cycle, with periodic inundation and exposure corresponding to seasonal fluctuations in the water table.

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The discharge of surface waters into Pensacola Bay, Bayou Grandc, and the coastal wetland areas presents the potential for transport of contaminants into these systems. This could have a significant impact on seagrass and other sensitive plant communities, as well as on shell fishing, recreational fishing, urd swimming in these coastal zones. Discharges, either through the surface vater or groundwater, into wetland areas found on-site could also have a significant impact on the biotic communities that are dependent on those habitats.

6.2 Site-Specific Surface Water Hydrology

Sites 13 and 14 do not have any lentic or lotic bodies of water; however, both sites are adjacent to Pensacola Bay.

Site 2 is located within Pensacola Bay, and, excluding tidal influence, Bay vater moves generally from the northeast portions of the Bay to the southwest into the Gulf of Mexico, primarily due to the river inputs in the central and eastern portions of the Bay. Tidal influence is slight, vith a mean amplitude of 1.2 feet, and total Bay flushing is estimated to occur every 3 to 4 weeks (98,000 cfs out Pensacola Pass during tidal cycles)(Ketchen and Staley 1979). With each tidal period, a wedge of salt vater can move up into Pensacola Bay underneath the lens of freshvater floving out (Wolfe et at. 1988). Currents immediately offshore from the NAS facility have been modeled by the Navy (WAR 1986), and although this information has not been reviewed by E & E, it is predicted that currents would carry wastes in a southwesterly direction avay from the NAS facility and out of the Bay through Pensacola Pass. The influence of tidal currents along the bay bottom is not known at this time, but facility vastes may be carried up into Pensacola Bay if disposed of within the tidal current.

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7. PHYSIOGRAPHY AND HYDROGEOLOGY

7.1 Physiography and Regional Hydrogeology

7.1.1 Physiography

NAS Pensacola is located in the Gulf Coastal Lowlands Subdivision of the Coastal Plain Province physiographic division (Brooks 1981). The 5,800 acre facility is located on a peninsula bounded on the east and south by Pensacola Bay and Big Lagoon, and on the north by Bayou Grande. The most prominent topographic feature on the peninsula is an escarpment 'or bluff vhich parallels the southern and eastern shorelines and on which Fort Barrancas was built. In the eastern portion of NAS Pensacola the bluff runs north-south just to the west of Chevalier Field. Seaward of the escarpment is a nearly level marine terrace with surface elevations of approximately 5 feet above mean sea level (MSL). The central part of the peninsula, located landward of the escarpment, is a broad gently rolling upland area with surface elevations up to 40 feet HSL (USGS 1970a and b). Sandy soils occur throughout 'the NAS Pensacola area. As a result, most of the rainfall infiltrates directly into the subsurface. Consequently there are few streams or surface water bodies on the peninsula.

7.1.2 Regional Hydrogeology

There are three principal hydrogeologic units of importance which underlie the NAS Pensacola. These are, in descending order, the Surficial Aquifer, the Intermediate System, and the Floridan Aquifer System.

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7.1.2.1 Surficial/Sand-and-Gravel Aquifer

The Surficial Aquifer occurs from land surface to a depth of approximately 300 feet at NAS Pensacola and is [composed] of a sequence of unconsolidated to poorly indurated clastic deposits (Wagner et al. 1984). In this portion of Florida the Surficial Aquifer constitutes an important source of water supply and is called the Sand-and-Gravel Aquifer (SEGS 1986). The sediments making up this aquifer belong to all or part of the Pliocene to Holocene Series which, in this area, consist mainly of the Citronelle Formation overlain by a thin cover of marine terrace deposits. Given that the Sand-and-Gravel Aquifer is contiguous with land surface and recharge occurs principally by the direct infiltration of precipitation, the aquifer is particularly susceptible to contamination from surface sources. In the NAS Pensacola vicinity the Sand-and-Gravel Aquifer is made up of three zones based on contrasting permeabilities. These zones are referred to as the surficial tone, the low permeability zone, and the main producing zone (Wilkins et al. 1985).

Surficial Zone. "be surficial zone is contiguous with land surface and contains groundwater under vater table or perched water table conditions. The results of numerous borings conducted at NAS Pensacola (G & M 1984, 1986) indicate that the surficial zone ranges in thickness between 40 and 70 feet and [consists] of tan and brown fine to medium-grained quartz sand. Depth to the vater table vithin the surficial zone is variable depending on location and ranges from less than one foot near surface water bodies to more than 20 feet in areas of higher elevation. In general, the direction of groundvater flow is controlled by the topography and by discharge to surface water bodies. Consequently shallow groundvater in the surficial zone moves toward areas of lover elevation and/or the nearest surface water body. Overall, the surficial zone has a high permeability. Numerous aquifer (slug) tests and laboratory permeability tests conducted on wells in or sediments from the surficial zone at NAS Pensacola (G & M 1986) yielded hydraulic conductivity values ranging from 16 to 56 ft/day. Horizontal

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groundwater flow velocities in the surficial zone will depend on site-specific hydraulic conductivities and horizontal hydraulic gradients, however, velocities would generally be expected to be high.

Low Permeability Zone. Underlying the surficial zone is a zone of lower permeability sediments dominated by clay and silt-sized material. This zone is referred to as the low permeability zone. At NAS Pensacola this zone is generally composed of gray to blue sandy, silty, slightly fossiliferous (shelly) clay, and clayey sand ranging in thickness from 8 to 40 feet (G & M 1984, 1986).

The results of laboratory permeability tests conducted on samples from this zone indicate that vertical hydraulic conductivities are low, ranging from 4.2×10^{-5} to 9.9×10^{-2} ft/day. Thus, the low permeability zone probably functions as a confining or semi-confining unit inhibiting the flow of groundwater between the surficial zone and the underlying main producing zone. The low permeability zone has been encountered in at least 16 borings at widely spread locations throughout the NAS Pensacola (G & M 1984, 1986). Although additional boring or geophysical techniques would be required to confirm its presence at a given location, it is likely that this unit is ubiquitous at NAS Pensacola. Few, if any, wells are open to the low permeability zone at NAS Pensacola, thus, no information is available regarding groundwater flow direction.

Main Producing Zone. The bottom portion of the Sand-and-Gravel Aquifer is called the main producing zone and (consists] mainly of sand and gravel interbedded with thin beds of silt and clay. The depth at which the main producing zone is encountered is somewhat variable, ranging from 60 to approximately 120 below land surface at NAS Pensacola. This zone generally has the highest permeability characteristics due to thicker, and more persistent sand and gravel beds, and is tapped by most of the major wells in the Pensacola area (Uilkins et al. 1985). NAS Pensacola has three supply wells which produce water from this zone, however, due to high iron content in the water the wells are infrequently used (G & M 1986). The principal sources of water for NAS

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Pensacola are wells located at Corry Field, approximately 3 miles to the north. The thickness of the main producing zone can be highly variable; however, it is estimated to be up to about 100 feet at NAS Pensacola. Insufficient data exist for wells open to the main producing zone at NAS Pensacola to determine direction of groundwater flow vithin this zone; however, the flow direction is assumed to be generally routhvard under ambient conditions. Pumpage of the supply wells would locally cause groundwater in this zone to flow toward the wells.

As a result of the overlying low permeability zone groundwater within the main producing zone occurs under confined or semi-confined conditions. At one nested well location on NAS Pensacola (east of Building 648) the water level elevation in a well open to the main producing zone is approximately 7 fact lower than that in an adjacent well open to the surficial zone (G 6 I 1986). This indicates that a significant downward hydraulic gradient exists between these two zones. Thus, a considerable potential exists for vertical groundwater flow from the surficial to the main producing zone at this location. It is not known to what extent this potential exists elsevhere at NAS Pensacola.

7.1.2.2 Intermediate System

The lover limit of the Sand-and-Gravel Aquifer coincides vith the top of a regionally extensive and vertically persistent hydrogeologic unit of much lower permeability. This unit is referred to as the Intermediate System. In the vicinity of NAS Pensacola the top of the Intermediate System generally lies within the sediments termed Miocene Coarse Clastics or corresponds to the top of the Upper Member of the Pensacola Clay and occurs at a depth of approximately 300 feet (Wilkins et al. 1985). In general the Intermediate System consists of fine-grained sediments and functions as an effective confining unit which retards the exchange of water between the overlying Sand-and-Gravel Aquifer and the underlying Floridan Aquifer System (SEGS 1986). For the most part the entire sequence is poor to non-water bearing. However, relatively thin beds of sand exist within the unit which may yield small quantities of water. In the NAS Pensacola area the Intermediate System is

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[Bold items enclosed in brackets denote changes from original text]

approximately 1,100 feet thick and is composed of the lower portion of the Miocene Coarse Clastics, the Upper Member of the Pensacola Clay, the Escambia Sand Member of the Pensacola Clay, and the Lower Hember of the Pensacola Clay; all [are] of Miocene Age.

7.1.2.3 Floridan Aquifer System

Immediately underlying the Intermediate System and occurring at a depth of approximately 1,500 feet below land surface at NAS Pensacola is the Ploridan Aquifer System. The Floridan Aquifer in this area is [composed] of the Hiddle to Lower Miocene Chickasawhay Limestone and undifferentiated Tampa Stage Limestone. Groundwater within the Floridan Aquifer in this area is highly mineralized and is not used for water supply (Wagner et al. 1984).

7.2 Site Hydrogeology

In the immediate vicinity of Sites 13 and 14, the surficial zone of the Sand-and-Gravel Aquifer occurs from land surface to a depth of approximately *42* to 48 feet. This lithologic description of cuttings collected during the installation of monitoring wells GM-65, GM-66, and GM-67, located west of Site 13, indicates that this zone primarily [consists] of white to buff, fine to medium-grained quartz sand (G & M 1987b). Thirteen shaliow monitoring wells exist around the IWTP that are open to the surficial zone in the vicinity of Site 13 (G & M 1988). These wells indicate that the water table along the peninsula occurs approximately 1 to 3 feet below land surface depending on land surface elevation and tidal influence. Based upon studies conducted by G & H on the IWTP, ambient groundwater flow in the surficial zone is generally towards the Pensacola Bay or Bayou Grande, depending on proximity to either water body. However, seven recovery wells have been installed into the surficial zone to treat groundwater contaminated by the IWTP (G & M 1987a), with an average total pumping rate of *46* gallons per minute (gpm) or 1.987 million gallons per month (G & M 1988). This recovery system has been shown to locally influence groundwater flow near the western side of Site 13, redirecting groundvater flow towards the recovery system (G & M 1988). G & M (1987a) has information on the recovery wells installed around the IWTP that indicates specific

[Bold items enclosed in brackets denote changes from original text)

capacities ranging from 0.35 to 1.7 gallons per minute (gpm)/ft at a pumping rate of 6.2 to 45 gpm. Immediately underlying the surficial zone in the vicinity of Sites 13 and 14 and extending to a depth of approximately 55 feet is the low permeability zone of the Sand-and-Gravel Aquifer. Based on the cuttings from the installation of wells GH-63, GM-65, GM-68, and GM-74, this zone primarily (consists] of gray clayey silt with some shell fragments. No monitoring vells opening into the low permeability zone exist in the vicinity of Sites 13 and 14; however, based on the lithology, this tone vould be expected to function as a confining or semi-confining unit restricting the flow of groundvater between the surficial zone and the underlying main producing zone. The direction of groundwater flov within the low permeability zone is unknown.

The top of the main producing zone occurs approximately 55 to 60 feet belov land surface in the vicinity of Sites 13 and 14 (G & M 1987b) and consists of gray, fine- to medium-grained sand to a depth of at least 120 feet. Monitoring wells GM-63, GM-65, GM-68, and GM-74 are screened between 62 and 65 feet and apparently open to the main producing zone. Water level elevations in these wells are approximately 1 foot lower than in the nearby shallow wells, indicating a downvard hydraulic gradient between the surficial zone and the main producing zone (G & M 1987a).

The direction of groundwater flow within the main producing zone at these sites is unknown; however, a generally southern flov is expected under ambient conditions. An NAS Pensacola supply well (Well No. 2) is located approximately 3/4 mile vest-southvest of Sites 13 and 14, is screened betveen 105 and 160 feet belov land surface, and thus is open to the main producing zone. The well is utilized by NAS Pensacola for backup water supply only during periods of peak demand. However, during these periods of pumping the direction of flow in the main producing zone would be directly tovard the supply well. Insufficient data exists for vells open to the main producing zone to allov a determination of hydraulic gradient at NAS Pensacola.

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[Bold items enclosed in brackets denote changes from original text]

8. PROJECT MANAGEMENT PLAN

The Generic Project Management Plan (GPMP), submitted to the Navy for approval, defines fhe technical approach and schedule as well as the qualifications of personnel who will be directing and performing this Contamination Assessment/Remedial Activities Investigation. This work 'plan will incorporate and reference applicable technical and schedule sections, as appropriate, and will follow E & E's project management guidelines (see Section 22).

[Bold items enclosed in brackets denote changes from original text]

9. SITE MANAGEMENT PLAN

The Generic Site Management Plan (GSMP), submitted to the Navy for approval; defines the management procedures for field activities on both the site and program level. The management and implementation of all field activities conducted as part of the Contamination Assessment/ Remedial Activities Investigation of Site 1 will follow the GSMP, and any updated versions. Data Quality Objectives (DQOs), and all applicable or relevant and appropriate requirements (ARARs) have been considered in developing the initial phases of fieldwork described here, and will be updated and revised for any subsequent phases of fieldwork.

[Bold items enclosed in brackets denote changes from original text]

10. HEALTH AND SAFETY PLAN

A comprehensive General Health and Safety Plan (GHSP) and individual site-specific safety plans (SSP) have been developed to provide readily available emergency information and preventative safety measures. The GHSP, submitted to the Navy for approval, outlines health and safety procedures and protocols to be followed during all field investigations at each of the 37 sites on NAS Pensacola. The plan includes: standard operating procedures (site entry, decontamination, etc.); hazard communication and training (safety training, briefings, documentation, etc.); safety equipment and instrumentation (monitoring, personnel protective equipment, etc.); hazard evaluation by contaminant class (metals, organics, etc.); and hazard evaluation for each task (drilling, sampling, etc.). The GHSP will be periodically updated, as required, during the course of this program.

In addition, the GHSP and the individual SSPs will define the toxicological properties and health hazards associated with each site. The SSP will include emergency action information pertinent to the safety of the field personnel and of the public (hospitals, ambulatory units, poison control centers, fire departments, and police/sheriff departments). The SSP will also identify first-aid and personal safety equipment, and will provide recommended site security precautions. The GHSP and the SSP will comply with the Occupational Safety and Health Administration (OSHA) Guidelines for Hazardous Vaste Operations (29 CFR Section 1910).

[Bold items enclosed in brackets denote changes from original text]

11. QUALITY ASSURANCE PROJECT PLAN

A Generic Quality Assurance Project Plan (GQAPP) has been prepared and 'submitted to the Navy for approval. This comprehensive document will be referenced for all field and laboratory procedures for this program used to develop the Site-Specific Quality Assurance Plans (SQAP).

The SOAP will provide site-specific quality assurance/quality control (QA/QC) measures used to obtain accurate and precise data for all site investigation activities. The SOAP will address all phases of the investigation from development of the initial sampling plan through verification and reporting of the analytical results. All of the QA/QC procedures described in the GQAPP and SOAP will be in accordance with applicable professional technical standards, U.S. Environmental Protection Agency [(EPA)] requirements, and specific Navy goals and requirements for this project. All samples will collected, handled, packaged, preserved, and transported in accordance with the GOAPP and SOAP, and with U.S. Navy and EPA procedures.

[Bold items enclosed in brackets denote changes from original text]

12. AERIAL PHOTOGRAPH ANALYSIS

Prior to the initiation of fieldwork, E & E will examine all available aerial photographs of NAS Pensacola for past and present conditions, features, and developments which may have direct relevance to the fieldwork methodology. The aerial photograph analysis task will involve assembling and stereoscopically analyzing historical photographic imagery and topographic maps available for the site area. For the purpose of supporting the development of field investigation strategies, efforts will be made to obtain photographs of an appropriate scale that will allow for analysis of past and present surface conditions, drainage, and land use. Photographs showing the history of site activities will be analyzed to obtain information regarding the evolution of site features which may have affected hydrologic conditions. The historical perspective gained by studying aerial photographs will provide insight applicable to such tasks as field reconnaissance and monitoring well placement. In addition, the analysis of historical and current aerial photographs, performed in conjunction with geophysical investigation, will aid in the accurate determination of the extent of the formerly used area at the site.

[Bold items enclosed in brackets denote changes from original text]

13. UTILITIES SURVEY

Prior to conducting any augering, boring, drilling, or excavation activities, E & E will locate all underground cables, pipes, utilities, or other obstructions which may become damaged or othervise hinder fieldwork. The appropriate authorities (e.g., NAS Pensacola Public Works and Southern Bell) will be contacted to identify the location of all underground utilities in the site area. In addition, E & E will examine available maps and documents and will conduct a metal detector survey on-site to determine the presence of any other potentially hazardous subsurface features. If appropriate and applicable, other surface geophysical techniques may be used to locate deeper obstructions not readily detected with a metal detector. The locations of all underground utilities or obstructions will be marked with surveyors flags, day-glow paint, or by other methods as appropriate. This task may be conducted as part of the physical survey but will be considered a separate task for cost purposes.

[Bold items enclosed in **brackets** denote changes from original text]

14. FIELDWORK METHODOLOGY

14.1 Phase I — Field Screening

The primary objective of the Phase I field screening investigation is to effectively and efficiently focus the Site Characterization (Phase 11) and subsequent Extent Delineation (Phase III and IV) studies. The field screening phase will employ a variety of field investigation techniques, including the collection of samples for laboratory analysis. However, the analysis of these samples will be subject to less rigorous Quality Assurance/Quality Control (QA/QC) requirements, which reflect the "focusing" objective--rather than a formal contaminant quantification objective--of this phase. Each field screening task will utilize all existing information from preceding tasks, including aerial photograph analysis, to adjust the locations of the various surveys and sampling locations, thereby achieving optimum results. The objectives/advantages of the field screening methods are discussed in detail in Section 9.1 of the GOAPP.

14.1.1 Physical Survey

14.1.1.1 Overall Physical Reconnaissance

Site 2 -- [At the present time, the exact location of the storm sever outfalls is unknown. More information regarding the outfalls will be obtained during Phase I]. A walkover survey will be conducted along the waterfront from Building 632 to the east and beyond the dock for the USS Lexington, and to the north of the waste water treatment plant, in order to map the exact location of storm sewer outfalls. At low tide, a walkover survey of the shallow bay bottom will be conducted to determine the lateral extent of the concrete platform that extends *out* into Pensacola Bay.

[Bold items *enclosed* in brackets denote changes from original text]

Sites 13 and 14 — A field reconnaissance survey will be conducted on and around Sites 13 and 14. Available aerial photographs and maps will be used as guides in locating surface features. Visual inspections will be made regarding surface conditions, surface drainage patterns, areas of exposed debris, leachate seeps, and stained soils.

During the reconnaissance survey, the field team will identify areas that present the most suitable conditions for the establishment of grid survey baselines. The use of a grid system as part of the Phase I field investigation is discussed in the following subsections.

The reconnaissance survey team will utilize radiation (Site 13 only) and air monitoring (Sites 13 and 14) equipment during walkovers of site areas, in accordance vith Sections 6.1.1 and 6.3.2 of the GQAPP. In the event that any "hot spots" are located, the area(s) vill be flagged and identified on a site map for future reference.

14.1.1.2 Radiation Survey

Sites 2 and 13 — A radiation survey will be conducted using a micro-R-meter and gamma scintillation detector on Sitar 2 and 13. The survey will be conducted in accordance vith Section 6.3.2 of the GQAPP. Por Site 13, measurements will be made at each 100 foot center grid point. For Site 2, measurements will be made vithin and around each storm sever outfall. All readings will be recorded in the field logbook.

[In addition, preliminary air screening will be conducted with a particulate monitor, *such* as a Mini-Ram, to determine if the site represents a source of particulates in the air. The air sampling will be conducted in accordance vith Section 6.1.3 of the GQAPP.]

14.1.1.3 HNu/OVA Surface Emissions Survey [and Particulate Air Sampling]

Site 2 -- A surface emissions survey will be conducted for *each* of the storm sever outfalls located during the physical survey to detect vapors

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[Bold items enclosed in brackets denote changes from original text]

and provide indications of whether the conduits are discharging volatile wastes. [The surface emissions survey will be performed only at outfalls that are above the bay water level.] For this survey, an HNu, OVA, or other equivalent piece of monitoring equipment will be used in accordance with Section 6.1.1 of the GQAPP.

Sites 13 and 14 -- A surface emissions survey will be conducted utilizing a grid system and HNu and/or OVA air monitoring equipment. Grid points will be established at 100-foot intervals. Measurements will be made at *each* established grid point, and readings will be recorded in the field logbook. The survey will be conducted in accordance with Section 6.1.1 of the GQAPP.

14.1.1.4 Habitat/Biota Survey

During the physical reconnaissance, an E & E biologist/ecologist will determine the on-site terrestrial and aquatic habitats, and the surrounding habitats which may be affected by off-site contaminant migrations. During the valkover survey, rare, threatened, and endangered species and their potential habitats will be identified, and an evaluation will be made of general site conditions to support viable populations of plants and animals. A habitat/biota survey will be conducted for Sites 13 and 14; an evaluation of the literature will be made for Site 2; and a visual confirmation of habitat types identified for Site 2 will be made during the sediment sampling.

14.1.1.5 Asbestos Survey

An asbestos survey will be conducted on Site 13 during the physical reconnaissance. This survey will consist of locating and identifying suspect building materials that could potentially contain asbestos. No sampling will be conducted, and suspect building materials will be mapped for future reference.

14.1.2 Analytical Screening

14.1.2.1 Laboratory Analyses

Phase I sampling activities for Sites 2, 13, and 14 will require the installation of shallow temporary monitoring wells, groundwater

sampling, and the collection of soil [and sediment] samples. All of the samples vill be analyzed in the laboratory for analytical screening parameters. The analytical screening program has been developed for the Phase I effort as a measure to efficiently and cost-effectively provide focus for subsequent phases of site characterization and contamination extent delineation. Analytical screening is addressed in detail in Section 9.1 of the GQAPP. Analytical requirements for samples collected in Phase I are shown in Table 14-1.

[Marine Sediments — Approximately 24 sediment samples will be collected from nearshore NAS Pensacola (see Figure 14-1). Metals analysis will be in accordance with the methods developed by FDER (Schropp and Windom 1988). The samples will be collected by divers using self-contained underwater breathing apparatus (SCUBA) and 4-inch diameter stainless steel cores taken to a depth of 6 inches.]

Soils — Approximately 16 soil samples will be collected from Site 13, and approximately [57] roil samples will be collected from [19 locations at) Site 14. Soil samples will be [collected from 5-foot intervals to the water table. For the purpose of estimating numbers of samples, the depth to the water table is assumed to be 5 feet at Site 13 and 15 feet at Site 14.) Collection of the soil vill be from either hand-held four-inch stainless steel bucket augers, or from the flights of a four-inch solid stem auger, extracted from the boring. As shown in Figures 14-2 and 14-3, the locations for these soil borings are tentative. The information gained from field reconnaissance surveys and aerial photograph interpretations will allov adjustments and finalization of the roil boring locations. All sampling activities conducted at Sites 13 and 14 vill be conducted in accordance with Section 6.6 of the GQAPP.

Groundvater — Approximately four temporary stainless steel monitoring vells will be installed on Site 13 and approximately 10 temporary monitoring wells will be installed on Site 14. The vells will be installed manually vith a 75-pound slide hammer, and to a depth at which

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[Sold items enclosed in brackets denote changes from original *tat]*

Table 14-1

PHASE I SAMPLING AND ANALYTICAL REQUIREMENTS—GROUP C

[SITE 2

Medium	No. of Samples	Duplicates	Total	Analytical Suite[a,b]
Sediment	24	1	25	A

SITE 13

Medium	No. of Samples	Duplicates	Total	Analytical Suite[a,b]
Soil	16	111	[17]	A
Groundwater	4	1	5	A
TOTAL	20	[2]	[22]	

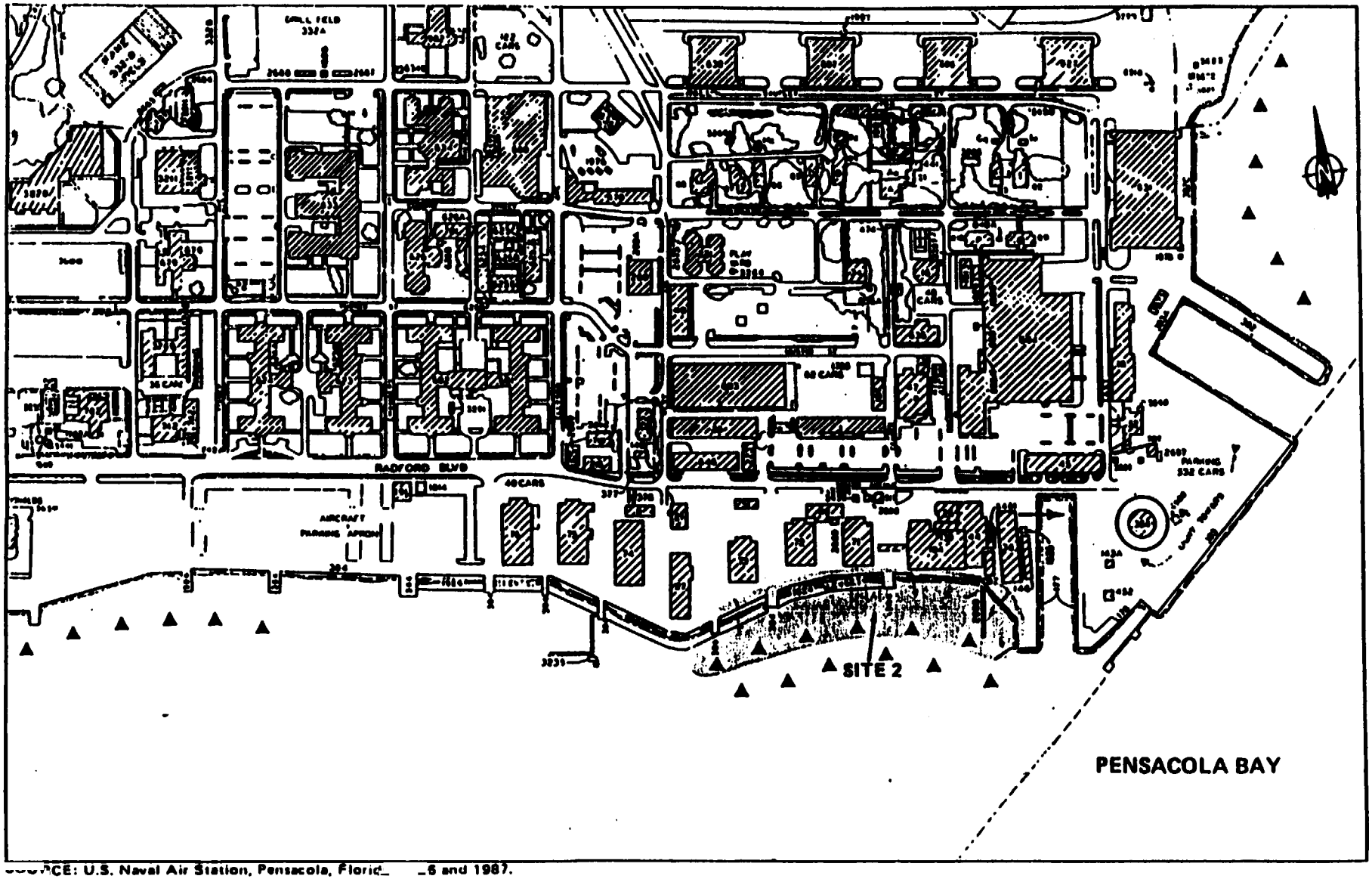
SITE 14

Medium	No. of Samples	Duplicates	Total	Analytical Suite[a,b]
Soil	[57]	[3]	[60]	A
Groundwater	10	1	11	A
TOTAL	[67]	[4]	[71]	

[a]Analytical suite designations are as follows:

A = Volatile organic coapounds, polynuclear aromatic hydrocsrbons, phenols, pesticides and total PCBs, total recoverable hydrocarbons, and metals (total. unfiltered).

[b]Specific constituents encompassed by the various chemical groups included within analytical suite A are identified in Tables 9-1 through 9-4 of the Generic Quality Assurance Project Plan.



SOURCE: U.S. Naval Air Station, Pensacola, Florid_ _6 and 1987.

KEY:

▲ Proposed Sediment Sampling

SCALE

0 200 400 600 800 FEET

Figure 14-1
PROPOSED NEARSHORE SEDIMENT SAMPLING LOCATIONS, SITE 2 - PHASE I

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well screens bracket the water table. As shown in Figures 14-2 and 14-3, the locations for these wells are tentative. The information gained from field reconnaissance surveys and aerial photograph interpretations will allow adjustments and finalization of the temporary shallow well network. The 14 temporary wells will be purged and sampled in accordance with Section 6.8 of the GQAPP.

14.1.3 Hydrologic Assessment

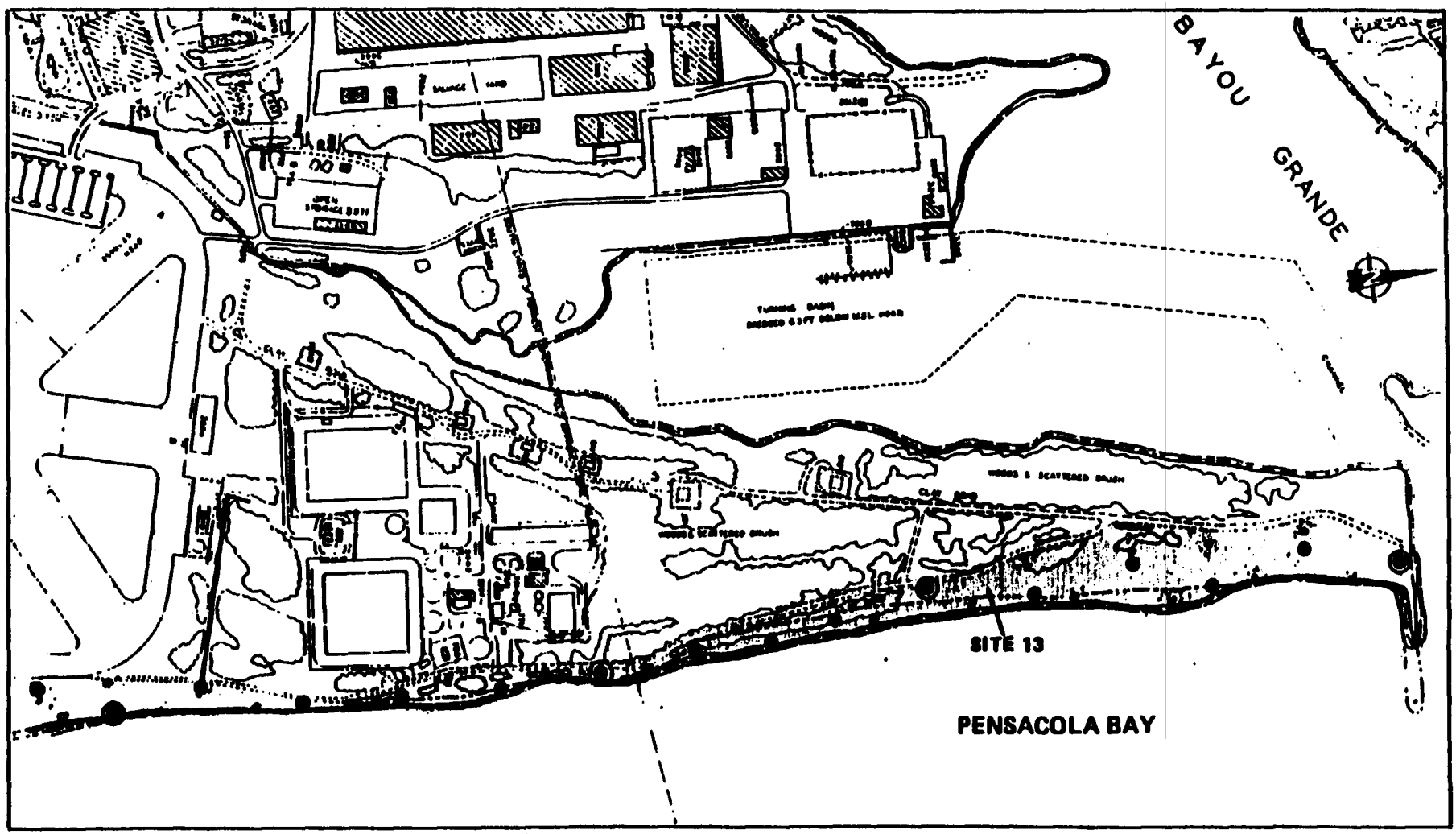
The temporary wells and existing well network will be surveyed to obtain top of casing elevations referenced to USGS datum or to a suitable established benchmark located wthin the vicinity of the sites. Static water levels will be measured in each well to determine shallow groundwater flow direction and horizontal hydraulic gradient. In conjunction with the well head survey, the elevations of other nearby features such as ponds, streams, and leachate seeps will be established. At least one rain gauge station will be established in the vicinity of Sites 13 and 14, and precipitation will be monitored during fieldwork activities.

Hydrologic data and analytical screening data collected during Phase I will be evaluated, and evidence of lateral contaminant migration in shallow groundwater will be assessed. Conclusions drawn from these evaluations will form the basis for permanent monitoring well installations in Phases 11 and 111.

14.2 Phase II — Characterization

The primary objectives of the Phase II field investigation are as follows:

- To characterize the nature and magnitude of the full spectrum of potential site contaminants;
- To confirm and validate the contaminant distributions indicated by the Phase I analytical screening results by collecting and analyzing samples under full-scale CERCLA-type QA/QC requirements;



SOURCE: U.S. Naval Air Station, Pensacola, Florida 1987 and 1988.

SCALE
0 200 400 600 800 1000 FEET

KEY:

● Tentative Soil Boring

○ Tentative Temporary Monitoring Well

Figure 14-2
TENTATIVE SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS
SITE 13 - PHASE I

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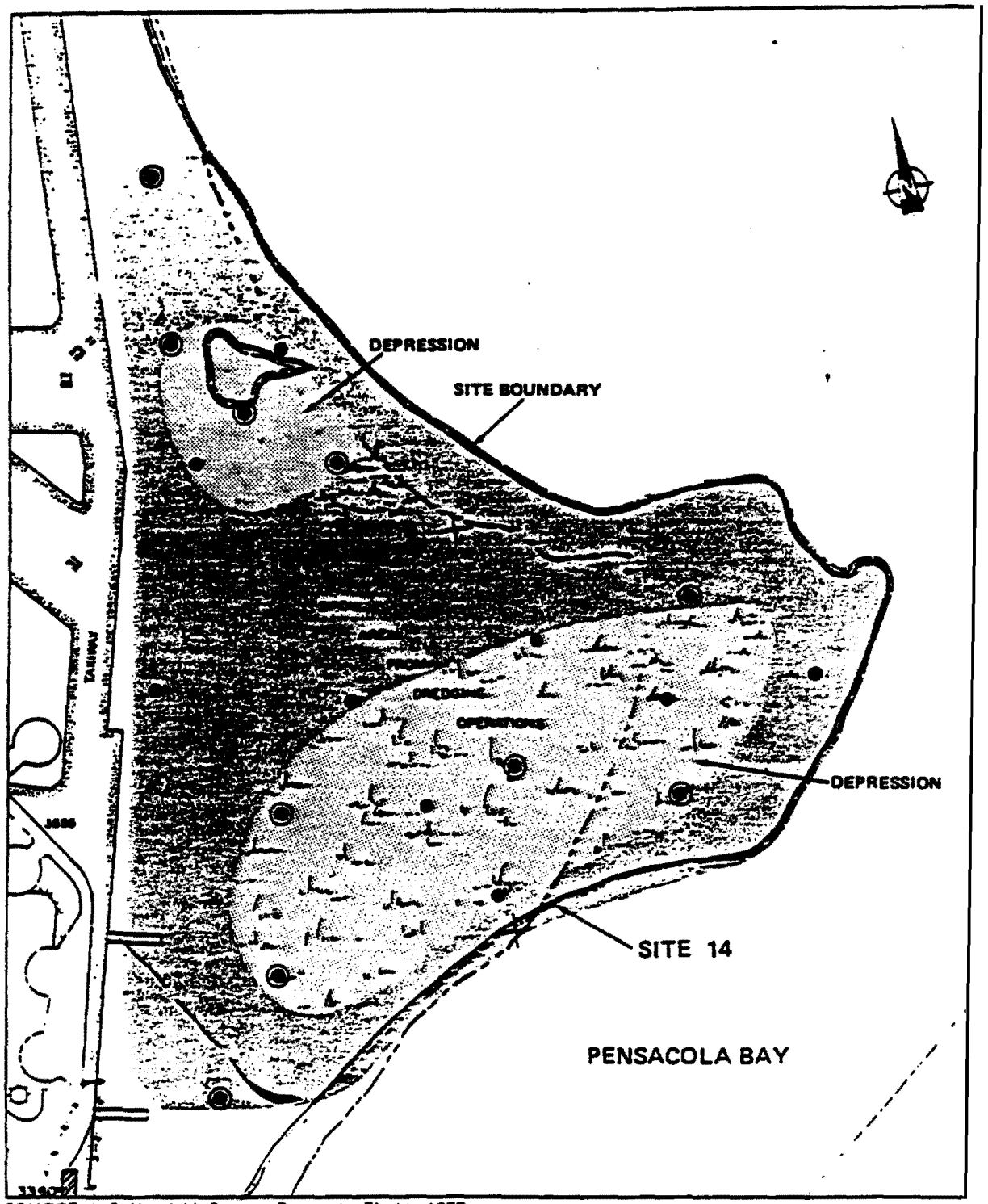

SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1988.

SCALE

0 200 400 600 800 FEET

KEY:

- ● Tentative Soil Boring
- Grasses
- ○ Tentative Temporary Monitoring Well

Figure 14-3
TENTATIVE SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS
SITE 14 - PHASE I

- To support the preliminary identification, screening, and evaluation data requirements of potential remedial alternatives.

The actual Phase II sampling locations, especially vith respect to the Phase I locations, will primarily be a function of how uniform the Phase I results were vith respect to contaminant type, magnitude, and distribution across the site. Phase II investigation of Sites 2, 13, and 14 vill involve the collection of sediment and soil samples. Air sampling will be conducted only if warranted by the results of Phase I efforts.

Phase II investigation of sites 13 and 14 vill involve the collection of soil samples. No additional permanent, shallov monitoring wells will be installed until verification of any contamination discovered during Phase I is made during Phase II.

The analytical requirements for Phase II samples are provided in Table 14-2.

[During the Phase II investigation of Site 2, which is covered by RCRA requirements, at least one sample per contaminated medium vill also be analyzed for Appendix IX parameters (40 CFR, Part 264). These samples vill be collected from the area of highest contamination for each radium as determined during the Phase I investigation. Additional *Appendix* IX samples may be required depending on the extent of contamination detected.]

[14.2.1 Biota Sampling

The need for formal biological sampling vill be based on the results of the Phase I habitat/biota survey and analytical screening results. If biological sampling is required, a separate biological sampling plan vill be prepared which outlines sample locations, sampling methodologies, analytical parameters, etc.]

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[Sold items enclosed in brackets denote changes from original text]

Table 14-2

PHASE II SAMPLING AND ANALYTICAL REQUIREMENTS—GROUP C

SITE 2

Medium	lo. of Samples	Dupli-cates	Trip Blanks[a]	Field Blanks	Rinsate Blanks	[Preservative Blanks[b]]	Total*	Analytical Suite[c,d]
Sediment	[84]	9	[NR]	[1]	4	[1]	[99] (10)	A [B]
TOTAL	[84]	9	[NR]	[1]	4	[1]	[99](10)	

SITE 13

Medium	lo. of Samples	Dupli-cates	Trip Blanks[a]	Field Blanks	Rinsate Blanks	[Preservative Blanks[b]]	Total.	Analytical Suite[c,d]
Soil	24	[2	1	1	1	1	30 (6)	C] [B]
TOTAL	24	[2	1	1	1	1	30](6)	

SITE 14

Medium	lo. of Samples	Dupli-cates	Trip Blanks[a]	Field Blanks	Rinsate Blanks	[Preservative Blanks[b]]	Total*	An. lytical Suite[c,d]
Soil	32	3	2	[1]	2	[1]	41 (6)	A C
TOTAL	32	3	2	[1]	2	[1]	41(6)	

Table 14-2 (Cont.)

[a]Trip blanks will be analyzed for Target Compound List (TCL) volatile organic compounds only.

[[b]Preservative blanks will be analyzed for TCL volatile organic compounds, total recoverable hydrocarbons, total TCL metals, and cyanide.]

[c]Analytical suite designations are as follows:

A = Total recoverable hydrocarbons, metals (modified EPA SW methods for marine sediments), and total organic carbon and total Kjeldahl nitrogen.

B = pH, alkalinity, percent moisture, grain size, BTU content, ash content, total halogens, sulfur, ignitability, and cation exchange capacity.

C = TCL volatile organic compounds plus xylene and ketones, TCL base/neutral and acid extractable organic compounds, TCL pesticides and PCBs, total recoverable hydrocarbons, TCL metals and cyanide.

[[d]]Specific constituents encompassed by the various chemical groups included within the above-listed analytical suites are identified in Tables 9-5 through 9-13 of the Generic Quality Assurance Project Plan.

[d]Trip blanks will be analyzed for Target Compound List (TCL) volatile organic compounds only.

*The number of samples shown in parentheses will be analyzed for the additional parameters indicated.

[NR = Not required.]

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[14.2.2] Sediment Sampling

To adequately assess the impact of NAS Pensacola operations [on] Pensacola Bay sediments, sediment sampling will be conducted on nearshore NAS Pensacola areas and offshore NAS Pensacola. This will allow a direct comparison of sediment samples from around the NAS Pensacola facility and sediments within Pensacola Bay that may be influenced by other Bay sources.

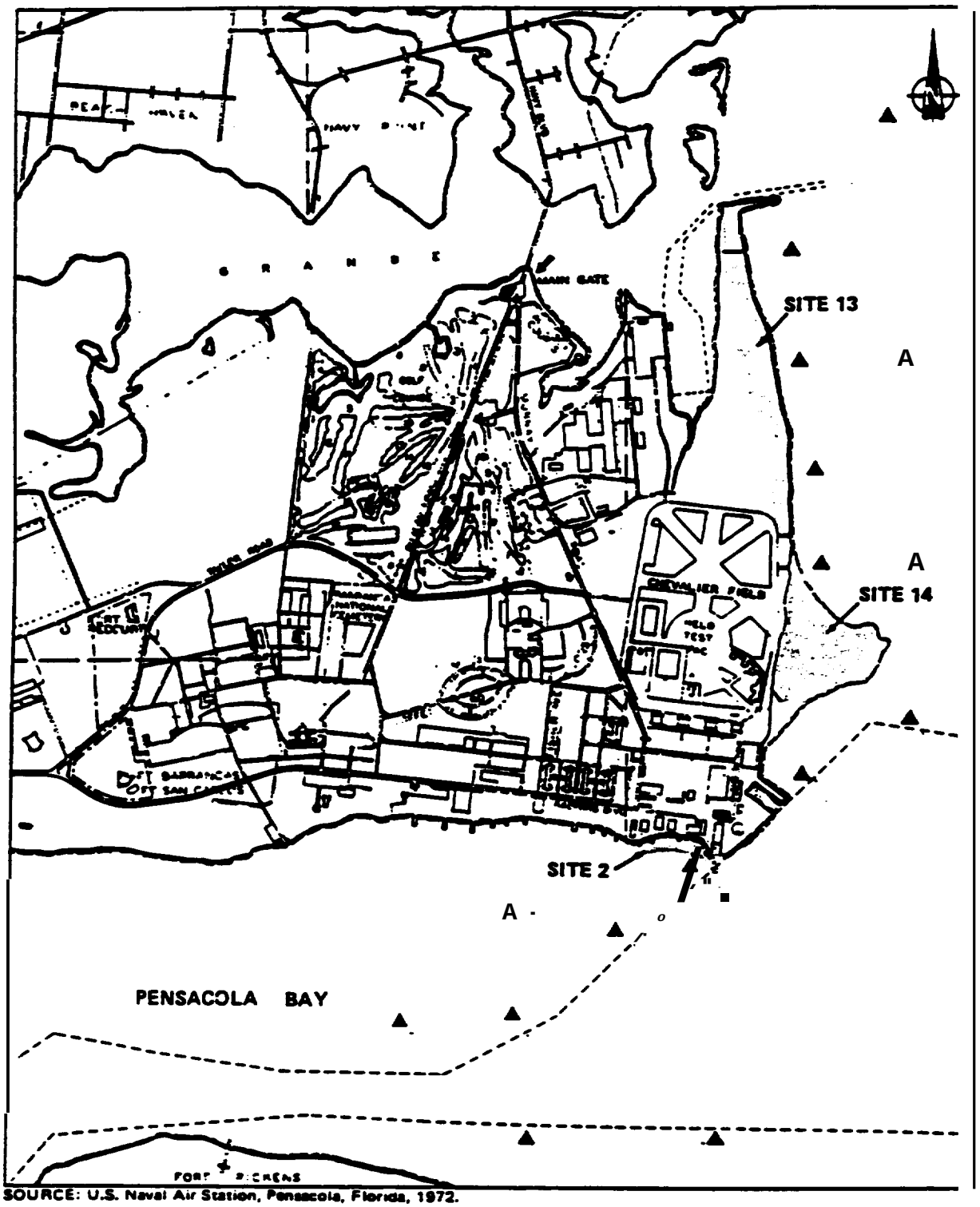
Metals analysis for marine sediments will be in accordance with the methods developed by FDER (Schropp and Windom 1988). This will allow comparison of the data generated during this phase with data from other NAS Pensacola studies.

Approximately 87 sediment samples will be collected from 12 stations close to NAS Pensacola and [from] 16 stations within Pensacola Bay near the NAS Pensacola facility (see Figures [14-4 and 14-51). [Field methods for sediment sample collection will be adapted in accordance with FDER official guidance for approved sediment sampling protocols (Ryan et al. 1984). Samples will be collected by SCUBA divers using 4-inch diameter stainless steel cores taken to a depth of 6 inches. Samples will be homogenized in stainless steel bowls and the appropriate sample aliquot removed from the homogenized sample. Triplicate samples will be taken from each station and averaged to produce mean values for each analyte.

[14.2.3] Soil Sampling

Soil samples will be collected to verify the results of the Phase I analytical screening. Locations for the proposed soil borings on Sites 13 and 14 are shown in Figures 14-6 and 14-7. At each location, samples will be collected from three composite intervals: surface to 0.5 feet below ground surface (BLS); 0.5 to 2.5 feet BLS; and 2.5 feet BLS to the water table. In areas where the water table is observed to occur greater than 5 feet from the surface, samples will only be collected to 10 feet at 2.5 feet intervals, unless Phase I samples indicate contamination is present in a deeper zone.

[Bold items enclosed in brackets denote changes from original text]



SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1972.

SCALE

0 1000 2000 3000 4000 FEET

KEY:

▲ Proposed Sediment Sampling

Figure 14-4
PROPOSED OFFSHORE **SEDIMENT SAMPLING** LOCATIONS
SITE 2 - PHASE II

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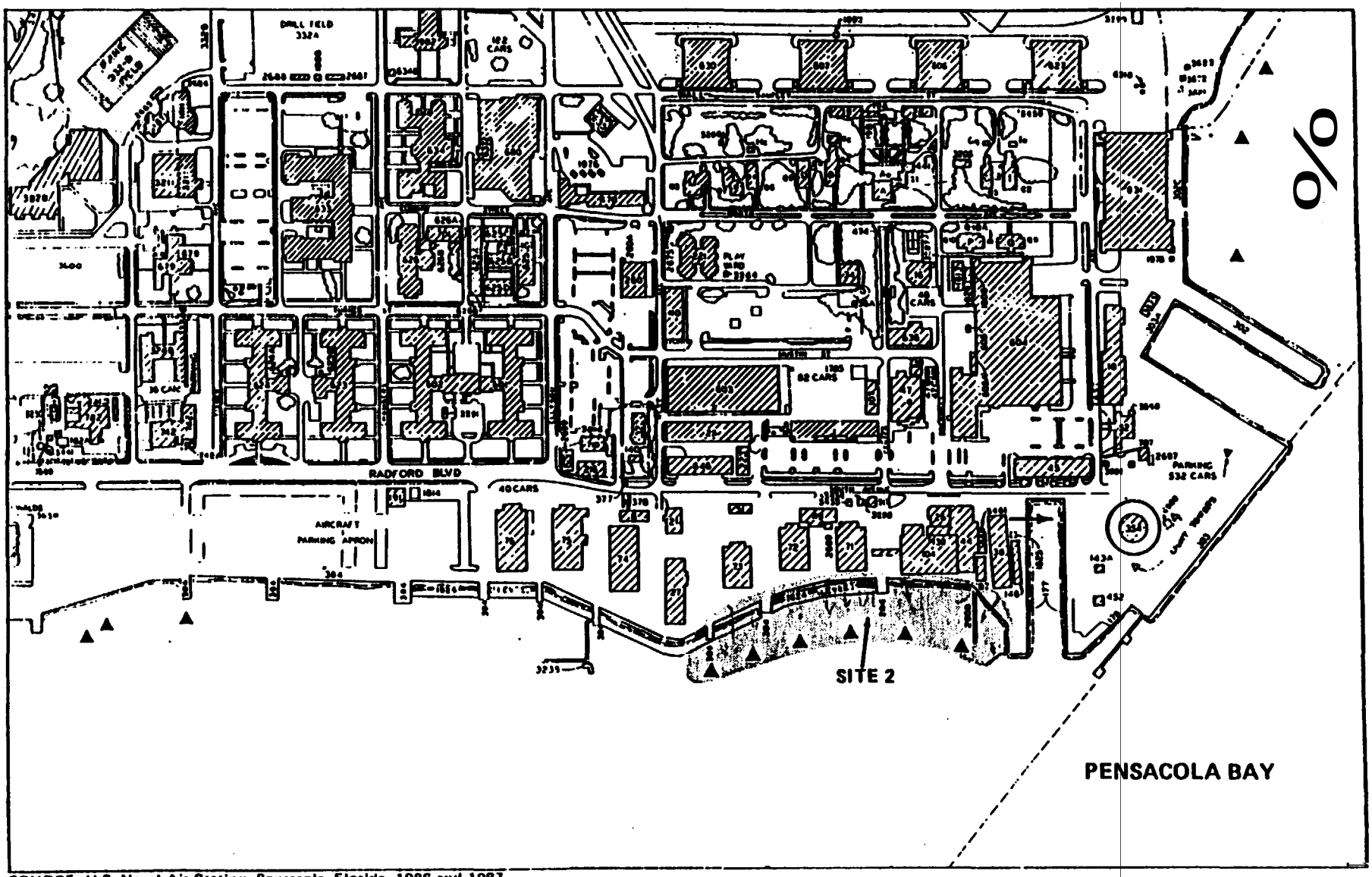
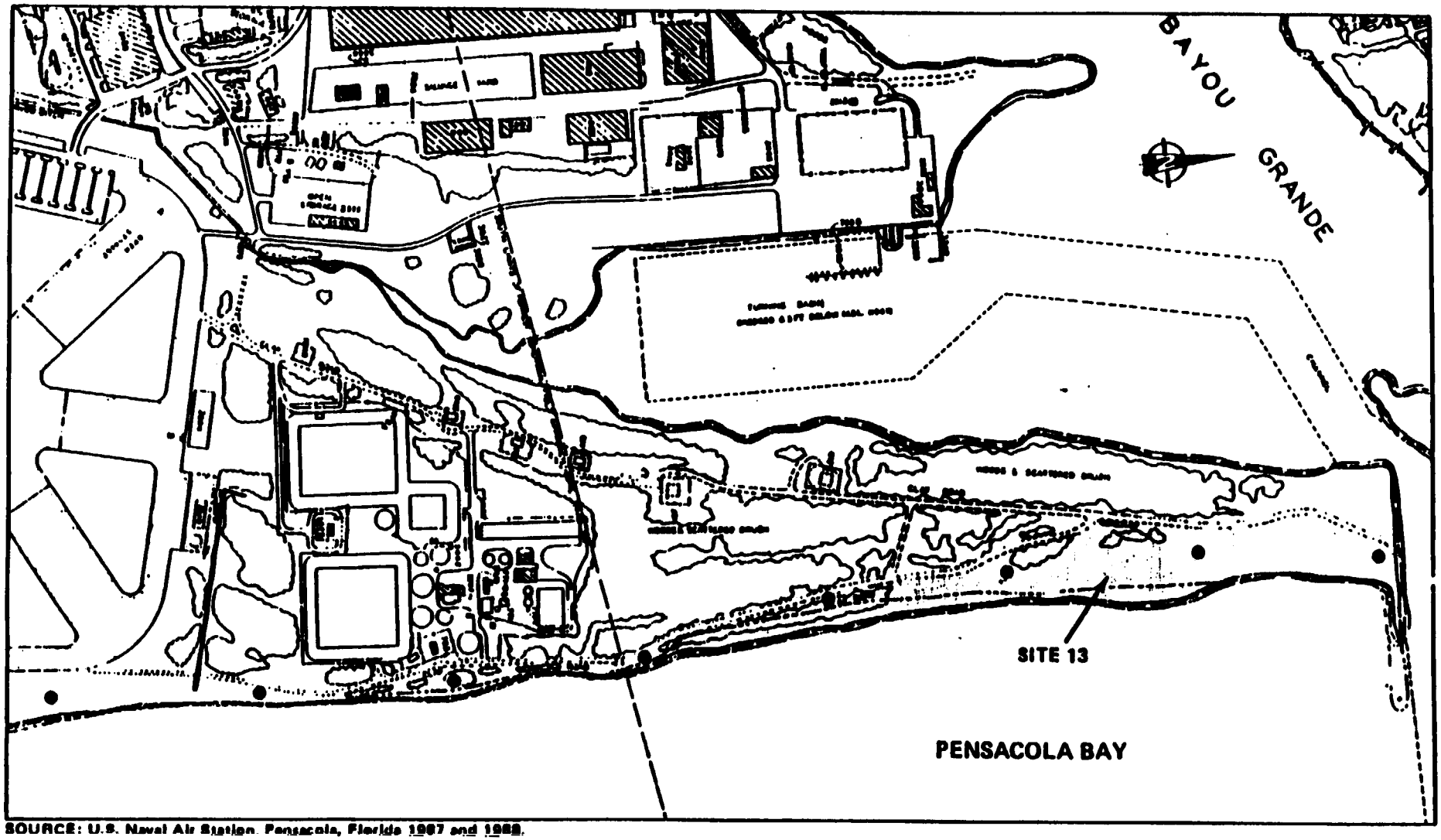


SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1986 and 1987.

KEY:
▲ Proposed Sediment Sampling

SCALE
0 200 400 600 800 FEET

Figure 14-5
PROPOSED NEARSHORE SEDIMENT SAMPLING LOCATIONS, SITE 2 - PHASE II



SOURCE: U.S. Naval Air Station, Pensacola, Florida 1987 and 1988.

SCALE
0 200 400 600 800 1000 FEET

KEY:

● Tentative Soil Boring

Figure 14-6
TENTATIVE SOIL BORING LOCATIONS, SITE 13 - PHASE II

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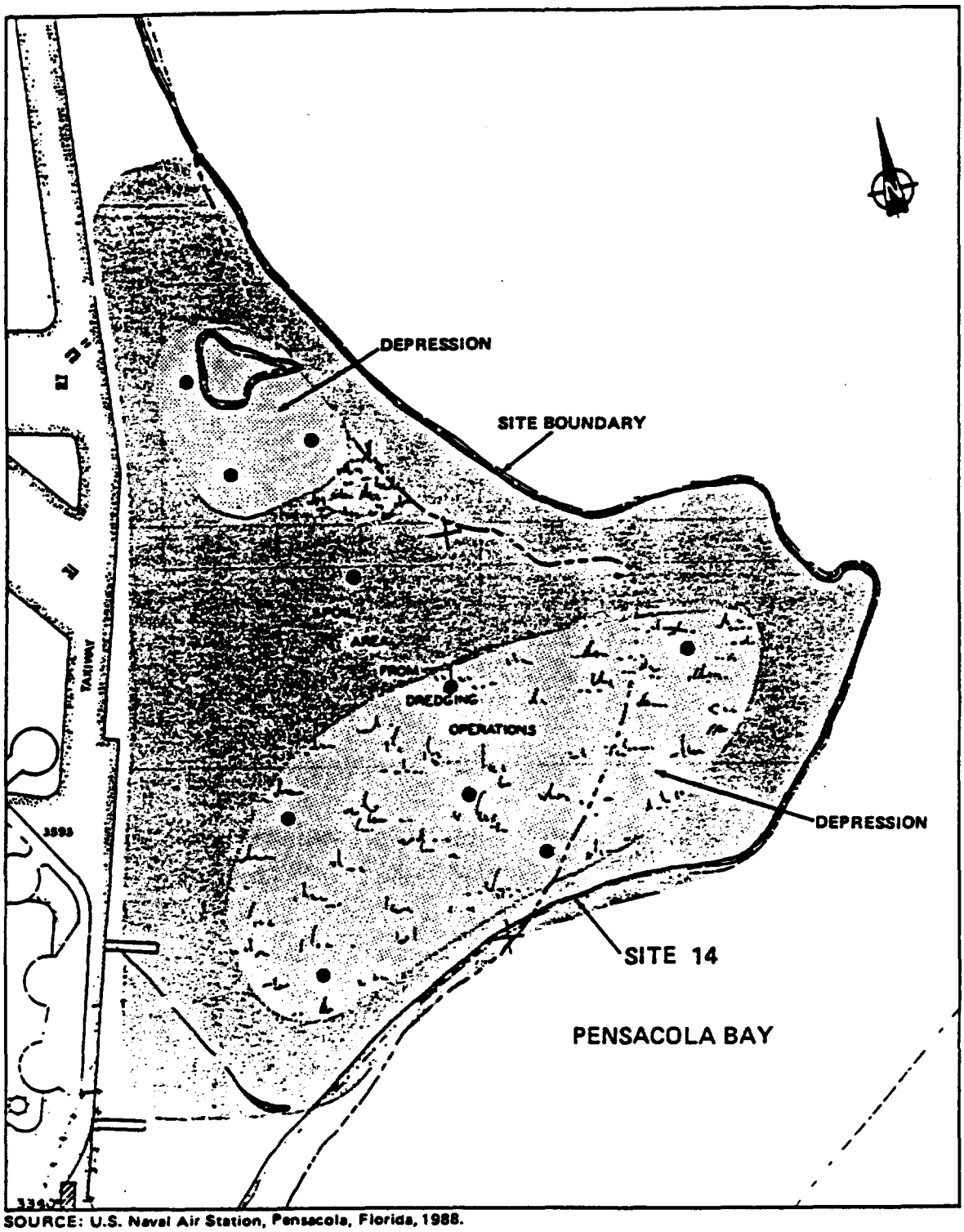

SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1988.

SCALE

0 200 400 600 800 FEET

KEY:

● Tentative Soil Boring

Grasses

Figure 14-7
TENTATIVE SOIL BORINGS, SITE 14 - PHASE II

The soil samples will be collected using a split-spoon sampling device or vith hand-held augers. All sampling, compositing, and lithologic logging will be performed in accordance vith Section 6.6 of the GQAPP. Equipment decontamination will be performed in accordance vith Section 6.10 of the GQAPP.

For planning purposes, three soil samples are **assumed** at each boring location for Sites 13 and 14, except for the location outside of the shallow depressions on Site 14. It is assumed that five soil samples vill be collected at *each* of these locations, thus a total of 24 soil samples will be collected at Site 13, and 32 soil samples will be collected at Site 14.

[14.2.4] Air **Sampling**

Formal air sampling will be performed only as required baaed on the results of the Phase I surface emission *survey* **[and particulate** air sampling, and the **Phase I shallow soil sampling.]**

11.3 Phase III - Extent Delineation

Phase III tasks will be conducted based on the results of Phases I and II. Although the earlier phases are intended to identify and characterize areas and contaminants of primary concern as they extend laterally from the landfill source(s), Phase III activities will be geared toward delineating the horizontal and vertical extents of contamination.

14.3.1 Biota Sampling

If deemed appropriate based on the findings of Phases I and II, [additional] flora and fauna sampling may be conducted in Phase 111. [However, as for Phase II, a separate biological sampling plan vill be prepared.) Biota sampling for Sites 13 and 14 may potentially include the collection of vegetation and small mammals from on-site populations. Biota sampling for Site 2 ray potentially include the collection of marine fish and/or benthic invertebrates from near shore populations.

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[Bold items enclosed in brackets denote changes from original tat]

14.3.2 Sediment Sampling

Sediment sampling will be conducted as needed for Site 2 to delineate the areas of contamination in Pensacola Bay.

14.3.3 Soil Sampling

For Sites 13 and 14, soil sampling will be conducted in conjunction with any new shallow or intermediate well installations.

14.3.4 Shallow Monitoring Vell Installation and Development

Additional shallow monitoring wells may be required at Sites 13 and 14 to further determine the horizontal extent of any shallow groundwater contamination.

14.3.5 Intermediate and Deep Monitoring Well Installation and Development

The installation of additional monitoring wells into deeper zones of the aquifer may be required in order to assess horizontal and vertical hydraulic gradients, aquifer physical characteristics, and vertical extent of contamination for Sites 13 and 14. The number of wells and their locations and depths are dependent upon Phase I and II findings.

14.3.6 Groundwater Sampling

All wells installed for Sites 13 and 14 in Phase III will be sampled, and analytical requirements for the samples will be developed based on the results of previous phases. It is anticipated that a select number of wells will not be sampled as part of this extensive delineation phase.

14.3.7 Hydrologic Assessment

All wells installed during Phase III will require a well head survey to obtain top of casing elevations. Water level measurements will be made for all site monitoring wells and nearby surface water bodies. Horizontal and vertical hydraulic gradients will be determined. Aquifer testing will be performed, as required, to ascertain aquifer physical characteristics. [On sites where contamination is found in the surficial zone during Phases I and/or 11, the low permeability zone will

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be further characterized during Phase III and any subsequent phases. It is intended that soil sample results, lithologic logs, isopach maps, permeability testing, aquifer testing, etc. will be utilized as required to determine the lateral extent and/or continuity of the low permeability zone, as well as the degree to which hydraulic connection exists between the surficial zone and underlying main producing zone at each site.]

14.3.8 Air Sampling

The need for formal air sampling *[during* Phase III] and the techniques to be employed *are* dependent upon the findings of Phases I and II.

14.4 Phase IV - Extent Delineation

The following tasks, if required, will be performed as a continuation in the effort of delineating the extent of contamination for Sites 2, 13, and 14.

- Sediment supling;
- soil Sampling;
- Shallow Monitoring Well Installation and Development;
- Intermediate and Deep Monitoring Well Installation and Development;
- Groundwater Sampling; and
- Hydrologic Assessment

14.5 Topographic Survey and Base Map

Following the completion of Phases III and IV, a topographic survey of Sites 13 and 14 will be conducted and a base map will be developed. Base map coverage, contour intervals, scale, and requirements for horizontal and vertical control will be established and approved by the Navy. The topographic base map will be developed for the requirements of remedial planning and will include the locations of surface features such as roads, structures, nearby surface waters, monitoring wells, and above ground utilities. The location of subsurface utilities and

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drainage structures will be reflected on the base map as indicated on existing NAS Pensacola General Development and Utilities maps and/or as located during field investigations.

14.6 Field Quality Assurance/Quality Control

14.6.1 Documentation

Pfeld activities and sample management will entail strict documentation requirements as described in Section 7.0 of the GQAPP.

14.6.2 Field QA/QC Samples

Samples collected for laboratory analysis during all phases of fieldwork will require the collection of field QA/QC samples as described in Section 6.12 of the GQAPP. The estimated numbers of required field QA/QC samples for Phases I and II are shown in Tables 14-1 and 14-2.

14.7 Decontamination and Waste Management Procedures

14.7.1 Decontamination Procedures

Equipment decontamination requirements for Sites 2, 13, and 14 will be performed in accordance with Section 6.10 of the GOAPP.

14.7.2 Vaste Management Procedures

All water generated during monitoring well purging and development activities on Sites 2, 13, and 14 will be discharged onto the ground surface away from the well or will be contained, labeled, and moved to a storage area on NAS Pensacola, as directed by the Navy.

Any excess soil auger cuttings generated by soil boring or monitoring well installation activities will be disposed of on-site or will be contained, labeled, and moved to a storage area on NAS Pensacola, as directed by the Navy.

Other investigation derived wastes, such as potentially contaminated clothing and disposable materials, will be contained, labeled, and moved to a storage area on NAS Pensacola.

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15. LABORATORY *QUALITY* ASSURANCE/QUALITY CONTROL

Laboratory QA/QC procedures are designed to ensure the accuracy, precision, completeness, representativeness, and comparability of all analytical data. Laboratory QA/QC has been addressed both in the Generic Quality Assurance Project Plan (GQAPP) and Generic Site Management Plan (GSHP). All phases of fieldwork will incorporate a different level of data quality and requisite laboratory QA/QC. These levels are discussed in detail in the GQAPP and QSHP.

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16. GROUNDWATER MODELING

E & E will use the data generated in the previous field investigation phases to conduct limited computer modeling when applicable and appropriate. Two scenarios will be considered to assess the potential for off-site contamination, including:

- Estimated future plume movement without any remedial actions effects (e.g., no action); and
- Estimated total time periods required to completely extract contaminants from the aquifer in order to meet previously established standards for drinking water (ARARs), for a total contaminant mass at variable pumping rates.

E & E will use the two-dimensional analytical RANDOMWALK model (Prickett et al. 1981) to arrive at these estimates. E & E will calculate flow velocity field input data for the solute transport simulation from a simplified model based on Darcy's Law. E & E will utilize parameters including transmissivity, storativity, and hydraulic conductivity from the phases of fieldwork described above.

To obtain a prediction of plume extent without remediation, E & E will illustrate organic and inorganic simulations for the current time and for one, five, and ten years into the future. Additional simulations will include different remedial pumping scenarios for both organic and inorganic contamination. E & E then will use information generated by these computer simulations for remedial alternative development. Other computer models that can be utilized to assess on-site groundwater conditions include: PLASM, a two-dimensional, finite-difference groundwater flow model; GWTRANS, a two-dimensional, finite-difference solute transport model; FEMWATER, a finite-element groundwater model; and FEMWASTE, a finite-element solute transport model.

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17. TREATABILITY STUDY

As indicated in Table 14-2, a number of the analyses to be performed on the 'samples collected during Phases II through IV are required in support of the treatability study. Characterization of samples in terms of parameters listed in Table 14-2, together vith treatability tests, will provide the basic data required for the evaluation of physical, chemical, and biological remedial technologies. Some of the treatability tests that may be examined are incineration tests, solubility tests, soil leaching tests, and coagulation-flocculation jar tests.

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18. BASELINE RISK ASSESSMENT

As part of the Remedial Activities Investigation, a baseline risk assessment will be conducted to determine the level of effort required in the Feasibility Study (PS) for remedial actions. The baseline risk assessment will provide an evaluation of the potential threat to human health and the environment in the absence of any remedial action, by providing the basis for determining whether or not remedial action is necessary and the justification for performing any remedial actions.

The baseline risk assessment identifies and characterizes the toxicity and levels of hazardous substances present in the media of concern (e.g., air, groundwater, soil, surface water, sediment, or biota), the environmental fate and transport mechanisms within the media of concern (e.g., physical, chemical, biological degradation processes, and hydrogeological conditions), the potential human and environmental receptors, the potential exposure routes and the extent of actual or expected exposure, the extent of impact or threat (i.e., risk characterization), and the level or levels of uncertainty associated with all of the above. The complexity of the site will determine the level of effort required to conduct the baseline risk assessment. The conclusions of the baseline risk assessment will determine the level of effort required in the risk assessment to be conducted in the FS.

The baseline risk assessment can be divided into four tasks: contaminant identification; exposure assessment; toxicity assessment; and risk characterization.

18.1 Contaminant Identification

The main purpose of this step is to screen available information on the hazardous wastes present at the site and to identify contaminants of

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concern to focus on in subsequent efforts in the risk assessment process. It may be useful at some of the NAS Pensacola sites to select "indicator chemicals" to represent the most toxic, persistent, and/or mobile substances among those identified that are most likely to contribute significantly to the overall risk posed by the site. Sometimes this indicator chemical can be selected to represent a "class" of chemicals (e.g., trichloroethylene to represent all volatiles).

18.2 Exposure Assessment

In this subtask, actual or potential pathways are identified, populations potentially exposed are characterized, and the extent of exposure is determined. Identification of potential exposure pathways helps to conceptualize the migration of contaminants from an existing source to an existing or potential point of contact. An exposure pathway may be viewed as identifying four elements:

1) A source mechanism of chemical release into the environment;
2) An environmental transport medium (e.g., air, ground water, biota);
3) A point of potential contact vith the medium of concern; and
4) An exposure route to the population from the contact paint.

The purpose of this analysis is to provide decision makers vith an understanding of both the current risks and potential future risks if no action is taken. Therefore, as part of this evaluation a reasonable maximum exposure scenario should be developed, which reflects the type(s) and extent(s) of exposures that could occur based on the expected future use of the site.

The final step in the exposure assessment is to integrate the information and develop a qualitative and/or quantitative estimate of the expected exposure levels resulting from the actual or potential release of contaminants from the site.

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18.3 Toxicity Assessment

This step considers: (1) the types of adverse human or environmental effects associated with contaminant exposure; (2) the relationship betveen the magnitude of exposure(s) and the adverse effects; and (3) related Uncertainties such as the evidence for a chemical's potential carcinogenicity in humans. Typically this process relies heavily on existing toxicity information and rarely involves the development of new data on toxicity or dose-response relationships.

18.4 Risk Characterization

In the final stages of the baseline risk assessment, a characterization of the potential adverse effects to human health or environment of each scenario derived is developed and summarized. By integrating information developed during the exposure and toxicity assessments, estimates of risk can be developed to include carcinogenic risks, noncarcinogenic risks, and environmental risks. To characterize environmental risks, the potential exposures to the surrounding ecological receptors must be identified, and the potential effects associated with such exposure(s) must be determined. Important factors to examine include disruptive effects to populations (plant and animal) and the extent of perturbations to the ecological community. [In addition, the Integrated Risk Information System (IRIS) will be utilized.]

[The following data will be obtained for *each* site as part of the baseline risk assessment:

- Distance to the closest residence (on or off NAS Pensacola);
- *Type* of barrier, if any, to prevent access;
- Approximate population vithin 0.25 rile of the site (including NAS Pensacola);
- Sensitive land uses in the vicinity of the site (e.g., schools, hospitals, retirement homes, etc.);
- Activities (recreational and/or occupational) which take place near the sites, and the estimated number of people involved;

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- Records of any environmental and/or health complaints regarding the sites; and

- Log of any actions taken by a health unit regarding health issues, complaints, and concerns.]

The results of the baseline risk assessment may indicate that the site poses little or no threat to human health or the environment. In such cases, the PS should be appropriately scaled down or eliminated. The results of the Remedial Activities Investigation and baseline risk. assessment will serve as the primary basis of documenting a no further action decision..

[It should be emphasized that all the tasks conducted as part of the baseline risk assessment will be performed on an interactive basis between the various disciplines required (i.e., hydrogeologists, chemists, risk assessors, etc.), the Navy, and the reviewing regulatory agencies (i.e., FDER and BPA) and that the goal of these tasks is to produce appropriate, sufficient, and high quality data to complete the baseline risk assessment.]

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19. FEASIBILITY STUDY

Further details on the specific tasks to be performed as part of the FS will be described in detail during the update of this workplan after the initial phases of the fieldwork have been completed. Hovever, it is anticipated that if contamination of some degree is identified on-site, the general approach described below will be followed.

As part of the initial scoping activities of the PS, E & E will prepare a summary of field data collected during the RI to compare and evaluate the concentration of the contaminants of concern against the cleanup criteria developed. E & E will prepare a qualitative and quantitative summary of contamination for the scenarios identified during risk assessment evaluation. Results of this evaluation will serve as a basis for the screening of applicable remedial technologies for the development and evaluation of remedial action technologies.

19.1 Screening of Applicable Remedial Technologies

E & E will screen and develop applicable technologies for the remediation of any on-site contamination. In the process of screening applicable technologies, E & E will consider all ARARs and identify problems, and determine pathways of contamination using a receptor-oriented approach based on the threat to the public health, welfare, and the environment. In this summary, pathways will be outlined for each medium of concern. E & E then will identify applicable remedial technologies for each general response action such as contaminant removal, treatment, disposal, and so on. The identification of technologies will be based on technical selection criteria and E & E's engineering judgment.

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19.2 Assessment of Applicable Remedial Technologies

During the assessment process, E & E will consider the relative applicability of each technology. In addition, criteria such as environmental, institutional, and public health impacts, and technical feasibility will be applied. A discussion of the applicable technologies will be provided for *each* general response action. The summary will include comments as appropriate concerning the reliability and implementability of the technology.

19.3 Risk Assessment

Based on the results of the baseline risk assessment conducted during the Remedial Activities Investigation, E 6 E will perform a detailed risk analysis to determine the acceptable levels of risk. This vill allow the Navy to balance the increase in costs associated with each alternative against gains in safety. The risk analysis will include consideration of site contaminant toxicity, transport mechanisms, persistence in the environment, and impacts on human health and the environment.

19.4 Development and Evaluation of Remedial Action Alternatives

During the preceding task, remedial technologies will be assessed independently vithout consideration of potential advantages or disadvantages of technologies applied in combination. In this task, individual technologies will be assembled into remedial action alternatives for the site. During the assembly and evaluation of the alternatives, criteria including technical feasibility, environmental and public health, institutional impacts, and comparative costs vill be considered.

19.5 Selection of Recommended Remedial Action Alternatives

During this task, E & E vill select a single remedial action alternative for the remediation of the site. The alternatives assembled during the preceding task vill be compared using technical, environmental, and economic criteria. E 6 E will consider present vorth of total costs, environmental effects, technical aspects, the extent to which alternatives comply with ARARs, community effects, and other factors,

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when comparing alternatives. E & E will apply these evaluation criteria uniformly to each alternative along with any additional criteria that may result from the Navy project coordination. E & E will discuss the selection of the chosen alternative by means of a statement of the relative advantages of the alternative over the other alternatives considered.

19.6 FS Report

A draft and final FS report will be provided to the Navy for review and comments.

20. REPORT

[Polloving the Phase I investigation, E & E will prepare a Phase I Interim Data Report and Recommendations for *each* site. The purpose of this report will be to summarize briefly the findings of Phase I and provide recommendations for the Phase II investigation; the Phase I interim report will not be a formal report. (In general, during the proposed multi-phase investigation process, formal reports will be generated only when little or no additional assessment vork appears to be required.) Following the Phase I interim report, the vork plans for the Phase II vork will be updated accordingly. If the results of Phase 11 indicate that no further action is warranted, a formal Phase II report will be produced. Hovever, if the Phase II results indicate that additional investigation is required, the Phase II report will be produced as the Phase II Interim Data Report and Recommendations and will only briefly summarize the Phase II results and provide recommendations for the Phase III investigation. Thus, the Phase II interim report will not be a formal document. Following production of the Phase II interim report, the vork plans for the Phase III work will be updated.]

E & E will prepare a 90% draft [for each of the above-described] reports, [which summarizes] the activities and results of the [investigation tasks performed]. Upon receipt of comments [from] the Navy concerning the *90%* draft reports, E *6* E will prepare a draft final report for the Navy and the Technical Review Committee (TRC) review. The TRC review comments will be incorporated into final reports. Each report will be written as an independent document? complete in its own right, and fully supportive of the conclusions that it contains. [Where appropriate,] public participation issues will be summarized? as will interim remedial measures necessary to protect against continued

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degradation of conditions at the site(s). Information used in analyses, but supplemental to the analytical results, will be provided in a series of appendices.

Monthly progress reports during all field activities will be subnitted to keep the Navy apprised of fieldvork status and site conditions. Current and planned activities as well as cost tracking will be provided.

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21. DOCUMENT REVISION

Periodic updating of all administrative documents (GQAPP, GSHP, GHSP, GPMP, and work plans) will be necessary due to changes in site conditions and/or program conditions or requirements. The schedules shown in the GPHP and GSHP indicate document revisions approximately every two months for the GQAPP, GSHP, GHSP, and GPHP. Work plans will be revised after each phase of fieldwork, with Phases III and IV, if required, fully developed after Phase II with separate cost estimations. Revised documents will undergo the same review process (e.g., Navy and TRC) as the original documents.

22. PROJECT MANAGEMENT

Project management will be an ongoing process throughout this investigation. This process includes preparation of bi-weekly project status reports, coordination of schedules, mobilizations, and other project incidentals vith the Navy, management of project staff, coordination with the E & E support groups (e.g., publications, laboratory), and ongoing project review by E & E technical managers and directors. These project management steps are described in detail in the GPHP submitted to the Navy.

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23. PROJECT SCHEDULE

[Figures 23-1, 23-2, 23-3, and 23-4 shov the project schedules for Phases I, II, 111, and IV, respectively. Given that the scopes of work for Phase II and beyond are dependent on the results of the preceding phases, the project schedules for Phases II, 111, and IV are tentative. In addition, the length of time between phases is subject to the schedule in the Federal Facilities Agreement Site Management Plan (FFASMP). The schedule in the FFASMP will be updated yearly.]

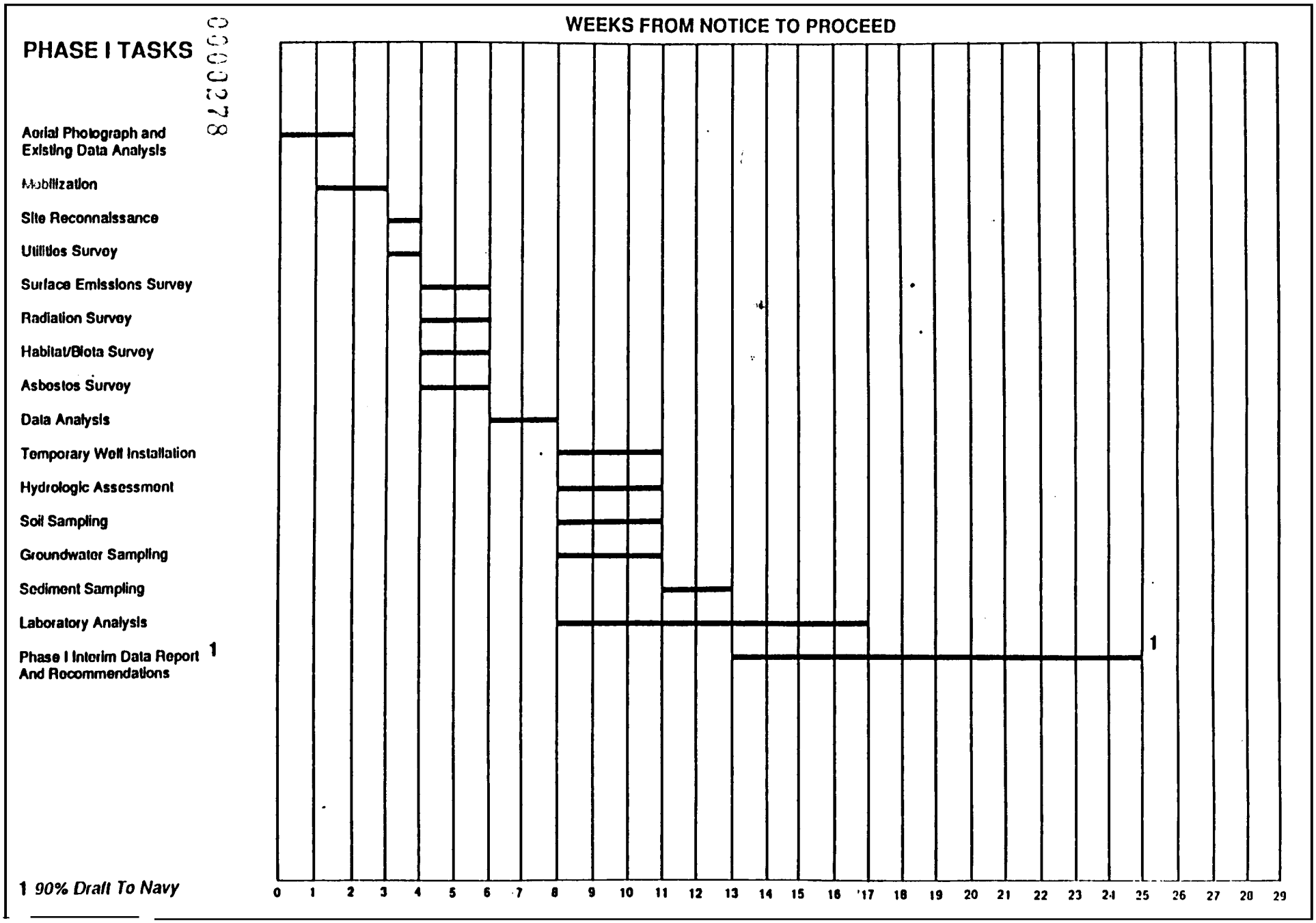

Figure 23-1 PHASE I PR(:T SCHEDULE -- GROUP C

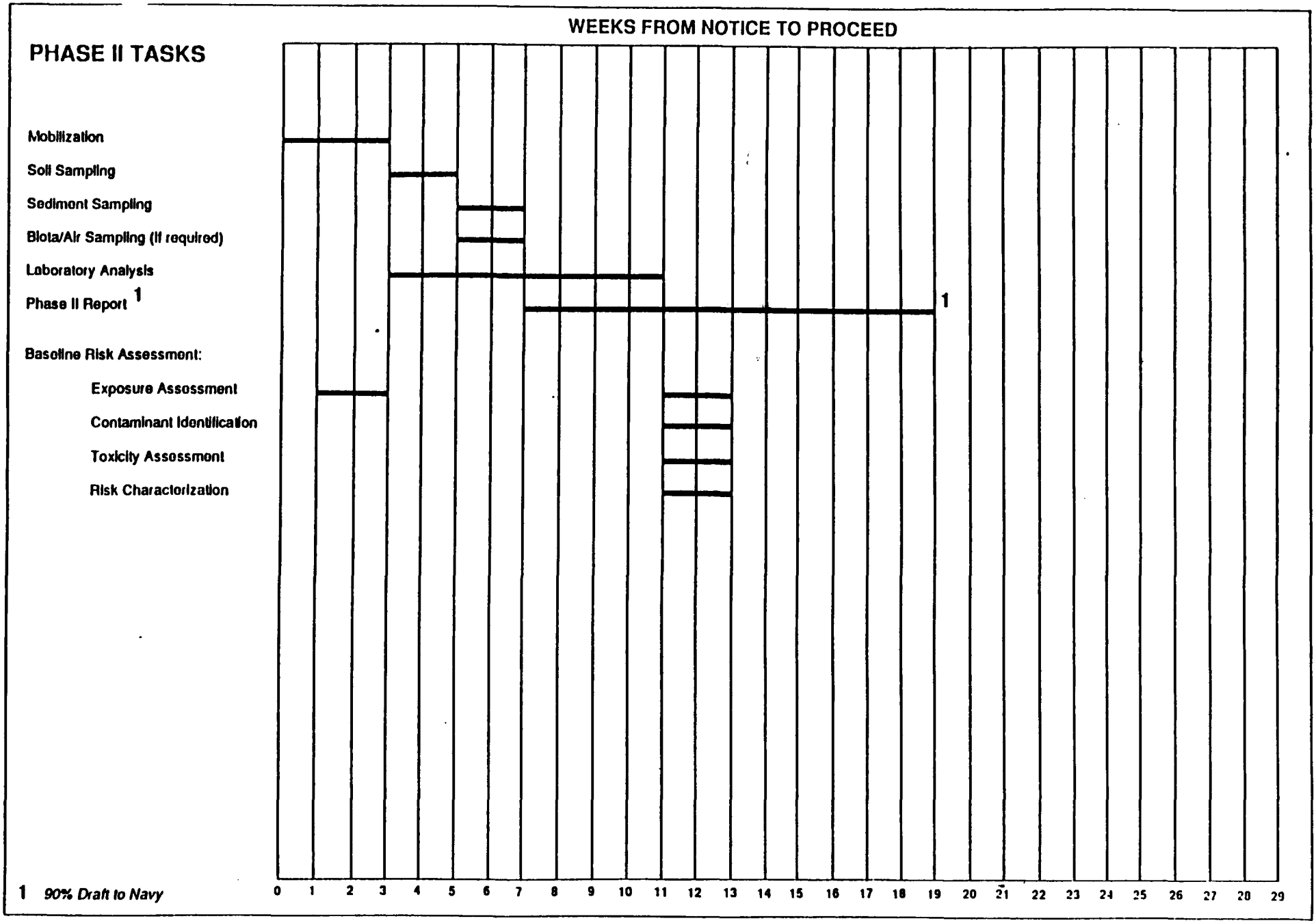

Figure 23-2 PHASE II PROJI SCHEDULE -- GROUP C

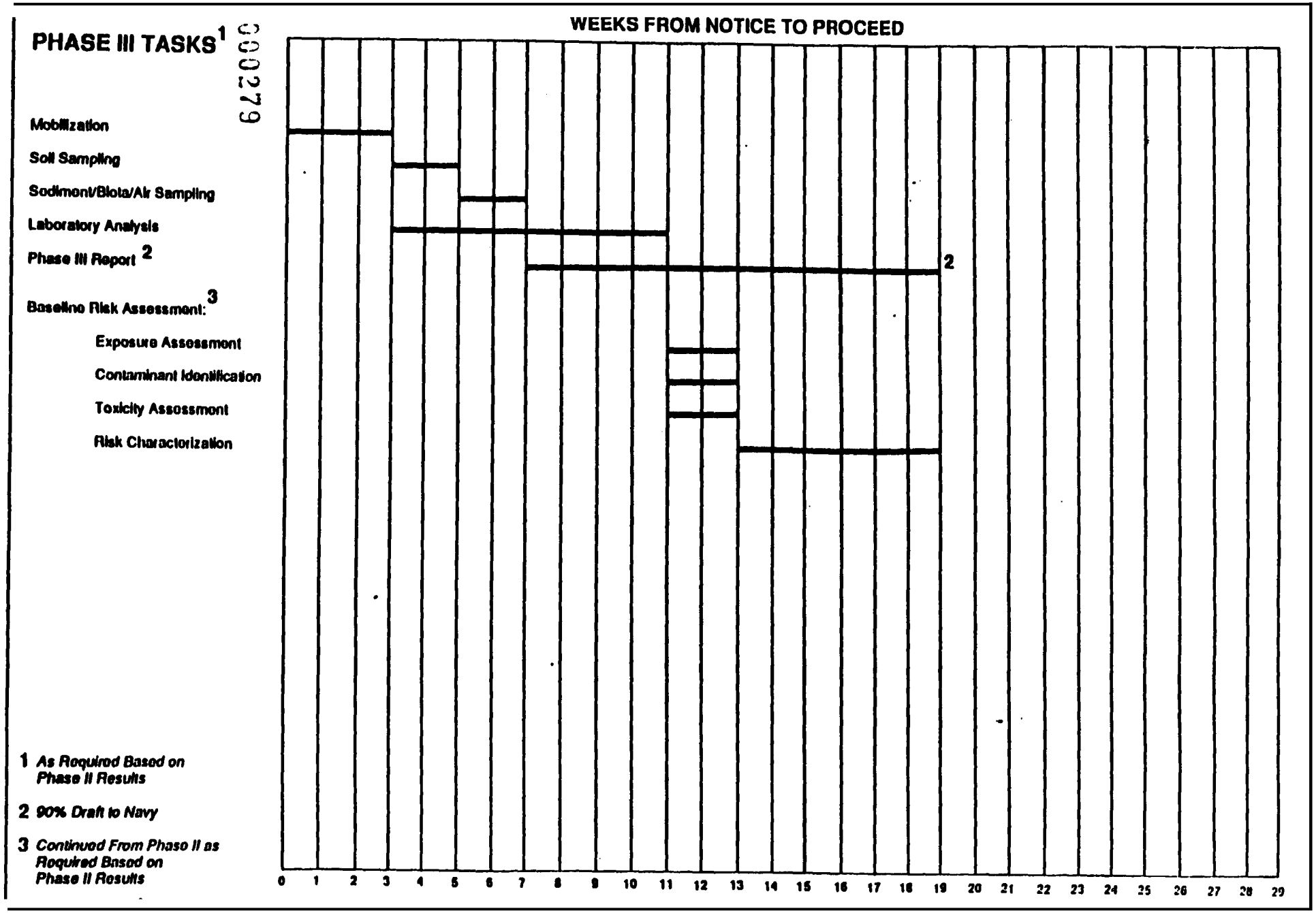

Figure 23-3 PHASE III PROJECT SCHEDULE – GROUP C

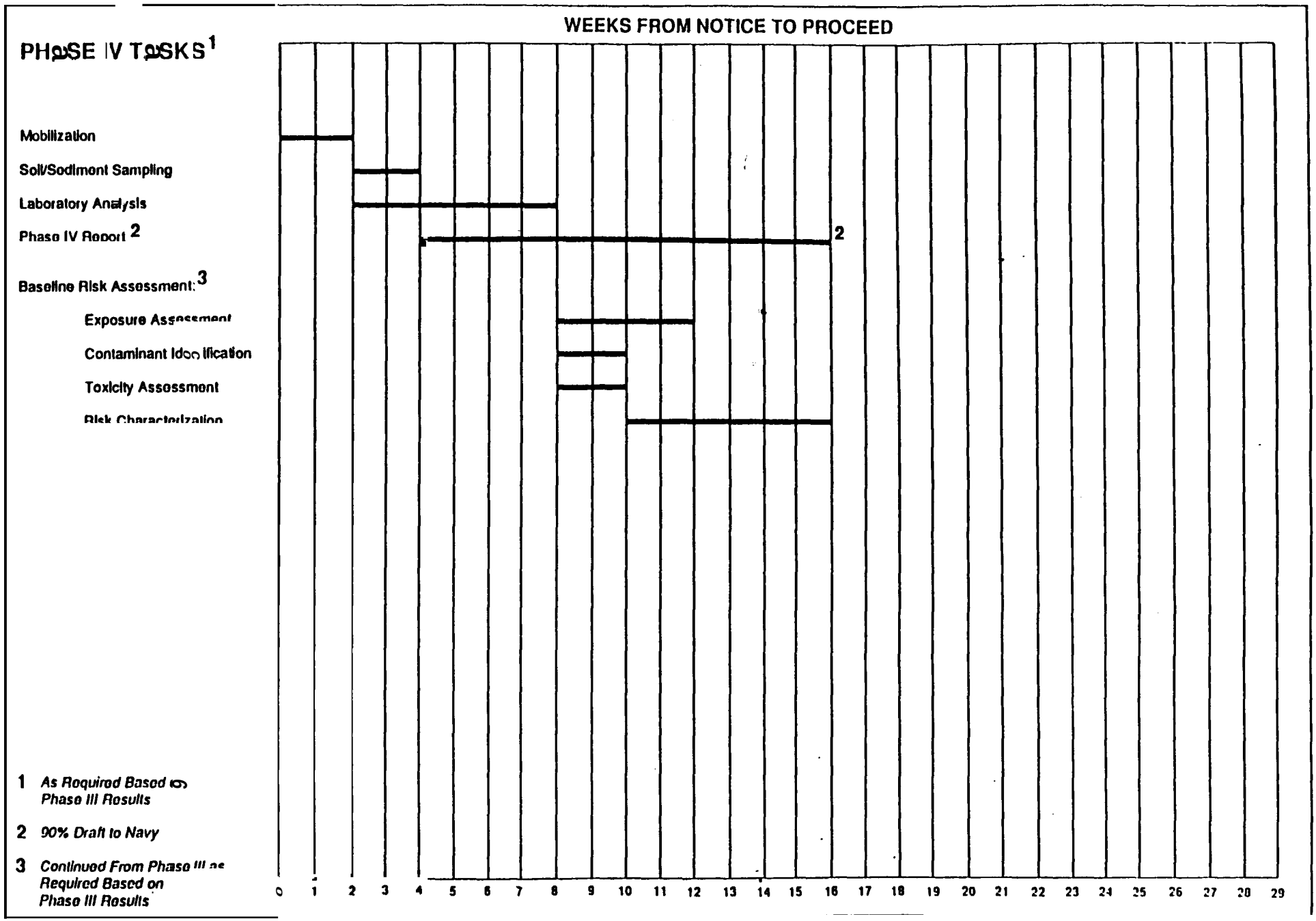

Figure 23-4 PHASE IV PROJECT SCHEDULE -- GROUP C

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[Bold items *enclosed* in brackets denote changes from original text]

APPENDIX A

SITE-SPECIFIC SAFETY PLAN

ecology and environment, inc.

SITE SAFETY PLAN

Version 988

A. GENERAL INFORMATION

Project Title: Site 2 - Waterfront Sediments

Project Ao.: UH1103

TDD/Pan No.:

Project Manager: John Barksdale

Project Dir.: Rick Rudy

Location(s): Waterfront Sediments - Marine sediments offshore from NAS Pensacola on East and South sides

Prepared by: Jon Schmidt

Date Prepared: 4-25-89

Approval by: Mary Miller MM

Date Approved: 5-5-89

Site Safety Officer Review:

Date Reviewed:

Scope/Objective of Work: Field Screening will include physical surveys, soil sampling, temporary well installation and groundwater sampling.

Proposed Date of Field Activities: September 1989

Background Info: Complete: [X] Preliminary (No analytical data available) [ ]

Documentation/Summary:

Overall Chemical Hazard:	Serious [ ]	Moderate [X]
	LOW [ ]	Unknown [ ]
Overall Physical Hazard	Serious [ ]	Moderate [ ]
	LOU [X]	Unknown [ ]

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

Liquid [ ]	Solid [ ]	Sludge [X]	Gas/Vapor [ ]

Characteristic(s):

Flammable/ Ignitable [ ]	Volatile [ ]	Corrosive [ ]	Acutely Toxic [ ]
Explosive [ ]	Reactive [ ]	Carcinogen [ ]	Radioactive. [ ]

Other: Unknown

Physical Hazards:

Overhead [X]	Confined. Space [ ]	Below Grade [X]	Trip/Fall [X]
Puncture [ ]	Burn [ ]	Cut [ ]	Splash [X]
Noise [ ]	Other: Scuba diving to collect sediment sampler		

quires completion of additional form and special approval from the Corporate Health/Safety group. Contact C or HQ.

Site History/Description and Unusual Features (see Sampling Plan for detailed description): This site is comprised of nearshore sediments along the southeastern perimeter of the NAS Pensacola facility. Liquid wastes were disposed of within the stormwater system from the 1930's to 1973. This waste was carried out into the Pensacola Bay by way of stormwater outfalls located along the southeastern portions of NAS Pensacola. At least 3 million gallons of paints, paint solvents, ketones, alodine, mercury, radium paint, and plating solutions were disposed, untreated, into Pensacola Bay.

Locations of Chemicals/Wastes: Unknown. It is assumed that wastes are bound to the organic fraction of nearshore sediments.

Estimated Volume of Chemicals/Wastes: At least 83 million gallons of paint, paint thinner and solvent, plating solutions, mercury, trichloroethylene and ketones.

Site Currently in Operation Yes: [ ] No: [X]

C. HAZARD EVALUATION

List Hazards by Task (i.e., drum sampling, drilling, etc.) and number them. (Task numbers are cross-referenced in Section D)

Physical Hazard Evaluation:

1) Physical Surveys - Walking along sewage outfalls;

2) Sediment Sampling - SCUBA Diving for sediment samples;

3) Decontamination Procedures - Using solvents.

Chemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
Mercury	0.1 mg/m^3	Inh/Absor/Cont	cough, weak	N/A	odorless
Trichloroethylene	100 ppm	Inh/Ingst/Cont	naus,vomit,vertigo	0.082 ppm	sweet odor
Isopropyl Alcohol	400 ppm	Inh, Abs	drowsiness,head.	7.5-200 ppm	rubbing alcohol
Nitric Acid	2 ppm	" "	corrosive	0.3-1 ppm	acrid
Cadmium	0.2 mg/m^3	Inhale/Ingest	cough, tight chest	N/A	varies
Cyanide	5 mg/m^3	Inhale/Ingest	weak, headache	N/A	almond odor(HCN)
Nickel	1 mg/m^3	Inh/Ingst/Cont	allergic, asthma	N/A	varies
Lead	0.05 mg/m^3	Inh/Ingst/Cont	insomnia, hyperten	N/A	varies
Chromium	500 mg/m^3	Inhale/Ingest	fibrosis of lungs	N/A	varies

Note: Complete and attach a Hazard Evaluation Sheet for major known contaminant.

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D. SITE SAFETY WORK PLAN

Site Control: Attach map, use back of this page, or sketch of site showing hot zone, contamination reduction, zone, etc.

Perimeter identified? [no] Site secured? [no 1

Areas Designated? [yes] Zone(s) of Contamination Identified? [no]

Personnel Protection (TLD badges required for all field personnel):

Anticipated Level of Protection (Cross-reference task numbers to Section C):

	A	B	C	
Task 1				X
Task 2				X
Task 3				X
Task 4				X

(Expand it necessary)

Modifications: Modified level D with wetsuit, neoprene gloves and dive mask.

Action Levels for Evacuation of Work Zone Pending Reassessment of Conditions:

- Level D: O_2 <19.5% or >25%, explosive atmosphere >10% LEL, organic vapors above background levels, particulates >_____ mg/m^3, other _____
- Level C: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapor (in breathing zone) >5 ppm, particulates >_____ mg/m^3, other _____
- Level B: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors (in breathing zone) >500 ppm, particulates >_____ mg/m^3, other _____
- Level A: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknovn organic vapors >500 ppm, particulates >_____ mg/m^3, other _____

Air Monitoring (daily calibration unless otherwise noted):

Contaminant of Interest	Type of Sample (area, personal)	Monitoring Equipment	Frequency of Sampling

Decontamination Solutions and Procedures tor Equipment, Sampling Gear, etc.:
Trisodium phosphate wash. tap water rinse, isopropanol rinse, distilled water rinse, isopropanol rinse, and final distilled water rinse.

Personnel Decon Protocol: Boot and glove wash - trisodium phosphate wash with clean water rinse. Expendables will be double bagged and drummed for disposal. Field personnel will take a hygienic shower, off-site, following each day's field work.

Decon Solution Monitoring Procedures, if Applicable: Decontamination will be performed on the boat

Special Site Equipment, Facilities, or Procedures (Sanitary Facilities and Lighting Must Meet 29 CFR 1910.120):

SCUBA procedures and equipment will follow N.A.U.I. and P.A.D.I. guidelines

Site Entry Procedures and Special Considerations: E & E's "Buddy System" will be employed at all times during fieldwork activities. Personnel will exercise caution in the vicinity of the outfalls and underwater. If above background radiation levels are encountered team members will evacuate the sampling area, and contact the corporate health physics group to reassess the site.

Work Limitations (time of day, weather conditions, etc.) and Heat/Cold Stress Requirements:

All fieldwork activities will be performed during daylight hours. Team members will take breaks as necessary to avoid heat stress and replace fluids.

General Spill Control, if applicable: N/A

Investigation-Derived Material Disposal (i.e., expendables, decon waste, cuttings):

All fieldwork waste materials will be double bagged, drummed, labeled and transported to a designated location for final disposal by the Navy.

Sample Handling Procedures Including Protective Wear:

During all handling of samples, all field team members will wear surgical gloves. Goggles will be worn during sample preservation with acids.

Team Member*	Responsibility
Team members to be determined	Team Leader
	Site Safety Officer/Sampler
	Geologist/Sampler

*All entries into exclusion zone require Buddy System use. All E & E field staff participate in medical monitoring program and have completed applicable training per 29 CFR 1910.120. Respiratory protection program meets requirements of 29 CFR 1910.134, and ANSI Z88.2 (1980).

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E. EMERGENCY INFORMATION

(Use supplemental sheets, if necessary)

LOCAL RESOURCES

(Obtain a local telephone book from your hotel, if possible.)

Ambulance On Base -- 904-452-4138, Off Base -- 911

Hospital Emergency Room NAS Dispensary - 904-452-2733, Baptist Hospital 904-434-4811 (Life Flight)

Poison Control Center

Police (include local, county sheriff, state) 911

Fire Department 911

Airport

U.S. Coast Guard Emergency - 904-453-8178, General Information 904-453-8282

Laboratory E & E ASC 1-716-631-0360

Fed. Express 1-800-238-5355

Client Contact U.S. Navy Southern Division, Engineer-In-Charge, 1-803-743-0574

Site Contact NAS Pensacola Enviromental Coordinator, W. Dewayne Ray -- 904-452-4515

Decompression Chamber NAS Pensacola for life threatening situations. All other cases will be taken by life flight to Bay Memorial Hospital in Panama City, Florida.

SITE RESOURCES

Site Emergency Evacuation Alarm Method N/A

Water Supply Source On-site

Telephone Location, Number To be determined on-site

Cellular Phone, if available N/A

Radio

Other On-site warehouse number to be determined

EMERGENCY CONTACTS

1. Dr. Raymond Harbison (Univ. of Florida) ..... (501) 221-0465 or (904) 462-3277, 3281
   Alachua, Florida (501) 370-8263 (24 hours)

2. Ecology and Environment, Inc., Safety Director
   Paul Jonmaire ..... (716) 684-8060 (office)
   (716) 655-1260 (home)

3. Regional Office Contact .....M.Miller.... 656-2854 (home)
   877-1978 (office)

4. Office Manager.....R.Rudy..... 893-7245 (home)

MEDTOX HOTLINE

1. Twenty-four hour answering service: (501) 370-8263

   What to report:

   - State: "this is an emergency."
   - Your name, region, and site.
   - Telephone number to reach you.
   - Your location.
   - Name of person injured or exposed.
   - Nature of emergency.
   - Action taken.

2. A toxicologist, (Drs. Raymond Harbison or associate) will contact you. Repeat the information given to the answering service.

3. If a toxicologist does not return your call within 15 minutes, call the following persons in order until contact is made:

   a. 24 hour hotline - (716) 684-8940
   b. Corporate Safety Director - Paul Jonmaire - home # (716) 655-1260
   c. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 688-0084

[redacted]

(NOTE: ~ ~Team meet Day Route(s) prior to start of Work)

Directions to hospital (include map)

NAS Dispensary - Follow Bradford Road west to Ellyson Avenue. Turn right (north) onto Ellyson and continue to it's intersection with Turner Street. The Nas Dispensary is located on the northwest corner of the intersection of Ellyson Avenue and Turner Street, in Building 625-A.

Baptist Hospital - Take Duncan Road (Navy Blvd.) north to exit the base. Navy Blvd. becomes HWY 90 and curves to the east. Follow Navy Blvd./Hwy. 91 east approx. 3mi to Pace Blvd. Turn left (north) on Pace Blvd. and proceed approx. 1mi to Cervantes St. (Hwy. 90). Turn right on Cervantes/Hwy. 90 and follow this road for about 8 blocks and turn left (north) onto E street. The hospital is about 6 blocks north on the left.

Emergency Egress Routes to Get Off-Site Emergency egress routes will be located if emergency exit routes become blocked by construction, etc.

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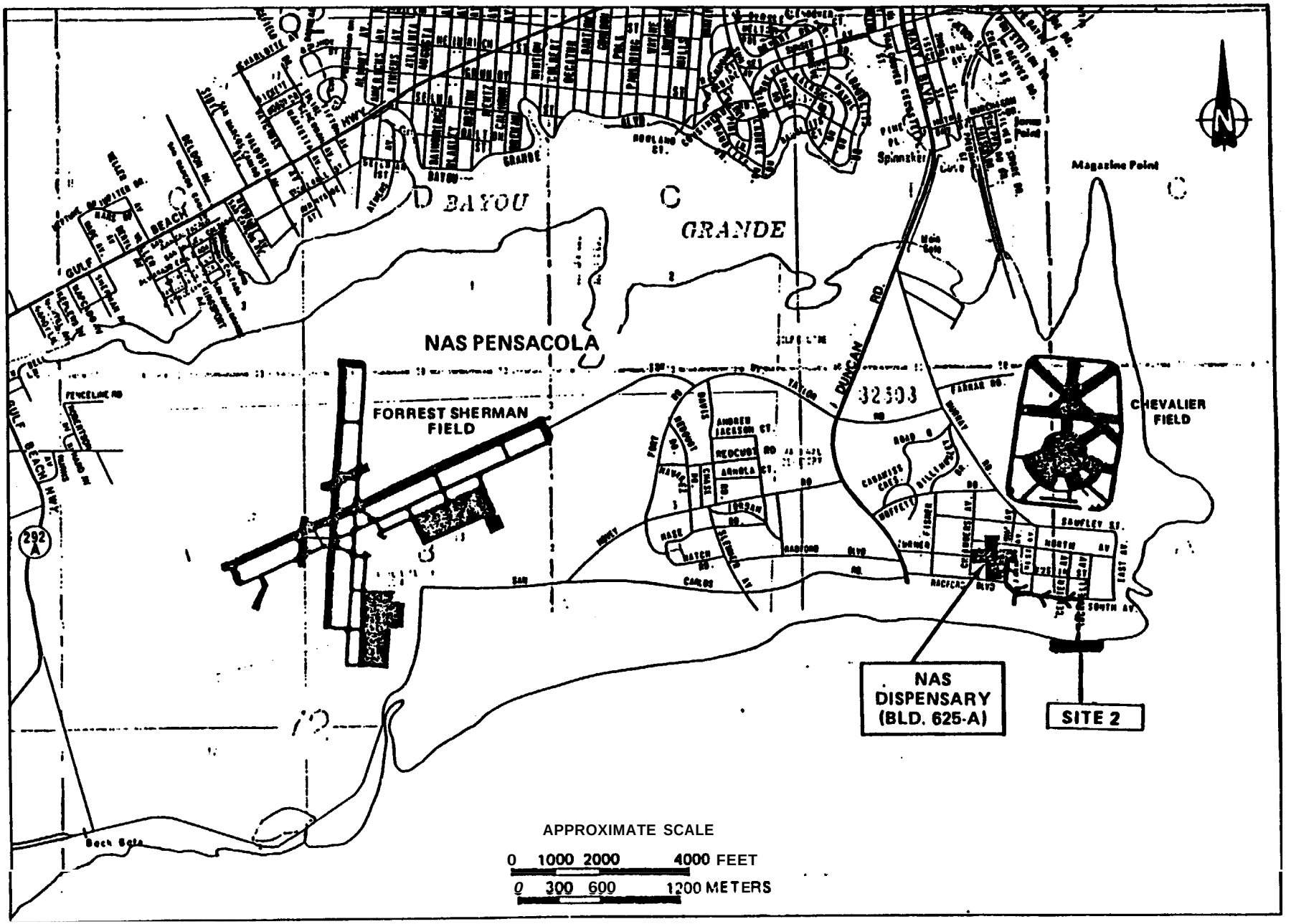
NAS PENSACOLA
FORREST SHERMAN FIELD
CHEVALIER FIELD
BAYOU
GRANDE
Magazine Point
NAS DISPENSARY (BLD. 625-A)
SITE 2
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

DRILL RIG SAFETY

* Hard hats must be worn.
* All team members must be know the procedure to shut the rig off and the location of the "kill" switch.
* When moving a rig off the road, pay attention to obstacles in route of travel. Walk the intended route first.
* Have someone guide the rig driver when clearance is at a minimum or when hazards are in close proximity.
* Set rig brakes and block the wheels when rig is set up at the desired drilling location.
* The mast must be lowered when the rig is roved.
* Always consider overhead wires to be live, watch for sagging lines and do not operate rig within 15 feet of overhead lines.
* Hake sure the site, platforms and walkways are free of obstructions.
* Make sure proper housekeeping is practiced around and on the rig at all tines. Tools should be stored in a manner that permits convenient access and provides for adequate safety.
* Store gasoline in approved containers that have a spark arrestor and keep them clear of the drilling work area.
* Check rig equipment prior to starting work. Repair or replace faulty and worn items.
* Handle augers with care. Use proper lifting techniques when picking up samplers and augers. Use a tool hoist if possible and stay clear of rotating augers. Keep cables and ropes secured when not in use.
* Level and stabilize the drill rig prior to raising the rast.
* Watch for slippery ground when working in the area of the rig.
* All unattended boreholes aust be properly covered.
* Do not drill during an electrical storm.
* Maintain a safe distance from the rig mechanisms during drive sampling and auger removal operations.

ECOLOGY AND ENVIRONMENT, INC.,
STANDARD OPERATING PROCEDURES FOR
EMERGENCIES DUE TO HEAT AND HEAT STRESS MONITORI'IC

Field operations during the summer months can create a variety of hazards to the employee. Heat cramps, heat exhaustion, and heat stroke can be experienced and, if not remedied. can threaten life or health. Therefore, It is important that all employees be able to recognize symptoms of these conditions and be capable of arresting the problem as quickly as possible,

THE EFFECTS OF HEAT

As the result of normal oxidation processes within the body, a predictable amount of heat Is generated. If the heat Is liberated as It is formed. there is no change In body temperature. If the heat is liberated more rapidly, the body cools to a point at which the production of heat Is accelerated and the excess is available to bring the body temperature back to normal,

Interference with the elimination of heat leads to its accumulation and thus to the elevation of body temperature. As a result, the person is said to have a fever. When such a condition exists, it produces a vicious cycle In which certain body processes speed up and generate additional heat. Then the body must eliminate not only the normal but also the additional quantities of heat.

Heat produced within the body is brought to the surface largely by the bloodstream and escapes to the cooler surroundings by conduction and radiation. If air movement or a breeze strikes the body, additional heat is lost by convrction. However, when the temperature of the surrounding air becomes equal to or rises above that of the body. all of the heat must be lost by vaporization of the moisture or sweat from the skin surface. As the air becomes more humid (contains more moisture), vaporization from the skin slows down. Thus, on a day when the temperature is 95 to 100°F, with high humidity and little or no breeze, conditions are ideal for the retention of heat within the body. It Is on such a day or, more commonly, a succession of such days (a heat wave) that medical emergencies due to heat are likely to occur. Such emergencies are classified in three categories: heat cramps, heat exhaustion, and heat stroke.

HEAT CRAMPS

Heat cramps usually affect people who work in hot environments and perspire a great deal. Loss of salt from the body causes very painful cramps of the leg and abdominal muscles. Heat cramps also may result from drinking iced water or other drinks either too quickly or in too large a quantity.

Heat Cramp Symptoms. The symptoms of heat cramp are:

- Muscle cramps in kgt and abdomen,
- Pain accompanying the cramps,
- Faintness, and
- Profuse perspiration.

Heat Cramp Emergency Care. Remove the patient to a cool place. Give hlm rips of liquids such as "Gatorade" or its equivalent. Apply manual pressure to the cramped muscle. Remove the patient to a hospital If there is my indication of a more serious problem.

HEAT EXHAUSTION

Heat exhaustion occurs in individuals working in hot environments, and may be associated with heat cramps. Heat exhaustion is aurrd by the pooling of blood in the vessels of the skin. The heat is transported from the interior of the body to the surface by the blood. The blood vessels in the skin become dilated and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when an individual is in m upright position, may lead to an inadequate return of blood to the heart and eventually to physical collapse.

Heat Exhaustion Symptoms. The symptoms of heat exhaustion are:

- Weak pulse;
- Rapid and usually shallow breathing:
- Generalized werkners;
- Pale, clammy skin;
- Profuse perspiration;
- Dizziness;
- Unconsciousness; and
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting).

Heat Exhaustion Emergency Care. Remove the patient to a cool place and remove as much clothing as possible. Administer cool water, "Gatorade," or its equivalent. If possible, fan the patient continually to remove heat by convection, but do not allow chilling or overcooling. Treat the patient for shock, and remove him to a medical facility if there is any indication of a more serious problem.

HEAT STROKE

Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions, unconsciousness, and even death. Direct

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exposure to sun, poor air circulation, poor physical condition, and advanced age (over 40) bear directly on the tendency to heat stroke. It is a serious threat to life and carries a 20% mortality rate. Alcoholics are extremely susceptible.

Heat Stroke Symptoms. The symptoms of heat stroke are:

- Sudden onset:
- Dry, hot, and flushed skin:
- Dilated pupils;
- Early loss of consciousness;
- Full and fast pulse:
- Breathing deep at first, later shallow and even almost absent;
- Muscle twitching, growing into convulsions: and
- body temperature reaching 105 to 106°F or higher.

Heat Stroke Emergency Care. Remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove the patient to a cool environment if possible, and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly— preferably by wrapping in a wet shed or else by dousing the body with water. If cold packs are available, place them under the arms, around the neck, at the ankles, or at any place where blood vessels that lie close to the skin can be cooled, Protect the patient from injury during convulsions, especially from tongue biting.

AVOIDANCE OF HEAT-RELATED EMERGENCIES

Please note that, in the case of heat cramps or heat exhaustion, "Gatorade" or its equivalent is suggested as part of the treatment regime. The reason for this type of liquid refreshment is that such beverages will return much-needed electrolytes to the system. Without these electrolytes, body systems cannot function properly, thereby increasing the represented health hazard. Therefore, when personnel are working in situations where the ambient temperatures and humidity are high— and especially in situations where protection Levels A B, and C are required— the site safety officer must:

- Assure that all employees drink plenty of fluids ("Gatorade" or its equivalent);
- Assure that frequent breaks are scheduled so overheating does not occur; and
- Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall).

If protective clothing must be worn, especially Levels A and B, the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minuter)
Abovo 90	15
85 to 90	30
80 to 85	60
70 to 80	90
80 to 70	120
50 to 60	180

One method of measuring the effectiveness of employees' rest-recovery regime is by monitoring the heart rate. The "Brouha guideline" is one such method:

- During a three-minute period. count the pulse rate for the last 30 seconds of the first minute, the last 30 seconds of the second minute, and the last 30 seconds of the third minute.
- Double the count.

If the recovery pulse rate during the last 30 seconds of the first minute b at 110 beats/minute or less and tho deceleration between the first second, and third minutes is at kart 10 beats/minute, the work-recovery regime is acceptable. If the employee's rate is above that specified, a longer rest period is required, accompanied by an increased intake of fluids.

Mallinckrodt
Material Safety Data

Emergency Phone Number: **314-982-5000**

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, **Paris, KY** 40361.

ISOPROPYL ALCOHOL

PRODUCT IDENTIFICATION:

Synonyms: 2-propanol; sec-propyl alcohol; isopropanol

Formula CAS No.: 67-63-0

Molecular Weight 60.10

Chemical Formula: $(CH_3)_2$ CHOH

Hazardous Ingredients: **Not** applicable.

PRECAUTIONARY MEASURES

WARNING! FLAMMABLE LIQUID. HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION.

Keep away from heat, **sparks** and flame.
Keep container closed.
Use with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Avoid contact with eyes, **skin** and clothing

EMERGENCY/FIRST AID

If swallowed, give water to drink. Induce vomiting if medical help is not immediately available. Never **give** anything by mouth to an unconscious person. If inhaled, remove to fresh air. **If** not breathing, give artificial respiration. If breathing **is** difficult, **give** oxygen. In caw of contact. immediately flush skin or **eyes** with plenty of water for at least **15** minuter In all cases **call** a physician.
SEE **SECTION 5.**

DOT Hazard Class: Flammable Liquid

SECTION 1 Physical Data

Appearance: **Clear,** colorless liquid.

Odor: Rubbing alcohol.

Solubility: Infinite In water.

Boiling Point: 82°C (180°F).

Melting **Point: -89°C (-128°F).**

Specific gravity: 0.79

Vapor Density (Air = 1): 2.1

Vapor Pressure (mm Hg): 33 **@ 20°C (68°F)**

Evaporation Rate: (n-BUAC = 1) 2.83

SECTION 2 Fire and Explosion Information

Fire:
Flammable **Liquid**
Flashpoint: 12°C (53°F). (closed cup).
Autoignition temperature: 399°C (750°F).
Flammable limits in air, % by volume:
lel: 2.0; uel: 12.0.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted **above.** Contact with strong oxidizers may cause **fire** or explosion.

Fire Extinguishing Media:
Water spray, dry chemical, **alcohol foam,** or **carbon dioxide.**
Water **spray** may be used to keep fire **exposed** containers **cool.**

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved **self-contained** breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Vapors can **flow** along surfaces **to** distant ignition source and flash back.

SECTION 3 Reactivity Data

Stability:
Stable under **ordinary** conditions of use and storage. Heat and sunlight can contribute to instability.

Hazardous Decomposition Products:
Toxic gases and vapors such **as** carbon **monoxide** may be **released** in a fire involving isopropyl alcohol.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Heat, flame, strong oxidizers, acetadehyde, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric add combination, potassium tert-butoxide, hypochlorous acid, **isocyanates,** nitroform, phosgene, oleum and perchloric add.

SECTION 4 Leak/Spill Disposal Information

Remove all **sources** of ignition. Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapors. **Small spills** may be absorbed on paper towels and evaporated in a fume hood. Allow enough time for fumes to clear **hood,** then ignite paper in a suitable location away from combustible materials. Contain **and** recover liquid for reclamation when possible. Larger **spills and** bt**sizes** em**be collected as hazardous waste and atomized** in a suitable **RCRA** approved combustion chamber, or absorbed with vermiculite, dry sand, earth or similar material for disposal **as** hazardous waste in a RCRA approved facility.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 1 Flammability: 3 **Reactivity:** 0

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SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
May cause irritation of the nose and throat. Exposure to high concentrations has a narcotic effect, producing symptoms of drowsiness, headache, staggering, unconsciousness and possibly death.

Ingestion:
May cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult is about 250 mls (SAX Sixth Edition).

Skin Contact:
Has a defatting action of the skin that can cause irritation. May cause initation with a stinging effect and burning sensation.

Eye Contact:
Vapors may irritate the eyes. Splashes may cause severe irritation, possible corneal bums and eye damage.

Chronic Exposure:
Prolonged contact with skin may causa mild initation. drying, cracking, or contact dermatitis may develop.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Give water to ddnk. Induce vomiting if medical help not is immediately available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure:
Remove any contaminated clothing. Wish skin with soap or mild detergent and water for at least 15 minuter Get medical attention if irritation develops or persists.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 5840 mg/kg. Skin rabbit LD50: 13 gm/kg. Inhalation rat LC50: 16000 ppm/8H. Mutation references cited Aquatic Toxicity rating TLm96: 1000-10 ppm.

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA).
-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA); 500 ppm (STEL).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a full faceplece chemical cartridge respirator may be worn, in general, up to the maximum use concentration specified by the respirator supplier. Alternatively, a supplied air full faceplece respirator or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab colt. apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quickdrench facilities in work area.

SECTION 7 Storage and Special Information

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounds for transfers to avoid static sparks. Storage and use areas should be NO Smoking areas. Use non-sparking type tools and equipment.

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Mallinckrodt

Material Safety Data

Emergency Phone Number: 314-982-5000

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 43061.

NITRIC ACID, 70%

PRODUCT IDENTIFICATION:

Synonyms: Aqua Fortis; Azotic Add; Nitric Acid 70%

Formula CAS No.: 7697-37-2

Molecular Weight: 63.00

Chemical Formula: HNO_3

Hazardous Ingredients: Not Applicable

PRECAUTIONARY MEASURES

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in eyes, on skin, or on clothing.
Avoid breathing mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, **DO NOT INDUCE VOMITING!** Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: Oxidizer

SECTION 1 Physical Data

Appearance: Clear, colorless to slightly yellow liquid.

Odor: Suffocating acrid.

Solubility: Infinite in water.

Boiling Point: 122°C (252°F)

Melting Point: -34°C (-29°F)

Specific Gravity: 1.41

Vapor Density (Air=1): 2-3 approximately

Vapor Pressure (mm Hg): 62 @ 20°C (68°F)

Evaporation Rate: No information found.

SECTION 2

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc.

Fire Extinguishing Media:
If involved in a fire, use water spray.

Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

SECTION 4 Leak/Spill Disposal Information

Isolate or enclose the area of the leak or spill. Clean-up personnel should wear protective clothing and respiratory equipment suitable for toxic or corrosive fluids or vapors. Small Spills: Flush with water and neutralize with alkaline material (soda ash, lime, etc.). Sewer with excess water. Larger spills and lot sizes: Neutralize with alkaline material, pick up with absorbent material (sand, earth, vermiculite) and dispose in a RCRA-approved waste facility or sewer the neutralized slurry with excess water if local ordinances allow. Provide forced ventilation to dissipate fumes.

Reportable Quantity (RQ)(CWA/CERCLA): 1000 lbs.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0 Other: Oxidizer

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SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Splashes may cause severe burns and permanent eye damage.

Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA

Inhalation (Rat) LC50: 244 ppm
(NO_2)/30M

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible.Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Special Information

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect from physical damage and direct sunlight. Isolate from incompatible substances. Protect from moisture.

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Mallinckrodt, Inc., Science Products Division. P.O. Box M, Paris, KY 40361.

SULFURIC ACID 96%

PRODUCT IDENTIFICATION:

Synonyms: Oil of Vitriol

Formula CAS No.: 7664-93-9

Molecular Weight: 98.07

Chemical Formula: H_2SO_4

Hazardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

DANGER! CORROSIVE LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In all cases call a physician. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
SEE SECTION 5.

DOT Hazard Class: *Corrosive* Material

SECTION 1 Physical Data

Appearance: Colorless, oily liquid.

Odor: Odorless.

Solubility: Infinite @ 20°C.

Boiling Point: **ca. 310°C (590°F)**

Melting Point: **ca. -14°C (6°F).**

Specific Gravity: 1.84

Vapor Density (Air = 1): **< 0.3 @ 25°C (77°F)**

Vapor Pressure (mm Hg): **1 @ 146°C (250°F).**

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Reacts with most metals releasing flammable, potentially explosive hydrogen gas.

Explosion:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Water, buy organic material, halogens, metal acetylides, oxides and hydrides, strong oxidizing and reducing agents and many other reactive substances.

SECTION 4 Leak/Spill Disposal Information

Dike and caw leaking or spilled liquid with dirt, vermiculite, kitty-litter or other inert absorbent. Cover spill with sodium bicarbonate or soda ash and mix. Clean-up personnel require protective clothing and respiratory protection from vapors and mists. Neutralized waste may be containerized and disposed in a RCRA approved waste disposal facility. flush area of spill with dilute soda ash solution and discard to sewer.

Reportable Quantity (RQ)(CWA/CERCLA) : 1000 lbs.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 2 Other: Water reactive

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SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. May cause lung edema. Symptoms may include irritation of the nose and throat, and labored breathing.

Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea.

Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.

Eye Contact:
Corrosive. Splashes can cause blurred vision, redness, pain and severe tissue burns.

Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth.

Aggrevation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
If swallowed, DO NOT induce vomiting. Give large quantities of water or milk if available. Call a physician immediately. Never give anything by mouth to an unconscious person.

Skin Exposure:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 2140 mg/kg. Inhalation Guinea Pig LC50: 18 mg/m^3.

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
1 mg/m^3 (TWA).
-ACGIH Threshold Limit Value (TLV):
1 mg/m^3 (TWA).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a full facepiece chemical cartridge respirator may be worn, in general, up to 100 times the TLV or the maximum use concentration specified by the respirator supplier, whichever is less. Alternatively, a supplied air full facepiece respirator or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible.Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Special Information

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; neve add water to the acid.

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Chemical Pact Sheet* Version 3

CHROMIUM (metal)

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made, The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: CAS 7440-47-3.

Trade Names: Chrome.

Uses: In the manufacture of chrome-steel and chrome-nickel-steel alloys and for chrome plating of other metals.

PHYSICAL INFORMATION

Appearance: Steel-gray metal or silver metal powder.

Odor: lone.

Behavior in Water: Insoluble.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 1 mg/m^3.

NIOSH Recommended Limit: None established,

ACGIH Recommended Limit: Average 8 hour exposure -- 0.5 mg/m^3.

Short Term Exposure:

Note: Chromium metal is not considered to be very hazardous and is primarily a dust irritant. However, welding or plating with chromium may produce hexavalent chromium (chromium VI) compounds, some of which are considered to be carcinogenic. See specific compounds.

Inhalation: Dust may cause irritation of the nose, throat and lungs.

Skin: Dust may cause irritation,

Eyes: Dust may cause irritation.

Ingestion: Dust may cause irritation of the mouth and throat,

Long Term Exposure:

No information found on exposure to chromium metal. See specific chromium compounds,

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, rea "Toxic Substances: How Toxic Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move person to fresh air. Give artificial respiration or oxygen as required. Seek medical attention, if necessary.

Skin: Wash affected area with soap and water. Seek medical attention, if necessary.

Eyes: Wash with water for at least 15 minutes. Seek medical attention, if necessary.

Ingestion: Seek medical attention, if necessary.

FIRE AND EXPLOSION INFORMATION

General: Dust may be flammable.

REACTIVITY

Materials to Avoid: Reacts with alkalies, alkali carbonates, dilute sulfuric acid and dilute hydrochloric acid.

PROTECTIVE MEASURES

Storage and Handling: Store in a sealed container away from materials listed above.

Engineering Controls: Provide adequate ventilation to prevent high concentrations of dust. Sinks, showers and eyewash stations should be readily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Wear eye protection.

Protective Equipment: & levels up to 0.25 mg/m^3 use a dust and mist respirator (except single-use or quarter-mask types), a supplied-air res irator or a self-contained breathing apparatus. For levels up to use a powered air-purifying respirator with a high efficiency particulate filter or a supplied-air respirator operated in continuous-flow mode. For levels use a respirator with a full facepiece and high-efficiency particulate filters, a powered air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter, a self-contained breathing apparatus with a full facepiece or a supplied-air respirator with a full facepiece, For levels up to 25 mg/m^3 use a supplied-air respirator operated in a positive pressure mode. For levels up to 50 mg/m^3 use a supplied-air respirator with a full facepiece and operated in a positive pressure mode.. For levels above 50 mg/m^3 or in areas of unknown concentrations use a self-contained breathing apparatus with full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape use a respirator with high-efficiency particulate filter8 or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Warn other workers of the spill. Put on proper protective clothing and equipment. Clean up using vet methods or by vacuuming. Place in suitable containers. For final disposal contact your regional office of the New Yor State Department of Environmental Conservation.

For more information:

Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

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1,1,2-TRICHLOROETHANE

?he information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large, *Any* generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Ethane trichloride: beta-trichloroethane; 1,2,2-trichloroethane; vinyl trichloride: NCI-C04579; CAS 79-00-5.

Trade Names: Beta-T.

Uses: As an intermediate in the production of vinylidine chloride: as a solvent for fats, waxes, and natural resina: and as a component of adhesives.

PHYSICAL INFORMATION

Appearance: Colorless liquid.

Odor: Chloroform-like, sweet.

Evaporation: Moderate. Vapors are heavier than air and tend to sink.

Behavior In Water: Only slightly soluble: rinks,

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 10 ppm.

NIOSH Recommended Limit: Average 10 hour day/40 hour week — 10 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- 10 ppm.

Short Term Exposure:

Inhalation: Inhalation may produce headache, lassitude, dizziness, incoordination, low blood pressure, irregular heart beat, coma and death from respiratory arrest, Exposure to vapor concentrations near 2000 ppm for 5 minutes causes central nervous *system* depression and anesthetic effects. Symptoms are nasal irritation, drowsiness and equilibrium disturbances. Death may result from 13,600 ppm for 2 hours,

Skin: May cause irritation and chemical burns if allowed to remain on the skin for a prolonged period. nay be absorbed through the skin to cause or increase the severity *of* symptoms listed above.

Eyes: May cause irritation.

Ingestion: May cause effects similar to those listed under inhalation. Liver and kidney damage have occurred in animals. Laboratory studies with animals suggests that the probable lethal dose for humans is about 12 ounces.

Long Term Exposure:

Inhalation may cause liver and kidney damage. Has caused cancer in laboratory animals. Whether it does so in humans is unknown,

Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see 'Toxic Substances: How Toxic Is Toxic", available from the New York State Department of Health,

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move to fresh air and perform artificial respiration if necessary. Keep warm a at rest. Get medical attention.

Skin: Remove contaminated clothing. Wash skin with soap or mild detergent and plenty of water for at least 15 minutes. Seek medical attention if necessary.

Eyes: Wash with water for 15 minutes. Seek medical attention.

Ingestion: Do not induce vomiting. Seek medical attention immediately.

FIRE AND EXPLOSION INFORMATION

General: Not flammable under normal conditions.

Explosive Limits: Upper -- 15.5%, lower -- 6.0%. (High energy ignition source required.)

Extinguisher: Water fog, foam, carbon dioxide, dry chemical.

REACTIVITY

Materials to Avoid: Fire and explosion may result from reaction with strong oxidizers such as peroxides and permanganates; strong caustics such as potassium hydroxide and sodium hydroxide and chemically active metals such as aluminum, magnesium powders, and potassium. Liquid will attack some forms of plastic, rubber and coatings.

Conditions to Avoid: When decomposed by hot metals, ultraviolet radiation, acids or acid fumes, highly toxic hydrogen chloride gas and small amounts of phosgene and carbon monoxide fumes are evolved. Open flames, welding arcs or other high temperature sources which induce thermal decomposition should be avoided.

PROTECTIVE MEASURES

Storage and Handling: Store in a cool, dry and dark place. Do not store in aluminum containers. Contaminated clothing should be placed in closed containers until it can discarded or cleaned.

Engineering Controls: Provide proper ventilation. Sinks, showers and eyewash stations should be easily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Splash-proof goggles, impervious clothing, gloves (not leather), and face shield. Wash clothing before reuse; it may not be possible to clean contaminated leather.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece and operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For fire fighting use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode. For escape use a gas mask providing protection against organic vapors or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Warn other workers of spill. Put on proper protective clothing and equipment. Ventilate the area. Mop, wipe or soak up immediately in absorbent material such as vermiculite or dry sand and move to safe place out-of-doors. Contain liquid, transfer to closed metal containers. For final disposal, contact your regional office of the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

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LEAD (Metallic and Inorganic Compounds)

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Lead, CAS 7439-92-1; lead carbonate, CAS 598-63-0; lead chloride, CAS 7758-95-4; lead monoxide, CAS 1317-36-8; lead sulfide, CAS 1314-87-0; and others.

Trade Names: C.I. Pigment Metal 4, C.I. 77575, Lead flake, Whole lead, Litharge and others.

Uses: Tank linings, piping and other chemical reaction equipment; petroleum refining; manufacture of gasoline additives; pigments for paint; storage batteries, solder and fusible alloys; radiation shielding and others.

PHYSICAL INFORMATION

Appearance: Bluish white to silvery grey solid (lead metal).

Odor: None.

Behavior in Water: Insoluble.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 0.05 mg/m^3 (lead).

NIOSH Recommended Limit: Average 10 hour day or 40 hour week exposure -- 0.1 mg/m^3 (lead).

ACGIH Recommended Limit: Average 8 hour exposure -- 0.15 mg/m^3 (lead).

NOTE: Blood-lead level is a good indicator of total lead exposure. Current OSHA regulations require that if an individual has a blood-lead level greater than or equal to .050 mg lead per 100 ml. blood, he or she must be removed from all exposures to lead and cannot return to the exposure environment until the blood level falls to .040 mg lead per 100 ml. blood or less.

Short Term Exposure:

Note: Lead is a cumulative poison. Increasing amounts can build up in the body eventually reaching a point where symptoms and disability occur. Lead dust carried home on contaminated clothing can result in exposure and symptoms in other family members. Standards only protect for inhalation exposure. Extra precautions should be taken if skin exposure also occurs.

Inhalation: The effects of exposure to fumes and dusts of inorganic lead may not develop quickly. Symptoms may include decreased physical fitness, fatigue, sleep disturbance, headache, aching bones, and muscles, constipation, abdominal pains and decreased appetite. These effects are reported to be reversible if exposure ceases. Inhalation of large amounts of lead may lead to seizures, coma and death.

Skin: May cause irritation.

Eyes: May cause irritation.

Ingestion: See effects listed for inhalation. Ingestion of large amounts of lead may lead to seizures, coma and death.

Long Term Exposure:

Lead can accumulate in the body over a period of time. Therefore, long term exposures to lower levels can result in a build up of lead in the body and more severe symptoms. These may include anemia, pale skin, a blue line at the gum margin, decreased hand-grip strength, abdominal pain, severe constipation, nausea, vomiting, and paralysis of the wrist joint. Prolonged exposure may also result in kidney damage. If the nervous system is affected, usually due to very high exposures, the resulting effects include severe headache, convulsions, coma, delirium and death. In non-fatal cases, recovery is slow and not always complete. Alcohol ingestion and physical exertion may bring on symptoms. Continuous exposure can result in decreased fertility. Elevated lead exposure of either parent before pregnancy can increase the chances of miscarriage or birth defects. Exposure of the mother during pregnancy can cause birth defects.

"Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move person to fresh air. Give artificial respiraton as needed. Get medical attention immediately.

Skin: Wash area with plenty of soap and water. Remove any contaminated clothing.

Eyes: Rinse eyes with plenty of water for 15 minutes. Seek medical attention, if necessary.

Ingestion: If person is conscious, give water. Seek medical attention.

Note to Physician: Whole blood lead levels, circulating plasma/erythrocyte lead concentration ratio, urine ALA, and erythrocyte protoporphyrin fluorescent microscopy may all be useful in monitoring or assessing lead exposure. Chelating agents such as edetate disodium calcium and penicillamine are generally useful in the therapy of acute lead intoxification.

FIRE AND EXPLOSION INFORMATION

General: Not combustible. If exposed to fire, may release toxic fumes or sulfur and lead oxides.

Extinguisher: Use extinguisher appropriate to burning material. When fighting fire, wear a self-contained breathing apparatus with a full facepiece and operated in positive pressure mode.

REACTIVITY

Materials to Avoid: Reacts violently with potassium.

Conditions to Avoid: Excessive heat.

PROTECTIVE MEASURES

Storage and Handling: Store in an area away from heat and keep separate from potassium.

Engineering Controls: Adequate ventilation, sinks, showers and eyewash stations should be provided.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Full body work clothing should be worn including bump caps or hard hats, rubber gloves, and eye protection. Employees should routinely wash their skin thoroughly and change clothing at the end of each work shift.

Protective Equipment: For levels up to 0.5 mg/m^3 use a supplied-air respirator, a self-contained breathing apparatus or an air-purifying respirator with high-efficiency particulate filter. For levels up to 1.25 mg/m^3 use a supplied-air respirator operated in continuous flow mode or a powered air-purifying respirator with high efficiency particulate filters. For levels up to 2.5 mg/m^3 use any of the above with a full facepiece. For levels up to 50 mg/m^3 use a Type C supplied-air respirator operated in a positive pressure mode. For levels up to 100 mg/m^3 use a Type C supplied-air respirator with a full facepiece operated in a positive pressure mode. For levels greater than 100 mg/m^3 or in areas of unknown concentrations use a self-contained breathing apparatus with full facepiece operated in a positive-pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a respirator with high-efficiency particulate filters or an escape self-contained breathing apparatus.

Miscellaneous: No eating, drinking, or smoking in areas where the dusts or fumes of lead or its compounds are present.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Put on necessary protective equipment including respirators. If spill is a solution cover with absorbent and shovel into suitable container. If spill is in powder form, vacuum whenever possible to avoid raising dust by sweeping or blowing. Place in suitable container. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

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Chemical Fact Sheet*

Version 2

MERCURY (metallic)

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Hydrargyrum; CAS 7439-97-6.

Trade Names: Quicksilver, liquid silver and others.

Uses: Used in the manufacture of scientific instruments, in electrical equipment, synthetic silk, solder, electrolytic processes, metal plating, tanning, dyeing, textiles, photography, photoengraving, paints and pigments.

PHYSICAL INFORMATION

Appearance: A silvery-white, heavy liquid.

Odor: Odorless.

Behavior in Water: Does not mix. Will sink.

Evaporation: Slow, but even at room temperature, may evaporate to cause symptoms as listed undrr inhalation.

HEALTH HAZARD INFORMATION

OSHA Standard: 0.1 mg/m^3.

NIOSH Recommended Limit: Average 8 hour exposure -- 0.05 mg/m^3.

ACGIH Recommended Limit: Average 8 hour exposure -- 0.05 mg/m^3.

Short Term Exposure:

Inhalation: Exposure to levels below 1 mg/m^3 has been shown to produce nonspecific symptoms such as shyness, insomnia, anxiety and loss of appetite. At higher levels (1-3 mg/m^3 for 7 hours) may cause headache, salivation, metallic taste, chills, cough, fever, tremors, abdominal cramps, diarrhea, nausea, vomiting, tightness in the chest, difficult breathing, fatigue, lung irritation and possible lung tissue damage. Symptoms may begin several hours after exposure and may last a week. Large doses may result in flu-like symptoms, which, in severe cases, may result in death due to pneumonia.

Skin: Can be absorbed through the skin. May cause irritation. Prolonged contact vitb skin can result in symptoms listed above.

Eyes: Can cause eye irritation.

Ingestion: Generally does not produce ill effects.

Long Term Exposure:

Mercury accumulates in the brain quickly during exposure but As released from the brain very slowly. This will result in A build-up in brain tissue over a long time. The liver and kidneys may also be damaged by mercury accumulation.

It may cause headache, dizziness, restlessness, irritability, sleepness, tremors, defective muscle control, increased salivation, loose teeth, irritation of the gums wrth a blue line between teeth and gums, loss or appetite, nausea, vomiting, diarrhea, liver damage, changes in urine, raised red areas and blisters of skin, impaired memory and possible permanent brain damage.

Frequency of complaints and severity of symptoms increase with levels of exposure, most notably above 0.1 mg/m^3. However, many of these symptoms have been reported at levels below recommended limits due to the accumulation of mercury over long term exposure.

*Prepared by the bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the teras and abbreviations used, see "Toxic Substances: now Toxic is toxic. available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get to fresh air. Give artificial respiration if breathing has stopped. Give oxygen if breathing is difficult. Keep warm and at rest. Get medical attention immediately.

Skin: Remove any liquid soaked clothing. Wash affected area with soap and water. Get medical attention if necessary.

Eyes: Immediately wash eyes with large amounts of water. Get medical attention immediately. Contact lenses should not be worn when working with this material.

Ingestion: Seek medical attention.

Note to Physician: Gastric lavage with 5% solution of sodium formaldehyde sulfoxalate or 2-5% solution of sodium bicarbonate. Administer BAL (dimercaprol) intramuscularly as a 10% solution in oil. Urine mercury determination may be useful as an index of absorption.

FIRE AND EXPLOSION INFORMATION

General: Not flammable.

REACTIVITY

Materials to Avoid: Reacts with nitrates, chlorates, hot sulfuric acid, ammonia gas, acetylenes, alkalies and dry bromine.

Conditions to Avoid: Heat will speed up the rate of evaporation, increasing risk due to inhalation.

PROTECTIVE MEASURES

Storage and Handling: Store in well-ventilated area, in small amounts, in closed polyethylene bottles.

Engineering Controls: Provide adequate ventilation in both storage tanks and work areas and enclose operations where possible. Eyewash stations, showers and sinks should be available. Provide separate storage for work and street clothes. Flooring should not be able to absorb mercury or have cracks and spaces.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Wear full body work clothes with a minimum of seams, no pleats or cuffs, made from a material that will not readily absorb mercury. Also wear protective shoes, or shoe covers, rubber gloves and goggles if there is any danger of splashing. Clothing, shoes, gloves and goggles should be changed or washed daily. Laundering should be provided by the employer.

Protective Equipment: For levels up to 0.5 mg/m³ use a supplied-air respirator, a self-contained breathing apparatus or a chemical cartridge respirator with cartridges providing protection against mercury vapors. For levels up to 1.25 mg/m³ use a supplied-air respirator operated in continoow-Now mode or a powered air-purifying respirator providing protection against mercury vapors. For levels up to [illegible] mg/m³ use any of the above with a full facepiece or a gas mask with a canister providing protection against mercury vapors. For levels up to 28 mg/m³ use a Type C supplied-air respirator operated in a positive pressure mode. For levels above 28 mg/m³ or at unknown concentrations use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a combination TYPE C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with a canister providing protection against mercury vapors or an escape self-contained breathing apparatus. For firefighting use a gas mask providing protection against mercury vapors or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Wearing protective equipment and clothing, clean up the spill with an industrial vacuum cleaner with a charcoal filter to absorb mercury vapor. For mercury spilled in cracks cover with zinc dust to form an amalgam, or cover with calcium polysulfide with excess sulfur. Do not sweep or use compressed air to blow mercury droplets as it an increase air concentrations. Store contaminated or waste mercury in tightly covered or vapor-proof containers pending removal. For final disposal contact your regional office of the New York State Dept of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at our worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

ecology and environment, inc.

SITE SAFETY PLAN

Version 988

A. GENERAL INFORMATION

Project Title: Site 13 - Magazine Point

Project lo. : UH1103

TDD/Pan No.:

Project Manager: John Barksdale

Project Dir.: Rick Rudy

Location(s): Magazine point - Eastern portion of land north of Chevalier Field, up to Magazine Point

Prepared by: Jon Schmidt

Date Prepared: 4-25-89 ?

Approval by: Mary Miller MM

Date Approved: 5-5-84

Site Safety Officer Review:

Date Reviewed:

Scope/Objective of Work: Field Screening will include physical surveys, soil sampling, temporary well installation and groundwater sampling.

Proposed Date of Field Activities: September 1989

Background Info: Complete: [X] Preliminary (No analytical data available) [ ]

cumentation/Summary:

Overall Chemical Hazard: Serious [ ] Moderate [ ] Low [X] Unknown [ ]

Overall Physical Hazard Serious [ ] Moderate [ ] Low [X] Unknown [ ]

a. SITE/WASTE CHARACTERISTICS

Waste Type(s):

Liquid [ ] Solid [X] Sludge [ ] Gas/Vapor [ ]

Characteristic(s):

Flammable/ Ignitable [ ] Volatile [ ] Corrosive [ ] Acutely Toxic [ ]

Explosive [ ] Reactive [ ] Carcinogen [ ] Radioactive. [ ]

Other: Unknown

Physical Hazards:

Overhead [X] Confined. Space [ ] Below Grade [X] Trip/Fall [X]

Puncture [ ] Burn [ ] Cut [ ] Splash [X]

Noise [X] Other: Sampling within a rubble disposal area

quires completion of additional form and special approval from the Corporate Health/Safety group. Contact sc or HQ.

Site History/Description and unusual features (see sampling plan for detailed description): [illegible] was disposed of on Magazine Point from the eastern edge of Chevalier Field, along the waterfront, north to the end of Magazine Point. An unknown quantity of materials were dumped over an unknown period of time.

Locations of Chemicals/Wastes: Solid waste (building materials) were dumped along the entire stretch of Magazine Point's eastern waterfront.

Estimated Volume of Chemicals/Wastes: unknown

Site Currently in Operation Yes: [X] No: [ ]

C. HAZARD EVALUATION

List Hazards by Task (i.e., drum sampling, drilling, etc.) and number them. (Task numbers are cross-referenced in Section D)

Physical Hazard Evaluation:

1) Physical Surveys - Walking along rubble area;

2) Temporary Monitoring Well Installation - Using portable drill rig;

3) Soil Sampling - Using portable drill rig;

4) Decontamination Procedures - Using solvents.

hemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
Fuel Oil No. 2	N/A	Inh/Abs	CNS depressant	0.082 ppm	mild aromatic
Isopropyl Alcohol	400 ppm	" "	drowsiness,head.	7.5-200 ppm	rubbing alcohol
Nitric Acid	2 ppm	" "	corrosive	0.3-1 ppm	acrid
Asbestos	0.01 f/cc	Inhalation	N/A	N/A	N/A

Note: Complete and attach a Hazard Evaluation Sheet for major known contaminant.

D. SITE SAFETY WORK PLAN

Site Control: Attach rap, use back of this page, or sketch of site shoving hot zone, contamination Toduction, zone, etc.

Perimeter identified? [yes] Site secured? [no]

Work Areas Designated? [yes] Zone(s) of Contamination Identified? [no]

Personnel Protection (TLD badge8 required for all field personnel):

Anticipated Level of Protection (Cross-refarenem task numbers to Section C):

	A	B	C	D
Task 1				X
Task 2				X
Task 3				X
Task 4				X

Modifications: Modified level D with tyveck, neoprene gloves and boots, safety glasses, APR available when level C upgrade is necessary

Action Levels for Evacuation of Work *tone* Pending Reassessment of Conditions:

- o Lave1 D: O_2 <19.5% or >25%, explosive atmosphere >10% LEL, organic vapors above background levels, particulates >_____ mg/m^3, other _____
- o Level C: O_2 [illegible] or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapor (in breathing zone) >5 ppm, particulates >_____ mg/m^3, other _____
- o Level B: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors (in breathing sone) >500 ppm, particulates >_____ mg/m^3, other _____
- o Level A: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors >500 ppm, particulates >_____ mg/m^3, other _____

Air Monitoring (daily calibration unless otherwise noted):

Contarinant of Interest	*Type* of Sample (area, personal)	Monitoring Equipment	Frequency of Sampling
VOC's	Area	OVA	Continuous
Radiation	Area	Mini-Rad	Continuous
Explosive Gases	Area	O_2/Explosimeter	Continuous

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc.:
Trisodium phosphate wash, tap water rinse, isopropanol rinse, distilled water rinse, isopropanol rinse, and final distilled water rinse.

Personnel Decon Protocol: Boot and glove wash - trisodium phosphate wash with clean water rinse. Expendables will be double bagged and drummed for disposal. Field personnel will take a hygienic shower, off-site, following each day's field work.

Decon Solution Monitoring Procedures, if Applicable: Decontamination will be performed in a well-ventilated area upwind of the sampling zone.

Special Site Equipment, Facilities, or Procedures (Sanitary Facilities and Lighting Must Meet 29 CFR 1910.120):

All drilling safety procedures will be strictly adhered to as outlined in Attachment A.

Site Entry Procedures and Special Considerations: E & E's "Buddy System" will bo employed at a11 tins during fieldwork activities. Personnel will exercise cautiee in tho vicinity of the rubble disposal area and along nearby readways. If above background radiation levels are encountered team members will evacuate the sampling area, and contact tho corporate health physics group to reassess the site.

Work Limitations (time of day, weather conditions, etc.) and Heat/Cold Stress Requirements:

All fieldwork activities will be performed during daylight hours. Team members will take breaks as necessary to avoid heat stress and replace fluids. Cooling vests may be used to prevent heat stress.

General Spill Control, if applicable: N/A

Investigation-Derived Material Disposal (i.e., expendables, decon waste, cuttings):

All fieldwork waste materials will be double bagged, drummed, labeled and transported to a designated location for final disposal by the Navy.

Sample Handling Procedures Including Protective Wear:

During all handling of samples, all field team members will wear surgical gloves. Goggles will be worn during sample preservation with acids.

Team Member*	Responsibility
Team members to bo determined	Team Leader
	Site Safety Officer/Sampler
	Geologist/Sampler

*All entries into exclusion zone require Buddy System use. All E & E field staff patticipato in medical monitoring program and have completed applicable training per 29 CFR 1910.120. Respiratory protection program meets requirements of 29 CFR 1910.134, and ANSI Z88.2 (1980).

E. EMERGENCY INFORMATION

(Use supplemental sheets, if necessary)

LOCAL RESOURCES

(Obtain a local telephone book from your hotel, if possible.)

Ambulance On Base — 904-452-4138, Off Base -- 911

Hospital Emergency Room NAS Dispensary — 904-452-2733, Baptist Hospital 904-434-4811 (Life Flight)

Poison Control Center

Police (include local, county sheriff, state) 911

Fire Department 911

Airport

U.S. Coast Guard Emergency — 904-453-8178, General Information 904-453-8282

Laboratory E & E ASC 1-716-631-0360

Fed. Express 1-800-238-5355

Client Contact U.S. Navy Southern Division, Engineer-In-Charge, 1-803-743-0574

Site Contact NAS Pensacola Environmental Coordinator, W. Dewayne Ray — 904-452-4515

SITE RESOURCES

Site Emergency Evacuation Alarm Method N/A

Water Supply Source On-rite

Telephone Location, Number To be determined on-site

Cellular Phone, if available N/A

Radio

other On-site warehouse number to be determined

EMERGENCY CONTACTS

1. Dr. Raymond Harbison (Univ. of Florida) ..... (501) 221-0465 or (904) 462-3277, 3281
   Alachua, Florida (501) 370-8263 (24 hours)

2. Ecology and Environment, Inc., Safety Director
   Paul Jonmaire ..... (716) 684-8060 (office)
   (716) 655-1260 (home)

3. Regional Office Contact ..... M.Miller.... 656-2854 (home)
   877-1978 (office)

4. Office Manager ..... R.Rudy ..... 893-7215 (home)

1. Twenty-four boar answering service: (501) 370-8263

   Wait to report:

   - State: "this is an emergency."
   - tour name, region, and site.
   - Telephone number to reach you.
   - Your location.
   - Name of person injured or exposed.
   - Nature ot emergency.
   - Action taken.

2. A toxicologist, (Drs. Raymond Harbison or associate) will contact you. Repeat the information given to the answering service.

3. If a toxicologist does not return your call within 15 minutes, call the following persons in order until contact is made:

   a. 24 hour hotline - (716) 684-8940
   b. Corporate Safety Director - Paul Jonnaire - home # (716) 655-1260
   c. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 688-0084

(NOTE: Hold Team Know Route(s) Mor to start of Work)

Directions to hospital (include map)

NAS Dispensary - Cross Chevalier Field (west) to Murray Road, follow Murray Road South to Ellyson Avenue, t right onto Ellyson Avenue and continue to it's intersection with Turner Street. The VV Dispensary is located om tho northwest corner of tho intersection of Ellyson Avenue and Turner Street, in Building 625-A.

Baptist Hospital - Take Duncan Road (Navy Blvd.) north to exit the base. Navy Blvd. becomes HWY 98 and curves to tho east. Follow Navy Blvd./Hwy. 98 east approx. 3mi to Pace Blvd. Turn lott (north) on Pace Blvd. and proceed approx. 1mi to Cervantes St. (Hwy. 90). Turn right on Cervantes/Hwy. 90 and follow this road for about 8 blocks and torn loft (north) onto E street. The hospital is about 6 block8 north on tho loft.

Emergency Egress Routes to Get Oft-Sit. Emergency egress routes will bo located if emergency exit routes become blocked by construction, etc.

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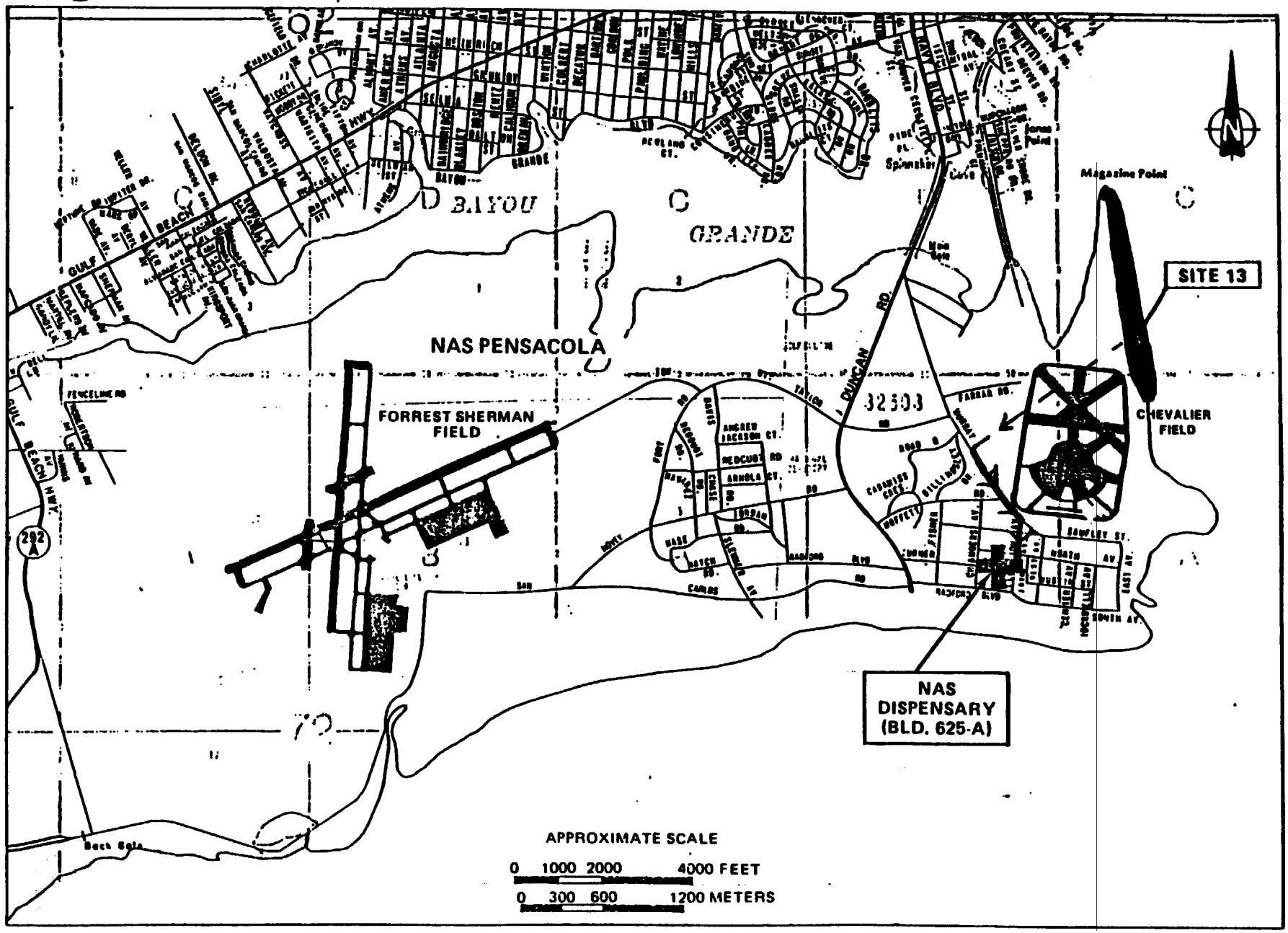
SITE 13
NAS PENSACOLA
FORREST SHERMAN FIELD
CHEVALIER FIELD
NAS DISPENSARY (BLD. 625-A)
BAYOU
GRANDE
Magazine Point
Spinnaker
32503
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

DRILL RIG SAFETY

* Bard hats must be worn.
* All team members must be know the procedure to shut the rig off and the location of the "kill" switch.
* When moving a rig off the road, pay attention to obstacles in route of travel. walk the intended route first, .
* Have someone guide the rig driver when clearance is at a minimum or when hazards are in close proximity,
* Set rig brakes and block the wheels when rig is set up at the desired drilling location.
* The mast must be lowered when the rig is moved.
* Always consider overhead wires to be live, watch for sagging lines and do not operate rig within 15 feet of overhead lines.
* Hake sure the site, platforms and walkways are free of' obstructions.
* Hake sure proper housekeeping is practiced around and on the rig at all times. Tools should be stored in a manner that permits convenient access and provides for adequate safety.
* Store gasoline in approved containers that have a spark arrestor and keep them clear of the drilling work area.
* Check rig equipment prior to starting work. Repair or re-place faulty and worn items.
* Handle augers with care. Use proper lifting techniques when picking up samplers and augers. Use a tool hoist if possible and stay cleat of rotating augers. Keep cables and ropes secured when not in use.
* Level and stabilize the drill rig prior to raising the mast.
* Watch for slippery ground when working in the area of the rig.
* All unattended boreholes must be properly covered.
* Do not drill during an electrical storm.
* Maintain a safe distance from the rig mechanisms during drive sampling and auger removal operations.

ECOLOGY AND ENVIRONMENT, INC.,
STANDARD OPERATING PROCEDURES FOR
EMERGENCIES DUE TO HEAT AND HEAT STRESS MONITORING

Field operations during the summer months can create a variety of hazards to the employee. Heat cramps, heat exhrustion. and heat stroke can be experienced and, If not remedied, can threaten life or health. Therefore, It Is Important that all employees be able to recognize symptoms of these conditions and be capable of arresting the problem as quickly as possible.

THE EFFECTS OF HEAT

As the result of normal oxidation processes within the body, a predictable amount of heat Is generated. If the heat Is liberated as It Is formed, there Is no change In body temperature. If the heat Is liberated more rapidly, the body cools to a point at which the production of hert Is accelerated and the excess Is available to bring the body temperature back to normal.

Interference with the elimination of heat leads to its accumulation and thus to the elevation of body temperature. As a result, the person Is said to have a fever. When such a condition exists, it produces a vlclour cycle In which certain body processes speed up and generate additional heat. Then the body must eliminate not only the normal but also the additional quantities of heat.

Heat produced within the body is brought to the surface largely by the bloodstream and escapes to the cooler surroundings by conduction and radiation. If air movement or a breeze strikes the body, additional heat is lost by convection. However, when the temperature of the surrounding air becomes equal to or rises above that of the body, all of the heat must be lost by vaporization of the moisture or sweat from the skin surface. As the air becomes more humid (contains more moisture), vaporization from the skin slows down. Thus, on a day when the temperature is 95 to 100°F, with high humidity and little or no breeze. conditions are ideal for the retention of heat within the body. It Is on such a day or, more commonly, a succession of such days (a heat wave) that medical emergencies due to heat are likely to occur. Such emergencies arc classified in three categories: heat cramps, heat exhaustion, and heat stroke.

HEAT CRAMPS

Heat cramps usually affect people who work in hot environments and perspire a great deal. Loss of salt from the body causes very painful cramps of the leg and abdominal muscles. Heat cramps also may result from drinking iced water or other drinks either too quickly or in too large a quantity.

<u>Heat Cramp Symptoms</u>. The symptoms of heat cramp are:

- Muscle cramps in kgs and abdomen,
- Pain accompanying the crimps.
- Faintness, and
- Profuse perspiration.

Heat [illegible] E —— Care. Remove the patient b a cool place. Give him sips of liquids such as "Gatorade" or its equivalent. Apply manual pressure to the cramped muscle, Remove the patient to a hospital if there is any indication of a more serious problem-

HEAT EXHAUSTION

Heat exhaustion occurs in individuals working in hot environments, and may be associated with heat cramps. Heat exhaustion is caused by the pooling of blood in the vessels of the skin. The heat is transported from the interior of the body b the surface by the blood. The blood vessels in the skin become dilated and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when an individual is in an upright position, may lead to an inadequate return of blood to the heart and eventually to physical collapse.

Heat Exhaustion Symptoms. The symptoms of heat exhaustion are:

- Weak pulse;
- Rapid and usually shallow breathing;
- Generalized weakness;
- Pale, clammy skin;
- Profuse perspiration;
- Dizziness;
- Unconsciousness; and
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting).

Heat Exhaustion Emergency Care. Remove the patient b a cool place and remove as much clothing as possible. Administer cool water, "Gatorade," or its equivalent. If possible, fan the patient continually to remove heat by convection. but do not allow chilling or overcooling. Treat the patient for shock, and remove him to a medical facility if there is any indication of a more serious problem.

HEAT STROKE

Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions. unconsciousness, and even death. Direct

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exposure to sun, poor air circulation, poor physical condition, and advanced age (over 40) bear directly on the tendency to heat stroke. It is a serious threat to life and carries a 20% mortality rate. Alcoholics are extremely susceptible.

Heat Stroke Symptoms. The symptoms of heat stroke arc:

- Sudden onset;
- Dry, hot, and flushed skin;
- Dilated pupils;
- Early loss of consciousness;
- Full and fast pulse;
- Breathing deep at first, later shallow and even almost absent;
- Muscle twitching, growing into convulsions; and
- Body temperature reaching 105 to 106°F. or higher.

Heat Stroke Emergency Gre. Remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove tho patient to a cool environment if possible, and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly — preferably by wrapping in a wet sheet or else by dousing the body with water. If cold packs are available, place them under the arms, around the 'neck, at the ankles, or at any place where blood vessels that lie close to the skin can be cooled. Protect the patient from injury during convulsions, especially from tongue biting.

AVOIDANCE OF HEAT-RELATED EMERGENCIES

Please note that, in the case of heat cramps or heat exhaustion, "Gatorade" or its equivalent is suggested as part of the treatment regime. The reason for this type of liquid refreshment is that such beverages will return much-needed electrolytes to the system. Without these electrolytes, body systems cannot function properly, thereby increasing the represented health hazard. Therefore, when personnel are working in situations where the ambient temperatures and humidity are high—and especially in situations where protection Levels A B, and C arc required — the site safety officer must:

- Assure that all employees drink plenty of fluids ("Gatorade" or its equivalent):
- Assure that frequent breaks are scheduled so overheating does not occur; and
- Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall).

If protective clothing *must* be worn, especially levels A and B, the suggested guidelines for ambient temperature *rid* maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minutes)
Above 90	15
85 to 90	*30*
80 *to* 85	*60*
70 to 80	*90*
60 to 70	120
SO to *60*	180

One method of measuring the effectiveness of employees' rest-recovery regime is by monitoring the heart rate. The "Brouha guideline" is one such method:

- During a three-minute period, count the pulse rate for the last *30* seconds of the first minute, the last 30 seconds of the second minute, and the last 30 seconds of the third minute.
- Double the count.

If the recovery pulse rate during the last 30 seconds of the first minute is at 110 beats/minute or less *m d* the deceleration between the first, second, and third minutes is at least 10 beats/minute, the work-recovery regime is acceptable. If the employee's rate is above that specified, a longer rest period is required, accompanied by an increased intake of fluids.

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Mallinckrodt
Material Safety Data

Emergency Phone Number: 311-982-5000

Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

Mallinckrodt makes no representations, or warranties, either [illegible] or implied, of merchantability, fitness for a particular purpose with respect to the information set forth herein or to the product to which the information refers. Accordingly, Mallinckrodt will not be responsible for damages resulting from use of or reliance upon this information.

Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

ISOPROPYL ALCOHOL

PRODUCT IDENTIFICATION,

Synonyms: 2-propanol; sec-propyl alcohol; Isopropanol

Formula CAS No.: 67-63-0

Molecular Weight: 60.10

Chemical Formula: $(CH_3)_2$ CHOH

Hazardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

WARNING! FLAMMABLE LIQUID. HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION.

Keep away from heat, sparks and flame.
Keep container closed.
Use with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.

EMERGENCY/FIRST AID

If swallowed, give water to drink. Induce vomiting if medical help is *not* immediately available. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: Flammable Liquid

SECTION 1 Physical Data

Appearance: Clear, colorless liquid.
Odor: Rubbing alcohol.

Solubility: Infinite in water.

Boiling Point: 82°C (180°F).

Melting Point: -89°C (-128°F).

Specific gravity: 0.79

Vapor Density (Air=1): 2.1

Vapor Pressure (mm Hg): 33 @ 20°C (68°F)

Evaporation Rate: (n-BUAC = 1) 2.83

SECTION 2 Fire and Explosion Information

Fire:
Flammable Liquid
Flashpoint: 12°C (53°F). (closed cup).
Autoignition temperature: 399°C (750°F).
Flammable limits in air, % by volume:
lel: 2.0; uel: 12.0

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and MOSH-approved self-contained breathing apparatus with full faceplece operated in the pressure demand or other positive pressure mode. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Vapors can flow along surfaces to distant ignition source and flash back.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.

Hazardous Decomposition Products:
Toxic gases and vapors such as carbon monoxide may be released in a fire involving isopropyl alcohol.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Heat, flame, strong oxidizers, acetaldehyde, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, oleum and perchloric acid.

SECTION 4 Leak/Spill Disposal Information

Remove all sources of ignition. Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapors. Small spills may be absorbed on paper towels and evaporated in a fume hood. Allow enough time for fumes to clear hood, then ignite paper in a suitable location away from combustible materials. Contain and recover liquid for reclamation when possible. Larger spills and bulk sizes can be collected as hazardous waste and atomized in a suitable RCRA approved combustion chamber, or absorbed with vermiculite, dry sand, earth or similar material for disposal as hazardous waste in a RCRA approved facility.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 1 Flammability: 3 Reactivity: 0

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SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
May cause irritation of the nose and throat. Exposure to high concentrations has a narcotic effect, producing symptoms of drowsiness, headache, staggering, unconsciousness and possibly death.

Ingestion:
May cause drowsiness, unconsciousness, and death.
Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (SAX Sixth Edition).

Skin Contact:
Has a defatting action of the skin that can cause irritation. May cause irritation with a stinging effect and burning sensation.

Eye Contact:
Vapors may irritate the eyes. Splashes may cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:
Prolonged contact with skin may cause mild irritation, drying, cracking, or contact dermatitis may develop.

Aggrevation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Give water to drink. Induce vomiting if medical help not is immediately available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 5840 mg/kg. Skin rabbit LD50: 13 gm/kg. Inhalation rat LC50: 16000 ppm/8H. Mutation references cited Aquatic Toxicity rating TLm96: 1000-10 ppm.

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA).
-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA); 500 ppm (STEL).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a full facepiece chemical cartridge respirator may be worn, in general, up to the maximum use concentration specified by the respirator supplier. Alternatively, a supplied air full facepiece respirator or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible.Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Special Information

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and ground for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment.

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Material Safety Data

Emergency Phone Number: 314-982-5000

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

NITRIC ACID, 70%

PRODUCT IDENTIFICATION:

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 70%

Formula **CAS** No: 7697-37-2

Molecular Weight: 63.00

Chemical **Formula:** HNO_3

Hazardous Ingredients: Not Applicable

PRECAUTIONARY MEASURES

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in **eyes,** on **skin,** or on clothing.
Avoid breathing mist.
Use only with adequate ventilation.
Wash **thoroughly** after handling.
Keep **from** contact with clothing and other combustible materials.
Do not **store** near combustible **materials.**
Store in a tightly closed container.
Remove and **wash** contaminated clothing promptly.
This substance **is** classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In case of contact, immediately flush skin or **eyes** with plenty of water for **at least 15** minutes. **If** swallowed, **DO** NOT INDUCE **VOMITING!** Give large quantities **of** water or milk **if** available. Never give anything by mouth to an unconscious person. **If** inhaled, remove to fresh air. If not breathing, give artificial respiration. **If** breathing is difficult, **give** oxygen. **In** all cases call a physician.
SEE SECTION **5.**

DOT Hazard Class: Oxidizer

SECTION 1 Physical Data

Appearance: Clear, colorless to slightly **yellow** liquid.

Odor: Suffocating acrid.

Solubility **Infinite** in water.

Boiling Point: 122°C (252°F)

Melting Point: **-34°C** (-29°F)

Specific Gravity: 141

Vapor Density **(Air=1):** 2-3 approximately

Vapor **Pressure** (mm **Hg):** 62 **@ 20°C (68°F)**

Evaporation Rate: **NO** information **found.**

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance **is a** strong oxidizer **and** its heat of reaction with reducing agents or combustibles may **cause** ignition. Can react with metals to **release** flammable hydrogen **gas.**

Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such **as:** alcohols, turpentine, charcoal, organic refuse, metal **powder,** hydrogen sulfide, etc.

Fire Extinguishing Media:
If involved in a fire, use water **spray.**

Special Information:
Increases the flammability of combustible, organic and readily oxidizable **materials.** In the event **of a** fire, **wear full** protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive **pressure** mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Containers may burst **when** heated.

Hazardous Decomposition Products:
When heated to decomposition, emits **toxic** nitrogen oxides fumes and hydrogen nitrate. Will **react with** water or **steam to** produce heat and **toxic** and **corrosive** fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A **dangerously** powerful oxidizing **agent,** concentrated nitric **acid is** incompatible with many **substances, especially** strong bases, metallic **powders, carbides, hydrogen sulfide, turpentine,** and combustible organic

SECTION 4 Leak/Spill Disposal Information

Isolate or **enclose the area of the leak** or **spill. Clean-up** personnel should **wear** protective clothing and **respiratory** equipment suitable for **toxic** or **corrosive** fluids **or vapors. Small Spills:** flush with **water** and **neutralize** with alkaline material (soda ash, lime, **etc.). Sewer** with **excess** water. **Larger spills and lot sizes:** Neutralize with alkaline material. pick up with **absorbent** material **(sand,** earth, vermiculite) and **dispose** in a RCRA-approved waste facility or **sewer** the neutralized slurry with **excess** water **if local** ordinances allow. Provide forced ventilation to dissipate fumes.

Reportable Quantity **(RQ)(CWA/CERCLA):** 1000 **lbs.**

Ensure compliance with **local,** state and federal regulations.

NFPA Ratings: Health: 3 Flammability: *0* Reactivity: *0* Other: Oxidizer

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SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema. which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth. throat, esophagus and gastrointestinal tract.

Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Splashes may cause severe burns and permanent eye damage.

Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Inhalation (Rat) LC50: 244 ppm
(NO_2)/30M

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, 'Industrial Ventilation, A Manual of Recommended Practices', most recent edition. for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded, wear a supplied air, full-facepiece respirator, airlined hood. or self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Special Information

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect from physical damage and direct sunlight. Isolate from incompatible substances. Protect from moisture.

.....

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

SULFURIC ACID 96%

PRODUCT IDENTIFICATION:

Synonyms: Oil of Vitriol

Formula CAS No.: 7664-93-9

Molecular Weight: 98.07

Chemical Formula: H_2SO_4

Hazardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In all cases call a physician. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
SEE SECTION 5.

DOT Hazard Class: Corrosive Material

SECTION 1 Physical Data

Appearance: Colorless, oily liquid.

Odor: Odorless.

Solubility: Infinite @ 20°C.

Boiling Point: ca. 310°C (590°F)

Melting Point: ca. -14°C (6°F).

Specific Gravity: 1.84

Vapor Density (Air = 1): < 0.3 @ 25°C (77°F)

Vapor Pressure (mm Hg): 1 @ 146°C (250°F).

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Reacts with most metals releasing flammable, potentially explosive hydrogen gas.

Explosion:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Water, bases, organic material, halogens, metal acetylides, oxides and hydrides, strong oxidizing and reducing agents and many other reactive substances.

SECTION 4 Leak/Spill Disposal Information

Dike and cover leaking or spilled liquid with dirt, vermiculite, kitty-litter or other inert absorbent. Cover spill with sodium bicarbonate or soda ash and mix. Clean-up personnel require protective clothing and respiratory protection from vapors and mists. Neutralized waste may be containerized and disposed in a RCRA approved waste disposal facility. Flush area of spill with dilute soda ash solution and discard to sewer.

Reportable Quantity (RQ)(CWA/CERCLA) : 1000 lbs.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 2 Other: Water reactive

SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Inhalation produces damaging effects on the mucous membranes and **upper respiratory** tract. May cause lung edema. Symptoms may Include irritation of the **nose** and throat, and labored breathing.

Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. **Can** cause sore throat, vomiting, diarrhea.

Skin Contact:
Corrosive. Symptoms of redness, pain, **and** severe burns occur.

Eye **Contact:**
Corrosive. Splashes can cause blurred vision, redness, **pain** and severe **tissue** burns.

Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth.

Aggravation **of** Pre-existing Conditions:
Persons **with** pre-existing skin disorders or **eye** problems or impaired respiratory function may be **more** susceptible **to** the effects of the substance.

B. FIRST AID

Inhalation:
Remove to fresh air. **If** not breathing, give artificial respiration. If breathing is **difficult,** give oxygen. **Call** a **physician.**

Ingestion:
If swallowed, DO **NOT** induce vomiting. Give large quantities of water or **milk if** available. **Call** a physician immediately. Never give anything by mouth to an **unconscious** person.

Skin Exposure:
In case of contact, Immediately flush skin with plenty of water for **at least 15** minutes while removing contaminated clothing and shoes. **Call** a physician.

Eye Exposure:
Wash eyes with plenty of water for **at least 15** minutes, **lifting** lower and upper eyelids **occasionally.** Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 2140 mg/kg. Inhalation Guinea Pig LC50: 18 mg/m^3.

ON 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
1 **mg/m^3** (TWA)
-ACGIH Threshold Limit Value (TLV):
1mg/m^3 (TWA).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee **exposures** below the Airborne **Exposure** Limits. Local exhaust ventilation is generally preferred because it can control the **emissions** of the contaminant at its source, preventing dispersion of it into the general work area. Please **refer** to the ACGIH document, "Industrial Ventilation, A Manual of Recommended **Practices", most** recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a **full** facepiece chemical cartridge **respirator** may **be** worn, In general, up to 100 times the TLV or the maximum **use** concentration specified by the respirator supplier, whichever is less. Alternatively, a supplied **air full** facepiece **respirator** or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, Including boots, **gloves,** lab **coat,** apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is **possible. Contact** lenses should not be worn when working **with this material.** Maintain eye wash fountain and quick-drench facilities In work area.

SECTION 7 Storage and Special Information

Store In a cool, dry, ventilated storage area with acid resistant floors and **good drainage.** Protect from physical damage. Keep out of direct sunlight and **away** from heat, water, and incompatible materials. Do **not** wash out container and use it for other purposes. When diluting, always add the acid to water, **never** add water to **the acid.**

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HAZARD EVALUATION OF CHEMICALS

Chemical Name Fuel Oil No. 2 Date

DOT Name/U.N. No. Fuel oil UN1993 Job No.

CAS Number N.S.

References Consulted (circle):

NIOSH/OSHA Pocket Guide Verschueren · Merck Index Hazardline Chris (Vol. II)

Toxic and Hazardous Safety Manual ACGIH Other: OHS 10100

Chemical Properties: (Synonyms: Diesel Oil. NA1993. ASTM D396)

Chemical Formula varies Molecular Weight varies

Physical State liquid Solubility (H_2O) insoluble Bailing Point 340-675°F

Flash Point 100-136°F Vapor Pressure/Density NA Freezing Point N.S.

Specific Gravity 0,879 Odor/Odor Threshold 0.082ppm Flammable Limits UEL-7.5%

Incompatabilities Strong oxidizers, heat LEL-0.6%

Biological Properties:

TLV-TWA None specified PEL N.S. Odor Characteristic mild oetroleum odor

IDLH N.S. Human N.S. Aquatic N.S. Rat/Mouse N.S.

Route of Exposure Dermal absorption, inhalation

Carcinogen possible Teratogen N.S. Mutagen N.S..

Handling Recommendations: (Personal protective measures)

Impervious clothinn. neoprene nloves and boots.APR with GMCH Cartridges at hinh concentrations

Monitoring Recommendations:

OVA or HNu with 10.2 eV probe for organic detection. MSA 260 for

Disposal/Waste Treatment:

Do not burn thermal decomposition products are toxic.

Contaminated materials to be disposed of as a hazardous waste.

Health Hazards and First Aid:

Skin and mucous membrane irritant. CNS depressant.

Wash skin upon contact, do not induce vomiting if Ingested.

Symptoms: Acute: Vomiting, diarrhea, pulmonary edema, pneumonia, coma respiratory paralvsis, asphyxia

Chronic: Skin, mucous membrane, respiratory irritant, CNS depressant

ASBESTOS

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygi practice is to minimize exposure to all chemicals.

Chemical Names: Amosite, amianthus, actinolite, tremolite, anthophyllite, amphiboles, crocidolite, chrysotile, calcium magnesium silicate; CAS 1332-21-4.

Trade Names: Ascarite and others.

Uses: Heat-resistant insulator, inert filler, component of cements or brake linings, and many others.

PHYSICAL INFORMATION

Appearance: Fine, slender, flaxy fiber which can be white, green, blue or grey-brown in color.

Odor: None.

Behavior in Water: Insoluble.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 0.2 fiber/cubic centimeter (effective 7/86).

NIOSH Recommended Limit: Average 8 hour exposure -- 0.1 fiber/cubic centimeter.

ACGIH Recommended Limit: Average 8 hour exposure -- amosite - 0.5 fiber/cubic centimeter, chrysotile - 2 fibers/cubic centimeter, crocidolite - 0.2 fiber/cubic centimeter, other forms - 2 fibers/cubic centimeter.

Short Term Exposure:

Short term exposure to asbestos has been shown to increase the risk of developing lung cancer, including mesothelioma. Such illnesses and their symptoms develop over a number of years and are usually associated with long term exposure to cancer-causing substa However, due to the action of asbestos fibers trapped in the lung, no level or duratic exposure can be assumed to be free of risk and any exposure may contribute to the development of disease.

Long Term Exposure:

Exposure to asbestos fibers has been shown to cause an increased risk of developing several forms of cancer and other chronic lung disease. These diseases usually develop over a number of years, but may appear more rapidly. Once established, the disease becomes progressively worse even if exposure has ceased. Due to the long period that may elapse between exposure and the onset of disease, OSHA requires medical monitoring of workers occupationally exposed to asbestos. There is a very large increase in the risk of developing lung cancer in workers exposed to asbestos who also smoke cigarettes. Because asbestos can cause cancer, attempts should be made to reduce exposure to the lowest level possible through the use of engineering controls, protective equipment and appropriate work practices. The failure of workers exposed to asbestos to follow proper work practices (such as showering and changing to clean clothes before leaving work) can expose family members to asbestos fibers brought home on clothing.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND First AID INSTRUCTIONS

Inhalation: Move person to fresh air. Clean any fibers away from nose and moan. Seek medical attention, if necessary.

Skin: Wash material from skin without inhaling fibers. Remove any soiled clothing.

Eyes: Wash with water for 15 minutes. Seek medical attention, if necessary.

Ingestion: Seek medical attention. if necessary.

FIRE AND EXPLOSION INFORMATION

General: Non-flammable.

REACTIVITY

General: Stable.

PROTECTIVE MEASURES

Note: Several New York State agencies regulate aspects of the asbestos removal industry. The Department of Environmental Conservation addresses issues of transportation and disposal of materials containing asbestos. The Departments of Health and Labor are developing regulations for licensing of contractors, certification of workers and establishment of criteria for training and work practices in the asbestos removal industry. ?or more information, please contact tbe appropriate state agency.

Storage and Handling: . Use closed, heavy-gauge, impervious plastic bags in sealed rigid containers protected from physical damage. DO not smoke, eat, or drink in the work area.

Engineering Controls: to reduce the formation of dust. asbestos-containing materials should be wet down, before being disturbed, with water that contains a surfactant or wetting agent (e.g. detergent). All hand-operated and power-operated tools which may release asbestos fibers in excess of OSHA standards must be supplied with local exhaust systems. Isolation, enclosure and dust collection methods should be used. Showers, sinks and eye wash stations should be readily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Fiber concentrations in excess of 0.2 fiber/cubic centimeter require the use of special clothing (coveralls, head coverings, gloves and foot coverings), change rooms with two separate lockers (one for street clothes and one for work clothes) and a medical surveillance program. Employers are urged to contact their regional OSXA offices tor Bote detailed information on the requirements of tho revised OSHA standard for occupational exposure to asbestos.

Protective Equipment: For levels up to 2 fibers/cubic centimeter use an air-purifying respirator with high-efficiency filters. For levels up to 10 fibers/cubic centimeter use the above with a full facepiece. For levels up to 20 fibers/cubic centimeter use a powered air-purifying respirator with high-efficiency filters or a supplied-air respirator operated in a continuous-flow mode. For levels up to 200 fibers/cubic r[illegible] use a supplied-air respirator with a full facepiece, operated in pressure demand mode. For levels above 200 fibers/cubic centimeter use a supplied-air respirator vita a full facepiece, operated in pressure demand mode and equipped rith an auxiliary positive pressure self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Wearing protective equipment, use a wet-mop or high-efficiency vacuum to clean area. Avoid blowing, dry-brushing and dry-mopping, all of which may raise dust levels. ?or information on proper storage and disposal of wastes containing asbestos, contact your regional office of tee New York State Department of Environmental Conservation.

For more information:

Contact the Industrial Hygienist or Safety Officer at your worksite OL the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

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SITE SAFETY PLAN

Version 988

A. GENERAL INFORMATION

Project Title: Site 14 - Dredge Spoil Fill Area

Project No.: UN1103

TDD/Pan No.:

Project Manager: John Barksdale

Project Dir.: Rick Rudy

Location(s): Dredge Spoil Fill Area - East side of Chevalier Field

Prepared by: Jon Schmidt

Date Prepared: 4-26-89

Approval by: Mary Miller MM

Date Approved: 5-5-89

Site Safety Officer Review:

Date Reviewed:

Scope/Objective of Work: Field Screening will include physical surveys, soil sampling, temporary well installation and groundwater sampling.

Proposed Date of Field Activities: September 1989

Background Info: Complete: [X] Preliminary (No analytical data available) [ ]

Documentation/Summary:

Moderate [ ]
Unknown [ ]

Moderate [ ]
Unknown [ ]

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

Liquid	[ ]	Solid	[X]	Sludge	[X]	Gas/Vapor	[ ]

Characteristic(s):

Flammable/ Ignitable	[ ]	Volatile	[ ]	Corrosive	[ ]	Acutely Toxic	[ ]
Explosive	[ ]	Reactive	[ ]	Carcinogen	[ ]	Radioactive*	[ ]

Other: Wastes are dredged sediments from Pensacola Bay

Physical Hazards

Overhead	[X]	Confined* Space	[ ]	Below Grade	[X]	Trip/Fall	[X]
Puncture	[ ]	Burn	[ ]	Cut	[ ]	Splash	[X]
Noise	[X]	Other: Sampling within depressions on-site					

*Requires completion of additional form and special approval from the Corporate Health/Safety group. Contact RSC or HQ.

Site History/Description and Unusual Features (see Sampling Plan for detailed description): From 1975 to 1977 dredge material was removed form the aircraft carrier turning basin and disposed along tho eastern side of Chevalier Field, creating the present point of land. The disposed material consists of Bay bottom sand which would contain tho same contamination as is found within the bay sediments.

Locations of Chemicals/Wastes: Dredged sediments from Pensacola Bay were deposited alongthe eastern side of Chevalier Field, creating tho present point of land.

Estimated Volume of Chemicals/Wastes: unknown

Site Currently in Operation Yes: [ ] No: [X]

C. HAZARD EVALUATION

List Hazards by Task (i.e., drum sampling, drilling, etc.) and number them. (Task numbers are cross-referenced in Section D)

Physical Hazard Evaluation:

1) Physical Surveys - Walking along rubble area;

2) Temporary Monitoring Well Installation - Using portable drill rig;

3) Soil Sampling - Using portable drill rig;

4) Decontamination Procedures - Using solvents.

Chemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
cadmium	0.2 mg/m^3	Inh, Ing	head,cough,chills	inadequate	varies
chromium	1 mg/m^3	Inh, Inq	none	N/A	N/A
isopropyl alcohol	400 ppm	" "	drowsiness,head.	7.5-200 ppm	rubbing alcohol
nitric acid	2 ppm	" "	corrosive	0.3-1 ppm	acrid
mercury	0.05 mg/m^3	Inh, con, abs	vomit,cough,naus	odorless	odorless
nickel	1 mg/m^3	inh, con, abs	naus,vomit,diarrhe	odorless	odorless
lead	SO ug/m^3	inh, inq, con	vomit, diarrhea	N/A	N/A
aluminum	15 mg/m^3	inh	emphysma,lethargy	N/A	N/A
zinc	5 mg/m^3	inh	naus,vomit,chills	N/A	N/A
arsenic	0.5 mg/m^3	inh, ing, con	naus,vomit,diarrhe	N/A	N/A

Note: Complete and attach a Hazard Evaluation Sheet tor major known contaminant.

D. SITE SAFETY WORK PLAN

Site Control: Attach map, use back of this page, or sketch of site showing hot zone, contamination reduction, zone, etc.

Perimeter identified? [yes] Site secured? [no]

Work Areas Designated? [yes] Zone(s) of Contamination Identified? [no]

Personnel Protection (TLD badges required for all field personnel):

Anticipated Level of Protection (Cross-reference task numbers to Section C):

	A	B	C	D
Task 1				X
Task 2				X
Task 3				X
Task 4				X

(Expand if necessary)

Modifications: Modified level D with tyveck, neoprene gloves and boots, safety glasses, APR available when level C upgrade is necessary

Action Levels for Evacuation of Work Zone Pending Reassessment of Conditions:

- Level D: O_2 <19.5% or >25%, explosive atmosphere >10% LEL, organic vapors above background levels, particulates >_____ mg/m^3, other _____.
- Level C: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapor (in breathing zone) >5 ppm, particulates >_____ mg/m^3, other _____.
- Level B: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors breathing zone) >500 ppm, particulates >_____ mg/m^3, other _____.
- Level A: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors >500 ppm, particulates >_____ mg/m^3, other _____.

Air Monitoring (daily calibration unless otherwise noted):

Contaminant of Interest	Type of Sample (area, personal)	Monitoring Equipment	Frequency of Sampling
VOC's	Area	WA	Coptinuous
Radiation	Area	Uni-Rad	Continuous
Explosive Gases	Area	O_2/Explosimeter	Continuous

(Expand if necessary)

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc.:
Trisodium phosphato wash, tap water rinse, isopropanol rinse, distilled water rinse, isopropanol rinse, and final distilled water rinse.

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Personnel Decon protocol: Boot and glove wash - trisodium phosphate wash with clean water rinse. Expendables will be double bagged and drummed for disposal. Field personnel will take a hygienic shower, off-site, following each day's field work.

Decon solution Monitoring Procedures, if Applicable: Decontamination will be performed in a well-ventilated area upwind of the sampling sone.

special Site Equipment, Facilities, or Procedures (Sanitary Facilities and Lighting Must Meet 29 CFR 1910.120):

All drilling safety procedures will be strictly adhered to as outlined in Attachment A.

Site Entry Procedures and Special Conridrrationr: E & E's "Buddy System" will be employed at all timer during fieldwork activities. Personnel will exercise caution in the rite vicinity and along nearby roadways. If above background radiation levels are encountered team members will evacuate the sampling area, and contact the corporate health physics group to reassess the site.

Work Limitations (time of day, weather conditions. etc.) and Heat/Cold Stress Requirements:

All fieldwork activities will be performed during daylight hours. Team members will take breaks as necessary to avoid heat stress and replace fluids. Cooling vests may be used to prevent heat stress.

General Spill Control, it applicable: N/A

Investigation-Derived Material Disposal (i.e., expendables, decon waste, cuttings):

All fieldwork waste materials will be double bagged, drummed, labeled and transported to a designated location for final disposal by the Wavy.

Sample Handling Procedures Including Protective Wear:

During a11 handling of samples, a11 field team members will wear surgical gloves. Goggles will be worn during sample preservation with acids.

Team Member*	Responsibility
Team members to be determined	Team Leader
	Site Safety Officer/Sampler
	Geologist/Sampler

*All entries into exclusion zone requite Buddy System use. All E & E field staff participate in medical monitoring program and have completed applicable training per 29 CFR 1910.120. Respiratory protection program wets requirements of 29 CFR 1910.134, and ANSI Z88.2 (1980).

E. EMERGENCY INFORMATION

(Use supplemental sheets, if necessary)

LOCAL RESOURCES

(Obtain a local telephone book from your hotel, if possible.)

Ambulance On Base — 904-452-4138, Off Base — 911

Hospital Emergency Room NAS Dispensary - 904-452-2733, Baptist Hospital 904-434-4811 (Life Flight)

Poison Control Center

Police (include local, county sheriff, state) 911

Fire Department 911

Airport

U.S. Coast Guard Emergency - 904-453-8178, General Information 904-453-8282

Laboratory E & E ASC 1-716-631-8360

Fed. Express 1-800-238-5355

Client Contact U.S. Navy Southern Division, Engineer-In-Charge, 1-803-743-0574

Site Contact NAS Pensacola Environmental Coordinator, W. Dewayne Ray — 904-453-4515

SITE RESOURCES

Site Emergency Evacuation Alarm Method N/A

Water Supply Source On-site

Telephone Location, Number To be determined on-site

Cellular Phone, if available N/A

Radio

Other On-site warehouse number to be determined

[redacted]

1. Dr. [redacted] Harbison (Univ. or Florida) ..... (Sol) 221-0465 or (904) 462-3277, 3281
   Alachua, Florida (501) 370-8263 (24 hours)

2. Ecology and Environment, Inc., Safety Director
   Paul Jonmaire ..... (716) 684-8060 (office)
   (716) 655-1260 (home)

3. Regional Office Contact .....M.Miller.... 656-2854 (home)
   877-1978 (office)

4. Office Manager.....R.Rudy..... 893-7245 (home)

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MEDTOX HOTLINE

1. Twenty-four hour answering service: (501) 370-8263

   What to report:

   - State: "this is an emergency."
   - tour name, region, and site.
   - telephone number to reach you.
   - Your location.
   - Name of person injured or exposed.
   - Nature of emergency,
   - Action taken.

2. A toxicologist, (Drs. Raymond Harbison or associate) wilt contact you. Repeat tbe inforration given to the answering service.

3. If 8 toxicologist does not return your call within 15 minutes, call the following persons in order until Contact is made:

   a. 24 hour hotline - (716) 684-8940
   b. Corporate Safety Director - Paul Jonnaire - home # (716) 655-1260
   e. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 688-0084

EMERGENCY ROUTES

(NOTE: Field Team must Know Route(s) Prior to Start of Work)

rections to hospital (include map)

S Dispensary - Follow Saufley Street west. Saufly Street will turn into Murray road. Follow Murray Road north to **Ellyson** Avenue. Turn left onto Ellyson Avenue and continue to Tumor Street. The NUS Dispensary is located at the northwest corner of the intersection of Ellyson Avenue and Turner Street, in Building 625-A.

Baptist Hospital - Take **Duncan** load (Navy Blvd.) north to exit the base. Navy Blvd. becomes HWY 98 and curves to the east. Follow Wavy **Blvd./Hwy.** 98 east approx. **3mi to Pace** Blvd. Turn left (north) on Pace Blvd. and proceed approx. **1mi** to Cervantes St. (Hwy. 90). Turn right on Cervantes/Hwy. 90 and follow this rood for about 8 blocks and turn left (north) onto **I** street. The hospital is about 6 blocks north on the left.

Emergency Egress Routes to **Get** Off-Site Emergency egress routes will bo located if emergency exit routes become blocked by construction, etc.

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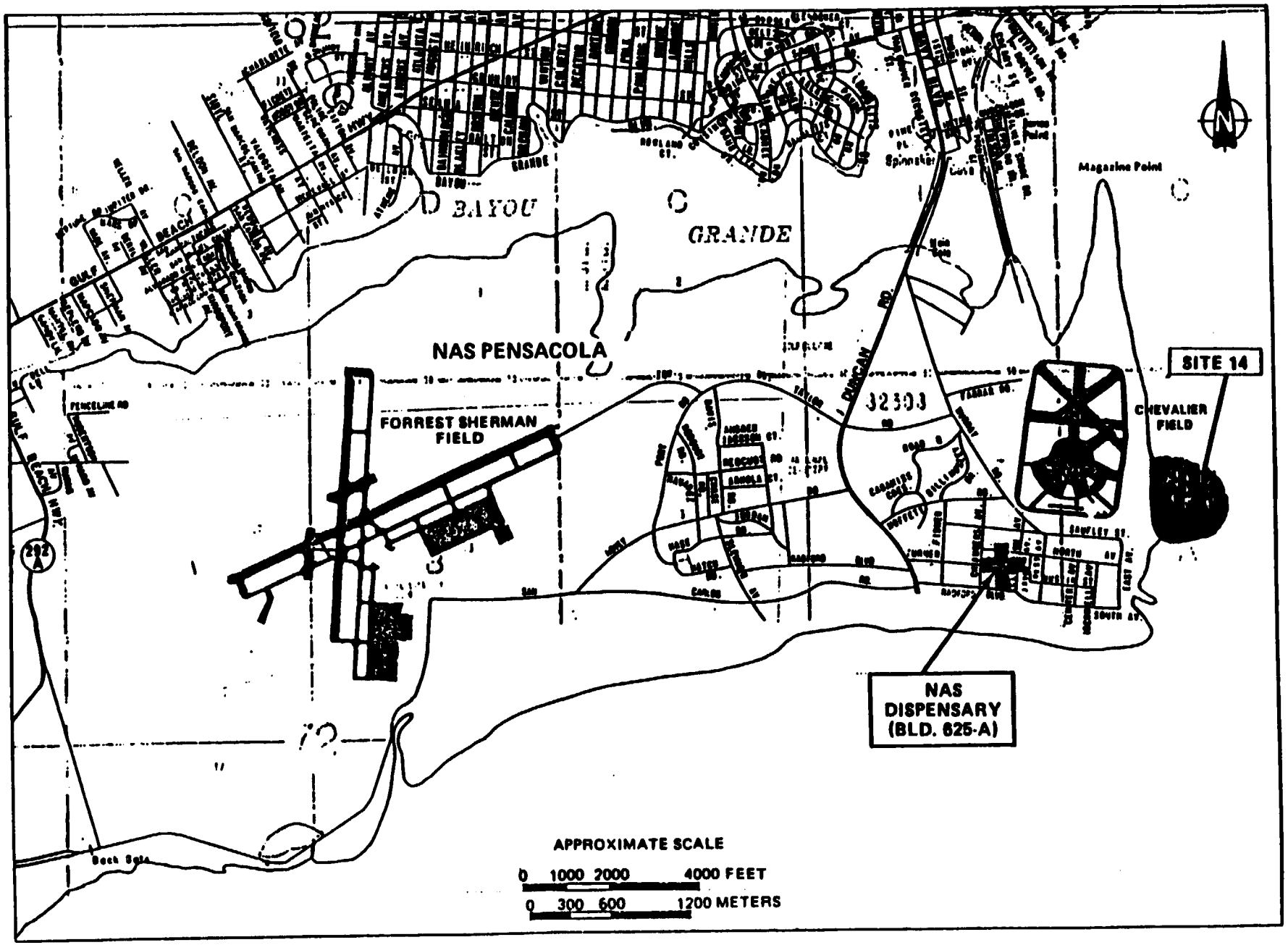
NAS PENSACOLA
FORREST SHERMAN FIELD
BAYOU
GRANDE
Magazine Point
SITE 14
CHEVALIER FIELD
NAS DISPENSARY (BLD. 625-A)
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

DRILL RIG SAFETY

* Hard hats must be worn.
* All team members must be know the procedure to shut the rig off and the location of the "kill" switch.
* When moving a rig off the road, pay attention to obstacles in route of travel. Walk the intended route first.
* Have someone guide the rig driver when clearance is at a minimum or when hazards are in close proximity.
* Set rig brakes and block the wheels when rig is set up at the desired drilling location.
* The mast must be lowered when the rig is moved.
* Always consider overhead wires to be live, watch for sagging lines and do not operate rig within 15 feet of overhead lines.
* Make sure the site, platforms and walkways are free of obstructions.
* Make sure proper housekeeping is practiced around and on the rig at all times. Tools should be stored in a manner that permits convenient access and provides for adequate safety.
* Store gasoline in approved containers that have a spark arrestor and keep them clear of the drilling work area.
* Check rig equipment prior to starting work. Repair or replace faulty and worn items.
* Handle augers with care. Use proper lifting techniques when picking up samplers and augers. Use a tool hoist if possible and stay clear of rotating augers. Keep cables and ropes secured when not in use.
* Level and stabilize the drill rig prior to raising the mast.
* Watch for slippery ground when working in the area of the rig.
* All unattended boreholes must be properly covered.
* Do not drill during an electrical storm.
* Maintain a safe distance from the rig mechanisms during drive sampling and auger removal operations.

ECOLOGY AND ENVIRONMENT. INC.,
. STANDARD OPERATING PROCEDURES FOR EMERGENCIES DUE TO HEAT AND HEAT STRESS MONITORING

Field operations during the summer months an create a variety of hazards to the employee. Heat cramps, heat exhaustion, and heat stroke can be experienced and. If not remedied, can threaten life or health. Therefore, It is Important that all employees be able to recognize Symptoms of these conditions and be capable of arresting the problem as quickly as possible.

THE EFFECTS OF HEAT

As the result of normal oxidation processes within the body, a predictable amount of heat is generated. If the heat Is liberated as It is formed, there Is no change In body temperature. If the heat is liberated more rapidly, the body cools to a point at which the production of heat Is accelerated and the excess is available to bring the body temperature back to normal.

Interference with the elimination of heat leads to its accumulation and thus to the elevation of body temperature. As a result. the person is raid to have 8 fever. When such a condition exists, it produces a vicious cycle In which certain body processes speed up and generate additional heat. Then the body must eliminate not only the normal but also the additional quantities of heat.

Heat produced within the body is brought to the surface largely by the bloodstream and escapes to the cooler surroundings by conduction and radiation. If air movement or a breeze strikes the body, additional heat is lost by convection. However, when tho temperature of the surrounding air becomes equal to or rises above that of the body. all of the heat must be lost by vaporization of the moisture or sweat from the skin surface. As the air becomes more humid (contains more moisture), vaporization from the skin slows down. Thus, on a day when the temperature is 95 to 100°F, with high humidity and little or no breeze, conditions are ideal for the retention of heat within the body. It is on such a day or. more commonly, a succession of such days (a heat wave] that medical emergencies due to heat are likely to occur. Such emergencies are classified in three categories: heat cramps, heat exhaurtlon, and heat stroke.

HEAT CRAMPS

Heat cramps usually affect people who work In hot environments and perspire a great deal. Loss of salt from the body causes very painful cramps of the leg and abdominal muscles. Heat cramps also may result from drinking iced water or other drinks either too quickly or in too large a quantity.

Heat Cramp Symptoms. The symptoms of heat cramp are:

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- Muscle cramps in legs and abdomen,
- Pain accompanying the cramps,
- Faintness, and
- Profuse perspiration.

Heat Cramp Emergency Care. Remove the patient to a cool place. Give him sips of liquids such as "Gatorade" or its equivalent. Apply manual pressure to the cramped muscle. Remove the patient to a hospital if there is any indication of a more serious problem.

HEAT EXHAUSTION

Heat exhaustion occurs in individuals working in hot environments, and may be associated with heat cramps. Heat exhaustion is caused by the pooling of blood in the vessels of the rkin. The heat is transported from the interior of the body to the surface by the blood. The blood vessels in the rkin become dilated and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when an individual is in an upright position, may lead to an inadequate return of blood to the heart and eventually to physical collapse.

Heat Exhaustion Symptoms. The symptoms of heat exhaustion are:

- Weak pulse:
- Rapid and usually shallow breathing;
- Generalized weakness;
- Pale, clammy skin;
- Profuse perspiration;
- Dizziness;
- Unconsciousness; and
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting).

Heat Exhaustion Emergency Care. Remove the patient to a cool place and remove as much clothing as possible. Administer cool water, "Gatorade," or its equivalent. If possible, fan the patient continually to remove heat by convection, but do not allow chilling or overcooling. Treat the patient for shock, and remove him to a medical facility if there is any indication of a more serious problem.

HEAT STROKE

Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions, unconsciousness, and even death. Direct

exposure to sun, poor air circulation, poor physical condition, and advanced age (over 80) bear directly on the tendency to heat stroke. It is a serious threat to life and carries a 20% mortality rate. Alcoholics are extremely susceptible.

Heat Stroke Symptoms. The symptoms of heat stroke are:

- Sudden onset:
- Dry, hot. and flushed skin;
- Dilated pupils;
- Early loss of consciousness;
- Full and fast pulse:
- Breathing deep at first, later shallow and even almost absent;
- Muscle twitching, growing into convulsions; and
- Body temperature reaching 105 to 106°F or higher.

Heat Stroke Emergency Can. Remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove the patient to a cool environment if possible. and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly—preferably by wrapping in a wet sheet or else by dousing the body with water. If cold packs are available, place them under the arms, around the neck. at the ankles, or at any place where blood vessels that lie close to the skin can be cooled. Protect the patient from injury during convulsions. especially from tongue biting.

AVOIDANCE OF HEAT-RELATED EMERGENCIES

Please note that, in the case of heat cramps or heat exhaustion, "Gatorade" or its equivalent is suggested as part of the treatment regime. The reason for this type of liquid refreshment is that such beverages will return much-needed electrolytes to the system. Without these electrolytes, body systems cannot function properly, thereby increasing the represented health hazard. Therefore, when personnel are working in situations where the ambient temperatures and humidity are high—and especially in situations where protection Levels A B, and C are required—the site safety officer must:

- Assure that all employees drink plenty of fluids ("Gatorade" or its equivalent):
- Assure that frequent breaks art scheduled so overheating does not occur; and
- Revise work schedules. when necessary. to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall).

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If protective clothing must be worn, especially Levels A and B, the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minutes)
Above 90	15
85 to 90	30
80 to 85	60
70 to 80	90
60 to 70	120
SO to 60	180

One method of measuring the effectiveness of employees' test-recovery regime is by monitoring the heart rate. The "Brouha guideline" is one such method:

- During a three-minute period. count the pulse rate for the last 30 seconds of the first minute. the last 30 seconds of the second minute, and the last 30 seconds of the third minute.
- Double the count.

If the recovery pulse rate during the last 30 seconds of the first minute is 8t 110 beats/minute or less and the deceleration between the first, second, and third minuter is at least 10 beats/minute, the work-recovery regime Is acceptable. If the employee's rate Is above that specified, a longer rest period Is required, accompanied by an increased intake of fluids.

Mallinckrodt
Material Safety Data

Emergency Phone Number: 314-982-5000

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

ISOPROPYL ALCOHOL

PRODUCT IDENTIFICATION:

Synonyms: 2-propanol; sec-propyl alcohol; isopropanol

Formula CAS No.: 67-63-0

Molecular Weight: 60.10

Chemical Formula: $(CH_3)_2$ CHOH

Hazardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

WARNING! FLAMMABLE LIQUID. HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION.

Keep away from heat, sparks and flame.
Keep container closed.
Use with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.

EMERGENCY FIRST AID

If [illegible], give water to drink. Induce vomiting if medical [illegible] is not [illegible] available. Never [illegible] anything by mouth to an unconscious person. If in [illegible] remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, Immediately flush skin or eyes with [illegible] of water for at least 15 minutes. In all cases [illegible] a physician.

SEE SECTION 5.

DOT Hazard Class: [illegible]

SECTION 1 Physical Data

Appearance: Clear, colorless liquid.

Odor: Rubbing alcohol.

Solubility: Infinite in water.

Boiling Point: 82°C (180°F).

Melting Point: -89°C (-128°F).

Specific gravity: 0.79

Vapor Density (Air = 1): 2.1

Vapor Pressure (mm Hg): 33 @ 20°C (68°F)

Evaporation Rate: (n-BUAC = 1) 2.8

SECTION 2 Fire and Explosion Information

Fire:
flammable Liquid
Flashpoint: 12°C (53°F). (closed cup).
Autoignition temperature: 399°C (750°F).
Flammable limits in air, % by volume:.
lel: 2.0; uel: 12.0.

Explosion:
Above Rash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and MOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Vapors can flow along surfaces to distant ignition source and flash back.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.

Hazardous Decomposition Products:
Toxic gases and vapors such as carbon monoxide may be released in a fire involving isopropyl alcohol.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Heat, flame, strong oxidizers, acetaldehyde, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, oleum and perchloric acid.

SECTION 4 Leak/Spill Disposal Information

Remove all sources of ignition. Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapors. Small spills may be absorbed on paper towels and evaporated in a fume hood. Allow enough time for fumes to clear hood, then ignite paper in a suitable location away from combustible materials. Contain and recover liquid for reclamation when possible. Larger spills and lot sizes can be collected as hazardous waste and atomized in a suitable RCRA approved combustion chamber, or absorbed with vermiculite, dry sand, earth or similar material for disposal as hazardous waste in a RCRA approved facility.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health 1 Flammability: 3 Reactivity: 0

e lth Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
May cause irritation of the nose and throat. Exposure to high concentrations has a narcotic effect, producing symptoms of drowsiness, headache, staggering, unconsciousness and possibly death.

Ingestion:
May cause drowsiness, unconsciousness, and death. Gastrointestinal pin, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose lor a human adult = about 250 mls (SAX Sixth Edition).

Skin Contacb
Has a defatting action of the skin that can cause Irritation. May cause irritation with a stinging effect and burning sensation.

Eye Contact:
Vapors may irritate the eyes. Splashes may cause severe irritation, possible corneal bums and eye damage.

Chronic Exposure:
Prolonged contact with skin may cause mild irritation, drying, cracking, or contact dermatitis may develop.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Give water to drink. Induce vomiting if medical hcip not is immediately available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lilting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral n t LD50: 5840 mg/kg. Skin rabbit LD50: 13 gm/kg. Inhalation n t LC50: 16000 ppm/8H. Mutation references cited Aquatic Toxicity rating TLm96: 1000-10 ppm.

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA).
-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA); 500 ppm (STEL).

Ventilation System:
A system ol local and/or general exhaust Is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, 'Industrial Ventilation, A Manual ol Recommended Practices', most recent edition, lor details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a full faceplece chemical cartridge respirator may be worn, in genenl, up to the maximum use concentration specified by the respirator supplier. Alternatively, a supplied air lull faceplece respintor or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab colt, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a lull face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities In work ares.

SECTION 7 Storage and Special Information

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage h preferred. Separate from oxidizing materials. Containers should be bonded a d grounded lor transfers to avoid static sparks. Storage and use areas should be NO Smoking areas. Use non-sparking type tools and equipment.

••

Mallinckrodt
Material Safety Data

Emergency Phone Number: 314-982-5000

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

NITRIC ACID, 70%

PRODUCT IDENTIFICATION:

Synonyms: Aqua Fortis; Azotic Add; Nitric Acid 70%

Fonnula CAS No: 7697-37-2

Molecular Weight: 63.00

Chemical Fonnula: HNO_3

Hazardous Ingredients: Not Applicable

PRECAUTIONARY MEASURES

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
CORROSIVE. LIQUID A!! MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in eyes, on skin, or on clothing.
Avoid breathing mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING! Giw large quantities of water or milk if available. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all casu tall a physician.
SEE SECTION 5.

DOT Hazard Class: Oxidizer

SECTION 1 Physical Data

Appearance: Clear, colorless to slightly yellow liquid.

Odor: Suffocating add

Solubility: Infinite in water.

Boiling Point: 122°C (252°F)

Melting Point: -34°C (-29°F)

Specific Gravity: 1.41

Vapor Density (Air = 1): 2-3 approximately

Vapor Pressure (mm Hg): 62 @ 20°C (68°F)

Evaporation Rate: No information round.

SECTION 2 Fire rad Explosion Information

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc.

Fire Extinguishing Media:
It involved in a fire, use water spray.

Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce h u t and tode a d corrosive fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

SECTION 4 Leak/Spill Disposal Information

Isolate or enclose the area of the leak or spill. Clean-up personnel should wear protective clothing and respiratory equipment suitable for toxic or corrosive fluids or vapors. Small Spills: Flush with water and neutralize with alkaline material (soda ash, lime, etc.). Sewer with excess water. Larger spills and bulk sizes: Neutralize with alkaline material, pick up with absorbent material (sand, earth, vermiculite) and dispose in a RCRA-approved waste facility or sewer the neutralized slurry with excess water if local ordinances allow. Provide forced ventilation to dissipate fumes.

Reportable Quantity (RQ)(CWA/CERCLA) : 1000 lbs.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 **Flammability:** 0 **Reactivity:** 0 **Other:** Oxidizer

SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Corrosive! Inhalation of vapors a n cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Splashes may cause severe burns and permanent eye damage.

Chronic Exposure:
Long-term exposure to concentrated vapors may ause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Oet medical attention immediately.

Skin Exposure:
I a cause of contact, immediately flush skin with plenty of water lor at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Oet medical attention immediately.

Eye Exposure:
Wash eyes with plenty of water lor at least 15 minutes, lifting lower a d upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Inhalation (Rat) LC50: 244 ppm (NO_2)/30M

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer lo the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, lor details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal.

SUO **Protection:**
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work a m .

SECTION 7 Storage and Special Information

Keep in a tightly closed container, stored in a cool, dry, ventilated a m . Protect from physical damage and direct sunlight. Isolate from incompatible substances. Protect from moisture.

Mallinckrodt
Material Safety Data

Emergency Phone Number: 314-982-5000

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

SULFURIC ACID 96%

PRODUCT IDENTIFICATION:

Synonyms: Oil of Vitriol

Fonnulr CAS No: 7664-93-9

Molecular Weight: 98.07

Chemical Formula: H_2SO_4

Hazardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In all cases call a physician. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
SEE SECTION 5.

DOT **Hazard Class: Corrosive Material**

SECTION 1 Physical Data

Appearance: Colorless, oily liquid.

Odor: Odorless.

Solubility: Infinite @ 20°C.

Boiling Point: ca. 310°C (590°F)

Melting **Point: ca. -14°C (6°F).**

Specific Gravity: 1.84

Vapor **Density (Air=1): < 03 @ 25°C (77°F)**

Vapor Pressure (mm **Hg): 1 @ 146°C (250°F).**

Evaporation Rate: NO information found.

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance b strong oxidizer and its heat of reaction with reducing agents or combustibles may **cause** ignition. Reacts with mart metals **releasing** flammable, **potentially explosive hydrogen gas.**

Explosion:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of **use i d storage.**

Hazardous Decomposition Products:
Toxic fumes of odder of sulfur. Will react with water or **steam** to produce **toxic** and corrosive fumes. Reacts with carbonates to **generate carbon** dioxide **gas,** and with cyanides and sulfides to form **poisonous** hydrogen cyanide and hydrogen sulfide **respectively.**

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Water, **bases, organic material, halogens, metal acetylides,** oxides and hydrides, strong **oxidizing** and reducing **agents and many other reactive substances.**

SECTION 4 Leak/Spill Disposal Information

Dike and cover leaking or spilled liquid with dirt, vermiculite, kitty-litter or other inert absorbent. Cover spill with sodium bicarbonate or soda ash and mix. Clean-up personnel require protective clothing and respiratory protection from vapors and mists. Neutralized waste may be containerized and disposed in a RCRA approved waste disposal facility. Flush area of spill with dilute soda ash solution and discard to sewer.

Reportable Quantity (RQ)(CWA/CERCLA) : 1000 lbs.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 2 Other: Water reactive

SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. May cause lung edema. Symptoms may Include irritation of the nose and throat, and labored breathing.

Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat. and stomach. leading to death. Can cause sore throat, vomiting, diarrhea.

Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.

Eye Contact:
Corrosive. Splashes can cause blurred vision, redness, pain and severe tissue burns.

Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth.

Aggravation of Pre-existing Conditionm
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
If swallowed, DO NOT induce vomiting. Give large quantities of water or milk if available. Call a physician immediately. Never give anything by mouth to an unconscious person.

Skin Exposure:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention Immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 2140 mg/kg. Inhalation Guinea Pig LC50: 18 mg/m^3.

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
1 mg/m^3 (TWA).
-ACGIH Threshold Limit Value (TLV):
1 mg/m^3 (TWA).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a full faceplace chemical cartridge respirator may be worn, In general, up to 100 times the TLV or the maximum use concentration specified by the respirator supplier, whichever is ku. Alternatively, a supplied air full faceplace respirator or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, including boots, glover, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Special Information

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water, never add water to the acid.

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Chemical Fact Sheet* Version

2,4-D

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygie practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: 2,4-Dichlorophenoxyacetic acid; CAS 94-75-7.

Trade Names: 2,4-D Acid, Esteron, Verton, Visko, Weedone, Brush-Rhap, Brush Killer, Chloroxone, Ded-Weed, and others.

Uses: As a fungicide, herbicide and defoliant; as a plant growth regulator.

PHYSICAL INFORMATION

Appearance: White or tan powder or crystals.

Odor: None.

Behavior in Water: Slightly soluble, crystals sinks.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure — 10 mg/m^3.

NIOSH Recommended Limit: Average 8 hour exposure — 10 mg/m^3.

ACGIH Recommended Limit: Average 8 hour exposure — 10 mg/m^3.

Short Term Exposure:

Inhalation: May cause irritation of the mouth, nose and throat, headache, nausea, vomiting, and diarrhea at levels above 10 mg/m^3. Nerve damage, which may be delay may include swelling of legs and feet, muscle twitch and stupor. Severe exposures may result in death.

Skin: Dust or liquid left in contact with the skin for several hours may be absorbed. This may result in severe delayed symptoms as listed above. These symptoms may last fo months or years.

Eyes: Irritation may occur.

Ingestion: The oral dose required to produce symptoms is about 1/12 ounce (1/2 teaspoon). Increasing amounts may result in increasingly severe symptoms as listed above. Death has resulted from as little as 1/5 ounce. Survival for more than 48 hour is usually followed by complete recovery although symptoms may last for several months.

Long Term Exposure:

Workers exposed to 2,4-D in the manufacturing process over a five to tea year period at levels above 10 mg/m^3 complained of weakness, rapid fatigue, headache and vertigo. Liver damage, low blood pressure and slowed heartbeat were also found.

*Prepared by the Bureau of *Toxic* Substance Assessment, New Yort State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How *Toxic* Toxic" available from the New York *State* Department of Health.

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EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get to fresh air. Give artificial respiration or oxygen as required, Seek medical attention, if necessary.

Skin: Remove soiled clothing promptly. Wash affected area with soap and water for at least five minutes.

Eyes: Wash eyes with plenty of water for at least 15 minutes. Seek medical attention .

Ingestion: Get immediate medical attention,

FIRE AND EXPLOSION INFORMATION

General: Non-flammable.

REACTIVITY

Materials to Avoid: None specified.

Conditions to Avoid: Heat and strong light cause breakdown to poisonous Compounds such as chlorinated phenols and phosgene.

PROTECTIVE MEASURES

Storage and Handling: Store away from light and beat.

Engineering Controls: Use in closed systems if possible. Sinks, shover: and eyewash stations should be available. Emergency water should be availabl if used out-of-doors.

Protective Clothing (Should not be substituted far proper handling and engineering controls): Safety glasses, dust mask and impervious gloves a clothing should be worn if contact is likely.

Protective Equipment: For any detectable levels use a self-contained breathi. apparatus with a full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contain breathing apparatus, both with a full facepiece and operated in a positiv pressure mode. For escape from a contaminated area use a gas mask with a. organic vapor canister and a high-efficiency particulate filter or an escape self-contained breathing apparatus,

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Wearing protective clothing and equipment sweep up carefully and place in suitable container. Liquid solution may be absorbed on clay or vermiculite and placed in a suitable container. Scrub spill area with soap and water. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

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Chemical Fact Sheet*

Version 2

METHYLENE CHLORIDE

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Dichloromethane, Methylene dichloride; CAS 75-09-2.

Trade Names: Solaestine, Aerothene MM, Narkotel, Somethine, R30 and others.

Uses: The liquid is used as a solvent, degreasing and cleaning fluid, aerosol propellant, anesthetic and refrigerant. Also used in paint removers, blowing agents in foams, in the process of decaffeinating coffee and extraction of spices.

PHYSICAL INFORMATION

Appearance: Clear, colorless liquid.

Odor: Sweetish (like chloroform or ether). **Minimum Detectable by Odor:** 214 ppm.

Behavior in Water: Slightly soluble (1.32 g/100 g water), remainder will sink.

Evaporation: Liquid evaporates rapidly.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure limit -- 500 ppm.

NIOSH Recommended Limit: Reduce exposure to the lowest feasible level.

ACGIH Recommended Limit: Average 8 hour exposure -- 100 ppm.
(Proposed for change in 1988: 50 ppm).

Short Term Exposure:

Note: Methylene chloride is changed to carbon monoxide in the human body. This is a particularly hazardous condition for those who have a history of heart trouble or those who are also exposed to carbon monoxide. See carbon monoxide fact sheet. These persons should take extra precautions.

Inhalation: Levels of 300-700 ppm for 3-5 hours has caused slight loss of muscle control and coordination. Effects of higher concentrations include stupor, dizziness, chest pain, arm and leg pains, loss of feeling, loss of appetite, hot flashes and death.

Skin: May be irritating if confined on the skin by glover or clothing. May be absorbed slowly through the skin to cause symptoms listed under inhalation.

Eyes: May cause pin, irritation and burns.

Ingestion: Accidental ingestion of paint removers containing methylene chloride as the main ingredient have reportedly caused headache, nausea, vomiting, visual disturbance, presence of blood in the urine, and unconsciousness.

Long Term Exposure:

Same symptoms as above. Prolonged exposure can cause changes in blood, hallucinations and decreased response to visual and auditory stimulation. Some long term exposures have also resulted in damage to the liver. Most of the effects will disappear after exposure stops. Methylene chloride caused genetic effects in certain bacteria and caused birth defects in chickens. fa laboratory studies, methylene chloride has also been shown to cause tumors in mice and rats. Whether methylene chloride cuses birth defects or tumors in humans is not known.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Remove perron to fresh air. Give artificial respiration or oxygen if breathing has stopped. Seek medical attention immediately.

Skin: Wash with large amounts of soap and water for at least 5 minutes. Seek medical attention if necessary.

Eyes: Wash with water for at least 15 minutes. Seek medical attention.

Ingestion: Do not induce vomiting. Seek medical attention.

Note to Physician: Gastric lavage uith 3-A sodium bicarbonate. Prompt hemodialysis if blood methanol level is above 50 mg/dl or if there is evidence of acidosis. Provide routine supportive measures and 100% oxygen until the carboxyhemoglobin level is satisfactory (less than 10% in an otherwise healthy patient).

FIRE AND EXPLOSION INFORMATION

General: Considered non-flammable, but will burn in high concentrations rucb as near spills or in closed spaces. Ignites at 624°C (1224°F).

Explosion Limits: Upper -- 64.6%; lower -- 15.5% in oxygen,

REACTIVITY

Conditions to Avoid: Avoid heat; decomposes to highly poisonous gases (phosgene).

Materials to Avoid: Avoid contact with alkali metals (example: sodium or potassium); such contact may cause an explosion. Methylene chloride will corrode iron, stainless steel and copper, especially at high temperatures and if the metals are wet. Can is impervious and resistant to methylene chloride. Improper glower or clothing can prevent evaporation and promote skin contact. Check with manufacturer's specification or your supervisor.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece operated in 8 positive pressure mode or a combination Type C supplied-air respirator uith an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pre is impervious and resistant to methylene chloride. Improper gloves or clothing a n prevent evaporation and promote skin contact. Check uitb manufacturer's specification or your rupervisor.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both vith a full facepiece and operated in ● positive pressure mode. For escape use a gas mask with an organic vapor canister or an escape self-contained breathing apparatus. For firefighting use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers *out of* the spill area. Remove all sources of combustion. Ventilate the area, If you must enter the area, wear protective clothing and equipment. Since methylene chloride is extremely volatile, most will evaporate. For final disposal contact your regional office *of* the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

1,1,2-TRICHLOROETHANE

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large, Any generalization *beyond* occupational exposures should p- made, The best industrial hygiene practice is to maintain concentrations oi chemicals at levels as low as is practical,

Chemical Name: Ethane trichloride; beta-trichloroethane; 1,2,2-trichloroethane; vinyl trichloride; HCI-CD4579; CAS 79-00-5.

Trade Names: Beta-T.

Uses: As an intermediate in the production of vinylidine chloride; as a solvent for fats, waxes, and natural resins; and as a component of adhesives-

PHYSICAL INFORMATION

Appearance: Colorless liquid.

Odor: Chloroform-like, sweet.

Evaporation: Moderate. Vapors are heavier than air and tend to rink,

Behavior In Water: *Only* slightly soluble; sinks,

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 10 ppm.

NIOSH Recommended Limit: Average 10 hour day/40 hour week -- 10 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- 10 ppm.

Short Term Exposure:

Inhalation: Inhalation may produce headache, lassitude, dizziness, incoordination, low blood pressure, irregular heart beat, coma and death from respiratory arrest, Exposure to vapor concentrations near 2000 ppm for. 5 minutes causes central nervous system depression and anesthetic effects. Symptoms are nasal irritation, drowsiness and equilibrium disturbances. Death may result from 13,600 ppm for 2 hours.

Skin: May cause irritation and chemical burns if allowed to remain on the skin for a prolonged period, May be absorbed through the skin *to* cause or increase the severity of symptoms listed above.

Eyes: May cause irritation,

Ingestion: May cause effects similar to those listed under inhalation. Liver and kidney damage have occurred in animals, Laboratory studies with animals suggests that the probable lethal dose for humans is about 12 ounces.

Long Term Exposure:

Inhalation ray cause liver and kidney damage, Has caused cancer in laboratory animals. Whether it does so in humans is unknown.

*Prepared by the Bureau *of* Toxic Substance Assessment, New York State Department o: Health. ?or an explanation of the terms and abbreviations used, see "Toxic Substances: Haw Toric Is Toxic", available from the New York State Department Health.

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EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move to fresh air and perform artificial respiration if necessary. Keep warm & at rest. Get medical attention.

Skin: Remove contaminated clothing. Wash skin with soap or mild detergent and plenty of water for at least 15 minutes. Seek medical attention if necessary.

Eyes: Wash with water for 15 minutes. Seek medical attention.

Ingestion: Do not induce vomiting. Seek medical attention immediately.

FIRE AND EXPLOSION INFORMATION

General: Not flammable under normal conditions.

Explosive Limits: Upper — 15.5%, lower — 6.0%. (High energy ignition source required.)

Extinguisher: Water fog, foam, carbon dioxide. dry chemical.

REACTIVITY

Materials to Avoid: tire and explosion may result from reaction with strong oxidizers such as peroxides and permanganates; strong caustics such as potassium hydroxide and sodium hydroxide and chemically active metals such as aluminum, magnesium powders, and potassium. Liquid will attack some forms of plastic. rubber and coatings.

Conditions to Avoid: When decomposed by bot metals, ultraviolet radiation, acids or acid fumes, highly toxic hydrogen chloride gas and small amounts *of* phosgene and carbon monoxide fumes are evolved. Open flames, welding arcs or other high temperature sources which induce thermal decomposition should be avoided.

PROTECTIVE MEASURES

Storage and Handling: Store in a *cool.* dry and dark place. Do not store in aluminum containers. Contaminated clothing should be placed in closed containers until it can be discarded or cleaned.

Engineering Controls: Provide proper ventilation. Sinks. showers and eyewash stations should be easily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Splash-proof goggles, impervious clothing, gloves (not leather), and face shield. Wash clothing before reuse; it may not be possible to clean contaminated leather.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece and operated in a positive pressure mode or a combination Type C supplied-air respirator vith an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For fire fighting use a self-contained breathing apparatus vith a full facepiece operated in a positive pressure mode. For escape use a gas mask providing protection against organic vapors or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Warn other workers of spill. Put on proper protective clothing and equipment. Ventilate the area. Mop, wipe or soak up immediately in absorbent material such as vermiculite or dry sand and move to safe place *out-of-doors.* Contain liquid, transfer to closed metal containers. For final disposal, contact your regional office of the New Yotk State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

Chemical Fact Sheet*

Version 3

CHROMIC ACID

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Chromic (VI) acid, chromic anhydride, chromic trioxide, chromium trioxide, chromium oxide; CAS 1333-82-0.

Trade Names: None found.

Uses: In chromium plating, aluminum anodizing, chemical conversion coatings, production of phosphate films on galvanized iron or steel, as corrosion inhibitor for non-ferrous alloys, as an oxidant in organic synthesis and in catalyst manufacturing.

PHYSICAL INFORMATION

Appearance: Dark red crystals which will liquify slowly upon exposure to air due to absorption of water.

Odor: None.

Behavior in Water: Soluble.

HEALTH HAZARD INFORMATION

OSHA Standard: 0.1 mg/m^3 (ceiling).

NIOSH Recommended Limit: Average 10 hour exposure — 0.025 mg/m^3 (as Cr).
15 minute ceiling — 0.05 mg/m^3 (as Cr).

ACGIH Recommended Limit: Average 8 hour exposure — 0.05 mg/m^3 (as Cr).

Short Term Exposure:

Inhalation: Exposure to concentrations between 0.18 and 1.4 mg/m^3 of acid mist fo. weeks produced irritation of the nose; after 4 weeks, ulcers of the nose developed; and after 8 weeks, holes formed in the tissue separating the nostrils. Additional effects noted in exposure to unknown concentrations are irritation of the throat, voice-box and lungs; asthmatic attacks, headache, wheezing, shortness of breath, coughing and painful breathing.

Skin: Direct contact will produce severe irritation of the skin. Sensitization from ve small exposures can occur resulting in severe dermatitis at a later time. Severe burns from hot chromic acid have resulted in symptoms of chromium poisoning: diarrhea, gastrointestinal bleeding, liver and kidney damage.

Eyes: Can result in severe irritation and permanent damage.

Ingestion: Swallowing of chromic acid solutions can result in severe irritation and damage to the mouth, throat and stomach. Symptoms may include ulcers, frequent vomitin gastrointestinal bleeding and coma. The lethal dose of hexavalent chromium is 6 grams (appproximately 1/4 ounce).

Long Term Exposure:

Prolonged exposure to chromic acid mist can result in perforations (holes) of the tissu separating the nostrils, lung irritation with symptoms similar to asthma and liver damage. Extended contact with skin can produce severe damage to the skin resulting in "chrome holes". Additionally, individuals may become sensitized such that subsequent exposure to lower concentrations produces irritation and rashes. Wearing away of the surfaces of teeth has been noted in workers exposed to chromic acid mist for a prolonge time. Some hexavalent chromium compounds (chromium VI) have been found to cause cancer laboratory animals. Studies of workplace exposure indicate that there is an increased incidence of respiratory cancer associated with production of chromium salts and chroma pigments.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of He For an explanation of the terms and abbreviations used, see "Toxic Substances: How T Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move person to fresh air, Give artificial respiration or oxygen as required. Seek medical attention as soon as possible.

Skin: Immediately wash with soap and water for 10 minuter. If irritation persists, seek medical attention.

Eyes: Wash immediately with water for 15 minutes. Seek immediate medical attention, preferably an *y e* doctor.

Ingestion: Give large amounts of water to drink. Do NOT force an unconscious person to *drink.* Seek medical attention immediately.

FIRE AND EXPLOSION INFORMATION

General: Non-flammable and non-explosive. Considered an oxidizing agent,

REACTIVITY

Materials to Avoid: will readily ignite paper, wood, sulfur, aluminum and plastics as well as any combustible organic material, possibly resulting in fire or explosion. Will ignite on contact with acetic acid and alcohol.

Conditions to Avoid: Improper storage containers. See below,

PROTECTIVE MEASURES

Storage and Handling: Keep in well-ventilated, tool area and in suitable (non-oxidizable) containers.

Engineering Controls: Process enclosure or local exhaust ventilation capable of keeping concentrations below the OSHA standard. Sinks, showers and eyewash stations should be readily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls) Impervious clothing and footwear, gloves and safety goggles or faceshield should be worn when direct contact with chromic acid is possible.

Protective Equipment: For levels up to 0.5 mg/m^3 use a dust and mist respirator (except single use and quarter face mask respirators), a rupplied-air respirator or a self-contained breathing apparatus. For levels up to 1.25 mg/m^3 use a powered air-purifying respirator with high-efficiency particulate filters or a supplied-air resparator operated in continuous-flow mode. For levels up ta 2.50 mg/m^3 use a powered air-purifying respirator with a full facepiece and high-efficiency particulate filters, a rupplied-air respirator with a full facepiece or a self-contained breathinq apparatus with a full facepiece. For levels up ta 10 mg/m^3 use a supplied-air respirator with a full facepiece and operated in a positive pressure mode, For levels greater than 10 mg/m^3 or in areas of unknown concentrations use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a combination type C supplied-air respirator with an auxiliary self-contained breathinq apparatus, both with a full facepiece and operated in a positive pressure mode. For escape use a high-efficiency particulate filter respirator or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Wearing proper protective clothing and equipment spread vermiculite, dry sand, or earth over spill. Place in suitable container. tor final disposal, contact yout regional office of the New York State Department of Environmental Conservation.

For more info — tionr
Contact the Industrial Hygienist or Safety Officer at your worksite or *the* New fork State' Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

LEAD (Metallic and Inorganic Compounds)

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Lead, CAS 7439-92-1; lead carbonate, CAS 598-63-0; lead chloride, CAS 7758-95-4; lead monoxide, CAS 1317-36-8; lead sulfide, CAS 1314-87-0; and others.

Trade Names: C.I. Pigment Metal 4, C.I. 77575, Lead flake, Whole lead, Litharge and others.

Uses: Tank linings, piping and other chemical reaction equipment; petroleum refining; manufacture of gasoline additives; pigments for paint; storage batteries, solder and fusible alloys; radiation shielding and others.

PHYSICAL INFORMATION

Appearance: Bluish white to silvery grey solid (lead metal).

Odor: None.

Behavior in Water: Insoluble.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 0.05 mg/m^3 (lead).

NIOSH Recommended Limit: Average 10 hour day or 40 hour week exposure -- 0.1 mg/m^3 (lead).

ACGIH Recommended Limit: Average 8 hour exposure -- 0.15 mg/m^3 (lead).

NOTE: Blood-lead level is a good indicator of total lead exposure. Current OSHA regulations require that if an individual has a blood-lead level greater than or equal to .050 mg lead per 100 ml. blood, he or she must be removed from all exposures to lead and cannot return to the exposure environment until the blood level falls to .040 mg lead per 100 ml. blood or less.

Short Term Exposure:

Note: Lead is a cumulative poison. Increasing amounts can build up in the body eventually reaching a point where symptoms and disability occur. Lead dust carried home on contaminated clothing can result in exposure and symptoms in other family members. Standards only protect for inhalation exposure. Extra precautions should be taken if skin exposure also occurs.

Inhalation: The effects of exposure to fumes and dusts of inorganic lead may not develop quickly. Symptoms may include decreased physical fitness, fatigue, sleep disturbance, headache, aching bones, and muscles, constipation, abdominal pains and decreased appetite. These effects are reported to be reversible if exposure ceases. Inhalation of large amounts of lead may lead to seizures, coma and death.

Skin: May cause irritiation.

Eyes: May cause irritation.

Ingestion: See effects listed for inhalation. Ingestion of large amounts of lead may lead to seizures, coma and death.

Long Term Exposure:

Lead can accumulate in the body over a period of time. Therefore, long term exposures to lower levels can result in a build up of lead in the body and more severe symptoms. These may include anemia, pale skin, a blue line at the gum margin, decreased hand-grip strength, abdominal pain, severe constipation, nausea, vomiting, and paralysis of the wrist joint. Prolonged exposure may also result in kidney damage. If the nervous system is affected, usually due to very high exposures, the resulting effects include severe headache, convulsions, coma, delirium and death. In non-fatal cases, recovery is slow and not always complete. Alcohol ingestion and physical exertion may bring on symptoms. Continuous exposure can result in decreased fertility. Elevated lead exposure of either parent before pregnancy can increase the chances of miscarriage or birth defects. Exposure of the mother during pregnancy can cause birth defects.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move person to fresh air, Give artificial respiraton as needed. Get medical attention immediately.

Skin: Wash area vitb plenty of soap and water. Remove any contaminated clothing.

Eyes: Rinse eyes with plenty of v a t for 15 minutes. Sed medical attention, if necessary.

Ingestion: If person is conscious, give water. Seek medical attention.

Note to Physician: Whole blood lead levels, circulating plasma/erythrocyte lead concentration ratio, urine ALA, and erythrocyte protoporphyrin fluorescent microscopy may all be useful in monitoring or assessing lead exposure. Chelating agents such as edetate disodium calcium and penicillamine are generally useful in the therapy of acute lead intoxification.

FIRE AND EXPLOSION INFORMATION

General: Not combustible. If exposed to fire, may release toxic fumes or sulfur and lead oxide..

Extinguisher: Use extinguisher appropriate to burning material. When fighting fire, wear a self-contained breathing apparatus with a full facepiece and operated in positive pressure mode.

REACTIVITY

Materials to Avoid: Reacts violently with potassium.

Conditions to Avoid: Excessive heat.

PROTECTIVE MEASURES

Storage and Handling: Store' in an area away from heat and keep separate from potassium.

Engineering Controls: Adequate ventilation. sinks. showers and eyewash stations should be provided.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Full body work clothing should be worn including bump caps or hard hats, rubber gloves, and eye protection. Employees should routinely wash their skin thoroughly and change clothing at the end of each wrk shift.

Protective Equipment: For levels up to 0.5 mg/m^3 use a supplied-air respirator, a self-contained breathing apparatus or an air-purifying respirator with high-efficiency particulate filter. For levels up to 1.25 mg/m^3 use a supplied-air respirator operated in continuous flow mode or a powered air-purifyiaq respirator with high efficiency particulate filters. For levels up to 2.5 mg/m^3 use any of the above witb a full facepiece. For levels up to 50 mg/m^3 use a Type C supplied-air respirator operated in a positive pressure mode. For levels up to 100 mg/m^3 use a Type C supplied-air respirator with a full facepiece operated in a positive pressure mode. par levels greater than 100 mg/m^3 or in areas of unknown concentrations use a self-contained breathing apparatus witb full facepiece operated in a positive-pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a respirator witb high-efficiency particulate filters or an escape self-contained breathing apparatus.

Miscellaneous: lo eating, drinking, or smoking in areas where the dusts or fumes of lead or its compounds are present.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Put on necessary protective equipment including respirators. If spill is a solution cover with absorbent and shovel into suitable container. If spill is in powder form. vacuum whenever possible to avoid raisinq dust by sweeping or blowing. Place in suitable container. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

Chemical Fact Sheet*

Version 2

MERCURY (metallic)

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Hydrargyrum; CAS 7439-97-6.

Trade Names: Quicksilver, liquid silver and others.

Uses: Used in the manufacture of scientific instruments, in electrical equipment, synthetic silk, solder, electrolytic processes, metal plating, tanning, dyeing, textiles, photography, photoengraving, paints and pigments.

PHYSICAL INFORMATION

Appearance: A silvery-white, heavy liquid.

Odor: Odorless.

Behavior in Water: Does not mix. Will sink.

Evaporation: Slow, but even at room temperature, may evaporate to cause symptoms as listed under inhalation.

HEALTH HAZARD INFORMATION

OSHA Standard: 0.1 mg/m^3.

NIOSH Recommended Limit: Average 8 hour exposure -- 0.05 mg/m^3.

ACGIH Recommended Limit: Average 8 hour exposure -- 0.05 mg/m^3.

Short Term Exposure:

Inhalation: Exposure to levels below 1 mg/m^3 has been shown to produce nonspecific symptoms such as shyness, insomnia, anxiety and loss of appetite. At higher levels (1-3 mg/m^3 for 2-5 hours) may cause headache, salivation, metallic taste, chills, cough, fever, tremors, abd cramps, diarrhea, nausea, vomiting, tightness in the chest, difficult breathing, fatigue, irritation and possible lung tissue damage. Symptoms may begin several hours after exposure and may last a week. Large doses may result in flu-like symptoms, which, in severe cases, may result in death due to pneumonia.

Skin: Can be absorbed through the skin. May cause irritation. Prolonged contact with skin can result in symptoms listed above.

Eyes: Can cause eye irritation.

Ingestion: Generally does not produce ill effects.

Long Term Exposure:

Mercury accumulates in the brain quickly during exposure but is released from the brain very slowly. This will result in a build-up in brain tissue over a long time. The liver and kidneys may also be damaged by mercury accumulation.

It may cause headache, dizziness, restlessness, irritability, sleepness, tremors, defective muscle control, increased salivation, loose teeth, irritation of the gums with a blue line between teeth and gums, loss or appetite, nausea, vomiting, diarrhea, liver damage, changes in urine, raised red areas and blisters of skin, impaired memory and possible permanent brain damage.

Frequency of complaints and severity of symptoms increase with levels of exposure, most notabl above 0.1 mg/m^3. However, many of these symptoms have been reported at levels below recommended limits due to the accumulation of mercury over long term exposure.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For a explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get to fresh air. Give artificial respiration if breathing has stopped. Give oxygen if breathing is difficult. Seep warm and at rest. Get medical attention immediately.

Skin: Remove my liquid soaked clothing. Wash affected area with soap and water. Get medical attention if necessary.

Eyes: Immediately wash eyes with large amounts of water. Get medical attention immediately. Contact lenses should not be worn when working with this material.

Ingestion: Seek medical attention.

Note to Physician: Gastric lavage with 5% solution of sodium formaldehyde sulfoxalate or 2-5% solution of sodium bicarbonate. Administer BAL (dimercaprol) intramuscularly as a 10% solutio in oil. Urine mercury determination may be useful as an index of absorption.

FIRE AND EXPLOSION INFORMATION

General: Not flammable.

REACTIVITY

Materials to Avoid: Reacts with nitrates, chlorates, hot sulfuric acid, ammonia gas, acetylenes, alkalies and dry bromine.

Conditions to Avoid: Heat will aped up the rate of evaporation, increasing risk due to inhalation.

PROTECTIVE MEASURES

Storage and Handling: store in well-ventilated area, in small amounts, in closed polyethylene bottles.

Engineering Controls: Provide adequate ventilation in both storage tanks and vork areas and enclose operations where possible. Eyewash stations, showers and sinks should be available. Provide separate storage for work and street clothes. Flooring should not be able to absorb mercury or have cracks and spaces.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Wear full body work clothes with a minimum of seams, no pleats or cuffs, made from a material that will not readily absorb mercury. Also wear protective shoes, or shoe covers, rubber gloves and goggles if there is any danger of splashing. Clothing, shoes, gloves and goggles should be changed or washed daily. Laundering should be provided by the employer.

Protective Equipment: For levels up to 0.5 mg/m3 use a supplied-air respirator, a self-contained breathing apparatus or a chemical cartridge respirator with cartridges providing protection against mercury vapors. For levels up to 1.25 mg/m^3 use a supplied-air respirator operated in continuous-flow mode or a powered air-purifying respirator providing protection against mercury vapors. For levels up to 2.5 mg/m^3 use any of the above vith a full facepiece or a gas mask vith a canister providing protection against mercury vapors. For levels up to 28 mg/m^3 use a Type C supplied-air respirator operated in a positive pressure rode. For levels above 28 mg/m^3 or at unknown concentrations use a self-contained breathing apparatus vith a full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator vith an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask vith a canister prwiding protection against mercury vapors or an escape self-contained breathing apparatus. For firefighting use a gas mask providing protection against mercury vapors or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Cat all workers out of spill area. Wearing protective equipment and clothing, clean up the spill with an industrial vacuum cleaner vith a charcoal filter to absorb mercury vapor. For mercury spilled in cracks cover vith zinc dust to form an amalgam, or cover vth calcium polysulfide vith excess sulfur. Do not sweep or use compressed air to blow mercury droplets as it can increase air concentrations. Store contaminated or waste mercury in tightly covered or vapor-proof contain pending removal. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:

Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toric Substance Assessment, 2 University Place, Albany, New York 12203.

APPENDIX B

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

0000323

Section 10 — Title Page

Work Plan Group: C
Site No.: 2
Site Name: Waterfront Sediments

Prepared by: Mary L. Hiller
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Prepared for: Department of the Navy
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Signature Approvals:

E & E Project Manager: J. Barksdale

E & E QA/QC Director or
Assistant QA/QC Director: T. Yeates/R. Short

E & E ASC Director: A. Clifton

E & E QA/QC Project Officer: A. Schuessler

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Section 30 — Project Summary

Vork Plan Group: C

Site No.: 2

Site Name: Waterfront Sediments

Site Description: A complete site description and history are presented in Sections 2.0 and 3.0 of the'attached work plan.

Phase I — Field Screening

Physical Survey (check all that apply):

- X Overall Physical Reconnaissance
- X HNu/OVA Surface Emission Survey
- ___ Radiation Survey
- X Habitat/Biota Survey
- ___ Asbestos Survey (in Rubble)
- ___ Hydrologic Assessment

Geophysical Survey (check all that apply).:

- ___ Electromagnetic Conductivity:
  - ___ EM-31 ___ EU-34
- ___ Magnetometry
- ___ Very Low Frequency
- ___ Ground Penetrating Radar
- ___ Seismic Refraction
- ___ Seismic Reflection

Analytical Screening (check all that apply):

- ___ Field Analyses:
- ___ Soil Headspace Analyses: Planned Number of Samples ___
- ___ Soil Gas Analyses : Planned Number of Samples ___
- ___ Laboratory Analyses:

PLANNED NUMBER OF SAMPLES		CATEGORIES OF ANALYSES
Surface Water	___	___ Volatile Organic Compounds
Sedirnent	___	___ Polynuclear Aromatic Hydrocarbons
Soil	___	___ Phenols
Groundvater	___	___ Organophosphorus Pesticides
Duplicates	___	___ Chlorinated Herbicides
Trip Blanks	___	___ Carbamates
Field Blanks	___	___ Pesticides/Polychlorinated Biphenyls
Rinsate Blanks	___	___ Total Recoverable Hydrocarbons
Other	___	___ Hetals
		___ Gross Alpha

Section 3.0 — Project Summary (Continued)

Phase II — Characterization

PLANNED NUMBER OF SAMPLES

Surface Water	___	Air	___	Duplicates	9
Sediment	87	Biota:		Trip Blanks	0
soil	___	Flora	___	Field Blanks	4
Groundwater	___	Fauna	___	Rinsate Blanks	4

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Halocarbons
- X Base/Neutral Extractables
- X Acid Extractables
- ___ Polynuclear Aromatic Hydrocarbons
- X Pesticides
- X Polychlorinated Biphenyls
- X Total Recoverable Hydrocarbons
- X Metals
- X Cyanide

Additional analytical categories are identified belov:

- ___ Gross Alpha
- X Total Organic Carbon
- ___ Hardness (vater only)
- X Alkalinity
- ___ Total Suspended Solids (vater only)
- X Total Kjeldahl Nitrogen
- ___ Ammonia Nitrogen
- ___ Orthophosphate Phosphorus
- ___ Dissolved Oxygen (in field)
- ___ 5-day Biological Oxygen Demand
- ___ Chemical Oxygen Demand
- ___ pH
- ___ Percent Moisture
- X Grain Size
- ___ BTU Content
- ___ Ash Content
- ___ Total Halogens
- ___ Sulfur
- ___ Ignitability
- ___ Cation Exchange Capacity

Section 4.0 — Project Organization and Responsibility

The overall organizational structure for this site is discussed in Section 4.0 of the GQAPP. Site-specific designated personnel and their responsibilities are listed below:

Site Manager:
Team/Task Leader(s): To Be Determined
Field Support Personnel:

Biographies for those personnel listed above which are not included in the GQAPP are included in Appendix A of this document.

Section 5.0 — QA/QC Objectives for Measurement Data

Criteria for reporting the accuracy, precision, and completeness of data are presented in Section 5.0 of the GQAPP. Detection limits for screening and quantitative analyses are presented in Section 9.0 of the GQAPP. Procedures used to assess data accuracy, precision, and completeness are presented in Section 14.0 of the GQAPP. All analytes (including field parameters), sample media, and method numbers relevant to the investigation of this site are listed in the following table, which also identifies any modifications to the accuracy (A), precision (P), completeness (C), and detection limit (DL) criteria specified in the above-referenced GQAPP sections.

Analyte	Media	Method No.	A	P	C	DL **
Laboratory Analyses						
TCL BNAs	S	BPA 8270	N/H	N/M	N/M	0.5***
TCL Pesticides & PCBs	S	BPA 8080	N/M	N/M	N/M	0.01-0.05
Total Recoverable Hydrocarbons	S	BPA 418.1	N/M	N/M	N/M	N/M
Metals:						
Aluminum	S	BPA 200.7	N/M	N/M	N/M	10
Antimony	S	EPA 204.2	N/M	N/M	NW	1.0
Arsenic	S	BPA 206.2	N/M	N/M	N/M	1.0
Cadmium	S	EPA 213.2	N/H	N/M	N/M	0.05
Chromium	S	EPA 200.7	N/M	N/M	N/M	1.0
Copper	S	BPA 200.7	N/M	N/M	N/M	1.0
Lad	S	EPA 239.2,	N/M	N/M	N/M	1.0
Mercury	S	EPA 245.5	N/M	N/M	N/M	0.01
Nickel	S	EPA 200.7	N/M	N/M	N/M	1.0
Silver	S	EPA 272.2	N/M	N/M	N/M	0.05
Tin	S	EPA 200.7	N/M	N/M	N/M	10
Zinc	S	EPA 200.7	N/M	N/M	N/M	1.0
Cyanide	S	SW 9010	N/M	N/H	N/M	1.0
TOC	S	EPA 415.1	N/M	N/M	N/M	100
Total Kjeldahl Nitrogen	S	BPA 351.3	N/M	N/M	N/M	1.0
Ammonia	S	EPA 350.2	N/M	N/M	N/M	0.6
Grain Size	S	ASTM 19-D422	N/M	N/M	N/M	--

* Cold-vapor furnace method, larger sample size will be used to achieve detection liaits.

** mg/kg dry veight, maximum detection limit required actual liaits may be lover.

*** Maximum detection liait required for PAH, see GQAPP for all other detection limits.

Section 6.0 — Fieldvork and Sampling Procedures

Fieldwork and sampling procedures are presented in Section 6.0 of the GQAPP. Modifications to these procedures are described below:

No Hodifications

Section 7.0 — Sample Custody

Sample custody procedures are presented in Section 7.0 of the GQAPP. Uodifications tq these procedures are described below:

No Modifications

Section 8.0 — Calibration Procedures and Frequency

Calibration procedures and frequency are presented in Section 8.0 of the GQAPP. Uodifications to these procedures are described below:

No Uodifications

Section 9.0 — Analytical Procedures

Screening and quantitative analytical procedures are presented in Section 9.0 of the GQAPP. Site-specific accuracy, precision, completeness, and detection limit criteria are presented in Section 5.0 of this SQAPP. Uodifications to any other of the analytical procedures are described below:

Marine sediments will be collected and analyzed following the methods outlined in the Florida Department of Environmental Regulation's Estuarine Chemical Handbook (1987).

Section 10.0 — Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 11.0 — Internal Quality Control Checks

Internal quality control check procedures are presented in Section 11.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

section 12.0 — Performance and System Audits

Performance and system audit procedures are presented in Section 12.0 of the GQAPP. Specific audits planned for this site investigation are listed below:

Audit Type	Frequency/Date	Description
	To Be Determined	

Section 13.0 — Preventive Maintenance

Preventive maintenance procedures are presented in Section 13.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 14.0 — Procedures Used to Assess Accuracy, Precision, and Completeness of Data

Procedures used to assess the accuracy, precision, and completeness of data are presented in Section 14.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 15.0 — Corrective Action

Corrective action procedures are presented in Section 15.0 of the GQAPP. Modifications to these procedures are described below:

No Hodifications

Section 16.0 — Quality Assurance Reports

Quality assurance report procedures are presented in Section 16.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Appendix A — Additional Personnel Biographies

Personnel assigned to this site investigation whose biographies do not appear in the GQAPP are listed below; biographies for these site personnel are presented on the following pages.

To Be Determined

Section 6.0 — Fieldwork and Sampling Procedures

Fieldwork and sampling procedures are presented in Section 6.0 of the GOAPP. Modifications to these procedures are described below:

No Hodifications

Section 7.0 — Sample Custody

Sample custody procedures are presented in Section 7.0 of the GOAPP. Modifications to these procedures are described below:

No Modifications

Section 8.0 — Calibration Procedures and Frequency

Calibration procedures and'frequency are presented in Section 8.0 of the GOAPP. Modifications to these procedures are described below:

No Modifications

Section 9.0 — Analytical Procedures

Screening and quantitative analytical procedures are presented in Section 9.0 of the GOAPP. Site-specific accuracy, precision, completeness, and detection limit criteria are presented in Section 5.0 of this SQAPP. Modifications to any other of the analytical procedures are described below:

Section 10.0 — Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GQAPP. Modifications to these procedures are described belov:

No Modifications

Section 11.0 — Internal Quality control Checks

Internal quality control *check* procedures are presented in Section 11.0 of the GQAPP. Modifications to these procedures *are* described belov:

No Modifications

Section *12.0* — Performance and System Audits

Performance and system audit procedures are presented in Section 12.0 of the GQAPP. Specific audits planned for this site investigation are listed belov:

Audit Type	Frequency/Date	Description
	To Be Determined	

Analyte	Media	Method No.	A	P	C	DL
Laboratory Screening Analyses*						
Volatile Organic Compounds	S/W	--	N/M	N/M	N/M	N/M
Polynuclear Aromatic Hydrocarbons	S/W	--	N/M	N/M	N/M	N/M
Pesticides	S/W	--	N/M	N/M	N/M	N/M
Polychlorinated Biphenyls	S/W	--	N/M	N/M	N/M	N/H
Total Recoverable Eydrocarbons	S/W	EPA 418.1				
Arsenic	S/W	--	N/M	N/M	N/H	N/M
cadmium	S/W	--	N/M	N/M	N/H	N/M
Chromium	S/W	--	N/M	N/M	N/H	N/M
Copper	S/W	--	N/M	N/M	N/M	N/H
Lead	S/W	--	N/M	N/M	N/H	N/M
Nickel	S/W	--	N/H	N/M	N/M	N/M
Silver	S/W	--	N/H	N/M	N/H	N/M
Zinc	S/W	--	N/M	N/M	N/H	N/M
Laboratory Analyses						
Volatile Halogenated Hydrocarbons	S/W	€PA 8010/601	N/M	N/M	N/H	N/M
Volatile Aromatic Eydrocarbons	S/W	EPA 8020/602	N/M	N/M	N/H	N/M
TCL Purgeables + xylene	S/W	EPA 8240/624	N/M	N/M	N/H	N/M
TCL BNAs	S/W	EPA 8270/625	N/H	N/H	N/M	N/M
TCL Pesticides & PCBs	S/W	EPA 8080/608	N/M	N/M	N/M	N/M
Total Recoverable Eydrocarbons	S/W	EPA 418.1	N/M	N/M	N/M	N/M
TCL Metals:						
Aluminum	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Antimony	S/W	EPA 6010/200.7	N/H	N/M	N/H	N/M
Arsenic	S/W	EPA 70601206.2	N/M	N/M	N/H	N/H
Barium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Beryllium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/H
Boron	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Cadmium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
calcium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Chromium	S/W	EPA 6010/200.7	N/M	N/M	N/H	N/M
Cobalt	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Copper	S/W	€PA 6010/200.7	N/M	N/M	N/M	N/M
Iron	S/W	EPA 6010/200.7	N/M	N/M	N/H	N/M
Lead	S/W	EPA 7421/239.2	N/M	N/M	N/M	N/M
Magnesium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Manganese	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Mercury	S/W	EPA 74711245.1	N/M	N/M	N/H	N/M

Analyte	Media	Method No.	A	P	C	DL
Nickel	S/W	BPA 6010/200.7	N/M	N/M	N/H	N/M
selenium	S/W	EPA 7740/270.2	N/M	N/M	N/M	N/M
Silver	S/W	EPA 6010/200.7	N/H	N/M	N/M	N/M
Sodium	S/W	EPA 6010/200.7	N/M	N/M	N/H	N/M
Thallium	S/W	EPA 7841/279.2	N/M	N/M	N/H	N/M
Vanadium	S/W	BPA 6010/200.7	N/M	N/M	N/H	N/M
Zinc	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Cyanide	S/W	BPA 9010/335.2	N/M	N/M	N/H	N/M
TOC	S/W	EPA 9060/415.1	N/H	N/M	N/H	N/M
Hardness	W	EPA 130.2	N/M	N/M	N/H	N/M
Alkalinity	W	EPA 310.1	N/M	N/M	N/M	N/H
Total Suspended Solids	W	EPA 160.2	N/M	N/M	N/M	N/M
Total Kjeldahl Nitrogen	S/W	RPA 351.3	N/H	N/H	N/M	N/M
Nitrogen-Ammonia	S/W	EPA 350.2	N/M	N/M	N/M	N/M
Orthophosphate Phosphorus	S/W	BPA 365.2	N/M	N/M	N/H	N/H
5-day Biological Oxygen Demand	V	SM 507	N/M	N/M	N/M	N/M
Chemical Oxygen Demand	W	EPA 410.4	N/M	N/M	N/M	N/M
pH	W	EPA 150.1	N/M	N/M	N/M	N/M
Percent Moisture	S	ASTM D-2216-80	N/M	N/M	N/M	N/
Grain Size	S	ASTH D-422-63	N/M	N/M	N/M	N/M
BTU Content	S	ASTM D-2015-77	N/M	N/M	N/M	N/M
Ash Content	S	ASTM D-482	N/M	N/M	N/M	N/M
Total Halogens	S	ASTM D-808-81	N/M	N/M	N/H	N/H
		BPA 32S.3	N/M	N/M	N/M	N/M
Sulfur	S	ASTH D-129-64	N/M	N/M	N/M	N/M
Ignitability	S/W	EPA 1010	N/M	N/M	N/H	N/M
Cation Exchange Capacity	S	EPA 9081	N/M	N/M	N/M	N/M
Field Parameters						
pH	W	Field	N/M.	N/M	N/M	N/M
Specific Conductance	W	Field	N/M	N/M	N/M	N/M
Temperature	V	Field	N/M	N/M	N/M	N/M
Dissolved Oxygen	V	EPA 360.1	N/M	N/M	N/M	N/M

Notes: S = Soil and/or sediment
V = Groundwater and/or surface water
N/M = No Modifications from GQAPP

•With the exception of Total Recoverable Hydrocarbons and Gross Alpha, the laboratory screening analyses do not have EPA method numbers.

Section 3.0 — Project Summary (Continued)

Phase II — Characterization

PLANNED NUMBER OF SAMPLES

Surface Water	___	Air	___	Duplicates	3
Sediment	___	Biota:		Trip Blanks	2
Soil	32	Flora	___	Field Blanks	2
Groundwater	___	Fauna	___	Rinsate Blanks	2

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Iialocarbons
- X Base/Neutral Extractables
- X Acid Extractables
- ___ Polynuclear Aromatic Eydrocarbons
- X Pesticides
- X Polychlorinated Biphenyls
- X Total Recoverable fiydrocarbons
- X Metals
- X Cyanide

Additional analytical categories are identified below:

- ___ Gross Alpha
- X Total Organic Carbon
- ___ Hardness (water only)
- X Alkalinity
- ___ Total Suspended Solids (water only)
- X Total Kjeldahl Nitrogen
- ___ Ammonia Nitrogen
- ___ Orthophosphate Phosphorus
- ___ Dissolved Oxygen (in field)
- ___ 5-day Biological Oxygen Demand
- ___ Chemical Oxygen Demand
- X pH
- X Percent Moisture
- X Grain Size
- X BTU Content
- X Ash Content
- X Total Halogens
- X Sulfur
- X Ignitability
- X Cation Exchange Capacity

Section 4.0 — Project Organization and Responsibility

The overall organizational structure for this site is discussed in Section 4.0 of the GQAPP. Site-specific designated personnel rad their responsibilities are listed below:

Site Manager:
Team/Task Leader(s): To Be Determined
Field Support Personnel:

Biographies for those personnel listed above which are not included in the GQAPP are included in Appendix A of this document.

Section 5.0 — QA/QC Objectives for **Measurement** Data

Criteria for reporting the accuracy, precision, and completeness of data are presented in Section 5.0 of the GQAPP. Detection limits for screening and quantitative analyses are presented in Section 9.0 of the GQAPP. Procedures used to assess data accuracy, precision, rad completeness are presented in Section 14.0 of the GQAPP. All analytes (including field parameters), sample media, and method numbers relevant to the investigation of this site are listed in the following table, which also identifies any modifications to the accuracy (A), precision (P), completeness (C), and detection limit (DL) criteria specified in the above-referenced GQAPP sections.

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Section 3.0 — Project Summary

Work Plan Croup: C

Site No.: 14

Site Name: Dredge Spoil Fill Area

Site Description: A complete site description and history are presented in Sections 2.0 and 3.0 of the attached work plan.

Phase I — Field Screening

Physical Survey (check all that apply):

- X Overall Physical Reconnaissance
- X HNu/OVA Surface Emission Survey
- ___ Radiation Survey
- X Habitat/Biota Survey
- ___ Asbestos Survey (in Rubble)
- X Hydrologic Assessment

Geophysical Survey (check all that apply):

- ___ Electromagnetic Conductivity:
  - ___ EM-31 ___ En-34
- ___ Magnetometry
- ___ Very Low Frequency
- ___ Ground Penetrating Radar
- ___ Seismic Befraction
- ___ Seismic Reflection

Analytical Screening (*check* all that apply):

- ___ Field Analyses:
- ___ Soil Headspace Analyses: Planned Number of Samples ___
- ___ Soil Gas Analyses : Planned Number of Samples ___
- X Laboratory Analyses:

PLANNED NUMBER OF SAMPLES		CATEGORIES OF ANALYSES
Surface Water	___	X Volatile Organic Compounds
Sediment	___	X Polynuclear Aromatic Eydrocarbons
Soil	27	X Phenols
Groundwater	10	___ Organophosphorus Pesticides
Duplicates	3	___ Chlorinated Herbicides
Trip Blanks	___	___ Carbamates
Field Blanks	___	X Pesticides/Polychlorinated Biphenyls
Rinsate Blanks	___	X Total Recoverable Eydrocarbons
Other	___	X Metals
		___ Gross Alpha

Appendix A -- Additional Personnel Biographies

Personnel assigned to this site investigation whose biographies do not appear in the GQAPP are listed below; biographies for these site personnel are presented on the following pages.

To Be Determined

Section 10 — Title Page

Work Plan Group: C
Site No.: 14
Site Name: Dredge Spoil Pill Area

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Prepared for: Department of the Navy
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Signature Approvals:

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E & E QA/QC Director or
Assistant QA/QC Director: Russell Short
T. Yeates/R. Short

B & E ASC Director: A. Clifton

B & B QA/QC Project Officer: Andrew Schuessler
A. Schuessler

Section 10.0 -- Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GOAPP. Hodifications to these procedures are described below:

No Hodifications

Section 11.0 — Internal Quality Control Checks

Internal quality control check procedures are presented in Section 11.0 of the GOAPP. Hodifications to these procedures are described below:

No Hodifications

Section 12.0 — Performance and System Audits

Performance and system audit procedures are presented in Section 12.0 of the GOAPP. Specific audits planned for this site investigation are listed below:

Audit Type	Frequency/Date	Description
	To Be Determined	

Section 13.0 — Preventive Maintenance

Preventive maintenance procedures are presentad in Section 13.0 of the GQAPP. Modifications to these procedures *are* described below:

No Modifications

Section 14.0 — Procedures Used to Assess Accuracy, Precision, and Completeness of Data

Procedures used to assess the accuracy, precision, and completeness of data are presented in Section 14.0 of the GQAPP. Modifications to these procedures art described belov:

No Modifications

Section 15.0 — corrective Action

Corrective action procedures are presented in Section 15.0 of the GQAPP. Modifications to these procedures are described belov:

No Modifications

Section 16.0 — Quality Assurance Reports to Management

Quality assurance report procedures are presented in Section 16.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Analyte	Media	Method No.	A	P	C	DL
Nickel	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Selenium	S/W	EPA 7740/270.2	N/M	N/M	N/M	N/M
Silver	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/H
Sodium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Thallium	S/W	EPA 7841/279.2	N/M	N/M	N/M	N/M
Vanadium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Zinc	S/W	EPA 60101200.7	N/M	N/M	N/M	N/H
Cyanide	S/W	EPA 9010/335.2	N/M	N/M	N/M	N/M
TOC	S/W	EPA 9060/415.1	N/M	N/M	N/M	N/M
Hardness	W	EPA 130.2	N/M	N/H	N/M	N/M
Alkalinity	W	EPA 310.1	N/M	N/M	N/M	N/H
Total Suspended Solids	W	EPA 160.2	N/M	N/M	N/M	N/M
Total Kjeldahl Nitrogen	S/W	EPA 351.3	N/M	N/M	N/H	N/M
Nitrogen-Ammonia	S/W	EPA 350.2	N/M	N/M	N/M	N/M
Orthophosphate Phosphorus	S/W	EPA 365.2	N/M	N/M	N/M	N/M
5-day Biological Oxygen Demand	W	SM 507	N/M	N/M	N/M	N/M
Chemical Oxygen Demand	W	EPA 410.4	N/M	N/H	N/H	N/M
pH	W	EPA 150.1	N/M	N/H	N/M	N/M
Percent Moisture	S	ASTM D-2216-80	N/M	N/M	N/M	N/M
Grain Size	S	ASTH D-422-63	N/M	N/M	N/M	N/M
BTU Content	S	ASTH D-2015-77	N/M	N/M	N/M	N/M
Ash Content	S	ASTH D-482	N/M	N/M	N/M	N/M
Total Halogens	S	ASTH D-808-81	N/M	N/M	N/M	N/M
		EPA 325.3	N/M	N/M	N/M	N/M
Sulfur	S	ASTH D-129-64	N/H	N/M	N/M	N/H
Ignitability	S/W	EPA 1010	N/M	N/M	N/M	N/H
Cation Exchange Capacity	S	EPA 9081	N/M	N/M	N/H	N/M
Field Parameters						
pH	W	Field	N/M	N/M	N/H	N/M
Specific Conductance	W	Field	N/M	N/M	N/M	N/M
Temperature	W	Field	N/M	N/M	N/M	N/M
Dissolved Oxygen	W	EPA 360.1	N/M	N/M	N/H	N/M

Notes: S = Soil and/or sediment
W = Groundwater and/or surface water
N/M = No Hodifications from GOAPP

*
With the exception of Total Recoverable Hydrocarbons and Gross Alpha, the laboratory screening analyses do not have EPA method numbers.

Section 6.0 — Fieldwork and Sampling Procedures

Fieldwork and sampling procedures are presented in Section 6.0 of the GQAPP. Modifications to these procedures are described below:

No modifications

Section 7.0 — Sample Custody

Sample custody procedures are presented in Section 7.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 8.0 — Calibration Procedures and Frequency

Calibration procedures and frequency are presented in Section 8.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 9.0 — Analytical Procedures

Screening and quantitative analytical procedures are presented in Section 9.0 of the GQAPP. Site-specific accuracy, precision, completeness, and detection limit criteria are presented in Section 5.0 of this SQAPP. Modifications to any other of the analytical procedures are described below:

Section 4.0 — Project Organization and Responsibility

The overall organizational structure for this site is discussed in Section 4.0 of the GQAPP. Site-specific designated personnel and their responsibilities are listed below:

Site Manager:
Team/Task Leader(s): To Be Determined
Field Support Personnel:

Biographies for those personnel listed above which are not included in the GQAPP are included in Appendix A of this document.

Section 5.0 -- QA/QC Objectives for Measurement Data

Criteria for reporting the accuracy, precision, and completeness of data are presented in Section 5.0 of the GQAPP. Detection limits for screening and quantitative analyses are presented in Section 9.0 of the GQAPP. Procedures used to assess data accuracy, precision, and completeness are presented in Section 14.0 of the GOAPP. All analytes (including field parameters), sample media, and method numbers relevant to the investigation of this site are listed in the following table, which also identifies any modifications to the accuracy (A), precision (P), completeness (C), and detection limit (DL) criteria specified in the above-referenced GOAPP sections.

Analyte	Media	Method No.	A	P	C	DL	
Laboratory Screening Analyses*							
Volatile Organic Compounds	S/W	--		N/M	N/M	N/M	N/M
Polynuclear Aromatic Hydrocarbons	S/W	--		N/M	N/M	N/M	N/M
Pesticides	S/W	--		N/M	N/M	N/M	N/M
Polychlorinated Biphenyls	S/W	--		N/M	N/M	N/M	N/M
Total Recoverable Hydrocarbons	S/W	EPA 418.1					
Arsenic	S/W	--		N/M	N/M	N/U	N/M
Cadmium	S/W	--		N/M	N/M	N/M	N/M
Chromium	S/W	--		N/M	N/M	N/M	N/M
Copper	S/W	--		N/M	N/H	N/M	N/M
Lead	S/W	--		N/M	N/M	N/M	N/M
Nickel	S/W	--		N/M	N/M	N/M	N/M
Silver	S/W	--		N/M	N/M	N/M	N/M
Zinc	S/W	--		N/M	N/M	N/M	N/M
Laboratory Analyses							
Volatile Halogenated Hydrocarbons	S/W	BPA 8010/601		N/M	N/M	N/M	N/M
Volatile Aromatic Hydrocarbons	S/W	EPA 8020/602		N/M	N/M	N/M	N/M
Gross Alpha	S/W	-- /EPA 900		N/M	N/M	N/M	N/M
Radium 226	S/W	— /EPA 903.1		N/M	N/M	N/M	N/M
TCL Purgeables + xylene	S/W	EPA 8240/624		N/M	N/M	N/M	N/M
TCL BNAs	S/W	EPA 8270/625		N/M	N/M	N/M	N/M
TCL Pesticides & PCBs	S/W	EPA 8080/608		N/M	N/M	N/M	N/M
Total Recoverable Hydrocarbons	S/W	EPA 418.1		N/M	N/M	N/M	N/M
TCL Metals:							
Aluminum	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Antimony	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Arsenic	S/W	EPA 7060/206.2		N/M	N/M	N/M	N/M
Barium	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Beryllium	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Boron	S/W	EPA 6010/200.7		N/H	N/M	N/M	N/M
Cadmium	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
calcium	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/H
Chromium	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Cobalt	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Copper	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/H
Iron	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Lead	S/W	EPA 74211239.2		N/M	N/M	N/M	N/M
Magnesium	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Manganese	S/W	EPA 6010/200.7		N/M	N/M	N/M	N/M
Mercury	S/W	EPA 7471/245.1		N/M	N/M	N/M	N/M

Section 3.0 -- Project Summary

Work Plan Group: C

sitt No. : 13

Site Name: Magazine Point Rubble Disposal Area

Site Description: A complete site description and history are presented in Sections 2.0 and 3.0 of the attached work plan.

Phase I — Field Screening
Physical Survey (check all that apply):

- X Overall Physical Reconnaissance
- X HNu/OVA Surface Emission Survey
- ___ Radiation Survey
- X Habitat/Biota Survey
- X Asbestos Survey (in Rubble)
- X Hydrologic Assessment

Geophysical Survey (check all that apply):

- ___ Electromagnetic Conductivity:
  - ___ En-31 ___ En-34
- ___ Magnetometry
- ___ Very Low Frequency
- ___ Ground Penetrating Radar
- ___ Seismic Refraction
- ___ Seismic Reflection

Analytical Screening (check all that apply):

- ___ Field Analyses:
- ___ Soil Headspace Analyses: Planned Number of Samples ___
- ___ Soil Gas Analyses : Planned Number of Samples ___
- X Laboratory Analyses:

PLANNED NUMBER OF SAMPLES		CATEGORIES OF ANALYSES
Surface Water	___	X Volatile Organic Compounds
Sediment	___	X Polynuclear Aromatic Hydrocarbons
Soil	16	X Phenols
Groundwater	4	___ Organophosphorus Pesticides
Duplicates	2	___ Chlorinated Herbicides
Trip Blanks	___	___ Carbamates
Field Blanks	___	X Pesticides/Polychlorinated Biphenyls
Rinsate Blanks	___	X Total Recoverable Hydrocarbons
Other	___	X Metals
		___ Gross Alpha

Section 3.0 — Project Summary (Continued)

Phase II — Characterization

PLANNED NUMBER OF SAMPLES

Surface Vatcr	___	Air	___	Duplicates	2
Sediment	___	Biota:		Trip Blanks	1
soil	24	Flora	___	Field Blanks	1
Groundwater	___	Fauna	___	Rinsate Blanks	1

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Halocarbons
- X Base/Neutral Extractables
- X Acid Extractables
- ___ Polynuclear Aromatic Hydrocarbons
- X Pesticides
- X Polychlorinated Biphenyls
- X Total Recoverable Hydrocarbons
- X Metals
- X Cyanide

Additional analytical categories are identified below:

- ___ Gross Alpha
- X Total Organic Carbon
- ___ Hardness (water only)
- ___ Alkalinity
- ___ Total Suspended Solids (water only)
- X Total Kjeldahl Nitrogen
- ___ Ammonia Nitrogen
- ___ Orthophosphate Phosphorus
- ___ Dissolved Oxygen (in field)
- ___ 5-day Biological Oxygen Demand
- ___ Chemical Oxygen Demand
- X pH
- X Percent Moisture
- X Grain Size
- X BTU Content
- X Ash Content
- X Total Halogens
- X Sulfur
- X Ignitability
- X Cation Exchange Capacity

Section 10 — Title Page

Work Plan Group: C
Site No.: 13
Site Name: Magazine 'Point Rubble Disposal Area

prepared by: Mary L. Miller
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Prepared for: Department of the Navy
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Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 10068
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Contract Number N62467-88-C-0200

Signature Approvals:

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E & E ASC Director: A. Clifton

E & E QA/QC Project Officer: A. Schuessler

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Section 13.0 — Preventive Maintenance

Preventive maintenance procedures are presented in Section 13.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 14.0 — Procedures Used to Assess Accuracy, Precision, and Completeness of Data

Procedures used to assess the accuracy, precision, and completeness of data are presented in Section 14.0 of the GMPP. Modifications to these procedures are described below:

No Modifications

Section 15.0 — Corrective Action

Corrective action procedures are presented in Section 15.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Section 16.0 — Quality Assurance Reports to Management

Quality assurance report procedures are presented in Section 16.0 of the GQAPP. Modifications to these procedures are described below:

No Modifications

Appendix A — Additional Personnel Biographies

Personnel assigned to this site investigation whose biographies do not appear in the GQAPP are listed below; biographies for these site personnel are presented on the following pages.

To Be Determined

APPENDIX C

THREATENED AND ENDANGERED FLORA AND FAUNA ASSOCIATED WITH NAS PWSACOLA

0000340

APPENDIX C

THREATENED AND ENDANGERED FLORA AND FAUNA OBSERVED OR LIKELY TO OCCUR WITHIN THE NAS PENSACOLA FACILITY OR NEARBY

Scientific Name	Common Name	Base * Status	Status FGFWFC(or FDA)	Status USFWS	Habitat
FISHES					
Acipenser oryrhynchur	Atlantic sturgeon	M	SSC	UR a	oull coast. estuarine
Ammocrypta asprella	Crystal darter	U	T	UR 2	Fresh water
Etheostoma histrio	Harelquin darter	U	SSC		Fresh water
Fundulus jenkinsi	Salt marsh topainnow	P	SSC		salt, fresh, brackish waters
Lepisosteus spatula	Alligator 9rr	U	SIC		Brackish, fresh, salt water
Moxostoma carinatum	River redhorse	U	SSC		Fresh water
AMPHIBIANS AND REPTILES					
Alligator mississippiensis	American Alligator	R	SIC	T(S/A)	Swamps, marshes, pondr
Caretta caretta caretta	Loggerhead turtlo	M ?	T	7	Marine, coastal
Chelonia mydas mydas	Green turtlo	M ?	E	E	Marine, corrtrl
Dermochelys coriacea	Leatherback turtlo	n	E	E	Marine, coastal
Drymarchon corais couperi	Eastern indigo snake	P	7	T	Open areas near water
Eretmochelys imbricata	Hawksbill turtlo	M ?	E	E	Marine, coastal
Gopherus polyphemus	Gopher tortoise	P	SSC	UR 1	Sandy coastal plains
Graptemys pulchra	Alabama map turtle	U	SSC		Swamps, streams, marshes, pondr
Lepidochelys kempi	Atlantic ridley	n r	E	E	Marine, coastal
Rana areolata aesopus	florldr gopher frog	P	SIC	UR a	Sand hill communities
Macroclemys temmincki	Alligator snapping turtlo	SR	SSC	UR 2	Swamps, marshes, ponds
MAMMALS					
Mustela vison lutensis	florldr mink	U		UR 2	Terrestrial habitats
Peromyscus pollonotur trissyllepsis	Perdido Key beach mousb	N/A	T	E	Beach dunes
Trichechus manatus latirostris	West Indian manatee	M	E	E	Atlantic and Gulf coasts
Ursus americanus floridanus	florldr black bear	N/A	T	UR 2	Titi swamps

Appendix C (Coat).

Scientific Name	Common Name	Base * Status	Status FGFWFC(or FDA)	Status USFWS	Habitat
BIRDS					
Charadrius melodus	Piping Plover	P	T	T	Open dry, sandy boachos
Charadrius alexandrinus	Snowy plover	P	T	UR 2	Open dry. sandy beaches
Dendroida dominica stoddardi	Stoddard's yellow-throated warbler	P-u		UR 2	Woodod habitat8
Dendroica kirtlandii	Kirtland's warbler	U	E	E	Woodod habitats
Haematopus palliatus	American oystercatcher	U	SSC		Coastal habitats
Egretta rufescens	Reddish egret	P-U	SSC	UR 2	Freshwater/coastal wetlands
Egretta caerulea	Little blue heron	P-u	SSC		Freshwater/coastal wotlands
Egretta thula	Snowy egret	P-U	SSC		Freshwater/coastal wetlands
Grus canadensis pratensis	Florida sandhill crane	U	T		Freshwater wotlands
Falco peregrinus tundrius	Arctic peregrine falcon	M	E	T	Winters on coasts
Falco sparverius paulus	Southeastern kestrel	R	T	UR 2	Open pine forests, clearings
Haematopus palliatus	American oystercatcher	P-U	SSC		Open coastal boachos
Haliaeetus leucocephalus	Bald eagle	P-u	T	E	Pine forests/coastal habitat
Pandion haliaetus	Osprey	R	SSC		Near water
Pelecanus occidentalis	Brown pelican	R	SSC	AC	Mangrove trees, coasts
Picoides borealis	Red-cockaded woodpockor	P-u	T	E	Cavity nests/old pine stands
Vermivora bachmanii	Bachmann's warbler	U	E	E	Woodod habitats
Campephilus principalis	Ivory-billed woodpockor	U	C	E	Woodod habitats
Sterna antillarum	Loast tern	U	T		Coastal habitats
Mycteria americana	Wood stork	U	E	C	Freshwater/coastal wotlands
Rostrhamus sociabilis	Snail kite	U	E	E	Freshwater/coastal wotlands
INVERTEBRATES					
Copris gopheri	Scarab beetle	P		UR 2	Associated w/Gopher Tortoise

Appendix C (Cont.)

Scientific Name	Common Name	Base * Status	Status FGFWFC(or FDA)	USFWS	Habitat
PLANTS					
Chrysopsis gossypina cruiseana	Cruise's golden-artor	P	E	UR 1	Coastal dunes
Drosera intermedia	Spoon-leaved sundew	R	T		Aquatic habitats
Epigaea repens	Trailing arbutum	U	I		Dry, acid, randy roil
Kalmia latifolia	Mountain laurel	U	t		Rich, moist, shady woods
Liliacopsis carolinensis	Carolina liliacopsis	R		UR 2	
Lilium iridollae	Panhandle lily	U	E	UR 2	Black, mucky soils
Pinguicula planifolia	Chapman's butterwort	U	RE	u12	
Polygonella macrophylla	Large-leaved jointweed	I	t	UR 1	rand pine-oak icrub
Rhododendron austrinum	Orange azalea	U	E	UR 5	Moist, woody habitats
Sarracenia leucophylla	alto-top pitcherplant	R	I		Open acid bogs
Sarracenia rubra	Sweet pitcherplant	U	E	UR 2	Acid bogs/slash pine woods
Stewartia malacodnedron	Silky camellia	U	E		Slopes of wooded ravines

I = Endangered
T = Threatened
UR 1 = Under review, lor Federal listing with substantial evidence in existence indicating at least some degree of biological vulnerability and/or throat.
UR 2 = Under review, insufficient biological data available.
UR 5 = Candidate species, but taxa has proven to bo more widespread than was previously believed and/or those species that are not subject to any identifiable throat.
IDA = Florida Department of Agriculture.
FGFWFC = Florida Game and Freshwater Fish Commission.
USFWS = U.S. Fish and Wildlife Service.

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Appendix C (Cont.)

Base * = Statui *of* species on tho **NAS** Pensacola facility.
R = Resident.
M = Migrant.
Sa = Suspected rooidoat.
P = Possible resident duo to available habitat; survey required.
U = Unknown, **survey required.**
N/A = Not expected to occur on the NAS Pensacola facility.