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CONTAMINATION ASSESSMENT/ REMEDIAL ACTIVITIES INVESTIGATIONWORK PLAN - GROUP F NAVAL AIR STATION PENSACOLA PENSACOLA, FLORIDA

Navy Yard Disposal Area (Site 9)
Commodore's Pond (Site 10)
Chevalier Field Pipe Leak Area (Site 23)
Soil South of Building 3460 (Site 29)
Solvent North of Building 3557 (Site 34)

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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 Navy Yard Disposal Area (Site 9), Commodore's Pond (Site 10), Chevalier Pipe Leak Area (Site 23), Soil South of Building 3460 (Site 29), and Solvent North of Building 3557 (Site 34) 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 allowing determination of whether further investigation is warranted. 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 toward 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 follows:

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- Efficient identification of those sites vhere environmental contamination has actually occurred as a result of past and/or present operations, thereby alloving non-contaminated sites to be eliminated from the program 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 vhich have documented contamination will likely require the additional phases of work, 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, which will provide all the information necessary for the development and completion of a Feasibility Study.

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2. SITE DESCRIPTION

2.1 Site 9 - Navy Yard Disposal Area

The Navy Yard Disposal Area (Site 9) is located at the southwestern corner of Chevalier Field (Figures 2-1 and 2-2). The southwestern perimeter of the site encloses portions of Hurray Road, Industrial Road, and an intersection which connects Hurray and Moffett Roads with Ellyson Avenue. The southeastern corner of the site contains a portion of an extensive concrete apron. The majority of the land area occupied by this site is paved with concrete and/or asphalt.

The land surface elevations are approximately 5 feet above mean sea level (HSL) and the terrain is relatively flat. Surface soils are mostly fine-grained sand.

No groundwater monitoring wells are located within the 'actual boundary of Site 9; however, four monitoring wells were constructed in the vicinity of the site in order to characterize groundwater conditions for all sites located vithin the southwest Chevalier Field area. Figure 2-2 shows the locations of the monitoring wells and of neighboring sites.

Well GH-29 is located approximately 200 feet from the southern perimeter of Site 9. Well GM-30 is located approximately 50 feet due east of the site perimeter. Well GW-6 is located approximately 750 feet north-northeast of the site, and well GH-7 is located approximately 400 feet southeast of the site.

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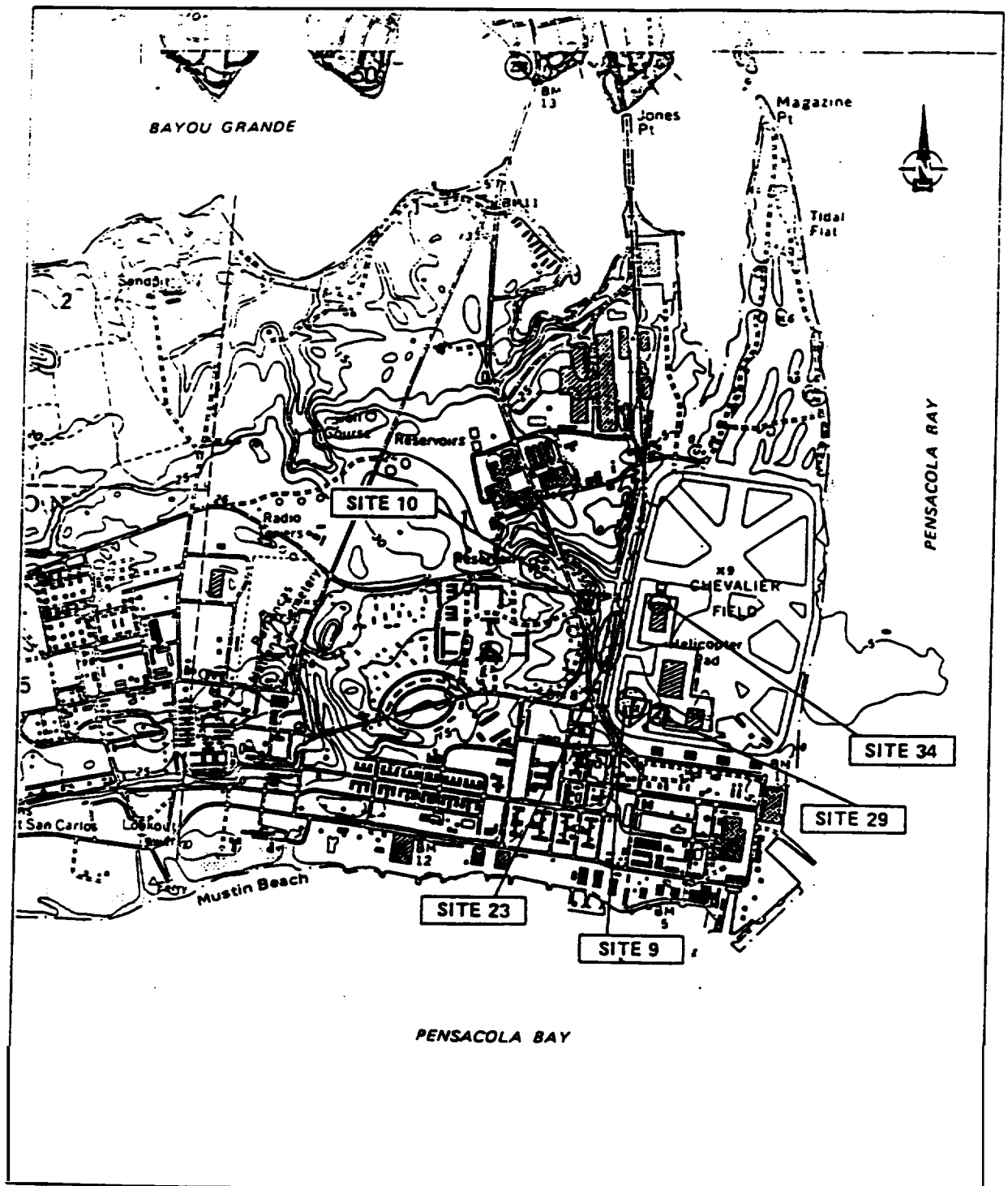

SOURCE: U.S.G.S. 7.5 Minute Series (Topographic) Quadrangles: Fort Barrancas, Fla. 1970 and West Pensacola, Fla. 1970. Photorevised 1987

SCALE

0 ½ 1 MILE

0 .5 1 KILOMETER

Figure 2–1 LOCATION MAP – NAS PENSACOLA SITES 9, 10, 23, 29, and 34

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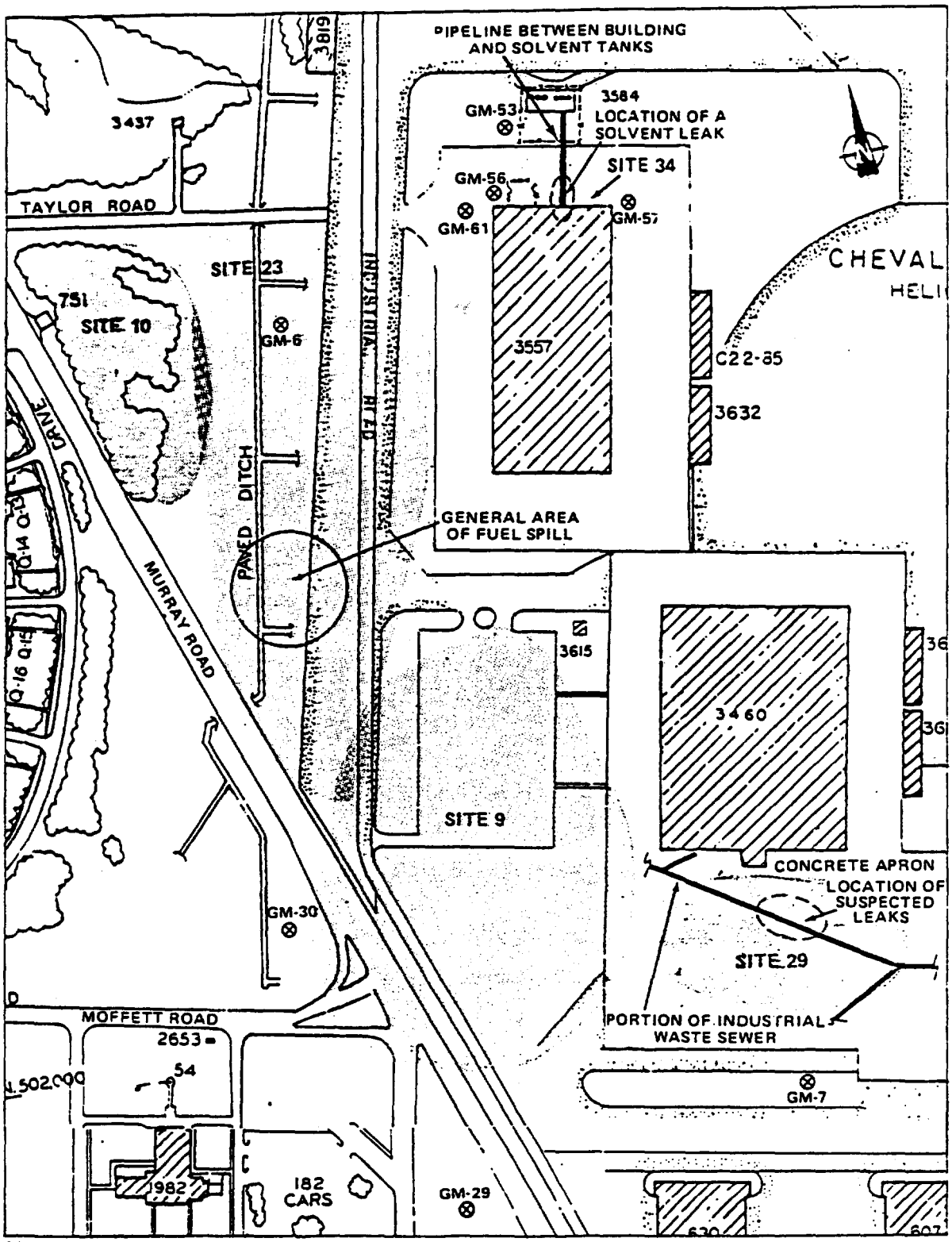

SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1986 and 1988; and Geraughty and Miller, 1986.

SCALE

0 200 400 600 800 FEET

KEY:

⊗ Existing Monitoring Well

Building

Figure 2–2 SITE MAP – NAS PENSACOLA SITES 9, 10, 23, 29, AND 34

2.2 Site 10 - Commodore's Pond

The Commodore's Pond site (Site 10) is located due vest of Chevalier Field and occupies portions of am open field and the vooded area southeast of the intersection of Hurray Road and Taylor Road. Building 751 is located adjacent to the northvest corner of the site boundary. Site 10 may partially overlay portions of the Chevalier Field Pipe Leak Area (Site 23).

The Site 10 area is completely unpaved and occupies a fine-grained sandy tract that is vegetated vith native grasses, live oaks, pines, and other varieties of native plant species. The land surface elevations are approximately 6 to 7 feet above HSL, and are slightly sloped down east to the paved ditch.

The northern boundary of Site 10 is adjacent to the base of the most prominent physiographic feature of the NAS Pensacola facility. This feature is an extensive escarpment vhich rises to elevations greater than 25 feet above MSL.

No groundwater monitoring vells are located on site. However, shallov monitoring well GH-6 is located 200 feet east of Site 10. The construction details are listed in Table 2-1.

23 Site 23 - Chevalier Field Pipe Leak Area

The Chevalier Field Pipe Leak Area (Site 23) is located near the southwestern corner of Chevalier Field (Figure 2-1).

The majority of the land area of Site 23 can be characterized as a flat, fine-grained, sandy tract vegetated vith native grasses. The paved sections of the site include Wurray Road, Taylor Road, a paved drainage ditch area, and a concrete apron. The land surface elevations are approximately 6 feet above HSL.

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TABLE 2-1

CONSTRUCTION DETAILS OF HONITORING WELLS RELATED TO SITES 9, 10, 23, 29, AND 34 AT NAS PENSACOLA

Well Designation	Surface Elevation (ft msl)	TOC Elevation (ft msl)	Total Depth Drilled (ft)	Screened Interval (ft)	Depth to Filter Pack (ft)
GM-6	6.0	6.40	12.0	9.7 - 12.2	5.7
GH-7	7.6	8.92	11.5	8.8 - 11.3	4.8
GM-29	7.0	7.91	11.5	9.2 - 11.7	5.2
GH-30	5.1	6.14	11.5	9.2 - 11.7.	5.0
GM-53	3.7	6.20	15.0	12.5 - 15.0	6.0
GM-56	9.3	8.98	12.5	10.0 - 12.5	4.0
GM-57	9.6	9.31	12.5	10.0 - 12.5	4.0
GM-61	9.3	8.91	87.5	82.5 - 87.5	76.0

Source: G 6 M 1984, 1986

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The perimeter which encircles Site 23 is approximated. A section of Murray Road occupies most of the southwestern portion of the site. A paved drainage ditch crosses the length of the site and is directed south beneath Murray Road via a culvert. The eastern edge of the site is occupied by a portion of Chevalier Field's extensive concrete apron.

Shallov groundwater monitoring.well GH-6 is located on the site approximately *400* feet north of the general area of the fuel spill (Figure 2-2). Five other monitoring wells were clustered 400 to 600 feet due east of this site: GM-53, GM-56, GM-57, and GH-61. Monitoring well GM-30 is located approximately 400 feet due south of the southern perimeter of this site. The construction details of these wells are listed in Table 2-1.

2.4 Site 29 - Soil South of Building 3460

The soil south of Building 3460 (Site 29) is located at the southvestern corner of Chevalier Field, approximately 100 feet south of the southeastern comer of Building 3460.

The entire site is covered by the Chevalier Field concrete apron. Land surface elevations are estimated at 7 to 8 feet above HSL. No groundwater monitoring wells are located within this site boundary; however, two monitoring wells are constructed in the vicinity of this site. Well Gti-7 is located 100 feet off the southern perimeter of the site, and GH-29 is located approximately 600 feet southwest of the site. The construction details of these wells are listed in Table 2-1.

2.5 Site 34 - Solvent North of Building 3557

Site *34* is located at the western edge of Chevalier Field (Figure 2-l), immediately north of Building 3557. The site is also covered by the Chevalier Field concrete apron. A tank farm is located approximately 100 feet north of Building 3557 and consists of seven aboveground vertical storage tank. They are designated as: T-101 (containing epoxy stripper HIL-R-81294); T-105 (detergent MIL-C-43616): T-106 (stoddard solvent.PD 680-Type II); and T-107 (unknovn). The tanks are aligned east-vest and are situated upon a raised concrete foundation

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Building 3557 is connected to the tank farm via a paved trench. The land surface elevations are approximately 4 feet above HSL and the concrete apron where Building 3557 is located, is raised to an elevation of 9.3 feet above HSL.

Three shallow groundwater monitoring wells (GH-53, GH-56, and GM-57) and one deep well (GH-61) are located within the area of concern for Site 34. Figure 2-2 shows the locations of the four monitoring wells.

3. SITE HISTORY

3.1 Site 9 - Navy Yard Disposal Area

Site 9 vas used for the disposal of trash and refuse during the period betveen 1917 and the early 1930's. It is reported that the site is shown on several old maps as the Navy Yard Dump or the Warrington Village Dump (NEESA 1983).

In the late 1960's, while trenching for the Industrial Waste Water Treatment Plant (IWTP) system, part of Site 9 was excavated. Glass, scrap metal, and debris were unearthed. No unusual odor was reported associated with the site.

Previous environmental studies of Site 9 were conducted under the Navy Assessment and Control of Installation Pollutants (NACIP) program. Former environmental inquests of the site consisted of an Initial Assessment Study (IAS) and a Verification Study.

The Navy's IAS report of 1983 evaluated Site 9 based on information taken from historical records, field inspections, and personnel interviews. The IAS report concluded that no further study of the site vas necessary and that the site did not constitute a threat to human health or to the environment. The conclusions were based upon an assumption that no hazardous materials were ever disposed of on-site, and the fact that dumping practices had ceased. No environmental sampling was performed on-site during the IAS to substantiate the recommendations (NEESA 1983).

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A Verification Study of Site 9 vas conducted by Geraghty & Hiller, Inc. (G & M)(1984). This report indicates that monitoring wells GM-6, GH-7, GH-29, and GH-30 vere constructed in the vicinity of the southvest corner of Chevalier Field for the determination of shallov groundvater flov and the collection of groundwater samples to further delineate the contamination problem in the general area of Sites 9, 10, 23, and 29. Groundwater samples from the four vells vere analyzed for volatile organic compounds (VOCs) using EPA Method 601. No VOCs vere detected in any of the samples obtained from the four monitoring wells.

3.2 Site 10 - Commodore's Pond

Site 10 vas formerly the location of a small surface water body. In the mid-nineteenth century, the pond vas used for the underwater storage of shaped oak timbers. This underwater storage method preserved the vood prior to its use for shipbuilding. The original pond is no longer in existence; therefore, its exact dimensions are unknovn (NEESA 1983).

Site debris vas unearthed in the late 1960's during trenching operations for installation of the IWTP system. Abandoned oak timbers vere exhumed and reburied on Magazine Point. It is reported that no hazardous materials vere encountered during this effort.

The Navy's IAS report of 1983 evaluated Site 10 based on information taken from historical records, field inspections, and personnel interviews. The IAS report concluded that no further study of the site vas necessary and that the site did not constitute a threat to human health or to the environment. No environmental sampling of the site vas performed to substantiate the IAS findings (NEESA). However, due to the proximity [of Site 10] to the Chevalier Field Pipe Leak Area (Site 23), there are still possibilities that subsurfafe contamination exists.

3.3 Site 23 - Chevalier Field Pipe Leak Area

Site 23 is the location of tvo separate underground fuel leaks. One leak in 1965 consisted of the loss of an unknovn quantity of Navy Special Fuel Oil (NSFO). It is reported that the fuel vas pumped from the groundwater table and contaminated soil vas removed (NEESA 1983).

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.In 1970, another leak, of unknown quantities, was discovered in the same area in a pipeline carrying Diesel Fuel Marine (DFM). A layer of fuel is suspected to be present on the water table surface, and soil in the area is suspected to be contaminated with oil.

G & M conducted a Verification Study of Site 23, constructing monitoring wells GH-6, GH-7, GH-29, and GM-30 in the vicinity of the southwest corner of Chevalier Field for the determination of shallow groundwater flow and for the collection of groundwater samples associated with this site. Groundwater samples for the four wells were analyzed for VOCs, however, none were detected. It was recommended that no further study of Site 23 was needed because the absence of VOCs in groundwater suggested that contaminants were very localized or had been purged from the groundwater system (G & M 1984). However, the same report indicated that a strong odor had been detected during the installation of well GM-6.

3.4 Site 29 - Soil South of Building *3460*

In the spring of 1981, several workers sustained chemical burns while working in an excavation south of Building 3460. It is reported that a slimy black substance in the soil of the excavation was responsible for the injuries. In addition, station personnel reported a'noticeable odor of "paint stripper" in the excavation.

The NAS Pensacola IWTP begin operating in 1971. Some parts of the sewer system are pressurized. Industrial wastes disposed of in the sewer reportedly include paint stripper, thinners, chromic acid, phenolic compounds, cyanides, sulfuric acid, and other hazardous waste. A portion of the IWTP lies beneath the concrete apron in the vicinity of Site 29. A leak in the industrial waste sewer line may have caused contamination at this site; however, the type and extent of contamination is unknown. It is also unknown whether or not the suspected leak was located and repaired. At present, it is suspected that the original site contamination encountered is still in existence. No environmental'samples were collected during the IAS investigation.

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The Verification Study conducted by G & M (1984) indicated that no VOCs vere detected in any of the samples collected from the four nearby monitoring vells (GH-6, GH-7, GH-29, and GH-30). It vas recommended that no further study vas necessary because the absence of VOCs in groundvater samples suggested that the contaminants vere very localized or had been purged from the groundvater system (G & M 1984).

3.5 Site 34 - Solvent North of Building 3557

During Hay 1984, a leak occurred in a pipeline at the north end of Building 3557. The leak reportedly resulted in the loss of approximately 45,000 gallons of a solvent detergent used for cleaning aircraft. The solution contained 1.7 percent chlorinated aromatic hydrocarbon solvent, or approximately 750 gallons of solvent.

Contamination of site soils and groundwater may have occurred as the result of the solvent detergent release. Contamination may have penetrated beneath the apron via the expansion jointing vhich separates individual concrete tiles and via runoff of escaped solvent to the unpaved storage tank area. The unpaved drainage ditch in the tank area is suspected to have carried contamination off-site and is presumed to be connected to the paved drainage ditch located vest of Chevalier Field. It is unknovn vhether or not site contamination entered into the NAS Pensacola storm sever system.

During the 1986 Characterization Study, a faint hydrocarbon odor vas observed when monitoring vells GH-56 and GH-61 vere constructed (G & M 1986). Groundwater samples from monitoring vells GH-53, GH-56, GH-57, GN-61, and GH-6, as well as three surface vater samples collected from a dovnstrearn portion of the paved ditch vest of Chevalier Field, vere collected and analyzed for VOCs. The results shoved that VOCs vere present in shallov well GH-53 (2 mg/L of benzene and 4 mg/L of toluene) and in all three surface vater samples, 2 to 42 mg/L total VOCs. The Characterization Study report suggested that the source of VOCs in surface vater vas not related to Site 34 because the types of VOCs detected in groundvater and surface waters vere different from those vhich leaked (G & M 1986).

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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 [seven] inches per month) and lowest during spring and fall (averaging [four] 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 clockwise rotation of the surface wind direction near the coast, commonly known as the sea-breeze effect (Flood and Associates

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1978). Hurricanes and tornadoes are infrequent but *can* cause substantial damage to the nearshore environment. *Six* hurricanes have passed within SO miles of Pensacola since 1980.

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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), Rydrocotyle bonariensis (beach pennywort), Ipomea stolonifera (beach morning-glory), Coccoloba uvifera (sea grape), Quercus geminata (tvin 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), Quercus spp. (scrub oak species, geminata, champanii, myrtifolia, and

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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 at. 1988).

Two other community types may be found in the western portions of the NAS Pensacola facility. These are flatvoods and sandhill vegetative communities. Flatvoods vegetation occupies areas vhich vere ocean bo-ttoms in recent geologic times. Primary overstory vegetation is dominated by Pinus palustris (longleaf pine), Pinus elliottii (slash pine), and Serenoa repens (sav palmetto). Platwoods communities also occupy areas of lov 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 vithin flatvoods are dominated by the herbaceous plants Pinguicula spp. (butterwort), Sarracenia spp. (pitcher-plants), Uticularia spp. (bladderworts), Polygala spp. (ailkvorts), and Drosera spp. (sundews)(Wolfe et at. 1988).

Sandhill communities are found in dry soils vhich are lover in fertility than flatvoods 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 uak), and Q. falvata (southern red oak). The understory is dominated by Diospyros virginiana (vild persimmon) and Crataegus lacrimata (Pensacola havthorn). The more abundant herbaceous plants found in moist areas are Pteridium aquilinum (bracken fern) and Aristida stricta (vire grass). These habitats were verified vith valk-through surveys and ground truthing by the Navy in March of 1986 (Navy 1986).

Freshwater Wetland Vegetation. Huch of the geological material underlying the NAS Pensacola facility is deep, porous sand often containing relatively impermeable clay lenses. In combination vith high annual rainfall, this geologic condition causes the formation of small

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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. The Navy recorded moderate size rookeries of the great blue heron, and

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found large numbers of nesting osprey in the southvestern portions of the NAS Pensacola facility. Because of the large number and diversity of habitats found around the facility and considering that the survey vas conducted during a predominantly non-mating season, it is likely that there are more species of birds using the facility and surrounding vaters 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 vhich 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 vestern portions of the facility (see Appendix C). Host 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 vater bodies can be detrimental to existing populations of reptiles and amphibians utilizing that water body.

5.1.2 Aquatic

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

Coastal Wetlands. There are no reported coastal marshes or estuarine, wetlands around the HAS Pensacola facility, principally along the low energy shores of Bayou Grande. The habitat type is usually dominated by saltmarsh cordgrass (Spartina alterniflora) 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 Halodule 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 March 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., Chaetoceros spp., assionema nitzschoides, 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. Marine 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 whole.

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 Eaploscoloplos spp.) and bivalves (Anodontia alba and Tellina spp.) during most of the year. FDER samples collected along the vastevater treatment plant outfall shov a drastic drop in species abundance and diversity close to the sevage outfall (Navy 1986). This indicates that the benthic community may have been negatively influenced by the sevage 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. Bovever, the Navy's data reveals that very fev 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 at. 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 vere 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 vas highest in the more saline vaters near the NAS Pcnsacola facility during spring and summer. In the less saline vaters of East Bay, diversity vas lowest in summer and highest during the vinter months. Fish population density vas the highest in the more saline vaters, vith peaks throughout the summer (Cooley 1978).

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

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(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 FDNR 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 Vildlife 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).

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 vithin seagrass beds or other protected habitats until maturity. Any contamination of the vater 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.

Urine Mammals. Few mammals have been sighted vithin 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 vaters. The atlantic bottlenose dolphin (Tursiops truncatus), hovever, has been sighted regularly off the NAS Pensacola facility. Hanatees have been sighted irregularly, vith one recent sighting in the area recorded by the FNAI in October 1988. A goosebeaked vhale (Ziphius cavirostris) vas reported stranded on Santa Rosa Island, and a pilot whale (Globicephala macrorhynchus) vas 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 quantitatively ranked as uncommon to common in abundance vithin the vaters 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 vith the wetland or bog habitats found on NAS Pensacola. A total of 57 occurrences for six plant species vere recorded in an inventory conducted by FNAI (1988b) of the NAS Pensacola facility (see Appendix C). Host of these plants vere found in the area around Sherman Field and habitats to the vest. Any site remediation and, more importantly, any assessment of environmental endangerment, must consider the vater level requirements of rare and endangered plant species, the foraging activities of birds in the vaters surrounding the NAS Pensacola facility, as well as nesting and feeding animals on the facility grounds. Complete biotic surveys may be necessary to determine

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the presence of threatened or endangered species and potential pathways of contamination to these species.

5.2 Site-Specific Biological Resources

Habitats on Sites 9, 29, and 34 have been completely altered by NAS activities. Native vegetation has been replaced by buildings, roads, easements and concrete aprons. It is expected that few species of birds, reptiles and rodents utilize these sites for feeding, nesting or as migration corridors.

The habitats on Site 23 have been altered by base activities as well. Terrestrial vegetation has been removed and replaced with cultivated grass which is periodically maintained. This site has a paved drainage ditch along the length of the site which has a heavy cover of grassy vegetation. This aquatic habitat may attract wading birds as well as amphibians and small mammals for feeding, from other nearby vegetated communities. If the site contamination has affected the paved ditch then the fauna which utilize the ditch may be affected. It is not known whether fish and invertebrates are found within the paved ditch.

The habitats on Site 10 have been altered to some degree by base activities. A semi-natural community consisting of planted and maintained pine trees exists along the southeast perimeter of this site. Construction of a water tower, small buildings, and Storage tanks has reduced the cover of native vegetation. However, some of the site still has a native sand pine scrub community. Fauna associated with this type of community are expected to utilize this site for feeding, nesting, and as a migration corridor.

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6. SURFACE WATER HYDROLOGY

6.1 General Occurrence and Significance of Surface Vater

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 with the land surface. These systems are defined by and dependent upon a dynamic water-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 Grande, and the coastal wetland areas presents the potential €or 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, and swimming in these coastal zones.

Discharges, either through the surface water or groundwater, into wetland areas found on-site could also have a significant impact on the biotic communities that are dependent on those habitats.

62 Site!-Specific Surface Water Hydrology

The principle surface water bodies related to Sites 9, 10, 23, 29, and *34* are a small unnamed creek and associated paved ditches, and Bayou Grande, located west and north of these areas (see Figures 2-1 and 2-2).

A paved ditch, apparently associated vith the NAS Pensacola storm water system, runs north-south through Site 11. The ditch contains water which flows northward toward Bayou Grande. The water in the ditch appears to be derived at least partly from groundwater in-flow. It is not known to what extent the paved ditch represents a previously existing stream or whether it is entirely man-made. Given that groundvater may feed the ditch and the water ultimately is discharged into Bayou Grande, any soil or groundwater contamination associated with these sites may impact these surface water bodies. No sampling is anticipated in the ditches, the creek, or Bayou Grande as these features are being investigated as part of Site 30.

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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 which 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 MSL (USGS 1970a and b). Sandy soils occur throughout the NAS fensacola 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 Eydrogeology

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.

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

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of unconsolidated to poorly indurated clastic deposits (Wagner et al. 1984). In this portion of Florida the Surficial Aquifer constitutes an important source of vater 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 vhich, 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 vith 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 zone, the lov permeability zone, and the main producing zone (Vilkins et al. 1985).

Surficial Zone. The 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 6 H 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 vater 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 vater bodies. Consequently shallow groundvater in the surficial zone moves tovard areas of lower 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 & H 1986) yielded hydraulic conductivity values ranging from 16 to 56 ft/day. Horizontal 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.

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Low Permeability Zone. Underlying the surficial zone is a zone of lover 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 x 10^{-5} to 9.9 x 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 6 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 (Vilkins et al. 1985). NAS Pensacola has three supply wells which produce vater 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 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

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Pensacola to determine direction of groundvater flov vithin this zone: however, the flov direction is assumed to be generally southvard under ambient conditions. Pumpage of the supply vells would locally cause groundwater in this zone to flov tovard the vells.

As a result of the overlying low permeability zone groundvater vithin the main producing zone occurs under confined or semi-confined conditions. At one nested vell location on NAS Pensacola (east of Building 648) the vater level elevation in a vell open to the main producing zone is approximately 7 feet lover than that in an adjacent well open to the surficial zone (G 6 M 1986). This indicates that a significant dovnvard hydraulic gradient exists betveen these tvo zones. Thus, a considerable potential exists for vertical groundvater flov from the surficial to the main producing zone at this location. It is not known to vhat extent this potential exists elsewhere at NAS Pensacola.

7.1.2.2 Intermediate System

The lover limit of the Sand-and-Gravel Aquifer coincides with the top of a regionally extensive and vertically persistent hydrogeologic unit of much lover permeability. This unit is referred to as the Intermediate System. In the vicinity of NAS Pensacola the top of the Intermediate System generally lies vithin 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 (Vilkins et al. 1985). In general the Intermediate System consists if fine-grained sediments, and functions as an effective confining unit vhich retards the exchange of vater betveen 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-vater bearing. However, relatively thin beds of sand exist vithin the unit which may yield small quantities of vater. In the NAS Pensacola area the Intermediate System is approximately 1,100 feet thick and is composed of the lover portion of the Miocene Coarse Clastics, the Upper Member of the Pensacola Clay, the Escambia Sand Member of the Pensacola Clay, and the Lower Member of the Pensacola Clay; all of Miocene Age.

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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 Floridan Aquifer System. The Floridan Aquifer in this area is [composed] of the Middle 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 9, 10, 23, 29, and 34, the surficial zone of the Sand-and-Gravel Aquifer occurs from land surface to a depth of approximately 50 feet. The lithologic description of cuttings collected during the installation of monitoring well GM-61, located on Site 34 (see Figure 2-2), indicates that this zone primarily [consists] of tan and brown, fine to medium-grained quartz sand. Seven shallow monitoring wells open to the surficial zone exists in the immediate proximity of Sites 9, 10, 23, 29, and 34 (see Figure 2-2). These wells indicate that the water table in this area occurs approximately 2 to 3.5 feet below land surface. Based on water-level data collected from these wells (G 6 M 1984), groundwater flov is generally west or northwest toward the paved ditch except for Site 10, which is assumed to be towards the east, and the horizontal hydraulic gradient is approximately 0.0005. Aquifer tests have been conducted on well GH-56 and G & M (1986) reported a hydraulic Conductivity of 57 ft/day. Assuming an effective porosity of 0.20, a groundwater flow velocity for the surficial zone in this area is estimated to be approximately 0.14 ft/day or 52 ft/year.

Immediately underlying the surficial zone in the vicinity of Sites 9, 10, 23, 29, and 34, and extending to a depth of approximately 62 feet, is the low permeability zone of the Sand-and-Gravel Aquifer. Based on the cuttings from the installation of well GM-61, this zone primarily [consists] of gray, sandy, clayey silt with some shell fragments. No monitoring wells open to the low permeability zone exist in the vicinity of Sites 9, 10, 23, 29, and 34; hovever, based on the lithology, this

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zone vould be expected to function as a confining or semi-confining unit restricting the flov of groundwater betveen the surficial zone and the underlying main producing zone. The direction of groundvater flov vithin the low permeability zone is unknovn. .

The top of the main producing zone occurs at approximately 77 feet belov land surface in the site vicinity and consists of medium to coarse grain quartz sand to a depth of at least 87 feet. Honitoring well GH-61 is screened betveen 82.5 and 87.5 feet and is open to the upper portion of this zone. The vater level elevation in well GH-61 is approximately 4 feet lover than that in well GM-56 (open to the surficial zone) indicating a significant downvard hydraulic gradient betveen the surficial zone and the main producing zone in this area (approximately 0.08); (G & M 1984). Thus, depending on the vertical hydraulic conductivity of the lov permeability zone at this site location, there exists a significant potential for dovnvard groundvater flov from the surficial zone into the main producing zone.

The direction of groundvater flov within the main producing zone at these sites is unknovn; however, a generally southward flov is expected under ambient conditions. An NAS Pensacola supply well (Well No. 2) is located approximately 2,000 feet west-northwest of Sites 9, 10, 23, 29, and 34, is screened betveen 110 and 160 feet belov land surface, and thus is open to the main producing zone. This well is utilized by NAS Pensacola for backup vater supply only during periods of peak demand. Eovever, during these periods of pumping the direction of flov in the main producing zone vould be directly toward the supply vell. 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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8. PROJECT MANAGEMENT PLAN

The Generic Project Management Plan (GPMP), submitted to the Navy for approval, defines the 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).

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9. SITE MANAGEMENT PLAN

The Generic Site Management Plan (GSHP), 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 each site 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.

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10. HEALTH AND SAFETY PLAN

A comprehensive General Health and Safety Plan (GBSP) and individual site-specific safety plans (SSP) have been developed to provide readily available emergency information and preventative safety measures. The GASP, 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 GBSP and the SSP will comply with the Occupational Safety and Health Administration (OSHA) Guidelines for Hazardous Waste 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, and will be used to develop the Site-Specific Quality Assurance Plans (SQAP).

The SQAP will provide site-specific quality assurance/quality control (QA/QC) measures used to obtain accurate and precise data for all site investigation activities. The SQAP 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 SQAP 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 GQAPP and SQAP, 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 addit'ion, 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 otherwise 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 vith 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]

grid survey baselines. The use of a grid system as part of the Phase I field investigation is discussed in the following sections.

The reconnaissance survey team will utilize radiation and air monitoring equipment during valkovers of each 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) will be flagged and identified on a site map for future reference. All findings of the physical reconnaissance will be mapped in detail and recorded in the field logbook.

14.1.1.2 Radiation Survey

A radiation survey will be conducted on Sites 9 [and] 10, using a micro-R-meter at one meter above the ground to approximate site team exposure. A gamma scintillation detector will also be used directly at ground level to locate source "hot spots". The performance of radiation survey will be as specified in Section 6.2 of GQAPP.

14.1.1.3 HNu/OVA Surface Emissions Survey

This survey will be performed at Sites 9, 10, 23, 29, and 34 across all unpaved areas and at cracks and openings on the paved areas using a Foxboro Organic Vapor Analyzer (OVA) or other equivalent monitoring equipment. Readings will be taken from [2] inches above the surface at grid points set at 25-foot centers in order to identify potential source areas of "hot spot" volatile organic releases. A more detailed survey, including readings in the breathing zone will be conducted across these potential source areas as well as the areas the are deemed necessary from the reconnaissance survey.

(In addition, preliminary air screening will be conducted vith 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.]

14.1.1.4 Habitat/Biota Survey

During the physical reconnaissance, an E 6 E biologist/ecologist will

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

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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 GQAPP.

14.1.1 Physical Survey

14.1.1.1 Overall Physical Reconnaissance

A field reconnaissance survey will be conducted on and around Sites 9, 10, 23, 29, and 34 areas. Available aerial photographs and maps will be used as guides in locating surface features. Visual inspections will be made regarding surface conditions, stressed vegetation, and surface drainage patterns.

During the reconnaissance survey, the field team will identify areas which present the most suitable conditions for the establishment of

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

14.1.3 Analytical Screening

14.1.3.1 Laboratory Analyses

Phase I sampling activities for each site will require the installation of shallov temporary monitoring wells, groundvater sampling, and the collection of soil samples. All of the samples will 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 shovn in Table[s] 14-1 [and 14-2].

Soil — Fifty-eight soil borings will be drilled in Group F sites: 15 [on Site 9, six] on Site 10, 17 on Site 23, [eight) on Site 29, and 12 on Site 34 as shovn in Figure 14-1. At each location, samples will be collected by compositing soils from 5 foot intervals until the water table is reached.

The soil samples will be collected using either a solid stem auger extraction method or a hand-[operated] bucket auger. All sampling, conpositing, and lithologic logging will be performed in accordance with Section 6.6 of the GQAPP. Equipment decontamination will be performed in accordance vith Section 6.10 of the GQAPP..

For planning purposes, one soil sample is assumed at each soil boring location. Thus, a total of 58 soil samples is tentatively projected.

Groundvater — Approximately 24 stainless steel temporary monitoring wells will be installed on these sites: six on Site 9, three on Site 10, seven on Site 23, three on Site 29, and five on Site 34. Each well will have 5 feet of 0.01-inch slotted screen and will be installed to a depth at which the well screen brackets the vater table (i.e., the top of the screen extends slightly above the vater level). As shovn on Figure 14-1, the locations for these vells are tentative. [There are

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

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determine the on-site terrestrial and aquatic habitats, and the surrounding habitats vhich may be affected by off-site contaminant migration. During the walkover 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 each site as well as an evaluation of the literature.

14.1.2 Geophysical Survey

For Sites 10, 23, and 34, areas will require an electromagnetic terrain conductivity survey (EM-31 and EM-34XL) and magnetometer (Mag) survey. The survey will not be conducted on Site 9 and 29, because of the interference from steel rebar in the concrete apron. The survey will be performed in accordance with field methodologies and data interpretation techniques discussed in Section 6.2 of the GQAPP.

The effort will initially require the establishment of a grid system over the study area. To accomplish this, at least two baseline transects will be established (providing an x and y axis), and flagged at the specified intervals. A transit survey instrument will be used to establish the baselines, and a Brunton compass and tape measure used to complete the grid system for the study area.

The EM-31 and Nag surveys will be conducted by obtaining measurements at each 25-foot interval grid point. EM-34XL readings 'will be obtained at alternating grid point' locations with a spacing of 50 feet.

The geophysical data will be used in conjunction with other background data obtained to identify: water table conditions; the location of potential subsurface contamination; and to ascertain the horizontal and vertical orientation of Contamination, if located. Ultimately, the interpretation of this data will be a primary consideration in the development of a rationale for Phase I and II monitoring well placement strategies.

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

Table [14-1] (Coat-)

SITE 29

Medium	No. of samples	Duplicates	Total	Analytical Suite[a,b]
Soil	8	1	9	A
Groundwater[c]	3	1	4	A
TOTAL	11	2	13	

SITE 34

Medium	No. of Samples	Duplicates	Total	Analytical Suite[a,b]
Soil	12	1	13	A
Groundwater[c]	5	1	6	A'
TOTAL	17	2	19	

[a]Analytical suite designations are as follows:

A = Volatile organic compounds, polynuclear aromatic hydrocarbons, 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 tho Genetic Quality Assurance Project Plan.

[[c]Groundwater samples and analytical requirements shown are for Phase I temporary wells only.]

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TABLE 14-1

PHASE I SAMPLING AND ANALYTICAL REQUIREMENTS-GROUP F

SITE 9

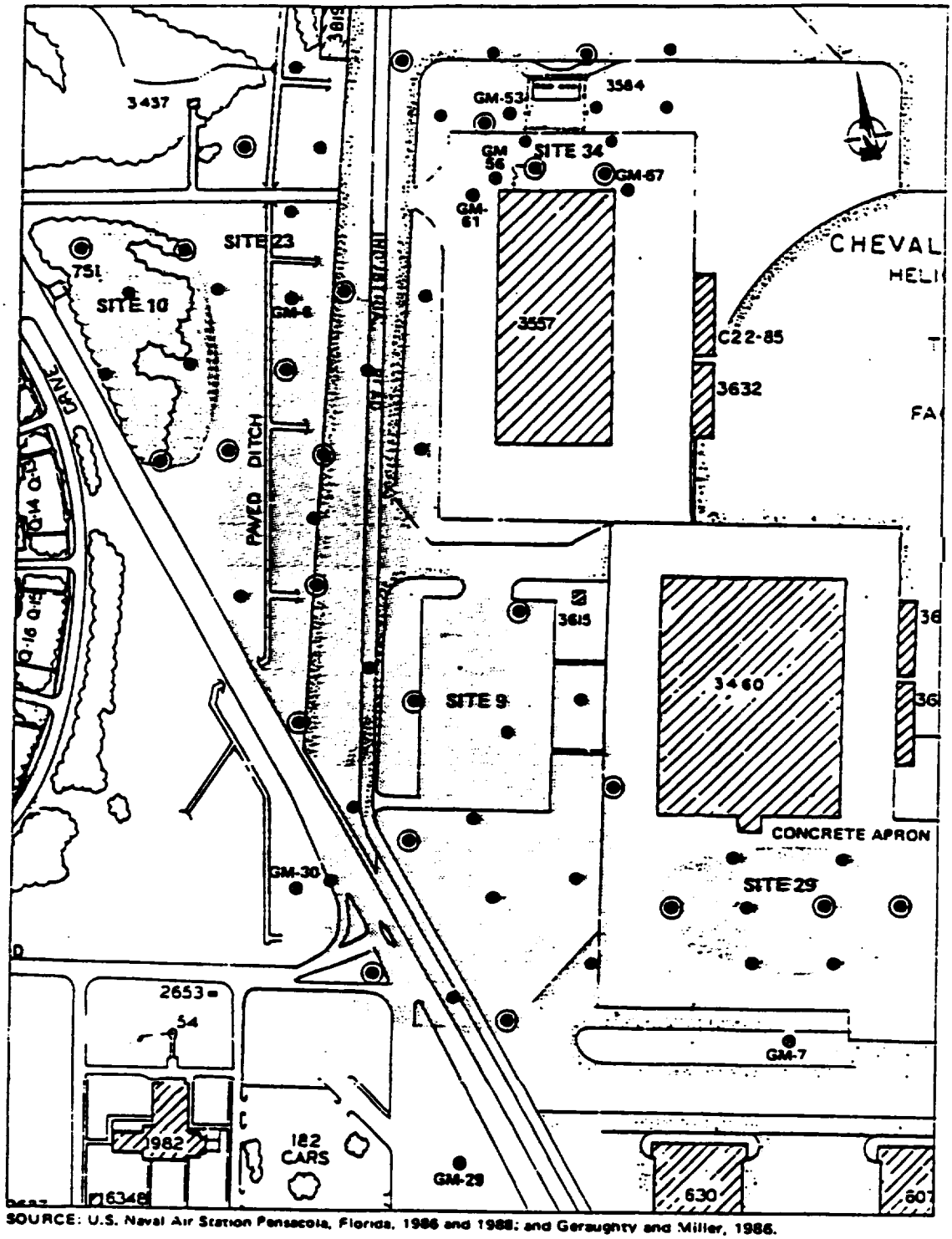
Medium	No. of samples	Duplicates	Total	Analytical Suite[a,b]
Soil	15	1	16	A
Groundwater[c]	6	1	7	A
TOTAL	21	2	23	

SITE 10

Medium	No. of Samples	Duplicates	Total	Analytical suite[a,b]
Soil	6	1	7	A
Groundwater[c]	3	1	4	A
TOTAL	9	2	11	

SITE 23

Medium	no. of Samples	Duplicates	Total	Analytical Suite[a,b]
Soil	17	1	1	A
Groundwater[c]	7	1	8	A
TOTAL	24	2	26	



SOURCE: U.S. Naval Air Station Pensacola, Florida, 1986 and 1988; and Geraughty and Miller, 1986.

SCALE

0 200 400 600 800 FEET

KEY:

- Existing Monitoring Well
- Tentative Soil Boring
- Tentative Temporary Monitoring Well
- Building

Figure 14–1 TENTATIVE SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS, SITES 9, 10, 23, 29, AND 34 – PHASE I

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[TABU 14–2

PHASE I EXISTING WELL SAMPLING AND ANALYTICAL REQUIREMENTS – GROUP F

Site Number	No. of Samples	Dupli-cates	Trip Blanks[a]	Field Blanks	Rinsate Blanks	Preservative Blanks[b]	Total	Analytical Suite[c,d]
9	2	1	1	1	1	1	7	A
23	1	1	1	1	1	1	6	A
29	1	1	1	1	1	1	6	A
34	4	1	1	1	1	1	9	A
TOTAL	8	4	4	4	4	4	28	

[a]Trip blanks will bo 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 = TCL rolatilo organic compounds plus xylene and ketones, TCL base/neutral and acid extractable organic compounds, TCL pesticides and PCBs, total recoverable hydrocarbons, TCL metals (total [i.e., unfiltered] and dissolved [i.e., millipore-filtered]), cyanide, total organic carbon, hardness (water only), and alkalinity (water only).]

[d]Specific constituontr encompassed by the various chemical groups included within the above-listed analytical suites are identified in Tables 9–5 through 9–13 of tho GQAPP.]

o To support the preliminary identification, screening, and evaluation data requirements of potential remedial alternatives;

Phase II investigation of each Site will involve the collection of soil and groundvater samples. Additional permanent, shallow monitoring wells will be installed. Air sampling will be conducted only if varranted by the results of Phase I efforts. In addition; limited aquifer testing will be performed.

The analytical requirements for Phase II samples are provided in Table 14-3.

[During the Phase II investigation of Sites 29 and 34, which are covered by RCRA requirements, at lust one sample per contaminated medium will *also* be analyzed for Appendix IX parameters (40 CFR, Part 264). These samples will be collected from the area of highest contamination for *each* medium 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 will 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 will be prepared which outlines sample locations, sampling methodologies, analytical parameters, etc.]

[14.2.2] Soil Sampling

Soil samples will be collected from the 27 tentative locations shovn in Figure 14-2. At each location, samples will be collected by composiring soils from the folloving intervals; surface to 0.5 feet, 0.5 to 2.5 feet, and every 2.5 feet there to the vater table.

The soil samples will be collected using a split-spoon sampling device during soil boring or well drilling. All sampling, compositing, and lithologic logging will be performed in accordance vith Section 6.6 of

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

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eight existing monitoring vells associated vith this site group. All eight vells will also be purged and sampled during Phase I.] The interpreted results of the geophysical investigation, as well as information gained from field reconnaissance surveys and aerial photograph interpretations, will allow adjustments and finalization of the temporary, shallow well network.

The 24 temporary wells [and eight existing vells] will be purged and sampled in accordance with Section 6.8 of the GQAPP.

14.1.4 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 within the vicinity of Sites 9, 10, 23, 29, and 34. 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 ditches will be established.

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

14.2 Phase II -- Characterization

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

- 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;

Table [14-3] (Cont.)

SITE 29

Medium	No. of Samples	Dupli-cates	Trip Blanks'	Field Blanks	Rinsate Blanks	[Preservative Blanks[b]]	Total	Analytical Suito[c,d]
Soil	15	2	2	[1]	2	[1]	23 (6)	A C
Groundwater	[3]	1	1	[NR]	1	[NR]	[6] (1)	A B
TOTAL	[18]	3	3	[1]	3	[1]	[29](7)	

SITE 34

Medium	No. of Samples	Dupli-cates	Trip Blanks'	Field Blanks	Rinsate Blanks	[Preservative Blanks[b]]	Total	Analytical Suito[c,d]
Soil	18	2	2	[1]	2	[1]	26 (6)	A C
Groundwater	[2]	1	1	[NR]	1	[NR]	[5] (1)	A B
TOTAL	[20]	3	3	[1]	3	[1]	[31](7)	

[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 = 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 (total [i.e., unfiltered], and dissolved [i.e., millipore-filtered]), cyanide, total organic carbon, hardness (water only), and alkalinity (water only).

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TABLE 14-[3]

PHASE II SAMPLING AND ANALYTICAL REQUIREMENTS—GROUP F

SITE 9

Medium	No. of Samples	Dupli-cates	Trip Blanks[a]	Field Blanks	Rinsate Blanks	[Preservative Blank8[b]]	Total*	Analytical Suite[c,d]
soil	18	2	2	[1]	2	[1]	26 (6)	A C
Groundwater	[4]	1	1	[NR]	1	[NR]	[7] (1)	A B
TOTAL	[22]	3	3	[1]	3	[1]	[33](7)	

SITE 10

Medium	Io. of Samples	Dupli-cates	Trip Blanks'	Field Blanks	Rinsato Blanks	[Preservative Blanks[b]]	Total*	Analytical Suite[c,d]
soil	9	1	1	1	1	[11	[14] (6)	A C
Groundwater	2	1	1	[NR]	1	[NR].	[5] (1)	A B
TOTAL	11	2	2	[1]	2	[1]	19(7)	

SITE 23

Medium	Io. of Samples	Dupli-cates	Trip Blanks[a]	Field Blanks	Rinsate Blanks	[Preservative Blanks[b]]	Total*	Analytical Suite[c,d]
soil	21	2	2	[1]	2	[1]	29 (6)	A C
Groundwater	[3]	1	1	[NR]	1	[NR]	[6] (1)	A B
TOTAL	[24]	3	3	[1].	3	[1]	[35](7)	

Table [14-3] (Cont.)

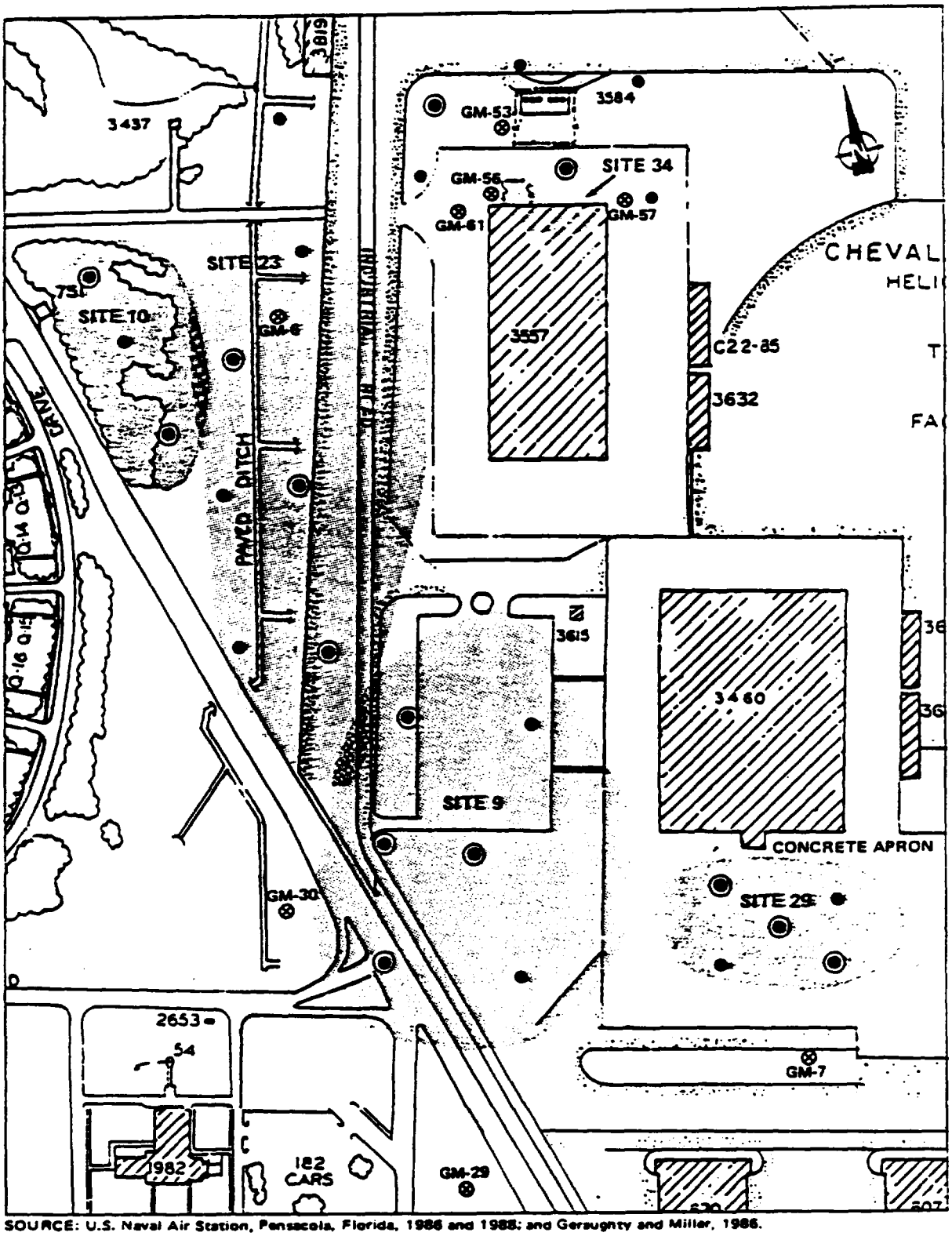
B = total suspended solids, total Kjeldahl nitrogen, ammonia nitroqon, orthophorphato phosphorus, dissolved oxygen (in field), 5-day biological oxygen demand (BOD_5), and chemical oxygen demand (COD).

C = pH, alkalinity, percent moisture, grain size, BTU contont, ash contont, total organic halogens, sulfur, ignitability, and cation exchange capacity.

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

* Tho number of samples shown in parentheses will bo analyzed for tho additional parameters indicated.

[NR = Rot required.]



SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1986 and 1988; and Geraughty and Miller, 1986.

SCALE

0 200 400 600 800 FEET

KEY:

- Existing Monitoring Well
- Tentative Soil Boring
- Tentative Shallow Monitoring Well
- Building

Figure 14–2 TENTATIVE SOIL BORING AND SHALLOW MONITORING WELL LOCATIONS, SITES 9, 10, 23, 29, AND 34 – PHASE II

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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 soil boring or well location. The following Section 14.2.2 assumes 27 soil boring locations in Phase 11, thus a total of 81 soil samples is tentatively projected.

[14.2.3] Shallow Monitoring Well Installation and Development

The actual number and locations for shallow monitoring wells to be installed in Phase II will be determined based on Phase I findings. For planning purposes, the number of permanent shallow monitoring wells to be installed is 14. All shallow wells will be installed to a depth of 15 feet and will be constructed of two-inch PVC, and bracket the water table vith 10 feet of screen. The wells will be installed utilizing hollow-stem auger techniques and in accordance with Sections 6.7 and 6.10 of the GQAPP.

[Temporary or permanent covers for monitoring wells installed on aircraft ramps and tov-ways must be able to withstand the weight of aircraft and tow vehicles in order to prevent damage either to the aircraft or to the monitoring wells. These covers will conform to Federal Specification RR-F-621E (February 23, 1989), will be constructed of ductile iron or structural steel, and will withstand a minimum proof loading of 100,000 pounds, which will be identified on the cover. In addition, well covers must be secured so they cannot be dislodged by propellor or jet blast.]

[Depending on the results obtained during Phase I, the delineation of the extent of shallow groundwater contamination may be possible during Phase II by the installation of a few monitoring wells in addition to the number proposed. When and where possible and/or practical, additional monitoring wells will be installed during Phase II in order to expedite the overall investigation schedule.)

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

[14.2.4] Groundwater Sampling

Groundvater samples will be collected from the estimated 14 nevly installed permanent [monitoring] wells, at the locations shovn on Figure 14-2. The purging and sampling of vells will be conducted in accordance vith Sections 6.8 and 6.20 of the GQAPP.

[14.2.5] Hydrologic Assessment

Well head elevations will be surveyed for all nevly installed monitoring vells and vater levels'vill be measured in all vells.

Limited aquifer testing will be conducted on all nevly installed and existing monitoring vells. These will consist primarily of performing short-duration specific capacity tests during development of the nevly installed monitoring vells and slug or specific capacity tests on the existing monitoring vells. Specific capacity and slug tests are particularly useful for deriving first estimates of aquifer hydraulic properties (i.e., hydraulic conductivity, transmissivity).

The advantage of conducting specific capacity tests [in] conjunction with well development is that the test itself does generate additional potentially contaminated vater which requires disposal. Slug testing does not generate any potentially contaminated water.

Physical and chemical aquifer data collected during Phase II will be evaluated to determine lateral contaminant migration characteristics. A plan for deep well installation will be developed based on the finding of Phases I and 11.

[14.2.6] Air Sampling

The need for formal air sampling will be based on the findings of the Phase I surface emissions survey [and particulate air sampling, and the Phase I shallov soil sampling.]

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

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14.3 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 these sites, Phase III activities will be geared toward further 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] biota sampling may be conducted in Phase 111. [Eovever, as for Phase 11, a separate biological sampling plan will be prepared.]

14.3.2 Soil Sampling

Soil sampling will be conducted in conjunction with any new shallow, intermediate or deep monitoring well installations.

14.3.3 Shallow Monitoring Well Installation and Development

Additional shallow monitoring wells may be required to further determine the horizontal extent of shallow groundwater contamination.

14.3.4 Intermediate and Deep Monitoring Well Instal-lation 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. The number of wells and their locations and depths are dependent upon Phase I and II findings.

14.3.5 Goundwater Sampling

All wells installed in Phase III will be sampled, and analytical requirements for the samples will be developed based on the results of previous phases. Monitoring wells installed prior to Phase III will be sampled as required.

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

14.3.6 Hydrologic Assessment

All vells 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 deteraine aquifer physical characteristics. [On sites where contamination is found in the surficial *zone* during Phases I and/or II, the lov permeability zone will be further characterized during Phase 111 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 lov permeability zone, as well as the degree to which hydraulic connection exists betveen the surficial zone and underlying main producing zone at each site.]

14.3.7 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 11.

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:

- o Soil Sampling;
- o Surface Vater and Sediment Sampling;
- o Shallow Monitoring Well Installation and Development;
- o Intermediate and Deep Honitoring Well Installation and Development;
- o Goundvater Sampling; and
- o Hydrologic Assessment

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

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14.5 Topographic Survey and Base Hap

Following the completion of Phases III and IV, a topographic survey of each site 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 water, monitoring wells, and above ground utilities. The location of subsurface utilities and 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

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

14.6.2 Field QA/QC Samples

Samples collected for laboratory analysis (both screening and non-screening) during all phases of fieldwork will require the preparation 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, 14-2, and 14-3.

14.7 Decontamination and Waste Management Procedures

14.7.1 Decontamination Procedures

All equipment decontamination procedures for each Site will be performed in accordance with Section 6.10 of the GQAPP.

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

14.7.2 Waste Management Procedures

All vater generated during monitoring well purging and development activities on Sites 9, 10, 23, 29, and 34 will be discharged onto the ground surface away from the vell, or will be containerized, 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 the Site or will be containerized, 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 containerized, labeled, and moved to a storage area on NAS Pensacola.

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

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 (GSMP). 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 QSMP.

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

16. GROUNDWATER HODELING

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 FEMUASTE, a finite-element solute transport model.

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

17. TREATABILITY STUDY

As indicated in Table 14-3, 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 14-3, together with 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 (FS) 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 volat'iles).

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 pathvays helps to conceptualize the migration of contaminants from an existing source to an existing or potential point of contact. *An* exposure prthvay 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 point.

The purpose of this analysis is to provide decision Makers with 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, vhich 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 between 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 mile 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) vhich 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 FS 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 betveen the various disciplines required (i.e., hydrogeologists, chemists, risk assessors, etc.), the Navy, and the revieving regulatory agencies (i.e., FDER and EPA) 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. However, 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 FS, 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 6 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 6 E then will identify applicable temedial 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.

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

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 & E will perform a detailed risk analysis to determine the acceptable levels of risk. This will allov 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 without 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 will be considered.

19.5 Selection of Recommended Remedial Action Alternatives

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

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vhen 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 PS Report

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

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

20. REPORT

[Following the Phase I investigation, B 6 E will prepare a Phase I Interim Data Report and Recommendations for each site. The purpose of this report is 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 vhen 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 II indicate that no further action is varranted, a formal Phase II report will be produced. Eovever, 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. Folloving production of the Phase I1 interim report, the work plans for the Phase III vork will be updated.]

E & E will prepare a 90% draft [for each of the above-described] reports, [vhich) summarizes the activities and results of [the investigation tasks performed.] Upon receipt of comments [from] the Navy concerning the 90% draft reports, E & E will prepare a draft final report for the Navy and the Technical Review Committee (TRC) reviev. 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 degradation of conditions at the site(s). Information used in analyses,

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measures necessary to protect against continued 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 submitted to keep the Navy apprised of fieldwork status and site conditions. Current and planned activities as well as cost tracking will be provided.

21. DOCUMENT REVISION

Periodic updating of all administrative documents (GQAPP, GSMP, GHSP, GPHP, 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 GSMP indicate document revisions approximately every two months for the GQAPP, GSMP, GHSP, and GPMP. 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.

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22. PROJECT MANAGEMENT

Project management will be an ongoing process throughout this investigation. This process includes preparation of bi-veekly project status reports, coordination of schedules, mobilizations, and other project incidentals with 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 GPMP submitted to the Navy.

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

23. PROJECT SCHEDULE

[Figures 23-1, 23-2, 23-3, and 23-4 show the project schedules for Phases I, II, III, 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, III, 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.

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

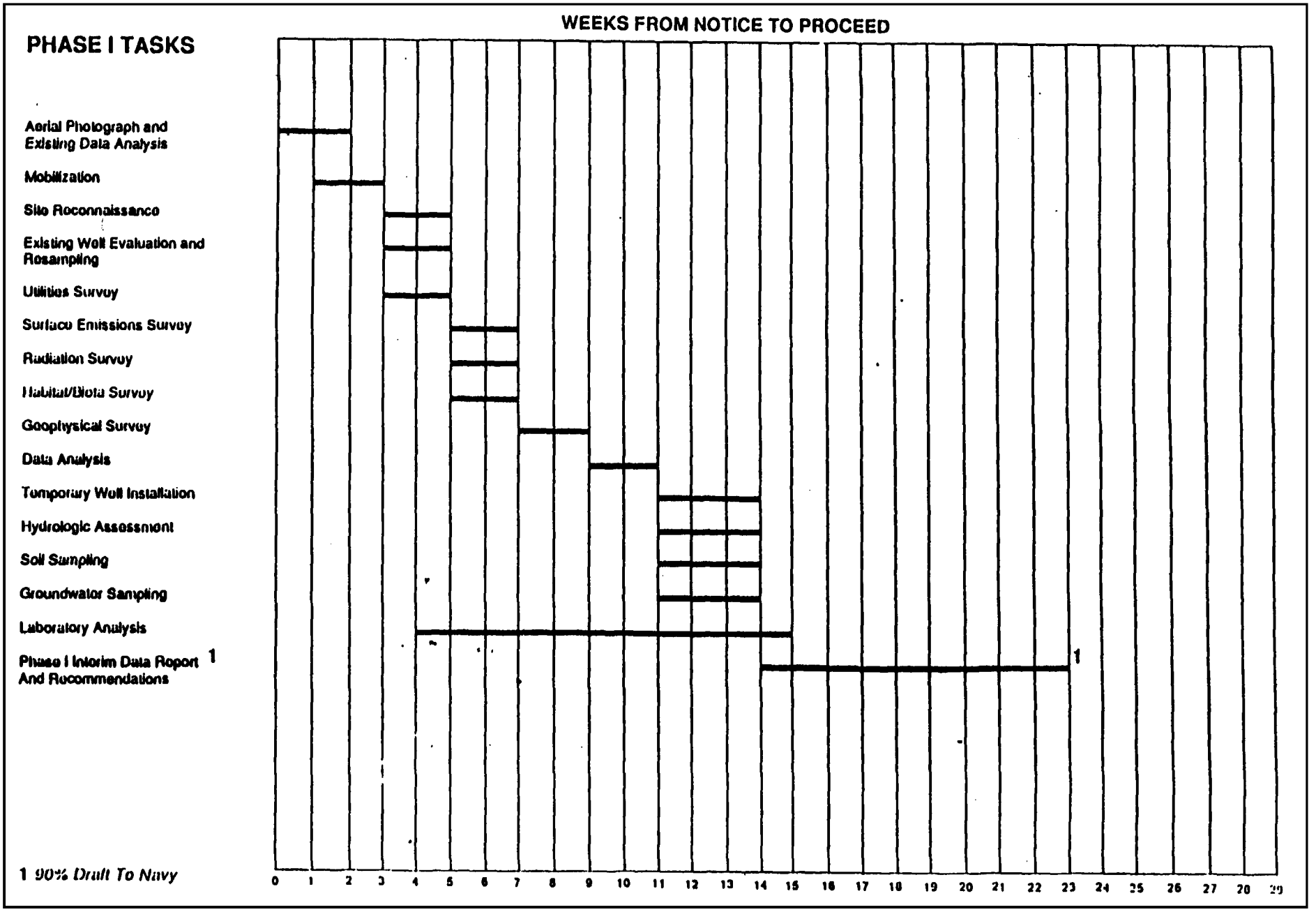

Figure 23-1 PHASE I PROJECT SCHEDULE -- GROUP F

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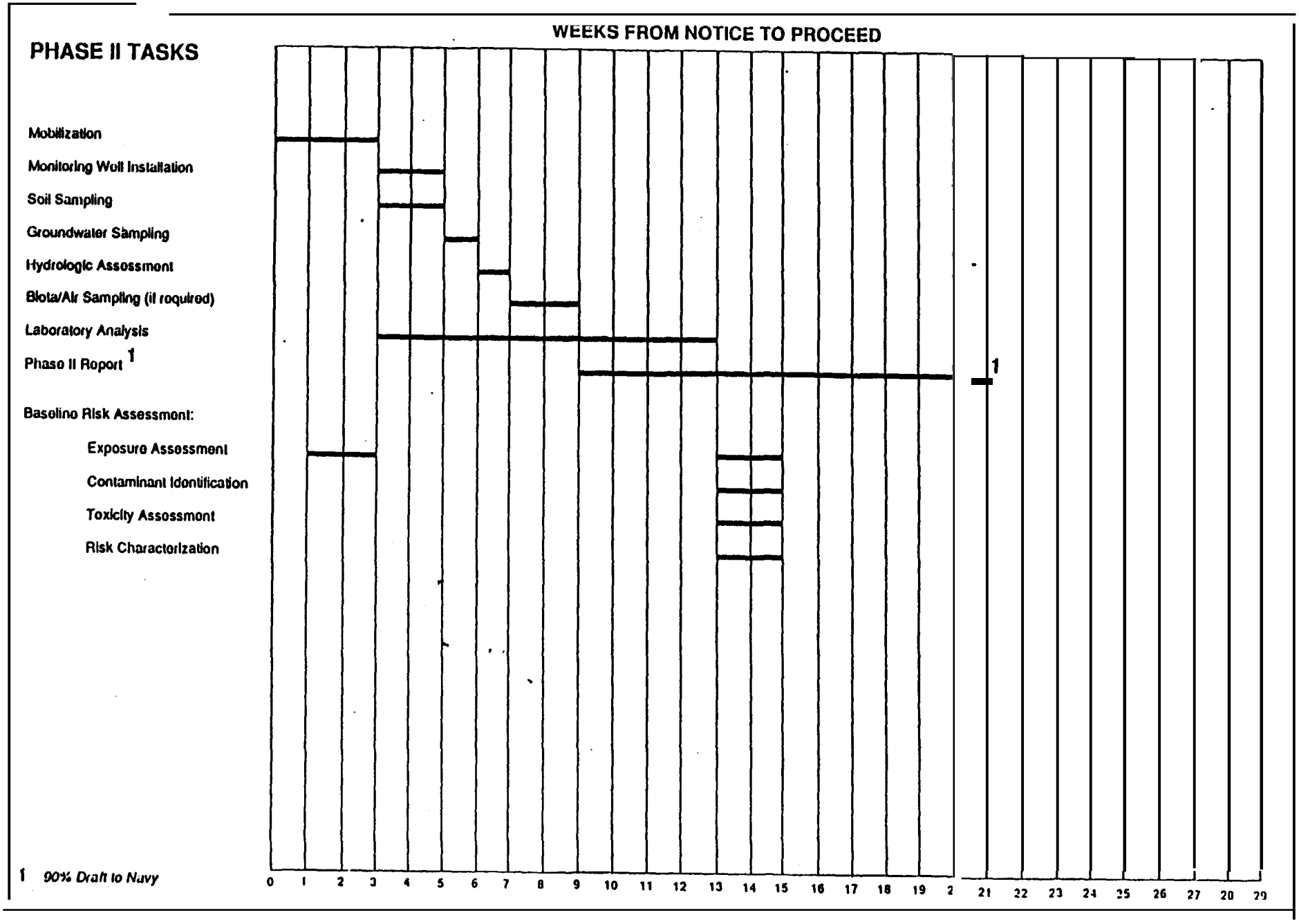

Figure 23-2 PHASE II PROJECT SCHEDULE -- GROUP F

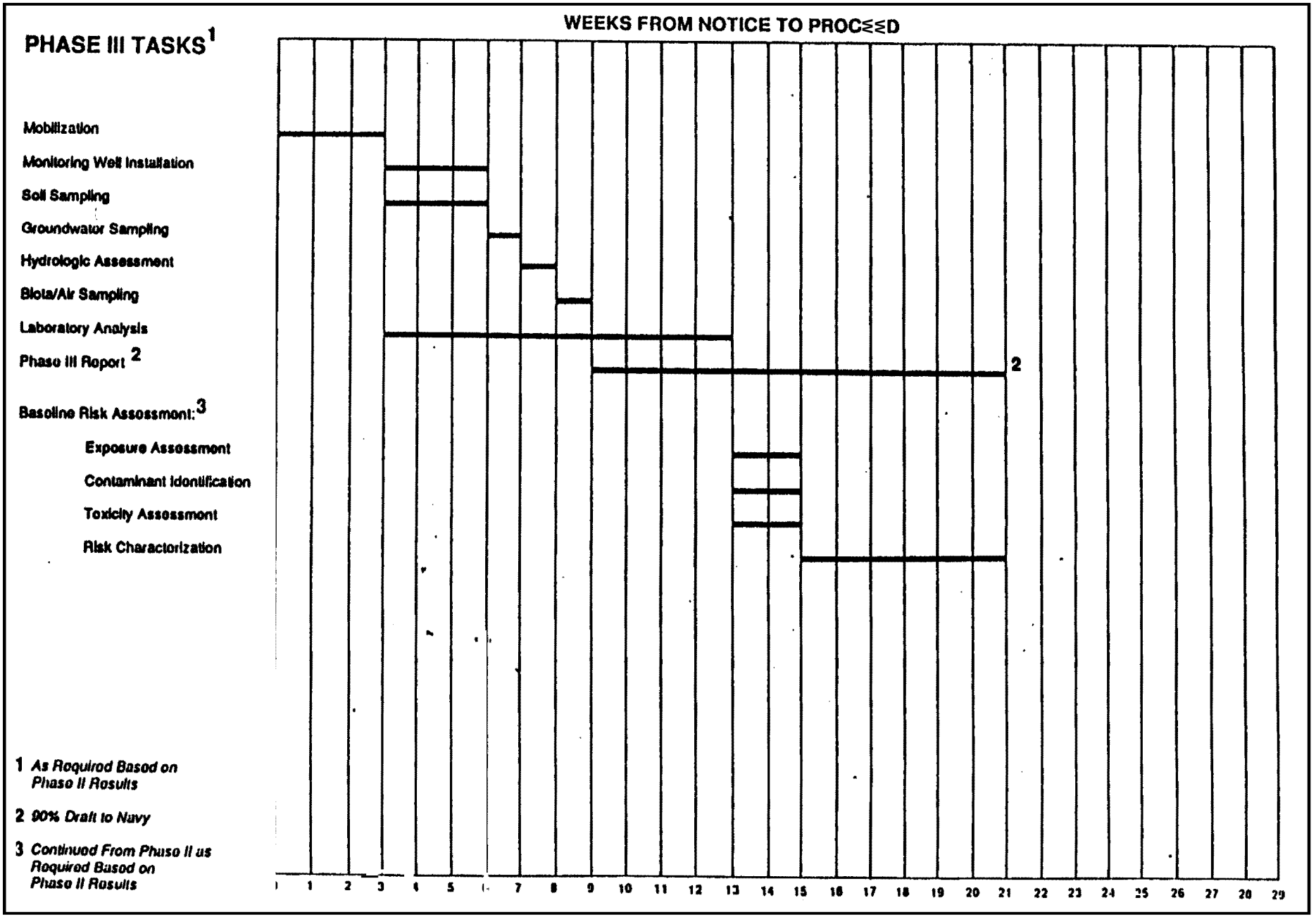

Figure 23-3 PHASE [illegible] 'OJECT SCHEDULE -- GROUP F

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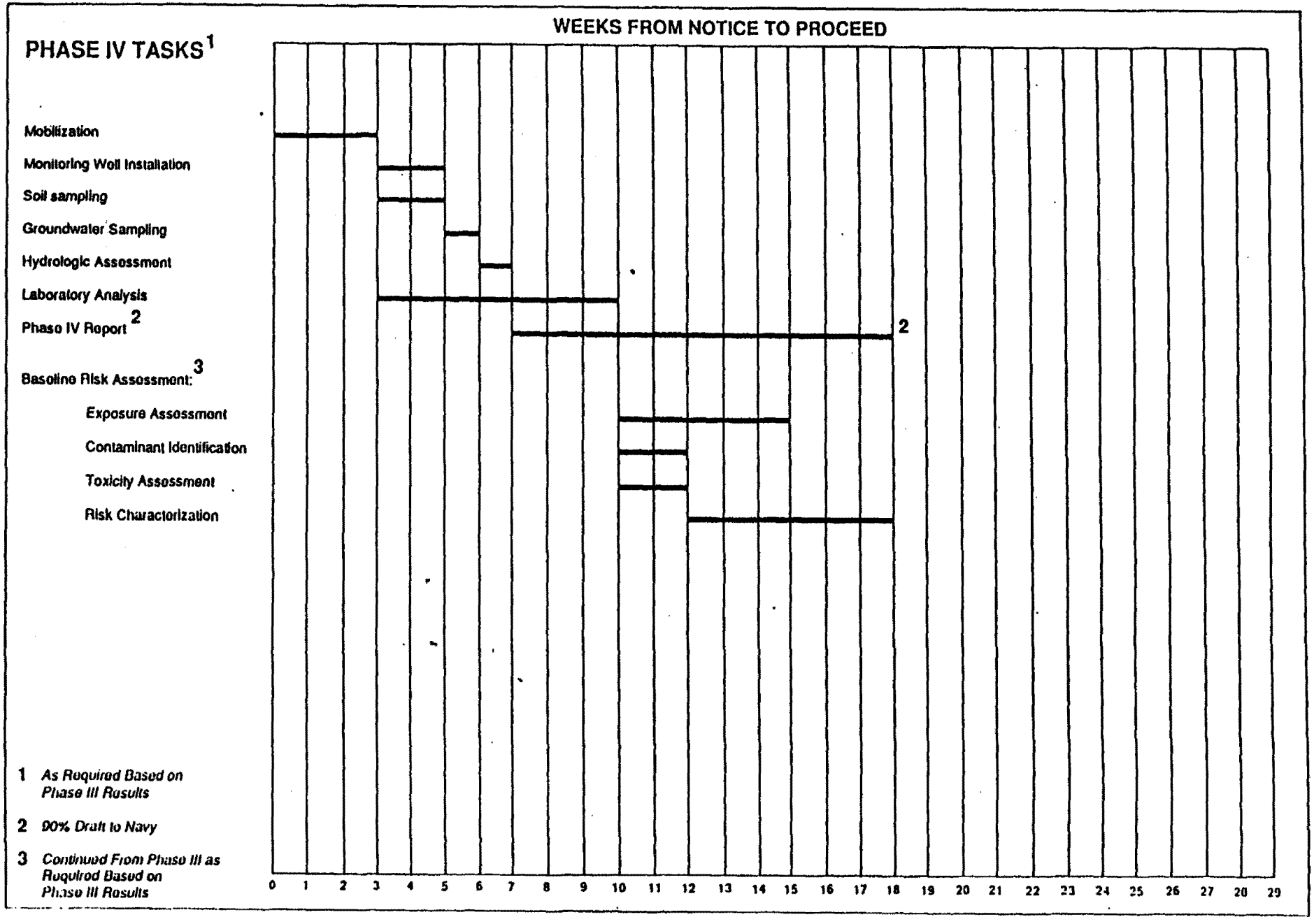

Figure 23-4 PHASE IV PROJECT SCHEDULE -- GROUP F

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APPENDIX A

SITB-SPECIFIC *SAFETY* PLAN

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

ecology and environment, inc.

SITE SAFETY PLAN

Version 988

A. GENERAL INFORMATION

Project Title: Site 9 - Navy Yard Disposal Area

Project no.: UH1201

TDD/Pan lo.:

Project Manager: John Barksdale

Project Dir.: Rick Rudy

Location(s): Navy Yard Disposal Area - Southwestern corner of Chevalier Field

Prepared by: Kim Walker

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.

Proporod Date of Field Activities: August 1989

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

Documentation/Summary:

Overall Chemical Hazard:	Serious [ ]	Moderate [ ]
	Low [X]	Unknown [ ]
Overall Physical Hazard	Serious [ ]	Moderate [ ]
	Low [X]	Unknown [1

B. SITE/WASTE

Wart. Type(s):

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

Characteristic(s)

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

Other:

Physical Hazards:

Overhead [X]	Confined* Space [ ]	Below Grade [ ]	Trip/Fall [X]
Puncture [ ]	Butn [ ]	Cut [ ]	Splash [X]
Noise [X]	Other: Aircraft and vehicular traffic using Chevalier Field.		

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

Site History/Description and Unusual Features (see Sampling Plan for detailed description): Between 1917 and 1930 Site 9 was used as a sanitary landfill. Currently tho majority of tho site is covered vith concrete or asphalt. Groundwater samples have boon collected in tho site vicinity, however no samples have actually been collected on the site property. The groundwater samples collected in tho site vicinity were analyzed tor volatile organic compounds and contained none of these compounds. Sampling teams ahould bo aware of tho sit proximity to Chevalier Field and take tho appropriate precautions.

Locations of Chemicals/Wastes: Solid, municipal waste, buried on-mito.

Estimated Volume of Chemicals/Wastes: unknown

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

C. ~~Gl~~

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

Physical Hazard Evaluation:

1) Physical Surveys - Aircraft, Automobile hazards;

2) Temporary Monitoring Well Installation - Aircraft, Automobile Hazard., 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
Isopropyl Alcohol	400 ppm	" "	drowsiness, head.	7.5-200 ppm	rubbing alcohol
Nitric Acid	2 ppm	" "	corrosive	0.3-1 ppm	acrid

Note: Complete and attach a Hazard Evaluation Shoot 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 rono, contamination reduction, zone, etc.

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

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

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

Anticipated Lovol of Protoction (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 tyvock, neoprene gloves and boots, safety glasses, APR available when level C upgrade is necessary

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

- Level A: O_2 <19.5% or >25%, explosive atmosphere >25% >500 ppm, particulates >_____ mg/m^3, other _____

Contaminant of Interest	Type of Sample (area, personal)	Monitoring Equipment	Frequency of Sampling
VOC's	Area	OVA	Continuous
Radiation	Area	Micro-R-Meter	Continuous
Explosive Gases	Area	O_2/Explosimeter	Continuous

Docontamination Solutions and Procoduros for Equipment, Sampling Gear, etc.:
Trisodium phosphate wash, tap water rinso, isopropanol rinso, distilled water rinso. isopropanol rinso, and final distilled water rinso.

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

Decon Solation Monitoring Procedures, if Applicable: Decontamination will bo performed in a well-ventilated area upwind of tho sampling zone.

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

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

Site Entry Procedures and Special Considerations: E & E's 'Buddy System' will bo employed at a11 times during fieldwork activities. Personnel will exercise caution in tho vicinity of Chevalier field and of along nearby roadways. If above background radiation levels are encountered team members will evacuate the sampling area, and contact tho corporato health physics group to reassess tho site.

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

All fieldwork activities will bo performed during daylight hours. Team members will take breaks as necessary to avoid heat stress and replace fluids. Cooling vests may bo 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 bo 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, a11 field team members will wear surgical gloves. Goggles will bo 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 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 288.2 (1980).

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E. EMERGENCY INFORMATION

(Use supplemental shoots, if necessary)

LOCAL RESOURCES

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

Ambulance On Base — 904-452-1138, 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.I. Navy Southern Division, Engineer-In-Charge, Mike Green — 1-803-743-0574

Site Contact NAS Pensacola Enviromental Coordinator, W. Dewayne Ray — 904-152-4515

SITE RESOURCES

Site Emergency Evacuation Alarm Method N/A

Water Supply Source On-site

Telephone Location, Number To be determined on-sit.

Cellular Phone, if available N/A

Radio

Other On-sit. warehouse number to bo 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) 604-8060 (office)
   (716) 655-1260 (home)
3. Regional Office Contact ..... M.Miller.... 656-2854 (homo)
   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 roach you.
   - Your location.
   - Name of person injured or exposed.
   - Nature of emergency.
   - Action taken.

2. A toricoloqist, (Drs. Raymond Harbison or associate) will contact you. Repeat tho information given to tho 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 - bow 1 (716) 655-1260
   C. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 688-0084

EMERGENCY ROUTES

(NOTE: Field Team must Know Route(s) Prior to Start of Work)

Directions to hospital (include map)

NAS Dispensary - Follow Murray Road South to Ellyson Avenue. Turn right onto Ellyson Avenue and continuo to it's intersection with Turner Street. Tho NAS Dispensary is located on tho northwest corner of the intersection of Ellyson Avenue and Turner Street, in Building 625-A.

Baptist Hospital - Take Duncan Road (Navy Dlvd.) 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 Dlvd. Turn loft (north) on Pace Dlvd. 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 loft (north) onto E street. The hospital is about 6 blocks north on the loft.

Emergency Egress Routes to Got Off-Sit. Emergency egress routes will bo located if emergency exit routes become bloekod by construction, etc.

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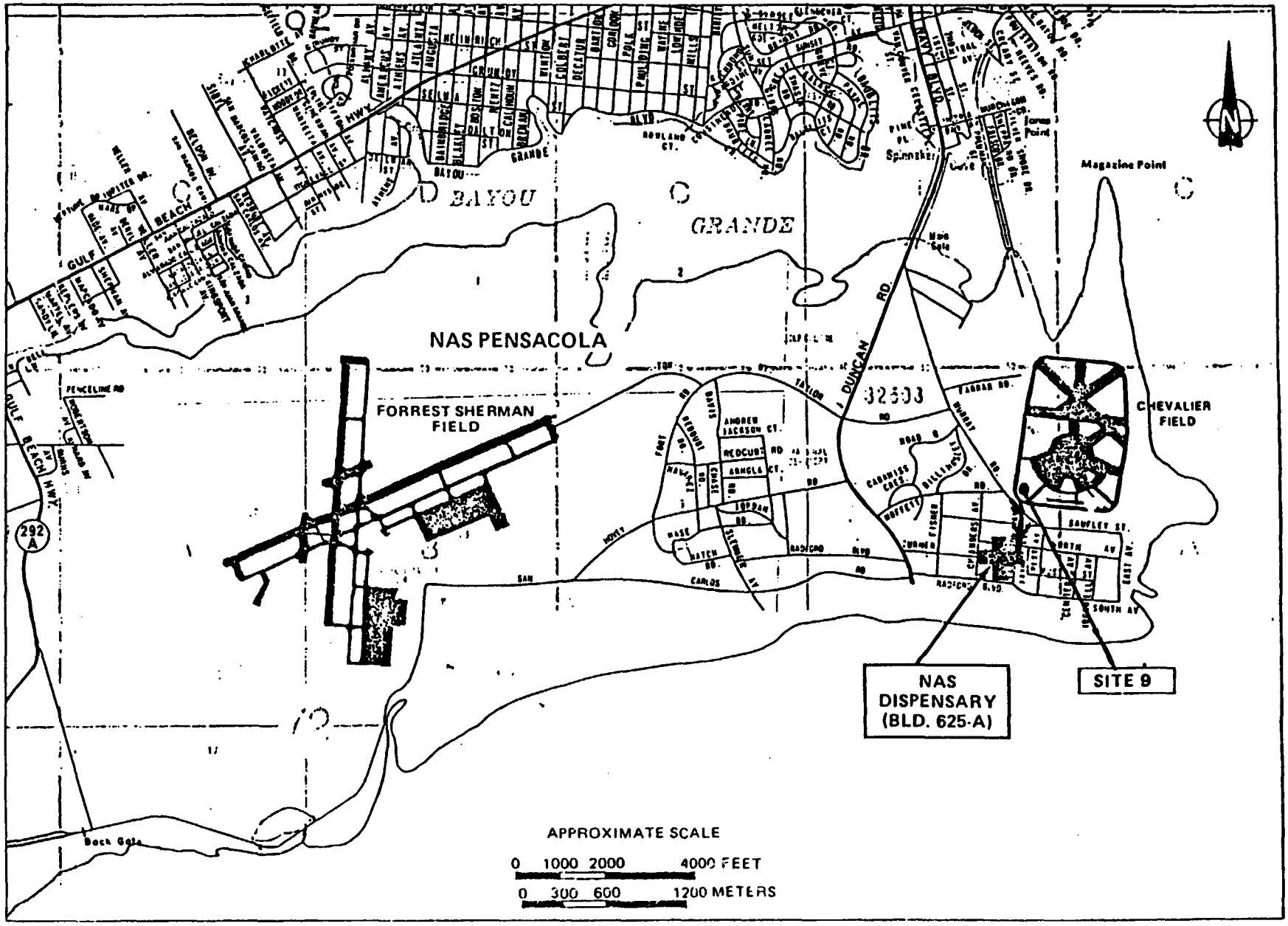
NAS PENSACOLA
FORREST SHERMAN FIELD
CHEVALIER FIELD
BAYOU
GRANDE
Magazine Point
Spinnaker
GULF BEACH HWY.
DUNCAN RD.
NAS DISPENSARY (BLD. 625-A)
SITE 9
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

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 MONITORI IG

Field operations during the summer months can create a variety of hazards to the employee. Heat cramps, heat exhaustlon. 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 whirh certain body processes speed up and generate addltlonal heat. Then the body must eliminate not only the normal but also the addltlonal quantlties of heat.

Heat produced wlthln 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 are classified in three categories: heat cramps, heat exhaustlon. 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 Symotoms.</u> The symptoms of heat cramp are:

- 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.,

HUT 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 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 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

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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 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 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 8, the suggested guidelines for ambient temperature urd 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
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 is at 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.

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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.

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 MEASU

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.
Amid 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 4 th plenty of water for at least 15 minutes. In all cases call 8 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-rir 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 form. 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 mixlures. 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 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 8 fume hood. Allow enough time for lumcs 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 hwrdous waste in 8 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.

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 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 kart 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. Oat 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).

Veotilrtion System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation b 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 tho ACGIH document, 'Industrial Ventilation, A Manual of Recommended Practices', mat 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 tho 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 whom the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounded for 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 makes no representations, or warranties, eith[illegible] or implied, of merchantability, fitness for a particular purpose [illegible] ect to the information set forth herein or to the product to which [illegible] mation refers. Accordingly, Mallinckrodt will not be responsible f[illegible] nages resulting from use of or reliance upon this information.

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: 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 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 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 M o r @. 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 4 th plenty of water for at least 15 minuter while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Exposure:
Wuh 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 Measurks

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 cannisters 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
Material Safety Data

Emergency Phone Number: 314.982-SO00

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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, **boiling 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**

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SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH

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 virion, 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 tho 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 medial **attention** Immediately.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 2140 **mg/kg.** Inhalation **Guinea** Fig LC50: 18 **mg/m³.**

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible **Exposure** Limit (PEL):
1 mg/m³ (TWA).
-ACGIH Threshold Limit Value **(TLV):**
1 mg/m³ (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 tho 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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Material Safety Data

Emergency Phone Number: 314-982-5000

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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! Giw large quantities of water or milk if available. Never give anything by mouth to an unconscious perron. 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 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 toric and corrosive fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric Kid is incompatible with m a t 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 rod 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 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.

Aggrevation 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); 4 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, 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 cannisters 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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Material Safety Data

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

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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 lo 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 rlcohol.

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 chemicrl, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers mol.

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 acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, oleum and perchloric rcid.

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 lor 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

SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
May cruse irritation of the nose and throat. Exposure to high concentrations has a narcotic effect, producing symptoms ot 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 a n cause irritation. May cruse irritation with a stinging effect and burning sensation.

Eye Contact:
Vapors may irritate the eyes. Splashes may cause severe idtation. 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:
Perrons 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 io 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.

Skln Exposure:
Remove any contaminated clothing. Wash 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, 1912)

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 b 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, 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 cll 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 thr fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounded 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

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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.

ERC CY/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 Io 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: cJ 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 rnd 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 marl metals releasing flammable, potentially explosive hydrogen gas.

Explosion:
Not combustible, but substance is a strong oxidizer and its h u t 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 fumu of oxides of sulfur. Will react with water or steam Io produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides Io 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 nac and throat, and labored breathing.

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

Skin Contra:
Corrosive. Symptoms Cl 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 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 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 less. Alternatively, a supplied air full faceplace 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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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 4 th 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 perron. 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 I 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 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 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.

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 clit 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 supplied air, full-facepien respirator, airlined hood, or self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and cannisters 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 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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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: $(CH_3)_2CHOH$

Hazardous Ingredients: **Not** applicable.

PRECAUTIONARY MEASURES

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

Keep any from heat, sparks and flame.
Keep container cloud.
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 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, 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

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.

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 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 reference 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 faceplace chemical cartridge respirator may be worn, in general, up to the maximum use concentration specified by the respirator supplier. Alternatively, a supplied air full faceplace 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 grounded 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, 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 ihe 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. Nenr 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 nod 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 **n t c r** or **steam to** produce tone **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, **b u y** 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 **u h** 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 4 t h 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 lore 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 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 physkian.

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; never add water to the acid.

HYDROGEN CYANIDE

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: Hydrogen cyanide, hydrocyanic acid, HCN, prussic acid: CAS 74-90-8.

Trade Names: Blausaure, Aero Liquid HCN and others.

Uses: Used as a fumigant**; used in electroplating, metallurgy and photographic processes; used in the synthesis of resin monomers, acrylates, methacrylates, hexamethylenediamine and acrylonitrile,

Appearance: Because its boiling point is near room temperature, hydrogen cyanide may be a colorless gas or colorless liquid, It is also sold as a water solution at a strength of 2% (USP) and commercial strengths of 5% to 10%.

Odor: Sweetish, like bitter almonds. **Minimum Detectable bv Odor:** 1 ppm.

Evaporation: Liquid evaporates at room temperature. Vaporizes rapidly above 26°C (80°F).

Behavior in Water: Very soluble,

HEALTH HAZARD INFORMATION

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

NIOSH Recommended Limit: 4.7 ppm.

ACGIH Recommended Limit: 10 ppm.

Short Term Exposure:

Inhalation: At less tban 20 ppm, exposure to hydrogen cyanide may produce headache, dizziness, nausea and vomiting. Concentrations greater than 50 ppm may cause difficulty in breathing, rapid throbbing of the heart, paralysis, unconsciousness, respiratory arrest or death. 30 minutes exposure to 135 ppm may cause death, 270 ppm has caused immediate death,

Skin: Hydrogen cyanide is readily absorbed through the skin. Symptoms arc similar to above.

Eyes: Hydrogen cyanide is irritating to the eye and rapidly absorbed.

Ingestion: Symptoms are similar to above. Death has resulted from ingestion of 570 mg/kg or 1.4 oz. for a 150 pound person,

Long Term Exposure:

Itching scarlet rash, red bumps, severe nose itch lcadinq to bleeding, and possibly holes in the nose, may result from long term exposure to hydrogen cyanide. Headache, nausea, vomiting, weakness and enlarged tbyroid gland have also been reported at exposures from 4 to 12 ppm. Most of these symptoms disappear after exposure stops.

**A permit may be requited when used for this purpose. For more information. contact the New York State Department of Environmental Conservation, Bureau of Pesticides Management.

*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. Administer artificial respiration and oxygen as required. NIOSH recommends that ampules of amyl nitrate be available wherever hydrogen cyanide is in use. Whenever symptoms appear break ampule into cloth and hold under nose for 15 seconds. Repeat after 15 seconds. Seek medical attention immediately.

Skin: Remove all contaminated clothing. Wash with soap and large amounts of water for at least 15 minutes. Seek medical attention.

Eyes: Wash with water at least 15 minutes. Seek medical attention.

Ingestion: Use amyl nitrate as above, give artificial respiration and oxygen as required. Get immediate medical attention.

Note to Physician: Blood CN level tests ray be useful. Break amyl nitrate ampule in cloth and hold under nose for 15 seconds. Repeat at 15 second intervals. Additional treatment 10 ml of 3% sodium thiosulfate intravenously within 2 minutes followed by 50 ml of 25%.

FIRE AND EXPLOSION INFORMATION

General: Hydrogen cyanide is a dangerous fire hazard. It butnr in air vith a blue flame. Ignites at -17°C (0°F).

Explosive Limits: Upper — 41%, Lower — 6b.

Extinguisher: Use dry chemical, carbon dioxide or alcohol foam. Fight fire from far away.

REACTIVITY

General: After long standing, liquid hydrogen cyanide polymerizes to form a dark brown explosive powder. Moisture and alkalies (like lye, potassium hydroxide) speed up the reaction.

PROTECTIVE MEASURES

Storage and Handling: Protect containers against physical damage. Store outdoors, if possible, or indoors in standard combustible liquid storage room or cabinet, away from sources of ignition.

Engineering Controls: Provide adequate ventilation to keep levels below recommendation.

Protective Clothing (Should not be substituted for proper handling and engineering control) Long rubber gloves, aprons and impervious clothing should be worn if contact with hydr. cyanide is likely.

Protective Equipment: For levels up to 40 ppm use a supplied-air respirator or a self-contained breathing apparatus. For up to 50 ppm we a supplied-air respirator wi full facepiece, a self-contained breathing apparatus with a full facepiece, a supplied respirator operated in continuour-flow mode or a gas mask vith full facepiece and a canister providing protection against hydrogen cyanide. For levels greater than 50 pp use 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-a respirator vith an auxiliary self-contained breathing apparatus, both with full facepi and operated in a positive pressure mode. For escape from a contaminated area use a g mask with a canister providing protection against hydrogen cyanide or an escape self-contained breathing apparatus, For firefighting use a self-contained breathing apparatus vith a full facepiece operated in a positive pressure mode.

PROCEDURES FOR SPILLS AND LEAKS

Waste solutions of hydrogen cyanide should be destroyed by alkaline chlorination or alkali reaction vith ferrous sulfate. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

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

ecology and environment, inc.

SITE SAFETY PLAN

Version 988

A. GENERAL INFORMATION

Project Title: Site 10 - Commodore's Pond

Project No.: UH1201

TDD/Pan No.:

Project Manager: John Barksdale

Project Dir.: Rick Rudy

Location(s): Commodore's Pond - Southeast of tho intersection of Hurray Road and Taylor Road

Prepared by: Kim Walker

Date Prepared: 1-25-89

Approval by: Mary Miller MM

Date Approved: 5-5-89

Site Safety Officer Review:

Dato Reviewed:

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

Proposed Date of Field Activities: August 1989

Background Info: Complete: [X]

Preliminary (No analytical data available) [ ]

Documentation/Summary:

a.

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

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

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

Characteristic(s):

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

Other:

Physical Hazards:

Overhead [X]	Confined* Space [ ]	Below Grade [ ]	Trip/Fall [X]
Puncture [ ]	Burn [ ]	Cut [ ]	Splash [X]
Noise [X]	Other: Vehicular traffic on nearby roadways		

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

Sit. History/Description and Unusual Features (roo Sampling Plan for detailed description): Sit ~10 was formerly the location of a small surface water *body*. In tho mid-nineteenth century, tho pond was used for tho underwater storage of shaped oak timbers. This underwater atoraqo method preserved tbo wod prior to its use for shipbuilding. The original pond is no longer in existence; therefore, ita exact dimensions are unknown. A subsequent excavation of tho site, during construction of the IWTP, did not reveal any contamination. No samples have boon collected at tho site. However, tho proximity of the Chevalier Field Pipe Area (site 23), presents the possibility of subsurface contamination. The site is unpaved and is covered with grasess and trees.

Locations of Chemicals/Wastes: If contamination is present, it is probably located below land surface.

Estimated Volume of Chemicals/Wastes: unknown

Site Currently in Operation , Yes: [ ] lo: [X]

---

e.B

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

Physical Hazard Evaluation:

1) Physical Surveys - Automobile hazards;

2) Temporary Monitoring Well Installation - Aircraft, Automobile Hazards, 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
Fuel Oil	not specified	inhale, dermal	vomit,diarrhea	0.082 ppm	mild petroleum
Isopropyl Alcohol	400 ppm	" "	drowsiness,head.	7.5-200 ppm	rubbing alcohol
Nitric Acid	2 ppm	" "	corrosive	0.3-1 ppm	acrid

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

3400138

Site History/Description and Unusual Features (see Sampling Plan for detailed description): Site 23 is tho location of two separate undorground fuel leaks. One leak. in 1965, consisted of the loss of an unknovn volume of Navy Special Fuel Oil (NSFO). It is reported that the fuel was pumped from tho groundvator table and contaminated soils were removed. In 1970, another leak, of unknown volume was discovered in tho same area in a pipeline carrying Diesel Fuel Marine (DFM). A layer of fuel is suspected to bo present on tho water table surface, and soil in tho area is suspected to bo contaminated with oil. Groundwater samples collected at tho site did not exhibit any VOC contamination, however strong odors were notod.

Locations of Chemicals/Wastes: If present, contamination is probably located below land surface.

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 - Aircraft, Automobile hazards;

2) Temporary Monitoring Well Installation - Aircraft, Automobile Hazards. Using portable drill rig:

3) Soil Sampling - Using portable drill rig;

4) Docontanination Procedures - Using solvents.

		Route of Exposure	Acute symptoms	Odor Threshold	Odor Doscription
Fuel Oil No. 2	N/A	fnh., Dorm.	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

Note: Complete and attach a Hazard Evaluation Shoot for major knovn 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? [no] 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 tyvock, neoprene gloves and boots, safety glasses, APR available when level C upgrade is necessary

Contaminant 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.

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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. rono, etc.

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

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

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VOC's	Area	OVA	Continuous
Radiation	Area	Mini-Rad	Continuous
Explosive Gases	Area	O_2/Explosimeter	Continuous

Docontarination Solutions and Procedures for Equipment, Sampling Gear, etc.:
Trisodium phosphate wash, tap water rinso, isopropanol rinso. distilled water rinso, 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 wrk.

Decon Solution Monitoring Procedures, if Applicable: Decontamination will bo performed in e well-ventilated area upwind of tho sampling zone.

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

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

Site Entry Procedures and Special Considerations: E & E's "Buddy Systoa. will bo employed at all times during fieldwork activities. Personnel will exercise caution in tho vicinity of Chevalier Field and of along nearby roadways. If above background radiation levels are encountered team members will evacuate tho sampling area, and contact tho corporato health physics group to reassess the site.

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

All fieldwork activities will bo performed during daylight hours. Team members will take breaks as necessary to aroid heat stress and replace fluids. Cooling vests may bo 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 bo double baggod, drummed, labeled and transported to a designated location for final disposal by the Navy.

Sample Handling Procedures Including Protective Wear:

During a11 handling of samples, all field team members will wear surgical gloves. Goggles will bo 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 participate in medical monitoring program and have completed applicable training per 29 CFR 1910.120. Respiratory proroction program rots requirements of 29 CFR 1910.134, and ANSI 288.2 (1980).

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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.

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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

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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 I a E ASC 1-716-631-0360

Fed. Express 1-000-238-5355

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-site

Telephone Location, Number To bo determined on-sit0

Cellular Phone, if available N/A

Radio

Other On-site warehouse number to bo dotorminod

EMERGENCY CONTACTS

1. Dr. Raymond Harbison (Univ. of Florida) ..... (501) 221-0465 or (904) 462-3277, 3281
   Alachua, Florida (501) 370-0263 (24 hours)

2. Ecology and Environment, Inc., Safety Director
   Paul Jenmaire ..... (716) 604-8060 (office)
   (716) 655-1260 (home)

3. Regional Office Contact ..... M.Miller.... 656-2054 (homo)
   877-1910 (office)

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

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E. EMERGENCY INFORMATION

(Use supplemental sheets, if necessary)

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

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   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) 370-1263

   What to report:

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

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

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

   a. 24 hour hotline - (716) 684-8940
   b. Corporato Safety Director - Paul Jonmaire - homo # (716) 655-1260
   c. Assistant Corp. Safety Officer - Steven Sherman - homo # (716) 688-0014

EMERGENCY ROUTES

(NOTE: Field Team must Know Route(s) Prior to Start of Work)

Directions to hospital (include u p)

NAS Dispensary - Follow Murray load South to Ellyson Avenue. Turn right onto Ellyson Avenue and continue to it's intersection with Turner Street. Tho NAS Dispensary is located on the 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 tho base. Nary Blvd. becomes HWY 98 and curves to tho east. Follow Navy Blvd./Hwy. 98 east approx. 3mi to Pace Blvd. Turn loft (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 loft (north) onto E street. Tho hospital is about 6 blocks north on tho loft.

Emergency Egress Routes to Got Off-Sit. Emergency egress routes will bo located if omorgoncy exit routes become blocked by construction, etc.

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MEDTOX HOTLINE

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

   What to report:

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

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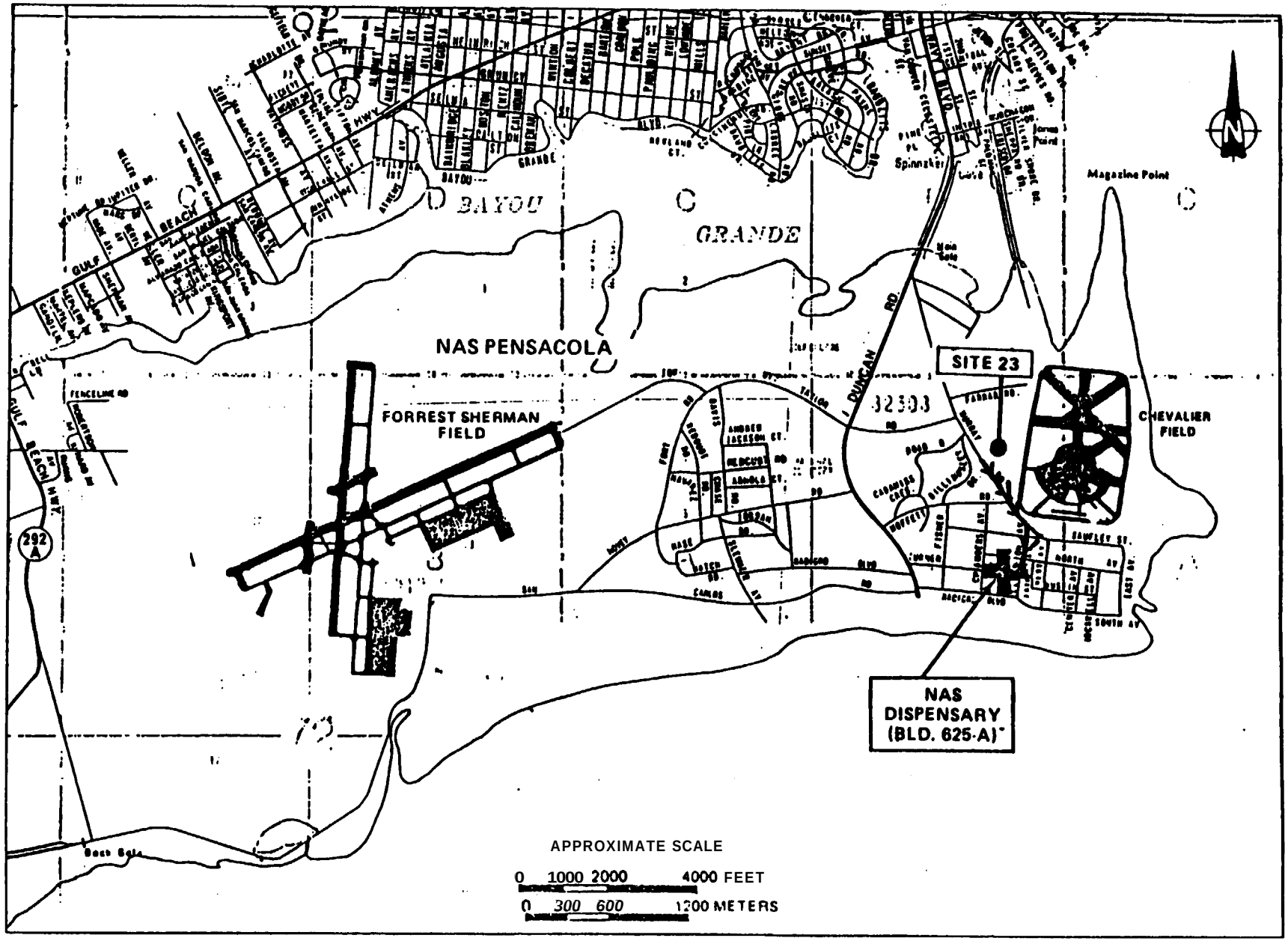
Emergency Egress Routes to Got Off-Site Emergency egress routes will be located if emergency exit routes become blocked by construction, otc.


NAS PENSACOLA
FORREST SHERMAN FIELD
SITE 23
CHEVALIER FIELD
NAS DISPENSARY (BLD. 625-A)
BAYOU GRANDE
Magazine Point
Spinnaker
GULF BEACH
DUNCAN RD.
FENCELINE RD
292 A
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

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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 AN6 HEAT STRESS MONITORI IC

Field operations during the summer months can create a variety of hazards to tho 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 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 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:

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If protective clothing must be worn, especially Levels A and 8, the suggestcd guidelines for ambient temperature arid maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minutes)
Abova 90	15
85 to 90	30
80 to 85	60
70 to 80	90
60 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 is at 110 beats/minute or leas and 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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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 Boiling 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 petroleum 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 clothins, neoprene gloves and boots.APR with GMCH Cartridges at high concentrations

Monitoring Recommendations:

OVA or HNu with 10.2 eV Drobe far or —ic detection. HSA 260 for gotentiallv explosive environments

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.

S Acute: Vomiti diarrhea, lmo dema i i coma respiratory ar ph

Chronic: Skin, muc membrane, ratory rritant, CNS essant

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Mallinckrodt
Material Safety Data

Emergency Phone Number: 314-982-5000

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 express 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 casu 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) 283

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: 2.9 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 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 an a of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapors. Small spills may be rbsorbed 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 rnd 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

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 mlr (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 eyer 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 mom susceptible to the effects of tho 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 kart 15 minutes. Get medkal 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 reference 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 grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment.

Mall& odt
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.

NLTRIC ACID, 70%

PRODUCTIDENTIFICATION;

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: 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 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 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: Rush 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 *b* **exceeded, wear a** supplied air, **full-facepiece respirator, airlined** hood, or self-contained breathing apparatus. **Nitric acid** *b* 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.

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**

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 S 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, a d 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 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/m³.**

SECTION 6 Occupational Control Measures

Airborne **Exposure Limits:**
-**OSHA** Permissible **Exposure** Limit (PEL):
1 **mg/m³** (TWA).
-ACGIH Threshold Limit Value **(TLV):**
1 **mg/m³ (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.

ON 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.**

SUI96

ecology and environment, inc.

SITE SAFETY PLAN

Version 988

A. GENERAL INFORMATION

Project Title: Site 29 - Soil South of Bldg 3460 Project no.: UH1201

TDD/Pan lo.:

Project Manager: John Barksdale Project Dir.: Rick Rudy

Location(s): Soil South of Bldg. 3460 - Approximately 100 feet south of tho southeast corner of Bldg. 3460

Prepared by: Kim Walker Date Prepared: 4-25-89

Approval by: Mary Miller MM Dato Approved: 5-5-89

Sit. Safety Officer Review: Dato Reviewed:

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

Proposed Dato of Field Activities: August 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 [ ]
	Low [X]	Unknown [ ]

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

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

Characteristic(s):

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

Other:

Physical Hazards:

Overhead [X]	Confined* Space [ ]	Below Grade [ ]	Trip/Fall [X]
Puncture [ ]	Burn [ ]	Cut [ ]	Splash [X]
Noise [X]	Other: Aircraft and vehicular traffic using Chevalier Field.		

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

Site History/Description and Unusual Features (see Sampling Plan for detailed description): In the spring of 1981, several workers sustained chemical burns while working in an excavation south of Bldg. 3460. It is reported that a slimy black substance in the soil excavation was responsible for the injuries. In addition, station personnel reported a noticeable odor of "paint stripper" in the excavation. A portion of tho IWTP lie beneath tho concrete apron in the vicinity of Site 29. Industrial wastes disposed of in tho sewer include: paint stripper, thinners, chromic acid, phenolic compounds, cyanides, sulfuric acid, and other hazardous wastes. It is suspected that a leak in the industrial waste sewer line may have caused the contamination at the site. The site is currently covered by a concrete apron of Chevalier Field.

Locations of Chemicals/Wastes: A sludge like material is located below land surace

Estimated Volume of Chemicals/Wastes: unknown

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

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e. HAZARD EVALUATION

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

Physical Hazard Evaluation:

1) Physical Surveys - Aircraft, Automobile hazards;

2) Temporary Monitoring Well Installation - Aircraft, Automobile Hazards, Using portable drill rig;

3) foil Sampling - Using portable drill rig;

4) Decontamination Procedures - Using solvents.

Chemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Doscription
Methylene CHloride	500 ppm	Derm., Inh	Fatig., Weak.	25-200 ppmm	Chloroform
paint thinners	N/A	" "	CNS depressant	variable	mild aromatic
isopropyl alcohol	400 ppm	•	drowsiness,head/	7.5-200 ppm	rubbing alcohol
nitric acid	2 ppm	• •	corrosive	0.3-1 ppm	acrid
chromic acid	0.1 mg/m3	•	Corrosive, Irr.	N/A	Acrid
HCN (cyanides)	10 ppm	•	Weak., Head.	0.00027 ppm	bitter almond
sulfuric acid	80 mg/m3	•	Coorosive	0.6 mg/m3	acrid

Note: Complete and attach A Hazard Evaluation Shoot tor 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 rono, contamination roduction. *rono*, otc.

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

Work Areas Designated? [yes] Zone(s) of Contamination Identified? [no 1

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	

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

- o Level D: O_2 <19.5% or >25%, explosive atmosphere >10% LEL, organic vapors above background levels, particulator >_____ mg/m^3, other _____
- o Level C: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapor n breathing zone) >5 ppm, particulates >_____ mg/m^3, other _____
- o Level B: O_2 t19.52 or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors in breathing rono) >500 ppa, 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):

contaminant of Interest	*Typo* 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 rinro, isopropanol rinro. dirtillod water rinse, isopropanol rinse, and final dirtillod water rinse.

Personnel Decon Protocol: Mot and glove wash - trisodium phosphate wash with ~loawater rinse. Expendables will be double bagged and drummed for disposal. Field personnel will take a hygienic shower, off-sit., following each day's field wrk.

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

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

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

Site Entry Procedures and Special Considerations: E & E's "Buddy System" will bo employed at a11 times during fieldwork activities. Personnel will exercise caution in tho vicinity of Chevalier Field and along nearby roadways. If above background radiation levels are encountered team members will evacuate tho sampling area, and contact tho corporato health physics group to reassess tho 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 bo used to prevent heat stress.

General Spill Control, if applicable: N/A

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

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

Sample Handling Procedures Including Protective Wear:

During a11 handling of samples, a11 field team members will wear surgical gloves. Goggles will bo worn durinp 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 mots requirements of 29 CFR 1910.134, and ANSI *tO0.2* (1980).

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E. EMERGENCY INFORMATION

(Use supplemental shoots, if necessary)

LOCAL RESOURCES

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

Ambulance On Base — 904-152-4138, 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, tnginoor-In-Chargo, 1-803-743-0574

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

SITE RESOURCES

Site Emergency Evacuation Alarm Method N/A

ıter Supply Source On-sit.

Telephone Location, Number To bo determined on-site

Cellular Hm., if available N/A

Radio

Other On-sit. warehouse number to bo 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 (homo)
   877-1978 (office)
4. Office Manager ..... R.Rudy..... 693-7245 (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 roach 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 tho information given to tho answering service.

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

   a. 24 hour hotline - (716) 684-0940
   b. Corporate Safety Director - Paul Jonnaire - home # (716) 655-1260
   c. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 608-0004

EMERGENCY ROUTES

(NOTE: ?Sold To- must Know —— to(Pr)or to Start of Work)

Directions to hospital (include map)

HAS Dispensary - Follow Hurray Road north to Ellyson Avonuo. Turn right onto Ellyson Avenue and continuo to it's intersection with Turner Street. The HAS Dispensary is located on tho northwest corner of tho intersection of Ellyson Avonuo and Turner Stroot. in Building 623-A.

Baptist Hospital - Take Duncan Road (Navy Blvd.) north to exit tho base. Navy Blvd. becomes HWY 98 and curves to tho east. Follow Navy Blvd./Hwy. 98 east approx. 3mi to Pace Dlvd. Turn loft (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 loft (north) onto E street. The hospital is about 6 blocks north on tho left.

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

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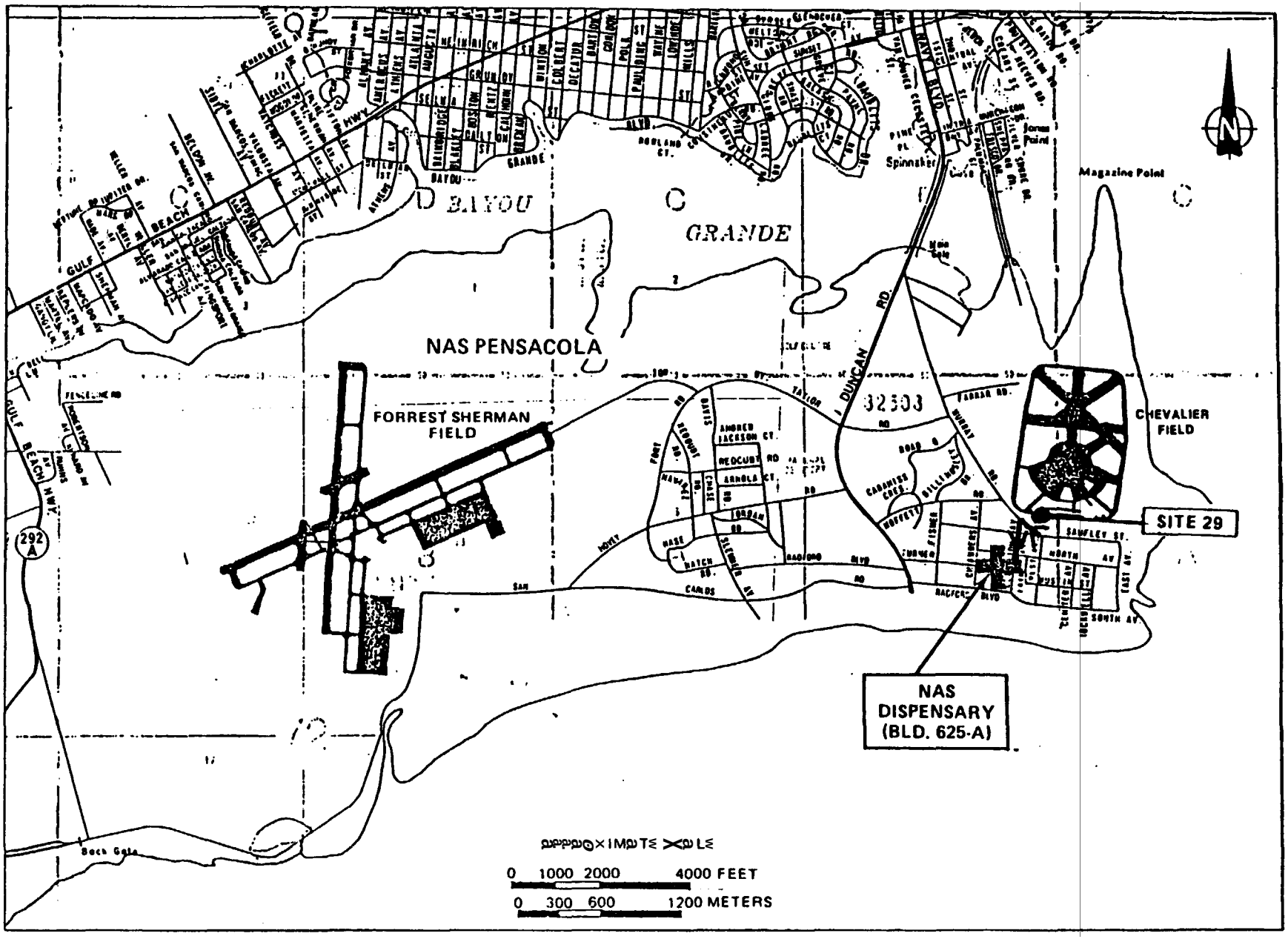
NAS PENSACOLA
FORREST SHERMAN FIELD
CHEVALIER FIELD
SITE 29
NAS DISPENSARY (BLD. 625-A)
BAYOU GRANDE
Magazine Point
Spinnaker
Jones Point
GULF BEACH HWY.
DUNCAN RD.
32503
0 1000 2000 4000 FEET
0 300 600 1200 METERS

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.
- 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 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 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 conditionr 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 convaction. 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 arid 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, heal 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 legs and abdomen,
- Pain accompanying the cramps,
- Faintness, and
- Profuse perspiration.

Heat Cramp Emergency Gre. 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 rkln. The heat is transported from the interior of the body to the surface by the blood. The blood vessels In the rkln become dilated and a large amount of blood is pooled in the rkln. This condition, plus me 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 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 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, "Catorade" 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 rituations 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 8, the suggested guidelines for ambient temperature urd maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minutes)
Above 90	15
85 to 90	30
80 to aS	60
70 to 80	90
60 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. me last 30 seconds of the second minute. and the last 30 seconds of the third minute.
- Double the aunt.

If the recovery pulse rate during the last 30 seconds of the first minute is at 110 beats/minute or less and 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.

3400154

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 ME SURES

WARNING! FLAMMABLE LIQUID. HARMFUL If SWALLOWED ON INHALED. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION.

Keep away from heat, sparks and flame.
Keep container closed.
Use with adequate ventilation.
Avoid breathing vapor.
'Wish 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 immedirtcly available. Never give anything by mouth lo 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 ia water.

Boiling Point; 82°C (180°F).

Melting Poinr: -89°C (-128°F).

specific gravity: 0.79

Vapor Density (Air–1): 21

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

Evaporation Rate: (n-BUAC = 1) 283

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: 120.

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 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 lot 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

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 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.

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 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 usa 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 when the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounded 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: 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 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.

Spacial 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 Rea[illegible]

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

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 lo 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 lo an unconscious person. Get medical attention immediately.

Skin Exposure:
In case of contact, immediately flush skin with plenty of n t c r lor 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 n t c r 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 b 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 cannisters 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 a d 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 i d direct sunlight. Isolate from incompatible substances. Protect from moisture.

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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 Ct. Puis. KY 40061.

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 lungedema. 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** Cl redness, pain, and severe burn can occur.

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

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 4th 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 4th acid resistant floors and good drainage. Protect from physical damage. **Keep** out Cl 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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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 M, Norkotel, 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: Liqufd 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 vho have a history of heart trouble oc those who are also exposed to carbon monoxide. Set 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 lag pains, loss of feeling, loss of appetite, hot flashes and death.

Skin: May be irritating if confined on the skin by gloves or clothing. Hay be absorbed slowly through the skin to cause symptoms listed under inhalation.

Eyes: May cause pain, irritation and burns,

Ingestion: Accidental ingestion of paint removers containing methylene chloride as the main ingredient have reportedly caused headache, nausea, vomiting, visual dirturtance, presence of blood in the urine, and unconsciousness.

Long Term Exposure:

Same symptoms as above. Prolonged exposure can cause changes in blood, hallucinations ana decreased response to visual and auditory stimulation. Some long term exposures have also resulted in damage to the liver. Post of the effects will disappear after exposure stops. Methylene chloride caused genetic effects in certain bacteria and caused birth defects in chickens. In laboratory studies, methylene chloride has also been shovn 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 Sutecances: How Toxic is Toxic' available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Remove person 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 with 3-5% 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 such as near spills or in closed spaces. Igniter 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 gloves or clothing can prevent evaporation 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 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 pre is impervious and resistant to methylene chloride. Improper gloves 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 a positive pressure mode or a combination Type C supplied-ai: respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape use a gas mask with an organic vapor canister or an escape self-contained breathing apparatus. 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.

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 say 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 oeach.

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 lina 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 hiqh exposures, the resulting effects include severe headache, convulsions, coma, delirium and death. In non-fatal cases, recovery is slow and not always complete. Alcohol inqestion 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 chancer 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 respiration 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.

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 AS 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 wen 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: fxporure 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, abdominal cramps, diarrhea, nausea, vomiting, tightness in the chest, difficult breaching, 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 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. Thio will result in a build-up in brain tissue over a long time. The lrver 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 of 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 vith 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 terms and abbreviations used, see Toxic Substances: 'How Toxic is Toxic' available from the New York Stare Department or Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get to fresh air. Give artificial respiration if breathing has stopped. Give oxyge it 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% soluti in oil. Urine mercury determination m y be useful as an index of absorption.

FIRE AND EXPLOSION INFORMATION

General: lot flammable.

REACTIVITY

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

Conditions to Avoid: Heat will sped up the rate of evaporation. Increasing risk due to inhalation.

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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 substitutted for proper handling and engineering controls): We 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 a 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/m^3 use a supplied-air respirator, a self-contained breathing apparatus or a chemical cartridge respirator with cartridges providi 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 with a full facepiece or a gas mask with a canister providing protection against mercury vapors. For levels

For levels above 2.5 mg/m^3 or unknown concentr

made from

PROCEDURES FOR SPILLS AND LEAKS

Chemical Fact Sheet. Version 2.

TOLUENE

e 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 la to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Methylbenzene, methylbenzol, phenylmethane, toluol; CAS 108-88-3.

Trade Names: Methacide, Antisal I and others.

Uses: Used in the manufacture of benzoic acid, benzaldehyde, explosives, dyes and adhesives.

Appearance: Clear, colorless liquid,

Odor: Strong, pleasant. **Minimum Detectable by Odor:** 40 ppm.

Behavior in Water: Only a very small amount will mix, the rest will float.

Evaporation: Liquid evaporates very slowly.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure limit -- 200 ppm.

NIOSH Recommended Limit: Average 8 hour exposure -- 100 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- 100 ppm.

Short Term Exposure:

Inhalation: 100. ppm exposure can cause dizziness, drowsiness and hallucinations. 100-200 ppm can cause depression. 200-500 ppm can cause headaches, nausea, loss of appetite, loss of energy, loss of coordination and coma. In addition to the above, death has resulted from exposure to 10,000 ppm for an unknown time.

Skin: Can cause dryness and irritation. Absorption may cause or increase the severity of symptoms listed above.

Eyes: Can cause irritation at 300 ppm.

Ingestion: Can Cause a burnfnq sensation in the mouth and stomach, upper abdominal pain, cough, hoarseness, headache, nausea, loss of appetite) loss of energy, loss of coordination and coma.

Levels below 200 ppm may produce headache, tiredness And nausea. From 200 to 750 ppm symptoms may include insomnia, irritability, dizziness, some loss of memory, loss of appetite, a feeling of drunkeness and disturbed menstruation. Levels up to 1,500 ppm may cause heart palpitations and loss of coordination. Blood effects and anemia have been reported but ate probably due to contamination by benzene. Most of these effects are believed to go away when exposure stops.

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

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get person to fresh air. Keep warm and quiet. Give artificial respiration, if necessary. Seek medial attention, if necessary.

Skin: Take off clothing soaked with liquid. Wash contaminated area with soap and water for at least [redacted] minutes. Seek medical attention, if necessary.

Eyes: Wash with large amounts of water for at least 15 minutes. Seek immediate medical attention.

- Do not induce vomiting. Give one or two ounces of mineral oil. Seek immediate attention. **Note:** Never force an unconscious person to drink.

Note to Physician: Exposure to toluene at levels greater then 200 ppm may result in hippuric acid levels above 5 gm/liter urine. After elevated exposure, toluene may also be detected in blood.

EXPLOSION INFORMATION

Flammable liquid. Fumes may spread a considerable distance and flash back. Will ignite at 4.4°C, 40°F.

Explosive Limits: Upper Limit -- 7.0%, Lower Limit -- 1.27%.

Extinguisher: water spay, carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Reacts violently with chlorine, permanganate and dichromate.

Conditions to Avoid: Sources of ignition.

PROTECTIVE MEASURES

Storage and Handling: Store outdoors or in a detached building, if possible. If indoors, store in a standard flammable liquid storage room or cabinet. Protect containers from physical damage.

Engineering Controls: Use in well-ventilated area. Eyewash stations, sinks and showers should be readily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear riton, PVA, NBR or polyethylene clothing.

Protective Equipment: For levels up to 1000 ppm use a chemical cartridge respirator with organic vapor cartridges, a supplied-air respirator, a self-contained breathing apparatus or a powered air-purifylag respirator with organic vapor cartridges. For levels use a gas mask with an organic vapor canister, a supplied-air respirator with a full facepiece, a self-contained breathing apparatus with a full facepiece or a supplied-air respirator operated in continuous flow mode. For levels above 2000 ppm or at use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a 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 an organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS OR LEAKS

Get all workers *out* of the spill area. Put on a respirator and other protective clothing. Spread sand or other absorbent material over liquid to absorb It. Shovel into buckets, take to a safe place in the open air. Wash area of spill with soap and water. For final disposal contact your regional office of the N.Y.S. 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.

BENZENE

The information in this sheet applies Lo 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: Benzol, phenyl hydride, cyclohexatriene; CAS 71-43-2.

Trade Names: Benzole, Benzelene, Carbon Oil, Carbon Naphtha, Mineral Naphtha, Motor benzol, Nitration benzene, Phene, Pyrobenzol and others.

Uses: In the manufacture of styrene, phenol, detergents, organic chemicals, pesticides, plastics and resins, synthetic rubber, aviation fuel, pharmaceuticals, dyes, explosives, gasoline, flavors and perfumes, paints and coatings. Used in the industrial processrnq of nylon, certain food products and photographic chemicals.

PHYSICAL INFORMATION

Appearance: Colorless liquid..

Odor: Strong, pleasant. **Minimum Detectable by Odor:** 5 ppm.

Behavior in Water: Slightly soluble, floats.

Evaporation: Rapid.

HEALTH HAZARD INFORMATION

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

NIOSH Recommended Limit: 1 ppm.

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

Short Term Exposure:

Inhalation: Benzene may produce both nerve and blood effects. Irritation of the nose, throat and lungs may occur (3,000 ppm may be tolerated tor only 30 to 60 minutes). Lunq congestion may occur. Nerve effects may include an exaggerated feeling of well-being, excitement, headache, dizziness and slurred speech. At high levels, slowed breathing and death may result. Death has occurred at 20,000 ppm for 5 to 10 minutes, or 7,500 ppm for 30 minutes.

Skin: Irritation may occur, with redness and blistering if not promptly removed. Benzene is poorly absorbed. Whole body exposure for 30 minutes has been reported with no health effects.

Eyes: May cause severe irritation.

Ingestion: Kay cause irritation of mouth, throat and Stomach. Symptoms are similar to those listed under. Inhalation. One tablespoon may cause collapse, bronchitis, pneumonia and death.

Long Term Exposure:

May cause loss of appetite, nausea, weight loss, fatigue, muscle weakness, headache, dizziness, nervousness and irritability. nild anemia has been reported from exposures of 25 ppm for several years and 100 ppm for 3 months. At levels between 100 and 200 ppm for periods of 6 months, or more, severe irreversible blood changes and damage to liver and heart may occur. Temporary partial paralysis has been reported.

Benzene is a known human carcinogen. Exposure ha8 been linked to increased risk of several forms of leukemia. Periodic blood tests of occupationally exposed individuals should be conducted.

*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 to fresh air. Give artificial respiration or oxygen if necessary. Seek medical attention.

Skin: Remove roiled clothing immediately. Wash thoroughly with soap and water for at least 5 minutes. Seek medical attention, if necessary.

Eyes: Irrigate eyes with water for at least 15 minutes. Seek medical attention.

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

Note to Physician: Severe exposure may require supportive measures for pulmonary edema.

FIRE AND EXPLOSION INFORMATION

General: Flammable, vapor may spread considerable distance to a source of ignition and flash back. Ignites at -11°C (12°F).

Explosive Limit: Upper — 7.1%, Lower — 1.3%.

Extinguisher: Carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Contact with strong oxidizers, or iron in the presence of chlorine or bromine.

Conditions to Avoid: Exposure to sources of ignition.

: Protect containers against physical damage. Storage preferred in an out & or detached building. If storage is indoor, use a standard flammable liquid storage room.

Engineering Controls: Use only ritb efficient ventilation.

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear protective rubber clothing, gloves and eye goggles.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece and operated a positive pressure mode or a combination type C supplied-air respirator with an auxiliary sea:-conearned breathing apparatus. both with full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Put on protective clothing and equipment when entering spill area lor clean-up. Spread absorbent material on spill, sweep up and keep contained in fiber carton tightly sealed. 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 Tort 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, stocing or handling and is not designed €or the population at large. *Any* generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrarions of all chemicals at levels as low as is practical.

Chemical Names: Ethane trichloride; beta-trichloroethane; 1,2,2-trichloroethane; vinyl trichlocide; 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 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 sink.

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.

CGIH 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 depcession and anesthetic effects. Symptoms are nasal irritation, drowsiness and equilibrium disturbances. Death may result from 13,600 ppm for 2 houcs.

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

Eyes: Hay cause irritation.

Ingestion: Hay 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 Toric 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 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 it 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 torrs 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 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 with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For fire f——— 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.

?or 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 Tork 12203.

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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 Boiling Point 340-675°F

Flash Paint 100-136°F Vapor Pressure/Density NA Freezing Paint 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 Petroleum 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 gloves and boots.APR with GMCH Cartridges at high concentrations

Monitoring Recommendations:

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

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 paralysis, asphyxia

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

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Version 988

A. GENERAL INFORMATION

Project Title: Site 23-Chevalier Field Pipe Leak Area Project No.: UH1201

TDD/Pan No.:

Project Manager: John Barksdale Project Dir.: Rick Rudy

Location(s): Chevalier Field Pipe Leak Area - Near tho southwestern corner of Chevalier Field between Murray Road and Industrial Road

Prepared by: Kim Walker 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: August 1989

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

Documentation/Summary:

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

B. SITE/WASTE CHARACTERISTICS

Waste Type(.):

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

Characteristic(s):

Flammable/ Ignitable [X]	Volatile [x]	corrosive [ ]	Acutely Toxic [ ]
Explosive [ ]	Reactive [ ]	Carcinogen [X]	Radioactive* [ ]

Other:

Physical Hazards:

Overhead [X]	Confined* Space [ ]	Below Grade [ ]	Trip/Fall [X]
Puncture [ ]	Burn [ ]	Cut [ ]	Splash [X]
Noise [X]	Other: Aircraft and vehicular traffic using Chevalier Field.		

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

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SITE SAFETY PLAA

Version 988

A. GENERAL INFORMATION

Project Title: Site 34- Solvent North of Bldg. 3557 Project No.: UH1201

TDD/Pan lo.:

Project Manager: John Barksdale Project Dir.: Rick Rudy

Location(s): Solvent North of Bldg. 3557 - Area underneath concrete apron immediately north of Bldg. 3557

Prepared by: Kim Walker 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: August 1989

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

Documentation/Summary:

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

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

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

Characteristic(s):

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

Other:

Physical Hazards:

Overhead	[X]	Confined* Space	[ ]	Below Grade	[ ]	Trip/Fall	[X]
Puncture	[ ]	Burn	[1	Cut	[ ]	Splash	[X]
Noise	[X]	Other:	Aircraft and vehicular traffic using Chevalier Field.				

*Requires completion of additional torr and special approval from tho Corporate Health/Safety qroup. Contact RSC or HQ.

Site History/Description and Unusual Features (see Sampling Plan for detailed description): A tank farm with pipes that connect to building 3557, is located along the northern edge of the site. In May 1984, one of these pipes leaked 45,000 gallons of a solvent/detergent solution into the surrounding area. The solution was composed of 1.7 percent, chlorinated aromatic hydrocarbon solvent. It is believed that contamination may hav penetrated the concrete apron, via expansion joints, and contaminated on-sit. soils and groundwater. Modera concentrations of some organics have been found in groundwater collected from wells in the immediated vicinity of the site.

Locations of Chemicals/Wastes: Contaminants from the pipe leak Arm likely contained in on-aitm soils, below the concrete apron.

Estimated Volume of Chemicals/Wastes: unknown

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

. . . . . .

e. HAZARD EVALUATION

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

Physical **Hazard Evaluation:**

1) **Physical Surveys** - Aircraft, Automobile hazards;

2) **Temporary** Monitoring Well Installation - Aircraft, Automobile Hazards, Using portable drill rig:

3) **Soil Sampling** - Wring portablm drill riq:

4) Decontamination Procedures - Using solvents.

Chemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
benzene	10 ppm	inh,ing,con,abs	head,vomit,euphoria	4.68 ppm	aromatic
toluene	200 ppm	inh,ing,con,abs	head,weakness,diss	0.17 ppm	aromatic
isopropyl alcohol	400 ppm	"	drowsiness,head.	7.5-200 ppm	rubbing alcohol
nitric acid	2 ppm	" "	corrosive	0.3-1 ppm	acrid

Note: **Complete** and attach A Hazard **Evaluation Sheet for** ujor 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

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

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

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

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

Contaninant of Interest	Typo 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 Equipaont, Sampling Gear, etc.:
Trisodium phosphate wash, tap water rinse, isopropanol rinso, distilled water rinso. isopropanol rinse. and final distilled water rinse.

Personnel ~ ~ c protocol: mot ad glove —ah - trisodium phosphate wash with ~ loa 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 bo performed in e well-ventilated area upwind of tho sampling zone.

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

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

Site Entry Procedures and Special Considerations: E & E's "Buddy System" will bo employed at a11 times during fieldwork activities. Personnel will exercise caution in tho vicinity of Chevalier Field and along nearby roadways. If above background radiation levels are encountered team members will evacuate tho sampling area, and contact tho corporato health physics group to reassess tho 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 bo 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 bo double bagged, drummed, labeled and transported to a designated location for final disposal by tho Navy.

Sample Handling Procedures Including Protective Wear:

During a11 handling of samples, a11 field team members will wear surgical gloves. Goggles will bo 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 288.2 (1980).

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E. EMERGENCY INFORMATION

(Use supplemental shoots, 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 - 904-432-2733. 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

SITE RESOURCES

Site Emergency Evacuation Alarm Method N/A

. ıter supply Source on-aft.

Telephone Location, Number To be determined on-site

Cellular Phone, if available N/A

Radio

Other On-sit. warehouse number to bo doterminod

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) 604-0060 (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)

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

What to report:

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

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

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

a. 24 hour hotline - (716) 684-8940
b. Corporate Safety Director - Paul Jonmaire - homo 4 (716) 655-1260
c. Assistant Corp. Safety Officer - Steven Sherman - homo # (716) 600-0004

EMERGENCY ROUTES

(NOTE: Field Team must Know Route(s) Prior to Start of Work)

Directions to hospital (include map)

NAS Dispensary - Follow Industrial Road south to Murray Road. Exit Industrial road and follow Hurray Road South to Ellyson Avenue. Turn right onto Ellyson Avenue and continuo to it's intersection with Turner Street. The NAS Dispensary is located on tho northwest corner of tho intersection of tllyson Avonuo and Turner Street, in Building 625-A.

Baptist Hospital - Take Duncan Road (Navy Blvd.) north to exit tho base. Navy Blvd. becomes HWY 98 and curves to tho east. Follow Navy Blvd./Hwy. 98 east approx. 3ri 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 block8 north on tho loft.

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

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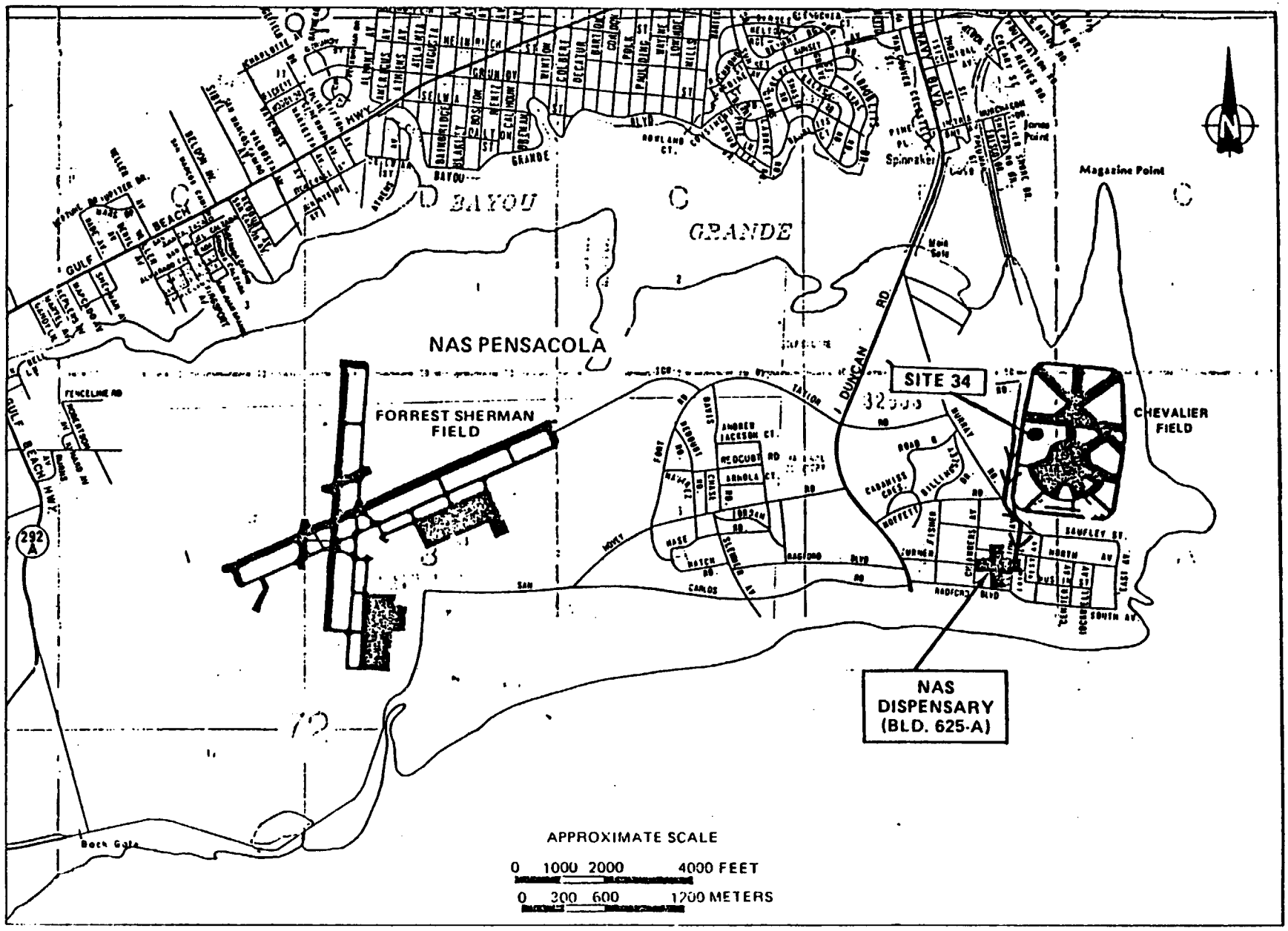
NAS PENSACOLA
FORREST SHERMAN FIELD
SITE 34
CHEVALIER FIELD
NAS DISPENSARY (BLD. 625-A)
BAYOU GRANDE
Magazine Point
Spinnaker
GULF BEACH HWY
DUNCAN RD
TAYLOR RD
SAN CARLOS
NAVY BLVD
FENCELINE RD
Back Gate
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

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.
* Wake 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 can create a variety of hazards to the employee. Heat cramps. heat exhaustion. and heat stroke can be experienced end, 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 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 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 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 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 loner 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.

H U T STROKE

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

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

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 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 ttie 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 (Minutes)
Above 90	15
85 to 90	30
80 to 85	60
70 to 80	90
60 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 is at 110 beats/minute or less and 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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ECOLOGY AND ENVIRONMENT, INC.,
STANDARD OPERATING PROCEDURES FOR
EMERGENCIES DUE TO HEAT AND HEAT STRESS MONITORI'IC

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- 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 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 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

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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.

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Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever arid 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 40) bear directly on the tendency to heat stroke. It is a serious threat to life and carries a 20% mortality rate. Alcoholics arm 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 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 WEAT-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 representcd 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 arc 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. lo nightfall).

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 10% 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 arid fast pulse;
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AVOIDANCE OF HEAT-RELATED EMERGENCIES

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- 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 8, the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time Der Excursion (Minutes)
Above 90	15
85 to 90	30
80 to aS	60
70 to 80	90
60 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 tho second minute, and the last 30 seconds of the third minutc.
- Double the count.

If the recovery pulse rate during the last I0 seconds of the first minute b at 110 beats/minute or less and the deceleration between the first, second, and third minutes is at kast 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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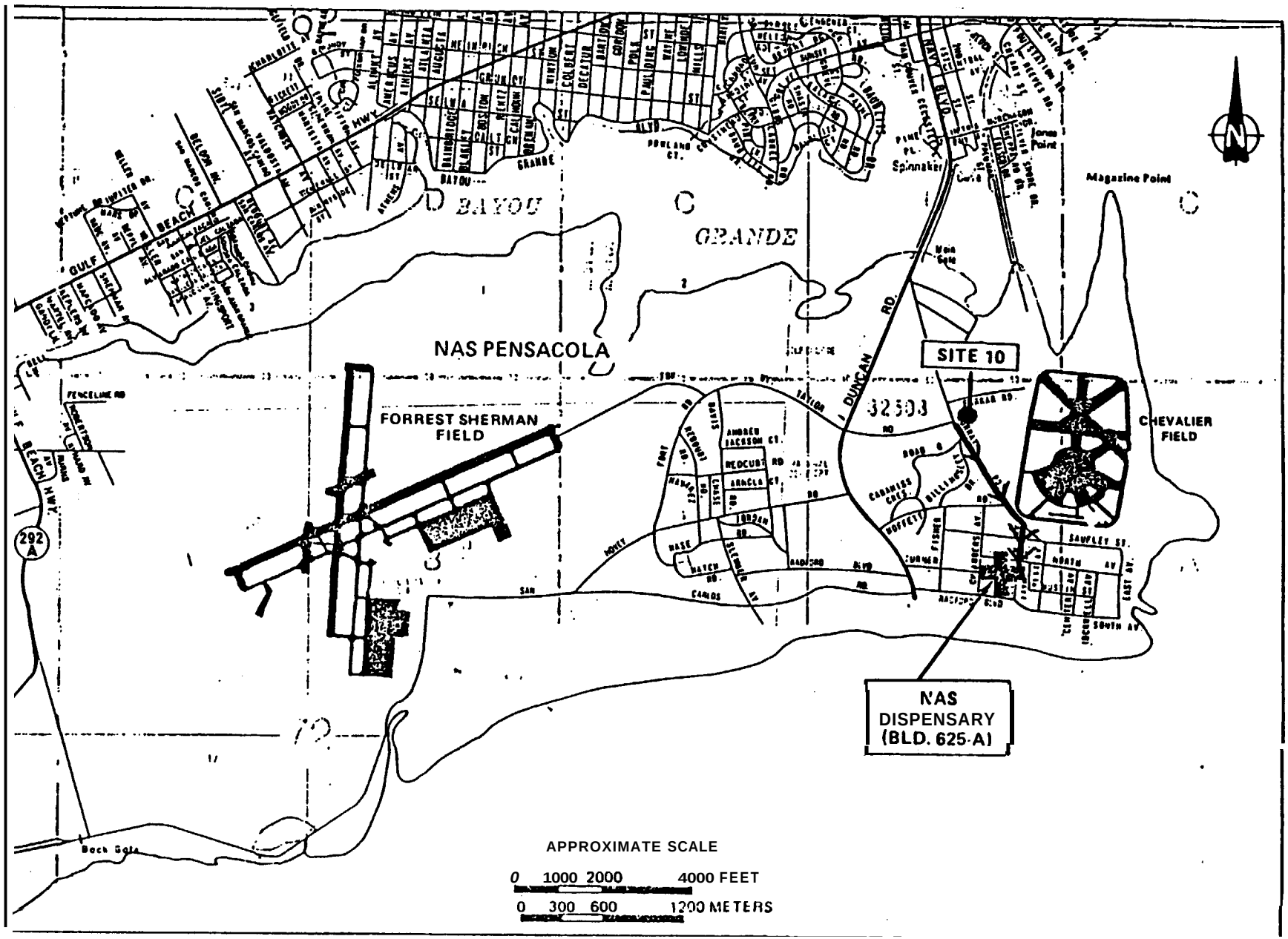
NAS PENSACOLA
FORREST SHERMAN FIELD
SITE 10
CHEVALIER FIELD
NAS DISPENSARY (BLD. 625-A)
BAYOU GRANDE
Magazine Point
Spinnaker
Main Gate
Back Gate
GULF BEACH HWY
DUNCAN RD.
NAVY BLVD.
32503
APPROXIMATE SCALE
0 1000 2000 4000 FEET
0 300 600 1200 METERS

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.
* Hake 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.

BENZENE

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: benzol, phenyl hydride, cyclohexatriene; CAS 71-43-2.

Trade Names: Benzole, Benzolene, Carbon Oil, Carbon Naphtha, Mineral Naphtha, Motor benzol, Nitration benzene, Phene, Pyrobenzol and others.

Uses: In the manufacture of styrene, phenol, detergents, organic chemicals, pesticides, plastics and resins, synthetic rubber, aviation fuel, pharmaceuticals, dyes, explosives, gasoline, flavors and perfumes, paints and coatings. Used in the industrial processing of nylon. certain food products and photographic chemicals.

PHYSICAL INFORMATION

Appearance: Colorless liquid.

Odor: Strong, pleasant. Minimum Detectable by Odor: 5 ppm.

Behavior in Water: Slightly soluble, floats.

Evaporation: Rapid.

HEALTH HAZARD INFORMATION

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

NIOSH Recommended Limit: 1 ppm.

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

Short Term Exposure:

Inhalation: Benzene may produce both nerve and blood effects. Irritation of the nose, throat and lungs may occur (3,000 ppm may be tolerated for only 30 to 60 minutes). Long congestion may occur. Nerve effects may include an exaggerated feeling of well-being, excitement, headache, dizziness and slurred speech. At high levels, slowed breathing and death may result. Death has occurred at 20,000 ppm for 5 to 10 minutes, or 7,500 ppm for 30 minutes.

Skin: Irritation may occur with redness and blistering if not promptly removed. Benzene is poorly absorbed. Whole body exposure for 30 minutes has been reported with no health effects.

Eyes: May cause severe irritation.

Ingestion: May cause irritation of mouth, throat and stomach. Symptoms are similar to those listed under inhalation. One tablespoon may cause collapse, bronchitis, pneumonia and death.

Long Term Exposure:

May cause loss of appetite, nausea, weight loss, fatigue, muscle weakness, headache, dizziness, nervousness and irritability. Mild anemia has been reported from exposures of 25 ppm for several years and 100 ppm for 3 months. At levels between 100 and 200 ppm for periods of 6 months, or more, severe irreversible blood changes and damage to liver and heart may occur. Temporary partial paralysis has been reported.

Benzene is a known human carcinogen. Exposure has been linked to increased risk of several forms of leukemia. Periodic blood tests of occupationally exposed individuals should be conducted.

"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 to fresh air. Give artificial respiration or oxygen if necessary. Seek medical attention.

Skin: Remove roiled clothing immediately. Wash thoroughly with soap and water for at least 5 minutes. Seek medical attention. if necessary.

Eyes: Irrigate eyes with water for at least 15 minutes. Seek medical attention.

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

Note to Physician: Severe exposure may require supportive measures tor pulmonary edema.

FIRE AND EXPLOSION INFORMATION

General: Flammable, vapor may spread considerable distance to a source of ignition and flash back. Ignites at -11°C (12°F).

Explosive Limit: Upper — 7.1%, Lower — 1.3%.

Extinguisher: Carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Contact with strong oxidizers, or iron in the presence of chlorine or bromine.

Conditions to Avoid: Exposure to sources of ignition.

PROTECTIVE MEASURES

Storage and Handling: Protect containers against physical damage. Storage preferred in an outdoor or detached building. If storage is indoor, use a standard flammable liquid storage room.

Engineering Controls: Use only with efficient ventilation.

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear protective rubber clothing, gloves and eye goggles.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece and operated a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers om of spill area. Put on protective clothing and equipment when entering spill area for clean-up. Spread absorbent material on spill, sweep up and keep contained in fiber carton tightly sealed. For final disposal, contact your regional office of the New York State Department of Environmental Conservation.

tor 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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TOLUENE

; information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing OK handling and is *not* designed Lor 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: Methylbenzene, methylbenzol, phenylmethane, toluol; CAS 108-88-3.

Trade Names: Methacide, Antisal I and others.

Used in the manufacture of benzoic acid, benzaldehyde, explosives, dyes and adhesives.

PHYSICAL INFORMATION

Appearance: Clear, colorless liquid,

Odor: Strong, pleasant. **Minimum Detectable by Odor:** 40 ppm.

Behavior in Water: Only a very small amount will mix, the rest will float.

Evaporation: Liquid evaporates very slowly.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure limit -- 200 ppm.

NIOSH Recommended Limit: Average 8 hour exposure -- 100 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- 100 ppm.

Short T :

Inhalation: 100. ppm exposure can cause dizziness, drowsiness and hallucinations. 100-200 ppm can cause depression, 200-500 ppm can cause headaches, nausea, loss of appetite, loss of energy, loss of coordination and coma. In addition to the above, death has resulted from exposure to 10,000 ppm for an unknown time.

Skin: Can cause dryness and irritation. Absorption may cause or increase the severity of symptoms listed above.

Eyes: Can cause irritation at 300 ppm.

Ingestion: Can causa a burning sensation in the mouth and stomach, upper abdominal pain, cough, hoarseness, headache, nausea, loss of appetite, loss of energy, loss of coordination and coma.

Long Term Exposure:

Levels below 200 ppm may produce headache, tiredness and nausea. From 200 to 750 ppm symptoms may include insomnia, irritability, dizziness, some loss of memory, loss of appetite, a feeling of drunkeness and disturbed menstruation. Levels up to 1,500 ppm may Cause heart palpitations and loss of coordination. Blood effects and anemia have been reported but are probably due to contamination by benzene. Most of these effects arc believed to go away when exposure stop.

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: Get person to fresh air. Keep warm and quiet. Give artificial respiration, if necessary. Seek medical attention, if necessary.

Skin: Take oft clothing soaked with liquid. Wash contaminated area with soap and water for at least 5 minutes. Seek medical attention, if necessary.

Eyes: wash with large amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Do not induce vomiting. Give one or two ounces of mineral oil. Seek immediate medical attention. Note: Never force an unconscious person to drink.

Note to Physician: Exposure to toluene at levels greater then 200 ppm may result in hippuric acid levels above 5 gm/liter urine. After elevated exposure, toluene may also be detected in blood.

EXPLOSION INFORMATION

General: Flammable liquid. Fumes ray spread a considerable distance and flash back. Will ignite at 4.4°C, 40°F.

Explosive Limits: Upper Limit -- 7.0%, Lower Limit -- 1.27%.

Extinguisher: water spray. carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Reacts violently with chlorine, permanganate and dichromate.

Conditions to Avoid: Sources of ignition.

PROTECTIVE MEASURES

Storage and Handling: Store outdoors or in a detached building, if possible. If indoors. store in a standard flammable liquid storage room or cabinet. Protect containers from physical damage.

Engineering Controls: Use in well-ventilated area. Eyewash stations, rinks and showers should be readily available,

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear viton, PVA, NBR or polyethylene clothing.

Protective Equipment: For levels up to 1000 ppm use a chemical urtridqc respirator with organic vapor cartridges, a supplied-air respirator. a self-contained breathing apparatus or a powered air-purifying respirator with organic-vapor cartridges. For levels up to 2,000 ppm use a gas mask with an organic vapor canister, a supplied-air respirator with a full facepiece, a self-contained breathing apparatus with a full facepiece or a supplied-air respirator operated in continuous flow mode. For levels above 2000 ppm or at unknown concentrations use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a 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 an organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS OR LEAKS

Get all workers *out* of the spill area. Put on a respirator and other protective clothing.. Spread sand or other absorbent material over liquid to absorb it. Shovel into buckets, take to a safe place in the opn air. Wash area of spill with soap and water. For final disposal contact your regional office of the N.Y.S. Department of Environmental Conservation.

tor more information:

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

APPENDIX B

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

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

Section 10 — Title Page

Work Plan Group: F
Site No.: 9
Site Name: Navy Yard Disposal Area

Prepared by: Mary L. Hiller
Ecology and Environment, Inc.
1203 Governor's Square Boulevard, Suite 401
Tallahassee, Florida 32301

Prepared for: Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 10068
Charleston, South Carolina 29411-0068
Contract Number N62467-88-C-0200

Signature Approvals:

E & E Project Manager: J. Barksdale

B & 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 3.0 — Project *Summary*

Work Plan Group: P

Site No. : 9

Site Name: Navy Yard Disposal Area

Site Description:, A complete site description and history are presented in Sections 2.0 and 3.0 of the attached vork plan.

Phase I — Field Screening
Physical Survey (check all that apply):

- X Overall Physical Reconnaissance
- X HNu/OVA Surface Emission Survey
- X Radiation Survey
- X Habitat/Biota Survey
- ___ Asbestos Survey (in Rubble)
- X Hydrologic Assessment

Geophysical Survey (check all that apply):

- ___ Electromagnetic Conductivity:
  - ___ EH-31 ___ EW-34
- ___ Magnetometry
- ___ Very Lov 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 Vater	___	X Volatile Organic Compounds
Sediaent	___	X Polynuclear Aromatic Hydrocarbons
Soil	1s	X Phenols
Groundvater	6	___ 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 Water	___	Air	___	Duplicates	3
Sediment	___	Biota:		Trip Blanks	2
Soil	18	Flora	___	Field Blanks	2
Groundwater	5	Fauna	___	Rinsate Blanks	2

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
- X Hardness (vater only)
- X Alkalinity
- X Total Suspended Solids (water only)
- X Total Kjeldahl Nitrogen
- X Ammonia Nitrogen
- X Orthophosphate Phosphorus
- X Dissolved Oxygen (in field)
- X 5-day Biological Oxygen Demand
- X 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 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, vhich 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 Screening Analyses						
Volatile Organic Compounds	S/W	--	N/M	N/H	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				
Phenols	S/W	--	N/M	N/M	N/M	N/M
Arsenic	S/W	--	N/M	N/M	N/M	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/M	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 Ealogenated' Hydrocarbons	S/W	EPA 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
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/H	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/N	N/M
Boron	S/W	EPA 6010/200.7	N/M	N/M	N/H	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/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/M
Iron	S/W	EPA 6010/200.7	N/M	N/M	N/M	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/H	N/M
Hanganese	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Hercury	S/W	EPA 7471/245.1	N/M	N/M	N/M	N/M

Analyte	Hedia	Method No.	A	P	C	DL
Nickel	S/W	EPA 6010/200.7	N/M	N/M	N/H	N/M
Selenium	S/W	EPA 77401270.2	N/M	N/M	N/M	N/M
Silver	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Sodium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Thallium	S/W	EPA 78411279.2	N/M	N/M	N/M	N/M
Vanadium	S/W	EPA 6010/200.7	N/H	N/H	N/M	N/M
Zinc	S/W	EPA 6010/200.7	N/M	N/H	N/M	N/M
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	V	EPA 130.2	N/M	N/H	N/M	N/M
Alkalinity	V	EPA 310.1	N/M	N/M	N/M	N/M
Total Suspended Solids	V	EPA 160.2	N/M	N/M	N/M	N/M
Total Kjeldahl Nitrogen	S/W	'EPA 351.3	N/M	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	EPA 365.2	N/M	N/M	N/M	N/M
5-day Biological Oxygen Demand	V	SH 507	N/M	N/M	N/H	N/M
Chemical Oxygen Demand	V	EPA 410.4	N/M	N/M	N/M	N/M
pH	V	EPA 150.1	N/M	N/M	N/M	N/M
Percent Hoisture	S	ASTH D-2216-80	N/M	N/H	N/M	N/
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/H	N/M	N/M
Ash Content	S	ASTH D-482	N/M	N/H	N/M	N/M
Total Halogens	S	ASTH D-808-81	N/M	N/H	N/M	N/M
		EPA 325.3	N/M	N/H	N/M	N/M
Sulfur	S	ASTH D-129-64	N/H	N/M	N/M	N/M
Ignitability	S/W	EPA 1010	N/M	N/M	N/M	N/M
Cation Exchange Capacity	S	EPA 9081	N/M	N/M	N/M	N/M
Field Parameters						
pH	V	Field	N/M	N/M	N/M	N/M
Specific Conductance	V	Field	N/M	N/M	N/M	N/M
Temperature	V	Field	N/M	N/H	N/M	N/M
Dissolved Oxygen	V	&PA 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 CQAPP

*Vith the exception of Total Recoverable Hydrocarbons and Cross 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 belov:

No Uodifications

Section 10.0 — Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GQAPP. Hodifications to these procedures are described belov:

No Uodifications

Section 11.0 -- Internal Quality Control Checks

Internal quality control check procedures are presented in Section 11.0 of the GOAPP. Modifications to these procedures art described belov:

No Uodifications

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	

Section 13.0 -- Preventive Maintenance

Preventive maintenance procedures are presented in Section 13.0 of the GQAPP. Hodifications to these procedures are described below:

No Modifications

Section 14.0 -- Procedures Used to Assess Accuracy, Precision, and Cornpleteness 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. Hodifications to these procedures are described belov:

No Hodifications

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 Hodifications

Appendix A -- Additional Personnel Biographies

Personnel assigned to this site investigation vhose biographies do not appear in the GOAPP are listed belov; biographies for these site personnel are presented on the folloving pages.

To Be Determined

Section 10 -- Title Page

Vork Plan Group: F
Site No.: 10
Site Name: Commodore's Pond

Prepared by: Hary L. Hiller
Ecology and Environment, Inc.
1203 Governor's Square Boulevard, Suite 401
Tallahassee, Florida 32301

Prepared for: Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 10068
Charleston, South Carolina 29411-0068
Contract Number N62467-88-C-0200

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 3.0 -- Project Summary

Work Plan Group: F

Site No.: 10

Site Name: Commodore's Pond

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
- X Radiation Survey
- X Habitat/Biota Survey
- ___ Asbestos Survey (in Rubble)
- X Hydrologic Assessment

Geophysical Survey (check all that apply):

- X Electromagnetic Conductivity:
  - X EM-31 X EM-34
- X Magnetometry
- ___ Very Lov 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. Vater	___	X Volatile Organic Compounds
Sediment	___	X Polynuclear Aromatic Hydrocarbons
Soil	6	X Phenols
Groundwater	3	___ 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 Vater	___	Air	___	Duplicates	2
Sediment	___	Biota:		Trip Blanks	2
Soil	9	Flora	___	Field Blanks	2
Groundvater	2	Fauna	___	Rinsate Blanks	2

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Ealocarbons
- 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
- X Hardness (vater only)
- X Alkalinity
- X Total Suspended Solids (vater only)
- X Total Kjeldahl Nitrogen
- X Ammonia Nitrogen
- X Orthophosphate Phosphorus
- X Dissolved Oxygen (in field)
- X 5-day Biological Oxygen Demand
- X Chemical Oxygen .Demand
- X pH
- X Percent Moisture
- X Grain Size
- X BTU Content
- X Ash Content
- X Total Ealogens
- 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 and their responsibilities 'are listed below:

Site Hanager:
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 Heasurement Data

Criteria for reporting the accuracy, precision, and completeness of data ace 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) cri ter'ia specified in the above-referenced GQAPP 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				
Phenols	S/W	--	N/M	N/M	N/M	N/M
Arsenic	S/W	--	N/M	N/M	N/M	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/M	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	EPA 8010/601	N/M	N/M	N/H	N/M
Volatile Aromatic Hydrocarbons	S/W	EPA 8020/602	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 6 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/H	N/M
Antimony	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Arsenic	S/W	EPA 70601206.2	N/M	N/M	N/M	N/M
Barium	S/W	EPA 6010/200.7	N/H	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/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/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/U	N/H	N/M
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/
Hercury	S/W	EPA 7471/245.1	N/M	N/M	N/M	N/

Analyte	Hedia	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/H	N/M
Silver	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Sodium	S/W	EPA 6010/200.7	N/M	N/M	N/H	N/H
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 6010/200.7	N/H	N/M	N/M	N/M
Cyanide	S/W	EPA 90101335.2	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/M	N/M	N/H
Alkalinity	U	EPA 310.1	N/M	N/M	N/M	N/M
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/M	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/M	N/M	N/M
pH	W	EPA 150.1	N/M	N/M	N/M	N/M
Percent Hoisture	S	ASTM D-2216-80	N/M	N/M	N/M	N/M
Grain Site	S	ASTM D-422-63	N/M	N/M	N/M	N/M
BTU Content	S	ASTM D-2015-77	N/H	N/M	N/M	N/M
Ash Content	S	ASTH D-482	N/M	N/M	N/M	N/M
Total Ealogens	S	ASTH D-808-81	N/M	N/H	N/M	N/H
		EPA 325.3	N/H	N/M	N/M	N/M
Sulfur	S	ASTM D-129-64	N/M	N/M	N/M	N/M
Ignitability	S/W	EPA 1010	N/M	N/M	N/M	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	W	Field	N/M	N/M	N/M	N/M
Dissolved Oxygen	W	EPA 360.1	N/M	N/M	N/M	N/H

Notes: S = Soil and/or sediment
V = Groundwater and/or surface water
N/M = No Modifications 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 — Pieldvork and Sampling Procedures

Fieldvork and sampling procedures are presented in Section 6.0 of the GQAPP. Modifications to these procedures are described' belov:

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 Hodifications

Section 8.0 — Calibration Procedures and Frequency.

Calibration procedures and frequency are presented in Section 8.0 of the GOAPP. Hodifications to these procedures are describe& belov:

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. Uodifications to any other of the analytical procedures are described belov:

No Uodifications

Section 10.0 -- Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GOAPP. 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 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 belov:

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 belov:

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 CQAPP. Modifications to these procedures are described belov:

No Modifications

Section 15.0 -- Corrective Action

Corrective action procedures are presented in Section 15.0 of the COAPP. Modifications to these procedures are described belov:

No Hodifications

Section 16.0 -- Quality Assurance Reports To Management

Quality assurance report procedures are presented in Sec ion 16.0 of the GQAPP. Modifications to these procedures are described belov:

No Hodifications

Appendix A -- Additional Personnel Biographies

Personnel assigned to this site investigation whose biographies do not appear in the CPAPP are listed below; biographies for these site personnel are presented on the following pages.

To Be Determined

Section 1.0 — Title Page

Work Plan Group: F
Site No.: 23
Site Name: Chevalier Field Pipe Leak Area

Prepared by: Mary L. Miller
Ecology and Environment, Inc.
1203 Governor's Square Boulevard, Suite 401
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Prepared for: Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 10068
Charleston, South Carolina 29411-0068
Contract Number N62467-88-C-0200

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 3.0 — Project Summary

Work Plan Group: F

Site No.: 23

Site Name: Chevalier Field Pipe Leak 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
- X Radiation Survey
- X Habitat/Biota Survey
- X Asbestos Survey (in Rubble)
- ___ Hydrologic Assessment

Geophysical Survey (check all that apply):

- X Electromagnetic Conductivity:
  - X EH-31 X EM-34
- X 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	17	X Phenols
Groundvater	7	___ 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 Water	___	Air	___	Duplicates	3
Sediment	___	Biota:		Trip Blanks	2
Soil	21	Flora	___	Field Blanks	2
Groundwater	5	Fauna	___	Rinsate Blanks	2

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Ralocarbons
- X Base/Neutral Extractables
- X Acid Extractables
- ___ Polynuclear Aromatic Hydrocarbons
- X Pesticides
- X Polychlorinated Biphenyls
- X Total Recoverable Hydrocarbons
- X Hetals
- X Cyanide

Additional analytical categories are identified below:

- ___ Gross Alpha
- X Total Organic Carbon
- X Bardness (water only)
- X Alkalinity
- X Total Suspended Solids (water only)
- X Total Kjeldahl Nitrogen
- X Ammonia Nitrogen
- X Orthophosphate Phosphorus
- X Dissolved Oxygen (in field)
- X 5-day Biological Oxygen Demand
- X Chemical Oxygen Demand
- X pH
- X Percent Xoisture
- 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 GOAPP. Site-specific designated personnel and their responsibilities are listed belov:

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 GOAPP. Detection limits for screening and quantitative analyses are presented in Section 9.0 of the GOAPP. 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 GQAPP sections.

Analyte	Media	Method No.	A	P	C	DL
*						
Laboratory Screening Analyses						
Valatile Organic Compounds	S/W	--	N/M	N/M	N/M	N/M
Polynuclear Aromatic Hydrocarbons	S/W	--	N/H	N/M	N/M	N/M
Pesticides	S/W	--	N/M	NfH	N/M	N/M
Polychlorinated Biphenyls	S/W	--	N/M	N/H	N/M	N/M
Total Recoverable Hydrocarbons	S/W	EPA 418.1				
Phenols	S/W	--	N/M	N/M	N/M	N/M
Arsenic	S/W	--	N/M	N/M	N/M	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/M	N/M	N/M
Lead	S/W	--	N/M	N/M	N/M	N/M
Nickel	S/W	--	N/H	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	EPA 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
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
Bery11ium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
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/M	N/M
Cobalt	S/W	EPA 6010/200.7	N/M	N/H	N/M	N/M
Copper	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Iron	S/W	EPA 6010/200.7	N/M	N/H	N/M	N/M
Lead	S/W	EPA 74211239.2	N/M	N/H	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/H	N/M	N/M
Mercury	S/W	EPA 7471/245.1	N/M	N/H	N/M	N/M

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/M
Sodium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Thallium	S/W	EPA 78411279.2	N/M	N/M	N/M	N/M
Vanadium	S/W	EPA 6010/200.7	N/X	N/M	N/M	N/M
Zinc	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
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/M	N/M	N/M
Alkalinity	W	EPA 310.1	N/M	N/M	N/M	N/M
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/M	N/M
Nitrogen-Ammonia	S/W	EPA 350.2	N/M	N/M	N/H	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/M	N/M	N/M
pH	W	EPA 150.1	N/M	N/H	N/M	N/M
Percent Moisture	S	ASTH 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/M	N/M	N/M	N/M
Ignitability	S/W	EPA 1010	N/H	N/M	N/M	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/H
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 Eydrocarbons and Cross Alpha, the laboratory screening analyses do not have EPA method numbers.

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 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. Hodifications 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 belov:

No Hodifications

Section 10.0 — Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GQAPP. Uodifications 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. Uodifications 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 belov:

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 belov:

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 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 below:

No Modifications

Section 16.0 — Quality Assurance Reports to Management

Quality assurance report procedures are presented in Section 16.0 of the GOAPP. 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 belov; biographies for these site personnel are presented on the following pages.

To Be Determined

Section 1.0 -- Title Page

Vork Plan Group: F
Site No. : . 29
Site Name: Soil South of Building *3460*

Prepared by: Mary L. Hiller
Ecology and Environment, Inc.
1203 Governor's Square Boulevard, Suite 401
Tallahassee, Florida 32301

Prepared for: Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 10068
Charleston, South Carolina 29411-0068
Contract Number N62467-88-C-0200

Signature Approvals:

E & E Project Manager: J. Barksdale

E & E QA/QC Director or
Assistant QA/QC Director: T. Yeates/R. Short

ECEASC Director: Al Clifton

E & E QA/QC Project Officer: A. Schuessler

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Section 3.0 -- Project Summary

Work Plan Group: F

Site No.: 29

Site Name: Soil South of Building 3460

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 ___ EM-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	8	X Phenols
Groundwater	3	___ 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 Uater	___	Air	___	Duplicates	3
Sediment	___	Biota:		Trip Blanks	2
Soil	15	Flora	___	Field Blanks	2
Groundvater	4	Fauna	___	Rinsate Blanks	2

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Halocarbons
- X Base/Neutral Extractables
- X Acid Extractables
- ___ Polynuclear Aromatic Rydrocarbons
- X Pesticides
- X Polychlorinated Biphenyls
- X Total Recoverable Eydrocarbons
- X Metals
- X Cyanide

Additional analytical categories are identified below:

- ___ Gross Alpha
- X Total Organic Carbon
- X Hardness (vater only)
- X Alkalinity
- X Total Suspended Solids (vater only)
- X Total Kjeldahl Nitrogen
- X Ammonia Nitrogen
- X Orthophosphate Phosphorus
- X Dissolved Oxygen (in field)
- X 5-day Biological Oxygen Demand
- X 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 and their responsibilities are listed belov:

Site Hanager:
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, vhich 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	Xedia	Method No.	A	P	C	DL
Laboratory Screening Analyses						
Volatile Organic Compounds	S/W	--	N/M	N/H	N/H	N/M
Polynuclear Aromatic Hydrocarbons	S/W	--	N/H	N/M	N/M	N/M
Pesticides	S/W	--	N/M	N/M	N/H	N/M
Polychlorinated Biphenyls	S/W	--	N/M	N/M	N/M	N/H
Total Recoverable Hydrocarbons	S/W	EPA 418.1				
Phenols	S/W	--	N/M	N/M	N/H	N/M
Arsenic	S/W	--	N/M	N/H	N/M	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/M	N/M	N/M
Lead	S/W	--	N/M	N/M	N/M	N/H
Nickel	S/W	--	N/H	N/ti	N/M	N/M
Silver	S/W	--	N/M	N/M	N/H	N/M
Zinc	S/W	--	N/M	N/H	N/M	N/M
Laboratory Analyses						
Volatile Halogenated fiydrocarbons	S/W	EPA 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
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 Hetals:						
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 70601206.2	N/M	N/M	N/M	N/M
Barium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Bery11ium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
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/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/M
Iron	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Lead	S/W	EPA 7421/239.2	N/M	N/M	N/M	N/M
Hagnesium	S/W	EPA 6010/200.7	N/M	N/H	N/M	N/M
Wanganese	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/
Hercury	S/W	EPA 7471/245.1	N/M	N/H	N/M	N/

Analyte	Media	Hethod No.	A	P	C	DL
Nickel	S/W	EPA 6010/200.7	N/H	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/M
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/H	N/M	N/M	N/M
Zinc	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Cyanide	S/W	EPA 9010/335.2	N/M	N/H	N/M	N/M
TOC	S/W	EPA 9060/415.1	N/H	N/M	N/M	N/M
Hardness	V	EPA 130.2	N/M	N/M	N/M	N/M
Alkalinity	W	EPA 310.1	N/H	N/M	N/M	N/M
Total Suspended Solids	W	EPA 160.2	N/M	N/M	N/M	N/M
Total Kjeldahl Nitrogen	S/W	EPA 351.3	N/H	N/M	N/M	N/M
Nitrogen-Ammonia	S/W	EPA 350.2	N/M	N/M	N/M	N/H
Orthophosphate Phosphorus	S/W	EPA 365.2	N/M	N/M	N/M	N/M
5-day Biological Oxygen Demand	W	SH 507	N/H	N/H	N/M	N/M
Chemical Oxygen Demand	W	EPA 410.4	N/M	N/M	N/M	N/H
pH	W	EPA 150.1	N/M	N/M	N/M	N/M
Percent Moisture	S	ASTM D-2216-80	N/M	N/H	N/M	N/M
Grain Size	S	ASTM 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/H
Ash Content	S	ASTM D-482	N/M	N/M	N/M	N/M
Total Halogens	S	ASTM D-808-81	N/H	N/M	N/M	N/M
		EPA 325.3	N/M	N/M	N/M	N/M
Sulfur	S	ASTM D-129-64	N/H	N/M	N/M	N/H
Ignitability	S/W	EPA 1010	N/M	N/M	N/M	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	W	Field	N/M	N/M	N/M	N/M
Dissolved Oxygen	W	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 Rydrocarbons 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. Hodifications to these procedures are described belov:

No Modifications

Section 7.0 — Sample Custody

Sample custody procedures are presented in Section 7.0 of the GQAPP. Wodifications to these procedures are described belov:

No Hodifications

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 belov:

No Hodifications

Section 9.0 -- Analytical Procedures

Screening and quantitative analytical procedures are presented in Section 9.0 of the CQAPP. 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 belov:

No Uodifications

Section 10.0 -- Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting procedures are presented in Section 10.0 of the GQAPP. Hodifications 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. 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 GQAPP. Specific audits planned for this site investigátion are listed belov:

Audit Type	Frequency/Date	Description
	To Be Determined	

Section 13.0 — Preventive Maintenance

Preventive maintenance procedures are presented in Section 13.0 of the GOAPP. Modifications to these procedures are described belov:

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 CQAPP. Modifications to these procedures are described belov:

No Modifications

Section 15.0 — Corrective Action

Corrective action procedures are presented in Section 15.0 of the GQAPP. Hodifications 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 belov:

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 1.0 — Title Page

Work Plan Group: F
Site No. : 34
Site Name: Solvent North of Building 3557

Prepared by: Mary L. Miller
Ecology and Environment, Inc.
1203 Governor's Square Boulevard, Suite 401
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Prepared for: Department of the Navy
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Contract Number N62467-88-C-0200

Signature Approvals:

E & E Project Manager: Jf Barksdale

E & E QA/QC Director or Assistant QA/QC Director: T. Yeates/B. Short

E 6 E ASC Director: A. Clifton

E & E QA/QC Project Officer: A: Schuessler

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Section 3.0 — Project Summary

Work Plan Group: F

Site No.: 34

Site Name: Solvent North of Building 3557

Site Description: A complete site description and history are presented in Sections 2.0 and 3.0 of the attached vork 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 Eydrologic Assessment

Geophysical Survey (check all that apply):

- X Electromagnetic Conductivity:
  - X EM-31 X EM-34
- X Hagnetometry
- ___ Very Lov Frequency
- ___ Ground Penetrating Radar
- ___ Seismic Refraction
- ___ Seismic Reflection

Analytical Screening (check all that apply):

- ___ Field Analyses:
- ___ Soil Readspace 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	12	X Phenols
Groundwater	5	___ Organophosphorus Pesticides
Duplicates	2	___ Chlorinated Berbicides
Trip Blanks	___	___ Carbamates
Field Blanks	___	X Pesticides/Polychlorinated Biphenyls
Rinsate Blanks	___	X Total Recoverable Bydrocarbons
Other	___	X Metals
		___ Gross Alpha

Section 3.0 -- Project Summary (Continued)

Phase II -- Characterization

PLANNED NUMBER OF SAMPLES

Surface Water	___	Air		Duplicates	3
Sediment	___	Biota:		Trip Blanks	2
Soil	18	Flora	___	Field Blanks	2
Groundwater	6	Fauna	___	Rinsate Blanks	2

CATEGORIES OF ANALYSES

- X Purgeable Aromatics
- X Purgeable Halocarbons
- X Base/Neutral Extractables
- X Acid Extractables
- ___ Polynuclear Aromatic Eydrocarbons
- 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
- X Hardness (water only)
- X Alkalinity
- X Total Suspended Solids (water only)
- X Total Rjeldahl Nitrogen
- X Ammonia Nitrogen
- X Orthophosphate Phosphorus
- X Dissolved Oxygen (in field)
- X 5-day Biological Oxygen Demand
- X Chemical Oxygen Demand
- X pH
- X Percent Hoisture
- 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 and their responsibilities are listed belov:

Site Manager:
Team/Task Leader(s): To Be Determined
Field Support Personnel:

Biographies for those personnel listed above vhich 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 aedia, and method numbers relevant to the investigation of this site are listed in the folloving table, vhich 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
at Screening Analys	*					
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 Bydrocarbons	S/W	EPA 418.1				
Phenols	S/W	--	N/M	N/M	N/M	N/M
Arsenic	S/W	--	N/M	N/M	N/M	N/M
Cadmium	S/W	--	N/M	N/M	N/M	N/M
Chromium	S/W	--	N/M	N/M	N/H	N/M
Copper	S/W	--	N/M	N/M	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	EPA 8010/601	N/M	N/M	N/M	N/M
Volatile Aromatic Eydrocarbons	S/W	EPA 8020/602	N/M	N/M	N/M	N/M
TCL Purgeables + xylenes	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 70601206.2	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/M	N/M	N/M	N/M
Cadmium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/H
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/H	N/M	N/M	N/M
Copper	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
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
Hagnesium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Hanganese	S/W	EPA 6010/200.7	N/N	N/M	N/M	N/M
Mercury	S/W	EPA 7471/245.1	N/M	N/M	N/M	N/M

Analyte	Media	Xethod No.	A	P	C	DL
Nickel	S/W	EPA 6010/200.7	N/M	N/H	N/M	N/M
Selenium	S/W	EPA 77401270.2	N/M	N/M	N/M	N/M
Silver	S/W	EPA 6010/200.7	N/M	N/H	N/M	N/M
Sodium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Thallium	S/W	EPA 78411279.2	N/M	N/H	N/M	N/M
Vanadium	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Zinc	S/W	EPA 6010/200.7	N/M	N/M	N/M	N/M
Cyanide	S/W	€PA 9010/335.2	N/M	N/M	N/M	N/M
TOC	S/W	EPA 9060/415.1	N/M	N/M	N/H	N/M
Hardness	W	EPA 130.2	N/M	N/M	N/M	N/M
Alkalinity	W	EPA 310.1	N/M	N/M	N/M	N/M
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/M	N/M
Nitrogen-Ammonia	S/W	EPA 350.2	N/M	N/M	N/H	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/H	N/M	N/M	N/M
Chemical Oxygen Demand	W	EPA 410.4	N/M	N/H	N/M	N/H
pH	V	EPA 150.1	N/M	N/M	N/M	N/[illegible]
Percent Moisture	S	ASTH D-2216-80	N/M	N/M	N/M	N/[illegible]
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	W	ASTH D-808-81	N/M	N/H	N/M	N/M
		EPA 325.3	N/M	N/M	N/M	N/M
Sulfur	S	ASTH D-129-64	N/M	N/H	N/M	N/M
Ignitability	S/W	EPA 1010	N/M	N/H	N/M	N/M
Cation Exchange Capacity	S	EPA 9081	N/M	N/H	N/H	N/M
Field Parameters						
pH	V	Field	N/M	N/M	N/M	N/M
Specific Conductance	W	Field	N/M	N/M	N/M	N/M
Temperature	W	Field	N/H	N/M	N/M	N/M
Dissolved Oxygen	W	EPA 360.1	N/M	N/M	N/M	N/M

Notes: S = Soil and/or sediment
W = Groundwater and/or surface water
N/M = No Hodifications from GQAPP

With the exception of Total Recoverable Hydrocarbons and Gross Alpha, the laboratory screening analyses do not have EPA method numbers.

Section 6.0 -- Pieldvork and Sampling Procedures

Fieldwork and sampling procedures are presented in Section 6.0 of the GQAPP. Hodifications to these procedures are described below:

No Modifications

Section 7.0 -- Sample Custody

Sample custody procedures are presented in Section 7.0 of the GOAPP. Modifications to these procedures are described belov:

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 0.0 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:

No Hodifications

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 Uodifications

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 ate presented in Section 12.0 of the GOAPP. Specific audits planned for this site investigation are listed belov:

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. Hodifications to these procedures are describhd below:

No Hodifications

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 belov:

No Modifications

Section 15.0 -- Corrective Action

Corrective action procedures are presented in Section 15.0 of the GQAPP. Hodifications to these procedures are described below:

No Modifications

Section 16.0 -- Quality Assurance Reports to Hanagement

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 vhose biographies do not appear in the GQA'PP 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 PENSACOLA

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

APPENDIX C

THREATENED AND ENDANGERED FLORA N D 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 2	Gulf coast, estuarine
Ammocrypta asprella	Crystal darter	U	T	UR 2	Fresh uator
Etheostoma hirtrio	Harelquin darter	U	SSC		Fresh uator
Fundulus jenkinsi	Salt marsh topminnow	P	SSC		Salt, fresh, brackish waters
Lepisosteus spatula	Alligator gar	U	SSC		Brackish, fresh, salt uator
Moxostoma carinatum	River redhorse	U	SSC		Fresh uator
AMPHIBIANS AND REPTILES					
Alligator mississippiensis	American Alligator	R	SSC	T(S/A)	Swamps, marshes, ponds
Caretta caretta caretta	Loggerhead turtle	M ?	T	T	Marine, coartal
Chelonia mydas mydas	Green turtlo	M ?	E	E	Marine, coartal
Dermochelys coriacea	Leatherback turtlo	M	E	E	Marine, coastal
Drymarchon corais couperi	Eastern indigo snake	P	t	T	Open areas near water
Eretmochelys imbricata	Hawksbi11 turtle	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, ponds
Lepidochelys kempi	Atlantic ridley •	M ?	E	C	Marine, coartal
Rana areolata aesopus	Florida gopher frog	P	SSC	UR 2	Sand hill communities
Macroclemys temmincki	Alligator snapping turtle	SR	SSC	UR 2	Swamps, marshes, ponds
MAMMALS					
Mustela vison lutensis	Florida mink	U		UR 2	Terrestrial habitats
Peromyscus polionotus trissyllepsis	Perdido Key beach mouse	N/A	T	E	Beach dunes
Trichechus manatus latirostris	West Indian manatee	n	E	E	Atlantic and Gulf coasts
Ursus americanus floridanus	Florida black boar	N/A	T	UR 2	Titi swamps

400 0

Appendix C (Cont).

Scientific Name	Common Name	Base status	statu. FGFWFC(or FDA)	USFWS	Habitat
BIRDS					
Charadrius melodus	Piping Plover	P	T	T	Open dry, sandy beaches
Charadrius alexandrinus	Snowy plover	P	T	UR 2	Open dry, sandy beaches
Dendroida doninica stoddardi	Stoddard's yellow-throated warbler	P-U		UR 2	Woodod habitats
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 wetlands
Egretta thula	Snowy egret	P-U	SSC		Freshwater/coastal wetlands
Grus canadensis pratensis	Florida sandhill crane	U	T		Freshwater wetlands
Falco peregrinus tundrius	Arctic peregrine falcon	M	E	T	Winters on coasts
Falco sparverius paulus	Southoastorn kestrel	R	T	UR 2	Open pine forests, clearings
Haematopus palliatus	American oystercatcher	P-U	SSC		Open coastal beaches
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 woodpecker	P-u	T	E	Cavity nests/old pine stands
Vermivora bachmanii	Bachmann's warbler	U	E	E	Woodod habitats
Campephilus principalis	Ivory-billed woodpecker	U	E	E	Woodod habitats
Sterna antillarum	Least torn	U	T		Coastal habitats
Mycteria americana	Wood stork	U	E	E	Freshwater/coastal wetlands
Rostrhamus sociabilis	Snail kite	U	E	E	Freshwater/coastal wetlands
INVERTEBRATES					
Copris gopheri	Scarab beetle	P		UR 2	Associated w/Gopher Tortoise

Appendix C (Cont.)

Scientific Name	Common Name	Base Statu.	FGFWFC (or FDA) statu.	USFWS	Habitat
PLANTS					
Chrysopsis gossypina cruiseana	Cruise's golden-artor	P	C	UR 1	Coastal dunes
Drosera intermedia	Spoon-leaved sundew	R	T		Aquatic habitats
Epigaea repens	Trailing arbutus	U	C		Dry, acid, sandy soil
Kalmia latifolia	Mountain laurel	U	T		Rich, moist, shady uoodr
Liliaeopsis carolinrnrir	Carolina liliaeopsis	R		UR 2	
Lilium iridollae	Panhandle lily	U	C	UR 2	Black, mucky soils
Pinguicula planifolia	Chapman's buttorwort	U	RE	UR 2	
Polygonella macrophylla	Large-leaved jointwood	R	T	UR 1	Sand pino-oak rcrub
Rhododendron austrinum	Orange azalea	U	E	UR 5	Moist, woody habitats
Sarracenia leucophylla	mito-top pitchorplant	R	E		Open acid bogs
Sarracenia rubra	Sweet pitcharplant	U	C	UR 2	Acid bogs/slash pine woods
Stewartia malacodnrdron	Silky camellia	U	E		Slopes of wooded ravines

C = Endangered
T = Threatened
UR 1 = Undor 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 provon to bo more widespread than was previously believed and/or thoro species that are not subject to any identifiable threat.
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 = = Status of sp cies o the NAS P ope ole f c ity
R = Resident.
M = Migrant.
SR = Suspected resident.
P = Possible resident due to available habitat; survey required.
U = Unknown, survey requi ed
N/A = Not e ɔ ctad to occur on the NAS Pensacola f <ility