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Mr. Thomas M. Moody
Florida Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, FL 32501-[illegible]

Subj: ADDENDUM RESPONSE TO OCTOBER [illegible], 1984 LETTER ADDRESSING THE CONFIRMATION STUDY (VERIFICATION PHASE) OF THE NAVY ASSESSMENT AND CONTROL OF INSTALLATION POLLUTANTS (NACIP) PROGRAM FOR NAS PENSACOLA, FL

Dear Mr. Moody:

In response to your letter of 30 October 1984 to Mr. E. A. Pike concerning the Phase II Confirmation Study (Verification) of the NACIP Program for NAS Pensacola, the attached response is forwarded. This document provides the information necessary to complete the first step (Verification) of the Confirmation Study. The second step of the Confirmation Study (Characterization) is designed to determine the nature and extent of contamination at sites requiring additional study. If it is determined that remedial action will be required for an identified study site, the Characterization Study will also recommend such measures.

The FDER is invited and encouraged to join Geraghty & Miller, Inc. in the field when the Characterization work begins. After the site work has been accomplished, the Characterization Report will be completed in approximately four months. At that time, a meeting will be scheduled with FDER to discuss the study findings and plans for Phase III, Remedial Action/Long Term Monitoring.

Should you have any questions, please feel free to contact Mr. A. L. Chestnut at the above telephone number.

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Sincerely,

[illegible] P.E.
[illegible] Branch

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Enclosure

Copy to:
[illegible] Pensacola (Mr. Pike)

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ADDENDUM RESPONSE
NAVY ASSESSMENT AND CONTROL OF INSTALLATION POLLUTANTS PROGRAM
PHASE II (VERIFICATION)

Your letter of October 30, 1984 addressed e number of areas concerning the Phase I Initial Assessment Study (IAS) and the Phase II Confirmation Study (CS) (Verification) which we would like to explain.

The first questions raised in the Department's letter concerns the selection of study sites between the Phase I IAS and the Phase II (CS) Verification. In the IPS, 29 sites (sites 1-29) were identified and evaluated of which seven were recommended for further study. These recommendations were reviewed in a meeting of 17 November 1983, attended by Navy and FCEE officials. During this meeting, it was agreed that 11 additional sites would be included in the Verification study. Subsequently, chemical anclyses became available which showed that site 21 was not in need of further study. This evidence was included in a letter of January 3, 1984 from the Navy to FDEP and the site was dropped from consideration. While the Qerificaticn study was in progress, a solvent spill occurred and it was included in the study BE site 34. The verification study, therefore, involved 18 sites of which nine were recommended for further investigation in the Characterization study. This chronology is summarized in Table 1 (quick reference) and Table 2 (detailed reference), which show the status of each site at each stage of the NACIP program to date.

We feel the rationale for deleting some of the sites is justified based upon a number of considerations, including (1) the remote location of the sites and their proximity to drinking water well supplies, (2) the potential far human contact with the site, (3) the probable inevitable hydrologic fate of potential contaminants which may discharge to surface water, (4) the elevated rates of volatilfzation characteristic of fuel components, and (5) the documented rates of biodegradation common to fuel constituents.

The Department's letter also addressed the need to take additional core samples at sites 2 (storm train outfall) and 30 (Building 645/755). The apparent rational for this suggestion is to assess the accumulation of contaminants in deeper sediment. During the period of the study, ten sediment samples have been taken at this former discharge rite (4 during the IAS and 6 during the Verification study). Results from total metal analyses (Phase I, IAS) showed very low metal levels with the exception of lead. The follow-up sediment testing for EP toxicity showed all sample stations below detection limits for EP toxicity.

Site 30 represents the potential contribution of plating wastes which could have been discharged from the mid-1940's through the early 1970's. Although not evaluated in the IAS, this site was sampled during the Phase II Verification study for metals using the extraction procedure. The results show no detectable EP toxicity levels fer tic, chromium, nickel, silver, lead, copper, and cyanide, with very low levels of cadmium (0.01-0.05 mg/l) and magnesium (0.5 to 7 mg/l).

Because of dredging to maintain the shipping channel in Pensacola Bay, it is not likely that appreciable sediment has accumulated at site 2 in recent years. The stream at site 30, in which sediment samples were taken, is in an erosional stage, and therefore is not likely to contain an accumulation of sediment. It seems doubtful that resampling these sites would be productive because of their geologic settings.

The analytical data (see above) is supported by historical records which show the bottom contour of the site 3 are (Figures 2 and 3). USC and GS contour maps for 1947 and 1976 show no significant change in depth in the vicinity of the site. A comparison between these years (29 years) provides valuable insight to the potential deposition of particulate matter in the water column in this area. Furthermore, the data does not support the idea that the sediments could accumulate toxic levels of metals discharged from the Naval Rework Facility.

In the Phase II Verification study, we considered the risk of four fuel spill sites (Site 3, Crash Crew Training Area; Site 23, Chevalier Field; Site 19, Fuel Farm Pipeline Leak; and Site 22, Refueler Repair Shop Disposal Site) and found no need for additional study based upon hydrologic investigation and chemical data substantiating the absence of free product or volatile organics.

Our considerations of these sites to conclude "no further study recommended" is also based upon a variety of published articles that address the biodegradative fate of petroleum products.

Bacteria and a variety of other organisms do not metabolize hydrocarbons in a concentrated form. This principle is true whether the source is simple sugars like glucose or compounds more complex such as petroleum distillates characteristic of the spill areas at the Naval Base. In order for biodegradative activity to proceed, the concentration of the original material must decrease to levels that can be assimilated by soil micro-organisms. This is accomplished through synthesis and modification of enzyme systems which will specifically oxidize the carbon source which say confront the soil bacteria or fungi.

Native bacteria require several months to a year to develop these systems. Our hydrologic evaluations demonstrate the absence of concentrated product since free product was never isolated from soil samples at the sites (see above) and volatile organic constituents were not detected. Placing in perspective the time interval prior to our investigations [Site 3 (2 to 19 years), Site 19 (26 years), Site 22 (7 to 26 years), and Site 23 (15 to 16 years)], it is very likely that the petroleum spill sites now reflect a progressive biodegradtion-assimilation of the hydrocarbon by native soil bacteria and the ever present physical/chemical precesses of dilution and attenuation.

The decomposition of petroleum components in soil has been evaluated by many authors. Microbial decomposition studies demonstrate the ability of ubiquitous gram negative rods to oxidize hydrocarbons from fuels (Beerstecher, 1954; Davis and Raymond, 1961; Fuhs, 1961; Jones and Edington, 1968; and Stirling and Watkinson, 1977) and have growth capabilities in soils and sediments saturated with oil (Carlson et al.; Kincannon, 1972) Gossen and Parkinson, 1974; Westlake, et al., 1974; and Denser;, 1975). These studies have been supported by research contributions describing the degradative activities of fungi (e.g., Aspergillus, Beerstecher, 1954; Foster, 1962; Jones and Edington, 1968; and Klug and Markovetz, 1971) and yeasts (e.g., Candida, Miller et al., 1964; Klug and Markovetz, 1971; Jones and Edington, 1968; Trichosporon, Klug and Markovetz, 1971).

Very few hydrocarbons are completely resistant to microbial attack (Haines and Alexander, 1974) and some soil microbes have been found to oxidize hydrocarbon chains up to 44 cartons

The decomposition rates of oil and hydrocarbons in soil are dependent upon the solubility of the hdyrocarbon and the availability of nutrients and oxygen in the soil. Published rates of hydrocarbon degradation by soil microbes vary as a function of type of hydrocarbon released and the chemical limitations of growth. Chemical evidence collected during this investigation show very little or no residual fuel product in the ground and would support reported degradation rates of 12% oil volume loss between 0-116 days (Francke and Clarke, 1979).

The documented features (described below) of petroleum microbial degradation offer credance to the concept that the oil and fuel spill areas have undergone a progressive decrease in concentration with time by predictable phases of biological oxidation by soil microbes.

In addition to biotic considerations, a variety of abiotic factors will effect the ultimate concentration of petroleum constituents in time.

Volatilization. Significant concentrations of lighter fractions in both crude oil (20-40%) and aviation fuel (40-60%) may be lost between several days to several weeks (Kinney et al., 1969; Schwendinger, 1968; MacKay et al., 1974; Rowell, 1975; McGill and Rowell, 1977a).

Photooxidation. Photooxidation, although limited in the destruction of organic matter when discharged to soil, could be important as a primary step in rendering high-molecular weight oil fractions more biodegradable (Jones et al., 1974).

Wo fee? the evaluation of fuel spill sites can best be examined for potential health risk following a sampling of the most recent case (site 19). To this end, an analysis for BTX (benzene, toluene, xylene) is justified for this location. Should the analyses detect levels above Florida drinking water standards, then additional sites should be evaluated. Should analytical results report levels below detection, then sites of higher priority should be pursued.

Site 9, a Navy disposal site used between 1917 and the early 1930's, rill not pose an organfc contaminant rist tc drinking water supplies at the base and we recommend no further inquiry.

Concerning the validity of the extraction procedure for PCBs at site 17, EPA Method 8080 was used as described in the EFA Methods Manual of July 1982, SW 846, 2nd Edition.

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McGill, W.B., and Rowell, M.J. (1977a). Extraction of oil from soils in The Reclamation of Agricultural Soils after Oil Spills, Part 1: Research (J.A. Toogood, Ed.). Alberta Institute of Pedology Pub. No. M-77-11, Dept. of Soil Sci., University of Alberta, Edmonton, pp. 69-78.

MacKay, D., Charles, M.E., and Phillips, C.R. (1974). The Physical Aspects of Crude Oil Spills on Northern Terrain. Environ. Soc. Comm., Northern Pipelines, Task Force on Northern Oil Development Report No. 73-42, Inform. Can. Cat. No. R72-9173.

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Stirling, L.A., and Watkinson, R.J. (1977). Microbial metabolism of alicyclic .hydrocarbons: Isolation and properties of a cyclohexane-degrading bacterium. J. Gen. Microbiol. 99:119-125.

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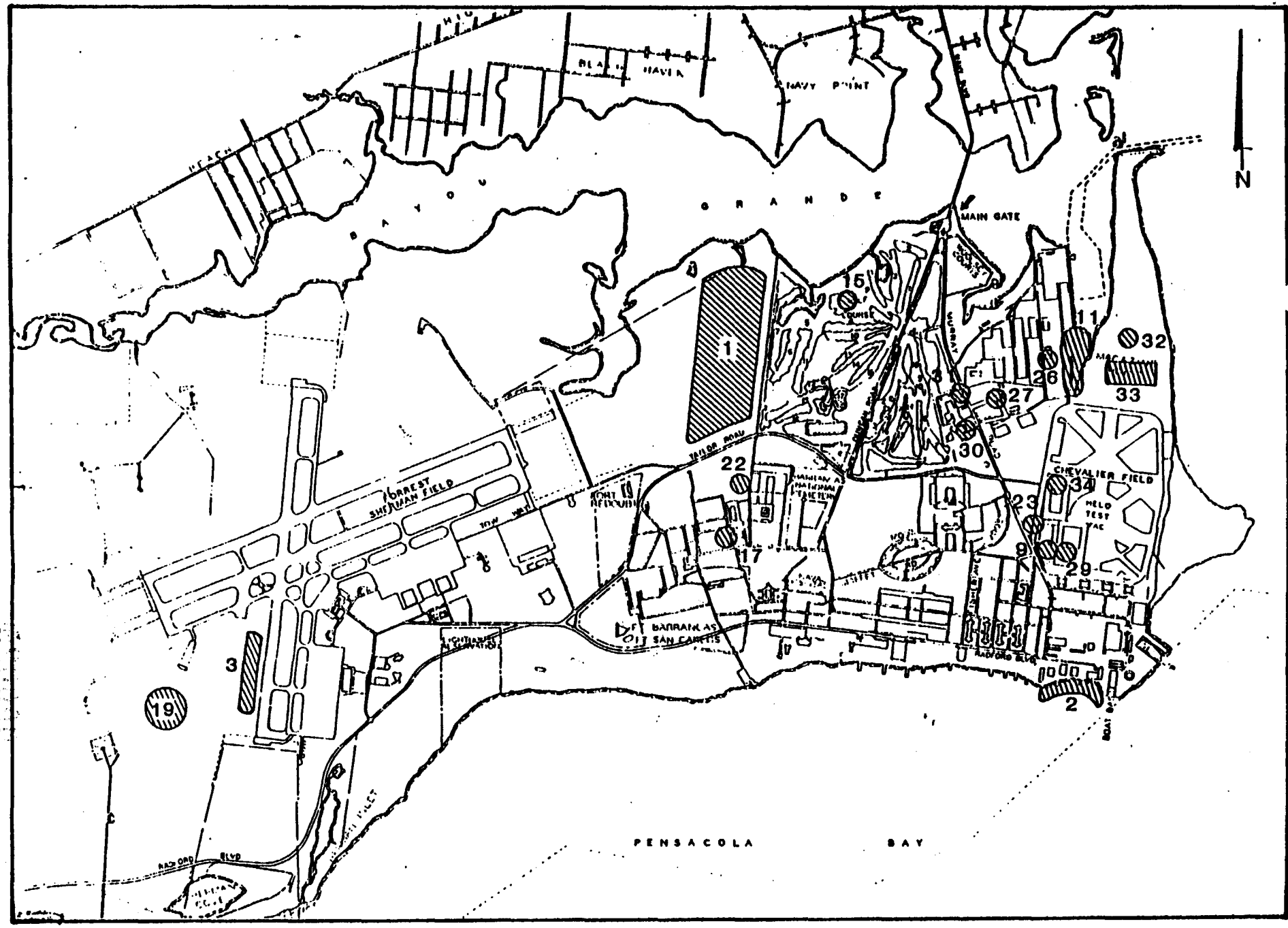


Figure 1. Locations of Sites Evaluated During the Verification Phase of the Confirmation Study.

Geraghty & Miller, Inc.

Table 1

| No. | | IAS (Phase I) Sites Recommended For Study | FDER/Navy Meeting Nov. 17, 1983 Sites Recommended For Study | Verification (Phase II) Sites Studied | Verification (Phase II) Sites Recommended for Characterization Study |
|---|---|---|---|---|---|
| 1 | Landfill | x | x | x | x |
| 2 | Waterfront | | x | x | |
| 3 | Crash Crew | | x | x | |
| 4 | Rubble | | | | |
| 5 | Borrow pit | | | | |
| 6 | Redoubt | | | | |
| 7 | Fire school | | | | |
| 8 | Rifle range | | | | |
| 9 | Navy yard | | x | x | |
| 10 | Commodore P. | | | | |
| 11 | N. Chevalier | x | x | x | x |
| 12 | Scrap bins | | | | |
| 13 | Mag. Point | | | | |
| 14 | Dredge spoil | | | | |
| 15 | Pesticide | | x | x | x |
| 16 | Brush disposal | | | | |
| 17 | Transformer | x | 4 | x | |
| 18 | PCB spill | | | | |
| 19 | Fuel pipeline | | x | x | |
| 20 | Berthing pier | | | | |
| 21 | Fuel tank sludge | x | x | | |
| 22 | Refueler | x | x | x | |
| 23 | Chevalier | | x | x | |
| 24 | DDT | | | | |
| 25 | Radium spill | | | | |
| 26 | Supply Dept. | | x | x | x |
| 27 | Dial shop | x | x | x | x |
| 28 | PCB spill | | | | |
| 29 | Bldg. 3460 | x | x | x | |
| 30 | Bldg. 649/755 | | x | x | |
| 31 | Bldg. 648 | | x | x | x |
| 32 | Sludge beds | | x | x | x |
| 33 | Ponds | | | x | x |
| 34 | Bldg. 3557 | | | x | x |

Table 2

NAVY VERIFICATION AND CONFIRMATION STUDY

| Site Number | Description | Years Active | IAS Conclusions | IAS Proposed Action |
|---|---|---|---|---|
| | | | PHASE I | |
| 1 | Sanitary Landfill | 1950-1972 | Leachate produced which may pose a threat. | Further investigation |
| 2 | Waterfront Sediments | 1939-1972 | Trace amounts of contaminants detected. However, this discharge stopped a decade ago. | No further investigation |
| 3 | Crash Crew Training Area | 1955-1982 | Only localized contamination - no significant risk. | No further investigation |
| 7 | Firefighting School | Active | Hazardous materials not rad. Poses no threat. | No further investigation |
| 9 | Navy Yard Disposal Site | 1917-1930 | A trash-refuse disposal area. No threat posed. | No further investigation |
| 11 | North Chevalier Field Disposal Sib | 1930-1940's | A refuse burning site for industrial waste. | Further investigation |
| 14 | Dredge Spoil Fill | | Owned by the State of Florida, perhaps containing contaminated sediments. | No further investigation |
| 15 | Pesticide Rinseate Disposal Site | 1963-1979 | Pesticides rinsed were dilute and have not affected nearby foliage. Poses no threat. | No further investigation |
| 17 | Transformer Storage Yard | 1964-1976 | PCB storage area which may have contaminated ground waters. | Further investigation. |
| 19 | Fuel Farm Pipeline Leak | W 8 | Jet oil spill in a shallow water table without potable wells. Poses no threat. | No further investigation |
| 20 | Berthing Pier Pipeline Leak | | Leak repair was performed and oil contaminated roil removed. Pam no threat. | No further investigation |
| 21 | Sludge Disposal at Fuel Tank Area | 1940-1960 | Tetraethyl led disposed to an unrestricted area. Health risk may be posed. | Further investigation |
| 22 | Refueler Repair Shop Fuel Disposal Site | 1958-1977 | Aircraft fuel and tetraethyl lead disposed in accessible area. May pose health risk. | Further investigation |
| 23 | Chevalier Field Pipeline Leak | 1968-1969 | An oil leak in an unaccessible area. posing no immediate health risk. | No further investigation |
| 26 | Supply Department Outside Storage | Up to 1964 | Industrial chemicals leaked to roil in an area not posing a health risk. | No further investigation |
| 27 | Radium Dial Shop Sanitary Sewer | 1970's-1975 | Sewer used to dispose of radium may pose threat to that portion of the sewer. | Further investigation |
| 29 | Soil South of Building 3460 | 1981 | Minor skin burns received from soil excavation site. May pose a threat. | Further investigation |
| 30 | Building 649/755 | 1940's-1970's | Not considered in Us. | |
| 11 | Building 648 | 1949-1973 | Not considered in IAS. | |
| 32 | Industrial Sludge Drying Beds | | Not considered in IAS. | |
| 13 | Wastewater Treatment Ponds | | Not considered in IAS. | |
| 34 | Building 3557 | 1984 | Not considered in IAS. | |

## .Table 2 (Continued)

NAVY VERIFICATION & CONFIRMATION STUDY

| Site Number | DER, Navy, G&M meeting 11/21/83 as summarized in 1/3/84 letter. | PHASE II | DER October 10, 1984 Recommendations |
|---|---|---|---|
| 1 | No change | hree mort deep wells to be installed into lower *sard.* Clay samples will be tested by permeameter o determine vertical hydraulic conductivity. Water levels will be compared between deep and shallow ells to determine vertical hydraulic conductivity. New wells will be teste3 for priority pollutants nd water levels. G&M wells will be tested for VOC, pH, and specific conductance, | |
| 2 | Added | ix additional bottom sediment samples taken and showed negligible concentrations of metals. Further tudy not recommended | Additional Core Samples |
| 3 | Added | ighteen shallow brings and six monitor wells installed. Ground-water samples taken and analyzed for OCs detected in low concentrations in 3 wells. No further studies recommended, | BTX |
| 7 | Deleted. No further study. | | |
| 9.23, 29,34 | 9, 23, 29, 34 to be combined due to proximity, | our monitor wells were installed. Ground-water samples showed VOCs at low concentrations in a down-tream ditch. No VOCs were found in ground waters. Further study not recommended, (see site #34 elow) | BTX |
| 11 | No change | edimant samples showed cadmium, chromium, mercury, nickel and lead at high levels. Quality of round water good. VOCS found in 3 wells; no constituent above 22 ppb. EP toxocity showed concentra-tions chromium, lead, iron, silva, nickel, copper, manganese at level higher than found in seawater, ecommendations include 5 additional shallow monitor wells an3 1 deep well below marine clay. Wells o be sampled for VOCs and metals. | |
| 14 | No change | | |
| 15 | Added | oil samples taken at various depths show a consistant decrease in tl! concentration of pesticides ith depth. Arsenic levels exceeded EO Toxicity stardard of 5 ppm. Recommendation includes 10 nore shallow brings for soil-arsenic analysis and 2 shallow monitor wells (downgradient) for rsenic and pesticides analysis. | |
| 17 | Added | hree borings were drilled through the pavement an3 soil samoles analyzed for PCBs. Arochlor 1260 was found in the catch basin only at 9 ppm. Results show PCBs had not permeated the pavement and affected area is restricted to a small area, the catch basin. Strong adsorption of PCBs to soil ard slow ate of biodegradation suggests area be noted in base master plan with no further study. | |
| 19 | Added | Eleven borings and 4 monitor wells installed to measure thickness of free products and fuel odor. Fuel odor was detected in an isolated area of dead trees and no free product found. Rapid rates of evaporation, biodegradation, and remoteness of site do not prompt further evaluation of this 25-year old spill site. | BTX |
| 20 | Continue recovery operati ith no additional action. | | |
| 21 | No further action require | | |
| 22 | No change | ifteen borings drilled to determine extent of fuel. No free product found while odor was detected in a small area. The elevated water table, high rates of evaporation and biodegradation combine to suggest no further study at this site. | BTX |
| 23 | Added (See Site #9) | | BTX |
| 26 | Added | | |
| 27,31 | No change | Hydrologic proximity provided opportunity to evaluate sites 27 and 31 together. Ground-water samples from site showed various concentrations of chlorinated hydrocarbons (up to 29 ppb) with no levels of gross alpha abov e the FDER primary drinking-water standards. Three shallow monitor wells and one deep well are recommended to be installed ard analyzed for VOCs. | |
| 29 | Added (See Site #9) | | BTX |
| 30 | Added | Four sediment samples from ditch adjacent to metal plating shops analyzed for metals and cyanide. Cadmium, magnesium, and copper were found at very low levels. Pollutants for this source are believed confined to ditch. Metals have *been* confined and immobilized m ditch and therefore require no further study. | Additional core Samples |
| 31 | Added (See Site #27) | | |
| 32, | Added | This site has been identified as RCRA hazardous uaste surface impoundment and study is being initiated by G&M to assess extent and concentration of contaminants and rate of movement. | |
| 33 | Added (See Site #32 | | |
| 34 | Added | Three shallow monitor wells and one deep well are recommended. Wells should be sampled for VOCs quarterly, surf ter samples should also be taken for VOCs, quarterly. | |

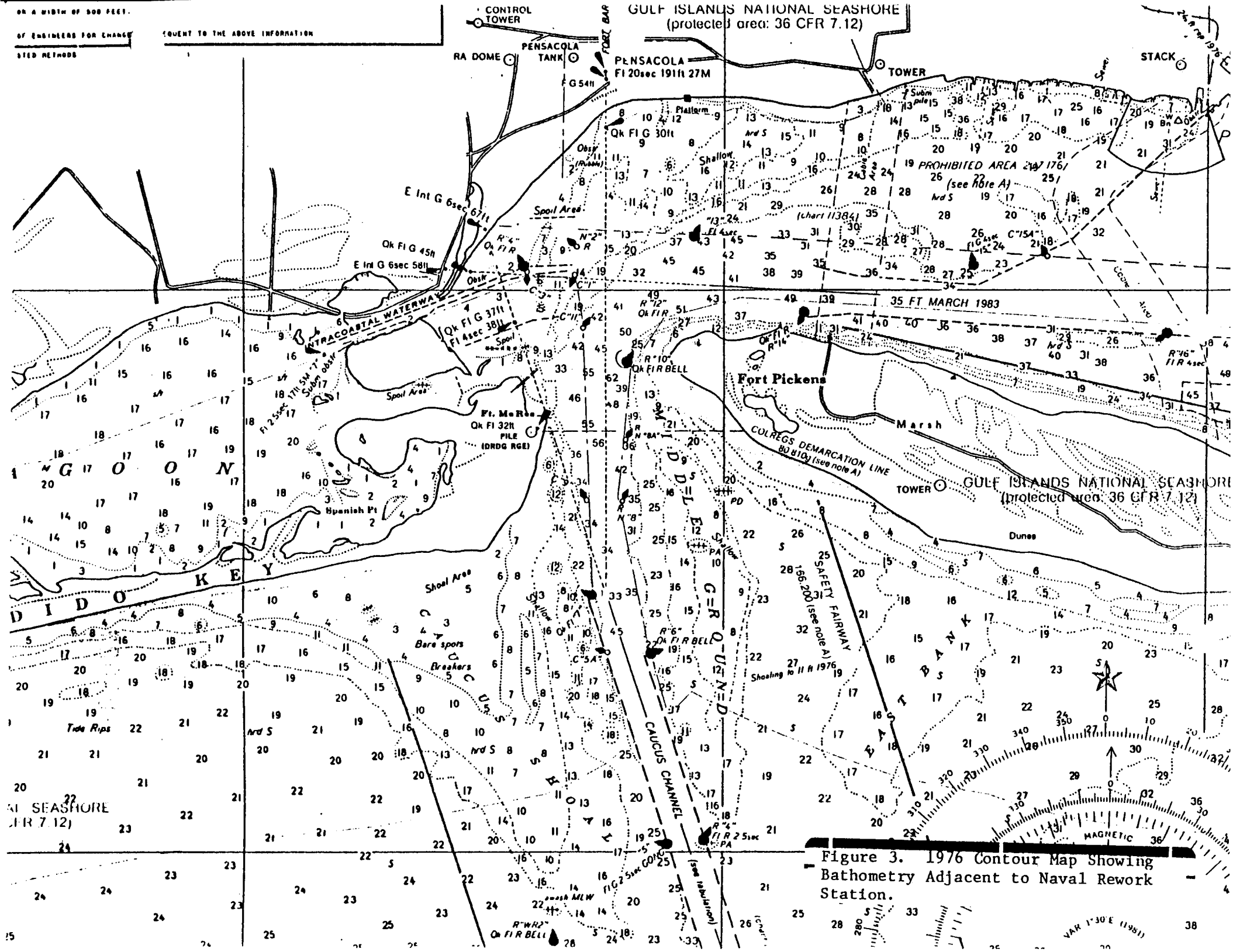


Figure 3. 1976 Contour Map Showing Bathometry Adjacent to Naval Rework Station.