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MONITORING PLAN AIR QUALITY SOLID WASTE ASSESSMENT TEST

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

DEPARTMENT OF THE NAVY
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA 94066-0727

MONITORING PLAN
AIR QUALITY SOLID WASTE ASSESSMENT TEST
WEST BEACH LANDFILL AND THE
1943 TO 1956 DISPOSAL AREA
NAVAL AIR STATION - ALAMEDA
ALAMEDA, CALIFORNIA

Prepared For:

Department of the Navy
Western Division
Naval Facilities Engineering Command
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October 30, 1989

86-018-10

Ms. Bella Dizon (Code 1813BD)
Department of the Navy
Western Division
Naval Facilities Engineering Command
PO Box 727
San Bruno, CA 94066-0727

<u>Transmittal</u>
<u>Final Draft Monitoring Plan</u>
<u>Air Quality Solid Waste Assessment Test</u>
<u>Naval Air Station Alameda</u>
<u>Alameda, California</u>

Dear Ms. Dizon:

Enclosed are 20 copies of the Final Draft Monitoring Plan for the Air Quality Solid Waste Assessment Test (Air SWAT) at the Naval Air Station Alameda.

This report completes a portion of the work authorized under contract N62474-85-D-5620 Delivery Order 0007.

If you have any questions, please call us.

Respectfully submitted,

C C White Jr

Claude Carlos White, Jr., P.E.
Project Engineer

CCW/mh

Enclosures

FINAL MONITORING PLAN AIR QUALITY SOLID WASTE ASSESSMENT TEST REVISION 1

DATED 24 APRIL 1990

IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000525**

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1.0 INTRODUCTION

This Air Quality Solid Waste Assessment Test (Air SWAT) Monitoring Plan has been prepared for the West Beach Landfill and the 1943 to 1956 Disposal Area at the Naval Air Station-Alameda, Alameda, California, (NAS-Alameda). Specifically this monitoring plan discusses the activities to be conducted at these sites to comply with California Health and Safety Code (HSC) 41805.5.

Prior to submission of this Monitoring Plan, the Department of the Navy, Western Division, Naval Facilities Engineering Command (Navy) participated in discussions with the Bay Area Air Quality Management District (BAAQMD) regarding HSC 41805.5. This document presents the site-specific monitoring plan for the Air SWAT to be performed at NAS-Alameda as a result of these discussions, and is being submitted to the BAAQMD for their comments prior to implementing Air SWAT monitoring activities.

This monitoring plan has been prepared in accordance with the "Hazardous Waste Disposal Site Testing Guidelines" (State of California Air Resources Board, 1987). HSC 41805.5 requires that all active solid waste disposal sites in California submit the following information to their local air pollution control district:

- o Results of testing for gas migration beyond the solid waste disposal site perimeter (perimeter monitoring)
- o Results of a chemical characterization test to determine the composition of gas streams above and within the solid waste disposal site (Integrated surface sampling and internal gas characterization)
- o Results of testing and analysis for hazardous constituents in the air adjacent to the site (ambient air characterization).

For inactive disposal sites, HSC 41805.5 requires that a questionnaire be submitted to the local air pollution control district (in this case, the BAAQMD). The Navy submitted separate questionnaires for each site to the BAAQMD on June 22, 1988. The BAAQMD then requested that the Navy meet the State requirements and perform an Air SWAT. For the purposes of the Air SWAT the BAAQMD has indicated that it will consider the West Beach Landfill and the 1943 to 1956 Disposal Area as one site.

2.0 PROJECT DESCRIPTION

This monitoring plan addresses the Air SWAT to be performed at the West Beach Landfill and the 1943-1956 Disposal Area; as requested by the BAAQMD, to comply with HSC 41805.5. The plan is being submitted to the BAAQMD for their comments prior to implementing Air SWAT monitoring activities.

2.1 Site Background

On the western end of Alameda Island, NAS-Alameda is located within the cities of Alameda and San Francisco, California (Figure 2-1). Rectangular in shape, NAS-Alameda presently occupies 2,570 acres of dry land, most of which was created by filling. Originally a peninsula, Alameda became an island in 1876 when engineers cut a channel through the peninsula connecting San Francisco and San Leandro Bays. The two landfill sites are adjacent to each other and are located at the extreme western end of NAS Alameda. The location of the two landfill sites on the air station property is shown on Figure 2-2.

The 1943-1956 Disposal Area, is located in the extreme northwestern corner of the station and occupies an area of about 120 acres. The Oakland Inner Harbor estuary lies along its northern perimeter and San Francisco Bay along its western perimeter. It is entirely within the City and County of Alameda.

The West Beach Landfill, is adjacent to and south of the 1943-1956 Disposal Area, on the southwestern corner of the station. It occupies an area of about 110 acres. San Francisco Bay lies along its western and southern perimeters. The northeast half of the West Beach Landfill is within the City and County of Alameda. The southwest half of the site is within the City and County of San Francisco.

2.2 Site History

The two landfill sites were not open to the public, but were for the use of NAS-Alameda and other Naval facilities in the Oakland vicinity. During the periods that the landfills were in use, records of the waste materials deposited at the landfills were not maintained. In 1980 the Navy initiated the Navy Assessment and Control of Installation Pollutants (NACIP) program to systematically identify, assess, and control contamination of the environment resulting from past hazardous materials management operations. An Initial Assessment Study (IAS) was performed at NAS Alameda by Ecology and Environment, Inc. (E&E, 1983). This report assembled information concerning disposal practices and waste materials disposed at the two landfill sites. A summary of this information follows.

2.2.1 1943-1956 Disposal Area

Waste disposal operations at the 1943-1956 Disposal Area began during the early 1940s and continued through 1956. The exact quantities of wastes disposed of at this site are unknown, but have been estimated at 15,000 to 160,000 tons. Long-term employees have reported that the area received all of the wastes generated on the base other than those drained to storm sewers. Materials known to have been disposed of at the site include old aircraft engines, cooked garbage, cables, scrap metal, waste oil, paint waste, solvents, cleaning compounds, construction debris, and radioactive material.

The disposal method reportedly used consisted of digging trenches to the water table, filling them with waste, and compacting the material with a bulldozer. Cover materials were applied on an irregular basis.

Based on aerial photographs dated March 24, 1947 and September 6, 1949, most of the waste disposal activity appears to have been concentrated in the northern half of the site. An aerial photograph dated August 14, 1953 shows that by that date the area had been covered by the present runways.

Disposal operations apparently continued in the landfill in the areas which had not been covered by runways from 1952 until 1956. In 1956 disposal operations were moved to the West Beach Landfill which had opened immediately to the south. The entire 1943-1956 Disposal Area was eventually covered with soil of unknown thickness.

During the mid-1950s, the western edge of the 1943-1956 Disposal Area was developed as the West Beach Fleet Recreation Area. The area is today covered by an unknown depth of soil, but no exposed waste is apparent. The perimeter of the landfill is assumed to extend to the rock seawall at the edge of San Francisco Bay.

2.2.2 West Beach Landfill

The West Beach Landfill served as the NAS-Alameda disposal area from approximately 1952 through March 1978. Waste disposal operations began at the site in the early 1950s with the disposal of waste chemical drums in the northeast corner of the site. Disposal operations increased after 1956 when waste disposal at the 1943-1956 Disposal Area ceased. By the late 1960s and early 1970s, most of the disposal of hazardous wastes at the site had been discontinued. Disposal operations at this landfill ceased in March 1978.

In addition to wastes from NAS Alameda, this landfill was used for disposal of wastes from Oak Knoll Naval Hospital (now Oakland Naval Hospital); Naval Supply Center, Oakland; and Treasure Island. Materials reportedly disposed of at the landfill include municipal garbage; solvents; oily waste and sludges; paint waste, strippers, thinners, and sludges; plating wastes; industrial strippers and cleaners; acids; mercury; polychlorinated biphenyl (PCB)-contaminated fluids and rags; batteries; low-level radiological wastes; scrap metal; inert ordnance; spoiled food; asbestos; pesticides; tear gas agents (CS and CSC); infectious waste; creosote; and waste medicines and reagents.

Estimates of the amounts of waste in the landfill vary. It has been estimated that a maximum of 1.6 million tons of municipal garbage is present in the landfill. It is estimated that the quantity of hazardous waste in the landfill is 262,481 tons (1958-1968) and 531,715 tons (1969-1978) for a total of 794,196 tons.

Disposal methods used at the site reportedly consisted of excavating a trench to the water table, filling the trench in with disposal materials, spreading and compacting the material with a bulldozer, and then covering the area with the excavated soil on an intermittent basis.

Disposal operations at the West Beach Landfill ended March 1978. The Navy developed plans to close the site as a Class II landfill in accordance with state and local regulations. Various investigations and designs for closure of the site were completed by contractors working for the Navy during the late 1970s and early 1980s and discussed with regulatory agencies; but due to a series of difficulties encountered at the site, an approved plan for closure was not completed.

At the present time the West Beach Landfill is surrounded by an earthen berm approximately 15 feet wide and 5 feet above the surface of the landfill. San Francisco Bay lies approximately 30 feet beyond the berm. During recent site visits no exposed areas of organic fill were apparent. A number of piles of construction debris were apparent, and dredge spoils were exposed in the constructed wetlands in the landfill area.

The area is moderately to well vegetated, primarily by grasses. The area supports a diverse wildlife and is known to provide nesting areas for birds.

3.0 AIR QUALITY SOLID WASTE ASSESSMENT TEST MONITORING ACTIVITIES

California Assembly Bill 3374 (Calderon) required the California Air Resources Board (ARB) to develop guidelines for Air SWAT compliance on or before February 1, 1987. The ARB, in conjunction with the California Air Pollution Control Officers Association (CAPCOA), formed a task force to meet this requirement. This monitoring plan is based on the ARB Hazardous Waste Disposal Site Testing Guidelines, January 1987 (ARB, 1987). These guidelines specify the monitoring activities required to comply with HSC 41805.5, including the number, types, and placement of monitoring devices and the sampling and analytical techniques. In addition, all field work associated with the Air SWAT monitoring at NAS-Alameda will be conducted in accordance with the established Site Health and Safety Plan and the Quality Assurance Project Plan.

The following sections describe each monitoring activity as it is to be applied along with the associated sampling devices and analytical techniques. Table 3-1 presents a summary of the analytical program for Air SWAT monitoring.

3.1 Perimeter Monitoring

HSC 41805.5 requires testing for off-site subsurface landfill gas (LFG) migration. Testing is to be accomplished by monitoring perimeter probes for subsurface concentrations of gaseous organic compounds, measured as methane. ARB guidelines suggest placing a minimum of one perimeter sampling probe for each 1,000 feet of site perimeter. The probes should be arranged around the landfill with spacing and location based on:

- Site geology
- Land use around the landfill
- Existing information about gas migration
- Any other criteria established by the BAAQMD.

Two perimeter monitoring probes will be installed at the perimeter of the site at the locations shown on Figure 2-2. These locations were chosen by the BAAQMD. These probes will be used to collect samples of subsurface gas and to obtain pressure measurements at the site perimeter. The probes will be installed by driving 1-inch-diameter carbon steel slotted pipe approximately 6 feet into the ground. Each perimeter probe will be sampled once. Before sampling, the following data will be collected and recorded.

- Date, time, and sample location
- Barometric pressure
- Subsurface pressure measurement.

Subsurface gas pressure measurements will be obtained with a Dwyer Series 2000 magnehelic gauge or a water manometer connected to the probe sampling port with Teflon tubing. Observed pressures will be reported in inches of water.

Following pressure measurement, each probe will be purged for a minimum of one minute; at least two probe volumes will be withdrawn. After the probe has been allowed to return to its initial pressure, one sample will be pumped into a 10-liter Tedlar bag. Prior to sample collection, the Tedlar bags will be visually inspected for moisture or particle contamination and pressure-checked for leaks. The bags will then be filled and flushed three times with analytical grade helium. All sample collection equipment surfaces that will come into contact with the sample are composed of inert materials (e.g., teflon and/or stainless steel). The Tedlar bag samples will be sent to Curtis and Tompkins, Ltd. Analytical Laboratories (C&T) where they will be analyzed within 72 hours for concentrations of total organic compounds as methane (methane), and the specified air contaminants listed in Table 3-2, using the analytical protocol described in Appendix A.

3.2 Integrated Surface Sampling

Four separate 50,000-square-foot grids will be plotted at the site for integrated surface sampling. An engineer or field technician experienced in such work will collect one continuous air sample 3 inches above the ground surface along the standard sampling pattern recommended in the ARB guidelines. Grid locations are shown on Figure 2-2. Each of the grids will be sampled once. During sampling, the following data will be collected and recorded.

- o Date, time, and sample location
- o Barometric pressure
- o Wind speed and direction.

Integrated surface sampling will be conducted only when the average wind speed, calculated on a 10-minute average, is 5 miles per hour (mph) or less and the instantaneous wind speed is 10 mph or less. No integrated surface sampling will take place during or within 72 hours after a period of precipitation.

The samples will be collected with an integrated surface sampler and pumped into 10-liter Tedlar bags enclosed in light-sealed boxes to prevent photochemical reactions. Prior to sample collection, each Tedlar bag will be visually inspected for moisture or particle contamination and pressure-checked for leaks. The bags will then be filled and flushed three times with analytical-grade helium. All sample collection equipment surfaces that will come into contact with the sample are composed of inert materials. The Tedlar bag samples will be sent to C&T where they will be analyzed within 72 hours for concentrations of methane and the specified air contaminants listed in Table 3-2, using the analytical protocol described in Appendix A.

3.3 Internal Gas Characterization

ARB guidelines state that LFG samples may be obtained from drilled wells, driven probes, an active LFG collection system, or by any other method that will yield an uncontaminated sample of LFG. A combination of existing groundwater monitoring wells and LFG characterization probes will be installed for LFG characterization. The wells and probes (wells) will be used to collect both subsurface gas samples and pressure measurements. Five LFG samples will be collected, one from each of the identified wells. Existing well WA-2 in the 1943 to 1956 Disposal Area and existing well 11 GW in the West Beach Landfill will be used to collect two of the required five samples. The other three samples will be collected from probes installed by driving 1-inch-diameter carbon steel slotted pipe approximately 6 feet into the landfill. The locations of all wells are presented on Figure 2-2. Available boring logs and well construction details for the existing wells are presented in Appendix B.

Before sampling, subsurface gas pressure will be measured at each well with a Dwyer Series 2000 magnehelic gauge or water manometer connected to the well sampling port with Teflon tubing. Observed pressures will be reported in inches of water.

Following pressure measurement, each LFG characterization well will be purged for a minimum of one minute, with at least two well volumes withdrawn. After the LFG characterization well has been allowed to return to its initial pressure, one LFG sample will be pumped from each well into a 10-liter Tedlar bag enclosed in a light-sealed box to prevent photochemical reactions. Prior to sample collection, each sample bag will be visually inspected for moisture and particle contamination and pressure-checked for leaks. The bags will then be filled and flushed three times with analytical-grade helium. All sample collection equipment surfaces that will come into contact with the sample are composed of inert materials.

For each LFG sample collected, the following data will be collected and recorded.

- Date, time, and sample location
- Barometric pressure
- Subsurface pressure measurements.

The samples will be transported to C&T where they will be analyzed within 72 hours using the analytical protocol described in Appendix A. The samples will be analyzed for the following parameters:

- Methane, carbon dioxide, oxygen, and nitrogen
- Specified air contaminants (Table 3-2).

3.4 Ambient Air Monitoring

In accordance with HSC 41805.5, ambient air monitoring is to be conducted at or near the site perimeter. According to the ARB guidelines, ambient air samples are to be collected over a minimum of 10 separate 24-hour periods using a minimum of four and a maximum of five ambient air sampling units. The number of sampling units required is dependent on site wind conditions.

The use of five ambient air sampling units at two locations to collect the required data is proposed. Two units will be placed at a single station upwind of the site and three units will be placed at a station downwind of the site. These units will be positioned so that air flow at the inlet will be unrestricted through an arc of at least 270 degrees. Proposed ambient air monitoring station locations are shown on Figure 2-2.

Two of the ambient air sampling units (one downwind and one upwind) will be equipped with the following:

- o A microresponse anemometer, with a threshold of 0.5 mph or less and an accuracy of $\pm$ 0.150 mph.
- o A microresponse vane, with a threshold of 0.5 mph or less and a resolution of less than 1 degree.

These microresponse units will interrupt sample collection if the wind direction changes by more than 60 degrees from the predetermined direction. Sample collection will resume automatically when acceptable wind conditions resume. All sample collection equipment surfaces that will come into contact with the samples are composed of inert materials. An engineer or field technician experienced in air sampling will adjust the sample flow rate with a flow meter, to 6.0 cubic centimeters per minute just prior to sample collection.

Ambient air monitoring will not be conducted during or within 72 hours after a period of precipitation, or when the 24-hour average wind speed exceeds 10 mph. Ambient air samples will be collected on ten, not necessarily consecutive days. During sampling, the following data will be collected and recorded.

- o Date, time, and sample location
- o Wind speed and direction.

Ambient air samples will be collected in 10-liter Tedlar bags. Before sample collection, each Tedlar bag will be visually inspected for moisture and particle contamination and pressure-checked for leaks. The bag will then be filled and flushed three times with analytical-grade helium.

The Tedlar bags will be enclosed in light-sealed boxes during and after sampling to prevent photochemical reactions. The samples will be transported to C&T where they will be analyzed within 72 hours for concentrations of air contaminants listed in Table 3-2. The analytical protocol described in Appendix A will be followed.

3.5 Meteorological Monitoring

HSC 41805.5 requires on-site monitoring of meteorological conditions prior to and during ambient air sample collection. Existing meteorological data (Appendix C) have been used to locate the upwind and downwind ambient air monitoring stations. During ambient air sample collection, meteorological stations will be established at the proposed upwind and downwind ambient air monitoring locations in accordance with HSC 41805.5. The meteorological stations will provide continuous recording of wind speed and direction.

4.0 DATA INTERPRETATION AND AIR SWAT REPORT

Upon receipt and initial Quality Control (QC) review of the Air SWAT monitoring analytical data, it will be submitted to the BAAQMD using the format presented in Attachment 3 of the ARB Guidelines (ARB, 1987). The data will then be evaluated and an Air SWAT report will be prepared summarizing the monitoring activities, field data, and analytical results. The report will include all data obtained, as well as procedures, field observations, and the work schedule. The diagrams and specifications of all instrumentation and equipment use during sampling will also be included, along with a topographic map showing the location of all monitoring points. The final Air SWAT report will be submitted to the BAAQMD in accordance with HSC 41805.5.

TABLES

TABLE 3-1. ANALYTICAL PROGRAM

Monitoring System	Number of Samples	Number of Blanks	Number of Duplicates	Total Samples	Sample Type	Chemical Analyses
Perimeter probes	2	0	0	2	G	Table 2, methane
Integrated surface	4	1	0	5	A	Table 2, methane
Internal gas characterization wells	5	1	1	7	G	Table 2, methane carbon dioxide, oxygen, nitrogen
Ambient air	40	10	10	60	A	Table 2
Totals	51	12	11	74		

G = Subsurface gas sample; detection limits to be used are in last column on Table 2.

A = Air sample; detection limits to be used are in middle column on Table 2.

TABLE 3-2. SPECIFIED AIR CONTAMINANTS[a]

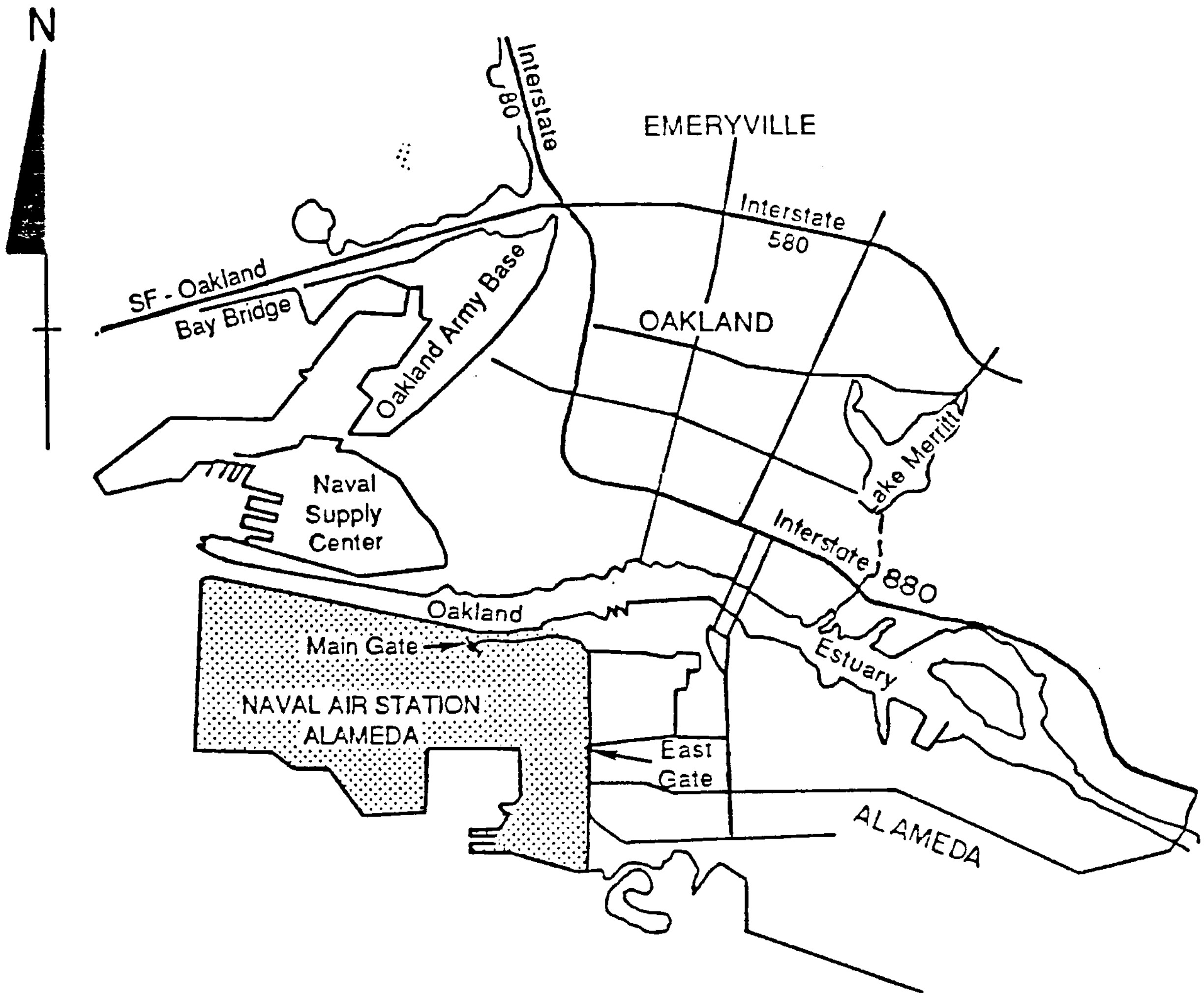
Compound	Detection Limits (ppb)[b*] Ambient Air and Integrated Surface Samples	Perimeter Probe and Internal Gas Samples
Chloroethene (Vinyl Chloride) CH_2:CHCl	2	500
Benzene C_6H_6	2	500
1,2-Dibromoethane (Ethylene Dibromide) $BrCH_2CH_2Br$	0.5	1
1,2-Dichloroethane (Ethylene Dichloride) $ClCH_2CH_2Cl$	0.2	20
Dichloromethane (Methylene Chloride) CH_2Cl_2	1	60
Tetrachloroethene (Perchloroethylene) Cl_2C:CCl_2	0.2	10
Tetrachloromethane (Carbon Tetrachloride) CCl_4	0.2	5
1,1,1-Trichloroethane (Methyl Chloroform) CH_3CCl_3	0.5	10
Trichloroethylene HClC:CCl_2	0.6	10
Trichloromethane (Chloroform) $CHCl_3$	0.8	2

[a] State of California Air Resources Board, "Hazardous Waste Disposal Site Testing Guidelines, "January 1987.

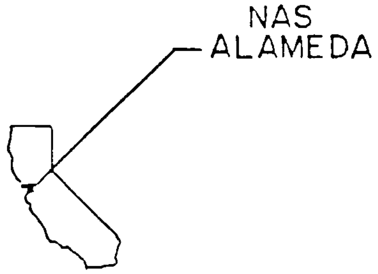
[b] Parts per billion, by volume

ILLUSTRATIONS

113525



SITE LOCATION



SCALE

6000 0 6000 FEET

SITE VICINITY PLAN
NAVAL AIR STATION
ALAMEDA, CALIFORNIA

PREPARED FOR

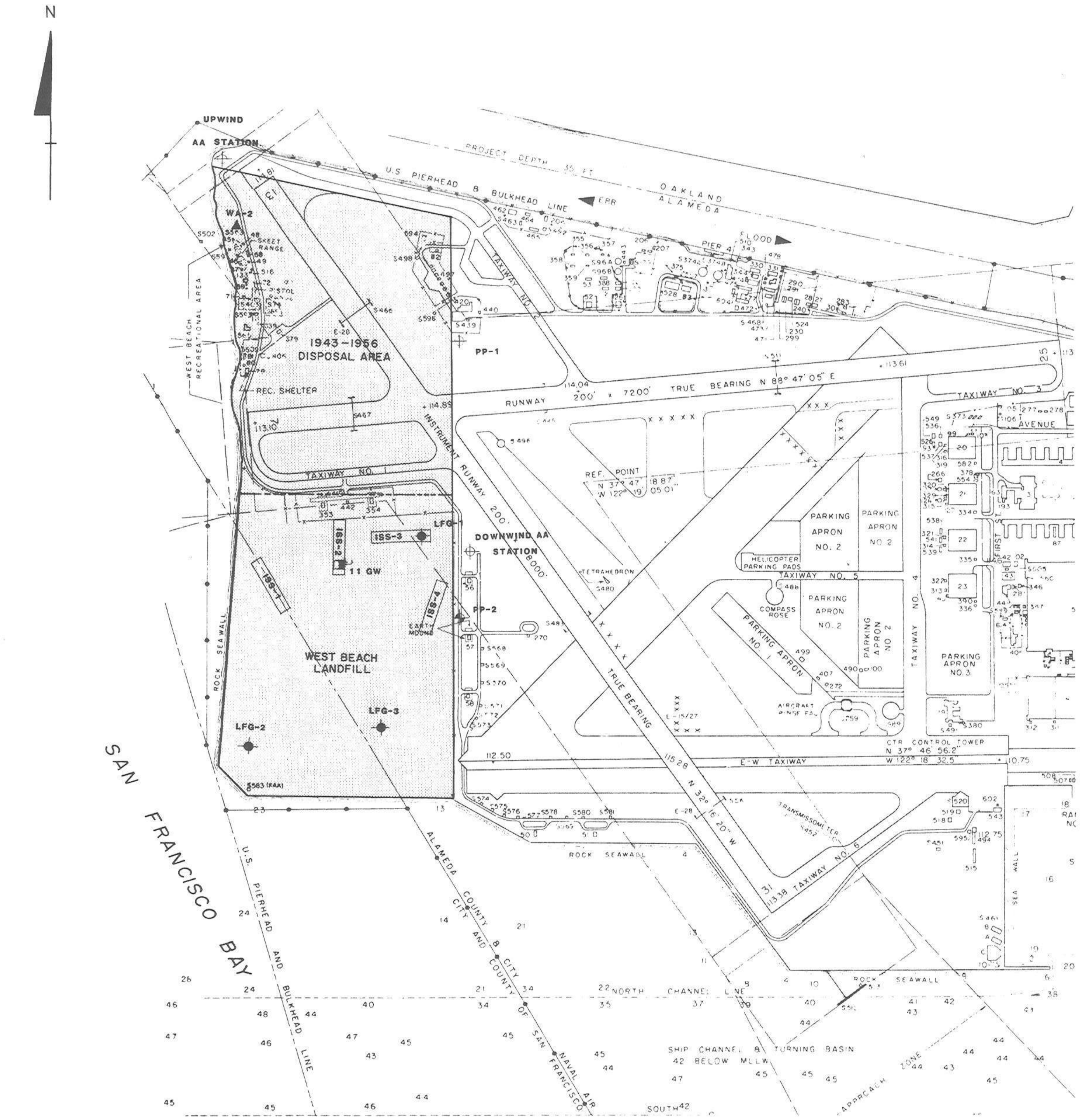
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

SCS ENGINEERS

SOURCE: CANONIE ENVIRONMENTAL SERVICES CORP.

DATE: 9/22/89	DRAWING NUMBER
SCALE: AS SHOWN	FIGURE 2-1

DRAWING NUMBER | CHECKED BY | APPROVED BY | DRAWN BY | NO. | DATE | REVISIONS



REFERENCE:
U.S. NAVY MAP

LEGEND:

- ▲ EXISTING WELL (WAHLER, 1985)
- EXISTING WELL (HARDING LAWSON ASSOCIATES, 1978)
- PROPOSED LFG MONITORING PROBE
- PROPOSED AMBIENT AIR MONITORING PROBE
- PROPOSED PERIMETER MONITORING PROBE
- ISS PROPOSED INTEGRATED SURFACE SAMPLING GRID

SCALE
500 0 500 1,000 FEET

SITE LOCATION AND MONITORING POINTS PLAN
WEST BEACH LANDFILL AND THE 1943 to1956 DISPOSAL AREA
NAVAL AIR STATION

ALAMEDA, CALIFORNIA

PREPARED FOR

WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA

BY

SCS ENGINEERS

SOURCE: CANONIE ENVIRONMENTAL SERVICES CORP.

DATE: 9/22/89	FIGURE 2-2	DRAWING NUMBER
SCALE: AS SHOWN		

REVISIONS	NO.	DATE

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APPENDIX A

Analytical Protocol for Laboratory Analyses

VOLATILE ORGANICS IN TEDLAR BAGS
CONCENTRATION METHOD FOR AMBIENT AIR SAMPLES

SCOPE

This method covers the determination of certain halogenated and aromatic volatile organics in Tedlar bag ambient air samples at very low concentrations (ppt range).

APPLICABLE DOCUMENTS

California ARB Staff report on Testing Guidelines for Active Solid Waste Disposal Sites: December 1986.
Draft Testing Guidelines for Active Solid Waste Disposal Sites, CH&S Code 41805.5, November 18, 1986.
ARB Method 103 Revision 1. and Method ADDL002,Rev. 3.1 (10/16/86)

Other Documents:
Hewlett-Packard Manual for model 5830 gas chromatograph
Hewlett-Packard Manual for model 18831/2A Air Sampler
Teckmar Manual for the LSC-2 sample concentrator

SUMMARY OF METHOD

Halogenated and aromatic analytes are concentrated from 200-500 mls of gas sample on a specially prepared carbon-tenax trap and thermally desorbed onto a gas chromatograph using a Teckmar LSC-2. Identification and quantitation is performed using a photoionization (PID) detector for Aromatics and Coulson electrolytic conductivity detector (ELCD) for organo-halides. Detectors are plumbed in series.

INTERFERENCES & LIMITATIONS

The samples and the gas chromatographic system can be contaminated by diffusion of volatile organic solvents from the laboratory. Cross contamination can occur when high level samples are analyzed, but the analysis of method blanks can demonstrate that the entire analytical system is interference free. Samples containing components generating interfering peaks can be analyzed with the specified confirmation column on the gas chromatograph or by LSC-2 concentration GC/MS methods.

INSTRUMENTS & CONDITIONS

Teckmar LSC-2 (1/4" charcoal/Tenax Trap) with HP 1831/2A gas sampling device. H-P model 5830 Gas Chromatograph with HP 3392A integrator, HNU PID Detector and Coulson ELCD detector plumbed in series.

INSTRUMENTS & CONDITIONS (continued)

Gas Chromatographic Columns & Conditions:
Primary column: 60 Meter * 0.75 mm ID, 1.5 um film thickness VOCL capillary column. Supelco catalog #2-3731
Scientific Cat #125-1334-0.53 mm
Carrier Gas: Helium: 5 cc/min
Make-up: Methane/Argon 25 cc/min
Oven Temp Profile: 35 C/1 min; 5C/min to 140 C
Confirmation column: 30 meter X 0.53 mm DB-624 Megabore Column, J&W Glass capillary column. Supelco catalog #2-3731
Note: DB-624 column requires confirmation of vinyl chloride using GC/MS.
TECKMAR LSC-2 CONCENTRATOR conditions appear below under SAMPLE TRAPPING

APPARATUS AND MATERIALS

Syringes: 5 & 10 ml; 10, 100 & 200 microliter gas tight
Calibration Gas Tank: 15.7 L Aluminum 80A Spectra Seal with CGA580 valve
Test Gauge: 0 to 200 psig range accurate to 1 psig
Vaccuum Pump: VWR benchtop pump
Flowmeter: Altech Flowcheck
Mol-Sieve Trap(s): HP 560-9084 for removing chlorinated hydrocarbons from reagent gasses.

REAGENTS
Methanol - ACS Reagent Grade or better
Nitrogen: 99.999% purity or better
Helium: 99.995% purity or better
Tenax Sorbent SKC West Cat # 226-35-04

STANDARDS: Stock standard solutions are prepared from pure standard compounds if possible or purchased methanolic solutions or cylinder mixes of gaseous compounds prepared in our lab or purchased outside.

PREPARATION OF GAS CALIBRATION STANDARDS:

Prepare two external standard calibration stock solutions from neat compounds highest purity avaliable. Pipette standards into a 5 dram vial weighing components accurately on an analytical balance. Date the preparation of the stock solutions and store stock standards in the freezer when not in use. Prepare new standards every three months.

Prepare 1 cylider each of low concentration and high concentration calibration gas mixture in pure nitrogen by injecting the calculated total volume of calibration solution mixture into an evacuated 11 liter stainless steel tank. Pressurize the tank to 100 psig with mol seived 99.999 % pure nitrogen. Condition the standard overnight and adjust the tank pressure to 100 psig if necessary. Prepare new gas phase standards from stock weekly.

PRECAUTIONS

Normal good laboratory practices should be followed when handling samples and standards.

CALIBRATION AND STANDARDIZATION

Each working day, before the analysis of samples, a single point liquid injection calibration of all analytes is done to validate the calibration range, instrument status, response factors and long term precision. A Tedlar bag filled with high level gaseous standards is analyzed daily as the gas phase calibration standard. A low level gas phase standard is analyzed periodically to demonstrate preformance of the instrument at detection limit levels. The updated response factors and retention times based on a moving average are calculated and reported using a computer program.

SAMPLE AND CALIBRATION STANDARD ANALYSIS

Connect the bags to the H-P Model 18831/2A air sampler manifold which is properly connected to the LSC-2 (see diagram below) after flowrates have been established and properly validated, sample 300-500 mls of Tedlar bag air. Program the LSC-2 to deliver the sample and turn on the GC system. Calculate response factors and analyte levels using the TEDL-WRK worksheet program on the IBM-PC.

CALCULATIONS & DOCUMENTATION

The absolute amount, in nanograms, of each analyte in the sample aliquot is calculated by the electronic integrator from the peak area using an external standard calculation procedure based on response of gas phase calibration standards. Using the injection volume and analyte signal area response, the analyst calculates the concentration, in nanoliters of analyte/liter sample using a Lotus Symphony spreadsheet program running on an IBM Personal Computer. The details of the program along with sample calculations appear below under "Sample Analysis Worksheet". The results of worksheet calculations for each work order must be printed out in full. The data package from the analysis of a sample is submitted to the Group Leader for review. This package consists of the following items: the sample chromatogram(s), copies of the chromatograms from the analysis of blanks and standards associated with the sample analysis, a copy of the updated calibration data sheet and Sample Analysis worksheet printout.

SAMPLE TRAPPING

The sample is introduced to the LSC-2 through flow calibrated HP-18831/2A 16 port gas sampling apparatus. The sample is pulled through the Tenax trap at 50 ml/min into the LSC-2 by vacuum. Flow is calibrated upstream of the trap using the mass flow controller on the HP-18831/2A and downstream of the trap using a Matheson mass flow controller accurately calibrated in the 5-100 ml/min range. Downstream flow is used for volume measurement. Before analysis the system is leak checked by blocking the Tedlar bag sample inlet port and verifying that the flow Matheson flow controller reads 0.

SAMPLE TRAPPING (contued)

Typically 300 mls of sample is taken, sample volume is controlled by stopwatch and manual activation of sample switching valve. After sampling is complete the the trap is flushed with 40 mls Helium carrier to remove water vapor and any nonadsorbed reactive gasses.

The sample is desorbed and applied to the top of the GC column by the Teckmar LSC-2 through heating and helium flushing the trap. The trap is heated to 225 C and backflushed with helium for 8 minutes to prepare the trap for the next injection.

QUALITY CONTROL REQUIREMENTS

CALIBRATION: A computer generated calibration control chart for the area responses of the high and low level gas phase calibration standard compounds is kept to insure consistent performance of instrument and trapping systems. If the response factors are not within the upper and lower control limits for applicable high or low level standards, (w/in +/- 3X Standard Deviation of the average Rf value) the analyst must notify the Group Leader and resolve the problem before proceeding. Multipoint calibrations are to be conducted monthly by analyzing a blank and three concentration level multicomponent standards which bracket concentrations of analytes normally found in ambient air samples. Linear regression analyses of the data are preformed and reviewed for consistency with single point calibrations by the Organics Group Leader.

BLANKS: A Tedlar bag filled with UHP nitrogen is analyzed before and after the analysis of standards to demonstrate that the entire analytical system is interference free. Leak checks are also performed.

DUPLICATES: All ambient samples are analyzed in duplicate. The relative percent difference calculated as defined by the QA manual section 2 shall be less than 20% for any analyte determined in the sample. Duplicate analyses with results outside this range must be explained, repeated, or the data discarded as unacceptable.

SPIKES: All blanks standards, control samples, and and ambient samples are spiked by injecting a known volume of surrogate gas standard (50 microliters) during sample trapping. Surrogate compounds are chosen such that they simulate the characteristics of of the analytes of interest and are unlikely to occur in the environment. The recoveries of added surrogates shall be tracked by control charts with upper & lower warning limits of +/- 25% and control limits of +/- 35%. Bromochloromethane (10 ppb) or 1,3-Bromochloropropane (30 ppb) are appropriate surrogates.

CONTROL SAMPLES: Analyze a Certified gas phase reference standard or control sample daily to check response factors and calibration consisency with outside sources.

VOLATILE ORGANICS IN TEDLAR BAGS
DIRECT INJECTION METHOD FOR LANDFILL GAS SAMPLES

SCOPE

This method covers the determination of certain halogenated and aromatic volatile organics in landfill gas samples at low concentrations (ppb).

APPLICABLE DOCUMENTS

California ARB Staff report on Testing Guidelines for Active Solid Waste Disposal Sites: December 1986.
Draft Testing Guidelines for Active Solid Waste Disposal Sites, CH&S Code 41805.5, November 18, 1986.
ARB Method 103 Revision 1. and Method ADDL002,Rev. 3.1 (10/16/86)

Other Documents:
Hewlett-Packard Manual for model 5830 gas chromatograph
Hewlett-Packard Manual for model 18831/2A Air Sampler

SUMMARY OF METHOD

Halogenated and aromatic analytes are determined by injecting 5 mls of gas sample into a gas chromatograph using a gas sampling loop or gas tight syringe. Identification and quantitation is performed using a photoionization (PID) detector for Aromatics, and Coulson electrolytic conductivity detector (ELCD) for organo-halides. Detectors are plumbed in series.

INTERFERENCES & LIMITATIONS

The samples and the gas chromatographic system can be contaminated by diffusion of volatile organic solvents from the laboratory. Cross contamination can occur when high level samples are analyzed, but the analysis of method blanks can demonstrate that the entire analytical system is interference free. Samples containing components generating interfering peaks can be analyzed with the specified confirmation column on the gas chromatograph or by direct injection GC/MS methods.

INSTRUMENTS & CONDITIONS

HP 1831/2A gas sampling device. H-P model 5830 Gas Chromatograph with HP 3392A integrator, HNU PID Detector and Coulson ELCD detector plumbed in series.

INSTRUMENTS & CONDITIONS (continued)

Gas Chromatographic Columns & Conditions:
Carrier Gas: Helium: 5 cc/min
Make-up: Helium 20 cc/min
Oven Temp Profile: 35 C/1 min; 5C/min to 140 C
Primary column: 60 Meter * 0.75 mm ID, 1.5 um film thickness VOCL Glass capillary column. Supelco catalog #2-3731
Confirmation column: 30 meter X 0.53 mm DB-624 Megabore Column, J&W Scientific Cat #125-1334-0.53 mm

APPARATUS AND MATERIALS

Syringes: 5 & 10 ml; 10, 100 & 200 microliter gas tight
Calibration Gas Tank: 15.7 L Aluminum 80A Spectra Seal with CGA580 valve
Test Gauge: 0 to 200 psig range accurate to 1 psig
Vaccuum Pump: VWR benchtop pump
Flowmeter: Altech Flowcheck
Mol-Sieve Trap(s): HP 560-9084 for removing chlorinated hydrocarbons from reagent gasses.

REAGENTS
Methanol - ACS Reagent Grade or better
Nitrogen: 99.999% purity or better
Helium: 99.995% purity or better

STANDARDS: Stock standard solutions are prepared from pure standard compounds if possible or purchased methanolic solutions or cylinder mixes of gaseous compounds prepared in our lab or purchased outside.

PREPARATION OF GAS CALIBRATION STANDARDS:

Prepare two external standard calibration stock solutions from neat compounds highest purity avaliable. Pipette standards into a 5 dram vial weighing components accurately on an analytical balance. Date the preparation of the stock solutions and store stock standards in the freezer when not in use. Prepare new standards every three months.

Prepare 1 cylider each of low concentration and high concentration calibration gas mixture in pure nitrogen by injecting the calculated total volume of calibration solution mixture into an evacuated 11 liter stainless steel tank. Pressurize the tank to 100 psig with mol seived 99.999 % pure nitrogen. Condition the standard overnight and adjust the tank pressure to 100 psig if necessary. Prepare new gas phase standards from stock weekly. See detailed calibration gas preparation procedure below.

PRECAUTIONS
Normal good laboratory practices should be followed when handling samples and standards.

CALIBRATION AND STANDARDIZATION
Each working day, before the analysis of samples, a single point liquid phase standard injection calibration of all analytes is done in order to validate calibration range, instrument status, response factors and long term precision. A tedlar bag filled with high level gaseous standards is analyzed daily as the gas phase calibration standard. A low level gas phase standard is analyzed periodically to demonstrate preformance of the instrument at detection limit levels. The updated response factors and retention times based on a moving average are calculated and reported using a computer program.

SAMPLE AND CALIBRATION STANDARD ANALYSIS

Inject the calibration standard or sample of landfill gas into the GC using the gas tight syringe or gas sampling loop(s) through the HP 1831/2A gas sampling device. Calculate response factors and/or analyte levels using the TEDL-WRK symphony worksheet program on the IBM-PC.

CALCULATIONS & DOCUMENTATION
The absolute amount, in nanograms, of each analyte in the sample aliquot is calculated by the electronic integrator from the peak area using an external standard calculation procedure based on response of gas phase calibration standards. Using the injection volume and analyte signal area response, the analyst calculates the concentration, in nanoliters of analyte/liter sample using a Lotus Symphony spreadsheet program running on an IBM Personal Computer. The details of the program along with sample calculations appear below under "Sample Analysis Worksheet".

The results of worksheet calculations for each work order must be printed out in full. The data package from the analysis of a sample is submitted to the Group Leader & Lab Director for review and reporting. The data package consists of the following items:

1) The sample chromatogram(s), copies of the chromatograms from the analysis of blanks and standards associated with the sample analysis
2) A copy of the updated calibration data sheet and Sample Analysis worksheet printout.
3) A summary data sheet with calculated levels of analytes, % RPD for duplicate analyses and surrogate spike recoveries.

QUALITY CONTROL REQUIREMENTS

CALIBRATION: A computer generated calibration control chart for the area responses of the high and low level gas phase calibration standard compounds is kept to insure consistent performance of instrument and trapping systems. If the response factors are not within the upper and lower control limits for applicable high or low level standards, (w/in +/- 3X Standard Deviation of the average Rf value) the analyst must notify the Group Leader and resolve the problem before proceeding. Multipoint calibrations are to be conducted monthly by analyzing a blank and three concentration level multicomponent standards which bracket concentrations of analytes normally found in ambient air samples. Linear regression analyses of the data are preformed and reviewed for consistency with single point calibrations by the Organics Group Leader.

BLANKS: A Tedlar bag filled with UHP nitrogen is analyzed before and after the analysis of standards to demonstrate that the entire analytical system is interference free. Leak checks are also performed.

DUPLICATES: All ambient samples are analyzed in duplicate. The relative percent difference calculated as defined by the QA manual section 2 shall be less than 20% for any analyte determined in the sample. Duplicate analyses with results outside this range must be explained, repeated, or the data discarded as unacceptable.

SPIKES: All blanks standards, control samples, and and ambient samples are spiked by injecting a known volume of surrogate gas standard (50 microliters) into the gastight syringe withte sample. A method for including surrogate standards in s second, "in line" sample loop is under development. Surrogate compounds are chosen such that they simulate the characteristics of of the analytes of interest and are unlikely to occur in the environment. The recoveries of added surrogates are tracked by control charts with upper & lower warning limits of +/- 25% and control limits of +/- 35%. Bromochloromethane (10 ppb) or 1,3-Bromochloropropane (30 ppb) are appropriate surrogates.

CONTROL SAMPLES: A Scott-Marrin Blend or Scott Specialty Gasses Certified gas phase reference standard or control sample is analyzed daily to check response factors and calibration consisency with outside sources and to document traceablity of calibration standards prepared in our laboratory.

APPENDIX B

Boring Logs and Well Construction Diagrams for Existing Wells

LOG OF BORING 11

Equipment 6" Flight Auger

Elevation 112.5 feet Date 10/29/77

Shear Strength (lbs/sq ft)	Moisture Content (%)	Dry Density (pcf)	Depth (ft)	Sample
			0	
			5	
			10	
			15	
			20	
			25	
			30	
			35	
			40	

BROWN SILTY SAND (SM)
loose to medium dense, with debris

water level 4/7/77

Refuse Fill

DARK BLUE-GRAY SILTY SAND (SM)
loose, saturated

BLUE-GRAY CLAYEY SILT (MH)
medium stiff, saturated, with lenses of silty sand

Hydraulic Fill

HARDING - LAWSON ASSOCIATES
Consulting Engineers and Geologists

Job No 2176,030.01 Appr JD Date 5/20/77

LOG OF BORING 11

Sanitary Landfill Site
Alameda Naval Air Station

PLATE 12

BORING LOCATION North End of Skeet Range | GROUND EL.

DEPTH/ELEV. WATER 3 ft ± | DRILL CONTRACTOR EXCELTECH - RPM | TOTAL DEPTH 21.5 ft

DRILL RIG Mobile B-34 | BORING DIA. 2" Ø HA | DATE DRILLED 10/12/84 | LOGGED BY JMc / CL

SOIL CLASS.	DESCRIPTION	DEPTH (ft)	SAMPLE NO.	PR / ROD	REC.	MODE	REMARKS
GP	0.0'–5.0' Sandy GRAVEL, gravel particles are 3/4" to 1½" in size, light brown, some concrete rubble up to 12"x 12"x3".	0				HA	DATA ON THIS LOG ARE AN APPROXIM[ATION] OF THE GEOLOGIC AND SUBSU[R]FACE CONDITIONS BECAUSE THE INFO[R]MATION WAS OBTAINED FROM INDIREC[T] DISCONTINUOUS, AND POSSIBLY DIS[]TURBED SAMPLING NECESSITATED [] USE OF SMALL-DIAMETER HOLE[S] ROTARY AND WASH BORING HOLES [] FURTHER COMPLICATIONS IN TH[IS] REGARD BECAUSE OF THE NEED TO [] DRILLING FLUID AND/OR CASING [] ADVANCING HOLES. ▽ ± THIS LOG INDICATES CONDITIONS [] THIS HOLE ONLY ON THE DATE IN[DI]CATED AND MAY NOT REPRESENT CON[DI]TIONS AT OTHER LOCATIONS AND [] OTHER DATES. ANY WATER LEV[ELS] SHOWN ARE SUBJECT TO VARIATI[ON]. THIS HOLE WAS LOGGED IN SUCH A [] AS TO PROVIDE DATA PRIMARILY [] DESIGN PURPOSES AND NOT NEC[ES]SARILY FOR THE PURPOSES OF S[PE]CIFIC CONTRACTORS.
SP-GP	5.0'-8.0' Gravelly fine to medium SAND, brown to gray, damp to wet	5	S-1A S-1B	2/4/4	12"	DR	THE STRATIFICATION LINES OR DE[PTH] INTERVALS REPRESENT THE APPRO[XI]MATE BOUNDARIES BETWEEN MATER[IAL] TYPES, AND THE TRANSITIONS MAY [] GRADUAL. SOIL CLASSIFICATIONS SHOWN ON L[OG] ARE FIELD CLASSIFICATIONS BASED [] THE UNIFIED SOILS CLASSIFICATI[ON] SYSTEM.
						HA	
SP	8.0'-19.0' Fine to Medium SAND, blue gray, saturated						Moderate petroleum fuel odor
		10					Definite oily band on sampler @ 10', oil sheen on spilled water
	Gray-brown, appeared oxidized						Much milder odor at about 12 ft
	Numerous shell fragments to ¼" at about 15 ft	15		2/5/3		DR	Auger at 15 ft, ste[m] filled to ~10 ft with running sand
						HA	
MH-CH	19.0-21.5' Clayey SILT, blue gray, saturated, soft, plastic, sometimes dilatant	20		1/1/0		DR	Trace gray clay on bit and plug. No fuel smell
	Hole terminated at 20.5' after drilling out the sampled interval						Installed 2" Ø sch. 4[0] PVC Threaded; (0-5.5': blank, 5.5'-19.5' slotted, 0.01")

Wahler Associates

CONFIRMATION STUDY
NAS-ALAMEDA

EXPLORATION BORING LOG | BORING N[O.] WA-2

PROJECT NO. | SHEET NO.

APPENDIX C

Meteorological Data

DEPARTMENT OF THE NAVY
NAVAL OCEANOGRAPHY COMMAND DETACHMENT
NAVAL AIR STATION
ALAMEDA, CALIFORNIA 94501-5011

RECEIVED
OCT 6 1989
Ans'd. CARLOS

IN REPLY REFER TO:
3140
SER: 05/295
27 Sep 89

From: Officer in Charge, Naval Oceanography Command Detachment, Naval Air Station, Alameda
To: Commanding Officer, Naval Air Station, Alameda

Subj: REQUEST FOR CLIMATOLOGICAL DATA

Ref: (a) Your 5090 Ser OLE/243 of 22 Sep 89

Encl: (1) Average Wind Trends for the Month of January
(2) Average Wind Trends for the Month of May
(3) Average Wind Trends for the Month of August
(4) Average Wind Trends for the Month of November
(5) Annual Wind Direction/Mean Wind Speed for NAS Alameda
(6) Monthly Wind Roses for NAS Alameda

1. As per referance (a), enclosures (1) through (6) are forwarded for your information.

R. E. Thayer
R. E. THAYER

PERIOD OF RECORD: 1955-1986

AVERAGE WIND TRENDS FOR THE MONTH OF JANUARY

	PRIMARY		SECONDARY	
TIME	DIRECTION	SPEED	DIRECTION	SPEED
0100 LST	NNW-N	6 KTS	ESE-SE	6-8 KTS
0400 LST	NNW-N	6 KTS	SE	8 KTS
0700 LST	NNW-N	5-7 KTS	SE	8 KTS
1000 LST	SE	10 KTS	NNW-N	7 KTS
1300 LST	NW-NNW	7-8 KTS	S	7 KTS
1600 LST	NW-NNW	7-8 KTS	S	8 KTS
1900 LST	NW-N	5-7 KTS	S	10 KTS
2200 LST	NNW-N	5-6 KTS	SE	8 KTS

PERIOD OF RECORD: 1955-1986

AVERAGE WIND TRENDS FOR THE MONTH OF MAY

	PRIMARY		SECONDARY	
TIME	DIRECTION	SPEED	DIRECTION	SPEED
0100 LST	W-WSW	8 KTS	NW	8 KTS
0400 LST	WNW-WSW	8 KTS	E	4-5 KTS
0700 LST	WSW-W	7 KTS	S-SSW	6 KTS
1000 LST	WSW-W	7-8 KTS	S	5 KTS
1300 LST	WSW-WNW	10-12 KTS	SW-SSW	10 KTS
1600 LST	W-WNW	14 KTS	S-SSW	10-12 KTS
1900 LST	W-WNW	10-12 KTS	SW	10 KTS
2200 LST	W-WSW	8-9 KTS	S-SSW	6-8 KTS

PERIOD OF RECORD: 1955-1986

AVERAGE WIND TRENDS FOR THE MONTH OF AUGUST

	PRIMARY		SECONDARY	
TIME	DIRECTION	SPEED	DIRECTION	SPEED
0100 LST	W-WSW	8-9 KTS	SW	7 KTS
0400 LST	W	8 KTS	SW-S	8 KTS
0700 LST	W	7 KTS	SW-SSW	7-8 KTS
1000 LST	W-WSW	6-7 KTS	SW-SSW	5-6 KTS
1300 LST	W-WNW	10-11 KTS	SW-WSW	9-10 KTS
1600 LST	W	12 KTS	WNW-NW	8-11 KTS
1900 LST	W	11 KTS	WNW-NW	7-9 KTS
2200 LST	W	8 KTS	WSW-SW	7-8 KTS

PERIOD OF RECORD: 1955-1986

AVERAGE WIND TRENDS FOR THE MONTH OF NOVEMBER

	PRIMARY		SECONDARY	
TIME	DIRECTION	SPEED	DIRECTION	SPEED
0100 LST	CALM	00 KTS	ESE-SE	5-7 KTS
0400 LST	CALM	00 KTS	SE	7 KTS
0700 LST	CALM	00 KTS	ESE-SE	6-8 KTS
1000 LST	SE	8 KTS	NNW-N	6-8 KTS
1300 LST	NW-N	6-7 KTS	S	6-9 KTS
1600 LST	NW-N	7-9 KTS	SSE-S	9-10 KTS
1900 LST	W	6 KTS	NNW-N	5-6 KTS
2200 LST	SE	5-6 KTS	SE	8 KTS

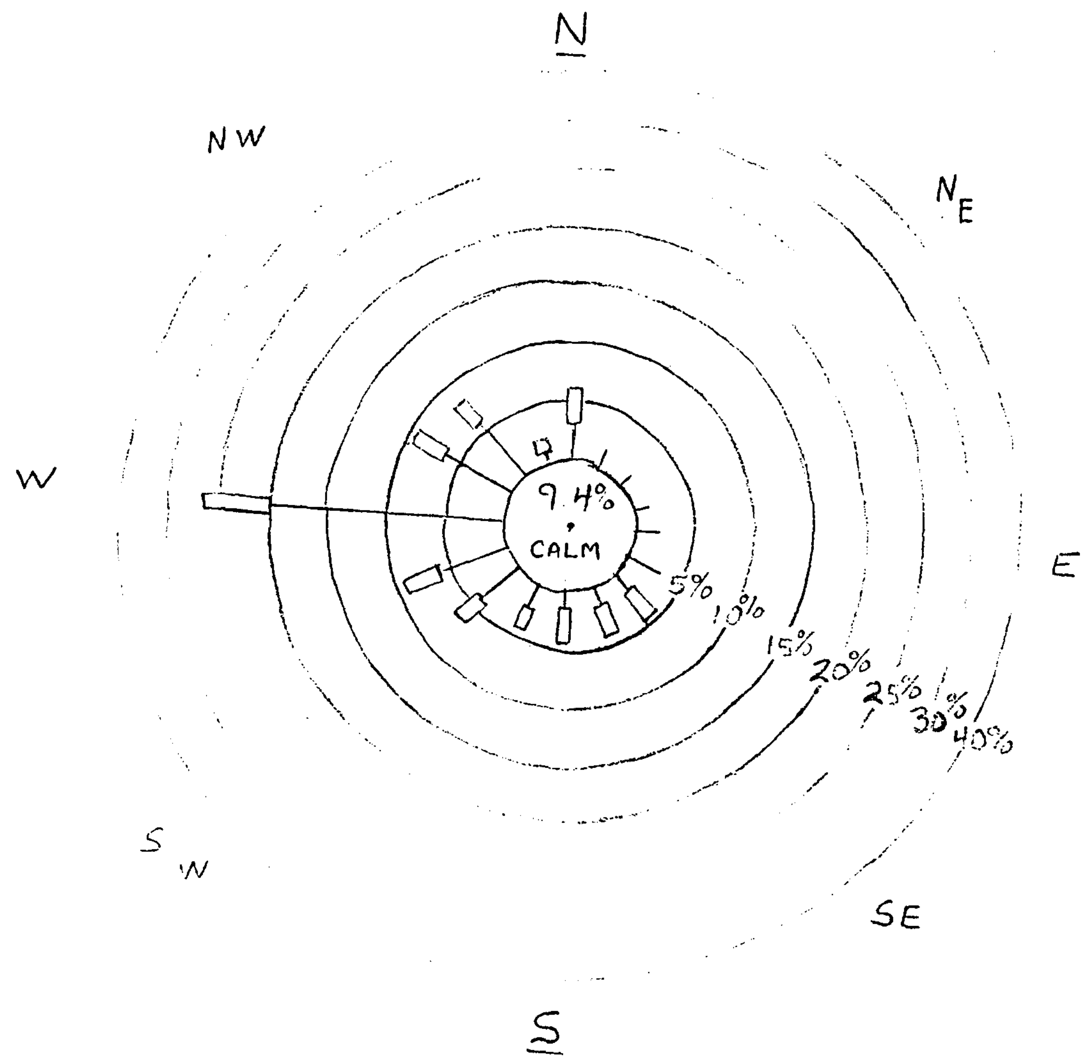
ANNUAL . .D DIRECTION

NAS ALAMEDA 'A

MEAN WIND SPEEl

PERIOD OF RECORD: 1955-1986

1-6KTS
7-16KTS
17 or greater

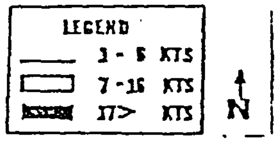


Encl. (5)

MONTHLY WIND ROSES NAS ALAMEDA, CA

WIND ROSES

PERIOD OF RECORD:1955-1979



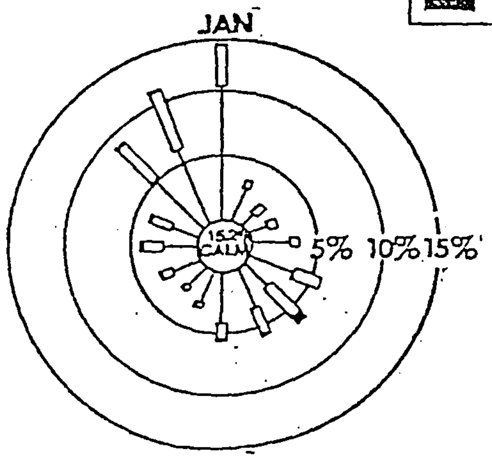


Figure II-51
January Wind Rose

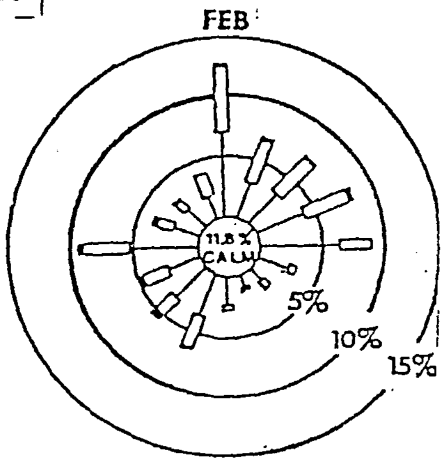


Figure II-52
February Wind Rose

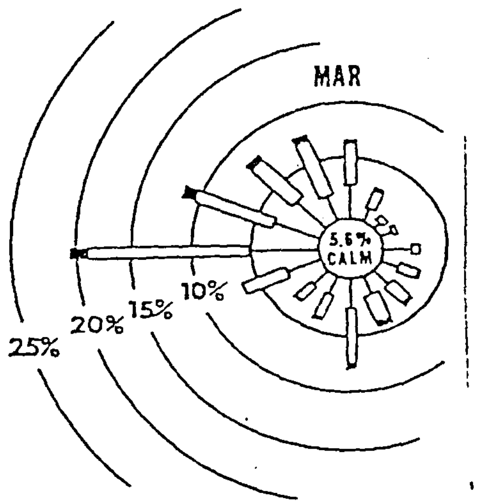


Figure II-53
March Wind Rose

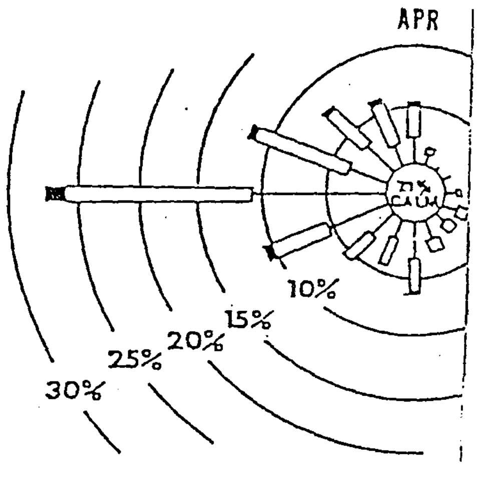
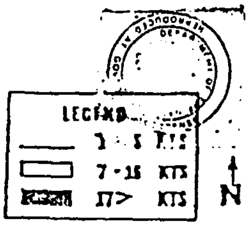


Figure II-54
April Wind Rose

Encl (6)



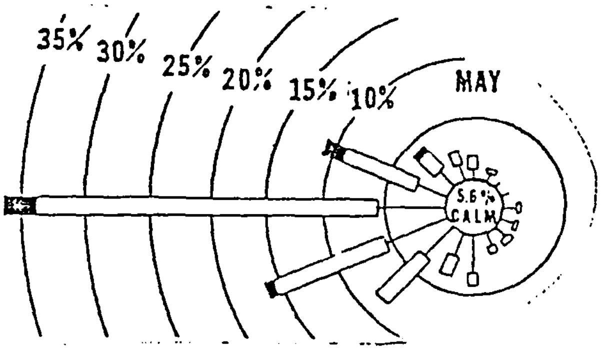


Figure II-55
May Wind Rose

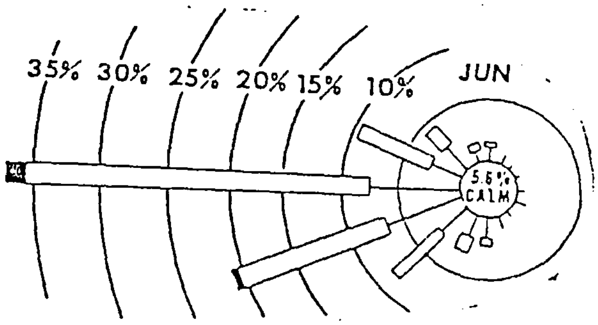


Figure II-56
June Wind Rose

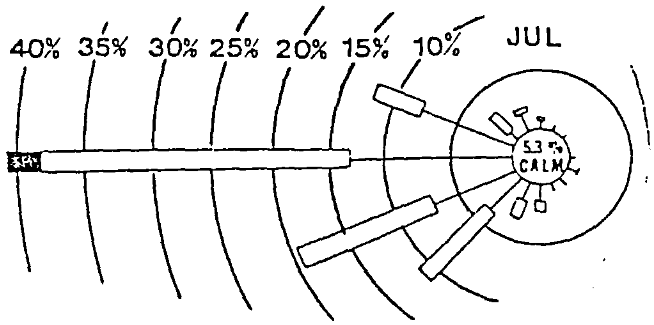


Figure II-57
July Wind Rose

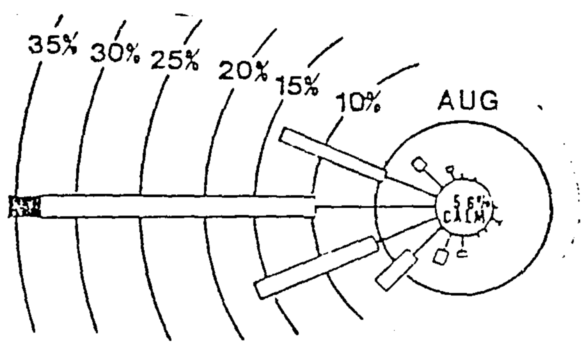
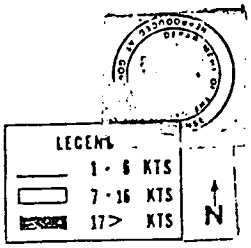


Figure II-58
August Wind Rose



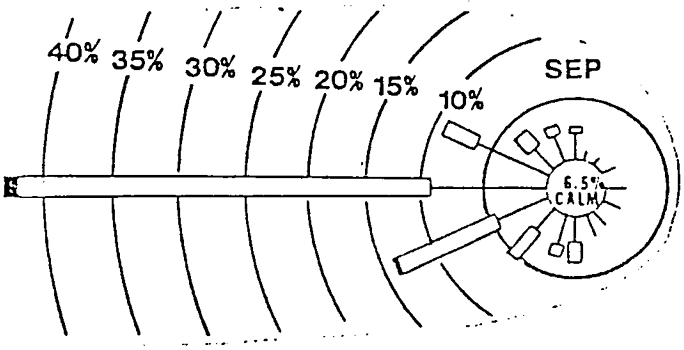


Figure II-59
September Wind Rose

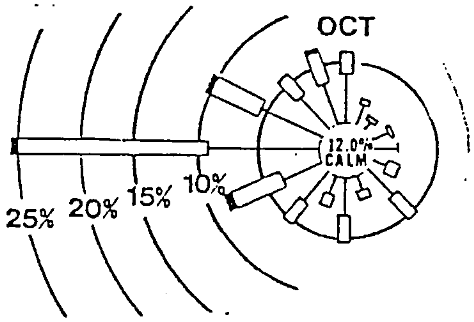


Figure II-60
October Wind Rose

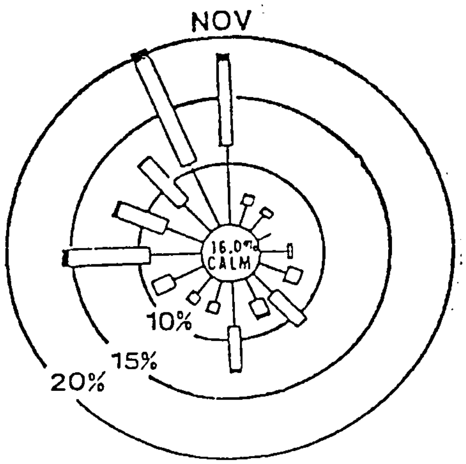


Figure II-61
November Wind Rose

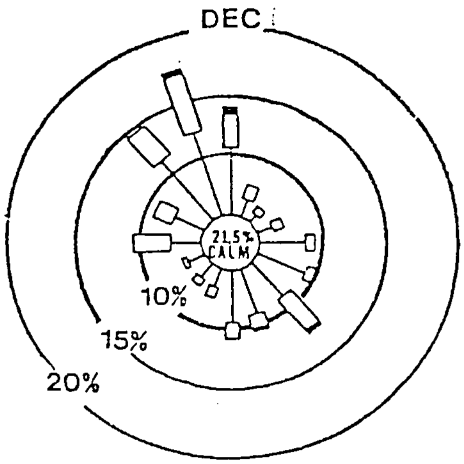


Figure II-62
December Wind Rose