Baseline Investigation of Radionuclide and Non-Radionuclide Contaminants in Ambient Air at the Laboratory for Energy Related Health Research (LEHR) at Davis, California (August 1995 - August 1996).

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Summary

In August 1995, Pacific Northwest National Laboratory (PNNL) began air monitoring at the Laboratory for Energy Related Health Research (LEHR) site in Davis, California. The contaminants of concern were identified in the LEHR Environmental Restoration Remedial Investigation/Feasibility Study (RI/FS) Work Plan (DOE 1994). Ambient air samples were collected using a network of 3 LEHR perimeter stations and 1 distant location. Continuous samples were collected for particulate and gas-phase radionuclides, whereas monthly or quarterly grab samples (i.e., periodic 24-hr samples) were collected for metals and organic compounds. Meteorological data was collected on a continuous basis. Several of the radionuclides with potential for release from the LEHR site are also found worldwide from two other sources: those that are naturally occurring and those resulting from nuclear weapons testing. The potential influence of LEHR operations on local radionuclide air concentrations was estimated by comparing the concentrations between the distant location with concentrations measured at the LEHR site perimeter. This comparison (distant verses site perimeter) was also used for the non-radionuclide samples where multiple sources exist within the local region for volatile organic compounds, metals, dust, and chlordane components.

Particulate Radionuclides

Both the average concentrations and maximum concentrations of total alpha radiation were similar for Site perimeter locations compared to the distant location, indicating that the observed levels were predominantly the result of natural sources and worldwide fallout. The highest average air concentration for a Site location was at AML-2 (0.0017 ± 0.0004 pCi/m^3; result $\pm$ 2 sigma counting error) and compared to the average concentration at the distant location 0.0017 ± 0.0005 pCi/m^3 there was no statistical difference.

Total beta radiation concentrations in ambient air peaked during the winter, following the expected pattern of natural annual radioactivity fluctuations. The highest average total beta concentration at a Site perimeter location (AML-3, 0.030 ± 0.012 pCi/m^3) was similar to the distant location 0.027 ± 0.010 pCi/m^3, indicating that the observed levels were predominantly a result of natural sources and worldwide fallout. No statistical differences were observed between the average total beta concentrations measured at the Site perimeter locations compared to the distant location.

Quarterly composite air samples were analyzed for gamma-emitting radionuclides. Radionuclides with at least one sample result above the counting error were ^{7}Be, ^{40}K, ^{137}Cs, ^{212}Pb, ^{214}Bi, ^{214}Pb. Beryllium-7 and potassium-40 are naturally occurring and were found at similar concentrations at the LEHR Site

and the distant location. All other gamma-emitting radionuclides were only detected for less than 3 samples out of 12. All gamma-emitting radionuclides were well below the DOE derived concentration guides (DCG). The DCG values represent the concentration of a radionuclide in air that an individual could continuously inhale and be immersed in at average annual rates without receiving an effective dose equivalent of greater than 100 mrem/yr.

Isotopic Radionuclides

All measured concentrations for isotopic thorium, uranium, radium, and strontium were well below the DOE derived concentration guides.

Thorium-228 was detected for all air samples at both the LEHR site and the distant location, with similar average concentrations. The highest air concentration was 0.00010 ± 0.00004 pCi/m^3 for both the AML-2 location and the distant station, with this value being 0.25% of the DOE derived concentration guide. There were no statistically significant differences between LEHR locations and the distant location.

Thorium-230 was detected in all air samples at both the LEHR site and the distant location. The highest air concentration was 0.000069 ± 0.000020 pCi/m^3 at AML-2 and this value was 0.17% of the DOE derived concentration guide. Average air concentrations were numerically higher at AML-2 compared to the distant location; and the difference was statistically significant. However, the number of samples was very limited (3 samples at each location) and additional samples may be needed to verify this observation.

Thorium-232 was detected for all air samples at both the LEHR site and the distant location. The highest air concentration was 0.000079 ± 0.000022 pCi/m^3 at AML-2 and this value was 1.1% of the DOE derived concentration guide. Average air concentrations were numerically higher at AML-2 and AML-3 compared to the distant location and the differences were statistically significant. However, the number of samples was very limited (3 samples at each location) and additional samples may be needed to verify this observation.

Uranium-233,234 was detected for most air samples, with similar concentrations at both the LEHR locations and the distant location. The highest detected concentration was 0.00028 ± 0.000091 pCi/m^3 at AML-3 and this value is 0.31% of the DOE derived concentration guide. The concentration differences between each Site perimeter location and the distant location were not statistically significant.

Uranium-235 was detected for six of nine air samples at the LEHR site and for one of three samples at the distant location. The highest detected concentration

was 0.000068 $\pm$ 0.000038 pCi/m^3 at the AML-3 location and this value was 0.068% of the DOE derived concentration guide. No statistical tests for differences between the LEHR locations and the distant station were conducted because of the low number of detectable concentrations.

Uranium-238 was detected for all samples at the LEHR site and the distant location. The highest concentration was at the distant location 0.00021 $\pm$ 0.000069 pCi/m^3 and this concentration was 0.21% of the DOE derived concentration guide. The concentration differences between each Site perimeter location and distant location were not statistically significant.

Radium-226 was detected for most air samples, with similar concentrations at both the LEHR locations and the distant location. The highest detected concentration was at the distant location (0.0031 $\pm$ 0.00008 pCi/m^3) and this value was 0.31% of the DOE derived concentration guide.

Air concentrations of strontium-89,90 were generally below the detection limits for most samples at both LEHR locations and the distant location. The highest detected concentration was at the distant location (0.061 $\pm$ 0.00078 pCi/m^3) and this value was 0.68% of the DOE derived concentration guide.

Gas Phase Radionuclides

Tritium

Tritium concentrations in air for both Site perimeter and the distant location were below the detection limit for all but one sample (3.3 $\pm$ 3.1 pCi/m^3), with this value being 0.0033% of the DOE derived concentration guide of 100,000 pCi/m^3.

Radon

Only one of 24 samples collected at the LEHR site was above the detection limit (0.9 pCi/L at AML-2, on 4/16/96); however, the concentration of radon in the duplicate sample at this location was below the detection limit (<0.3 pCi/m^3). The distant location (AML-6) had detectable concentration of radon for 4 of 8 samples, with a maximum concentration of 2.1 pCi/L. All measured radon air concentrations and detection limits were below the DOE derived concentration guide of 3.0 pCi/L.

PM-10 Dust

PM-10 dust concentrations exceeded the air quality standard of 150 ug/m^3 on 10/4/95 at AM-2 (390 ug/m^3) and AM-3 (240 ug/m^3), with a PM-10

concentration of 20 ug/m^3 at the distant station. All other PM-10 concentrations were below the 150 ug/m^3 standard. The 10/4/95 sampling event was characterized by very strong winds with field staff directly observing the resuspension of dust from the livestock area 20-m north of station AM-2 onto the LEHR site. Thus the elevated PM-10 concentrations appear to be largely influenced by non-LEHR sources of airborne particulate.

Metals

Detectable concentrations of metals were found in ambient air at both the LEHR and distant stations. Air concentrations were corrected by subtracting the average analytical blank contribution from the individual sample results. Ambient air concentrations were compared to U.S. EPA Region IX preliminary remediation goals (PRG) for ambient air (SJ Smucker, EPA Region IX, 2/1/95). The PRG values are health-based concentrations that correspond to either a one-in-one million (1×10^{-6}) cancer risk or a chronic health quotient of one, whichever is lower. The PRG values combine EPA toxicity values with reasonable maximum exposure factors to estimate concentrations that are protective of humans over a lifetime of exposure. The PRG values are meant to be used a screening tool for pollutants in environmental media and environmental values that exceed the PRG suggest that further evaluation of the potential risk may be required.

No PRG values exist for antimony, selenium, or copper in ambient air. Antimony and selenium show similar average concentrations for the distant and perimeter locations, with no statistical differences between the LEHR stations and the distant location. Antimony had poor analytical recoveries for spiked samples and a standard reference material; thus antimony concentrations may be underestimated by factor of 4. Average copper concentrations were somewhat higher at LEHR stations compared to the distant station; however the differences were not statistically significant. Copper was also detected in the blank samples; however, the blank concentrations were small compared to the actual sample concentrations.

Beryllium was only detected for three samples at the LEHR site and no detectable concentrations were measured at the distant location. The maximum beryllium concentration was 0.00021 ug/m^3 (AML-2 on 10/4/96), which was 26% of the 0.0008 ug/m^3 PRG value. The high concentration was associated with the strong northerly winds and high PM-10 concentrations reported on that date.

Average air concentrations of molybdenum were similar at the LEHR stations and the distant location with no statistical differences. The maximum molybdenum air concentration was 0.00032 ug/m^3 (AML-2 on 10/4/96), which

was 0.0018% of the 18 ug/m^3 PRG value. The high concentration was associated with the strong northerly winds and high PM-10 concentrations reported on that date. Molybdenum was detected in the blank samples at concentrations similar to the actual samples; however, the contribution of the blank to a representative air sample (0.00011 ug/m^3 for a 1,600 m^3 sample) was considerably below the 18 ug/m^3 PRG value.

Chromium was detected in all air samples, with average air concentrations numerically greater at the AML-2 and AML-3 locations compared to the distant station (AML-6); however, the differences were not statistically significant. The highest chromium concentration was 0.054 ug/m^3 at AML-2 on 10/4/95, which was associated with the strong northerly winds and high PM-10 concentrations reported on that date. Air concentrations of chromium at the LEHR locations and the distant location were above the PRG values for total chromium. Chromium was also detected in the blank samples at levels that would exceed the PRG value for a typical sample volume. The chromium air concentrations reported were corrected by subtracting the average blank value from each individual sample. Chromium samples had reasonable spike recovery values 84% $\pm$ 16% (n = 4); however, analysis of NIST Standard 1648 Urban Dust had low recoveries 21% $\pm$ 5.8%. The low recoveries for the Urban Dust Standard may result from the different digestion method used for the LEHR samples (nitric acid digestion) compared to a more rigorous digestion method used for certifying the standard. Because of the high chromium concentration in the blank samples and the low recoveries for the NIST Urban Dust standard, the chromium data is suspect. Any additional air sampling for chromium should use either a different air filter media or a longer sampling interval to minimize the effect of the blank.

Organic Compounds

Alpha-chlordane, gamma-chlordane, heptachlor, and trans-nonachlor were detected in most samples. Cis-nonachlor and heptachlor epoxide were only occasionally detected with no location reporting more than one detectable concentration for the six sampling events. The average air concentrations of chlordane components were numerically greater at the AML-2 location compared to the distant station (AML-6); however, the differences were not statistically significant. Average air concentrations at AML-3 and AML-4 were similar to the distant station, with no statistical differences compared to the distant station. All measured LEHR air concentrations for chlordane components were below the available PRG values.

The air concentrations for the majority of volatile organic compounds were below the detection limits. Toluene was the most frequently detected volatile organic with a maximum air concentration of 280 ug/m^3 at AML-2 on 10/4/95.

All other concentrations of toluene were less than 7 ug/m^3, with similar concentrations at the LEHR stations and the distant station. Dichlorodifluoromethane (Freon 12) was found for six samples with similar concentrations at the LEHR stations and the distant station. 1,1,1-trichloroethane was found for three samples at the LEHR site with a maximum concentration of 15 ug/m^3 at AML-2 on 8/8/96. Chlorobenzene was detected for one sample with a concentration of 8.0 ug/m^3 at AML-2 on 10/4/95. Because of the low number of samples with detectable concentrations it was not possible to make a statistical comparison between the LEHR perimeter and the distant location. All ambient air volatile organic compound concentrations measured at the LEHR Site were below the PRG values.

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1.0 Introduction

In August 1995 Pacific Northwest National Laboratories (PNNL) began air monitoring at the Laboratory for Energy Related Health Research (LEHR) site in Davis California. The LEHR site is located in a rural area in the southeast portion of the University of California Davis (UC Davis) campus and is bounded on the west, north and east by UC Davis research facilities. The southern boundary of the LEHR site is the South Fork of Putah Creek. Private land is adjacent to and surrounds UC Davis property on all sides and is mainly used for agricultural purposes.

UC Davis conducted scientific studies at the LEHR site on laboratory animals for the DOE from the 1950s until the mid 1980s. Studies involving aerosols, coal flyash, radioactive and toxic gas-particles, carcinogen-coated particles, and organic vapor uptake were also conducted.

From August 1995 to August 1996, PNNL developed and operated the air monitoring program to fulfill the following objectives:

- Document existing off-site, background air concentrations for selected potential contaminants of concern.
- Support a quantitative risk assessment by measuring air concentrations.
- Identify potential environmental problems and evaluate the need for remedial actions if necessary.
- Establish local meteorological conditions at the site.
- Verify compliance with applicable federal, state and local regulations and DOE Orders.
- Detect and characterize unplanned releases
- Verify effluent control
- Allow assessment of airborne impacts during remediation
- Allow assessment of post remediation reduction in releases

2.0 Experimental

2.1 Contaminants of concern.

The contaminants of concern were identified in the LEHR Environmental Restoration Remedial Investigation/Feasibility Study (RI/FS) Work Plan (DOE 1994). The selection of contaminants of concern for ambient air monitoring were based on: their detection in soil or groundwater at levels above background concentrations; past site history and use; their relative importance in terms of potential dose to man and the environment. Table 2.1 details radiological and non-radiological contaminants of concern for the ambient air monitoring on the LEHR site. In addition, air samples were also analyzed for airborne particulate with aerodynamic diameters smaller than, or equal to, 10 micrometers (PM-10).

2.2 Sampling Sites

Ambient air samples were collected using a network of 3 LEHR perimeter stations and 1 distant location. Air stations are identified using the code "AML-x", which stands for "Air Monitoring Location" and were used to be consistent with air station identifications in the FI/FS work plan. Two of the perimeter stations (AML-2 and AML-5) were located in the prevailing downwind directions (north-south) of the main LEHR facilities (Figure 2.2.1). Station AML-2 is located at the northeast corner of the site directly north of the Toxic Pollutant Health Research Lab building. Station AML-5 is located along the southern fence line approximately 100-m east of the southwestern boundary. The other perimeter station (AML-3) is located approximately 100-m west of the LEHR eastern fence boundary and provided coverage near the Old Landfill Unit No. 3. The offsite sampling site, AML-6, is located approximately 10 km west of the LEHR site at LTRAS (Figure 2.2.2). Air monitoring stations AML-1 and AML-4 were not used for this monitoring program. An onsite meteorological station is located near the center of the LEHR facility (Figure 2.2.1). Table 2.2 list geographical positioning data for each sampling location. Geographic positioning data was collected with a Trimble Geoline Positioning System (Model GEO-II, Sunnyvale, California).

Air sampling equipment at each station (primarily air pumps inside aluminum hutches) were bolted onto wooden platforms (0.7 meters high and 1.5 meters x 2 meters in area) to provide stability. Sample inlets were located approximately 2-m above the ground. Power was supplied to the pumps by outdoor-type extension cords.

2.3 Sampling Schedule

Air samples were collected according to a schedule established prior to the start of monitoring (Table 2.3). Continuous samples were collected for particulate and gas-phase radionuclides, whereas monthly or quarterly grab samples (i.e., periodic 24-hr samples) were collected for metals and organic compounds. Meteorological data was collected on a continuous basis.

2.4 Sampling and Analysis Methods

2.4.1 Particulate Radionuclides

Air samples for particulate radionuclides were collected by passing air through 5.1-cm diameter high-efficiency glass fiber particle filters (Type LB5211 A-O, Hi-Q Environmental Products Company, San Diego, CA, or equivalent) at an average flow rate of 40 L/min for 2 weeks (typical sample volume of 800 m^3). Flow rates were determined using an SAIC/Radeco air flow calibrator which uses a precision machined venturi to create a differential pressure across a fixed orifice. A Magnehelic gage is used to measure the differential pressure which is calibrated to a flow velocity. The air flow calibrator was calibrated at the Hanford Site's Calibration Facility (Westinghouse Hanford Company, Richland, Washington).

The exposed filters were sent to Lockheed Environmental Systems and Technology Company, Las Vegas, Nevada where, after a holding time to allow for the decay of naturally occurring radon and thoron decay products, they were analyzed for total alpha and total beta radiation. For most radionuclides, the amount of particulate material collected on the biweekly filters was too small to be readily measured. The sensitivity and accuracy of the analysis was increased by combining the biweekly filters into composite samples. Individual filters from each location were composited and analyzed on a quarterly basis (typical sample volume of 5,600 m^3) for gamma-emitting radionuclides and other specific radionuclides (Sr, U, Th, and Ra).

2.4.2 Gas-Phase Radionuclides

Tritium (as HTO)

Air samples for tritium (as HTO) were collected using solid adsorbent silica gel to collect atmospheric moisture (Patton et al. 1995). Air samples were collected using silica gel packed into three clear-plastic gas-drying columns (5.9-cm diameter x 18-cm length each) connected in series. Air was passed through the columns at 0.2 L/min for 4 weeks with a typical sampling volume of 8 m^3. The silica gel has a moisture-sensitive indicator on its surface which

allows for visual observation of the extent of moisture penetration into the columns. Sampling flow rates were measured using either a calibrated rotameter or a Kurz 541S mass flowmeter (Kurz Instruments, Inc., Monterey, California), which were calibrated at the Hanford Site's Calibration Facility (Westinghouse Hanford Company, Richland, Washington).

Silica gel columns were prepared and analyzed by Lockheed Environmental Systems and Technology Company, Las Vegas, Nevada. The analysis involved distillation of the atmospheric moisture from the silica gel followed by liquid scintillation counting.

The tritium air sampling system experienced flow control problems for a significant portion of the early air samples. Sampling periods ending on 9/7/95, 10/4/95, and 1/23/96 experienced either leaks, breakthrough, or had questionable air volumes. These problems were eventually traced to leaks past the gaskets in the gas-drying columns. Because of the very low flow rates, these leaks were difficult to detect using the original rotameters for flow control and measurement. The problem was solved through the use of a mass flowmeter to measure flowrate at both the inlet and outlet of the gas-drying columns. Because of the air flow problems the tritium data is reported both as the air concentrations (pCi/m^3 of air and as the tritium content of the atmospheric moisture (pCi/mL of moisture).

Radon

Air samples for radon were collected using Radtrak DRNF radon detectors (Landauer Inc., Glenwood, Illinois). The radon units are passive air devices which provide for the time integration of alpha particle tracks with a minimum level of detection of 30 pCi/L days. Detector holders are enclosed in a cylindrical cavity composed of electrically conducting material with filtered openings to permit diffusion of radon gas only. Duplicate radon detectors were installed at a height of 2 meters at each site with duplicate blanks kept inside a sealed glass jar in an office at LEHR.

2.4.3 Metals and PM10 Dust

Air samples for metal and dust analysis were collected using a Graseby (Village of Cleves, OH) PM10 particle size selective inlet high-volume sampling system (Federal Register, 1987). The PM10 sampler passes air through 20-cm by 25-cm high-purity glass fiber filters (EPM-2000 glass microfiber filters, Whatman, Hillsboro, Oregon). Samples were collected at a flow rate of 1.13 m^3/min ($\pm$ 10%) for 24-hr with a typical sample volume of 1600 m^3. Sampling flow rates were controlled and maintained by a critical venturi device. Flow control is accomplished by accelerating the air flow through the venturi until a critical

flow is achieved. Critical flow through the venturi is not greatly affected by changes in filter loading, temperature, or pressure and a stable volumetric flow is maintained. A blank sampling head was shipped with the actual samples and put through the same handling and analysis steps as the actual samples.

Samples were analyzed by Battelle-Sequim (Sequim, Washington) using inductively coupled plasma - mass spectrometry for antimony (Sb), beryllium (Be), chromium (Cr), copper (Cu), and molybdenum (Mo). Selenium (Se) was analyzed using graphite furnace atomic absorption spectroscopy. Dust loadings (as PM10) were determined gravimetrically. A standard reference material (NIST 1648 Urban Dust) from the National Institute of Standards and Technology (Gaithersburg, Maryland) was analyzed with each set of air samples.

2.4.4 Organic Compounds

Chlordane

Air samples for chlordane components were taken using U.S. EPA Method TO-4 (Winberry et al., 1988). A Graseby (Village of Cleves, Ohio) GPS-1 high volume air sampling unit was used to pull air through a 10-cm diameter glass fiber filter (Micro Filtration Systems, Dublin, California, Grade GA5S, borosilicate filters) particle filter backed up by a 7.6 cm thick by 6.5 cm diameter polyurethane foam (PUF) adsorbent trap at flow rates of 200-280 L/min for 24-hr (typical sample volume of 350 m^3). Flow rates were determined by measuring the pressure drop behind the filter/adsorbent sampling train using the Magnehelic gauge supplied with each GPS-1 sampler. This pressure drop was related to volumetric flow by using the GPS-1 calibration orifice. To evaluate vapor penetration (breakthrough) through the PUF plug, a secondary PUF plug was placed behind the primary PUF plug at one sampling station during each sampling event. In addition, a blank sampling train (filter + PUF plug) was shipped with the actual samples and put through the same handling and analysis steps as the actual samples.

Polyurethane foam adsorbent plugs were cleaned by Soxhlet extraction at Battelle-Sequim prior to sampling. Samples were analyzed by Battelle-Sequim using Soxhlet extraction followed by capillary gas chromatography with electron capture detection. Air samples were analyzed for the following chlordane components: heptachlor, heptachlor epoxide, trans-chlordane, cis-chlordane, trans-nonachlor, and cis-nonachlor. Two surrogate standards (polychlorinated biphenyls PCB-103 and PCB-198) were added to each sample prior to extraction to assess the efficiency of the analysis. The surrogate compounds were used to correct sample recoveries and are considered surrogate

internal standards.

Volatile Organic Compounds

Air samples were collected using U.S. EPA Method TO-14 (Winberry et al., 1988), which uses electropolished stainless-steel canisters (SUMMA canisters). The analytical laboratory (Quantera, Knoxville, Tennessee) provided calibrated low-flow inlets and evacuated SUMMA canisters. The low-flow inlets allowed for a constant flow of air into the canisters during the 24-hr sampling period. During a sampling event, one air sample was collected at each air station with one station collecting a duplicate sample. A total of 39 volatile organic compounds were analyzed by gas chromatography-mass spectrometry. The compounds m-xylene and p-xylene are not resolved by the TO-14 Method and their concentrations were reported as the sum of both compounds.

2.4.5 Meteorological Monitoring

Continuous meteorological data was collected near the center of the LEHR site using a Met One weather station (Grants Pass, Oregon). The measuring equipment was located 3-m above ground. Data was collected for wind speed, wind direction, and temperature. Meteorological data was not available during some time periods because of power losses to the weather station (see Section 3.5). The meteorological data was downloaded from the Met One weather station by PNNL staff conducting the monthly and quarterly non-radionuclide samples.

3.0 Results and Discussion

3.1 Particulate Radionuclides

Particulate radionuclide air sampling results for LEHR perimeter stations and the distant station for total alpha, total beta, and specific radionuclides are given in Tables 3.1.1 and 3.1.2. In addition, the U.S. DOE Derived Concentration Guides (DCG) for selected radionuclides in air are given in Table 3.1.3. The DCG values represent the concentration of a radionuclide in air that an individual could continuously inhale and be immersed in at average annual rates without receiving an effective dose equivalent of greater than 100 mrem/yr (DOE Order 5400.5).

Several of the radionuclides with potential for release at the LEHR site are also found worldwide from two other sources: those that are naturally occurring and those resulting from nuclear weapons testing. The potential influence of LEHR operations on local radionuclide air concentrations was estimated by comparing the concentrations between the distant location with concentrations measured at the LEHR site perimeter. This comparison (distant verses site perimeter) was also used for the non-radionuclide samples where multiple sources exist within the local region for volatile organic compounds, metals, dust, and chlordane components.

3.1.1 Total Alpha

The maximum and average concentrations of total alpha radioactivity in air are given in Table 3.1.1, with individual results given in Appendix Table 5.1. The air concentrations at the Site perimeter and the distant location were similar, as shown in Figure 3.1.1. Both the average concentrations and maximum concentrations were similar for Site perimeter locations compared to the distant location indicating that the observed levels were predominantly the result of natural sources and worldwide fallout. The highest average air concentration for a Site location was at AML-2 (0.0017 ± 0.0004 pCi/m^3; result $\pm$ 2 sigma counting error) and compared to the average concentration at the distant location 0.0017 ± 0.0005 pCi/m^3 there was no statistical difference (two-tailed t-test, 5% significance level). There is no DOE derived concentration guide for total alpha radiation in air.

3.1.2 Total Beta

The maximum and average concentrations of total beta radioactivity in air are given in Table 3.1.1, with individual results given in Appendix Table 5.2. Total beta radiation concentrations in ambient air peaked during the winter (Figure 3.1.2). This winter-time maximum concentration is the expected

pattern of natural annual radioactivity fluctuations (Eisenbud 1987). As shown in Table 3.1.1, the highest average total beta concentration at a Site perimeter location (AML-3, 0.030 $\pm$ 0.012 pCi/m^3) was similar to the distant location 0.027 $\pm$ 0.010 pCi/m^3, indicating that the observed levels were predominantly a result of natural sources and worldwide fallout. The concentration differences between each Site perimeter location and distant location were not statistically significant (two-tailed t-test, 5% significance level). There is no DOE derived concentration guide for total beta radiation in air.

3.1.3 Gamma Scans

This section presents the results for only the first 3 quarterly composite air sample sets. The last quarterly composite air sample set (collected from 5/14/96 to 8/7/96) has not yet been reported from the analytical lab.

Table 3.1.2 gives the average and maximum air concentrations for gamma-emitting radionuclides at Site perimeter and the distant location, individual sample results are available in Appendix Table 5.3. Radionuclides with at least one sample result above the counting error were ^{7}Be, ^{40}K, ^{137}Cs, ^{212}Pb, ^{214}Bi, ^{214}Pb. Beryllium-7 is a naturally occurring cosmogenic radionuclide and potassium-40 is a naturally occurring primordial nuclide and both of these radionuclides were found at similar concentrations at the Site perimeter and distant locations. All other gamma-emitting radionuclides were only detected for less than 3 samples out of 12. All gamma-emitting radionuclides were well below the DOE derived concentration guides (Table 3.1.3). Because of the low number of samples with detectable concentrations it was not possible to make a statistical comparison between the LEHR perimeter and the distant location.

3.1.4 Isotopic Analysis

This section discussed the results for only the first 3 quarterly composite air sample sets. The last quarterly composite air sample set (collected from 5/14/96 to 8/7/96) has not yet been reported from the analytical lab.

Table 3.1.2 gives the average air concentration for isotopic thorium, uranium, radium, and strontium, with individual results reported in the Appendix Table 5.4. All measured concentrations for isotopic thorium, strontium, radium and uranium were well below the DOE derived concentration guides (Table 3.1.3).

Isotopic Thorium

Thorium-228 was detected for all air samples at both the LEHR site and the distant location, with similar average concentrations. The highest air

concentration was 0.00010 ± 0.00004 pCi/m^3 for both the AML-2 location and the distant station (AML-6) on 11/14/95, with this value being 0.25% of the DOE derived concentration guide (Table 3.1.3). There were no statistically significant differences between LEHR locations and the distant location (natural log transformed, two-tailed t-test, 5% significance level).

Thorium-230 was detected in all air samples at both the LEHR site and the distant location. The highest air concentration was 0.000069 ± 0.000020 pCi/m^3 at AML-2 on 11/14/95 and this value was 0.17% of the DOE derived concentration guide (Table 3.1.3). Average air concentrations were numerically higher at AML-2 compared to the distant location (AML-6); and the difference was statistically significant (natural log transformed, two-tailed t-test, 5% significance level). However, the number of samples was very limited (3 samples at each location) and additional samples may be needed to verify this observation.

Thorium-232 was detected for all air samples at both the LEHR site and the distant location. The highest air concentration was 0.000079 ± 0.000022 pCi/m^3 at AML-2 on 11/14/95 and this value was 1.1% of the DOE derived concentration guide (Table 3.1.3). Average air concentrations were numerically higher at AML-2 and AML-3 compared to the distant location. The difference between AML-2 and the distant location (AML-6) was statistically significant (natural log transformed, two-tailed t-test, 5% significance level); however, the number of samples was very limited (3 samples at each location) and additional samples may be needed to verify this observation.

Isotopic Uranium

Uranium-233,234 was detected for most air samples, with similar concentrations at both the LEHR locations and the distant location. The highest detected concentration was at the AML-3 location (0.00028 ± 0.000091 pCi/m^3, 11/14/95) and this value is 0.31% of the DOE derived concentration guide (Table 3.1.3). The concentration differences between each Site perimeter location and the distant location were not statistically significant (natural log transformed, two-tailed t-test, 5% significance level).

Uranium-235 was detected for six of nine air samples at the LEHR site and for one of three samples at the distant location. The highest detected concentration was at the AML-3 location (0.000068 ± 0.000038 pCi/m^3, 11/14/95) and this value was 0.068% of the DOE derived concentration guide (Table 3.1.3). No statistical tests for differences between the LEHR locations and the distant station were conducted because of the low number of detectable concentrations.

Uranium-238 was detected for all samples at the LEHR site and the distant

location. The highest concentration was at the distant location 0.00021 ± 0.000069 pCi/m^3 and this concentration was 0.21% of the DOE derived concentration guide. The concentration differences between each Site perimeter location and distant location were not statistically significant (natural log transformed, two-tailed t-test, 5% significance level).

Radium-226

Radium-226 was detected for most air samples, with similar concentrations at both the LEHR locations and the distant location. The highest detected concentration was at the distant location (0.0031 ± 0.00008 pCi/m^3, AML-6, 8/9/95) and this value was 0.31% of the DOE derived concentration guide (Table 3.1.3). No statistical tests for differences between the LEHR locations and the distant station were conducted because of the low number of detectable concentrations at the distant location.

Strontium-89,90

Concentration of strontium-89,90 were generally below the detection limits for most samples at both LEHR locations and the distant location. The highest detected concentration was at the distant location (0.061 ± 0.00078 pCi/m^3, AML-6, 8/9/95) and this value was 0.68% of the DOE derived concentration guide. No statistical tests for differences between the LEHR locations and the distant station were conducted because of the low number of detectable concentrations.

3.2 Gas Phase Radionuclides

3.2.1 Tritium

Table 3.1.1 summarizes the air concentrations for tritium in both atmospheric moisture units (pCi/mL) and air concentration units (pCi/m^3), with individual results given in Appendix Tables 5.5 and 5.6. Only one of 41 samples had a detectable concentration of tritium (3.3 ± 3.1 pCi/m^3 at AML-2, on 10/31/1995). This air concentration was 0.003% of the DOE derived concentration guide of 100,000 pCi/m^3.

3.2.2 Radon

Table 3.1.1 summarizes the concentrations of radon in ambient air samples collected at the LEHR site, with individual results given in Appendix Table 5.7. The concentration detection limit (pCi/L) was determined by dividing the exposure detection limit (30 pCi/L day) by the total number of days the device

was placed in the field. Thus for a 1 day exposure the concentration detection limit would be 30 pCi/L and for a 30 day exposure the concentration detection limit would be 1 pCi/L. For this monitoring program the radon detectors were exposed from 1 to 3 months, with corresponding concentration detection limits of <1.2 to <0.4 pCi/L.

Only one of 24 samples collected at the LEHR site was above the detection limit (0.9 pCi/L at AML-2, on 4/16/96); however, the concentration of radon in the duplicate sample at this location was below the detection limit (<0.3 pCi/m^3). The distant location (AML-6) had detectable concentration of radon for 4 of 8 samples, with a maximum concentration of 2.1 pCi/L. No statistical analysis was possible because of the limited number of samples with detectable concentrations. All measured radon air concentrations and detection limits were below the DOE derived concentration guide of 3.0 pCi/L.

3.3 Metals and PM-10 Dust

3.3.1 Metals

Table 3.3.1 gives the results for the concentrations of metals measured in ambient air at both the LEHR and distant stations, with measurable levels found for most compounds (Appendix Table 5.8). Air concentrations reported in Table 3.3.1 were corrected by subtracting the average analytical blank contribution from the individual sample results. Table 3.3.1 also provides the U.S. EPA Region IX preliminary remediation goals (PRG) for ambient air (SJ Smucker, EPA Region IX, 2/1/95). The PRG values are health-based concentrations that correspond to either a one-in-one million (1×10^{-6}) cancer risk or a chronic health quotient of one, whichever is lower. The PRG values combine EPA toxicity values with reasonable maximum exposure factors to estimate concentrations that are protective of humans over a lifetime of exposure. The PRG values are meant to be used a screening tool for pollutants in environmental media and environmental values that exceed the PRG suggest that further evaluation of the potential risk may be required.

No PRG values exist for antimony, selenium, or copper in ambient air. Antimony and selenium show similar average concentrations for the distant and perimeter locations, with no statistical differences between the LEHR stations and the distant location (natural log transformed, two-tailed t-test, 5% significance level). Antimony had poor analytical recoveries for spiked samples and analysis of NIST 1648 Urban Dust (25% $\pm$ 12%, n = 7, Sb concentration was provided as a reference value only for NIST 1648); thus antimony concentrations may be underestimated by factor of 4. Average copper concentrations were somewhat higher at LEHR stations compared to the distant station; however the differences were not statistically significant (natural

log transformed, two-tailed t-test, 5% significance level). Copper was also detected in the blank samples (Table 3.3.2); however, the blank concentrations were small compared to the actual sample concentrations.

Beryllium was only detected for three samples at the LEHR site and no detectable concentrations were measured at the distant location. The maximum beryllium concentration was 0.00021 ug/m^3 (AML-2 on 10/4/96), which was 26% of the 0.0008 ug/m^3 PRG value. The high concentration was associated with the strong northerly winds and high PM-10 concentrations reported in Section 3.3.2.

Average air concentrations of molybdenum were similar at the LEHR stations and the distant location with no statistical differences (natural log transformed, two-tailed t-test, 5% significance level). The maximum molybdenum air concentration was 0.00032 ug/m^3 (AML-2 on 10/4/96), which was 0.0018% of the 18 ug/m^3 PRG value. The high concentration was associated with the strong northerly winds and high PM-10 concentrations reported in Section 3.3.2. Molybdenum was detected in the blank samples (Table 3.3.2) at concentrations similar the actual samples; however, the contribution of the blank to a representative air sample (0.00011 ug/m^3 for a 1,600 m^3 sample) was considerably below the 18 ug/m^3 PRG value.

Chromium was detected in all air samples, with average air concentrations numerically greater at the AML-2 and AML-3 locations compared to the distant station (AML-6); however, the differences were not statistically significant (natural log transformed, two-tailed t-test, 5% significance level). The highest chromium concentration was 0.054 ug/m^3 at AML-2 on 10/4/95, which was associated with the strong northerly winds and high PM-10 concentrations reported in Section 3.3.2. Air concentrations of chromium were above the PRG values for total chromium, with air concentration at the distant location also exceeding the PRG values. Chromium was also detected in the blank samples (Table 3.3.2) at levels (mean of 4.8 $\pm$ 0.33 ug/filter) that would exceed the PRG value for a typical sample volume (1,600 m^3). The chromium air concentration reported in Table 3.3.1 were corrected by subtracting the average blank value from each individual sample. Chromium samples had reasonable spike recovery values 84% $\pm$ 16% (n = 4); however, analysis of NIST Standard 1648 Urban Dust had low recoveries 21% $\pm$ 5.8%. The low recoveries for the Urban Dust Standard may result from the different digestion method used for the LEHR samples (nitric acid digestion) compared to a more rigorous digestion method used for certifying the standard. Because of the high chromium concentration in the blank samples and the low recoveries for the NIST Urban Dust standard, the chromium data is suspect. Any additional air sampling for chromium should use either a different air filter media or a longer sampling interval to minimize the effect of the blank.

3.3.2 Airborne Dust (as PM-10)

Table 3.3.1 gives the results for airborne dust measured at both the LEHR and distant stations, with individual results given in Appendix Table 5.9. The U.S. EPA has a size-specific air quality standard for ambient air particulate. The primary standard applies to particles with aerodynamic diameters less than or equal to 10 um (PM-10) [Federal Register, 1987], with PM-10 concentrations not to exceed 150 ug/m^3 for a 24-hr period. PM-10 concentrations exceeded the air quality standard on 10/4/95 at AML-2 (390 ug/m^3) and AML-3 (240 ug/m^3), with a corresponding PM-10 concentration of 20 ug/m^3 at the distant station. All other PM-10 concentrations were below the 150 ug/m^3 standard.

The 10/4/95 sampling event was characterized by very strong winds from the north, with field staff directly observing the resuspension of dust from the livestock area (20-m north of station AML-2) onto the LEHR site (AT Cooper, personal observations). Thus the elevated PM-10 concentrations appear to be largely influenced by non-LEHR sources of airborne particulate.

3.4 Organic Compounds

3.4.1 Chlordane

Table 3.4.1 gives the results for all chlordane components above the detection limit, with individual sample results reported in the Appendix Table 5.10. Alpha-chlordane, gamma-chlordane, heptachlor, and trans-nonachlor were detected in most samples. Cis-nonachlor and heptachlor epoxide were occasionally detected with no location reporting more than one detectable concentration for the six sampling events. The average air concentrations of chlordane components were numerically greater at the AML-2 location compared to the distant station (AML-6); however, the difference was not statistically significant (natural log transformed, two-tailed t-test, 5% significance level). Average air concentrations at AML-3 and AML-4 were similar to the distant station, with no statistical differences compared to the distant station (natural log transformed, two-tailed t-test, 5% significance level). All measured chlordane air concentrations were below the available PRG values (Table 3.4.1).

At one air sampling location during each sampling period, the filter and polyurethane foam plugs were extracted and analyzed as individual samples (most samples were analyzed as a combined extract of filter + polyurethane foam plug). Detected chlordane components were found almost exclusively on the polyurethane foam plug traps (i.e. not on the particulate filter), indicating that these compounds were predominantly vapor-phase material.

The surrogate compounds PCB-103 and PCB-198 were added to each sample prior to Soxhlet extraction. The average percent recovery for these compounds from the polyurethane foam adsorbent traps were (percent recovery $\pm$ 1 standard deviation) 69% $\pm$ 25 and 79% $\pm$ 25%, respectively [n = 19]. The average percent recovery for these compounds from the glass fiber filters were 66% $\pm$ 11 and 77% $\pm$ 25%, respectively [n = 11]. The average percent recovery for these compounds from combined extracts of glass fiber filters and polyurethane foam plugs were 65% $\pm$ 26 and 75% $\pm$ 32%, respectively [n = 18].

At one air sampling location during each sampling period, a second polyurethane foam plug was placed behind the primary polyurethane foam plug to monitor for vapor penetration (breakthrough) beyond the primary plug adsorbent trap. No detectable amounts of chlordane components were found in the second plugs for any samples, thus breakthrough did not occur at the air volumes sampled.

3.4.2 Volatile Organic Compounds

The air concentrations for the majority of volatile organic compounds were below the detection limits with all results above the detection limit summarized in Table 3.4.1 and the detailed results given in Appendix Table 5.11. Also given in Table 3.4.1 are the U.S. EPA Region IX preliminary remediation goals (see PRG definition in section 3.3.1) for ambient air (SJ Smucker, EPA Region IX, 2/1/95). The target volatile organic compounds are given in Table 3.4.2 along with the range of detection limits for each compound. The detection limits ranged from 0.42 - 17 ug/m^3.

Toluene was the most frequently detected volatile organic with a maximum air concentration of 280 ug/m^3 at AML-2 on 10/4/95. All other concentrations of toluene were less than 7 ug/m^3, with similar concentrations at the LEHR stations and the distant station. Dichlorodifluoromethane (Freon 12) was found in six samples with similar concentrations at the LEHR stations and the distant station. 1,1,1-trichloroethane was found in three samples at the LEHR site with a maximum concentration of 15 ug/m^3 at AML-2 on 8/8/96 (a duplicate sample on this date at AML-2 had a concentration of 9.1 ug/m^3). Chlorobenzene was detected in one sample with a concentration of 8.0 ug/m^3 at AML-2 on 10/4/95. All ambient air volatile organic compound concentrations measured at the LEHR Site were below the PRG values.

Because of the low number of samples with detectable concentrations it was not possible to make a statistical comparison between the LEHR perimeter and the distant location.

The surrogate compounds d4-1,2-dichloroethane, d8-toluene, and bromofluorobenzene were added to each SUMMA canister and the average percent recovery for these compounds were (percent recovery $\pm$ 1 standard deviation) 97% $\pm$ 2.0, 102% $\pm$ 2.8%, and 96% $\pm$ 5.6%, respectively [n = 29].

3.5 Meteorological Monitoring

Meteorological monitoring results for November 1994 to July 1996 are given in Figure 3.5 (wind rose and wind speed histogram) and Table 3.5 (joint frequency distribution). The wind rose indicates the frequency distribution of wind directions at the monitoring station; the length of each line in the wind rose is proportional to the amount of time the wind blows from the indicated direction toward the station. The dominant wind direction is from the south with most winds along a south-north axis. The highest frequency wind speeds were in the 1 - 3 mph and 4-7 mph ranges. Monthly wind roses, wind speed histograms, and joint frequency distribution tables are given in the Appendix for each month from November 1994 to July 1996. Meteorological data was not available for the following time periods because of equipment failure at the weather station:

1994 - Data began on 11/23/94 @ 11:00 - no missing data

1995 - Missing data from 11/19/95 @ 19:00 to end of the year

1996
- Missing all of 2/96
- Missing all of 3/96
- Missing 4/1/96 @ 0:00 to 4/17/96 @ 19:00
- Missing 4/18/96 @ 0:00 to 4/18/96 @ 11:00
- Missing 5/31/96 @ 0:00 to 5/31/96 @ 23:00
- Missing 7/25/96 @ 0:00 to 7/25/76 @ 23:00
- Missing 7/26/96 @ 12:00 to the end of 7/96.

4.0 References

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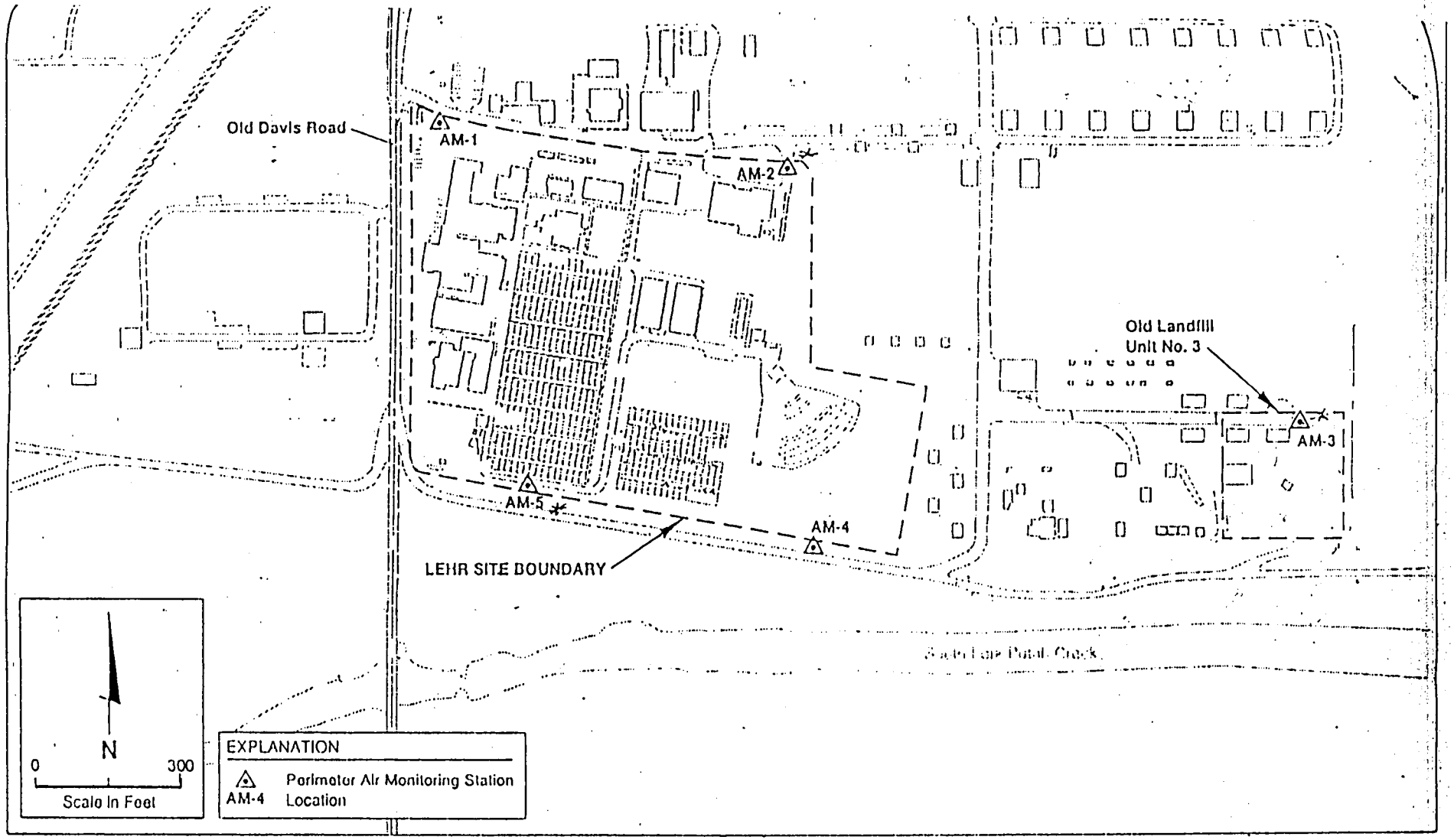
Figure 2.2.1 Onsite Ambient Air Monitoring Locations



LOCATION MAP
PERIMETER AIR
MONITORING STATIONS
RI/FS Work Plan
LEHR Environmental Restoration
Davis, California

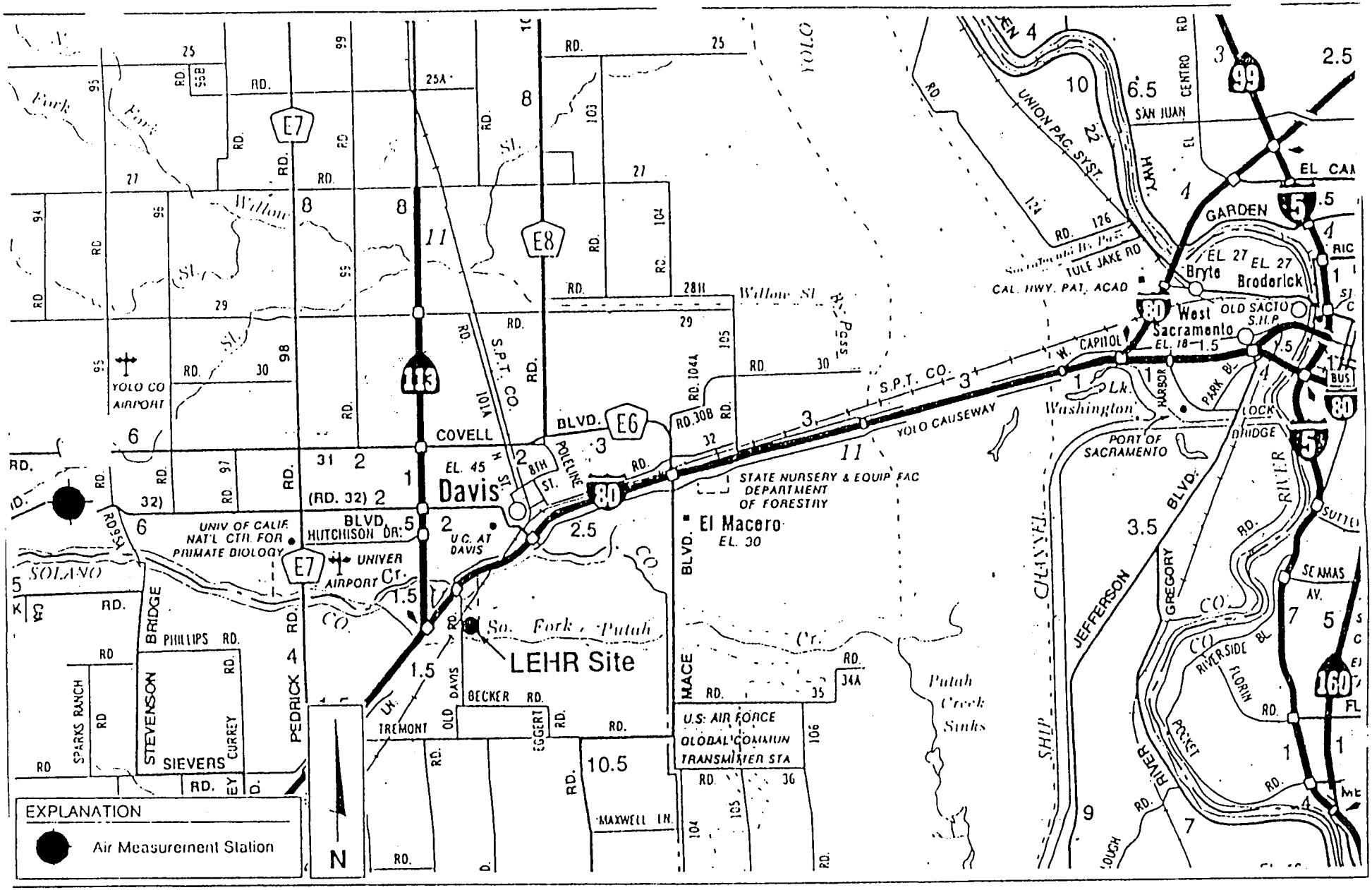


Figure 2.2.2 Offsite (Background) Ambient Air Monitoring Location

LOCATION MAP
BACKGROUND AIR MEASUREMENT STATIONS

RI/FS Work Plan
LEHR Environmental Restoration
vis, California

Figure 3.1.1 Air Concentrations of Total Alpha Radiation

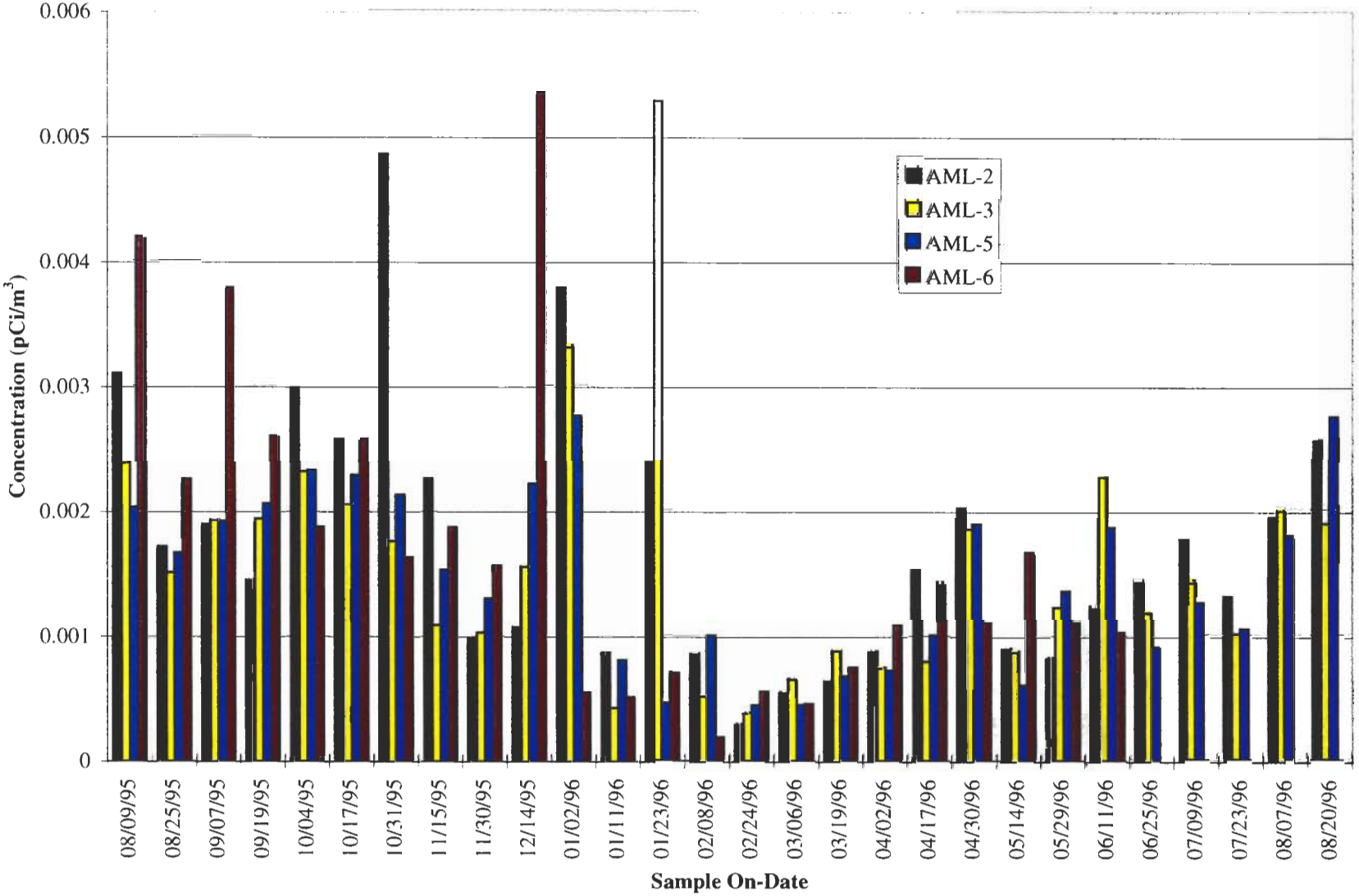


Figure 3.1.2 Air Concentrations of Total Beta Radiation

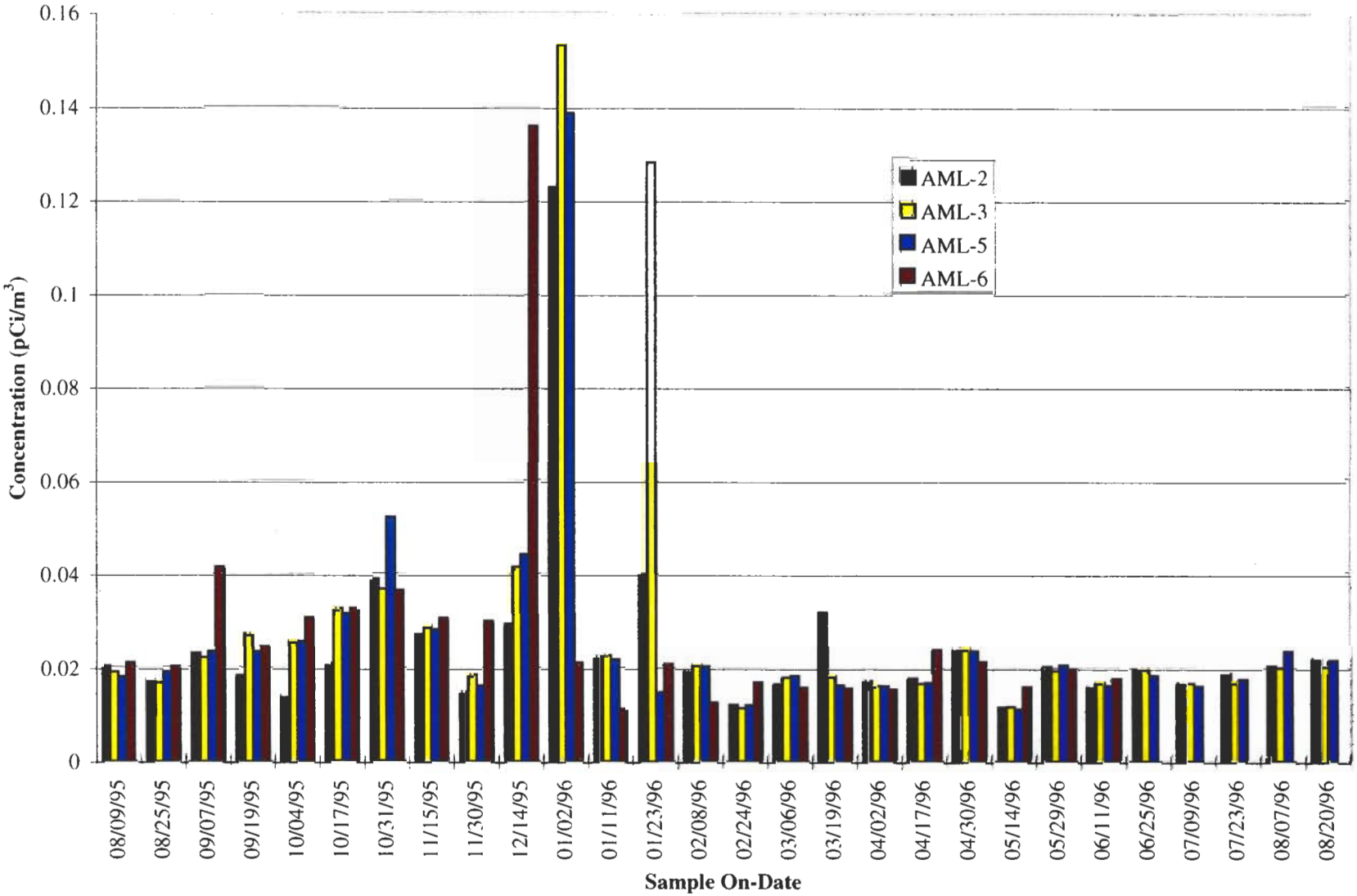


Figure 3.5 Wind Rose and Wind Speed Histogram for LEHR Meteorological Data from November 1994 to July 1996. (Wind roses indicate the frequency distribution of wind directions at each station; the length of each line in the wind rose is proportional to the amount of time the wind blows from the indicated direction toward the station).

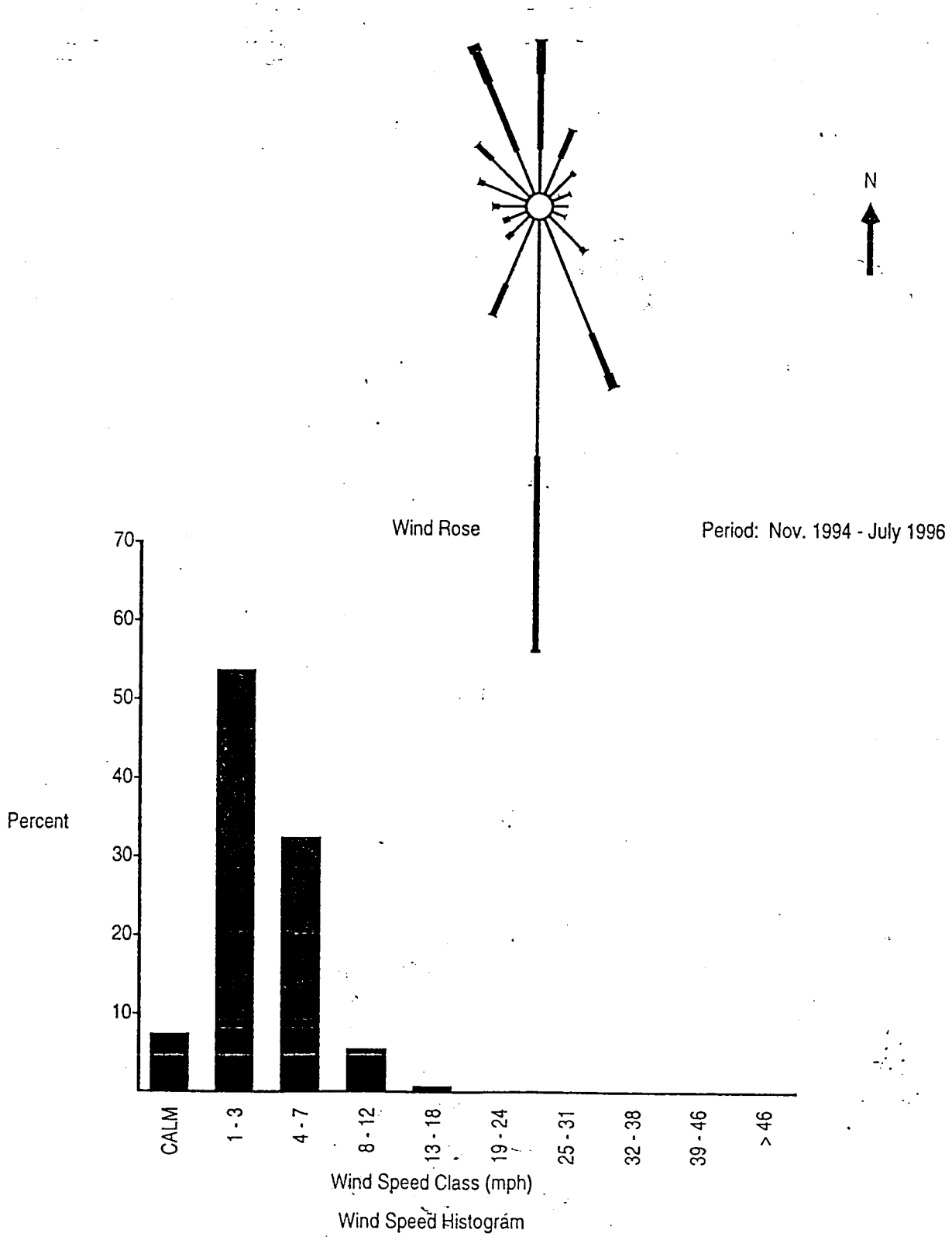


Table 2.1 Radiological and Non-Radiological Contaminants of Concern

Radiological Contaminants of Concern		Non-Radiological Contaminants of Concern
Actinium-228		Antimony
Beryllium-7		Beryllium
Bismuth-214		Chlordane
Cesium-134		Chloroform
Cesium-137		Chromium
Cobalt-57		Copper
Cobalt-60		Methylene Chloride
Gross Alpha		Molybdenum
Gross Beta		Selenium
Lead-212		
Lead-214		
Potassium-40		
Radium-226		
Radium-226		
Radon		
Strontium-89,90		
Thallium-208		
Thorium-228		
Thorium-230		
Thorium-232		
Thorium-234		
Tritium		
Uranium-233/234		
Uranium-235		
Uranium-235		
Uranium-238		
Uranium-238		

Table 2.2 Geographical Positioning Data for Onsite and Offsite Air Monitoring Locations

Station	Longitude	Latitude
AML-2	-121°45'14.968"	38°31'10.001"
AML-3	-121°45'03.305"	38°31'07.521"
AML-5	-121°45'23.222"	38°31'05.174"
AML-6	-121°52'26.372"	38°32'45.084"
Met Tower	-121°45'17.109"	38°31'06.712"

Table 2.3 Scheduled Dates for Collection of LEHR Air Samples

Scheduled SampleDate	Actual Actual Date	Alpha/Beta	H-3	24 Hr Samples
8/8/95	8/9/95	x	x	x
8/22/95	8/22/95	x		
9/4/95	9/7/95	x	x	x
9/19/95		x		
10/3/95	10/4/95	x	x	x
10/17/95	10/17/95	x		
10/31/95	10/31/95	x	x	
11/14/95	11/14/95	x		
	11/15/95	x		
11/28/95	11/30/95	x	x	
12/12/95	12/13/95	x		
	12/14/95	x		
12/26/95	1/2/96	x	x	
1/9/96	1/11/96	x		
1/23/96	1/23/96	x	x	x
2/6/96	2/8/96	x		
2/20/96	2/24/96	x	x	
3/5/96	3/6/96	x		
3/19/96	3/19/96	x	x	
4/2/96	4/2/96	x		
4/16/96	4/16/96	x	x	x
4/30/96	4/30/96	x		
5/14/96	5/14/96	x	x	
5/28/96	5/29/96	x		
6/11/96	6/11/96	x	x	
6/25/96	6/25/96	x		
7/9/96	7/9/96	x	x	
7/23/96	7/23/96	x		x
8/6/96	8/6/96	x	x	
8/20/96	8/23/96	x		
9/3/96		x	x	

Table 3.1.1 Summary of Total Alpha, Total Beta, Tritium, and Radon in Ambient Air at LEHR

	AML-2					AML-3					AML-5					AML-6				
(pCi/m^3)	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE
Total Alpha	28	0.0017	0.0004	0.0049	0.0011	28	0.0016	0.0004	0.0053	0.0028	28	0.0015	0.0003	0.0028	0.00079	23	0.0017	0.0005	0.0053	0.0029
Total Beta	28	0.025	0.0077	0.12	0.0091	28	0.03	0.012	0.15	0.0099	28	0.026	0.009	0.14	0.0094	23	0.027	0.01	0.14	0.0091
Tritium Air Concentrations	9	0.46	0.87	3.3	3.1	11	-0.71	1.2	0.44	0.88	10	0.27	0.39	1.1	1.3	11	-0.016	0.59	0.96	1.2
(pCi/mL)	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE
Tritium Distillate Water	9	0.028	0.022	0.081	0.076	11	-0.011	0.027	0.041	0.082	10	0.022	0.035	0.1	0.12	11	0.0081	0.026	0.064	0.077
(pCi/L)	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE	n	Avg	2 SEM	Max	CE
Radon	8	0.65	0.27	1.2	NA	8	0.58	0.27	1.2	NA	8	0.58	0.27	1.2	NA	8	0.81	0.42	2.1	NA

AML = Air Monitoring Location
Avg = Average
SEM = Standard Error of the Mean
CE = 2 Sigma Counting Error
n = Number of Samples
Max = Maximum

Table 3.1.2 Summary Table of Gamma-Emitting Radionuclides, Radium, Strontium, Thorium and Uranium in Ambient Air at LEHR (pCi/m^3)

		AML-2					AML-3					AML-5					AML-6				
		n	Average	2 SEM	Max	CE	n	Average	2 SEM	Max	CE	n	Average	2 SEM	Max	CE	n	Average	2 SEM	Max	CE
Gamma	Actinium-228	3	-0.00016	0.00072	0.00038	0.00072	3	0.00017	0.00083	0.001	0.0013	3	-0.00082	0.00017	-0.00068	0.0018	3	0.00005	0.00035	0.00027	0.00033
	Be-7	3	0.07	0.03	0.093	0.011	3	0.085	0.022	0.097	0.01	3	0.091	0.014	0.1	0.01	3	0.089	0.031	0.11	0.01
	Bismuth-214	3	0.00036	0.00056	0.00082	0.00051	3	0.00024	0.0002	0.00044	0.00061	3	0.000022	0.00035	0.00025	0.00058	3	-0.00017	0.00056	0.00034	0.00046
	Cesium-134	3	-0.0001	0.00018	0.000019	3.1E-05	3	-2.6E-05	0.000097	0.000053	0.00013	3	-5.5E-05	0.00022	0.000078	0.0001	3	-0.000033	0.000074	1.3E-05	2.4E-05
	Cesium-137	3	2.9E-06	0.00016	0.00011	0.00016	3	0.000034	0.00016	0.00012	0.00038	3	-0.00015	0.00035	0.000039	0.00041	3	0.00026	0.00006	0.00031	0.00034
	Cobalt-57	3	-0.00001	0.00013	0.0001	0.0003	3	-4.4E-05	0.0001	0.000018	0.00016	3	-1.2E-05	0.00011	0.000078	0.00012	3	-0.000006	0.000044	3.7E-05	0.00019
	Cobalt-60	3	-0.00012	0.00013	-4.2E-05	0.00015	3	-0.00014	0.000055	-8.6E-05	0.00021	3	-3.2E-05	0.00016	0.0001	0.00015	3	-0.00007	0.00016	0.00006	0.00019
	Lead-212	3	0.00017	0.00047	0.00045	0.00035	3	0.00017	0.00032	0.00046	0.00046	3	0.000039	0.00015	0.00017	0.00049	3	0.00017	0.00017	0.00027	0.00029
	Lead-214	3	0.0003	0.0003	0.00045	0.00085	3	0.00027	0.00029	0.00056	0.00054	3	-0.00034	0.00062	0.000078	0.00014	3	-0.000025	0.00014	0.0001	0.00027
	Potassium-40	3	0.0053	0.0011	0.0059	0.0033	3	0.0015	0.0019	0.0033	0.0044	3	0.0037	0.0014	0.005	0.0075	3	0.0022	0.0017	0.0034	0.0034
	Thallium-208	3	5.9E-06	0.00011	0.000087	0.00024	3	0.000044	0.00028	0.00029	0.00039	3	-0.00017	0.00013	-5.2E-05	0.00038	3	0.000028	0.00019	0.00021	0.00036
	Thorium-234	3	0.0014	0.0016	0.0025	0.0023	3	-0.00055	0.00025	-0.00035	0.0023	3	-0.00019	0.0014	0.0013	0.0045	3	-4.6E-06	0.00021	0.00018	0.0002
	Uranium-235	3	-0.00061	0.0005	-0.00015	0.00015	3	0.00053	0.00062	0.001	0.001	3	-9.6E-05	0.00077	0.00057	0.0011	3	-0.00014	0.00025	7.1E-05	0.00074
Isotopic	Thorium-228	3	0.000078	2.7E-05	0.0001	3.7E-05	3	0.000056	4.3E-06	0.00006	2.4E-05	3	0.000059	0.000015	0.000073	3.5E-05	3	0.000069	0.000034	0.0001	3.9E-05
	Thorium-230	3	0.000058	1.6E-05	0.000069	0.00002	3	0.000046	0.000014	0.000054	1.8E-05	3	0.000033	0.000009	0.000042	1.6E-05	3	0.000041	8.3E-06	4.7E-05	1.8E-05
	Thorium-232	3	0.000068	1.4E-05	0.000079	2.2E-05	3	0.000059	0.000025	0.000073	1.7E-05	3	0.000043	0.000018	0.000054	1.6E-05	3	0.000049	0.000018	6.5E-05	2.1E-05
	Uranium-233/23	3	0.00015	0.00008	0.00022	7.2E-05	3	0.00017	0.00012	0.00028	9.1E-05	3	0.00012	0.000064	0.00017	6.4E-05	3	0.00015	0.000099	0.00023	0.00008
	Uranium-235	3	0.000046	3.9E-05	0.000068	3.8E-05	3	0.000036	0.000019	0.000055	3.9E-05	3	0.00002	0.00001	0.00003	3.3E-05	3	0.000049	0.000084	0.00013	5.5E-05
	Uranium-238	3	0.00012	0.00006	0.00016	5.9E-05	3	0.0001	0.000039	0.00013	6.8E-05	3	0.000078	0.000062	0.00014	5.4E-05	3	0.0001	0.00011	0.00021	6.9E-05
Radium-22	Radium-226	3	0.00014	7.4E-05	0.00021	0.00012	3	0.00016	0.000023	0.00018	5.8E-05	3	0.00017	0.000097	0.00027	7.6E-05	3	0.00015	0.00016	0.00031	0.00008
Sr-89,90	Strontium-89,90	3	0.00019	0.00021	0.00038	0.00014	3	0.000054	0.000036	0.000073	0.00017	3	0.000089	0.000076	0.00016	0.00012	3	0.02	0.041	0.061	0.00078

AML = Air Monitoring Location
SEM = Standard Error of the Mean
Max = Maximum
CE = 2 Sigma Counting Error
n = Number of Samples

Table 3.1.3 Selected US DOE Derived Concentration Guides for Radionuclides Detected in Ambient Air at LEHR (DOE Order 5400.5)

Radionuclide	pCi/m^3
Total Alpha	No Value
Total Beta	No Value
^{3}H	100,000
7Be	40,000
^{40}K	900
^{90}Sr	9
^{137}Cs	400
^{212}Pb	80
^{214}Bi	2000
^{214}Pb	2000
^{226}Ra	1
^{228}Th	0.04
^{230}Th	0.04
^{232}Th	0.007
$^{233,234}U$	0.09
^{235}U	0.1
^{238}U	0.1

Table 3.3.1 Detectable Concentrations of Metals[a] and PM-10 Dust in Ambient Air at LEHR

		AML-2				AML-3				AML-5				AML-6			
ug/m^3	PRG Value	n	Avg	2 SEM	Max	n	Avg	2 SEM	Max	n	Avg	2 SEM	Max	n	Avg	2 SEM	Max
Antimony	NA	5	0.000096	0.00002	0.00012	5	0.000083	0.000025	0.00011	6	0.000084	0.000022	0.00013	4	0.00011	0.000024	0.00013
Beryllium	0.0008	2	0.00013	0.00016	0.00021	1	0.000049	-	0.000049	0	-	-	-	0	-	-	-
Chromium	0.00016	6	0.012	0.017	0.054	6	0.0036	0.0024	0.0076	6	0.0028	0.002	0.0062	6	0.0024	0.0016	0.0046
Copper	NA	6	0.032	0.019	0.068	6	0.032	0.039	0.13	6	0.064	0.11	0.35	6	0.019	0.01	0.032
Molybdenum	18	6	0.00018	0.000078	0.00032	6	0.00012	0.000056	0.00023	6	0.00015	0.000068	0.00027	6	0.00013	0.000074	0.00025
Selenium	NA	6	0.0007	0.00069	0.0024	5	0.00094	0.00086	0.0026	5	0.0047	0.0071	0.019	5	0.00093	0.00086	0.0026
ug/m^3	US EPA Standard	n	Avg	2 SEM	Max	n	Avg	2 SEM	Max	n	Avg	2 SEM	Max	n	Avg	2 SEM	Max
PM-10 Dust	150	6	110	120	390	6	72	69	240	6	37	14	58	6	32	15	52

(a) Metal concentrations were corrected for filter blanks (Table 3.3.2)
Avg = Average
SEM = Standard Error of the Mean
n = Number of Samples
Max = Maximum
NA = Not Available
PRG = USEPA Region IX Preliminary Remediation Goals

Table 3.3.2 Concentrations of Metals in Blank Filter Samples

	n	Average (ug/filter)	2 SEM (ug/filter)	Max (ug/filter)	Representative Air Concentration (ug/m^3)
Antimony	0	-	-	-	
Beryllium	0	-	-	-	
Chromium	6	4.8	0.33	5.5	0.003
Copper	5	2	0.76	3.1	0.0013
Molybdenum	6	0.18	0.067	0.32	0.00011
Selenium	0	-	-	-	

Representative Air Concentration = (average blank) / (typical air volume)

Typical air volume = 1600 m^3

n = number of samples

SEM = Standard Error of the Mean

Max = Maximum

Table 3.4.1 Concentrations of Chlordane Components and Volatile Organic Compounds Above the Detection Limits at LEHR and US EPA Region IX Preliminary Remediation Goals

		AML-2			AML-3			AML-5			AML-6		
ug/m^3	PRG Values	n	Avg	Max	n	Avg	Max	n	Avg	Max	n	Avg	Max
1,1,1-Trichloroethane	1000	2	12	15	1	6.9	6.9	0	-	-	0	-	-
Chlorobenzene	21	1	8	8	0	-	-	0	-	-	0	-	-
Dichlorodifluoromethane	210	2	2.7	2.7	1	2.7	2.7	0	-	-	3	2.5	2.7
Toluene	400	3	95	280	3	4.3	6.6	1	2.9	2.9	2	4.4	6.6
ng/m^3	PRG Values	n	Avg	Max	n	Avg	Max	n	Avg	Max	n	Avg	Max
Alpha-Chlordane	5.2	5	0.049	0.067	6	0.037	0.053	6	0.037	0.067	5	0.039	0.062
Cis-Nonachlor	NA	1	0.005	0.005	0	-	-	0	-	-	1	0.0027	0.0027
Gamma-Chlordane	5.2	5	0.07	0.11	5	0.057	0.091	6	0.049	0.14	5	0.041	0.057
Heptachlor	1.5	5	0.058	0.091	3	0.03	0.038	6	0.029	0.046	3	0.038	0.044
Heptachlor Epoxide	0.74	1	0.067	0.067	0	-	-	1	0.0051	0.0051	1	0.028	0.028
Trans Nonachlor	NA	4	0.034	0.046	5	0.031	0.041	5	0.029	0.058	4	0.031	0.047

AML = Air Monitoring Location
n = Number of Samples
Avg = Average
Max = Maximum
NA = Not Available
PRG = US EPA Region IX Preliminary Remediation Goals

Table 3.4.2 Detection Limits (ug/m^3) for Volatile Organic Compounds in Ambient Air at LEHR

	Detection Limit Minimum	Detection Limit Maximum
1,1,1-Trichloroethane	1.1	8.7
1,1,2,2-Tetrachloroethane	1.4	11
1,1,2-Trichloro-1,2,2-trifluoroethane	2.3	18
1,1,2-Trichloroethane	1.1	8.7
1,1-Dichloroethane	0.82	6.5
1,1-Dichloroethene	0.8	6.4
1,2,4-Trichlorobenzene	1.5	12
1,2,4-trimethylbenzene	0.99	7.9
1,2-Dibromoethane	1.6	12
1,2-Dichloro-1,1,2,2-tetrafluoroethane	1.4	11
1,2-Dichlorobenzene	1.2	9.6
1,2-Dichloroethane	0.82	6.5
1,2-Dichloropropane	0.93	7.4
1,3,5-trimethylbenzene	0.99	7.9
1,3-Dichlorobenzene	1.2	9.6
1,4-Dichlorobenzene	1.2	9.6
Benzene	0.65	5.1
Benzyl Chloride	1	8.3
Bromomethane	0.78	6.2
Carbon tetrachloride	1.3	10
Chlorobenzene	0.93	7.4
Chloroethane	0.53	4.2
Chloroform	0.99	7.8
Chloromethane	0.42	3.3
Dichlorodifluoromethane	1	7.9
Ethylbenzene	0.88	7
Hexachlorobutadiene	2.2	17
Methylene chloride	1.1	8.3
Styrene	0.86	6.8
Tetrachloroethene	1.4	11
Toluene	0.76	6
Trichloroethene	1.1	8.6
Trichlorofluoromethane	1.1	9
Vinyl chloride	0.52	4.1
cis-1,2-Dichloroethene	0.8	6.4
cis-1,3-Dichloropropene	0.92	7.3
m and/or p-Xylene	0.88	7
o-Xylene	0.88	7
trans-1,3-Dichloropropene	0.92	7.3

Table 3.5 Wind Speed (mph) and Direction at the LEHR Meteorological Station from November 1994 to July 1996 Joint Frequency Distributions (percent).

	Direction																	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.5	7.5
1-3	2.8	2.5	2	1.2	1	0.9	2.8	7.8	15	4.4	1.5	1.2	1.6	2.9	3.3	2.9	0	53.7
4-7	4.8	1.9	0.3	0.1	0	0	0.4	2.8	12.3	2.2	0.5	0.5	0.5	0.4	1.3	4.7	0	32.5
8-12	2.1	0.1	0	0	0	0	0	0.9	0.2	0.1	0	0	0	0	0.1	2.1	0	5.6
13-18	0.2	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.6	0	0.8
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	9.8	4.5	2.2	1.3	1	0.9	3.2	11.6	27.4	6.7	2	1.6	2.1	3.3	4.7	10.2	7.5	100

5.0 Appendix

Appendix Table 5.1 Concentrations of Total Alpha Radiation in Ambient Air at LEHR.

Appendix Table 5.2 Concentrations of Total Beta Radiation in Ambient Air at LEHR.

Appendix Table 5.3 Concentrations of Gamma-Emitting Radionuclides in Ambient Air at LEHR.

Appendix Table 5.4 Concentrations of Isotopic Radionuclides (Uranium, Thorium, Strontium, and Radium) in Ambient Air at LEHR.

Appendix Table 5.5 Concentrations of Tritium in Ambient Air at LEHR.

Appendix Table 5.6 Concentrations of Tritium in Atmospheric Moisture at LEHR.

Appendix Table 5.7 Concentrations of Radon in Ambient Air at LEHR.

Appendix Table 5.8 Concentrations of Metals in Ambient Air at LEHR.

Appendix Table 5.9 Concentrations of PM-10 Dust in Ambient Air at LEHR.

Appendix Table 5.10 Concentrations of Chlordane Components in Ambient Air at LEHR.

Appendix Table 5.11 Concentrations of Volatile Organic Compounds in Ambient Air at LEHR.

Appendix Table 5.12 Joint Frequency Distributions for Meteorological Data at LEHR.

Appendix Figures Wind Roses for LEHR Site Meteorological Data.

Appendix Table 5.1 Concentrations (pCi/m^3) of Total Alpha Radiation in Ambient Air at LEHR

Sample On Date	AML-2	CE	AML-3	CE	AML-5	CE	AML-6	CE
8/9/95	0.0031	0.0009	0.0024	0.0007	0.002	0.0006	0.0042	0.00086
8/25/95	0.0017	0.0007	0.0015	0.0006	0.0017	0.0006	0.0023	0.00069
9/7/95	0.0019	0.0008	0.0019	0.0007	0.0019	0.0007	0.0038	0.0012
9/19/95	0.0015	0.0005	0.0019	0.0005	0.0021	0.0007	0.0026	0.00067
10/4/95	0.003	0.0011	0.0023	0.0009	0.0023	0.0007		
10/10/95							0.0019	0.00091
10/17/95	0.0026	0.0009	0.0021	0.0008	0.0023	0.0008	0.0026	0.00086
10/31/95	0.0049	0.0011	0.0018	0.0006	0.0021	0.0019	0.0016	0.00066
11/14/95	0.0023	0.0008	0.0011	0.0005				
11/15/95					0.0015	0.0005	0.0019	0.00061
11/30/95	0.001	0.0002	0.001	0.0002	0.0013	0.0003		
12/13/95	0.0011	0.0004	0.0016	0.0005			0.0016	0.00038
12/14/95					0.0022	0.0006		
1/2/96	0.0038	0.0027	0.0033	0.0025	0.0028	0.0025	0.0053	0.0029
1/11/96	0.0009	0.0004	0.0004	0.0003	0.0008	0.0004	0.00055	0.00027
1/23/96	0.0024	0.0018	0.0053	0.0028	0.0005	0.0005	0.00051	0.00051
2/8/96	0.0009	0.0003	0.0005	0.0003	0.001	0.0003	0.0007	0.00029
2/24/96	0.0003	0.0003	0.0004	0.0003	0.0004	0.0003	0.00019	0.00029
3/6/96	0.0006	0.0003	0.0007	0.0003	0.0005	0.0003	0.00055	0.00032
3/19/96			0.0009	0.0004	0.0007	0.0004	0.00045	0.00029
3/29/96	0.0006	0.0007						
4/2/96	0.0009	0.0004	0.0008	0.0004	0.0007	0.0004	0.00075	0.00034
4/16/96	0.0015	0.0007	0.0008	0.0004				
4/17/96					0.001	0.0004	0.0011	0.00042
4/30/96	0.002	0.0007	0.0018	0.0006	0.0019	0.0006	0.0014	0.00052
5/14/96	0.0009	0.0004	0.0009	0.0004	0.0006	0.0003		
5/29/96	0.0008	0.0005	0.0012	0.0005	0.0013	0.0005	0.0011	0.00047
6/11/96	0.0012	0.0005	0.0023	0.0008	0.0018	0.0006	0.0017	0.00058
6/25/96	0.0014	0.0006	0.0012	0.0005	0.0009	0.0004	0.0011	0.00047
7/9/96	0.0018	0.0007	0.0014	0.0006	0.0013	0.0005	0.001	0.00048
7/23/96	0.0013	0.0006	0.001	0.0005	0.001	0.0005	Discontinued	Discontinued
8/6/96	0.002	0.0007	0.002	0.0007				
8/7/96					0.0018	0.0008		
8/20/96					0.0028	0.0008		
8/23/96	0.0026	0.001	0.0019	0.0007				

CE = 2 Sigma Counting Error

Appendix Table 5.2 Concentrations (pCi/m^3) of Total Beta Radiation in Ambient Air at LEHR

Sample On Date	AML-2	CE	AML-3	CE	AML-5	CE	AML-6	CE
8/9/95	0.02	0.001	0.019	0.001	0.018	0.0009	0.021	0.001
8/25/95	0.017	0.0011	0.017	0.001	0.019	0.0011	0.02	0.0011
9/7/95	0.023	0.0014	0.022	0.0014	0.023	0.0014	0.041	0.0025
9/19/95	0.018	0.0005	0.027	0.0011	0.023	0.0011	0.024	0.0011
10/4/95	0.014	0.001	0.026	0.0013	0.025	0.0013		
10/10/95							0.031	0.0019
10/17/95	0.021	0.0011	0.033	0.0013	0.031	0.0013	0.032	0.0013
10/31/95	0.039	0.0016	0.037	0.0015	0.052	0.0064	0.036	0.0015
11/14/95	0.027	0.0012	0.029	0.0012				
11/15/95					0.028	0.0012	0.03	0.0012
11/30/95	0.015	0.0006	0.018	0.0006	0.016	0.0007		
12/13/95	0.029	0.0011	0.041	0.0015			0.03	0.001
12/14/95					0.044	0.0016		
1/2/96	0.12	0.0091	0.15	0.0099	0.14	0.0094	0.14	0.0091
1/11/96	0.022	0.0012	0.022	0.0012	0.022	0.0012	0.021	0.0012
1/23/96	0.04	0.0038	0.13	0.0073	0.015	0.0013	0.011	0.0011
2/8/96	0.019	0.0009	0.021	0.0009	0.02	0.0009	0.021	0.00096
2/24/96	0.012	0.0009	0.011	0.0008	0.012	0.0008	0.013	0.00093
3/6/96	0.016	0.0009	0.018	0.001	0.018	0.001	0.017	0.00095
3/19/96			0.018	0.0009	0.016	0.0009	0.016	0.00087
3/29/96	0.032	0.0024						
4/2/96	0.017	0.0009	0.016	0.0009	0.016	0.0009	0.016	0.00086
4/16/96	0.018	0.001	0.017	0.0009				
4/17/96					0.017	0.0009	0.015	0.00089
4/30/96	0.024	0.0011	0.024	0.0011	0.024	0.0011	0.024	0.0011
5/14/96	0.012	0.0007	0.012	0.0007	0.011	0.0007		
5/29/96	0.02	0.001	0.019	0.001	0.021	0.0011	0.021	0.0011
6/11/96	0.016	0.0009	0.017	0.0009	0.016	0.0009	0.016	0.0009
6/25/96	0.02	0.001	0.02	0.001	0.018	0.0009	0.02	0.00097
7/9/96	0.017	0.0009	0.017	0.0009	0.016	0.0009	0.018	0.00093
7/23/96	0.019	0.001	0.017	0.001	0.018	0.0009	Discontinued	Discontinued
8/6/96	0.02	0.0009	0.02	0.0009				
8/7/96					0.024	0.0013		
8/20/96					0.022	0.0011		
8/23/96	0.022	0.0011	0.02	0.0011				

CE = 2 Sigma Counting Error

Appendix Table 5.3 Concentrations (pCi/m^3) of Gamma-Emitting Radionuclides in Ambient Air at LEHR

	Sample On Date	AML-2	CE	AML-3	CE	AML-5	CE	AML-6	CE
Actinium-228	8/9/95	0.00038	0.00072	-0.0003	0.0011	-0.00097	0.00049	0.00027	0.00033
	11/14/95	-2.5E-05	0.00066	-0.00018	0.00056	-0.00068	0.0018	0.00018	0.0011
	2/8/96	-0.00083	0.00082	0.001	0.0013	-0.00081	0.00076	-0.0003	0.0013
Beryllium-7	8/9/95	0.076	0.0084	0.094	0.013	0.094	0.014	0.11	0.01
	11/14/95	0.042	0.025	0.063	0.019	0.078	0.027	0.058	0.017
	2/8/96	0.093	0.011	0.097	0.01	0.1	0.01	0.1	0.011
Bismuth-214	8/9/95	0.00082	0.00051	0.00044	0.00061	0.00025	0.00058	0.00034	0.00046
	11/14/95	-0.00015	0.0001	0.00013	0.00074	-0.00033	0.00073	-0.00024	0.00076
	2/8/96	0.00042	0.00075	0.00016	0.00042	0.00014	0.00031	-0.00062	0.00035
Cesium-134	8/9/95	0.000019	0.000031	0.000053	0.00013	0.000078	0.0001	-5.7E-06	0.00012
	11/14/95	-0.00027	0.00028	-0.00011	0.00015	-0.00028	0.00027	0.000013	0.000024
	2/8/96	-5.7E-05	0.000049	-0.000017	0.000026	0.000035	0.000054	-0.00011	0.0002
Cesium-137	8/9/95	0.00011	0.00016	-0.00012	0.00025	0.000039	0.00041	0.00021	0.00016
	11/14/95	0.00005	0.00057	0.0001	0.00037	-0.0005	0.0003	0.00031	0.00034
	2/8/96	-0.00015	0.00019	0.00012	0.00038	0	0.00042	0.00025	0.00044
Cobalt-57	8/9/95	-7E-06	0.0001	0.000018	0.00016	0.000078	0.00012	-0.000019	0.00011
	11/14/95	0.0001	0.0003	-0.00015	0.00021	0	0.0003	0.000037	0.00019
	2/8/96	-0.00012	0.000098	-3.5E-06	0.00016	-0.00011	0.000081	-0.000035	0.00008
Cobalt-60	8/9/95	-4.2E-05	0.00015	-0.00018	0.000093	-0.00017	0.00014	-0.000057	0.000082
	11/14/95	-0.00025	0.00022	-0.00016	0.00014	-2.5E-05	0.000033	0.00006	0.00019
	2/8/96	-5.7E-05	0.00011	-0.000086	0.00021	0.0001	0.00015	-0.00021	0.0002
Lead-212	8/9/95	0.00045	0.00035	0.00046	0.00046	0.00017	0.00049	0.00027	0.00029
	11/14/95	0.00035	0.00068	0.00013	0.00049	-7.5E-05	0.00012	0	0.00001
	2/8/96	-0.0003	0.00052	-0.000086	0.00022	0.000017	0.00023	0.00023	0.00028
Lead-214	8/9/95	0.00044	0.0004	0.00056	0.00054	0.000078	0.00014	-0.000038	0.0004
	11/14/95	0.00045	0.00085	0.00016	0.00039	-0.00095	0.00038	0.0001	0.00027
	2/8/96	0	1.9E-06	0.0001	0.0002	-0.00016	0.00034	-0.00014	0.00032
Potassium-40	8/9/95	0.0059	0.0033	0.0033	0.0044	0.0025	0.0047	0.0034	0.0034
	11/14/95	0.0042	0.0071	0.0013	0.0049	0.005	0.0075	0.00052	0.0049
	2/8/96	0.0057	0.0055	0	0.0047	0.0036	0.0051	0.0027	0.0048
Thallium-208	8/9/95	0.000087	0.00024	0.000053	0.00037	-0.00017	0.00039	0	0.00025
	11/14/95	0.000025	0.00057	0.00029	0.00039	-0.00028	0.00055	0.00021	0.00036
	2/8/96	-9.5E-05	0.00045	-0.00021	0.00038	-5.2E-05	0.00038	-0.00012	0.00038
Thorium-234	8/9/95	-0.00017	0.0011	-0.00035	0.0023	-0.00078	0.0031	-0.00019	0.00036
	11/14/95	0.002	0.0046	-0.00078	0.0029	0.0013	0.0045	0	0.00012
	2/8/96	0.0025	0.0023	-0.00052	0.00078	-0.001	0.0014	0.00018	0.0002
Uranium-235	8/9/95	-0.00066	0.00054	-0.000035	0.00021	-0.00076	0.0012	-0.00036	0.00056
	11/14/95	-0.00015	0.00015	0.0006	0.001	-0.0001	0.0017	-0.00013	0.0011
	2/8/96	-0.001	0.00066	0.001	0.001	0.00057	0.0011	0.000071	0.00074

CE = 2 Sigma Counting Error

Appendix Table 5.4 Concentrations (pCi/m^3) of Isotopic Radionuclides in Ambient Air at LEHR

	Sample On Date	AML-2	CE	AML-3	CE	AML-5	CE	AML-6	CE
Radium-226	8/9/95	0.0001	0.000049	0.00018	0.000058	0.00027	0.000076	0.00031	0.00008
	11/14/95	0.00021	0.00012	0.00015	0.00013	0.00013	0.000095	0.0001	0.000081
	2/8/96	0.000097	0.000068	0.00014	0.000097	0.00012	0.000086	0.000048	0.000071
Strontium-89,90	8/9/95	0.000019	0.00014	1.8E-05	0.00011	4.7E-05	0.00012	0.061	0.00078
	11/14/95	0.00017	0.00019	7.3E-05	0.00017	5.5E-05	0.00018	0.00013	0.00019
	2/8/96	0.00038	0.00014	7.1E-05	0.00012	0.00016	0.00012	0	0.00013
Thorium-228	8/9/95	0.000067	0.00001	5.4E-05	8.6E-06	4.6E-05	8.5E-06	0.000045	9.6E-06
	11/14/95	0.0001	0.000037	5.5E-05	0.000036	7.3E-05	0.000035	0.0001	0.000039
	2/8/96	0.000061	0.000028	0.00006	0.000024	5.9E-05	0.000024	0.00006	0.000025
Thorium-230	8/9/95	0.000043	6.1E-06	3.2E-05	4.9E-06	2.7E-05	4.9E-06	0.000033	5.7E-06
	11/14/95	0.000069	0.00002	5.4E-05	0.000018	0.00003	0.000015	0.000047	0.000018
	2/8/96	0.000064	0.000017	5.1E-05	0.000016	4.2E-05	0.000016	0.000043	0.000016
Thorium-232	8/9/95	0.000055	6.5E-06	3.5E-05	4.9E-06	2.5E-05	4.7E-06	0.000035	5.4E-06
	11/14/95	0.000079	0.000022	0.00007	0.000021	4.9E-05	0.000018	0.000065	0.000021
	2/8/96	0.000072	0.000019	7.3E-05	0.000017	5.4E-05	0.000016	0.000046	0.000016
Uranium-233/234	8/9/95	0.000086	0.000031	8.1E-05	0.000032	6.4E-05	0.000027	0.000063	0.000031
	11/14/95	0.00015	0.000075	0.00028	0.000091	0.00014	0.000068	0.00014	0.000071
	2/8/96	0.00022	0.000072	0.00014	0.000052	0.00017	0.000064	0.00023	0.00008
Uranium-235	8/9/95	6.8E-06	0.000012	2.4E-05	0.000018	1.4E-05	0.000013	5.6E-06	7.7E-06
	11/14/95	0.000062	0.000042	5.5E-05	0.000039	0.00003	0.000033	7.9E-06	0.000026
	2/8/96	0.000068	0.000038	3.1E-05	0.000024	1.6E-05	0.000026	0.00013	0.000055
Uranium-238	8/9/95	0.000061	0.000028	6.7E-05	0.000026	4.5E-05	0.000023	0.000033	0.000021
	11/14/95	0.00013	0.000065	0.00013	0.000068	0.00005	0.000045	0.000065	0.00005
	2/8/96	0.00016	0.000059	0.00011	0.000043	0.00014	0.000054	0.00021	0.000069

CE = 2 Sigma Counting Error

Appendix Table 5.5 Concentrations (pCi/m^3) of Tritium in Ambient Air at LEHR

Sample On Date	AML-2	CE	AML-3	CE	AML-5	CE	AML-6	CE
8/9/95	NS	NS	-0.24	1.6	NS	NS	NS	NS
10/4/95	NS	NS	0.16	0.78	0.85	1.1	NS	NS
10/10/95	NS	NS					0.16	1.5
10/31/95	3.3	3.1	0.39	1	0.37	0.75	0.96	1.2
11/30/95	0.4	1.2	-0.98	1.1	0.3	1.3	0.6	2.7
1/2/96	-1.7	8.5	-6.8	6.9	-0.64	1.2	-0.54	1.3
1/23/96	0.71	4.8	-0.62	3.9	-0.86	1.2	0.00	5.2
3/19/96	NS	NS	NS	NS	NS	NS	-2.6	3.5
4/16/96	0.23	0.63	-0.43	0.53	NS	NS	NS	NS
4/17/96					0.22	0.58	-0.085	0.63
5/14/96	0.3	2.1	0.22	1.8	0.8	1.8	0.54	2
6/11/96	0.56	0.92	0.44	0.88	0.38	0.89	0.59	0.82
7/9/96	-0.31	2.3	-0.053	-0.19	1.1	1.3	0.65	1.2
8/6/96	0.68	1.5	0.11	1.4	0.22	1.4	-0.45	1.4

AML = Air Monitoring Location
NS = No Sample
CE = 2 Sigma Counting Error

Appendix Table 5.6 Concentrations (pCi/mL) of Tritium in Atmospheric Moisture at LEHR

Sample On Date	AML-2	CE	AML-3	CE	AML-5	CE	AML-6	CE
8/9/95	NS	NS	-0.02	0.13	NS	NS	NS	NS
10/4/95	NS	NS	0.02	0.095	0.08	0.1	NS	NS
10/10/9	NS	NS					0.01	0.093
10/31/9	0.081	0.076	0.027	0.071	0.035	0.07	0.064	0.077
11/30/9	0.03	0.087	-0.07	0.081	0.02	0.09	0.02	0.09
1/2/96	-0.02	0.1	-0.09	0.091	-0.05	0.094	-0.04	0.095
1/23/96	0.02	0.14	-0.02	0.13	-0.09	0.12	0.00	0.13
3/19/96	NS	NS	NS	NS	NS	NS	-0.06	0.08
4/16/96	0.03	0.081	-0.06	0.074	NS	NS	NS	NS
4/17/96					0.03	0.08	-0.01	0.075
5/14/96	0.014	0.096	0.011	0.092	0.039	0.086	0.025	0.095
6/11/96	0.051	0.084	0.041	0.082	0.034	0.079	0.06	0.084
7/9/96	-0.013	0.097	0.03	0.11	0.1	0.12	0.06	0.11
8/6/96	0.06	0.13	0.01	0.13	0.02	0.12	-0.04	0.13

AML = Air Monitoring Location
NS = No Sample
CE = 2 Sigma Counting Error

Appendix Table 5.7 Concentrations (pCi/L) of Radon in Ambient Air at LEHR

Sample On Date	AML-2	AML-3	AML-5	AML-6	Blank
10/5/95	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
10/5/95	< 1.2	< 1.2	< 1.2	2.1	< 1.2
10/31/95	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
10/31/95	< 0.4	< 0.4	< 0.4	0.4	< 0.4
1/23/96	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
1/23/96	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
4/16/96	0.9	< 0.3	< 0.3	0.9	0.5
4/16/96	< 0.3	< 0.3	< 0.3	0.7	< 0.3

Appendix Table 5.8 Concentrations (ug/m^3) of Metals[(a)] in Ambient Air at LEHR

	Sample On Date	AML-2	AML-3	AML-5	AML-6
Antimony	8/8/95	0.0001	0.000052	0.000088	0.00011
	9/6/95	0.00012	0.00011	0.00013	0.00013
	10/4/95	0.000065	0.000054	0.000068	< 0.00006
	1/23/96	0.00011	0.0001	0.000094	0.00012
	4/16/96	< 0.000048	< 0.00005	0.000053	< 0.000053
	7/23/96	0.000083	0.000092	0.000074	0.000073
Beryllium	8/8/95	0.000051	< 0.000047	< 0.000048	< 0.000049
	9/6/95	< 0.000081	< 0.000049	< 0.00005	< 0.000047
	10/4/95	0.00021	0.000049	< 0.00005	< 0.00006
	1/23/96	< 0.00005	< 0.000053	< 0.000048	< 0.00005
	4/16/96	< 0.000048	< 0.00005	< 0.00005	< 0.000053
	7/23/96	< 0.000049	< 0.00005	< 0.000051	< 0.00005
Chromium	8/8/95	0.012	0.0087	0.0091	0.0075
	9/6/95	0.014	0.0078	0.0077	0.0072
	10/4/95	0.057	0.01	0.0068	0.0049
	1/23/96	0.0035	0.0038	0.0036	0.0034
	4/16/96	0.0029	0.0032	0.003	0.0034
	7/23/96	0.0044	0.0055	0.0046	0.0065
Copper	8/8/95	0.054	0.021	0.35	0.03
	9/6/95	0.07	0.13	0.017	0.015
	10/4/95	0.032	0.01	0.0071	0.0093
	1/23/96	0.012	0.016	0.0057	0.0042
	4/16/96	0.016	0.014	0.0069	0.033
	7/23/96	0.018	0.008	0.0055	0.032
Molybdenum	8/8/95	0.00036	0.00018	0.00037	0.00036
	9/6/95	0.00033	0.00033	0.00031	0.00022
	10/4/95	0.00043	0.00018	0.00017	0.00011
	1/23/96	0.00022	0.00024	0.00023	0.00026
	4/16/96	0.00016	0.00017	0.00018	0.00022
	7/23/96	0.00026	0.00029	0.0003	0.0003
Selenium	8/8/95	0.00058	0.00024	0.0007	0.00081
	9/6/95	0.00021	0.00082	0.00085	0.00035
	10/4/95	0.00013	< 0.000066	< 0.000069	< 0.000083
	1/23/96	0.0024	0.0026	0.0026	0.0026
	4/16/96	0.00049	0.00062	0.019	0.00051
	7/23/96	0.00043	0.00039	0.0004	0.00038

(a) Values were not corrected for filter blanks (Table 3.3.2)

Appendix Table 5.9 Concentrations (ug/m^3) of PM-10 Dust in Ambient Air at LEHR

Sample On Date	AML-2	AML-3	AML-5	AML-6
8/8/95	93	57	58	50
9/6/95	96	50	54	52
10/4/95	390	240	41	20
1/23/96	17	20	21	15
4/16/96	16	19	16	14
7/23/96	33	43	31	43

Appendix Table 5.10 Concentrations (ng/m^3) of Chlordane Components in Ambient Air at LEHR

	Sample On Date	Media		AML-2		AML-3		AML-5		AML-6
Alpha-Chlordane	8/8/95	Combo				0.037		0.067		0.024
Alpha-Chlordane	8/8/95	Filter	<	0.0033						
Alpha-Chlordane	8/8/95	PUF	<	0.0033						
Alpha-Chlordane	8/8/95	PUF		0.049						
Alpha-Chlordane	9/6/95	Combo				0.046		0.019		0.035
Alpha-Chlordane	9/6/95	Filter	<	0.0049						
Alpha-Chlordane	9/6/95	PUF		0.055						
Alpha-Chlordane	9/6/95	PUF	<	0.0049						
Alpha-Chlordane	10/4/95	Combo	<	0.023				0.025	<	0.0039
Alpha-Chlordane	10/4/95	Filter			<	0.0037				
Alpha-Chlordane	10/4/95	PUF			<	0.0037				
Alpha-Chlordane	10/4/95	PUF				0.008				
Alpha-Chlordane	1/23/96	Combo				0.046		0.043		0.046
Alpha-Chlordane	1/23/96	Filter	<	0.004						
Alpha-Chlordane	1/23/96	PUF		0.046						
Alpha-Chlordane	1/23/96	PUF	<	0.004						
Alpha-Chlordane	4/16/96	Combo		0.03				0.022		0.026
Alpha-Chlordane	4/16/96	Filter			<	0.003				
Alpha-Chlordane	4/16/96	PUF				0.029				
Alpha-Chlordane	4/16/96	PUF			<	0.003				
Alpha-Chlordane	7/23/96	Combo				0.053		0.048		0.062
Alpha-Chlordane	7/23/96	Filter	<	0.0034						
Alpha-Chlordane	7/23/96	PUF	<	0.0034						
Alpha-Chlordane	7/23/96	PUF		0.067						
Cis-Nonachlor	8/8/95	Combo			<	0.0034	<	0.0036	<	0.0036
Cis-Nonachlor	8/8/95	Filter	<	0.0038						
Cis-Nonachlor	8/8/95	PUF	<	0.0038						
Cis-Nonachlor	8/8/95	PUF	<	0.0038						
Cis-Nonachlor	9/6/95	Combo			<	0.0034	<	0.0037	<	0.0035
Cis-Nonachlor	9/6/95	Filter	<	0.0056						
Cis-Nonachlor	9/6/95	PUF	<	0.0056						
Cis-Nonachlor	9/6/95	PUF	<	0.0056						
Cis-Nonachlor	10/4/95	Combo	<	0.026			<	0.0038	<	0.0044
Cis-Nonachlor	10/4/95	Filter			<	0.0042				
Cis-Nonachlor	10/4/95	PUF			<	0.0042				
Cis-Nonachlor	10/4/95	PUF			<	0.0042				
Cis-Nonachlor	1/23/96	Combo			<	0.0019	<	0.0018		0.0027
Cis-Nonachlor	1/23/96	Filter		0.005						
Cis-Nonachlor	1/23/96	PUF	<	0.0022						
Cis-Nonachlor	1/23/96	PUF	<	0.0022						
Cis-Nonachlor	4/16/96	Combo	<	0.0017			<	0.0017	<	0.0019
Cis-Nonachlor	4/16/96	Filter			<	0.0016				
Cis-Nonachlor	4/16/96	PUF			<	0.0016				
Cis-Nonachlor	4/16/96	PUF			<	0.0016				
Cis-Nonachlor	7/23/96	Combo			<	0.0017	<	0.0018	<	0.0018
Cis-Nonachlor	7/23/96	Filter	<	0.0019						
Cis-Nonachlor	7/23/96	PUF	<	0.0019						
Cis-Nonachlor	7/23/96	PUF	<	0.0019						
Gamma-Chlordane	8/8/95	Combo				0.091		0.14		0.057
Gamma-Chlordane	8/8/95	Filter	<	0.0019						
Gamma-Chlordane	8/8/95	PUF	<	0.0019						

Filter = Result for filter extract
PUF = Result for polyurethane foam plug extract
Combo = Result for combined filter and PUF extract

Appendix Table 5.10 Concentrations (ng/m^3) of Chlordane Components in Ambient Air at LEHR

	Sample On Date	Media		AML-2		AML-3		AML-5		AML-6
Gamma-Chlordane	8/8/95	PUF		0.11						
Gamma-Chlordane	9/6/95	Combo				0.07		0.025		0.033
Gamma-Chlordane	9/6/95	Filter	<	0.0027						
Gamma-Chlordane	9/6/95	PUF		0.093						
Gamma-Chlordane	9/6/95	PUF	<	0.0027						
Gamma-Chlordane	10/4/95	Combo	<	0.013				0.022	<	0.0022
Gamma-Chlordane	10/4/95	Filter			<	0.002				
Gamma-Chlordane	10/4/95	PUF			<	0.002				
Gamma-Chlordane	10/4/95	PUF			<	0.002				
Gamma-Chlordane	1/23/96	Combo				0.049		0.047		0.047
Gamma-Chlordane	1/23/96	Filter	<	0.0022						
Gamma-Chlordane	1/23/96	PUF		0.053						
Gamma-Chlordane	1/23/96	PUF	<	0.0022						
Gamma-Chlordane	4/16/96	Combo		0.029				0.017		0.017
Gamma-Chlordane	4/16/96	Filter			<	0.0016				
Gamma-Chlordane	4/16/96	PUF				0.024				
Gamma-Chlordane	4/16/96	PUF			<	0.0016				
Gamma-Chlordane	7/23/96	Combo				0.049		0.047		0.051
Gamma-Chlordane	7/23/96	Filter	<	0.0019						
Gamma-Chlordane	7/23/96	PUF	<	0.0019						
Gamma-Chlordane	7/23/96	PUF		0.071						
Heptachlor	8/8/95	Combo			<	0.0017		0.046	<	0.0018
Heptachlor	8/8/95	Filter	<	0.0019						
Heptachlor	8/8/95	PUF		0.091						
Heptachlor	8/8/95	PUF	<	0.0019						
Heptachlor	9/6/95	Combo			<	0.0017		0.021		0.044
Heptachlor	9/6/95	Filter	<	0.0028						
Heptachlor	9/6/95	PUF		0.09						
Heptachlor	9/6/95	PUF	<	0.0028						
Heptachlor	10/4/95	Combo	<	0.013				0.021	<	0.0022
Heptachlor	10/4/95	Filter			<	0.0021				
Heptachlor	10/4/95	PUF			<	0.0021				
Heptachlor	10/4/95	PUF			<	0.0021				
Heptachlor	1/23/96	Combo				0.038		0.035		0.038
Heptachlor	1/23/96	Filter	<	0.0023						
Heptachlor	1/23/96	PUF		0.047						
Heptachlor	1/23/96	PUF	<	0.0023						
Heptachlor	4/16/96	Combo		0.031				0.025		0.032
Heptachlor	4/16/96	PUF			<	0.0017				
Heptachlor	4/16/96	PUF				0.028				
Heptachlor	4/16/96	PUF			<	0.0017				
Heptachlor	7/23/96	Combo				0.024		0.026	<	0.0019
Heptachlor	7/23/96	Filter	<	0.0019						
Heptachlor	7/23/96	PUF	<	0.0019						
Heptachlor	7/23/96	PUF		0.031						
Heptachlor Epoxide	8/8/95	Combo			<	0.0004	<	0.00043	<	0.00044
Heptachlor Epoxide	8/8/95	Filter		0.013						
Heptachlor Epoxide	8/8/95	PUF	<	0.00045						
Heptachlor Epoxide	8/8/95	PUF		0.054						
Heptachlor Epoxide	9/6/95	Combo			<	0.00041		0.0051		0.028
Heptachlor Epoxide	9/6/95	Filter	<	0.00067						

Filter = Result for filter extract

PUF = Result for polyurethane foam plug extract

Combo = Result for combined filter and PUF extract

Appendix Table 5.10 Concentrations (ng/m^3) of Chlordane Components in Ambient Air at LEHR

	Sample On Date	Media		AML-2		AML-3		AML-5		AML-6
Heptachlor Epoxide	9/6/95	PUF	<	0.00067						
Heptachlor Epoxide	9/6/95	PUF	<	0.00067						
Heptachlor Epoxide	10/4/95	Combo	<	0.0031			<	0.00045	<	0.00053
Heptachlor Epoxide	10/4/95	Filter			<	0.0005				
Heptachlor Epoxide	10/4/95	PUF			<	0.0005				
Heptachlor Epoxide	10/4/95	PUF			<	0.0005				
Heptachlor Epoxide	1/23/96	Combo			<	0.00047	<	0.00043	<	0.00046
Heptachlor Epoxide	1/23/96	Filter	<	0.00055						
Heptachlor Epoxide	1/23/96	PUF	<	0.00055						
Heptachlor Epoxide	1/23/96	PUF	<	0.00055						
Heptachlor Epoxide	4/16/96	Combo	<	0.00042			<	0.00041	<	0.00046
Heptachlor Epoxide	4/16/96	Filter			<	0.0004				
Heptachlor Epoxide	4/16/96	PUF			<	0.0004				
Heptachlor Epoxide	4/16/96	PUF			<	0.0004				
Heptachlor Epoxide	7/23/96	Combo			<	0.00041	<	0.00044	<	0.00045
Heptachlor Epoxide	7/23/96	Filter	<	0.00047						
Heptachlor Epoxide	7/23/96	PUF	<	0.00047						
Heptachlor Epoxide	7/23/96	PUF	<	0.00047						
Trans Nonachlor	8/8/95	Combo				0.041		0.058		0.023
Trans Nonachlor	8/8/95	Filter	<	0.0045						
Trans Nonachlor	8/8/95	PUF	<	0.0045						
Trans Nonachlor	8/8/95	PUF	<	0.0045						
Trans Nonachlor	9/6/95	Combo				0.028		0.012		0.018
Trans Nonachlor	9/6/95	Filter	<	0.0065						
Trans Nonachlor	9/6/95	PUF		0.039						
Trans Nonachlor	9/6/95	PUF	<	0.0065						
Trans Nonachlor	10/4/95	Combo	<	0.031			<	0.0044	<	0.0052
Trans Nonachlor	10/4/95	Filter			<	0.0049				
Trans Nonachlor	10/4/95	PUF			<	0.0049				
Trans Nonachlor	10/4/95	PUF			<	0.0049				
Trans Nonachlor	1/23/96	Combo				0.03		0.027		0.036
Trans Nonachlor	1/23/96	Filter	<	0.0054						
Trans Nonachlor	1/23/96	PUF		0.032						
Trans Nonachlor	1/23/96	PUF	<	0.0054						
Trans Nonachlor	4/16/96	Combo		0.02				0.014	<	0.0045
Trans Nonachlor	4/16/96	Filter			<	0.004				
Trans Nonachlor	4/16/96	PUF			<	0.004				
Trans Nonachlor	4/16/96	PUF				0.019				
Trans Nonachlor	7/23/96	Combo				0.037		0.033		0.047
Trans Nonachlor	7/23/96	Filter	<	0.0046						
Trans Nonachlor	7/23/96	PUF	<	0.0046						
Trans Nonachlor	7/23/96	PUF		0.046						

Filter = Result for filter extract
PUF = Result for polyurethane foam plug extract
Combo = Result for combined filter and PUF extract

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
1,1,1-Trichloroethane	8/8/95		9.1	<	4.3	<	3.6	<	4.6
	8/8/95		15						
	9/6/95	<	2.9	<	3.2	<	4.1	<	3.5
	9/6/95	<	2.4						
	10/4/95	<	3.5	<	3.4	<	3.6	<	3.2
	1/23/96	<	3	<	8.7	<	3.1	<	2.2
	1/23/96					<	3.4		
	4/16/96	<	2.8		6.9	<	2.8	<	2.2
	4/16/96			<	3.1				
	7/23/96	<	3.1	<	3.5			<	2.2
	7/23/96			<	2.1				
	7/24/96					<	4		
1,1,2,2-Tetrachloroethane	8/8/95	<	5.7	<	5.5	<	4.5	<	5.8
	8/8/95	<	6.1						
	9/6/95	<	3.7	<	4	<	5.1	<	4.4
	9/6/95	<	3						
	10/4/95	<	4.4	<	4.2	<	4.6	<	4.1
	1/23/96	<	3.7	<	11	<	3.9	<	2.8
	1/23/96					<	4.2		
	4/16/96	<	3.5	<	6.1	<	3.5	<	2.7
	4/16/96			<	3.9				
	7/23/96	<	3.9	<	4.4			<	2.7
	7/23/96			<	2.7				
	7/24/96					<	5		
1,1,2-Trichloro-1,2,2-trifluoroethane	8/8/95	<	9.6	<	9.2	<	7.6	<	9.7
	8/8/95	<	10						
	9/6/95	<	6.1	<	6.7	<	8.6	<	7.3
	9/6/95	<	5						
	10/4/95	<	7.4	<	7.1	<	7.6	<	6.8
	1/23/96	<	6.2	<	18	<	6.5	<	4.7
	1/23/96					<	7.1		
	4/16/96	<	5.9	<	10	<	5.9	<	4.6
	4/16/96			<	6.6				
	7/23/96	<	6.5	<	7.3			<	4.6
	7/23/96			<	4.5				
	7/24/96					<	8.5		
1,1,2-Trichloroethane	8/8/95	<	4.5	<	4.3	<	3.6	<	4.6
	8/8/95	<	4.9						
	9/6/95	<	2.9	<	3.2	<	4.1		3.5
	9/6/95	<	2.4						
	10/4/95	<	3.5	<	3.4	<	3.6		3.2
	1/23/96	<	3	<	8.7	<	3.1	<	2.2
	1/23/96					<	3.4		
	4/16/96	<	2.8	<	4.9	<	2.8	<	2.2
	4/16/96			<	3.1				
	7/23/96	<	3.1	<	3.5			<	2.2
	7/23/96			<	2.1				
	7/24/96					<	4		
1,1-Dichloroethane	8/8/95	<	3.4	<	3.2	<	2.7	<	3.4
	8/8/95	<	3.6						
	9/6/95	<	2.2	<	2.3	<	3	<	2.6
	9/6/95	<	1.8						
	10/4/95	<	2.6	<	2.5	<	2.7	<	2.4
	1/23/96	<	2.2	<	6.5	<	2.3	<	1.6
	1/23/96					<	2.5		
	4/16/96	<	2.1	<	3.6	<	2.1	<	1.6
	4/16/96			<	2.3				
	7/23/96	<	2.3	<	2.6			<	1.6
	7/23/96			<	1.6				

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	7/24/96					<	3		
1,1-Dichloroethene	8/8/95	<	3.3	<	3.2	<	2.6	<	3.4
	8/8/95	<	3.5						
	9/6/95	<	2.1	<	2.3	<	3	<	2.5
	9/6/95	<	1.7						
	10/4/95	<	2.5	<	2.5	<	2.6	<	2.3
	1/23/96	<	2.2	<	6.4	<	2.3	<	1.6
	1/23/96					<	2.4		
	4/16/96	<	2	<	3.5	<	2	<	1.6
	4/16/96			<	2.3				
	7/23/96	<	2.2	<	2.5			<	1.6
	7/23/96			<	1.6				
	7/24/96					<	2.9		
1,2,4-Trichlorobenzene	8/8/95	<	6.2	<	5.9	<	4.9	<	6.3
	8/8/95	<	6.6						
	9/6/95	<	4	<	4.3	<	5.5	<	4.7
	9/6/95	<	3.3						
	10/4/95	<	4.8	<	4.6	<	4.9	<	4.4
	1/23/96	<	4	<	12	<	4.2	<	3
	1/23/96					<	4.6		
	4/16/96	<	3.8	<	6.6	<	3.8	<	3
	4/16/96			<	4.2				
	7/23/96	<	4.2	<	4.7			<	3
	7/23/96			<	2.9				
	7/24/96					<	5.5		
1,2,4-trimethylbenzene	8/8/95	<	4.1	<	3.9	<	3.2	<	4.2
	8/8/95	<	4.4						
	9/6/95	<	2.6	<	2.9	<	3.7	<	3.1
	9/6/95	<	2.2						
	10/4/95	<	3.1	<	3	<	3.3	<	2.9
	1/23/96	<	2.7	<	7.9	<	2.8	<	2
	1/23/96					<	3		
	4/16/96	<	2.5	<	4.4	<	2.5	<	2
	4/16/96			<	2.8				
	7/23/96	<	2.8	<	3.1			<	2
	7/23/96			<	1.9				
	7/24/96					<	3.6		
1,2-Dibromoethane	8/8/95	<	6.4	<	6.1	<	5.1	<	6.5
	8/8/95	<	6.9						
	9/6/95	<	4.1	<	4.5	<	5.7	<	4.9
	9/6/95	<	3.4						
	10/4/95	<	4.9	<	4.8	<	5.1	<	4.5
	1/23/96	<	4.2	<	12	<	4.4	<	3.1
	1/23/96					<	4.7		
	4/16/96	<	4	<	6.9	<	4	<	3.1
	4/16/96			<	4.4				
	7/23/96	<	4.3	<	4.9			<	3.1
	7/23/96			<	3				
	7/24/96					<	5.7		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	8/8/95	<	5.8	<	5.6	<	4.6	<	5.9
	8/8/95	<	6.3						
	9/6/95	<	3.7	<	4.1	<	5.2	<	4.4
	9/6/95	<	3.1						
	10/4/95	<	4.5	<	4.3	<	4.6	<	4.1
	1/23/96	<	3.8	<	11	<	4	<	2.8
	1/23/96					<	4.3		
	4/16/96	<	3.6	<	6.3	<	3.6	<	2.8
	4/16/96			<	4				
	7/23/96	<	3.9	<	4.5			<	2.8

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	7/23/96			<	2.8				
	7/24/96					<	5.1		
1,2-Dichlorobenzene	8/8/95	<	5	<	4.8	<	4	<	5.1
	8/8/95	<	5.4						
	9/6/95	<	3.2	<	3.5	<	4.5	<	3.8
	9/6/95	<	2.6						
	10/4/95	<	3.9	<	3.7	<	4	<	3.6
	1/23/96	<	3.3	<	9.6	<	3.4	<	2.4
	1/23/96					<	3.7		
	4/16/96	<	3.1	<	5.4	<	3.1	<	2.4
	4/16/96			<	3.4				
	7/23/96	<	3.4	<	3.8			<	2.4
	7/23/96			<	2.3				
	7/24/96					<	4.4		
1,2-Dichloroethane	8/8/95	<	3.4	<	3.2	<	2.7	<	3.4
	8/8/95	<	3.6						
	9/6/95	<	2.2	<	2.3	<	3	<	2.6
	9/6/95	<	1.8						
	10/4/95	<	2.6	<	2.5	<	2.7	<	2.4
	1/23/96	<	2.2	<	6.5	<	2.3	<	1.6
	1/23/96					<	2.5		
	4/16/96	<	2.1	<	3.6	<	2.1	<	1.6
	4/16/96			<	2.3				
	7/23/96	<	2.3	<	2.6			<	1.6
	7/23/96			<	1.6				
	7/24/96					<	3		
1,2-Dichloropropane	8/8/95	<	3.8	<	3.7	<	3.1	<	3.9
	8/8/95	<	4.1						
	9/6/95	<	2.5	<	2.7	<	3.5	<	2.9
	9/6/95	<	2						
	10/4/95	<	3	<	2.9	<	3.1	<	2.7
	1/23/96	<	2.5	<	7.4	<	2.6	<	1.9
	1/23/96					<	2.8		
	4/16/96	<	2.4	<	4.1	<	2.4	<	1.8
	4/16/96			<	2.6				
	7/23/96	<	2.6	<	3			<	1.8
	7/23/96			<	1.8				
	7/24/96					<	3.4		
1,3,5-trimethylbenzene	8/8/95	<	4.1	<	3.9	<	3.2	<	4.2
	8/8/95	<	4.4						
	9/6/95	<	2.6	<	2.9	<	3.7	<	3.1
	9/6/95	<	2.2						
	10/4/95	<	3.1	<	3	<	3.3	<	2.9
	1/23/96	<	2.7	<	7.9	<	2.8	<	2
	1/23/96					<	3		
	4/16/96	<	2.5	<	4.4	<	2.5	<	2
	4/16/96			<	2.8				
	7/23/96	<	2.8	<	3.1			<	2
	7/23/96			<	1.9				
	7/24/96					<	3.6		
1,3-Dichlorobenzene	8/8/95	<	5	<	4.8	<	4	<	5.1
	8/8/95	<	5.4						
	9/6/95	<	3.2	<	3.5	<	4.5	<	3.8
	9/6/95	<	2.6						
	10/4/95	<	3.9	<	3.7	<	4	<	3.6
	1/23/96	<	3.3	<	9.6	<	3.4	<	2.4
	1/23/96					<	3.7		
	4/16/96	<	3.1	<	5.4	<	3.1	<	2.4
	4/16/96			<	3.4				

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	7/23/96	<	3.4	<	3.8			<	2.4
	7/23/96			<	2.4				
	7/24/96					<	4.4		
1,4-Dichlorobenzene	8/8/95	<	5	<	4.8	<	4	<	5.1
	8/8/95	<	5.4						
	9/6/95	<	3.2	<	3.5	<	4.5	<	3.8
	9/6/95	<	2.6						
	10/4/95	<	3.9	<	3.7	<	4	<	3.6
	1/23/96	<	3.3	<	9.6	<	3.4	<	2.4
	1/23/96					<	3.7		
	4/16/96	<	3.1	<	5.4	<	3.1	<	2.4
	4/16/96			<	3.4				
	7/23/96	<	3.4	<	3.8			<	2.4
	7/23/96			<	2.4				
	7/24/96					<	4.4		
Benzene	8/8/95	<	2.7	<	2.5	<	2.1	<	2.7
	8/8/95	<	2.9						
	9/6/95	<	1.7	<	1.9	<	2.4	<	2
	9/6/95	<	1.4						
	10/4/95	<	2	<	2	<	2.1	<	1.9
	1/23/96	<	1.7	<	5.1	<	1.8	<	1.3
	1/23/96					<	2		
	4/16/96	<	1.6	<	2.9	<	1.6	<	1.3
	4/16/96			<	1.8				
	7/23/96	<	1.8	<	2			<	1.3
	7/23/96			<	1.3				
	7/24/96					<	2.4		
Benzyl Chloride	8/8/95	<	4.3	<	4.1	<	3.4	<	4.4
	8/8/95	<	4.6						
	9/6/95	<	2.8	<	3	<	3.9	<	3.3
	9/6/95	<	2.3						
	10/4/95	<	3.3	<	3.2	<	3.4	<	3.1
	1/23/96	<	2.8	<	8.3	<	2.9	<	2.1
	1/23/96					<	3.2		
	4/16/96	<	2.7	<	4.6	<	2.7	<	2.1
	4/16/96			<	3				
	7/23/96	<	2.9	<	3.3			<	2.1
	7/23/96			<	2				
	7/24/96					<	3.8		
Bromomethane	8/8/95	<	3.2	<	3.1	<	2.6	<	3.3
	8/8/95	<	3.5						
	9/6/95	<	2.1	<	2.3	<	2.9	<	2.5
	9/6/95	<	1.7						
	10/4/95	<	2.5	<	2.4	<	2.6	<	2.3
	1/23/96	<	2.1	<	6.2	<	2.2	<	1.6
	1/23/96					<	2.4		
	4/16/96	<	2	<	3.5	<	2	<	1.6
	4/16/96			<	2.2				
	7/23/96	<	2.2	<	2.5			<	1.6
	7/23/96			<	1.5				
	7/24/96					<	2.9		
Carbon tetrachloride	8/8/95	<	5.2	<	5	<	4.2	<	5.3
	8/8/95	<	5.6						
	9/6/95	<	3.4	<	3.6	<	4.7	<	4
	9/6/95	<	2.8						
	10/4/95	<	4	<	3.9	<	4.2	<	3.7
	1/23/96	<	3.4	<	10	<	3.6	<	2.6
	1/23/96					<	3.9		
	4/16/96	<	3.2	<	5.6	<	3.2	<	2.5

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	4/16/96			<	3.6				
	7/23/96	<	3.5	<	4			<	2.5
	7/23/96			<	2.5				
	7/24/96					<	4.6		
Chlorobenzene	8/8/95	<	3.8	<	3.7	<	3	<	3.9
	8/8/95	<	4.1						
	9/6/95	<	2.5	<	2.7	<	3.4	<	2.9
	9/6/95	<	2						
	10/4/95		8	<	2.8	<	3.1	<	2.7
	1/23/96	<	2.5	<	7.4	<	2.6	<	1.9
	1/23/96					<	2.8		
	4/16/96	<	2.4	<	4.1	<	2.4	<	1.8
	4/16/96			<	2.6				
	7/23/96	<	2.6	<	2.9			<	1.8
	7/23/96			<	1.8				
	7/24/96					<	3.4		
Chloroethane	8/8/95	<	2.2	<	2.1	<	1.7	<	2.2
	8/8/95	<	2.4						
	9/6/95	<	1.4	<	1.5	<	2	<	1.7
	9/6/95	<	1.2						
	10/4/95	<	1.7	<	1.6	<	1.8	<	1.6
	1/23/96	<	1.4	<	4.2	<	1.5	<	1.1
	1/23/96					<	1.6		
	4/16/96	<	1.4	<	2.4	<	1.4	<	1.1
	4/16/96			<	1.5				
	7/23/96	<	1.5	<	1.7			<	1.1
	7/23/96			<	1				
	7/24/96					<	1.9		
Chloroform	8/8/95	<	4.1	<	3.9	<	3.2	<	4.1
	8/8/95	<	4.4						
	9/6/95	<	2.6	<	2.8	<	3.7	<	3.1
	9/6/95	<	2.1						
	10/4/95	<	3.1	<	3	<	3.2	<	2.9
	1/23/96	<	2.7	<	7.8	<	2.8	<	2
	1/23/96					<	3		
	4/16/96	<	2.5	<	4.4	<	2.5	<	2
	4/16/96			<	2.8				
	7/23/96	<	2.7	<	3.1			<	2
	7/23/96			<	1.9				
	7/24/96					<	3.6		
Chloromethane	8/8/95	<	1.7	<	1.6	<	1.4	<	1.7
	8/8/95	<	1.8						
	9/6/95	<	1.1	<	1.2	<	1.5	<	1.3
	9/6/95	<	0.91						
	10/4/95	<	1.3	<	1.3	<	1.4	<	1.2
	1/23/96	<	1.1	<	3.3	<	1.2	<	0.84
	1/23/96					<	1.3		
	4/16/96	<	1.1	<	1.8	<	1.1	<	0.83
	4/16/96			<	1.2				
	7/23/96	<	1.2	<	1.3			<	0.83
	7/23/96			<	0.81				
	7/24/96					<	1.5		
cis-1,2-Dichloroethene	8/8/95	<	3.3	<	3.2	<	2.6	<	3.4
	8/8/95	<	3.5						
	9/6/95	<	2.1	<	2.3	<	3	<	2.5
	9/6/95	<	1.7						
	10/4/95	<	2.5	<	2.5	<	2.6	<	2.3
	1/23/96	<	2.2	<	6.4	<	2.3	<	1.6
	1/23/96					<	2.4		

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	4/16/96	<	2	<	3.5	<	2	<	1.6
	4/16/96			<	2.3				
	7/23/96	<	2.2	<	2.5			<	1.6
	7/23/96			<	1.6				
	7/24/96					<	2.9		
cis-1,3-Dichloropropene	8/8/95	<	3.8	<	3.6	<	3	<	3.8
	8/8/95	<	4.1						
	9/6/95	<	2.4	<	2.6	<	3.4	<	2.9
	9/6/95	<	2						
	10/4/95	<	2.9	<	2.8	<	3	<	2.7
	1/23/96	<	2.5	<	7.3	<	2.6	<	1.8
	1/23/96					<	2.8		
	4/16/96	<	2.3	<	4.1	<	2.3	<	1.8
	4/16/96			<	2.6				
	7/23/96	<	2.5	<	2.9			<	1.8
	7/23/96			<	1.8				
	7/24/96					<	3.3		
Dichlorodifluoromethane	8/8/95	<	4.1	<	3.9	<	3.3	<	4.2
	8/8/95	<	4.4						
	9/6/95		2.7	<	2.9	<	3.7	<	3.1
	9/6/95		2.7						
	10/4/95	<	3.2	<	3.1	<	3.3	<	2.9
	1/23/96	<	2.7	<	7.9	<	2.8		2.5
	1/23/96					<	3		
	4/16/96	<	2.5	<	4.4	<	2.5		2.2
	4/16/96			<	2.8				
	7/23/96	<	2.8	<	3.2				2.7
	7/23/96				2.7				
	7/24/96					<	3.6		
Ethylbenzene	8/8/95	<	3.6	<	3.5	<	2.9	<	3.7
	8/8/95	<	3.9						
	9/6/95	<	2.3	<	2.5	<	3.2	<	2.8
	9/6/95	<	1.9						
	10/4/95	<	2.8	<	2.7	<	2.9	<	2.6
	1/23/96	<	2.4	<	7	<	2.5	<	1.8
	1/23/96					<	2.7		
	4/16/96	<	2.2	<	3.9	<	2.2	<	1.7
	4/16/96			<	2.5				
	7/23/96	<	2.4	<	2.8			<	1.7
	7/23/96			<	1.7				
	7/24/96					<	3.2		
Hexachlorobutadiene	8/8/95	<	8.9	<	8.5	<	7	<	9
	8/8/95	<	9.5						
	9/6/95	<	5.7	<	6.2	<	8	<	6.8
	9/6/95	<	4.7						
	10/4/95	<	6.8	<	6.6	<	7.1	<	6.3
	1/23/96	<	5.8	<	17	<	6.1	<	4.3
	1/23/96					<	6.6		
	4/16/96	<	5.5	<	9.5	<	5.5	<	4.3
	4/16/96			<	6.1				
	7/23/96	<	6	<	6.8			<	4.3
	7/23/96			<	4.2				
	7/24/96					<	7.8		
m and/or p-Xylene	8/8/95	<	3.6	<	3.5	<	2.9	<	3.7
	8/8/95	<	3.9						
	9/6/95	<	2.3	<	2.5	<	3.2	<	2.8
	9/6/95	<	1.9						
	10/4/95	<	2.8	<	2.7	<	2.9	<	2.6
	1/23/96	<	2.4	<	7	<	2.5	<	1.8

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	1/23/96					<	2.7		
	4/16/96	<	2.2	<	3.9	<	2.2	<	1.7
	4/16/96			<	2.5				
	7/23/96	<	2.4	<	2.8			<	1.7
	7/23/96			<	1.7				
	7/24/96					<	3.2		
Methylene chloride	8/8/95	<	4.3	<	4.1	<	3.4	<	4.4
	8/8/95	<	4.7						
	9/6/95	<	2.8	<	3	<	3.9	<	3.3
	9/6/95	<	2.3						
	10/4/95	<	3.3	<	3.2	<	3.5	<	3.1
	1/23/96	<	2.8	<	8.3	<	3	<	2.1
	1/23/96					<	3.2		
	4/16/96	<	2.7	<	4.7	<	2.7	<	2.1
	4/16/96			<	3				
	7/23/96	<	2.9	<	3.3			<	2.1
	7/23/96			<	2.1				
	7/24/96					<	3.8		
o-Xylene	8/8/95	<	3.6	<	3.5	<	2.9	<	3.7
	8/8/95	<	3.9						
	9/6/95	<	2.3	<	2.5	<	3.2	<	2.8
	9/6/95	<	1.9						
	10/4/95	<	2.8	<	2.7	<	2.9	<	2.6
	1/23/96	<	2.4	<	7	<	2.5	<	1.8
	1/23/96					<	2.7		
	4/16/96	<	2.2	<	3.9	<	2.2	<	1.7
	4/16/96			<	2.5				
	7/23/96	<	2.4	<	2.8			<	1.7
	7/23/96			<	1.7				
	7/24/96					<	3.2		
Styrene	8/8/95	<	3.5	<	3.4	<	2.8	<	3.6
	8/8/95	<	3.8						
	9/6/95	<	2.3	<	2.5	<	3.2	<	2.7
	9/6/95	<	1.9						
	10/4/95	<	2.7	<	2.6	<	2.8	<	2.5
	1/23/96	<	2.3	<	6.8	<	2.4	<	1.7
	1/23/96					<	2.6		
	4/16/96	<	2.2	<	3.8	<	2.2	<	1.7
	4/16/96			<	2.4				
	7/23/96	<	2.4	<	2.7			<	1.7
	7/23/96			<	1.7				
	7/24/96					<	3.1		
Tetrachloroethene	8/8/95	<	5.6	<	5.4	<	4.5	<	5.7
	8/8/95	<	6.1						
	9/6/95	<	3.6	<	3.9	<	5.1	<	4.3
	9/6/95	<	3						
	10/4/95	<	4.3	<	4.2	<	4.5	<	4
	1/23/96	<	3.7	<	11	<	3.9	<	2.8
	1/23/96					<	4.2		
	4/16/96	<	3.5	<	6.1	<	3.5	<	2.7
	4/16/96			<	3.9				
	7/23/96	<	3.8	<	4.3			<	2.7
	7/23/96			<	2.7				
	7/24/96					<	5		
Toluene	8/8/95	<	3.1	<	3		2.9	<	3.2
	8/8/95	<	3.4						
	9/6/95		2.3		4.4	<	2.8	<	2.4
	9/6/95		1.8						
	10/4/95		280	<	2.3	<	2.5		6.6

Appendix Table 5.11 Concentrations (ug/m^3) of Volatile Organic Compounds in Ambient Air at LEHR

	Sample On Date		AML-2		AML-3		AML-5		AML-6
	1/23/96	<	2		6.6	<	2.1		2.1
	1/23/96					<	2.3		
	4/16/96	<	1.9	<	3.4	<	1.9	<	1.5
	4/16/96			<	2.2				
	7/23/96	<	2.1	<	2.4			<	1.5
	7/23/96				2				
	7/24/96					<	2.8		
trans-1,3-Dichloropropene	8/8/95	<	3.8	<	3.6	<	3	<	3.8
	8/8/95	<	4.1						
	9/6/95	<	2.4	<	2.6	<	3.4	<	2.9
	9/6/95	<	2						
	10/4/95	<	2.9	<	2.8	<	3	<	2.7
	1/23/96	<	2.5	<	7.3	<	2.6	<	1.8
	1/23/96					<	2.8		
	4/16/96	<	2.3	<	4.1	<	2.3	<	1.8
	4/16/96			<	2.6				
	7/23/96	<	2.5	<	2.9			<	1.8
	7/23/96			<	1.8				
	7/24/96					<	3.3		
Trichloroethene	8/8/95	<	4.5	<	4.3	<	3.6	<	4.5
	8/8/95	<	4.8						
	9/6/95	<	2.9	<	3.1	<	4	<	3.4
	9/6/95	<	2.4						
	10/4/95	<	3.4	<	3.3	<	3.6	<	3.2
	1/23/96	<	2.9	<	8.6	<	3.1	<	2.2
	1/23/96					<	3.3		
	4/16/96	<	2.8	<	4.8	<	2.8	<	2.2
	4/16/96			<	3.1				
	7/23/96	<	3	<	3.4			<	2.2
	7/23/96			<	2.1				
	7/24/96					<	4		
Trichlorofluoromethane	8/8/95	<	4.7	<	4.5	<	3.7	<	4.8
	8/8/95	<	5						
	9/6/95	<	3	<	3.3	<	4.2	<	3.6
	9/6/95	<	2.5						
	10/4/95	<	3.6	<	3.5	<	3.7	<	3.3
	1/23/96	<	3.1	<	9	<	3.2	<	2.3
	1/23/96					<	3.5		
	4/16/96	<	2.9	<	5	<	2.9	<	2.2
	4/16/96			<	3.2				
	7/23/96	<	3.2	<	3.6			<	2.2
	7/23/96			<	2.2				
	7/24/96					<	4.1		
Vinyl chloride	8/8/95	<	2.1	<	2	<	1.7	<	2.2
	8/8/95	<	2.3						
	9/6/95	<	1.4	<	1.5	<	1.9	<	1.6
	9/6/95	<	1.1						
	10/4/95	<	1.6	<	1.6	<	1.7	<	1.5
	1/23/96	<	1.4	<	4.1	<	1.5	<	1
	1/23/96					<	1.6		
	4/16/96	<	1.3	<	2.3	<	1.3	<	1
	4/16/96			<	1.5				
	7/23/96	<	1.4	<	1.6			<	1
	7/23/96			<	1				
	7/24/96					<	1.9		

Appendix Table 5.12. Joint Frequency Distributions for Meteorological Data at LEHR (wind speed in miles/hr).

Period: November 1994 — Joint Frequency Distribution (Percent) — Total Hours: 181

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	15.5	15.5
1-3	2.8	3.3	2.8	1.1	1.1	.6	2.8	10.5	2.2	3.3	1.1	2.2	3.3	4.4	4.4	3.3	.0	49.2
4-7	7.2	3.3	.0	.0	.0	.0	.0	7.2	2.8	1.7	.6	2.8	.0	.0	1.7	5.5	.0	32.6
8-12	1.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1	.0	2.8
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	11.6	6.6	2.8	1.1	1.1	.6	2.8	17.7	5.0	5.0	1.7	5.0	3.3	4.4	6.1	9.9	15.5	100.0

Period: December 1994 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	8.5	8.5
1-3	5.4	3.9	3.4	2.8	2.0	1.6	4.8	11.7	5.4	2.6	1.7	.7	2.0	2.2	5.0	7.7	.0	62.8
4-7	7.8	3.4	.7	.1	.0	.0	.8	4.0	.9	.5	.0	.0	.0	.1	1.1	7.0	.0	26.5
8-12	.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.5	.0	1.9
13-18	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.4
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	13.8	7.3	4.0	3.0	2.0	1.6	5.6	15.7	6.3	3.1	1.7	.7	2.0	2.3	6.0	16.3	8.5	100.0

Period: January 1995 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	5.0	5.0
1-3	3.4	1.9	3.0	2.2	1.7	2.7	9.7	9.4	5.6	3.2	.8	.7	1.1	2.0	1.6	3.2	.0	52.2
4-7	2.4	1.3	.1	.3	.0	.1	3.8	14.8	4.2	1.6	.5	.7	.4	.1	.1	2.6	.0	33.1
8-12	.1	.3	.0	.0	.0	.0	.0	7.9	.8	.0	.0	.0	.0	.0	.0	.4	.0	9.5
13-18	.0	.0	.0	.0	.0	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	5.9	3.5	3.1	2.4	1.7	2.8	13.4	32.4	10.6	4.8	1.3	1.3	1.5	2.2	1.7	6.2	5.0	100.0

Period: February 1995 — Joint Frequency Distribution (Percent) — Total Hours: 672

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	22.6	22.6
1-3	3.7	5.5	6.1	3.3	1.5	1.3	2.5	8.9	5.7	3.0	1.5	.4	1.3	3.3	6.7	4.5	.0	59.2
4-7	3.9	2.2	.0	.0	.0	.0	.0	1.2	3.1	1.5	.4	.0	.0	.3	.7	4.3	.0	17.7
8-12	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3	.0	.4
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	7.7	7.7	6.1	3.3	1.5	1.3	2.5	10.1	8.8	4.5	1.9	.4	1.3	3.6	7.4	9.1	22.6	100.0

Period: March 1995 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.7	7.7
1-3	1.1	1.1	.5	.3	.4	.8	3.9	9.1	9.9	5.8	1.3	.9	1.3	2.3	3.5	2.6	.0	44.9
4-7	2.7	.9	.0	.0	.0	.0	.5	5.0	8.3	4.0	1.1	.4	.1	.1	1.6	8.5	.0	33.3
8-12	4.3	.0	.0	.0	.0	.0	.4	4.3	.7	.1	.0	.0	.0	.0	.0	3.8	.0	13.6
13-18	.0	.0	.0	.0	.0	.0	.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.5
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	8.1	2.0	.5	.3	.4	.8	4.8	19.0	19.0	9.9	2.4	1.3	1.5	2.4	5.1	14.8	7.7	100.0

Period: April 1995 — Joint Frequency Distribution (Percent) — Total Hours: 720

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2.1	2.1
1-3	.4	.8	.7	.3	.0	.3	1.7	7.2	12.5	7.5	2.4	1.4	1.1	1.8	2.8	1.5	.0	42.4
4-7	2.8	1.0	.1	.0	.0	.0	.0	4.3	10.6	8.2	1.1	.7	1.8	1.5	3.2	7.8	.0	43.1
8-12	3.8	.0	.0	.0	.0	.0	.0	.0	.6	.0	.0	.0	.0	.3	.7	7.1	.0	12.4
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.1
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	6.9	1.8	.8	.3	.0	.3	1.7	11.5	23.6	15.7	3.5	2.1	2.9	3.6	6.7	16.5	2.1	100.0

Period: May 1995 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.8	3.8
1-3	1.6	2.7	.7	2.0	.7	.4	2.3	8.7	27.6	4.8	1.3	2.6	2.6	2.8	4.7	1.5	.0	66.9
4-7	2.2	.4	.4	.4	.0	.0	.0	.7	14.0	2.0	.1	1.2	.7	1.5	2.0	3.4	.0	28.9
8-12	.1	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.4
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	3.9	3.1	1.2	2.4	.7	.4	2.3	9.4	41.5	6.9	1.5	3.8	3.2	4.3	6.9	4.8	3.8	100.0

Period: June 1995 — Joint Frequency Distribution (Percent) — Total Hours: 720

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.9	3.9
1-3	1.4	1.7	1.1	.4	.3	.1	1.1	5.8	25.1	2.2	.3	.6	.1	2.8	1.8	.7	.0	45.6
4-7	6.4	1.9	.3	.1	.0	.0	.0	.4	23.1	1.5	.3	.4	.3	.1	2.1	4.4	.0	41.4
8-12	3.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.0	.0	7.4
13-18	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.7	.0	1.8
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	11.1	3.8	1.4	.6	.3	.1	1.1	6.3	48.2	3.8	.6	1.0	.4	2.9	3.9	10.8	3.9	100.0

Period: July 1995 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.7	4.7
1-3	1.9	.9	.9	.4	1.1	.7	2.3	7.5	22.0	2.3	1.9	1.5	3.1	3.0	2.2	1.6	.0	53.2
4-7	5.0	2.2	.3	.0	.0	.0	.0	.5	26.5	.5	.3	.5	.5	.3	.4	3.0	.0	39.9
8-12	2.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2.2
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	9.0	3.1	1.2	.4	1.1	.7	2.3	8.1	48.5	2.8	2.2	2.0	3.6	3.2	2.6	4.6	4.7	100.0

Period: August 1995 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.6	4.6
1-3	3.0	1.7	2.6	1.5	.9	.5	2.0	9.1	26.2	2.7	.9	.4	.4	1.6	1.5	.9	.0	56.0
4-7	4.0	1.7	.5	.4	.0	.0	.0	.3	23.5	1.2	.1	.1	.1	.3	.8	3.5	.0	36.7
8-12	1.6	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0	.9	.0	2.7
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	8.6	3.5	3.1	1.9	.9	.5	2.0	9.4	49.9	3.9	1.1	.5	.5	1.9	2.3	5.4	4.6	100.0

Period: September 1995 — Joint Frequency Distribution (Percent) — Total Hours: 720

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.3	4.3
1-3	2.5	2.2	1.9	.8	1.0	1.0	2.2	7.4	26.8	5.0	1.3	.8	2.5	4.6	3.9	2.5	.0	66.4
4-7	3.3	1.5	.1	.1	.0	.1	.0	.3	17.6	.8	.1	.0	.0	.4	.7	2.1	.0	27.4
8-12	1.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8	.0	1.9
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	6.9	3.8	2.1	1.0	1.0	1.1	2.2	7.6	44.4	5.8	1.4	.8	2.5	5.0	4.6	5.4	4.3	100.0

Period: October 1995 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.3	13.3
1-3	5.8	3.6	2.6	.7	.5	.7	1.3	5.1	8.5	5.8	1.3	1.1	1.1	3.9	3.2	4.6	.0	49.7
4-7	8.3	4.3	.1	.0	.0	.0	.0	.1	2.4	1.3	.3	.3	.5	.1	.7	3.4	.0	21.9
8-12	6.3	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.4	.0	9.9
13-18	1.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.9	.0	5.1
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	21.6	8.2	2.7	.7	.5	.7	1.3	5.2	10.9	7.1	1.6	1.3	1.6	4.0	3.9	15.2	13.3	100.0

Period: November 1995 — Joint Frequency Distribution (Percent) — Total Hours: 451

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	19.7	19.7
1-3	5.5	6.2	2.9	.4	.4	.9	1.6	8.4	9.3	5.8	1.1	1.1	2.0	6.7	5.5	5.1	.0	63.0
4-7	7.5	.9	.0	.0	.0	.0	.0	.7	2.2	1.6	.2	.0	.0	.0	.7	2.0	.0	15.7
8-12	1.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0	1.6
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	14.4	7.1	2.9	.4	.4	.9	1.6	9.1	11.5	7.3	1.3	1.1	2.0	6.7	6.2	7.3	19.7	100.0

Period: January 1996 — Joint Frequency Distribution (Percent) — Total Hours: 744

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	12.8	12.8
1-3	6.3	4.4	3.5	1.5	2.0	1.7	2.7	7.0	2.2	1.9	.7	.7	.9	3.2	4.2	6.6	.0	49.5
4-7	7.8	3.8	.9	.1	.0	.1	.7	8.1	1.1	.1	.5	.1	.0	.0	1.2	6.2	.0	30.8
8-12	.8	.8	.0	.0	.0	.0	.0	2.0	.0	.0	.0	.0	.0	.0	.0	2.6	.0	6.2
13-18	.0	.0	.0	.0	.0	.0	.0	.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	14.9	9.0	4.4	1.6	2.0	1.9	3.4	17.9	3.2	2.0	1.2	.8	.9	3.2	5.4	15.3	12.8	100.0

Period: April 1996 — Joint Frequency Distribution (Percent) — Total Hours: 314

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.8	3.8
1-3	1.6	.3	.6	1.3	.3	.0	2.2	5.1	5.4	3.8	3.5	2.9	2.5	1.6	4.1	3.2	.0	38.5
4-7	7.0	.3	.0	.0	.0	.0	.0	1.6	8.3	1.6	2.2	.6	1.0	.6	2.2	12.4	.0	37.9
8-12	3.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3	8.6	.0	12.7
13-18	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.1	.0	7.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	13.4	.6	.6	1.3	.3	.0	2.2	6.7	13.7	5.4	5.7	3.5	3.5	2.2	6.7	30.3	3.8	100.0

Period: May 1996 — Joint Frequency Distribution (Percent) — Total Hours: 720

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.8	1.8
1-3	.6	1.3	.7	.4	1.3	.3	2.6	4.7	13.6	8.6	2.6	1.7	1.9	3.6	3.2	1.7	.0	48.8
4-7	3.9	.6	.6	.0	.0	.0	.0	1.5	14.4	5.3	1.8	1.0	1.1	.8	2.4	5.7	.0	39.0
8-12	3.3	.1	.0	.0	.0	.0	.0	.0	.8	.8	.0	.0	.1	.0	.0	3.9	.0	9.2
13-18	.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.7	.0	1.3
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	8.3	1.9	1.3	.4	1.3	.3	2.6	6.3	28.9	14.7	4.4	2.6	3.2	4.4	5.6	11.9	1.8	100.0

Period: June 1996 — Joint Frequency Distribution (Percent) — Total Hours: 720

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.2	4.2
1-3	1.8	1.8	.8	.7	.4	.7	1.1	5.8	21.5	5.7	2.1	2.1	2.6	2.2	2.1	1.7	.0	53.2
4-7	5.3	1.9	.0	.0	.0	.0	.0	.0	19.4	3.6	.3	.8	1.0	.7	2.1	4.3	.0	39.4
8-12	2.1	.0	.0	.0	.0	.0	.0	.0	.6	.0	.0	.0	.3	.0	.0	.3	.0	3.2
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	9.2	3.8	.8	.7	.4	.7	1.1	5.8	41.5	9.3	2.4	2.9	3.9	2.9	4.2	6.3	4.2	100.0

Period: July 1996 — Joint Frequency Distribution (Percent) — Total Hours: 588

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	5.1	5.1
1-3	.9	1.7	.7	.7	1.4	1.4	3.4	10.0	24.1	5.4	2.0	.9	1.4	1.2	1.7	.5	.0	57.3
4-7	1.7	2.0	.0	.0	.0	.0	.2	.7	27.9	.7	.0	.0	.3	.0	.3	2.0	.0	35.9
8-12	1.4	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0	1.7
13-18	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	3.9	3.9	.7	.7	1.4	1.4	3.6	10.7	52.0	6.1	2.0	.9	1.7	1.2	2.0	2.7	5.1	100.0

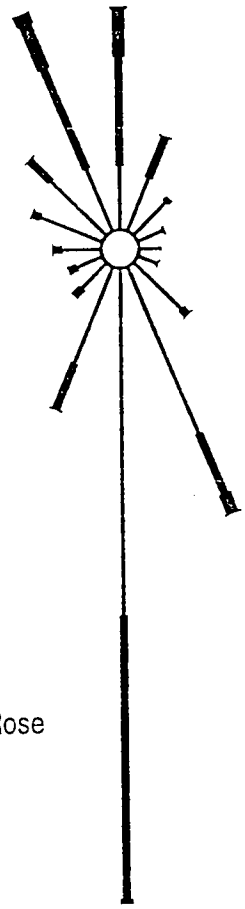
Period: Nov. 1994 - July 1996 — Joint Frequency Distribution (Percent) — Total Hours: 11758

DIRECTION

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
CALM	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.5	7.5
1-3	2.8	2.5	2.0	1.2	1.0	.9	2.8	7.8	15.0	4.4	1.5	1.2	1.6	2.9	3.3	2.9	.0	53.7
4-7	4.8	1.9	.3	.1	.0	.0	.4	2.8	12.3	2.2	.5	.5	.5	.4	1.3	4.7	.0	32.5
8-12	2.1	.1	.0	.0	.0	.0	.0	.9	.2	.1	.0	.0	.0	.0	.1	2.1	.0	5.6
13-18	.2	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0	.6	.0	.8
19-24	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25-31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32-38	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39-46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
> 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	9.8	4.5	2.2	1.3	1.0	.9	3.2	11.6	27.4	6.7	2.0	1.6	2.1	3.3	4.7	10.2	7.5	100.0

Appendix Figures.

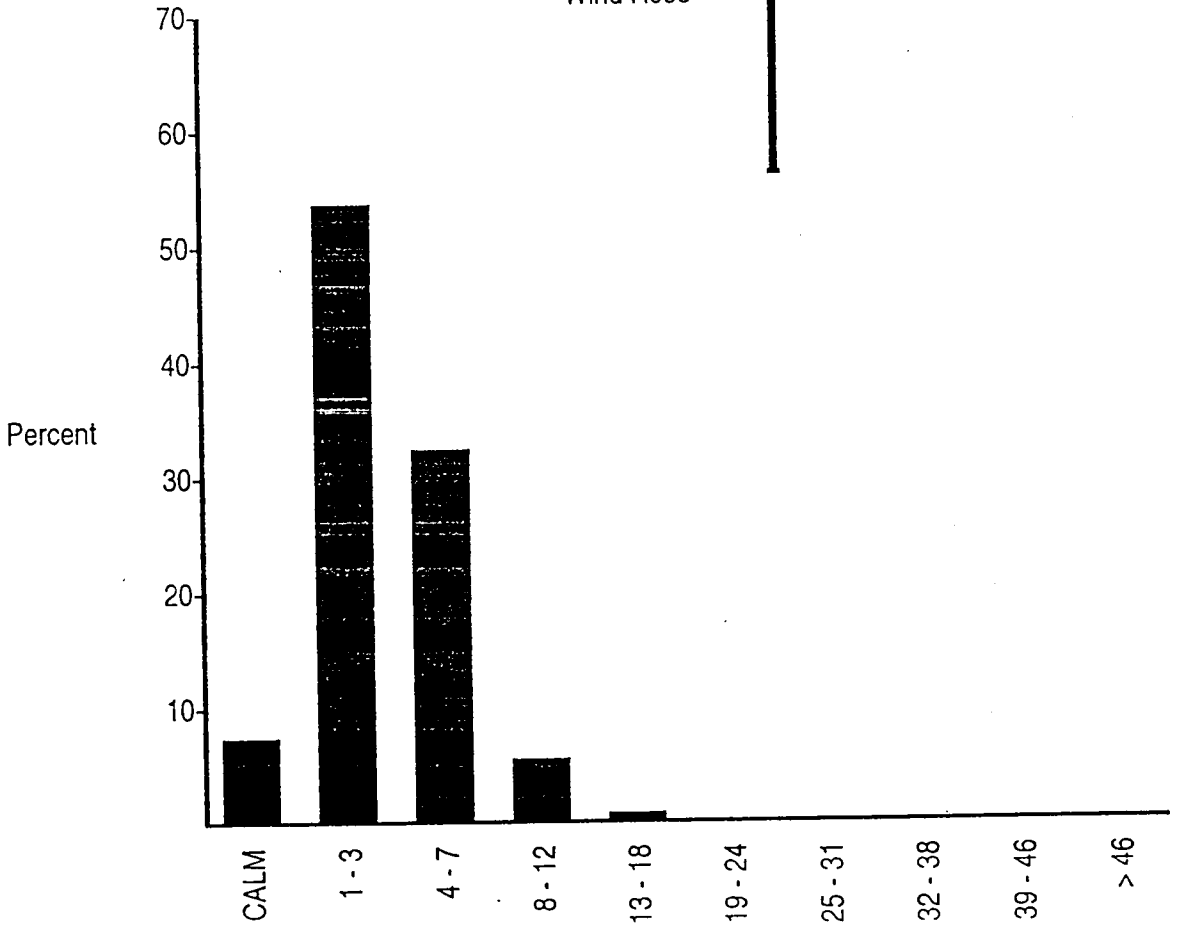
Wind Rose and Wind Speed Histogram for LEHR Meteorological Data from November 1994 to July 1996. (Wind roses indicate the frequency distribution of wind directions at each station; the length of each line in the wind rose is proportional to the amount of time the wind blows from the indicated direction toward the station).



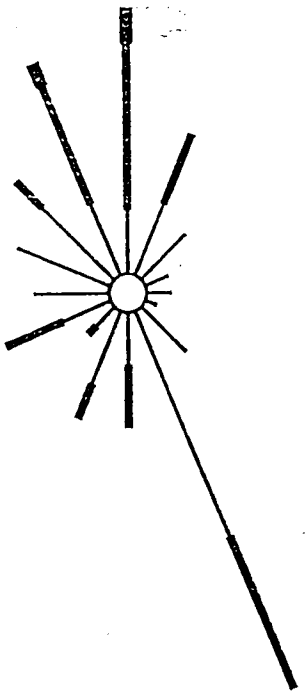
N

Wind Rose

Period: Nov. 1994 - July 1996

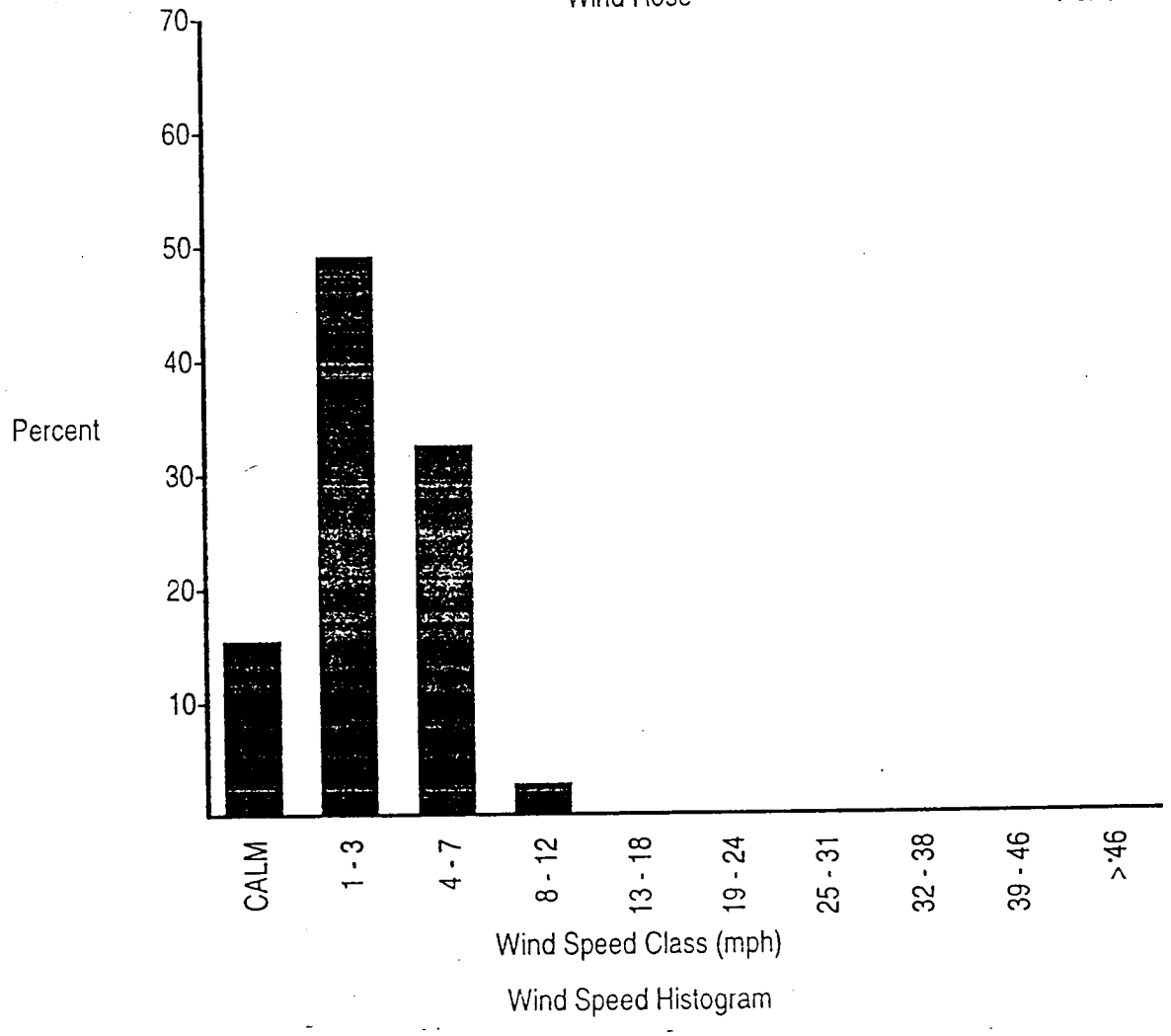


Wind Speed Histogram

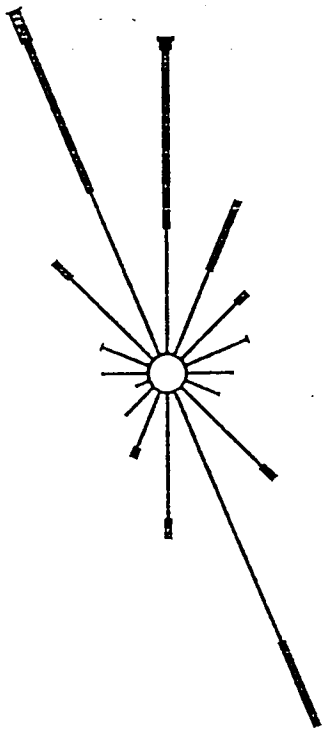


Wind Rose

Period: Nov. 1994



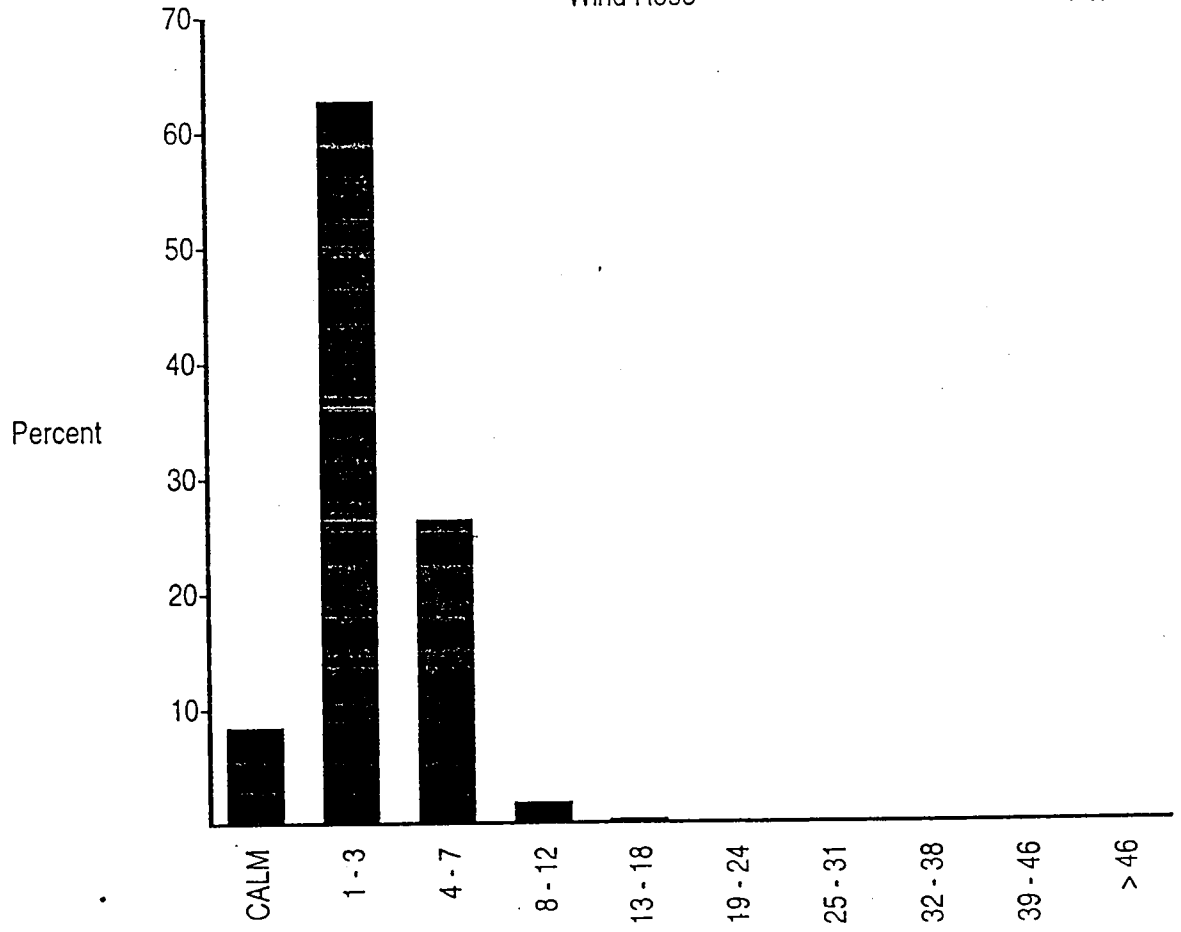
Wind Speed Histogram



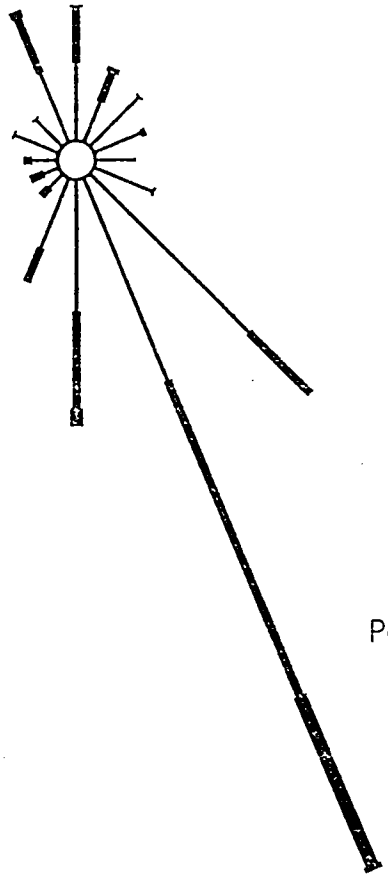
N

Wind Rose

Period: Dec. 1994



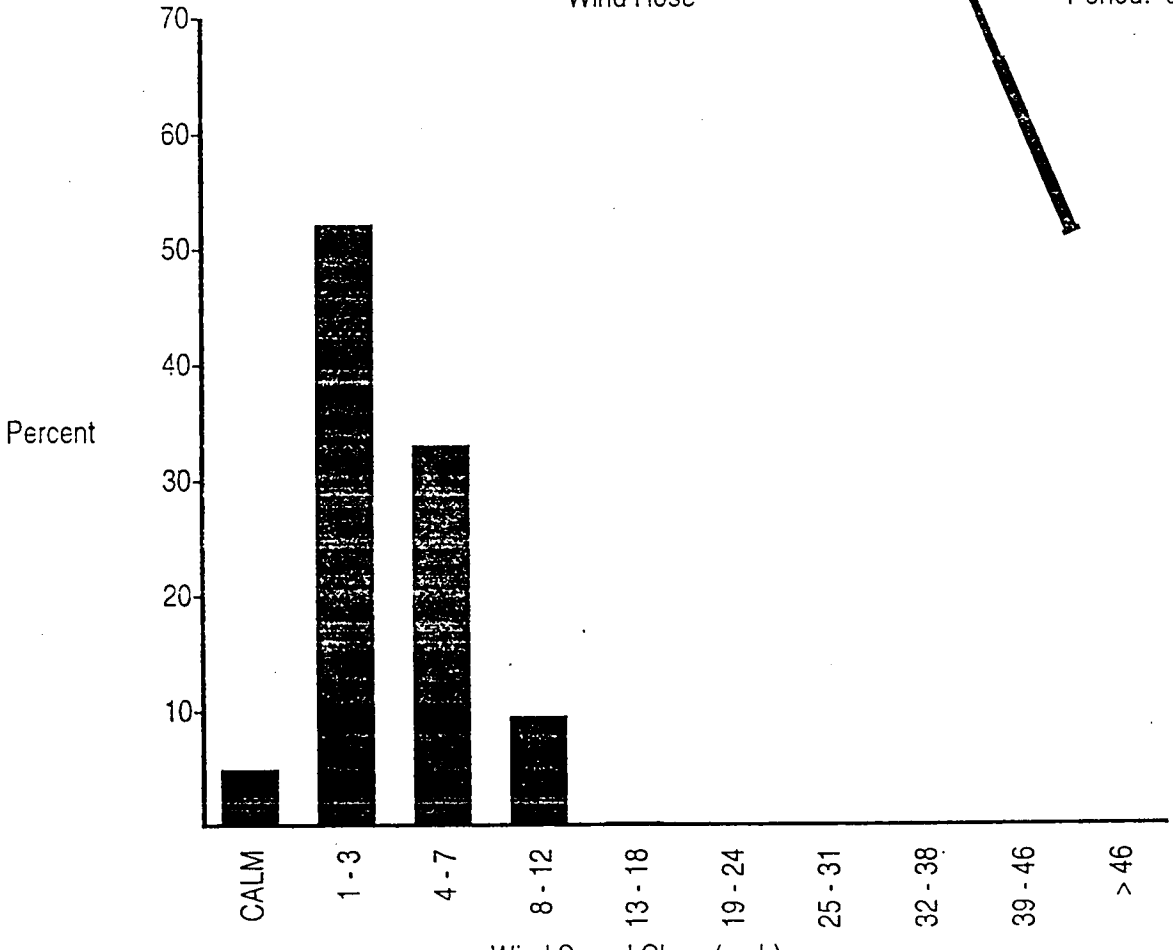
Wind Speed Histogram



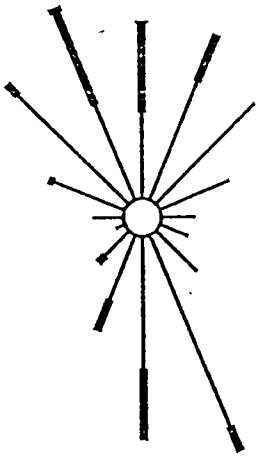
N

Wind Rose

Period: Jan. 1995

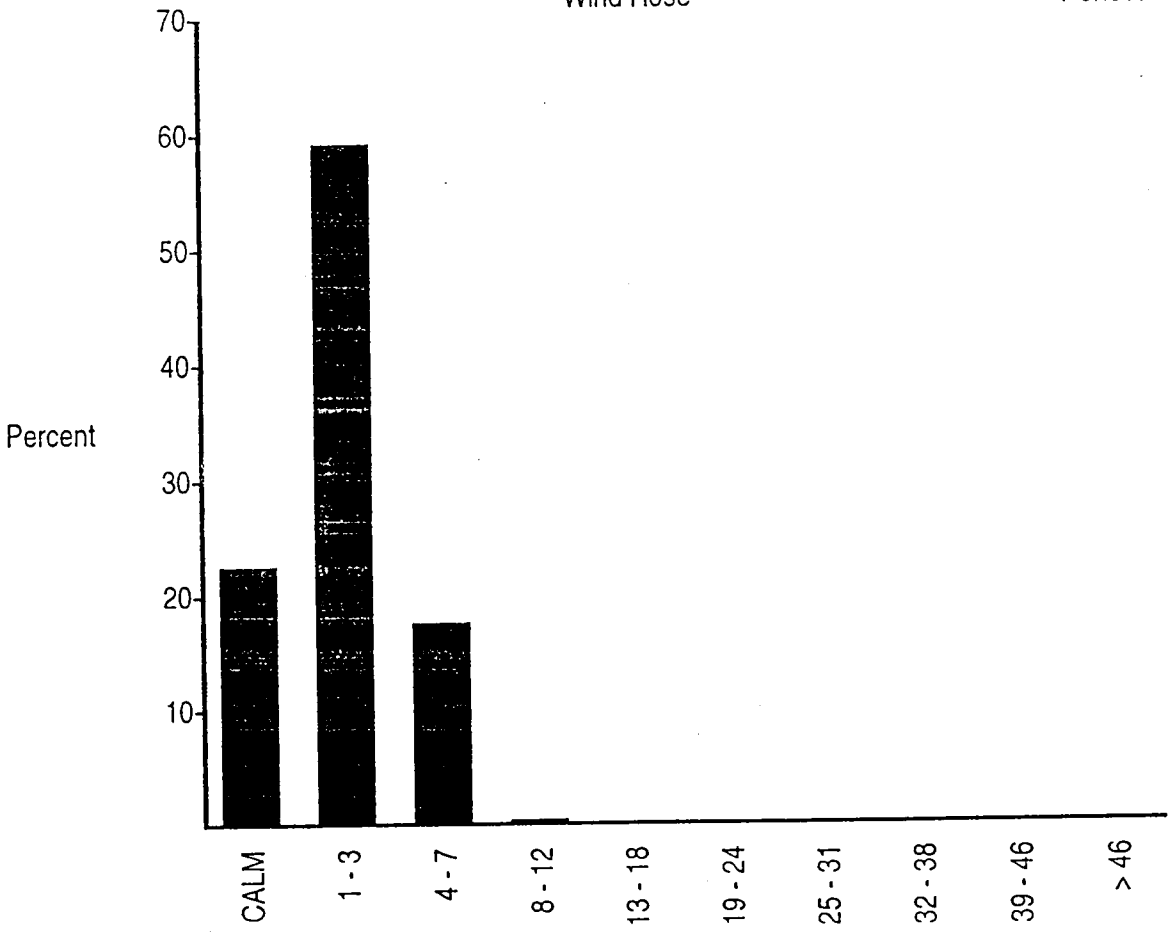


Wind Speed Histogram

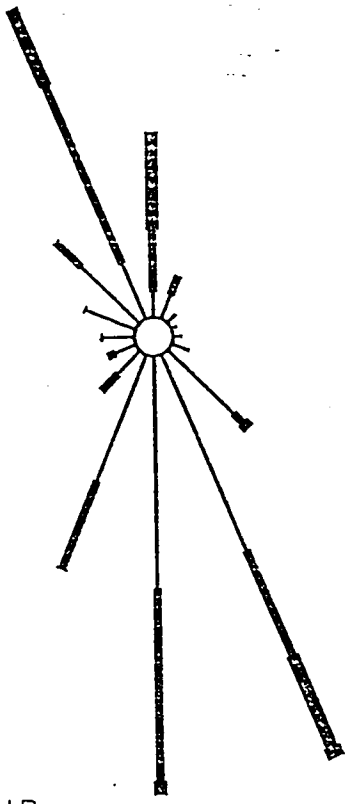


Wind Rose

Period: Feb. 1995



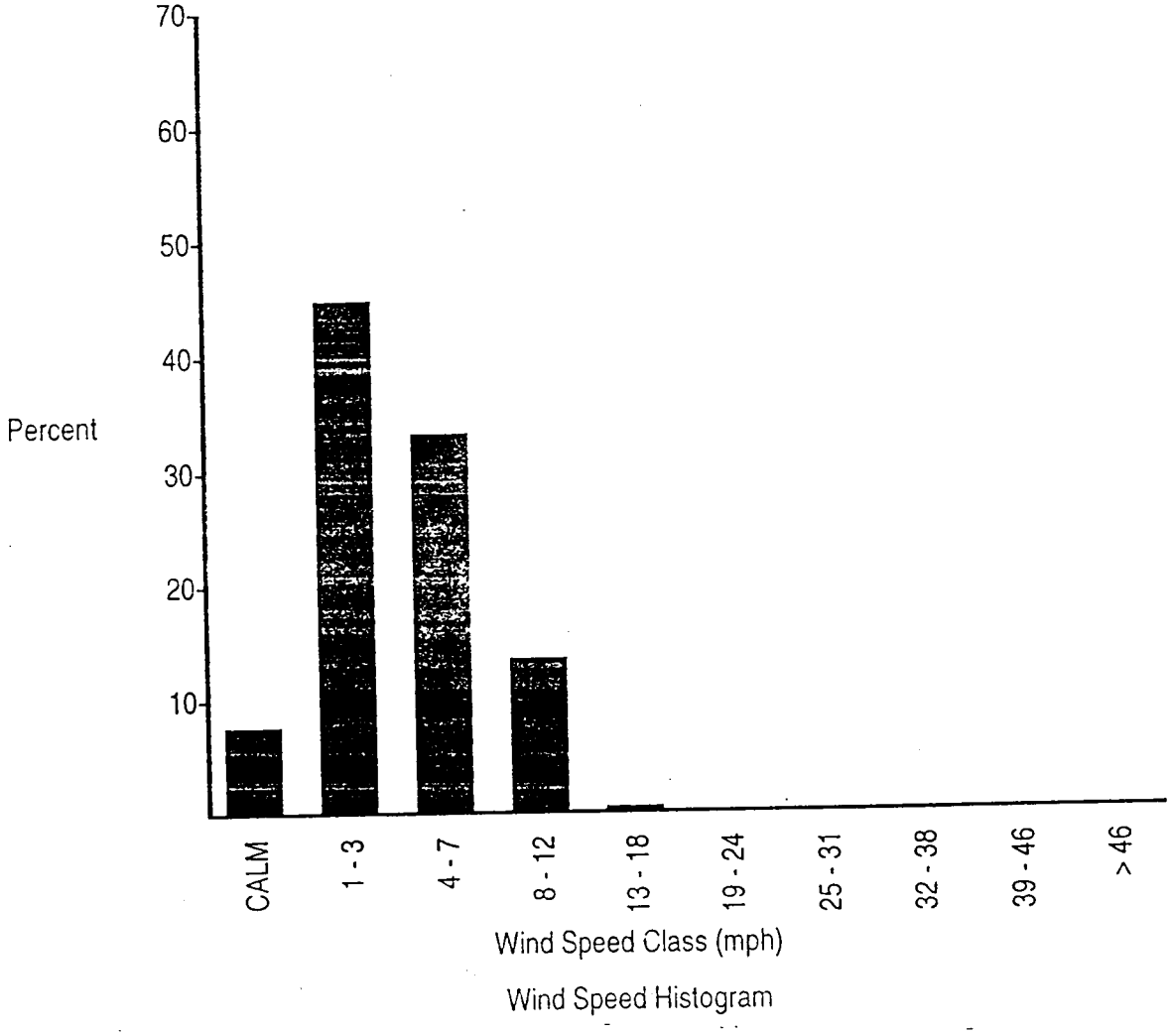
Wind Speed Histogram



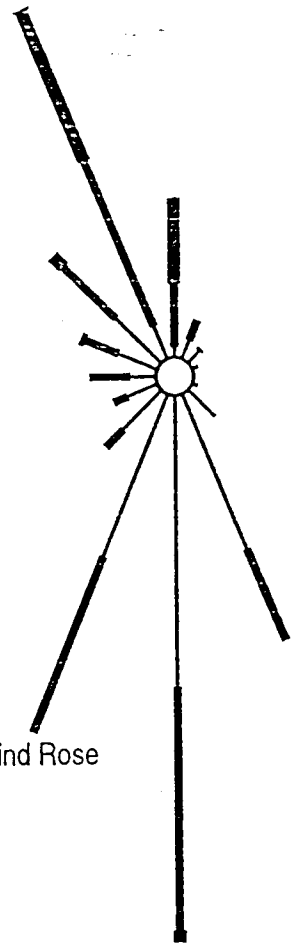
N

Wind Rose

Period: Mar. 1995



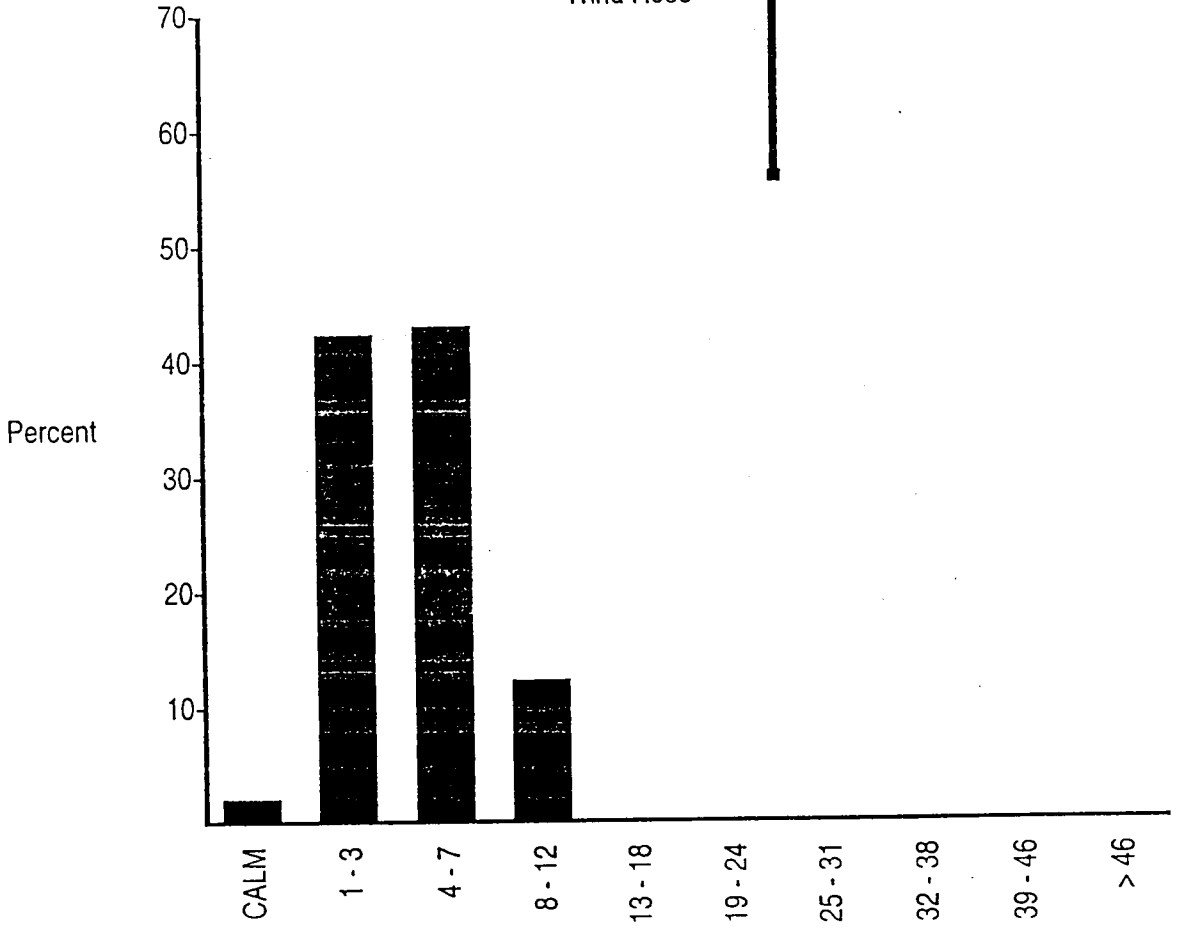
Wind Speed Histogram



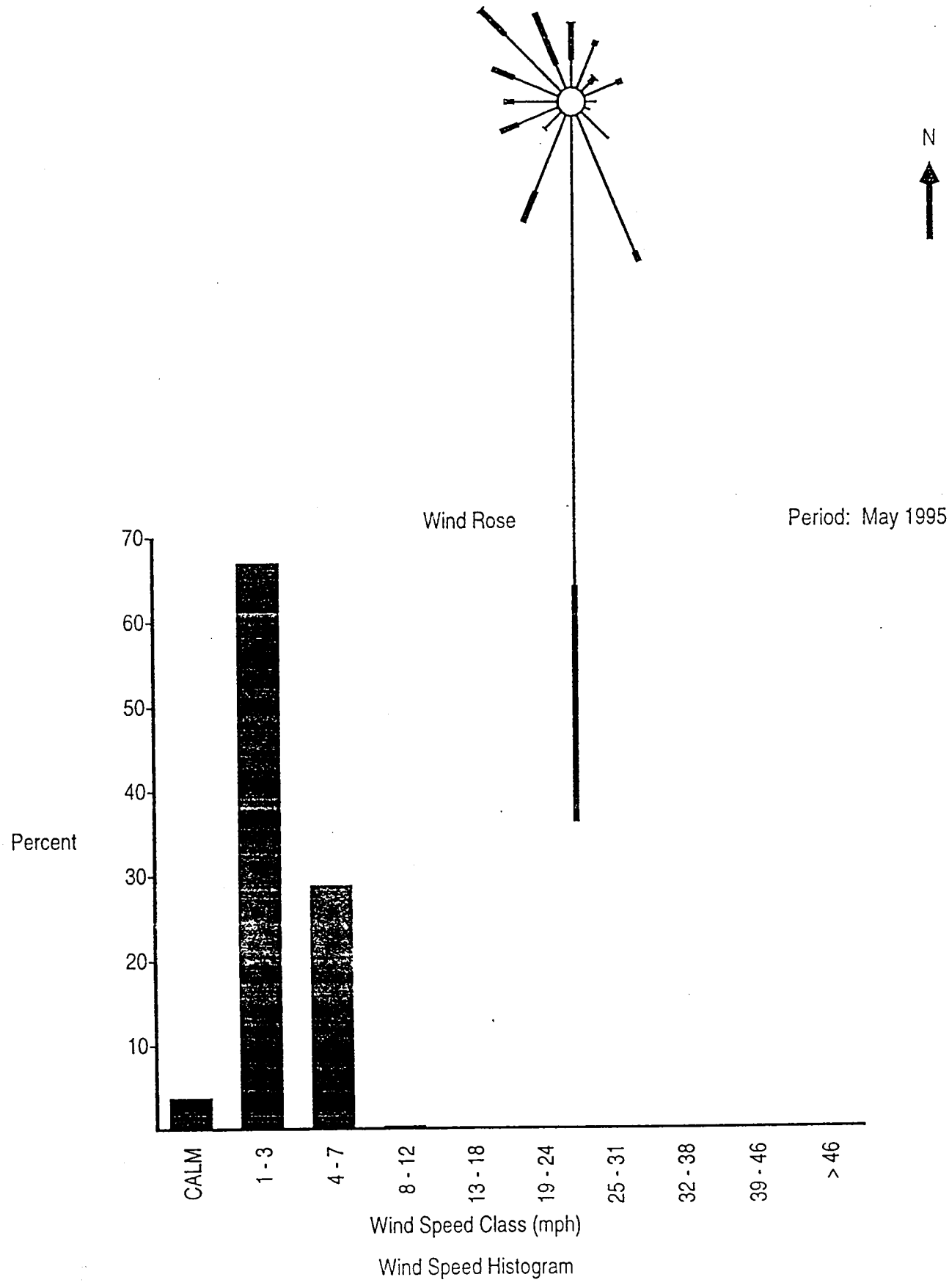
N

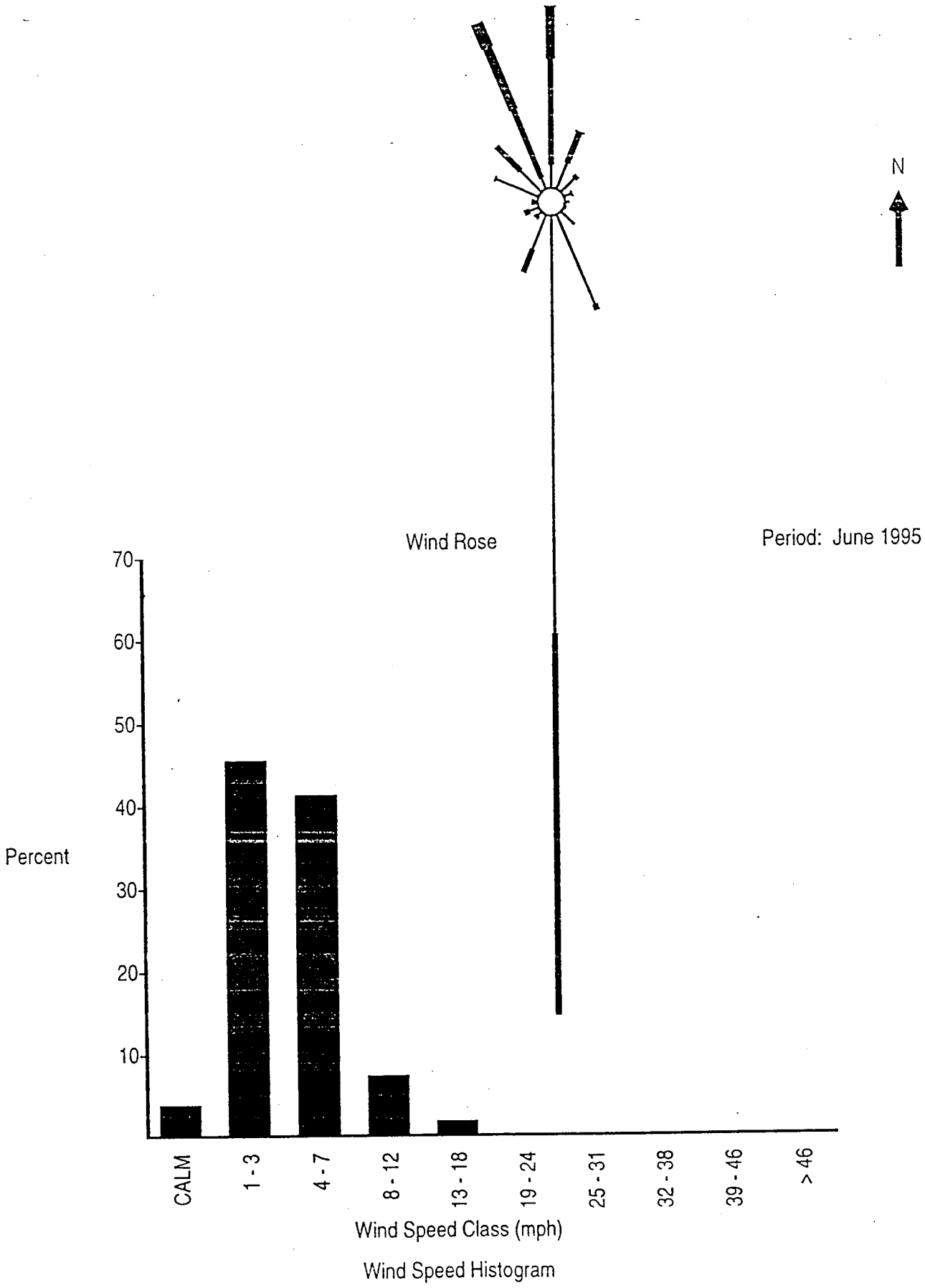
Wind Rose

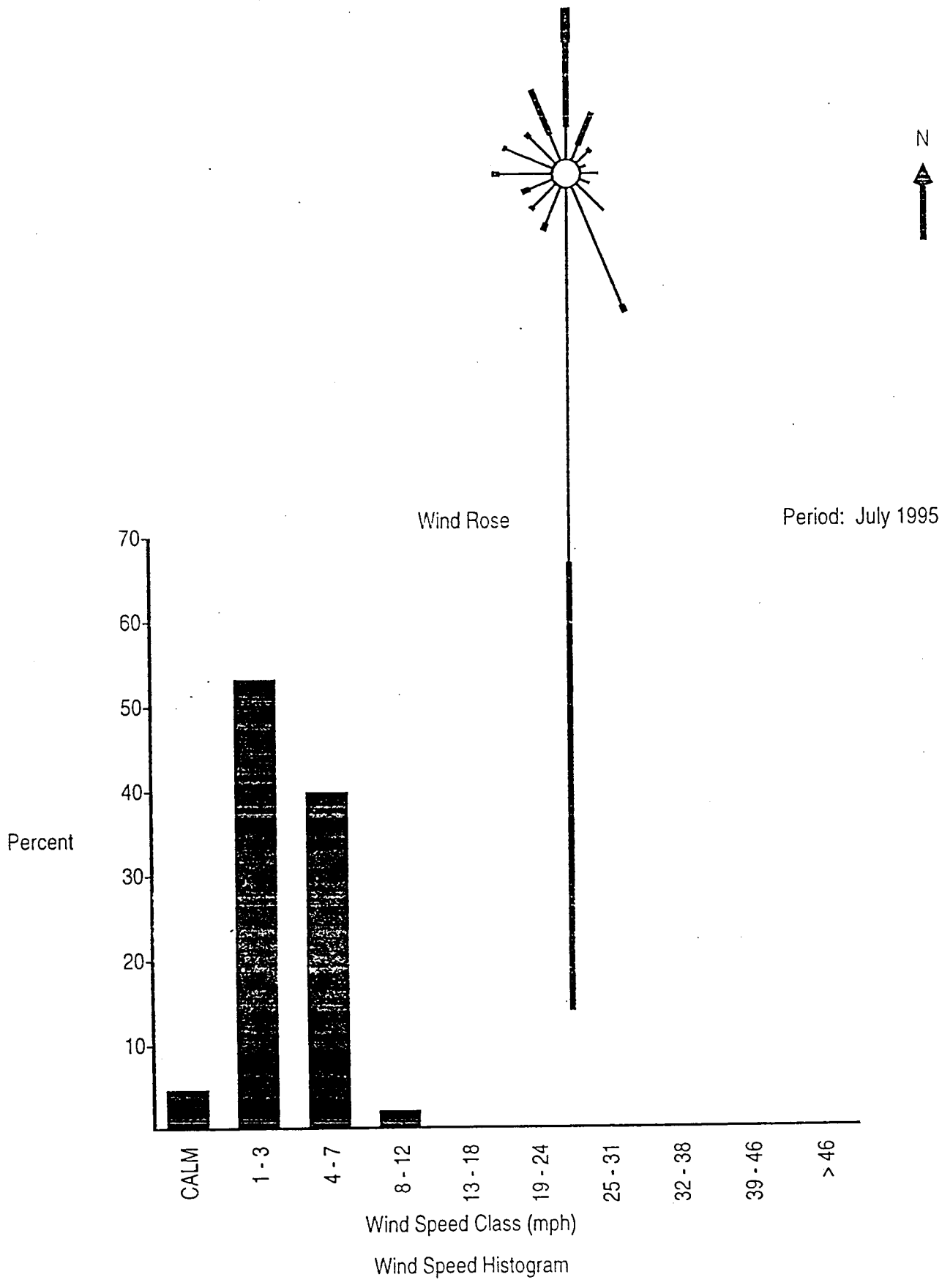
Period: Apr. 1995

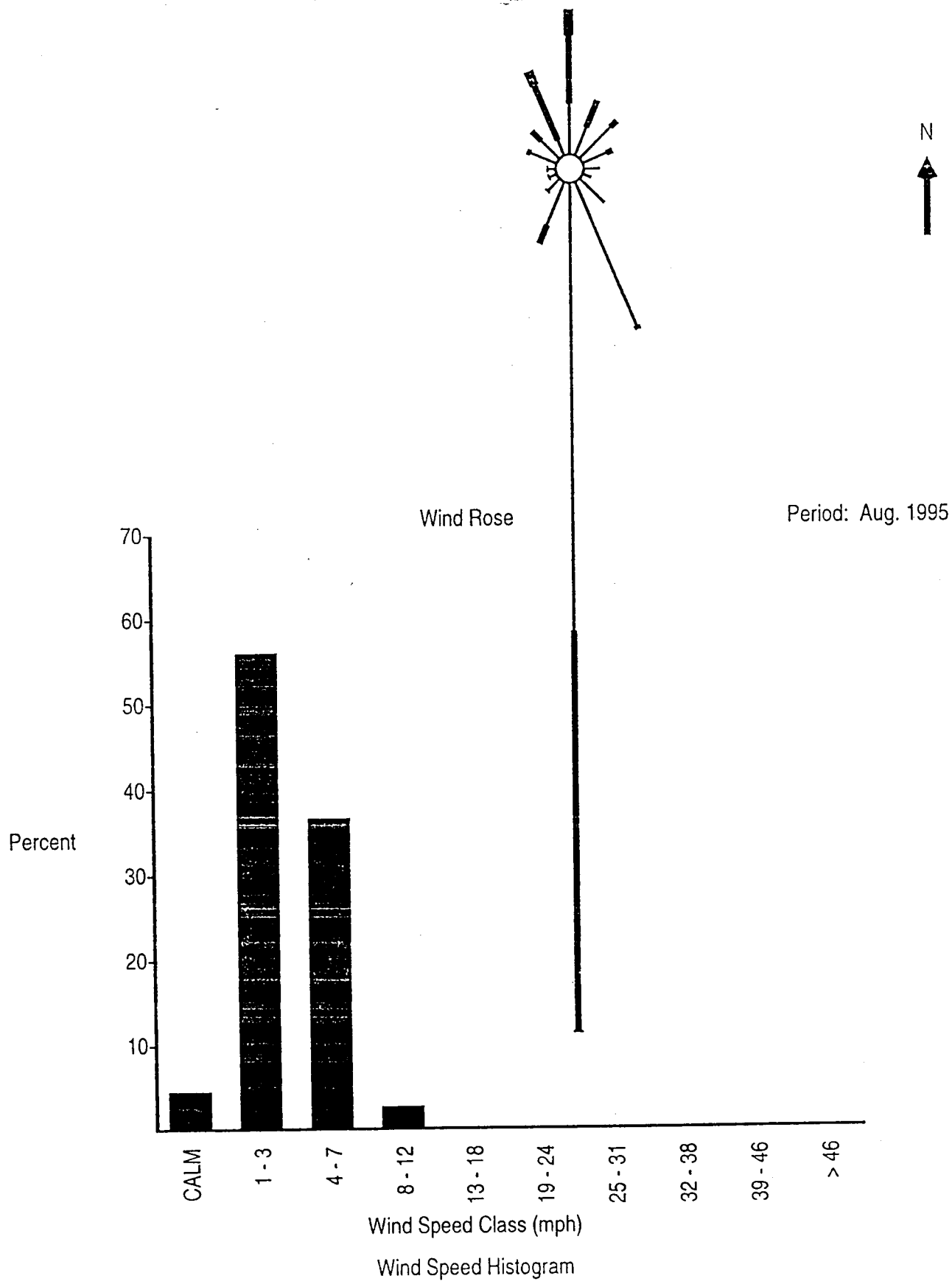


Wind Speed Histogram

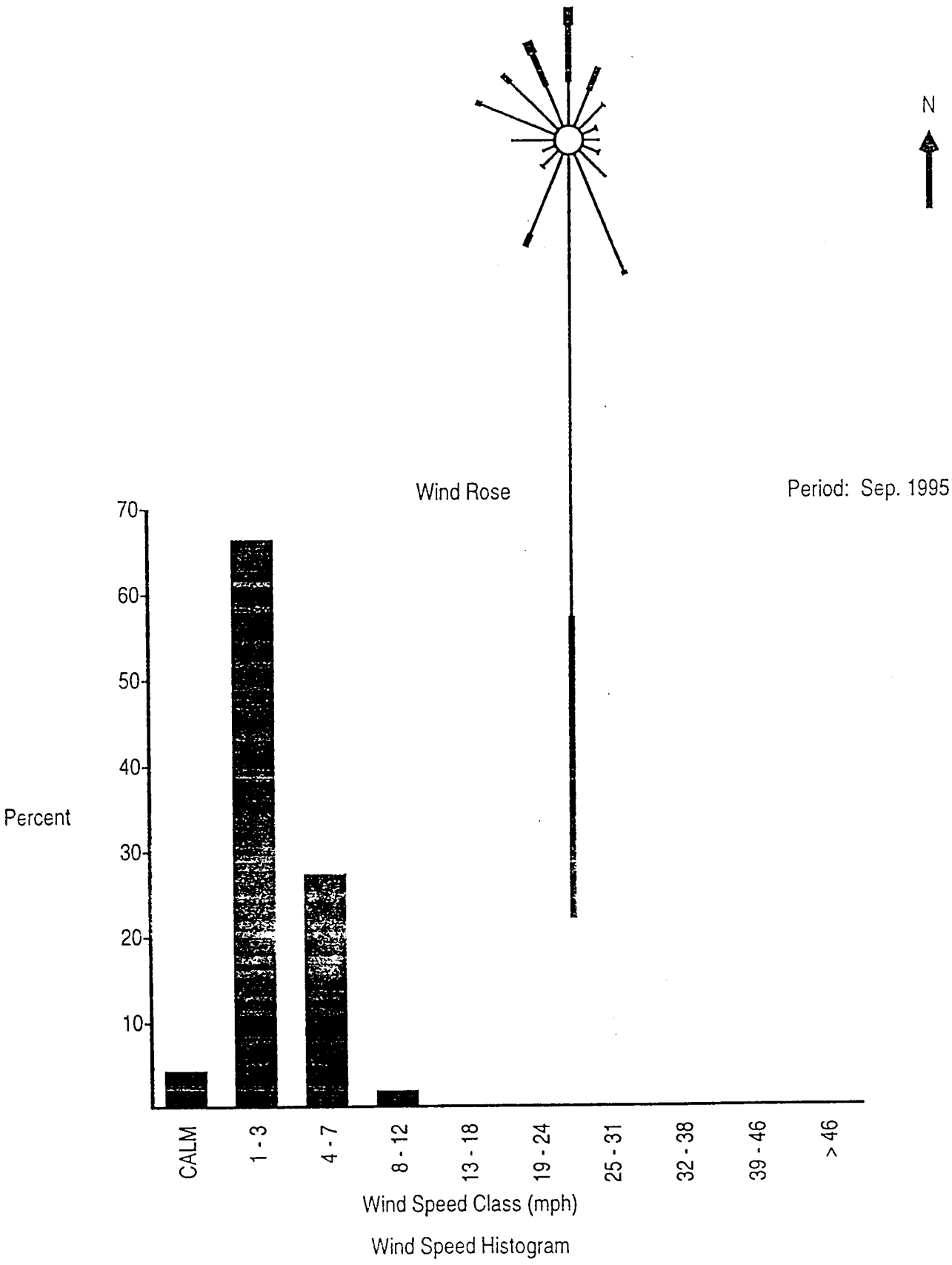

N
Wind Rose
Period: May 1995
70
60
50
40
30
20
10
Percent
CALM
1 - 3
4 - 7
8 - 12
13 - 18
19 - 24
25 - 31
32 - 38
39 - 46
> 46
Wind Speed Class (mph)
Wind Speed Histogram

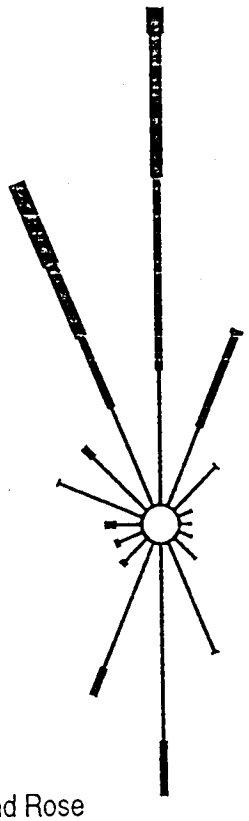

N
Wind Rose
Period: June 1995
70
60
50
40
30
20
10
Percent
CALM
1 - 3
4 - 7
8 - 12
13 - 18
19 - 24
25 - 31
32 - 38
39 - 46
> 46
Wind Speed Class (mph)
Wind Speed Histogram


N
Wind Rose
Period: July 1995
Percent
70
60
50
40
30
20
10
CALM
1 - 3
4 - 7
8 - 12
13 - 18
19 - 24
25 - 31
32 - 38
39 - 46
> 46
Wind Speed Class (mph)
Wind Speed Histogram



Wind Speed Histogram

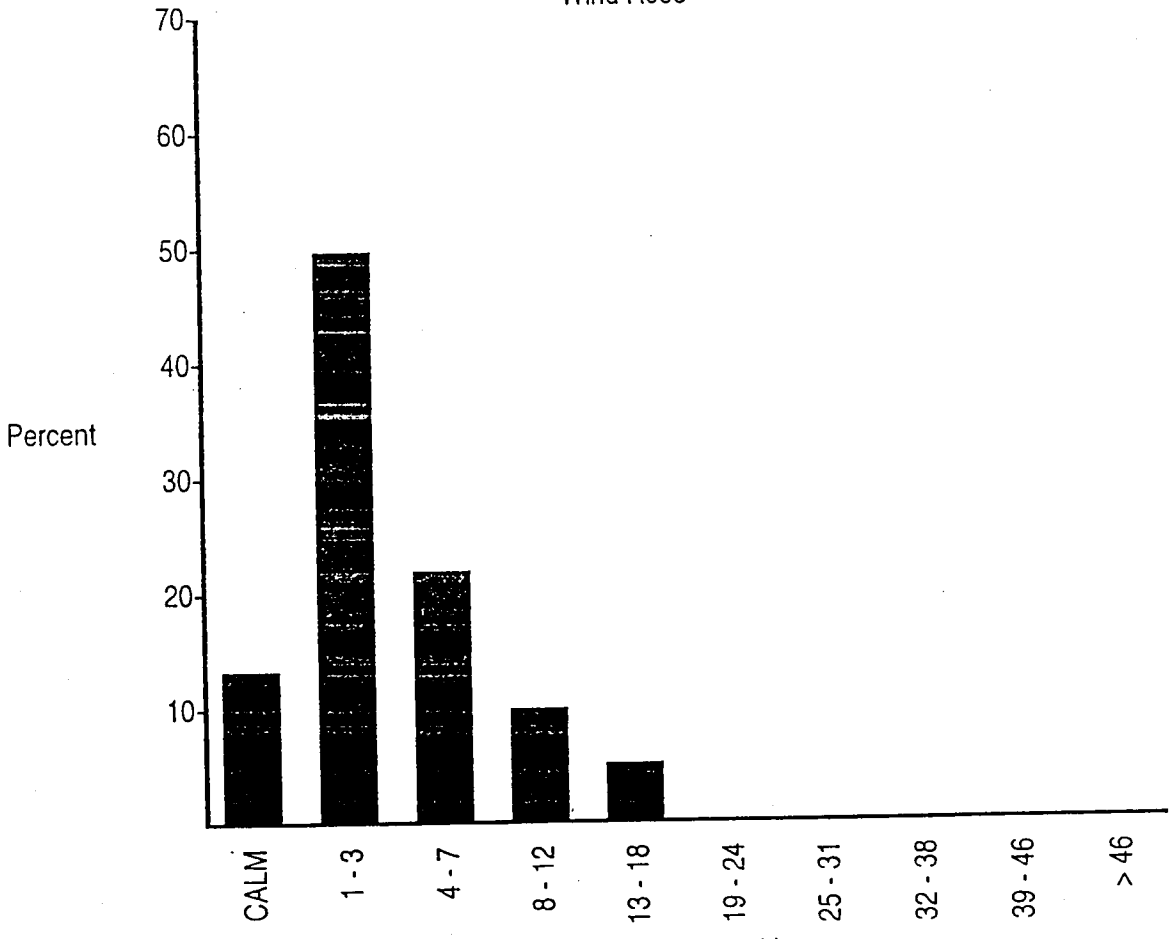

N
Wind Rose
Period: Sep. 1995
70
60
50
40
30
20
10
Percent
CALM
1 - 3
4 - 7
8 - 12
13 - 18
19 - 24
25 - 31
32 - 38
39 - 46
> 46
Wind Speed Class (mph)
Wind Speed Histogram



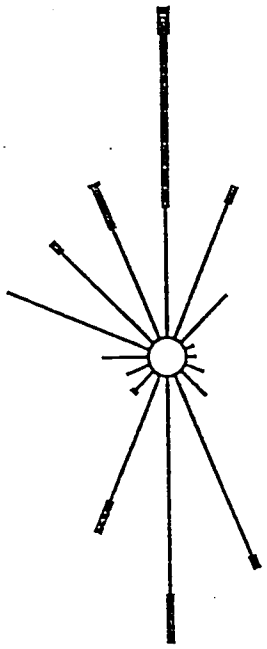
N

Wind Rose

Period: Oct. 1995



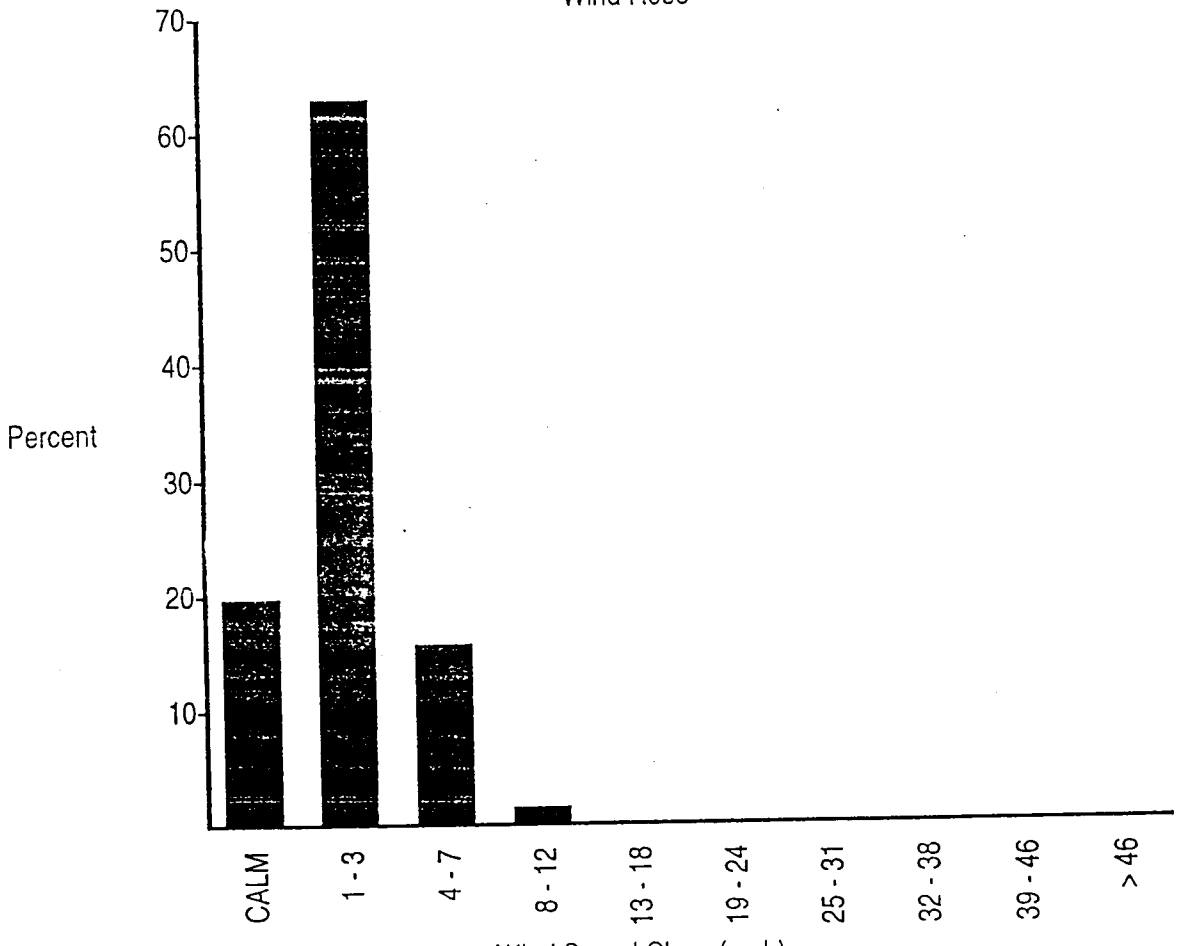
Wind Speed Histogram



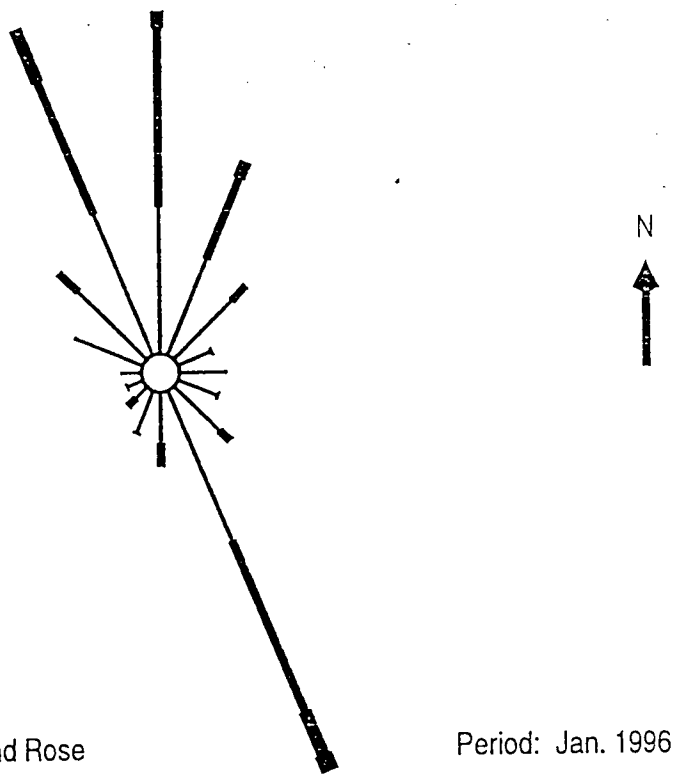
N

Wind Rose

Period: Nov. 1995

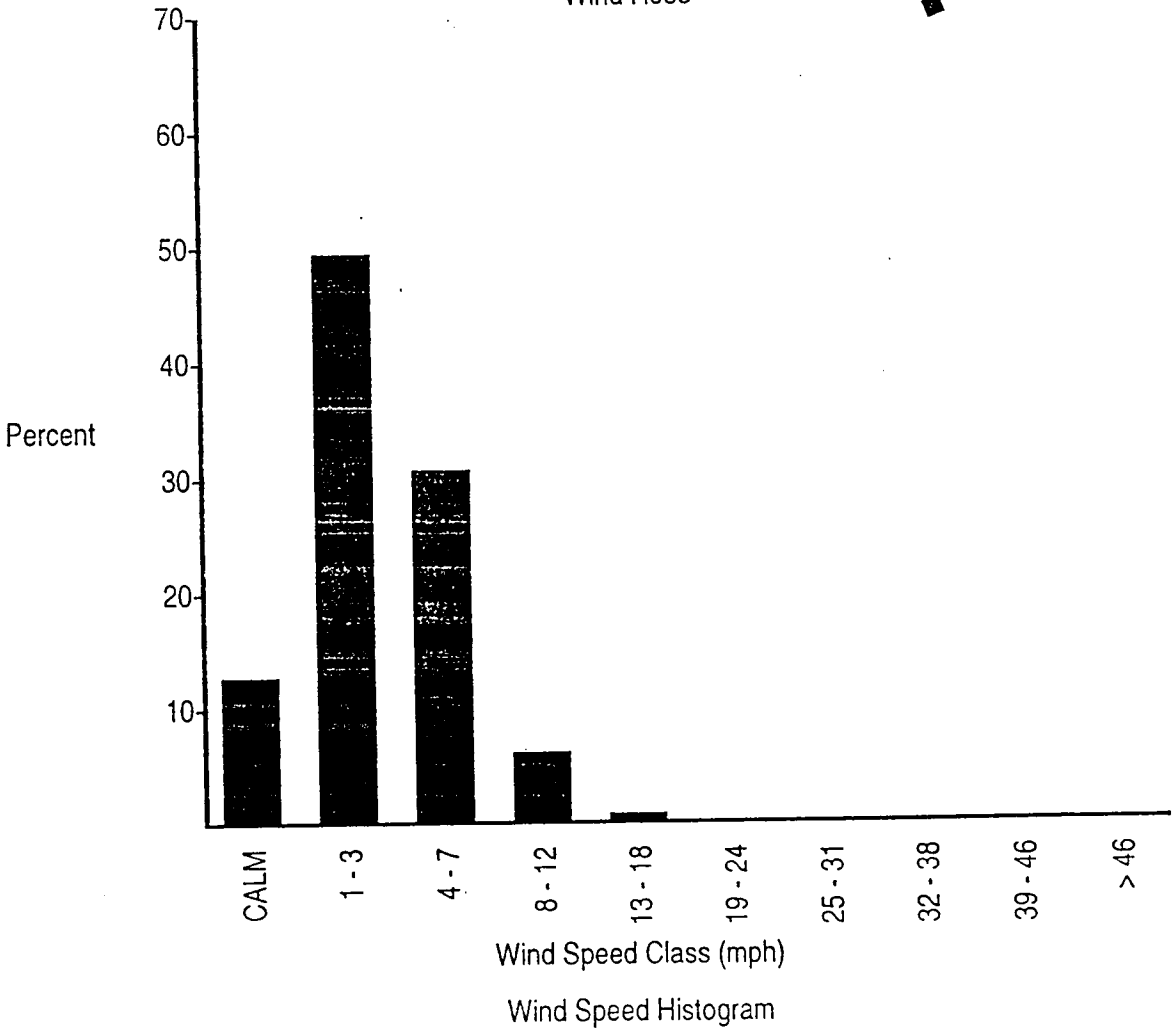


Wind Speed Histogram

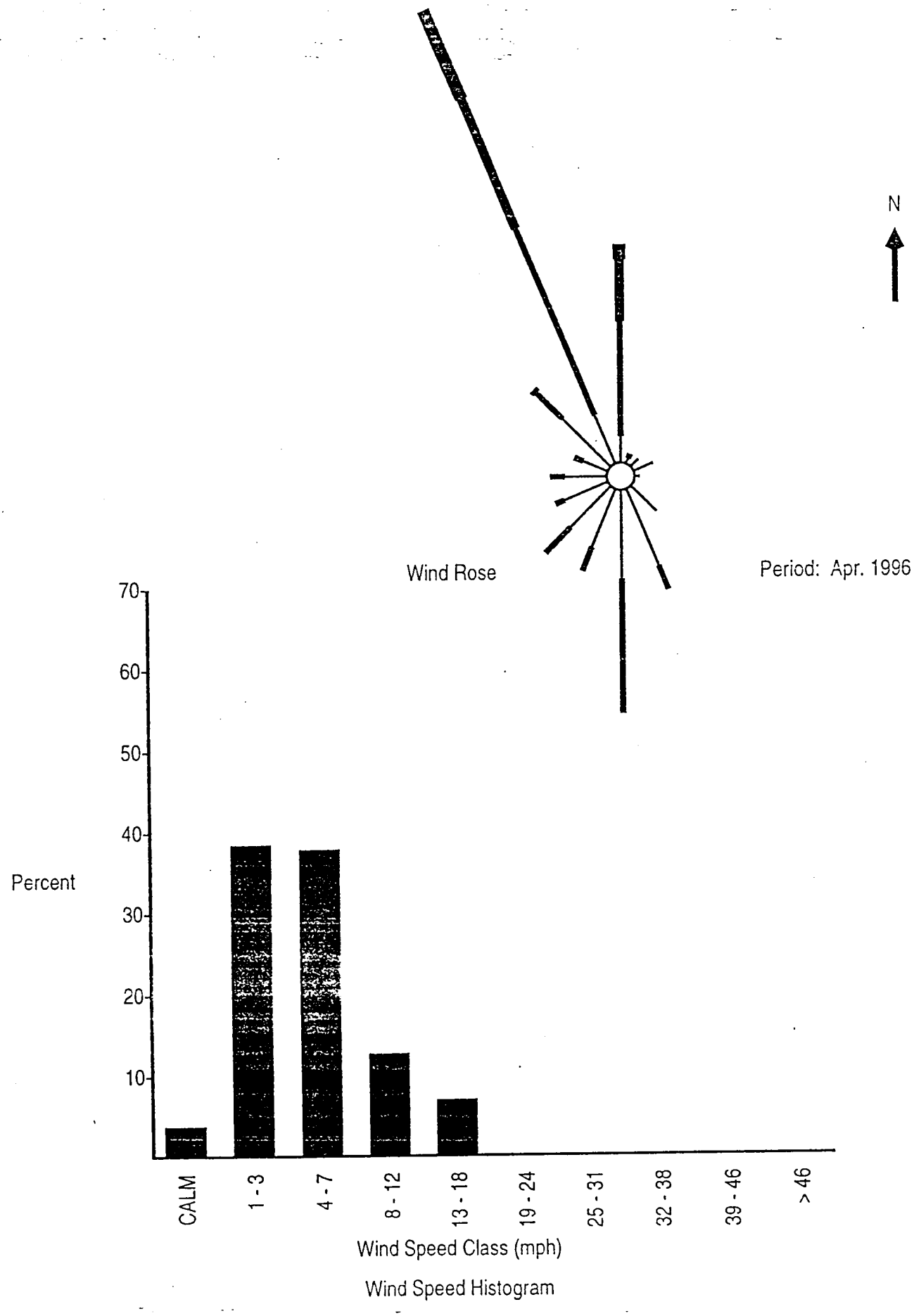


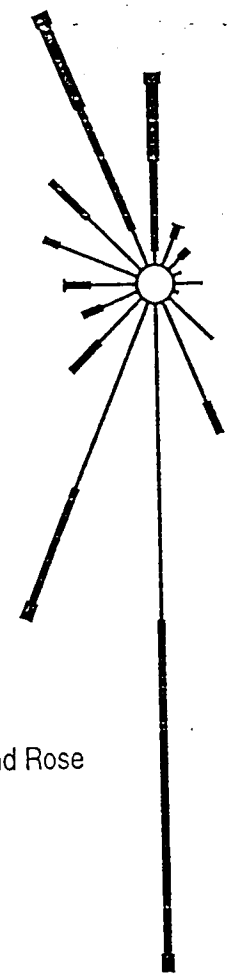
Wind Rose

Period: Jan. 1996



Wind Speed Histogram

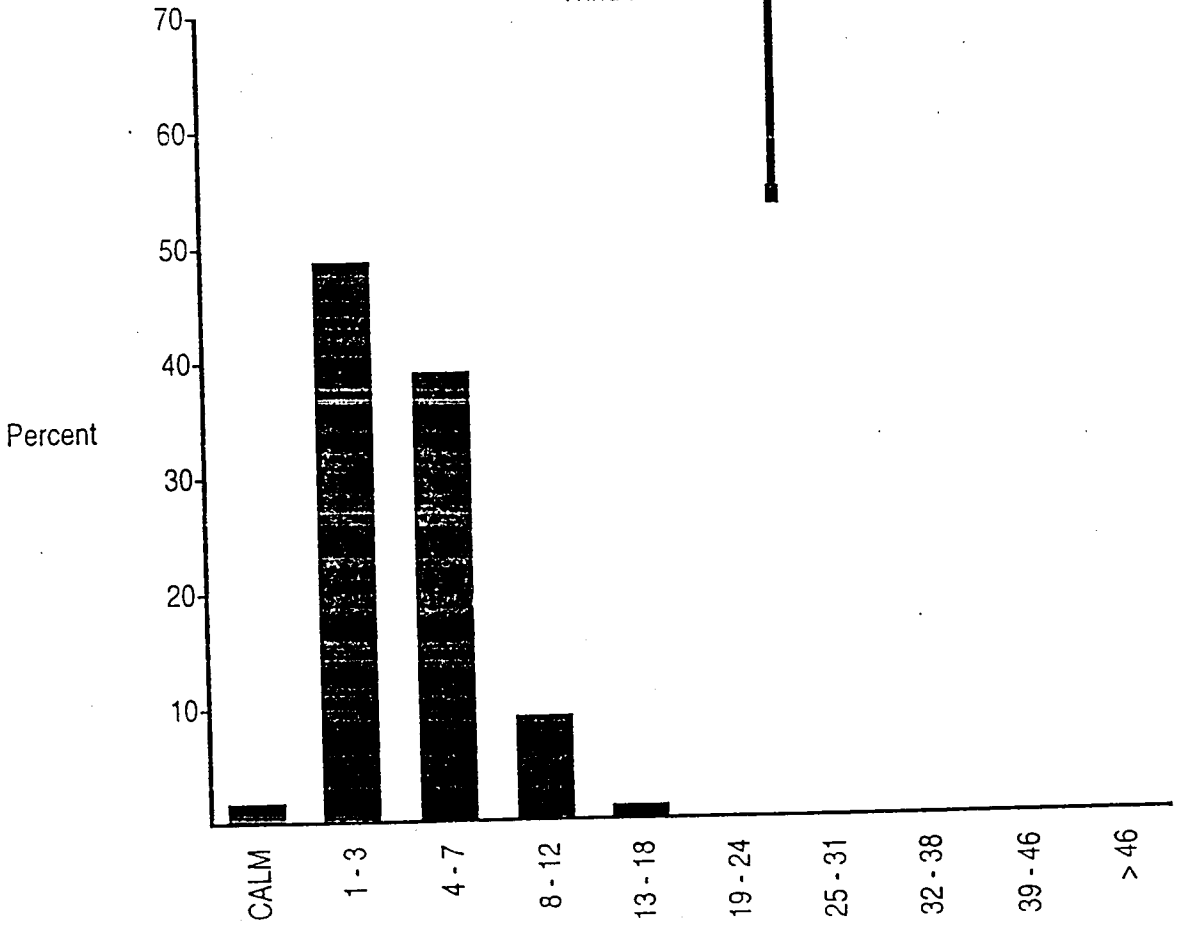

N
Wind Rose
Period: Apr. 1996
70
60
50
40
30
20
10
Percent
CALM
1 - 3
4 - 7
8 - 12
13 - 18
19 - 24
25 - 31
32 - 38
39 - 46
> 46
Wind Speed Class (mph)
Wind Speed Histogram



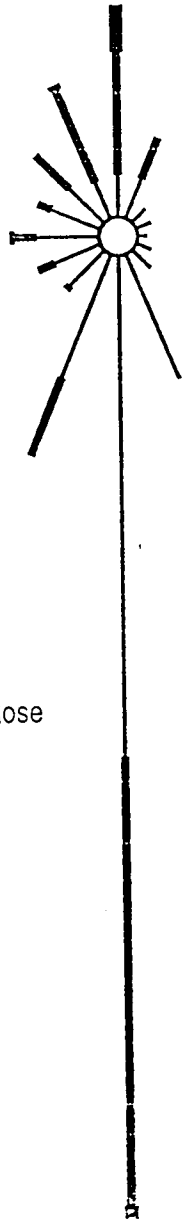
N

Wind Rose

Period: May 1996



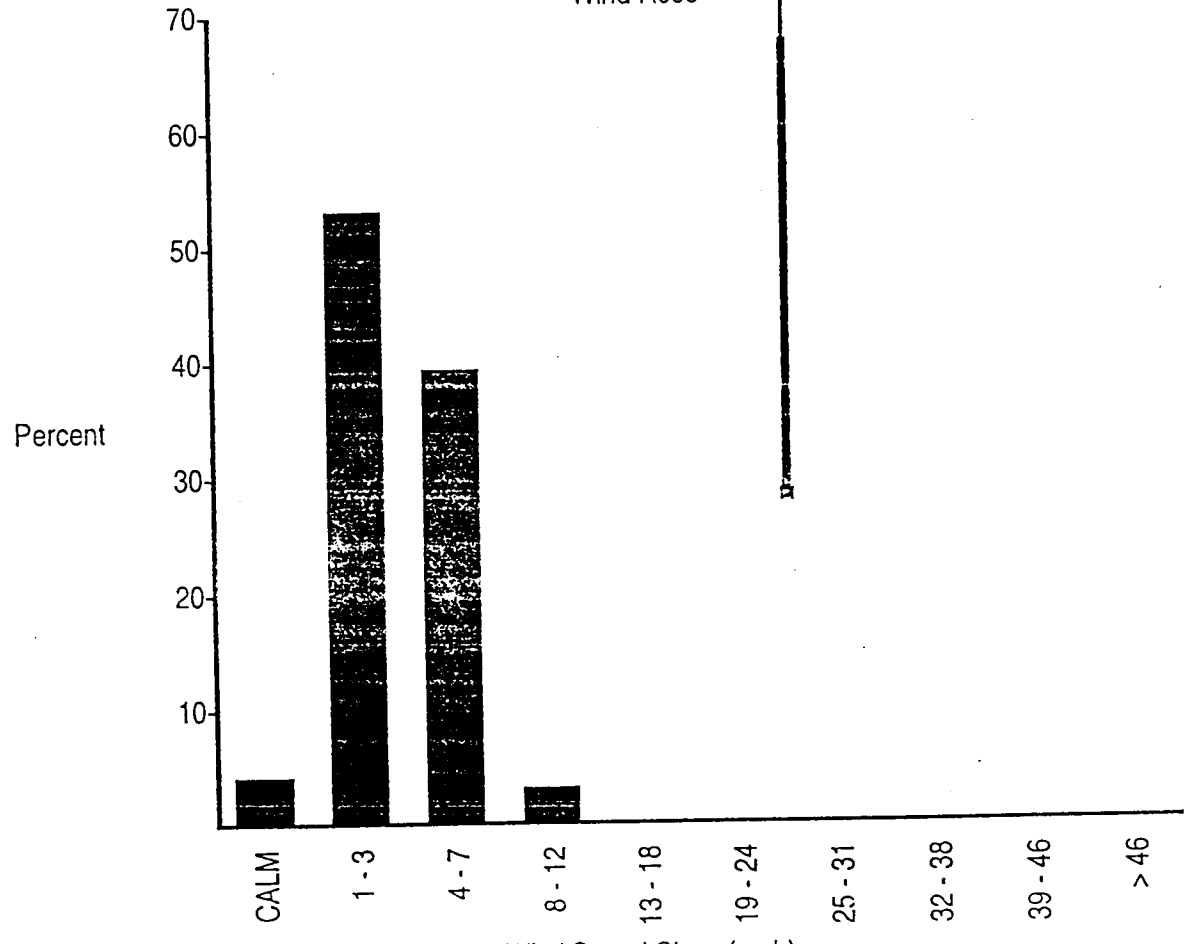
Wind Speed Histogram



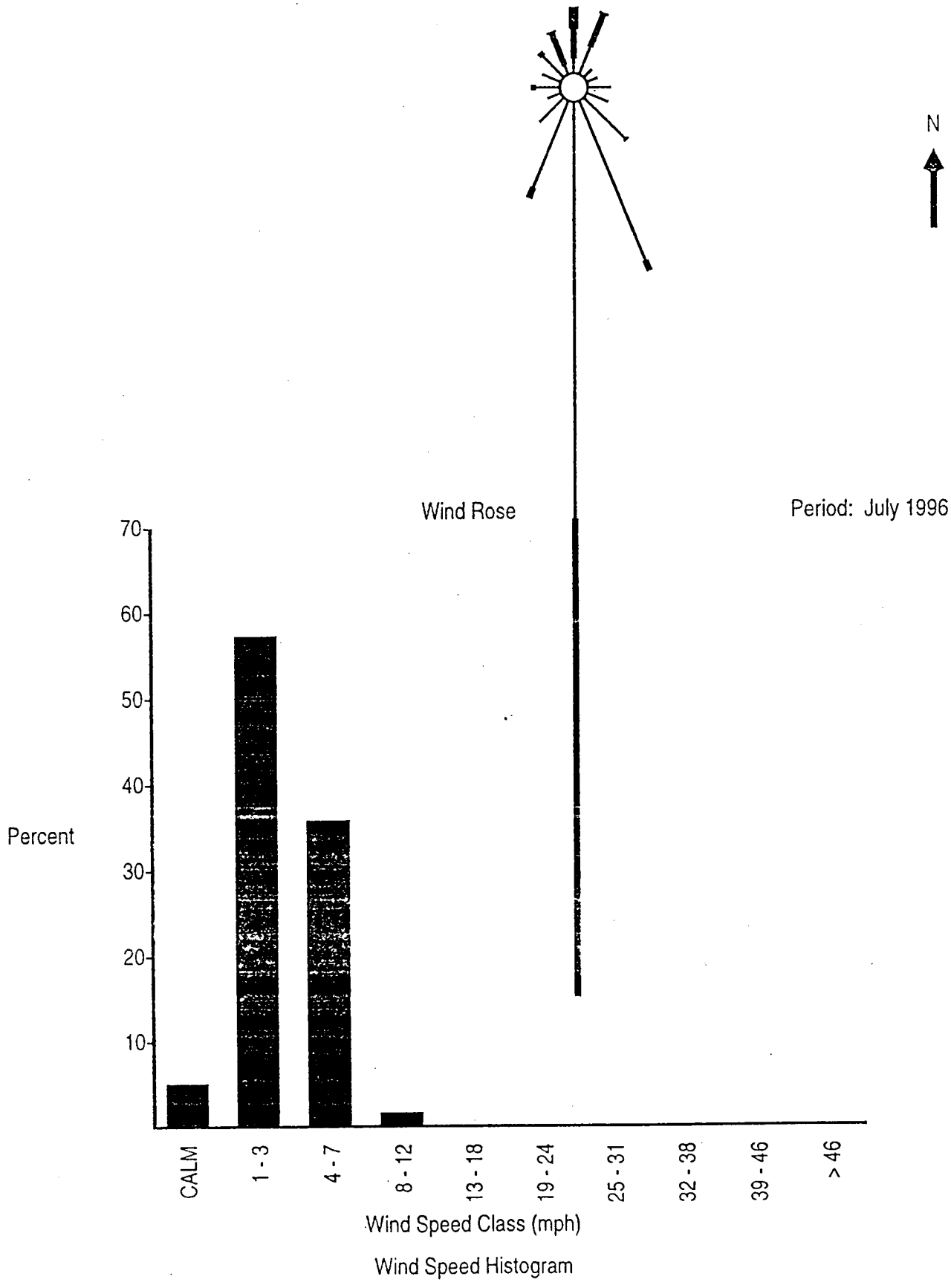
N

Wind Rose

Period: June 1996



Wind Speed Histogram


N
Wind Rose
Period: July 1996
70
60
50
40
30
20
10
Percent
CALM
1 - 3
4 - 7
8 - 12
13 - 18
19 - 24
25 - 31
32 - 38
39 - 46
> 46
Wind Speed Class (mph)
Wind Speed Histogram