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**CHARACTERIZATION OF
PARTICULATE SOURCES
INFLUENCING MONITORING SITES
IN
REGION VIII
NON-ATTAINMENT AREAS**



**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII**

AIR & HAZARDOUS MATERIALS DIVISION

DENVER , COLORADO 80295

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**CHARACTERIZATION OF PARTICULATE SOURCES
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IN REGION VIII NON-ATTAINMENT AREAS**

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CONTENTS

| | <u>Page</u> |
|---|-------------|
| 1.0 INTRODUCTION | 1-1 |
| 2.0 METHODOLOGY | 2-1 |
| 2.1 Microinventories and Site Evaluations | 2-1 |
| 2.2 Emission Estimates | 2-3 |
| 2.3 Evaluation of Potential Emission Reductions | 2-5 |
| 2.4 Microscopic Analysis | 2-7 |
| 3.0 SITE EVALUATION DESCRIPTIONS | 3-1 |
| 3.1 Adams City | 3-3 |
| 3.2 Arvada | 3-8 |
| 3.3 Aurora | 3-13 |
| 3.4 Brighton | 3-18 |
| 3.5 Denver-School Administration Building | 3-23 |
| 3.6 Denver-CAMP | 3-27 |
| 3.7 Denver-Gates Rubber Company | 3-32 |
| 3.8 Denver-Wastewater Treatment Plant | 3-36 |
| 3.9 Denver-C.A.R.I.H. | 3-41 |
| 3.10 Englewood | 3-46 |
| 3.11 Lakewood | 3-51 |
| 3.12 Littleton | 3-56 |
| 3.13 Longmont | 3-61 |
| 3.14 Greeley-City Complex | 3-66 |
| 3.15 Greeley-Wastewater Treatment Plant | 3-71 |
| 3.16 Loveland | 3-76 |
| 3.17 Sterling | 3-80 |
| 3.18 Windsor | 3-85 |
| 3.19 La Salle | 3-90 |
| 3.20 Platteville | 3-95 |
| 3.21 Colorado Springs | 3-100 |
| 3.22 Pueblo-Fire Station | 3-105 |
| 3.23 Pueblo-Health Department | 3-110 |
| 3.24 Trinidad | 3-115 |
| 3.25 Walsenburg | 3-120 |
| 3.26 Steamboat Springs | 3-125 |
| 3.27 Rifle | 3-130 |
| 3.28 Grand Junction | 3-135 |
| 3.29 Tract CB Trailer 020 | 3-139 |
| 3.30 Tract CB Trailer 022 | 3-144 |
| 3.31 Great Falls | 3-149 |
| 3.32 Butte-Greeley School | 3-154 |
| 3.33 Missoula-Courthouse | 3-159 |

| | <u>Page</u> |
|--|-------------|
| 3.34 Libby | 3-164 |
| 3.35 Magna | 3-169 |
| 3.36 Ogden-Health Department/NASN Station | 3-174 |
| 3.37 Provo | 3-179 |
| 3.38 Salt Lake City-Health Department/NASN Station | 3-184 |
| 3.39 Salt Lake City-Airport | 3-189 |
| 3.40 Rock Springs | 3-194 |
| 3.41 Rapid City-Health Department | 3-199 |
| 3.42 Rapid City-Ken Freize Enterprises | 3-203 |
| 3.43 Rapid City-Cement Plant | 3-207 |
| 4.0 SUMMARY | 4-1 |
| 4.1 Reasons for Non-attainment in Region VIII | 4-1 |
| 4.2 Need for Implementation Plan (SIP) Revisions | 4-5 |
| 4.3 Observations on Air Quality Data | 4-7 |
| 4.4 Relationship between Emission Densities and Air Quality | 4-10 |
| A APPENDIX | A-1 |
| REFERENCES | R-1 |

FIGURES

| <u>No.</u> | | <u>Page</u> |
|------------|--|-------------|
| 4-1 | Relative Change in Measured TSP Concentration for Region VIII Sites, 1974 to 1975 | 4-8 |
| 4-2 | Particulate Emission Density versus Measured Air Quality | 4-11 |

TABLES

| <u>No.</u> | | <u>Page</u> |
|------------|---|-------------|
| 1-1 | Non-Attainment Particulate Sampling Sites in EPA Region VIII | 1-3 |
| 2-1 | Control Techniques for Selected Fugitive Dust Sources | 2-6 |
| 2-2 | Estimated Particulate Background | 2-8 |
| 4-1 | EPA Region VIII Non-Attainment Summary | 4-2 |

1.0 INTRODUCTION

The preamble to the proposed regulations for submittal of AQMA plans specifies that the Administrator will notify the states by July 1, 1976 as to which state implementation plans (SIP's) are "substantially inadequate" to attain ambient air quality standards in particular AQCR's, and require that a plan revision be submitted for these identified areas by July 1, 1977 (with certain provisions for extensions). In EPA Region VIII, there are 43 suspended particulate sampling sites that are presently or have in the recent past recorded concentrations higher than the annual primary standard (75 ug/m^3).^{*} Since almost all point sources are now in compliance with applicable SIP regulations, this would indicate that plan revisions may be required for the AQCR's in which these sampling sites are located.

Before making the determination of which AQCR's are substantially violating the particulate standards, the Regional Administrator desires to verify the air quality data on which the decisions will be based and to check that further reductions in ambient concentrations can be achieved by additional or more stringent control regulations. Recent area source emission inventories and AQMA analyses for

* There may be a few additional sites in Region VIII which do not report data to SAROAD or which are classified as special studies' sites that measure average concentrations above 75 ug/m^3 but have not been included in this study.

particulates in all Region VIII states have shown that fugitive dust sources such as unpaved roads are major contributors to ambient concentrations; in many cases, these fugitive dust sources cannot be controlled to the extent necessary to attain the standards.

This report contains a compilation of information and analysis of data for each of the non-attainment sites, presented in a format that will permit EPA to determine whether the recorded data are representative of actual air quality in the area of the sampling station and/or whether the sources contributing to the high concentrations are controllable. The 43 non-attainment sites that have been evaluated in this study are listed by state and AQCR in Table 1-1.

All of the non-attainment sites were surveyed during the months of March and April 1976, with the exception of those in South Dakota, which were completed in November, 1975. Detailed site-specific data were obtained which would enable the determination of the particulate sources having the greatest potential impact on measured values and permit the assessment of possible exposure biases. Photographs were taken of each site, historical air quality data were obtained from the appropriate state agencies, and detailed demographic, traffic, and localized development data were obtained. Emission estimates were then prepared for each site and correlated with air quality measurements.

Microscopic analysis of selected filters at all sampling sites was originally planned in order to provide a second means of estimating relative source impacts on the samplers' readings. However, the preliminary microscopy work revealed an inability to distinguish the source origin of most of the mineral material (fugitive dust) on the filters. Since this mineral fraction constituted 70 to 90 percent of the material on most of the filters, microscopy usually did not provide any significant additional information

Table 1-1. NON-ATTAINMENT PARTICULATE SAMPLING
SITES IN EPA REGION VIII

| State | AQCR | Site |
|--------------|-----------------------------------|---------------------------------------|
| Colorado | Denver | Adams City |
| | | Arvada |
| | | Aurora |
| | | Brighton |
| | | School Administration Building |
| | | CAMP |
| | | Gates Rubber Company |
| | | Wastewater Treatment Plant |
| | | C.A.R.I.H |
| | | Englewood |
| | | Lakewood |
| | | Littleton |
| | | Longmont |
| | Pawnee | Greeley-City Complex |
| | | Greeley-Wastewater Treatment Plant |
| | | Loveland |
| | | Sterling |
| | | Windsor |
| | | La Salle |
| | San Isabel | Platteville |
| | | Colorado Springs |
| | | Pueblo-Fire Station |
| | | Pueblo-Health Department |
| | | Trinidad |
| | | Walsenburg |
| | Yampa Grand Mesa | Steamboat Springs |
| | | Rifle |
| | | Grand Junction |
| | | Tract CB Trailer 020 |
| | | Tract CB Trailer 022 |
| Montana | Great Falls Helena Missoula | Great Falls |
| | | Butte |
| | | Missoula |
| | | Libby |
| Utah | Wasatch Front | Magna |
| | | Ogden-Health Department/NASN |
| | | Provo |
| | | Salt Lake City-Health Department/NASN |
| | | Salt Lake City-Airport |
| | | |
| Wyoming | Wyoming | Rock Springs |
| South Dakota | Black Hills | County Health Department |
| | | Ken Freize Enterprises |
| | | South Dakota Cement Plant |

as to the origin of the material. Therefore, results of the microscopic analyses were concluded to be of limited value to this study and are not included herein.

Chapter 2 details the methodologies employed for the assemblage of data, preparation of emission estimates, site evaluations and quality assurance evaluations, microscopic investigations of filter pads, and presentation of data.

Chapter 3 presents, by each individual non-attainment site, a five page data summary including: (1) detailed site description and a graph of historical trends in air quality; (2) photographs of sampler location and surrounding area; (3) map showing sampler locations, one mile radius, and major sources; (4) summary of emissions; and (5) the meteorological data for that location and site summary and evaluation. The meteorological data were obtained from the nearest National Weather Service station.

Chapter 4 presents an overview discussion of particulate non-attainment in EPA Region VIII, based on summaries of the individual site evaluations. Overall findings by AQCR are presented, including emission density versus air quality relationships, trends in measured air quality, probable reasons for individual site and AQCR-wide non-attainment of standards, and representativeness of data from regional sampling networks.

2.0 METHODOLOGY

2.1 MICROINVENTORIES AND SITE EVALUATIONS

Each of the high volume particulate sampling stations listed in Table 1-1 was visited and the area within a one mile radius of the site surveyed to identify all particulate sources possibly impacting on the sampler which may form a component of the measured particulate concentration. This "microinventory" technique was developed by PEDCo and has been applied to similar investigations in EPA Regions VII and IX. It has served as the prime basis for development of an emission density versus air quality relationship from which air quality could be predicted in areas otherwise not suitable for utilization of conventional dispersion modeling techniques. The procedure has demonstrated reasonably good accuracy and reproducibility in correlating quantified estimates of source emission strength with measured air quality.

The survey procedure employed to provide the best observation of overall site exposure was to ground survey, via automobile, the sampler stations and all probable sources of emissions within a one mile radius of each sampling site to identify the sources with primary impact on the samplers. Sources of fugitive dust and conventional point and area sources were located on the appropriate USGS 7.5 minute quadrangle map and labeled with pertinent data, such as size and boundaries, observed activity and operational characteristics, estimated emission rate, and any other important parameters. Two observers independently

estimated and agreed upon parameters observed at each site to increase accuracy and completeness.

Large point sources outside the one mile radius were also located if it was possible that they might contribute to measured particulate loading. The site locations and surrounding one mile radius survey areas are illustrated on the second page of each site data summary in Chapter 3. All point sources within 1/4 mile of the sampler are indicated on these site maps regardless of their emission rate. From a 1/4 mile to 1 mile radius, those sources emitting greater than 25 ton/yr are shown. Beyond the 1 mile radius, only those sources emitting greater than 100 ton/yr are shown. Power plants are shown irrespective of their emission rates or siting relative to the sampler.

While the survey team was at each site, PEDCo staff also completed site description forms designed to evaluate the exposure of the sampling locations and identify any problems with representativeness or validity of the high volume sampler data. The sampler site and immediate surrounding area (300 feet radius) were subjectively judged with respect to adequacy of physical placement and potential for physical or localized pollution interferences, land rise of surroundings and terrain features, and the probability of obtaining a representative sample of ambient air given the existing siting conditions. The survey form used for this site description evaluation is included in Appendix A.

The field team also contacted cognizant state and local agency personnel to assess sample handling and quality assurance procedures employed by operators and laboratories responsible for each site. The information acquired included both qualitative and quantitative data regarding operator performance in high volume sampler calibration, recording of applicable data, and sample handling, packaging, and mailing. To ensure that proper laboratory procedures were employed in

each case, information on filter specifications, filter inspection, weighing and marking, and balance calibration was obtained. The completed survey forms used for this quality assurance check are also included in Appendix A.

Finally, two photographs illustrating the sampler, viewed in the directions where the greatest potential for localized pollution influence existed, were obtained for every site except seven that were completely inaccessible to the survey team (School Administration Building and Gates Rubber Company in Denver, Loveland, Grand Junction, and three in Rapid City--Health Department, Ken Freize Enterprises, and South Dakota Cement Plant). These photographs are the second page of each site data summary in Chapter 3.

2.2 EMISSION ESTIMATES

The survey data were converted into estimates of particulate emission density (ton/sq mi/yr) within the 3.14 square mile area (circle of 1 mile radius) by a three-step procedure. First, all identified fugitive dust sources within each site area were listed and estimates of size in terms of emission parameters were made. Next, appropriate emission factors were applied to each source to calculate estimated annual emissions. Third, conventional area and point source emissions were added to get total particulate emissions in each survey area.

The emissions associated with each site are presented in a table in each site data summary in Chapter 3. Shown also are the emission factors for the fugitive dust sources. Variations in these factors between AQCR's are accounted for by differences in climate of the various geographic areas, i.e., wind speed, soil erosion parameters, and precipitation-evaporation indices. Appropriate methodologies for development of each factor were obtained from Compilation of Air

Pollutant Emission Factors, Supplement 5,¹ and from Development of Emission Factors for Fugitive Dust Sources.²

Conventional area source emissions in the microinventory areas were not estimated by emission factors, but as a percentage of the respective total county emissions calculated for the categories included in the appropriate current area source inventory. The categories were condensed, for summary purposes, into four general categories: fuel combustion, incineration, other mobile, (off-highway vehicles, aircraft, locomotives, and vessels) and motor vehicle exhaust (on-highway gasoline and diesel automobiles and trucks). The percentage of county emissions occurring in the area was assumed to be the same as the percentage of the county's population (or VMT for motor vehicle exhaust) contained in the microinventory areas. This necessitated the collection and generation of some demographic data (i.e., population, employment, vehicle miles traveled) for each survey area.

Current state or NEDS point source inventories were the reference for emission data for point sources. Small point sources not included in point source listings were evaluated from the size and activity parameters obtained during the surveys together with emission factors keyed to these parameters. All of the point sources included on the site emission data summaries in Chapter 3 may not be located on the maps, due to the emission rate and distance from sampler criteria that were detailed in the preceding section of this chapter. Additionally, all point sources located outside of the one mile radius survey area were not included in the calculation of emission density for the area.

Assuming then that particulate emissions in the site survey areas are, in fact, directly proportional to air quality measured therein, the 1975 annual geometric mean concentration for each sampler and corresponding emission density were plotted by AQCR (Figure 4-2). Using the valid

data points, linear regression analyses were performed to determine the lines of best fit, which resulted in a "background" concentration from 39 to 68 ug/m³ (zero emission density) and correlation coefficients ranging from 0.60 to 0.80. An emission density of approximately 200 ton/sq mi/yr was shown to be equivalent to 75 ug/m³ annual geometric mean.

2.3 EVALUATION OF POTENTIAL EMISSION REDUCTIONS

In order to determine which of the contributing sources at the non-attainment sites were most amenable to emission reductions and whether reductions sufficient to bring about attainment of the primary standards could reasonably be expected, the sources were considered under three separate categories--point sources, area sources, and fugitive dust sources. For point sources, NEDS printouts and state emission inventory summaries were checked to find the compliance status of each source and what regulation was applied to determine allowable emissions. Where the source was not in compliance or the applicable regulation represented less than reasonably available control technology, note was made of the potential for emission reductions.

It was assumed that no emission reductions could be obtained from conventional area sources. Fuel combustion in Region VIII states is already almost exclusively natural gas, incineration emissions were negligible in most of the survey areas, off-highway vehicles offer little opportunity for control, and motor vehicle emissions are under federal jurisdiction.

Fugitive dust sources are often uncontrolled at present and therefore provide the greatest potential for significant emission reductions. Approximate control efficiencies for several types of fugitive dust sources are shown in Table 2-1. However, these controls are not necessarily "reasonable

Table 2-1. CONTROL TECHNIQUES FOR SELECTED FUGITIVE DUST SOURCES

| Source | Practicality of regulation ^a | Control Method | Control efficiency |
|-----------------------|--|---|-----------------------|
| Unpaved roads | 2-3 | Paving and right-of-way improvement | 85% |
| | 4 | Surface treatment with penetration chemicals | 50% |
| | 3 | Soil stabilization chemicals worked into the roadbed | 50% |
| | 1-2 | Speed control | 25-40% |
| Construction activity | 1-2 | Watering | 50% |
| | 2 | Chemical stabilization of completed cuts and fills | 80% |
| | 3 | Treatment of temporary access and haul roads on or adjacent to site Minimal exposure periods (controlled by permit; good practice with watering or chemical stabilization) | 50% |
| Agriculture | 3 | Continuous cropping | 25% |
| | 3 | Limited irrigation of fallow fields | 20% |
| | 5 | Windbreaks | 5% |
| | 5 | Inter-row plantings of grain on widely spaced row crops | 15% |
| | 5 | Stubble, crop residue, or mulch left on fields after harvest for wind protection | 10% |
| | 5 | Spray-on chemical stabilization | 40% |
| Tailings piles | 2 | Chemical stabilization | 80% |
| | 2-3 | Vegetation | 65% |
| | 2 | Combined chemical-vegetative stabilization | 90% |
| Aggregate storage | 2 | Continuous spray of chemical on material going on storage piles | 90% |
| | 1-2 | Watering of haul roads and storage areas | 50% |
| | 3 | Treatment of haul roads and traffic areas | 50% |
| | 2 | Watering (sprinklers or truck) | 80% |

^a 1 = excellent, 2 = good, 3 = fair, 4 = poor, 5 = not recommended

Source: Investigation of Fugitive Dust--Sources, Emissions and Control, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, Publication Number EPA 450/3-74-036, 1974.

techniques" because of the large number of sources to which they would have to be applied on a county- or AQCR-wide basis.

Potential reductions in emissions in each study area were estimated to produce proportional changes in the portion of the ambient concentration (annual mean) above background, or that portion supposedly affected by the emissions. Values used for background in each AQCR are shown in Table 2-2. These values were estimated from nonurban sites in the AQCR unaffected by nearby emission sources, from y-intercepts of emission density versus air quality curves, or from modeling analyses performed in these areas. The calculations of potential emission reductions and air quality associated with such reductions have not been shown because of the many assumptions and approximations involved in determining reasonable control measures for both point sources and fugitive dust sources.

2.4 MICROSCOPIC ANALYSIS

Strips of exposed high volume filters could not be viewed directly under the polarized light microscope because of particle agglomeration on the surface of the filter. Therefore, particles were resuspended and dispersed in water in a sonic cleaner and then recollected on a Millipore filter. A wedge of the Millipore filter was then placed on a slide and the filter material cleared with a solution of dimethyl phthalate/diethyl oxylate. Particles on the slide were identified as to origin, counted, and their sizes estimated using a calibrated Porton reticule at a total magnification of 100 power. Based on particle counts and estimated densities (a function of suspected particle origin), the percent by weight of the major components was calculated.

Table 2-2. ESTIMATED PARTICULATE BACKGROUND
CONCENTRATIONS

| AQCR | Estimated background concentration, ug/m ³ |
|------------------|--|
| Denver | 40-45 |
| Pawnee | 45 |
| San Isabel | |
| Colorado Springs | 30-35 |
| Pueblo | 45 |
| Other sites | 40-45 |
| Yampa | 20 |
| Grand Mesa | 40 |
| Great Falls | 20-25 |
| Helena | 25 |
| Missoula | 38 |
| Wasatch Front | 40 |
| Wyoming | 28-35 |
| Black Hills | 30-35 |

Published descriptions and photomicrographs of particle types plus samples of soil and fine material from ground-level sources were used as references for determining particle origins. Personnel performing the microscopy were experienced in characterization of particulate matter.

Prior to proceeding with microscopic examination of high volume filters from each site, some quality control work was done first to determine the accuracy of microscopic identification of particulate composition and origin. Results of the quality control evaluation showed that the particle count by size range for any five fields under the microscope is ± 52 percent of the true value for mineral matter and ± 44 percent for combustion products. Of this total variability, differences in counts by different analysts account for one-third of the error, differences in the fields selected account for 21 percent of the error, and differences in the cores cut from the sample account for 46 percent (as a result of nonhomogeneous impaction on the filter).

However, a more important problem surfaced during this quality control work. Even with the polarized light microscope and experienced analysts, it was not possible to subdivide the mineral fraction (fugitive dust) into any detailed source categories, such as reentrained dust from streets, construction dust, or naturally-occurring material from wind erosion. Since the mineral fraction was 70-90 percent of the total particles on most slides, the microscopy results in most cases did not provide any significant additional information as to the origin of the material collected on the filters and were not included in the individual site evaluations.

3.0 SITE EVALUATIONS

The purposes of the visit to each non-attainment site and inspection of the sampler's exposure were to determine: (1) whether the readings accurately reflect particulate concentrations in the vicinity of the sampler; and (2) whether the sources contributing to the high ambient concentrations could reasonably be further controlled by passing new or more stringent regulations. The site evaluations presented in this chapter attempt to correlate all the available information on each site and identify specific reasons for non-attainment. This discussion is presented in the Summary and Conclusions section of every site evaluation package, which follows the site description, photographs, map, and emission inventory.

Broader conclusions relative to predominant sources in non-attainment areas, common reasons for non-attainment, the need for SIP revisions in AQCR's with one or more samplers violating the standards, short-term versus annual average violations, etc., are discussed in Chapter 4 by compiling the findings of the individual site evaluations.

The 43 site evaluations presented here involve 11 different AQCR's in five states. The sites are listed by AQCR in Table 1-1. It should be noted that 13 of the 43 sites surveyed are in the Denver AQCR and that 25 of the non-attainment sites in Region VIII are in the three Colorado Front Range AQCR's of Denver, Pawnee, and San Isabel. The site evaluation package for a specific site can be accessed most rapidly by referring to the Table of Contents.

Two of the sites surveyed and evaluated, Tract CB sites 020 and 022 in Grand Mesa AQCR, do not have any recent reported concentrations above the primary standards. They were included because concentrations above the 24-hour secondary standard of 150 ug/m^3 were reported for the sites, even though they were established as baseline or background stations. The purpose of the on-site surveys at these locations was to determine whether background particulate levels in arid parts of Region VIII might occasionally exceed the short-term secondary standard. Alternatively, the sites could be influenced by nearby open sources.

3.1 ADAMS CITY - TRI-COUNTY HEALTH DEPARTMENT
SAROAD Site No. 06-0020-001

Description

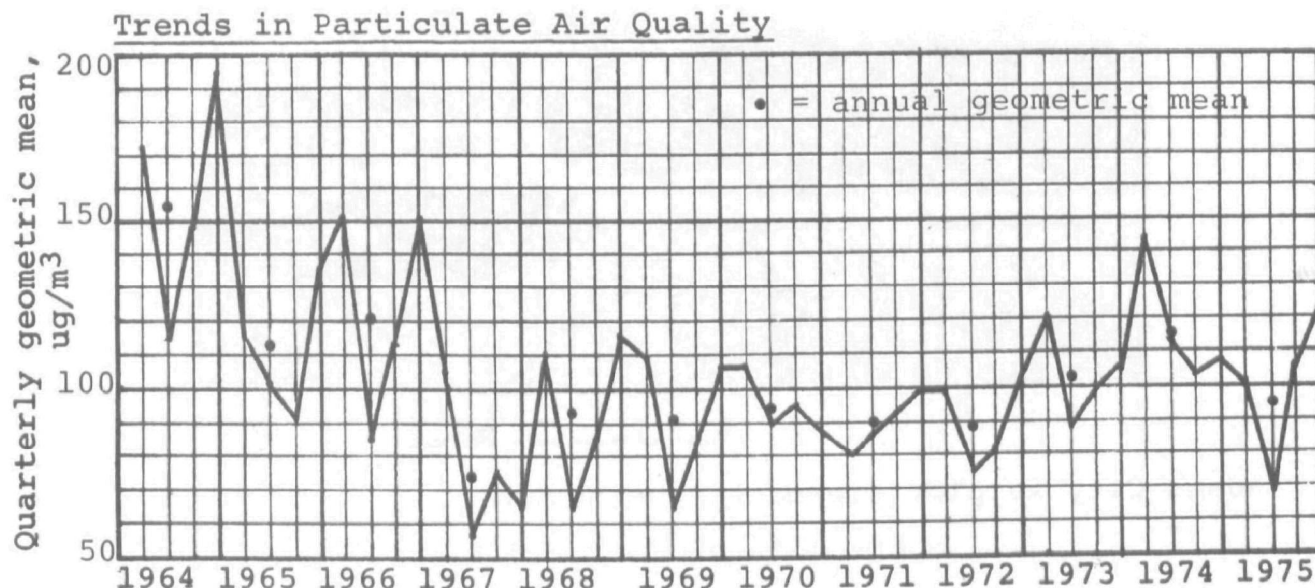
General site description - The sampler is located on the roof of the Tri-County Health Department (4301 East 72nd) about 15 feet above ground level. It is about 100 feet back from the road in a light commercial/residential area.

Localized pollution influences - The sampler is bordered on two sides by a large paved parking lot that is relatively clean. There are large unpaved parking lots 300 feet to the northwest and northeast and a small cleared area 500 feet to the northeast. Also, the County Highway Department has a small sand and gravel operation approximately 600 feet north of the sampler. There are about 4 roof vents and an air conditioning compressor about 50 feet from the sampler, but these do not appear capable of affecting the readings.

Physical interferences - No major obstructions were noted in the immediate vicinity of the sampler. There were few other buildings within 500 feet and none taller.

Terrain - The site area is relatively flat and comprised of open land to the north and west with several large highways cutting through the area.

Comments - The site has a reasonable suburban exposure, but is probably not representative of ambient air in this area, which is characterized more by industrial land use. In its current position, the sampler is relatively isolated from impacts caused by industrial activity in Adams City. The streets in the area were sanded and dirty at the time of the survey.

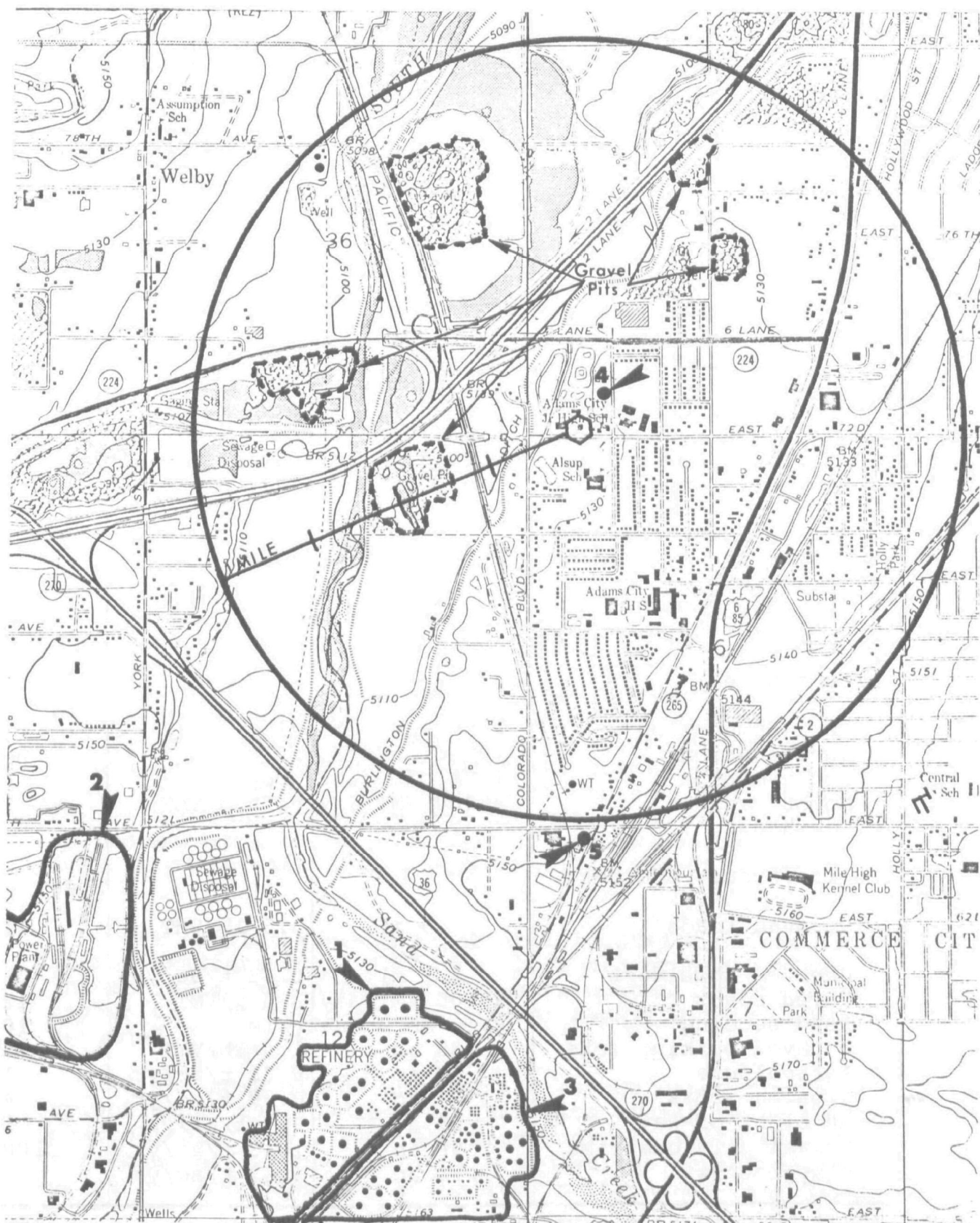




Adams City sampler viewed to the north.



Adams City sampler viewed to the south.



Adams City - Tri-County Health Department.

Sources in Microinventory Area (1 mile radius)

Adams City

Population = 2,250

VMT = 86,400

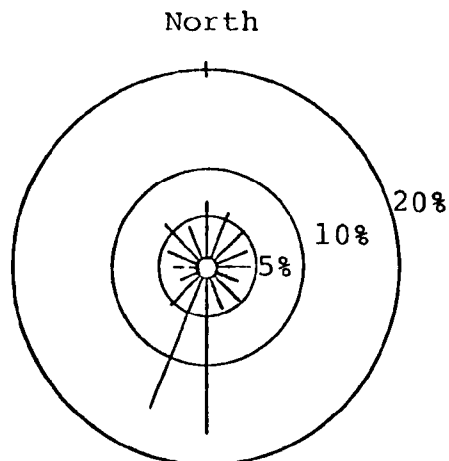
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Mack Precast Products | | | neg |
| Hungarian Flour Mill | | | unknown |
| Far Mar Company | | | 12 |
| 1 Conoco | Outside mile radius | | 254 |
| Denver Feeds | | | 10 |
| CPL Construction | | | neg |
| 2 Cherokee Power Plant | Outside mile radius | | 925 |
| Barnett Company | | | neg |
| Mobile Pre-Mix | | | 2 |
| Adams County Hwy Dept | | | unknown |
| 3 Refinery Corporation | Outside mile radius | | 59 |
| 4 Kilgore Atchison | | | 26 |
| 5 Kellogg Company | | | 102 |
| Colorado Milling/Elev | | | 34 |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 1.2% of county pop 86400 VMT/day | | 8 |
| Incineration | | | neg |
| Other mobile | | | 1 |
| Motor vehicle exhaust | | 0.59 g/VMT | 21 |
| Fugitive dust sources: | | | |
| Unpaved roads | 3.0 mi, 60 ADT | 3.5 lb/VMT | 115 |
| Unpaved shoulders | 8.1 mi | 0.62 t/ac/yr | 12 |
| Paved roads | 86400 VMT/day | 3.5 g/VMT | 122 |
| Road sanding | From APCD analysis | | 104 |
| Unpaved parking lots | 56 ac | 1.4 lb/VMT | 32 |
| Agriculture | 52 ac | 0.31 t/ac/yr | 16 |
| Cleared areas | 77 ac | 0.59 t/ac/yr | 45 |
| RR right-of-way | 24 ac | 0.7 t/ac/yr | 17 |
| Gravel pits/quarries | 98 ac | 10.3 t/ac/yr | 1009 |
| Playgrounds | 10 ac | 0.62 t/ac/yr | 6 |
| Total emissions, ton/yr | | | 1694 |
| Emission density, ton/sq mi/yr | | | 539 |
| Percent fugitive dust | | | 87 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Maximum Recorded Concentrations

1974 = 405 ug/m³; 1975 = 255 ug/m³

Summary and Conclusions

The Adams City site has been consistently over the primary standard for the past 12 years, with no definite downtrend in particulate concentrations in recent years. Seasonal variations have not been as pronounced at this site as at most others in the Denver area, probably because of the relatively low local influence of road sanding emissions. Major impacting sources were identified to be several nearby sand and gravel pits, unpaved roads, street dust, and possibly some large point sources just outside the one mile radius survey area. The estimated emission density in the survey area is quite high, tending to confirm the ambient measurements (116 ug/m³ in 1974 and 96 ug/m³ in 1975).

The sampler appears to be well located and free from local interferences. In fact, there are probably many industrial areas in Adams City where concentrations even higher than measured at the present sampling site could be recorded.

Since some of the sources and source categories contributing to the readings at this site appear to be further controllable (e.g., sand and gravel pits), increased enforcement effort or additional regulations could reduce emissions and improve air quality in the Adams City area.

3.2 ARVADA-GRANDVIEW AVENUE
SAROAD Site No. 06-0120-001

Description

General site description - The sampler is located on the roof of a building (7622 Grandview Avenue) about 10 feet above ground level and set back 20 feet from a paved parking lot. The surrounding area is primarily commercial.

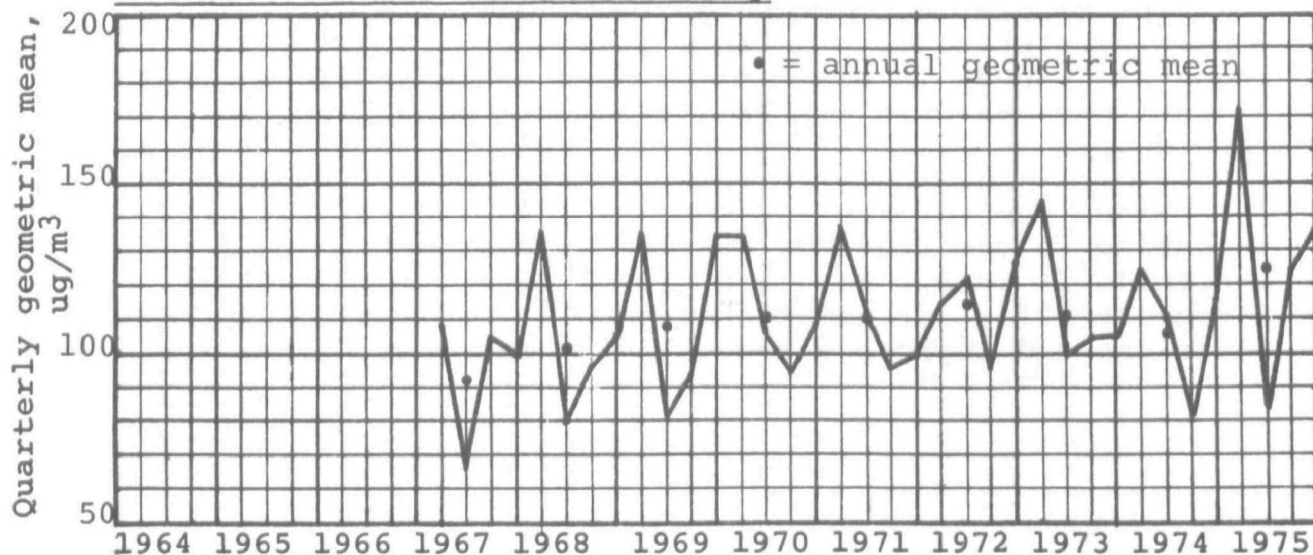
Localized pollution influences - Immediately adjacent to the sampler building is a 35 car parking lot and an unpaved lot 100 feet south. Grandview Avenue, approximately 75 feet from the sampler, is a 4 lane, heavily traveled street.

Physical interferences - There are no obstructions in the immediate vicinity which may interfere with the sampler's readings.

Terrain - The terrain is flat in the immediate vicinity of the sampler, and tapers off to rolling terrain on the fringes of the 1 mile radius survey area.

Comments - The entire area is mainly residential with uncleaned streets. It is questionable whether this site allows for representative sampling of the overall air quality in this area due to the localized influences.

Trends in Particulate Air Quality





Arvada sampler viewed to the northeast.



Arvada sampler viewed to the southeast.

Arvada-Grandview Avenue.

Sources in Microinventory Area (1 mile radius)

Arvada

Population = 6,700
VMT = 214,000

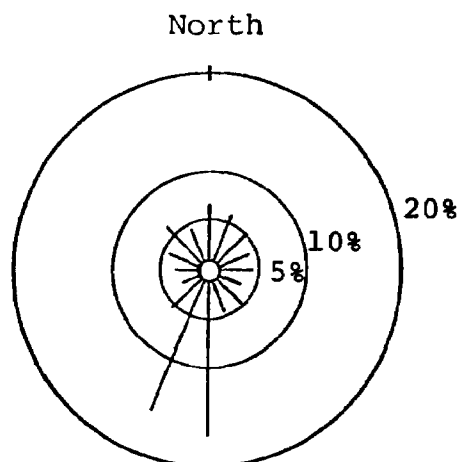
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| Asphalt Specialties | | | 20 |
| Strong Brothers | | | neg |
| Armcor, Incorporated | | | 1 |
| Ready Mixed Concrete | | | neg |
| Spano's Greenhouse | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 2.9% of county pop 214000 VMT/day | 0.59 g/VMT | 37 |
| Other mobile | | | 3 |
| Motor vehicle exhaust | | | 51 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.0 mi, 30 ADT | 4.5 lb/VMT | 49 |
| Unpaved shoulders | 2.6 mi | 0.62 t/ac/yr | 4 |
| Paved roads | 214000 VMT/day | 3.5 g/VMT | 301 |
| Road sanding | From APCD analysis | | 104 |
| Unpaved parking lots | 31 ac | 1.4 lb/VMT | 18 |
| Cleared areas | 22 ac | 0.59 t/ac/yr | 13 |
| RR right-of-way | 23 ac | 0.7 t/ac/yr | 16 |
| Playgrounds | 15 ac | 0.62 t/ac/yr | 9 |
| Total emissions, ton/yr | | | 626 |
| Emission density, ton/sq mi/yr | | | 199 |
| Percent fugitive dust | | | 82 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 348 ug/m³; 1975 = 400 ug/m³

Summary and Conclusions

The Arvada site has recorded annual geometric means over 100 ug/m³ every year since 1968. In all of these years except one, the highest quarterly average has been in the first (winter) quarter, indicating a strong seasonal impact from a source such as road sanding. The microinventory showed that the three source categories with greatest emissions, accounting for 73 percent of particulate emissions in the survey area, were all traffic related--dust from paved roads, street sanding, and motor vehicle exhaust.

The estimated emission density for the area surrounding the site did not appear sufficient to cause the high ambient readings at the site. Evaluation of the site location revealed a probable bias due to its close proximity to a major arterial street.

If a site in the same area but without the localized influence still exceeded the annual standard, the only sources that would be further controllable would be reentrained dust from the streets (including sand for snow control) and some minor fugitive dust sources. The feasibility of reducing emissions from streets has not yet been determined, but this source category constitutes such a pervasive problem in the Denver area that it should certainly be investigated in detail. The requirement of an SIP revision would provide an impetus and set a schedule for such an investigation.

3.3 AURORA-AURORA CIVIC CENTER SAROAD Site No. 06-0140-001

Description

General site description - The sampler is located on the roof of the Aurora Civic Center Building (1633 Florence Street) about 15 feet above ground level. It is set back about 50 feet to the west of Florence Street. The surrounding area is combined light commercial and residential land use.

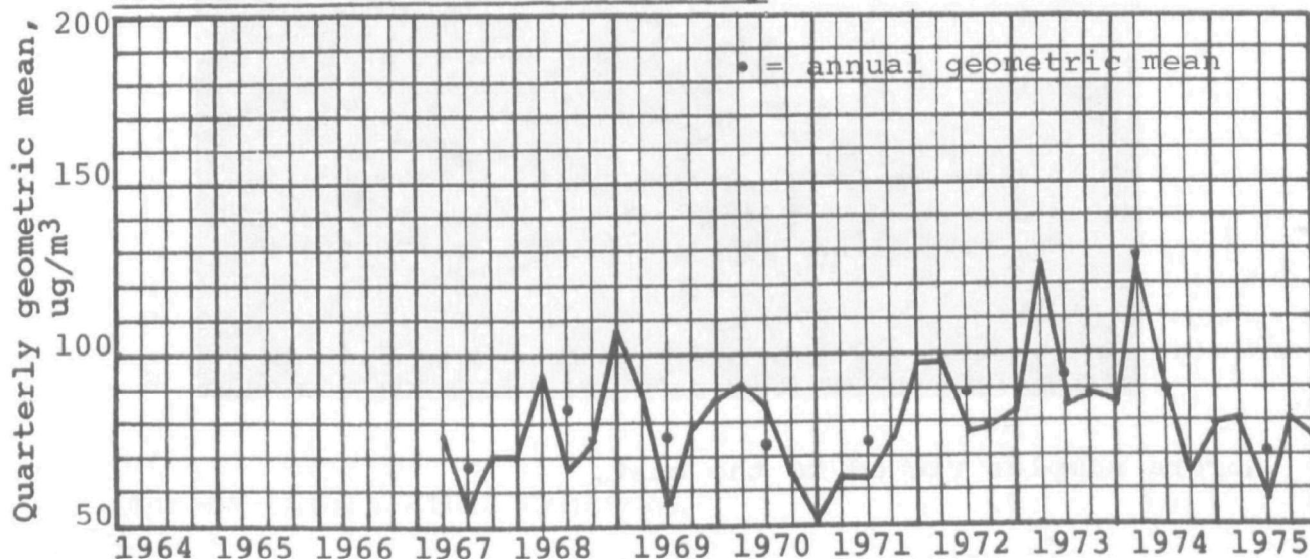
Localized pollution influences - There is a large (5 acre) unpaved playground across the street at the Crawford School, about 300 feet from the site. To the rear of the Civic Center, there is a gravel-covered paved alley about 100 feet from the sampler. The roof has a couple of small vents and an air conditioning compressor.

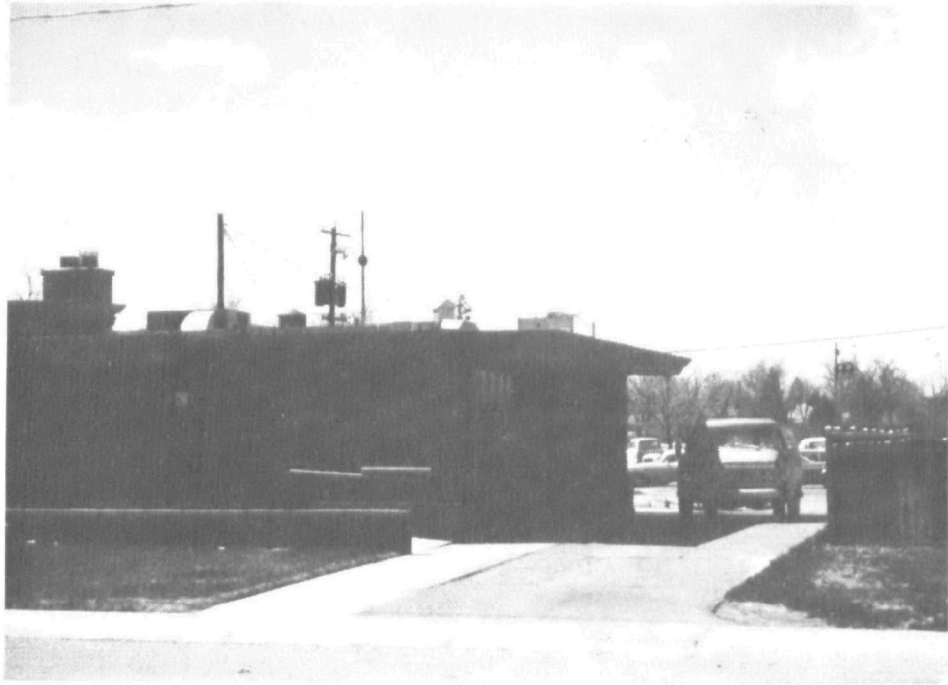
Physical interferences - No obstructions were noted in the immediate vicinity of the sampler. There were no taller buildings in the immediate area.

Terrain - The surrounding area is predominately flat with some rolling areas in the southeast to southwest quadrant. The airport is at lower elevation than most of the site area. The mean elevation is approximately 5,350 feet msl.

Comments - The site appears to provide a realistic indication of urban exposure. However, Stapleton International Airport is approximately 1 mile due north and there is quite a bit of traffic in the area. Overall, the streets appear somewhat dusty and swept infrequently.

Trends in Particulate Air Quality

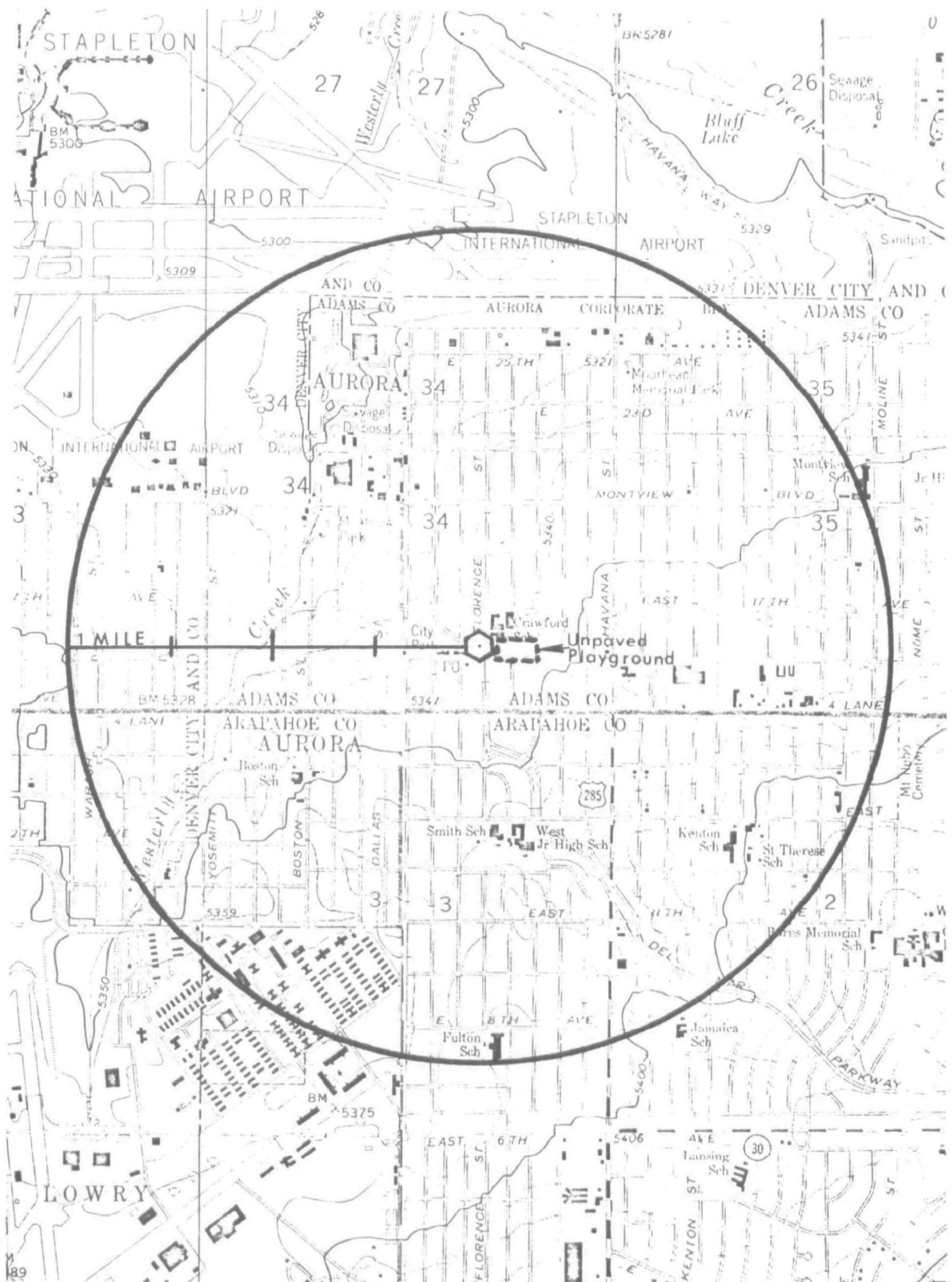




Aurora sampler viewed to the west.



Aurora sampler viewed to the east.



Aurora-Aurora Civic Center.

Sources in Microinventory Area (1 mile radius)

Aurora

Population = 7,200
VMT = 190,000

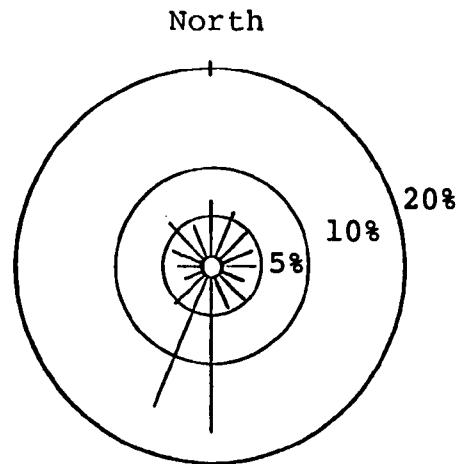
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 2.0% of Adams and Arapahoe pop 190000 VMT/day | | 26 |
| Other mobile | | | 3 |
| Motor vehicle exhaust | | 0.59 g/VMT | 45 |
| Fugitive dust sources: | | | |
| Unpaved roads | 4.3 mi, 10 ADT | 3.5 lb/VMT | 27 |
| Unpaved shoulders | 1.0 mi | 0.62 t/ac/yr | 1 |
| Paved roads | 190000 VMT/day | 3.5 g/VMT | 268 |
| Road sanding | From APCD analysis | | 174 |
| Unpaved parking lots | 22 ac | 1.4 lb/VMT | 13 |
| Cleared areas | 7 ac | 0.59 t/ac/yr | 4 |
| Playgrounds | 3 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 563 |
| Emission density, ton/sq mi/yr | | | 179 |
| Percent fugitive dust | | | 87 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 329 ug/m^3 ; 1975 = 231 ug/m^3

Summary and Conclusions

After a three year excursion above the standards, the Aurora site in 1975 was below both the annual and 24-hour primary standards. The microinventory showed that almost all the emissions in this commercial and residential area were traffic or fuel combustion related. No point sources were identified within a one mile radius of the sampler.

The site seems to be representative for the Aurora area; no local interferences were noted.

The current emission density of 179 ton/sq mi/yr would substantiate ambient concentrations below the standards. Therefore, it was concluded that Aurora should no longer be classified as a non-attainment site.

3.4 BRIGHTON-BRIGHTON NATIONAL BANK
SAROAD Site No. 06-0240-001

Description

General site description - The sampler is located on the roof of the Brighton National Bank (15 South Main) set back from Main Street approximately 30 feet. It is in the commercial district of town and the area on the periphery is comprised of residential and open areas.

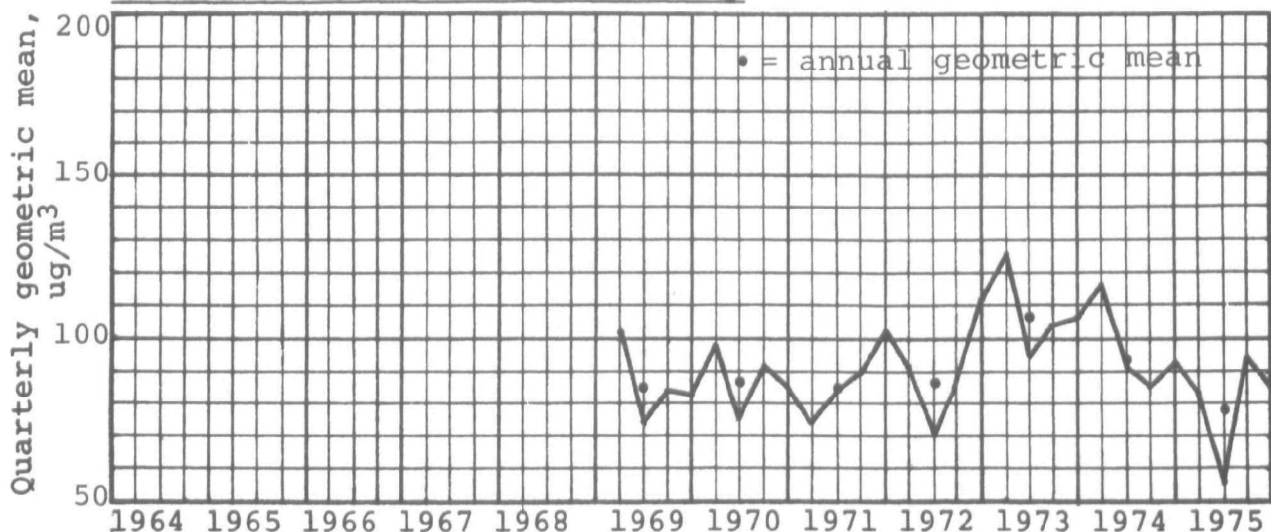
Localized pollution influences - The roof of the bank is composed of loose gravel; it has an incinerator vent 50 feet east and a furnace vent 30 feet east of and 12 feet higher than the sampler. It is 900 feet from Highway 85 (4 lanes, extending north-south).

Physical interferences - The sampler is located 18 feet west of a 10 foot elevator tower wall, which may partially screen air movements from the east or town side. It is higher than all surrounding structures.

Terrain - The immediate site area and surrounding survey area is generally flat with some rolling hills to the west. The mean elevation is approximately 4,950 feet msl.

Comments - The older sections of town are very dusty due to many unpaved roads, lots, and driveways. Overall, streets are dusty and poorly swept. Much agriculture surrounds the site area and the land is very dry and arid.

Trends in Particulate Air Quality

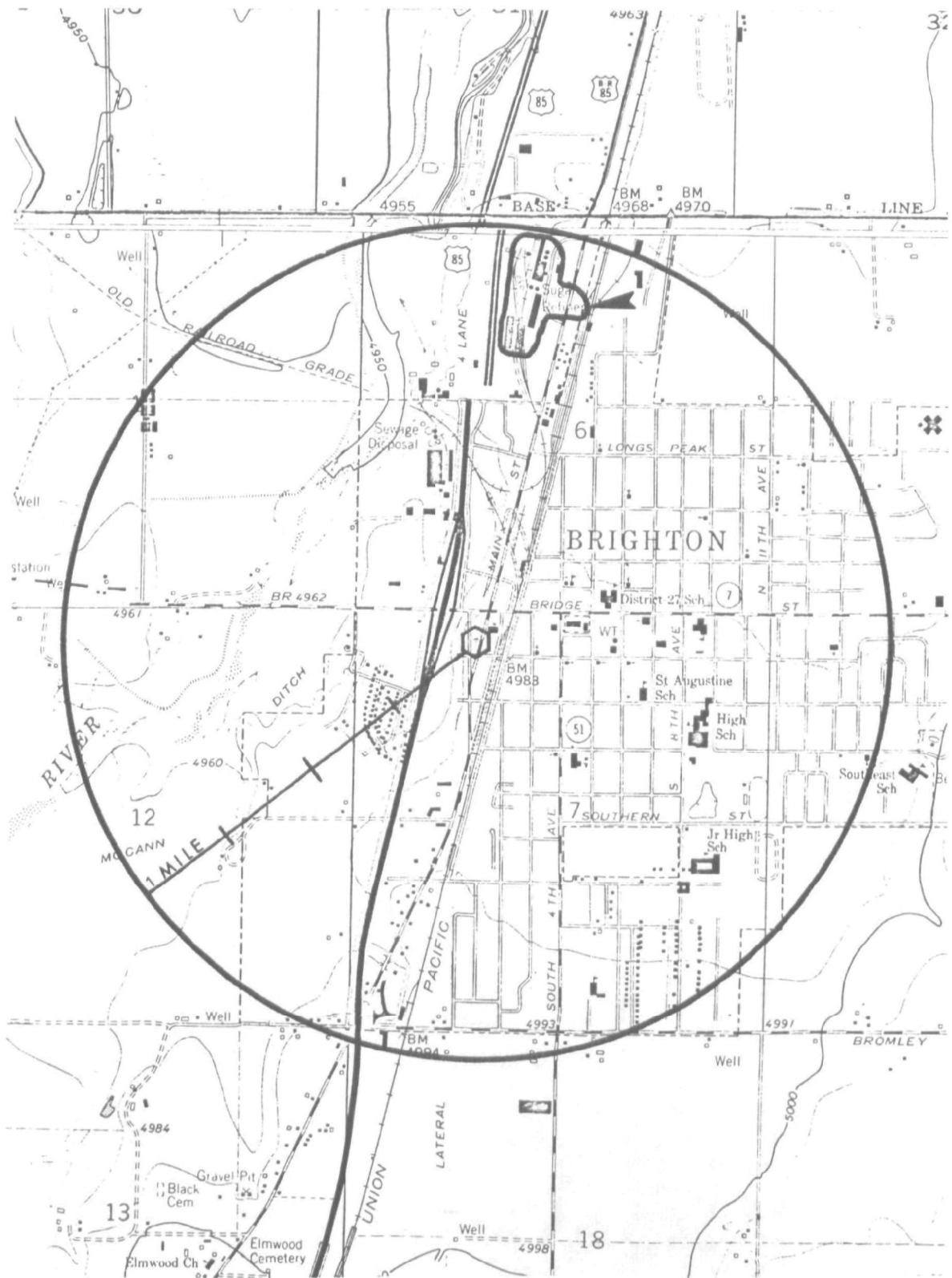




Brighton sampler viewed to the north.



Brighton sampler viewed to the south.



Brighton-Brighton National Bank.

Sources in Microinventory Area (1 mile radius)

Brighton

Population = 7,400

VMT = 57,100

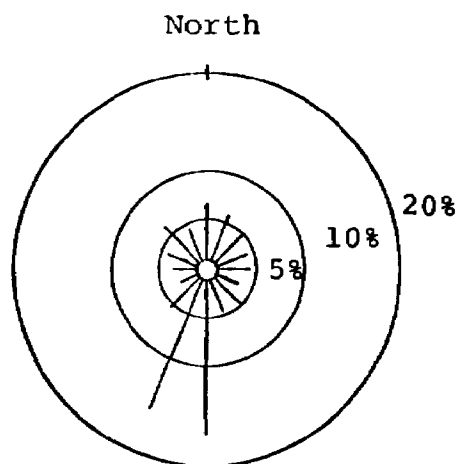
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|------------------------------------|--------------------------|
| Point sources: | | | |
| 1 Great Western Sugar | | | 72 |
| Brighton Grain | | | 1 |
| Kuner Empson Pickles | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 4.0% of county pop 57100 VMT/day | | 25 |
| Other mobile | | | 4 |
| Motor vehicle exhaust | | 0.59 g/VMT | 14 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.7 mi, 20 ADT | 3.5 lb/VMT | 34 |
| Unpaved shoulders | 1.5 mi | 0.62 t/ac/yr | 2 |
| Paved roads | 57100 VMT/day | 3.5 g/VMT | 80 |
| Unpaved parking lots | 10 ac | 1.4 lb/VMT | 6 |
| Agriculture | 185.4 ac | 0.22 t/ac/yr, 0.09 t/ac/yr tilling | 57 |
| Construction | 6.0 ac, 4 mo | 0.62 t/ac/mo | 15 |
| Cleared areas | 64.8 ac | 0.59 t/ac/yr | 38 |
| RR right-of-way | 12 ac | 0.7 t/ac/yr | 7 |
| RR yards | 22 ac | 0.7 t/ac/yr | 16 |
| Playgrounds | 3 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 373 |
| Emission density, ton/sq mi/yr | | | 119 |
| Percent fugitive dust | | | 69 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 241 $\mu\text{g}/\text{m}^3$; 1975 = 221 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Brighton site is outside the influence of the high traffic emissions in the Denver urban area and thus experiences less seasonal variation in particulate concentrations than the urban sites. Although the first and fourth quarters also generally have the highest readings at Brighton, these increases are attributed to the higher potential for wind erosion across croplands when the fields are least protected during the winter months.

There were no predominant contributing sources identified in the survey area. Several different fugitive dust sources accounted for 69 percent of the total emissions, and one large point source was located within a mile of the sampler. The estimated emission density of 119 ton/sq mi/yr was low in comparison with the geometric mean concentration of 78 $\mu\text{g}/\text{m}^3$ (93 $\mu\text{g}/\text{m}^3$ in 1974), but the site does not appear to be unduly influenced by localized sources. The screening effect of a nearby wall would tend to lower rather than increase measured concentrations. Although the emission density in the surrounding area does not seem to be sufficient to produce the observed readings, background concentrations in this agricultural area may be much higher than in adjacent urban and suburban exposures. Background, the nonreducible concentration from naturally-occurring sources, at Brighton is estimated to be 40 to 45 $\mu\text{g}/\text{m}^3$.

The fugitive dust emissions could probably be reduced enough to lower ambient concentrations from 78 to 75 $\mu\text{g}/\text{m}^3$. This could be accomplished by a more comprehensive enforcement program for existing regulations (and thus no SIP revision).

3.5 DENVER-SCHOOL ADMINISTRATION BUILDING
SAROAD Site No. 06-0580-001

Description

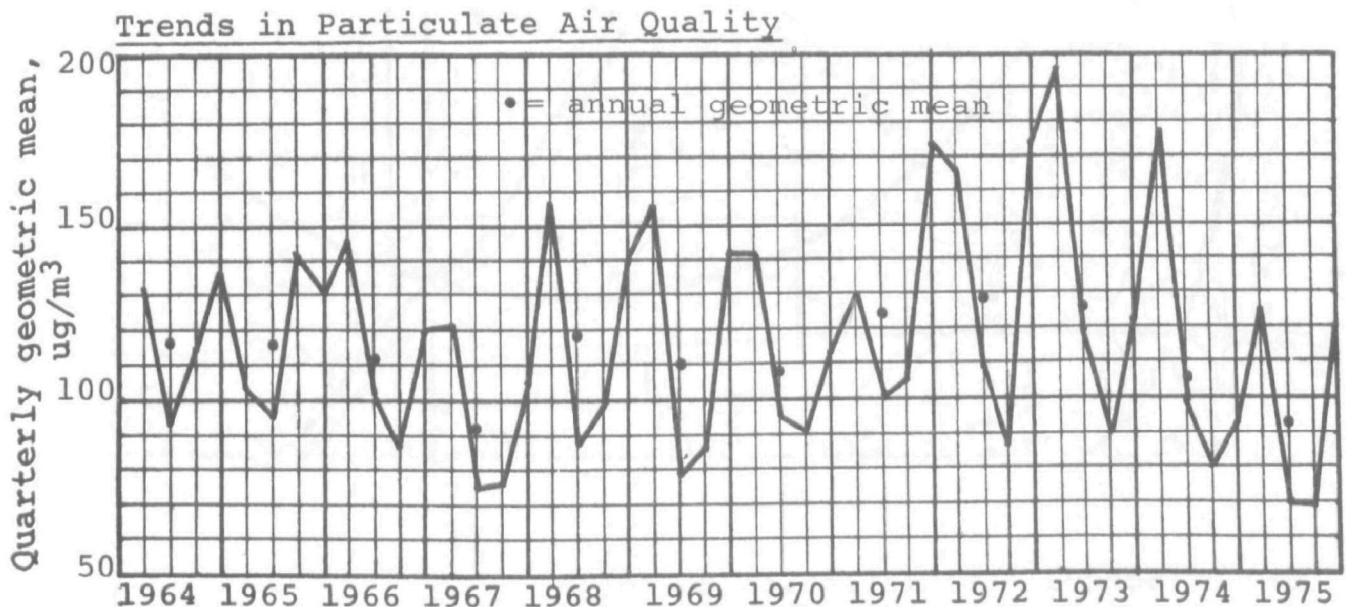
General site description - The sampler is located on the roof of the school administration building (414 Fourteenth Street) about 40 feet above ground level. It is situated in the commercial downtown district.

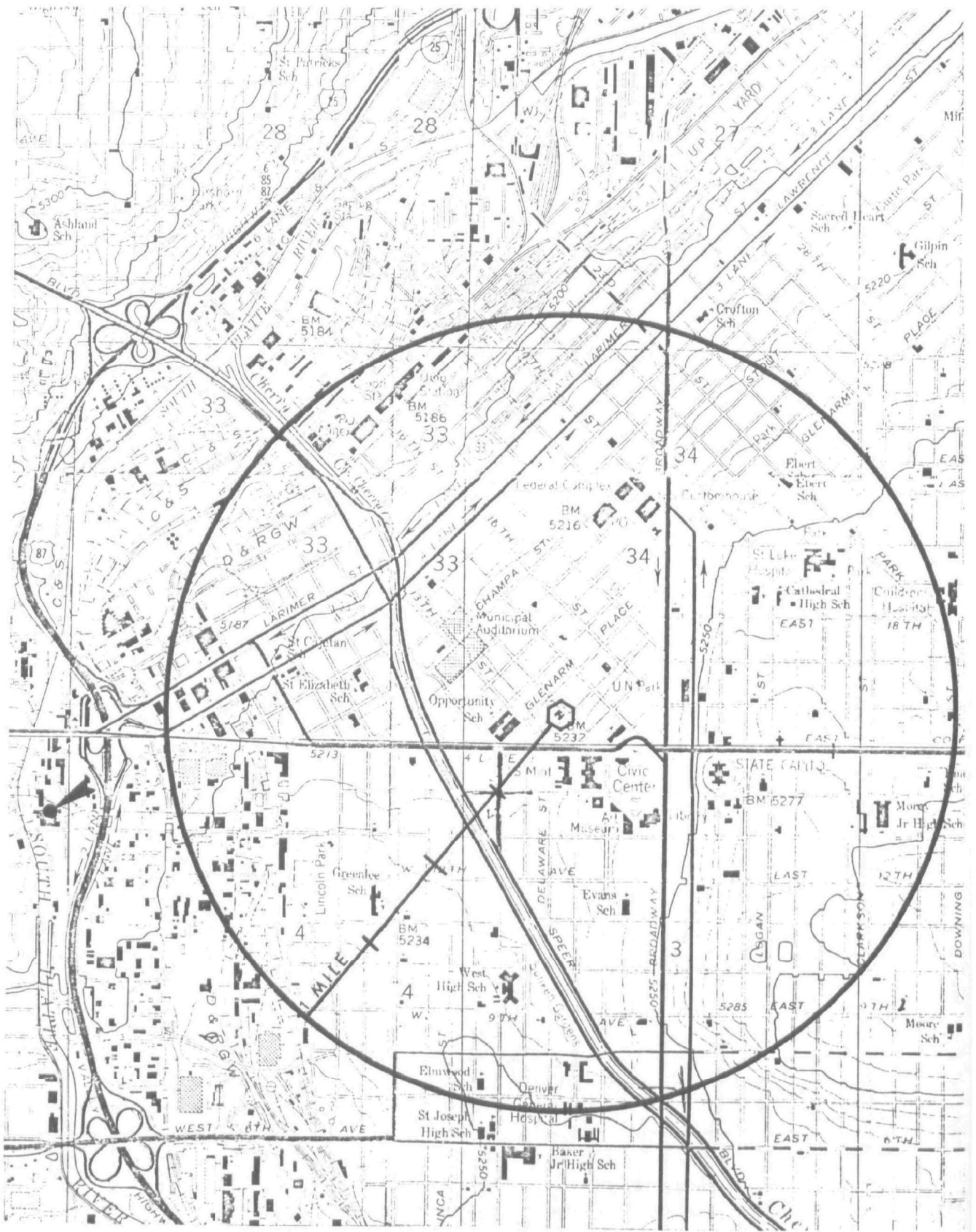
Localized pollution influences - Traffic is the predominant influence in the area. There are several small incinerators on the side of the building, with stacks generally higher than sampler height.

Physical interferences - The only significant obstructions are several roof vents near the sampler.

Terrain - The immediate area and continuing to the periphery of the 1 mile radius circle is generally flat. There are no predominant natural landmarks in the area.

Comments - The sampler siting is satisfactory, and it probably measures quite representatively the downtown air quality.





Denver-School Administration Building.

Sources in Microinventory Area (1 mile radius)

Denver-School Administration Building

Population = 19,900

VMT = 730,000

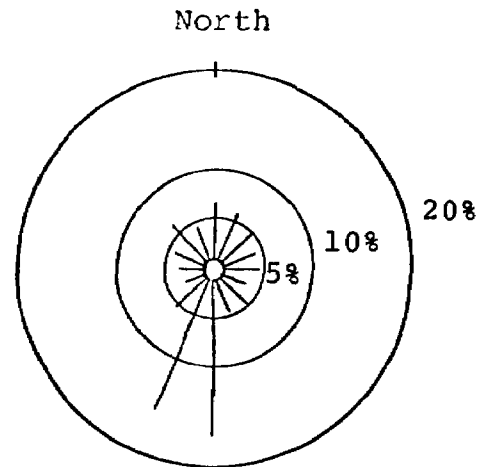
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|---------------------------------------|-----------------------|-----------------|--------------------------|
| Point sources: | | | |
| Mobile Pre-Mix | | | neg |
| Thompson Pipe & Steel | | | neg |
| Thomas Machine | | | neg |
| Spratten Materials | | | neg |
| Kaiser Refractories | | | 12 |
| Trucker Terminal Elev | | | neg |
| Panel Corporation | | | neg |
| 1 Zuni Power Plant | Outside mile radius | | 74 |
| Mobile Pre-Mix | | | neg |
| Eversman Manufacturing | | | neg |
| Chemitron | | | neg |
| Komac | | | neg |
| U.S. Mint | | | 1 |
| Public Service Company | | | 59 |
| Area sources: | | | |
| Fuel combustion | From AQMA emission | | 137 |
| Other mobile | inventory report, | | 8 |
| | 3.8% of county pop | | |
| Motor vehicle exhaust | 730000 VMT/day | 0.59 g/VMT | 173 |
| Fugitive dust sources: | | | |
| Paved roads | 730000 VMT/day | 3.5 g/VMT | 1027 |
| Road sanding | From APCD analysis | | 660 |
| Unpaved parking lots | 1 ac | 1.4 lb/VMT | 1 |
| Construction | 8 ac, | 0.62 t/ac/mo | 20 |
| | 4 mo | | |
| Cleared areas | 20 ac | 0.59 t/ac/yr | 12 |
| RR right-of-way | 34 ac | 0.7 t/ac/yr | 24 |
| RR yards | 70 ac | 0.7 t/ac/yr | 49 |
| Total emissions, ton/yr | | | 2183 |
| Emission density, ton/sq mi/yr | | | 695 |
| Percent fugitive dust | | | 82 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 436 $\mu\text{g}/\text{m}^3$; 1975 = 333 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

This downtown site in Denver has shown a definite trend toward lower concentrations the past few years, recording an annual mean below 100 $\mu\text{g}/\text{m}^3$ in 1975 for only the second time in its 12 year history. The air quality data exhibit the typical seasonal trend for the Denver area, with high averages in the first and fourth quarters and low averages in the second and third quarters.

Approximately 77 percent of the emissions in the survey area were from reentrained dust from streets and road sanding. Another eight percent were from motor vehicle exhaust. Therefore, significant emission reductions (sufficient to attain the primary standard) appear to be achievable only by improved street cleaning measures or traffic controls. An SIP revision would probably be required for either of these approaches.

The estimated emission density agrees well with the high measured concentrations, and no site location biases that would inflate the measured readings were noted.

3.6 DENVER-CAMP
SAROAD Site No. 06-0580-002

Description

General description - The sampler is located on the roof of the CAMP station (2105 Broadway) about 9 feet above ground level. It is in the center of the downtown commercial district. Located on a street island, it is surrounded by arterial streets 10-20 feet distant.

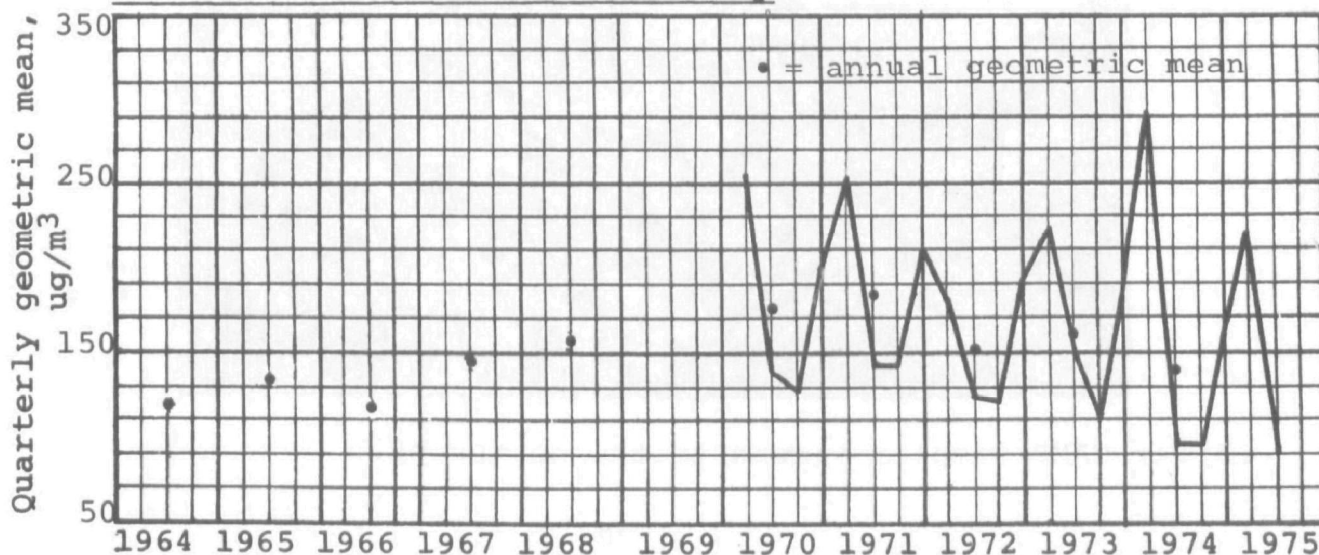
Localized pollution influences - Traffic-generated particulates are the predominant source at this site.

Physical interferences - The sampler sits in a shallow "street canyon" surrounded by buildings. These, however, are low (1-2 stories) and do not form a continuous wall. Buildings are located within 100 feet in most directions.

Terrain - The immediate area and entire 1 mile radius survey area is flat with no predominant natural features. The downtown buildings create a rough surface and cause much channeling and local turbulence.

Comments - The sampler is probably measuring the downtown air quality at street level quite representatively. As stated above, the readings are mainly influenced by traffic in this area.

Trends in Particulate Air Quality

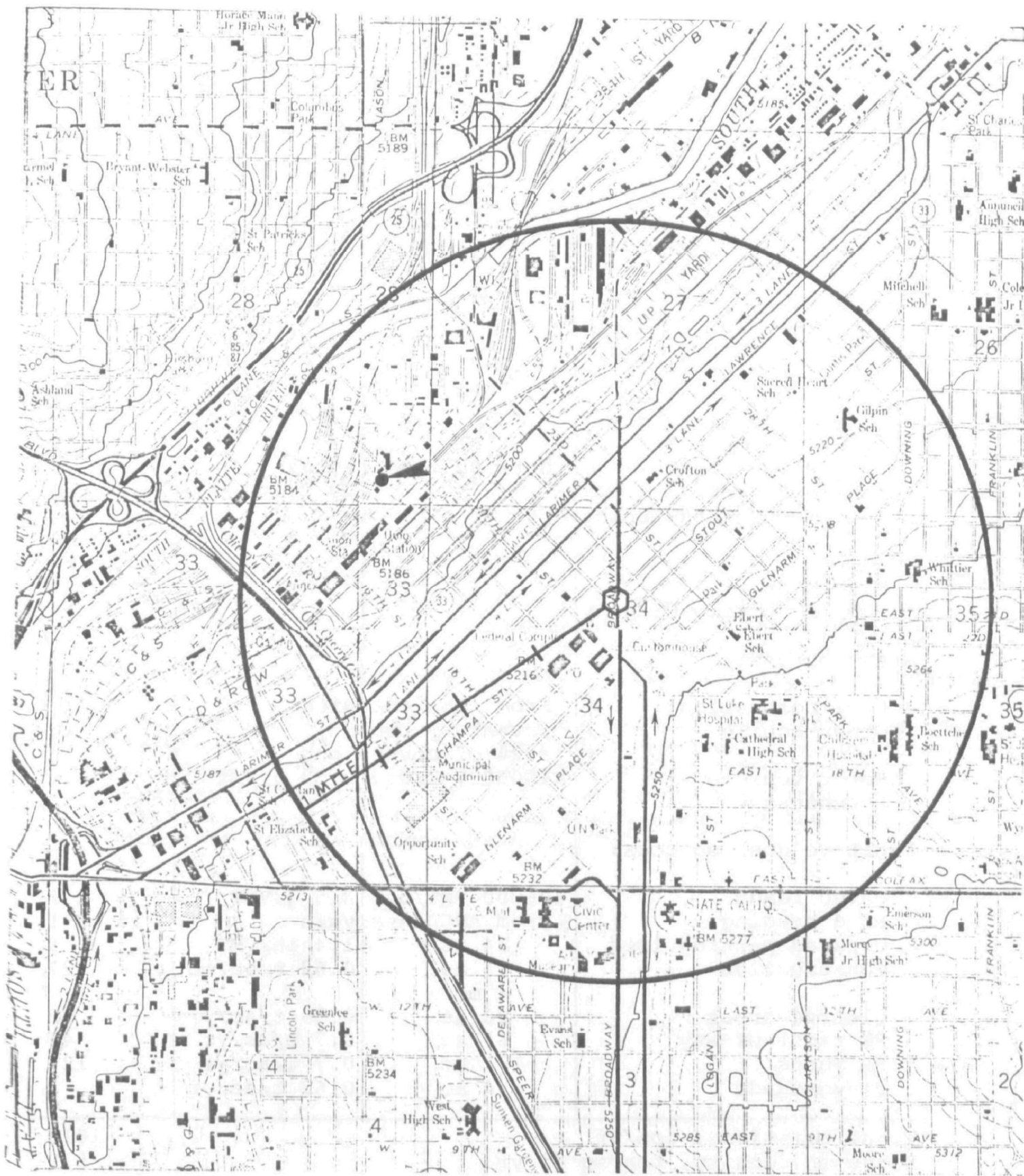




Denver-CAMP sampler viewed to the south.



Denver-CAMP sampler viewed to the northwest.



Denver-CAMP.

Sources in Microinventory Area (1 mile radius)

Denver-CAMP

Population = 16,800
VMT = 496,000

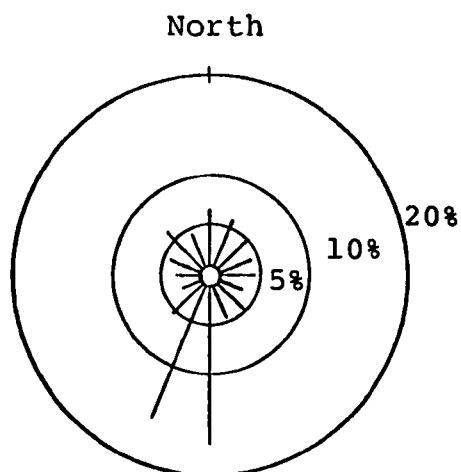
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| Mobile Pre-Mix | Outside mile radius | | neg |
| Thompson Pipe & Steel | | | neg |
| Thomas Machine | | | neg |
| Spratten Materials | | | neg |
| Kaiser Refractories | | | 12 |
| Trucker Terminal Elev | | | neg |
| Panel Corporation | | | neg |
| Zuni Power Plant | | | 74 |
| Mobile Pre-Mix | | | neg |
| Eversman Manufacturing | | | neg |
| Chemitron | | | neg |
| Komac | | | neg |
| U.S. Mint | | | 1 |
| 1 Public Service Company | | | 59 |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 3.2% of county pop 496000 VMT/day | 0.59 g/VMT | 115 |
| Other mobile | | | 10 |
| Motor vehicle exhaust | | | 118 |
| Fugitive dust sources: | | | |
| Paved roads | 496000 VMT/day | 3.5 g/VMT | 699 |
| Road sanding | From APCD analysis | | 591 |
| Unpaved parking lots | 14 ac | 1.4 lb/VMT | 8 |
| Construction | 11 ac, 4 mo | 0.62 t/ac/mo | 27 |
| Cleared areas | 20 ac | 0.59 t/ac/yr | 12 |
| RR right-of-way | 61 ac | 0.7 t/ac/yr | 43 |
| RR yards | 172 ac | 0.7 t/ac/yr | 121 |
| Playgrounds | 4 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 1818 |
| Emission density, ton/sq mi/yr | | | 579 |
| Percent fugitive dust | | | 83 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Summary and Conclusions

The CAMP site in Denver has an extended record of annual geometric means near 100 ug/m^3 and the same strong seasonal variations as the other urban Denver sites. The emissions in the survey area were determined to be 71 percent from paved roads and road sanding, with six percent from motor vehicle exhaust. As with most of the Denver area sites, most of the emissions and potential emission reductions appear to be traffic related. Due to the widespread nature of this source impact and the extent of standards' violations, the need for an SIP revision is well established.

Even though this site is near ground level and close to three major streets, it is probably representative of human exposure in the central business district. The emission density of 579 ton/sq mi/yr in the survey area indicates that the readings are not unduly influenced by the sampler's location and low height above ground.

3.7 DENVER-GATES RUBBER COMPANY
SAROAD Site No. 06-0580-003

Description

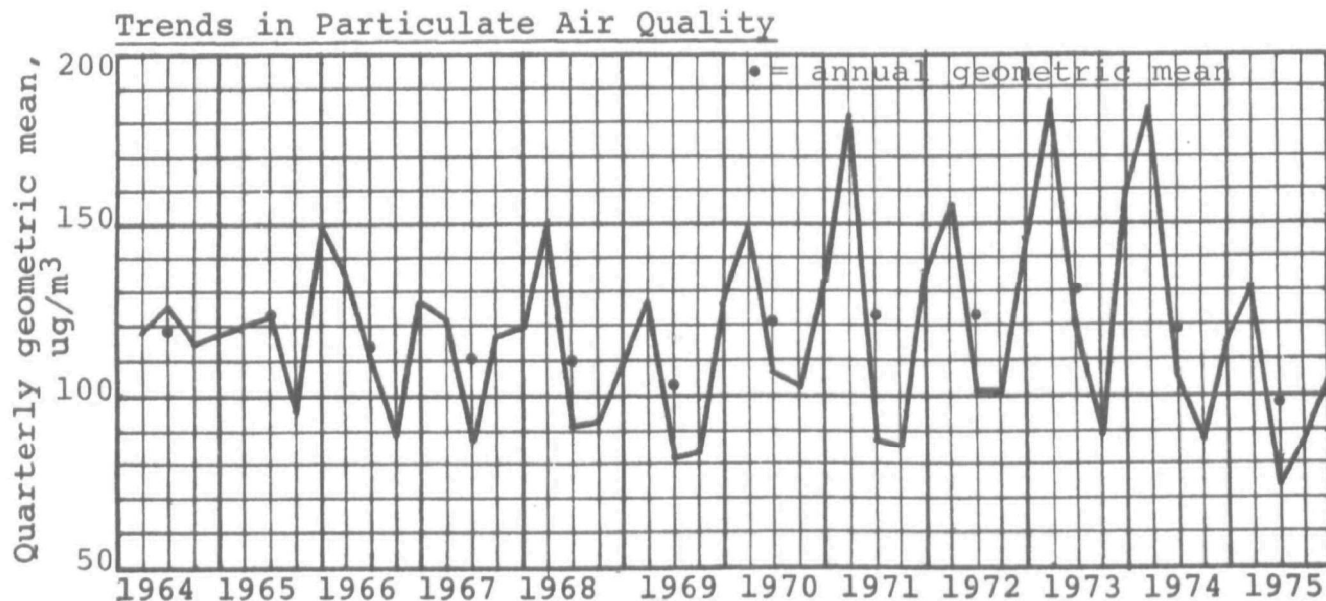
General site description - The sampler is located on the roof of the Gates Rubber Plant office building (1050 South Broadway) about 20 feet above ground level. The area is highly industrialized in the western portion of the survey area and residential in the east.

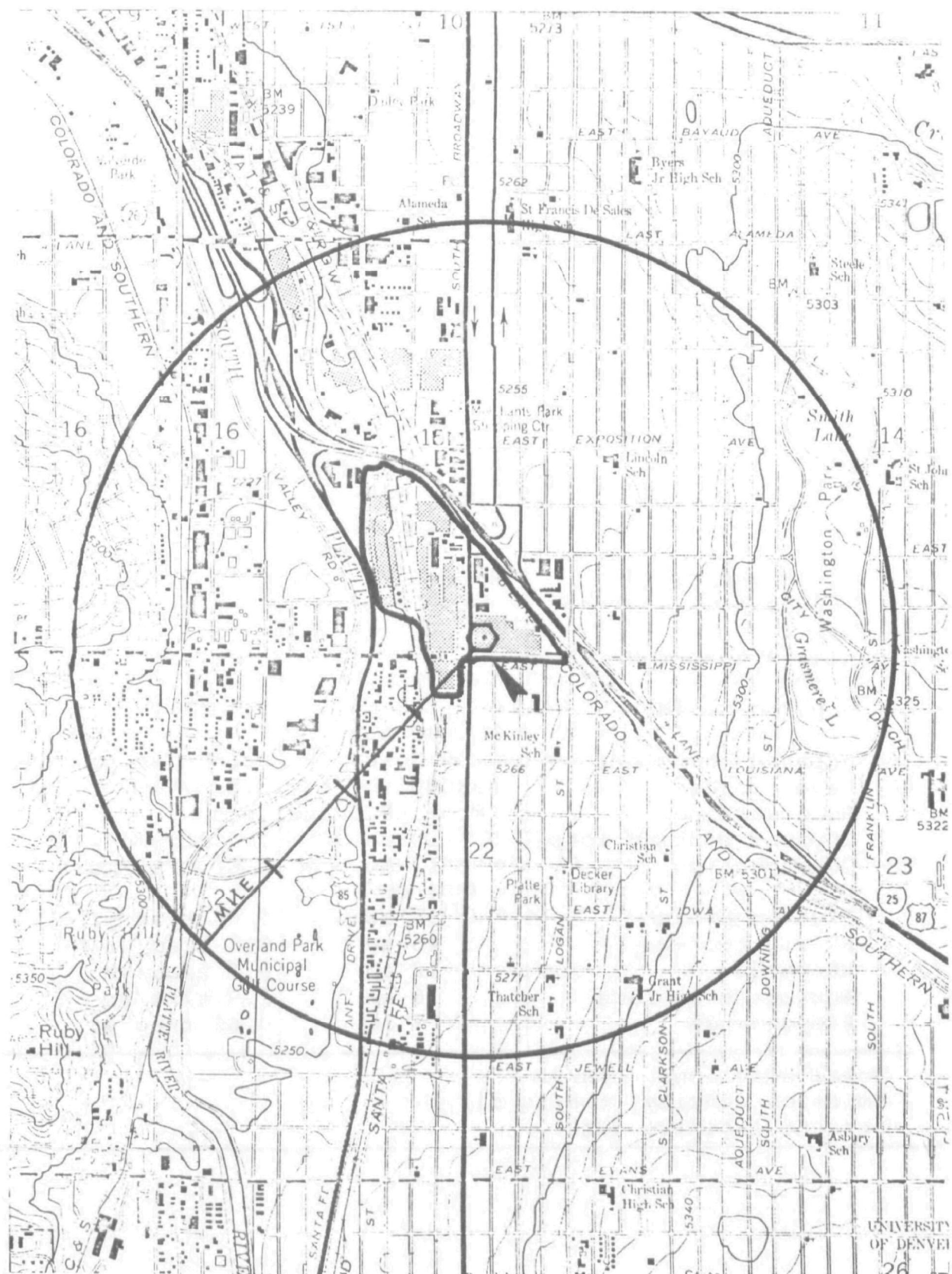
Localized pollution influences - The major influence in the general area would appear to be the Gates Rubber Company. In the immediate sampler vicinity, there are no interfering sources of pollution.

Physical interferences - Roof projections in the vicinity of the sampler would be the only elements that could affect the sampler's readings.

Terrain - The entire area is flat with many large buildings in the western sector. Interstate 25 runs northwest to southeast through the center of the area.

Comments - The sampler is probably drawing representative samples of the air in this industrial region.





Denver-Gates Rubber Company.

Sources in Microinventory Area (1 mile radius)

Denver-Gates Rubber Company

Population = 21,600

VTM = 493,000

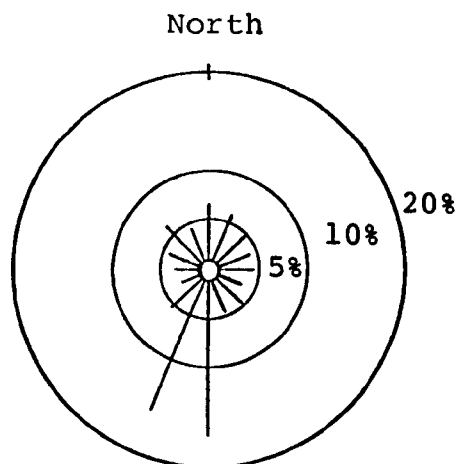
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Gates Rubber Company | | | 31 |
| Copeland Concrete | | | neg |
| Ace Block | | | neg |
| Ready-Mix | | | neg |
| Area sources: | | | |
| Fuel combustion | From AQMA emission inventory report, 4.2% of county pop 493000 VMT/day | 0.59 g/VTM | 151 |
| Other mobile | | | 13 |
| Motor vehicle exhaust | | | 117 |
| Fugitive dust sources: | | | |
| Unpaved roads | 1.5 mi, 30 ADT | 3.5 lb/VTM | 29 |
| Unpaved shoulders | 3 ac | 0.62 t/ac/yr | 2 |
| Paved roads | 493000 VMT/day | 3.5 g/VTM | 694 |
| Road sanding | From APCD analysis | | 382 |
| Unpaved parking lots | 10 ac | 1.4 lb/VTM | 6 |
| Construction | 12 ac, 4 mo | 0.62 t/ac/mo | 30 |
| Cleared areas | 37 ac | 0.59 t/ac/yr | 22 |
| RR right-of-way | 46 ac | 0.7 t/ac/yr | 32 |
| RR yards | 12 ac | 0.7 t/ac/yr | 8 |
| Aggregate storage | 6 ac | 1.9 t/ac/yr | 11 |
| Playgrounds | 7 ac | 0.62 t/ac/yr | 4 |
| Total emissions, ton/yr | | | 1532 |
| Emission density, ton/sq mi/yr | | | 488 |
| Percent fugitive dust | | | 80 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 357 ug/m³; 1975 = 405 ug/m³

Summary and Conclusions

This sampler had always shown annual mean concentrations in the range of 100 to 130 ug/m³ until 1975, when the annual mean dropped to 98 ug/m³. In spite of the site's industrial exposure, it demonstrates the same marked seasonal variations as the more traffic-oriented sites. The microinventory results reveal that this is because 70 percent of the inventoried emissions are from paved roads and road sanding.

The estimated emission density of 488 ton/sq mi/yr supports the high measured concentrations. It is concluded that the same control measures which would be effective at other urban Denver sites would also reduce emissions substantially at this site.

3.8 DENVER-WASTEWATER TREATMENT PLANT
SAROAD Site No. 06-0580-004

Description

General site description - The sampler is located on the roof of a pumphouse at the Wastewater Treatment Plant (51st and Franklin) about 10 feet above ground level. The immediate and surrounding area is completely industrial. It is not near any major highways.

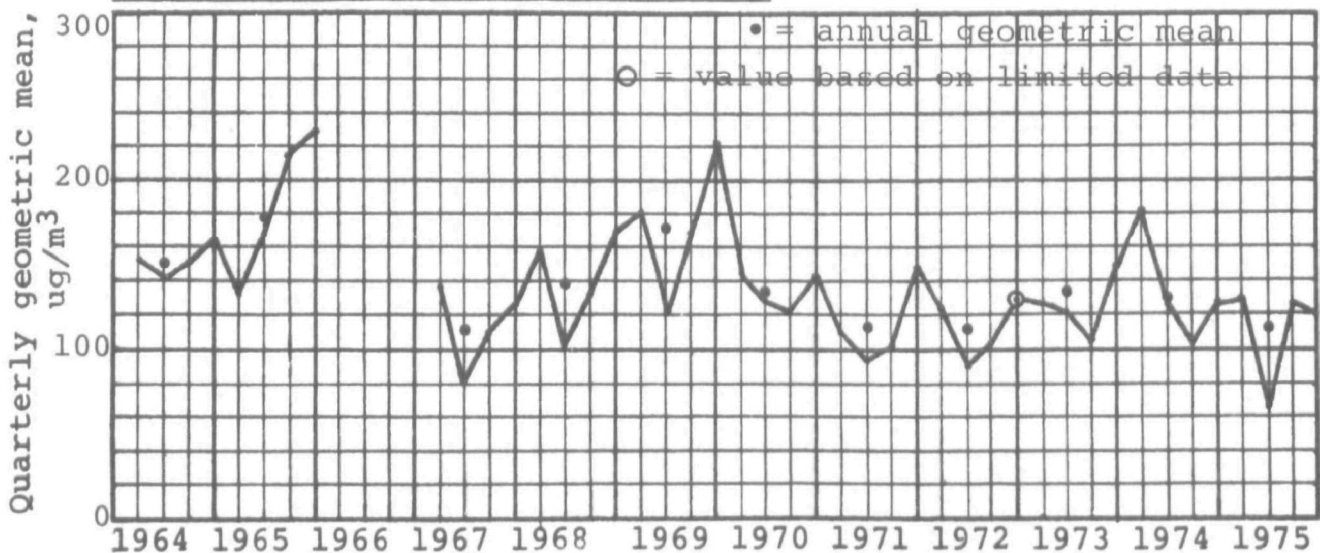
Localized pollution influences - Immediately adjacent to the sampler (25 feet) is the plant access road which is bare and under construction. Major industrial sources exist within 1/8 mile. In the immediate vicinity (300 feet) are many open areas and unpaved parking lots.

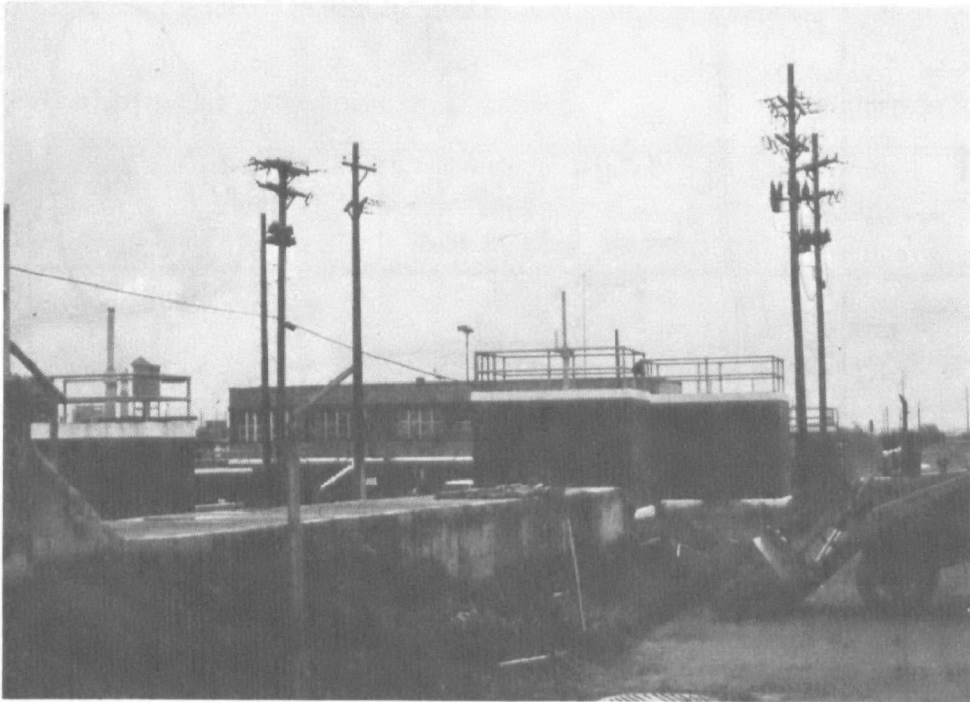
Physical interferences - No physical obstructions exist which could affect the readings of the sampler.

Terrain - The immediate and surrounding peripheral terrain in this survey area is mostly flat to rolling and devoid of predominant natural features.

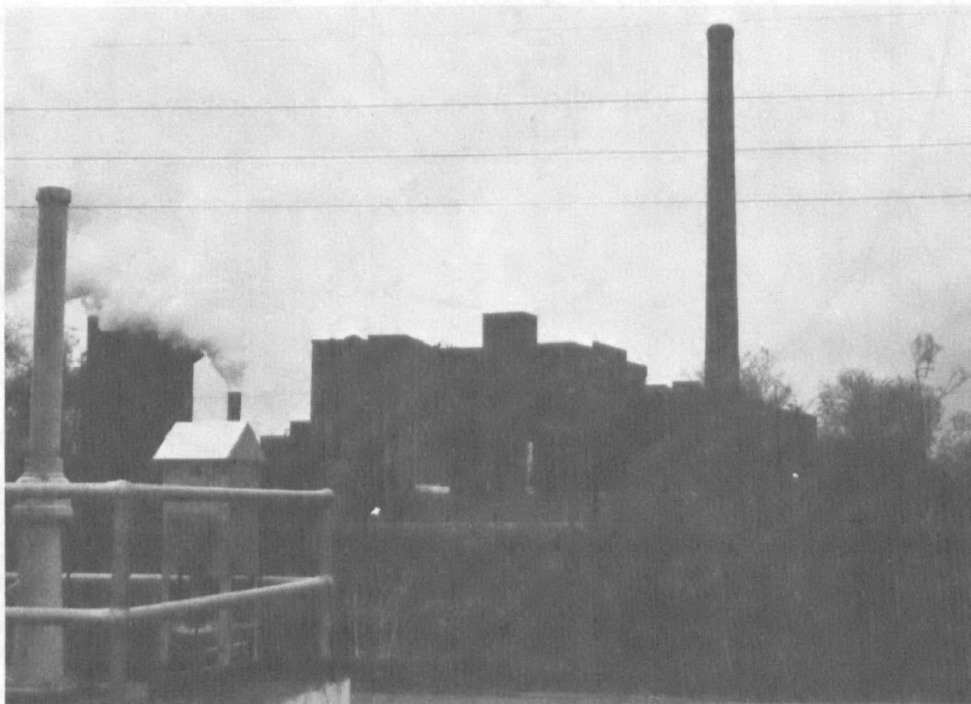
Comments - The sampler is situated well and probably represents the air quality in this industrial area quite accurately.

Trends in Particulate Air Quality

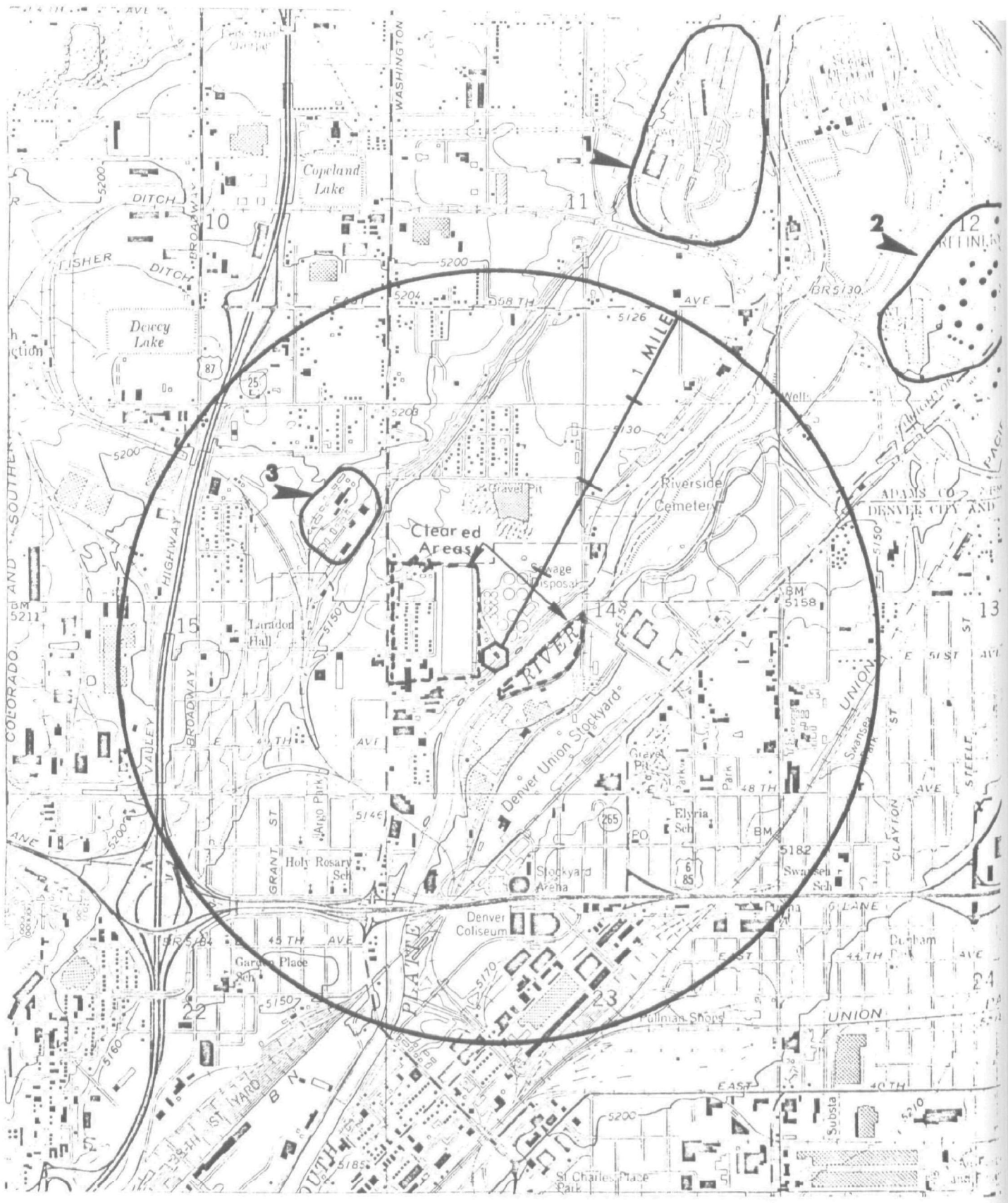




Denver-Wastewater Treatment Plant sampler viewed to the north.



Denver-Wastewater Treatment Plant sampler viewed to the east.



Denver-Wastewater Treatment Plant.

Sources in Microinventory Area (1 mile radius)

Denver-Wastewater Treatment Plant

Population = 2,500 (est)
VMT = 185,000

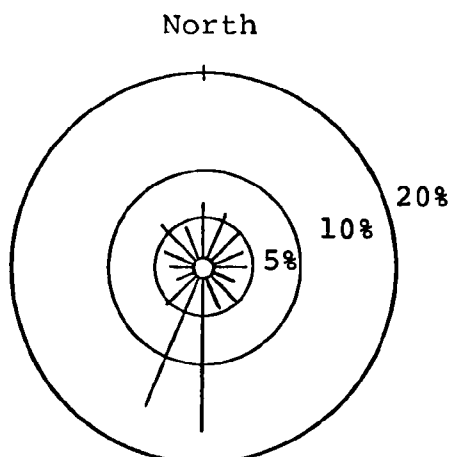
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| Denver Recycling | Outside mile radius | | neg |
| 1 Cherokee Power Plant | | | 925 |
| Denver Highway Div | | | neg |
| Clalite Concrete | | | neg |
| Cudahy | | | 6 |
| Birko Chemical | Outside mile radius | | neg |
| 2 Conoco Refinery | | | 254 |
| 3 ASARCO-Globe Plant | | | 25 |
| Twin Mountain Rock | | | neg |
| Midwest Steel & Iron | | | neg |
| Associated Grocers | | | neg |
| Trumbull Asphalt | | | 6 |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 0.5% of Denver county pop | | 18 |
| Other mobile | | | 2 |
| Motor vehicle exhaust | 185000 VMT/day | 0.59 g/VMT | 44 |
| Fugitive dust sources: | | | |
| Unpaved roads | 5.1 mi, 50 ADT | 3.5 lb/VMT | 163 |
| Unpaved shoulders | 17 ac | 0.62 t/ac/yr | 10 |
| Paved roads | 185000 VMT/day | 3.5 g/VMT | 261 |
| Road sanding | From APCD analysis | | 273 |
| Unpaved parking lots | 88 ac | 1.4 lb/VMT | 51 |
| Agriculture | 100 ac | 0.59 t/ac/yr | 59 |
| Cleared areas | 156 ac | 0.31 t/ac/yr | 48 |
| RR right-of-way | 26 ac | 0.7 t/ac/yr | 18 |
| RR yards | 42 ac | 0.7 t/ac/yr | 30 |
| Gravel pits/quarries | 15 ac | 1.9 t/ac/yr | 28 |
| Total emissions, ton/yr | | | 1042 |
| Emission density, ton/sq mi/yr | | | 332 |
| Percent fugitive dust | | | 90 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 565 ug/m³; 1975 = 289 ug/m³

Summary and Conclusions

This site₃ has always recorded an annual geometric mean above 100 ug/m³ throughout its history. It does not display the strong seasonal variations of some of the other Denver area sites, but 51 percent of its estimated emissions are still from paved roads and road sanding. Most of the remaining emissions in the survey area are from many different types of fugitive dust sources, including unpaved roads and parking lots, agriculture, cleared areas, railroad yards, and gravel pits. There are some minor industrial point sources within a one mile radius and some much larger ones outside this mile radius. Because of the large percentage reduction indicated to be necessary in order to attain the primary standard at this site, sources in several different categories would need to be further controlled. For many of the fugitive dust sources, a more comprehensive plan for enforcement of existing regulations could bring about significant emission reductions. None of the point sources are in a noncompliance status.

The site is probably biased somewhat by nearby fugitive dust sources, although similar sources are found throughout the one mile radius survey area. Even with an allowance for the influence of the localized sources, the site would still not reach the level of the standards. The estimated emission density of 332 ton/sq mi/yr is intermediate for the non-attainment sites in the Denver area and would normally be associated with a site reading in the 80's or 90's (annual geometric mean). This site provides additional evidence of the need for an SIP revision for suspended particulate in the Denver AQCR.

3.9 DENVER-C.A.R.I.H.
SAROAD Site No. 06-0580-009

Description

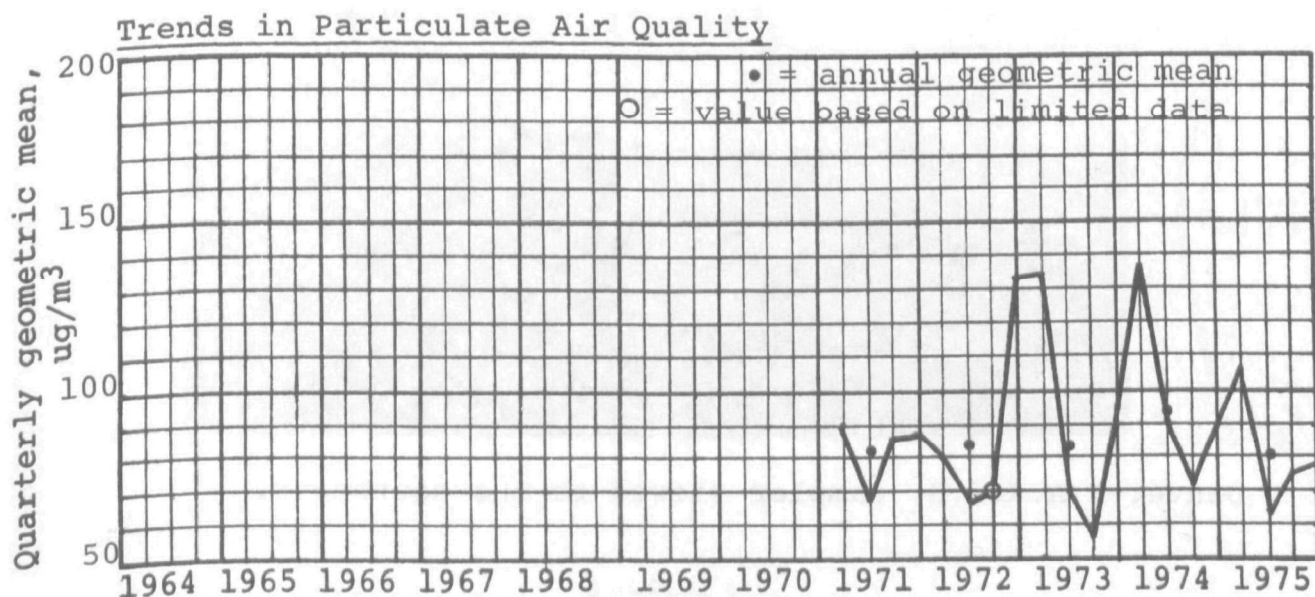
General site description - The sampler is located on the roof of the research center of the C.A.R.I.H. Hospital (2097 Julian) about 20 feet above ground level. The immediate area and greater part of the 1 mile radius survey area is residential. The sampler is set back 100 feet from roads on two sides.

Localized pollution influences - The only adverse influence in the immediate area is about five acres of cleared land 200 feet to the southeast. The streets are swept and clean.

Physical interferences - There are no physical obstructions or tall buildings in the area which would affect the sampler's readings.

Terrain - The entire area is composed of flat to rolling land. The only predominant natural feature is a shallow gulch at the extreme south of the 1 mile radius.

Comments - The site appears to be located well and depicts the air quality representatively.

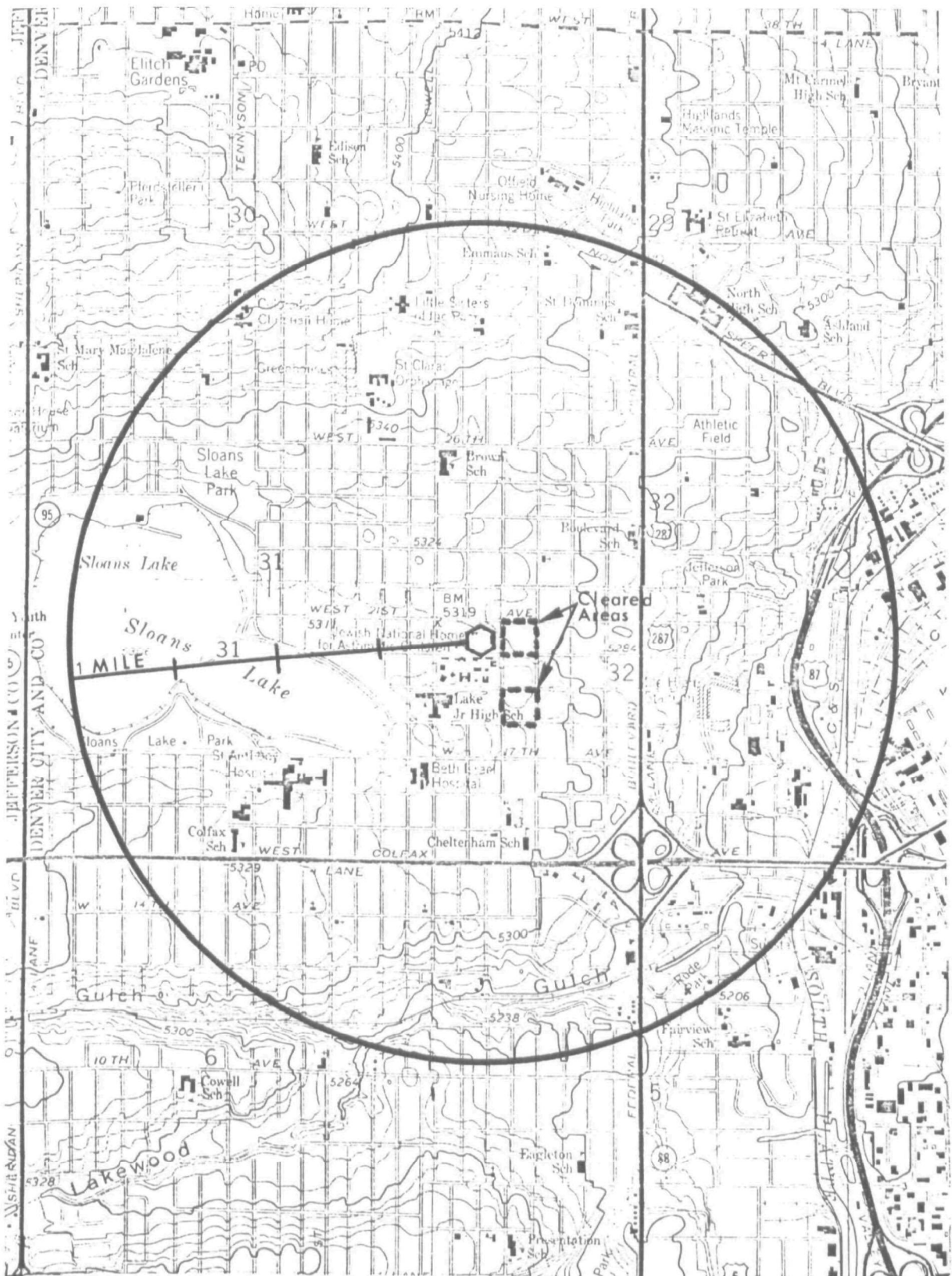




Denver-C.A.R.I.H. sampler viewed to the north.



Denver-C.A.R.I.H. sampler viewed to the southeast.



Denver-C.A.R.I.H.

Sources in Microinventory Area (1 mile radius)

Denver-C.A.R.I.H.

Population = 21,500

VMT = 357,000

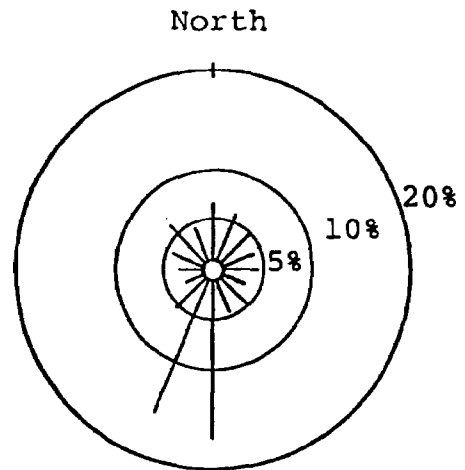
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| Nursery Supply | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 4.1% of county pop 357000 VMT/day | | 147 |
| Other mobile | | | 13 |
| Motor vehicle exhaust | | 0.59 g/VMT | 84 |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.2 mi, 30 ADT | 3.5 lb/VMT | 4 |
| Unpaved shoulders | 0.2 mi | 0.62 t/ac/yr | neg |
| Paved roads | 357000 VMT/day | 3.5 g/VMT | 504 |
| Road sanding | From APCD analysis | | 417 |
| Unpaved parking lots | 10 ac | 1.4 lb/VMT | 6 |
| Construction | 7 ac, 4 mo | 0.62 t/ac/mo | 17 |
| Cleared areas | 22 ac | 0.59 t/ac/yr | 13 |
| RR right-of-way | 7 ac | 0.7 t/ac/yr | 5 |
| RR yards | 17 ac | 0.7 t/ac/yr | 12 |
| Total emissions, ton/yr | | | 1222 |
| Emission density, ton/sq mi/yr | | | 389 |
| Percent fugitive dust | | | 80 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 317 ug/m³; 1975 = 252 ug/m³

Summary and Conclusions

The C.A.R.I.H. site has consistently recorded annual mean concentrations in the 80's since it was installed in 1971. It has a typical pattern of seasonal concentrations for the Denver area. There are no point sources with significant impact on this residential area sampler, and the site appears to be free from any localized influences or physical obstructions.

The major contributing sources identified by the micro-inventory were paved roads, road sanding, and motor vehicle exhaust, together accounting for 82 percent of the emissions. Therefore, attainment at this site is also linked to reduction in these emissions, probably through improved street cleaning or traffic controls.

3.10 ENGLEWOOD-ARAPAHOE COUNTY HEALTH DEPARTMENT
SAROAD Site No. 06-0780-001

Description

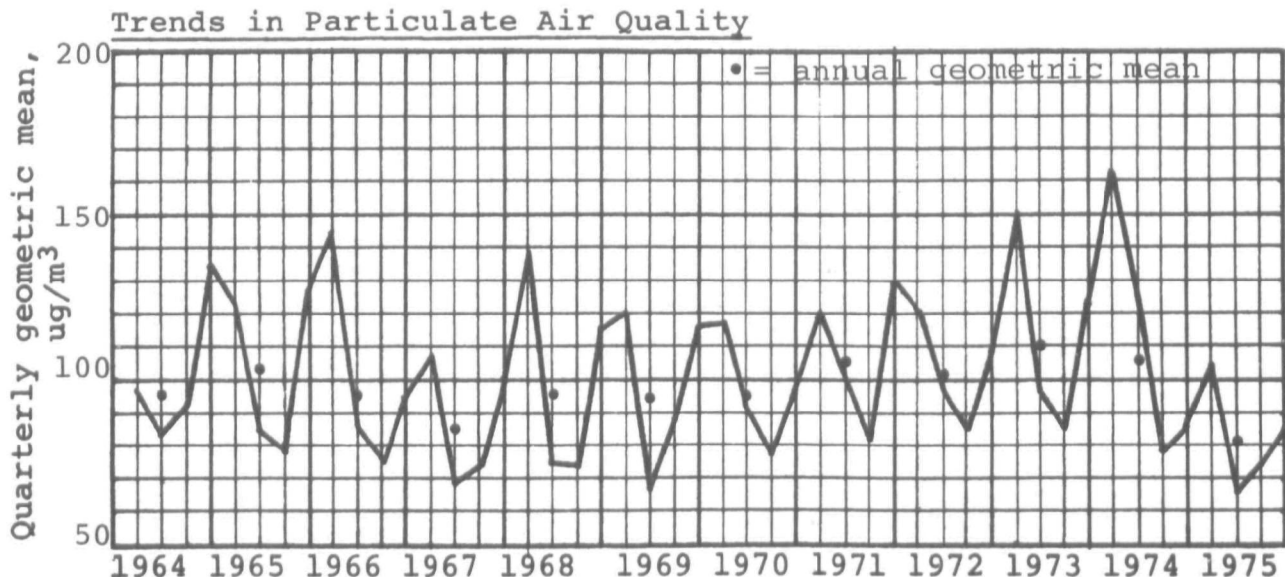
General site description - The sampler is located on the roof of the Health Department building (4857 South Broadway) about 15 feet above ground level in a predominately commercial area. It is set back 50 feet from streets parallel to the building on two sides.

Localized pollution influences - A 4 lane highway borders the building 50 feet east of the sampler, while there is an unpaved storage lot 200 feet to the northwest and a dirty parking lot immediately due west.

Physical interferences - There are no obstructions or tall structures which would affect the sampler's readings in any way.

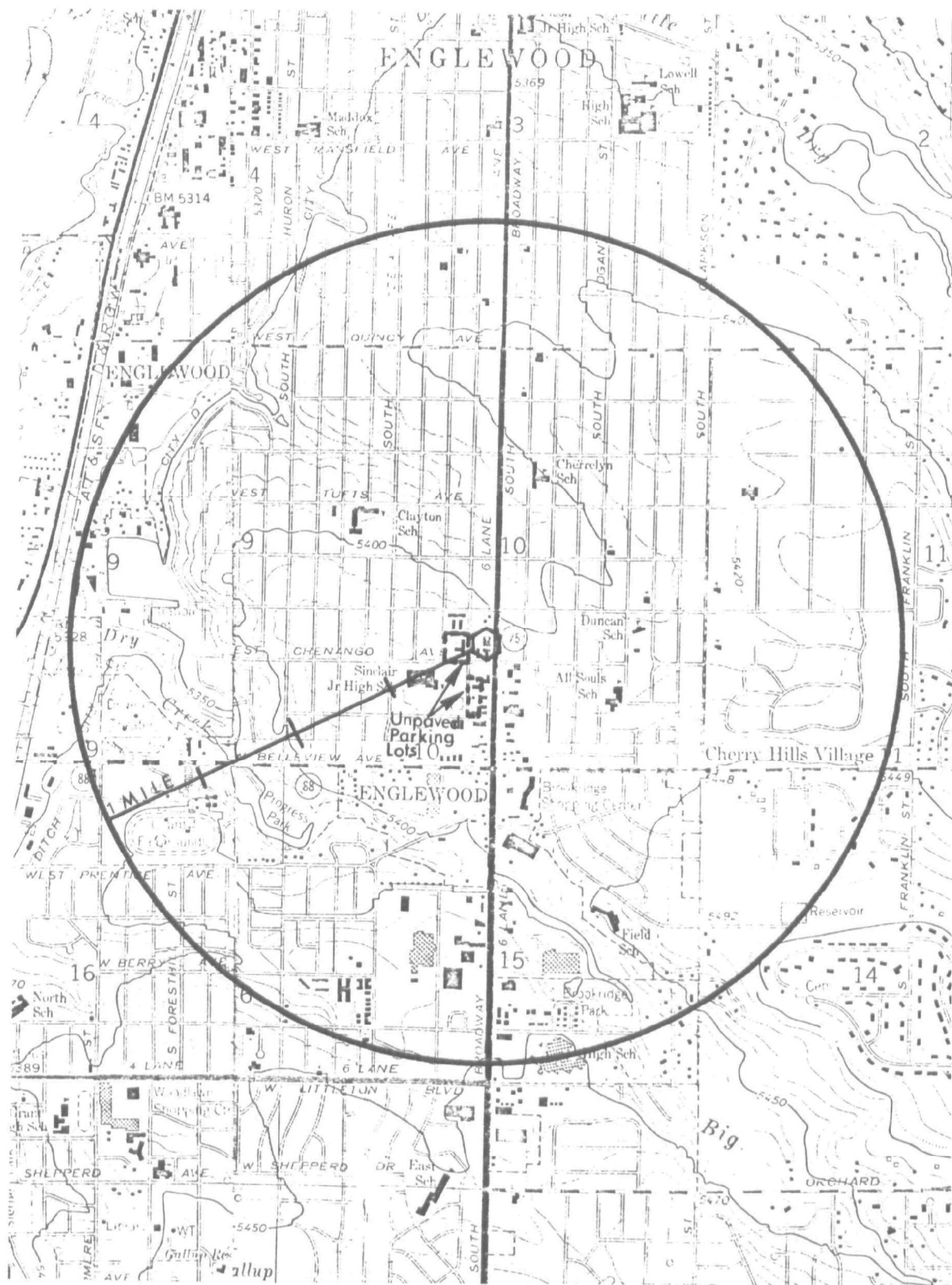
Terrain - The terrain immediately surrounding the sampling site is completely flat. Rolling hills predominate 1/2 mile to the west and south.

Comments - The sampler readings are mainly influenced by traffic in the area. The readings are probably representative of a high density residential area.





Englewood sampler viewed to the east.



Englewood-Arapahoe County Health Department.

Sources in Microinventory Area (1 mile radius)

Englewood

Population = 10,600

VMT = 200,000

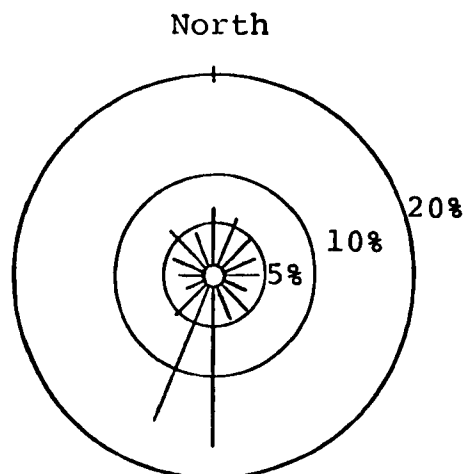
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 6.5% of county pop 200000 VMT/day | 0.59 g/VMT | 43 |
| Incineration | | | 1 |
| Other mobile | | | 5 |
| Motor vehicle exhaust | | | 48 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.7 mi, 10 ADT | 3.5 lb/VMT | 17 |
| Unpaved shoulders | 2.6 mi | 0.62 t/ac/yr | 4 |
| Paved roads | 200000 VMT/day | 3.5 g/VMT | 282 |
| Road sanding | From APCD analysis | | 104 |
| Unpaved parking lots | 7 ac | 1.4 lb/VMT | 4 |
| Construction | 4 ac, 4 mo | 0.62 t/ac/mo | 10 |
| Cleared areas | 67 ac | 0.59 t/ac/yr | 39 |
| Playgrounds | 7.7 ac | 0.62 t/ac/yr | 5 |
| Total emissions, ton/yr | | | 562 |
| Emission density, ton/sq mi/yr | | | 179 |
| Percent fugitive dust | | | 83 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 369 $\mu\text{g}/\text{m}^3$; 1975 = 224 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Englewood site annual means have centered around the 100 $\mu\text{g}/\text{m}^3$ level over the past 12 years before dropping to 81 $\mu\text{g}/\text{m}^3$ in 1975. The measurements have always shown the characteristic seasonal variations of sites in the urban Denver area. As with most of the other sites, traffic-related emissions were identified as the major contributor in this survey area. No point sources with significant impact on the site were found.

The sampler appears to be well located and not unduly influenced by localized sources. The estimated emission density of 179 ton/sq mi/yr is relatively low for a site exceeding the annual standard. The site survey did not yield a good explanation for the high concentrations measured at this location. Since several other obvious non-attainment sites are located in the Denver AQCR, no further investigation was made of this anomaly.

3.11 LAKEWOOD-CITY-COUNTY HEALTH DEPARTMENT
SAROAD Site No. 06-1260-001

Description

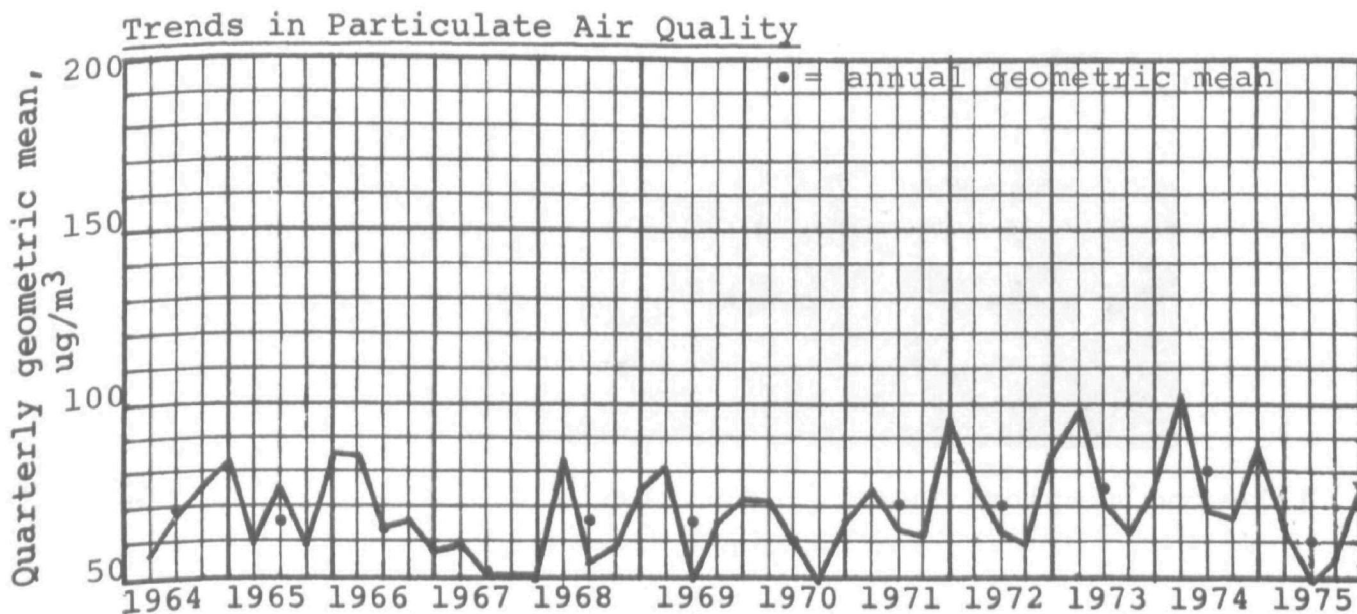
General site description - The sampler is located on the roof of the Health Department (260 South Kipling) about 25 feet above ground level. It is surrounded by residential and open areas.

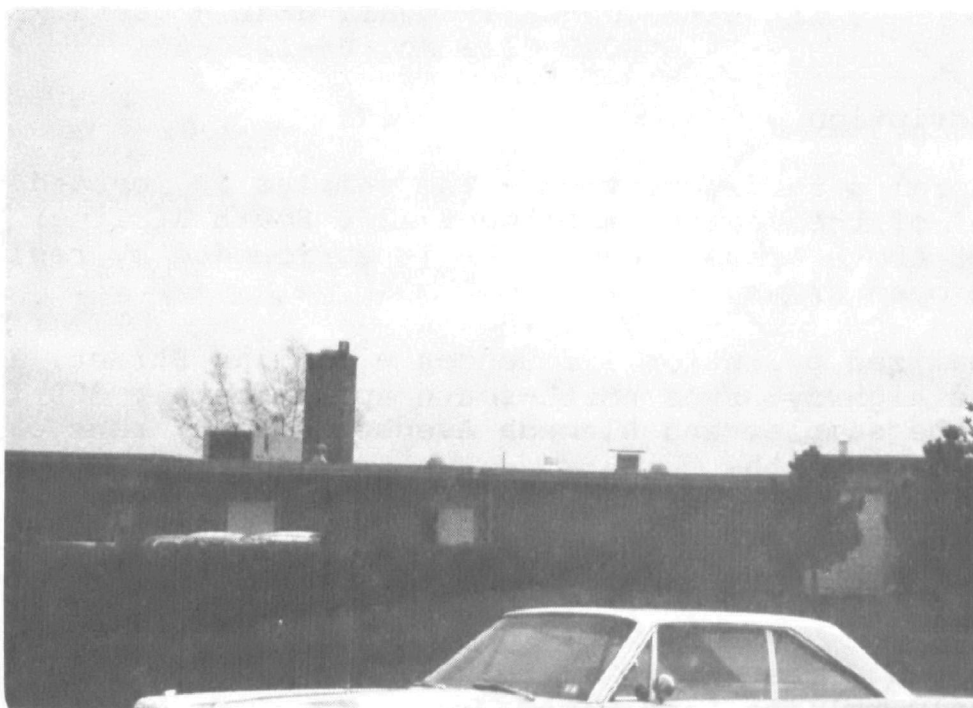
Localized pollution influences - Kipling Street, a major 4 lane highway, runs north-south approximately 300 feet east of the sampler and Alameda Avenue (4 lane) runs east-west 300 feet south.

Physical interferences - There are no obstructions or taller buildings in the immediate vicinity which would affect the sampler's performance.

Terrain - The entire microinventory area is composed of gently rolling land with a mean elevation of 5,500 feet msl.

Comments - The sampler appears to represent the air quality in the Lakewood area well.





Lakewood sampler viewed to the east.



Lakewood sampler viewed to the north.



Lakewood - City-County Health Department.

Sources in Microinventory Area (1 mile radius)

Lakewood

Population = 11,300

VMT = 67,200

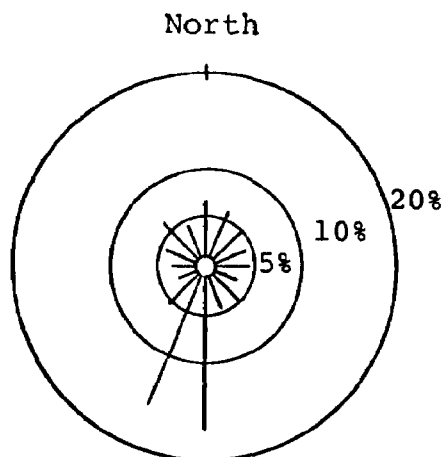
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 2.2% of county pop 67200 VMT/day | | 79 |
| Other mobile | | | 7 |
| Motor vehicle exhaust | | 0.59 g/VMT | 16 |
| Fugitive dust sources: | | | |
| Unpaved roads | 1.2 mi, 50 ADT | 3.5 lb/VMT | 38 |
| Unpaved shoulders | 2.3 mi | 0.62 t/ac/yr | 3 |
| Paved roads | 67200 VMT/day | 3.5 g/VMT | 95 |
| Road sanding | From APCD analysis | | 70 |
| Cleared areas | 23 ac | 0.59 t/ac/yr | 14 |
| Playgrounds | 2.5 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 324 |
| Emission density, ton/sq mi/yr | | | 103 |
| Percent fugitive dust | | | 69 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 348 $\mu\text{g}/\text{m}^3$; 1975 = 234 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Lakewood site has historically had annual mean concentrations less than the primary standard, except in 1974 when the mean was 80 $\mu\text{g}/\text{m}^3$. In 1975, the annual mean was only 60 $\mu\text{g}/\text{m}^3$. The microinventory of the survey area did not disclose any significant point sources and revealed relatively low traffic and population densities. The emission density was estimated to be 103 ton/sq mi/yr, which compares well with the measured ambient concentration of 60 $\mu\text{g}/\text{m}^3$.

The site evaluation showed no physical interferences or nearby sources that might bias the readings. All data seemed to indicate that this site was well below the concentration of primary standard and had experienced atypically high pollutant levels in 1974.

3.12 LITTLETON-CENTENNIAL WELLS
SAROAD Site No. 06-1420-002

Description

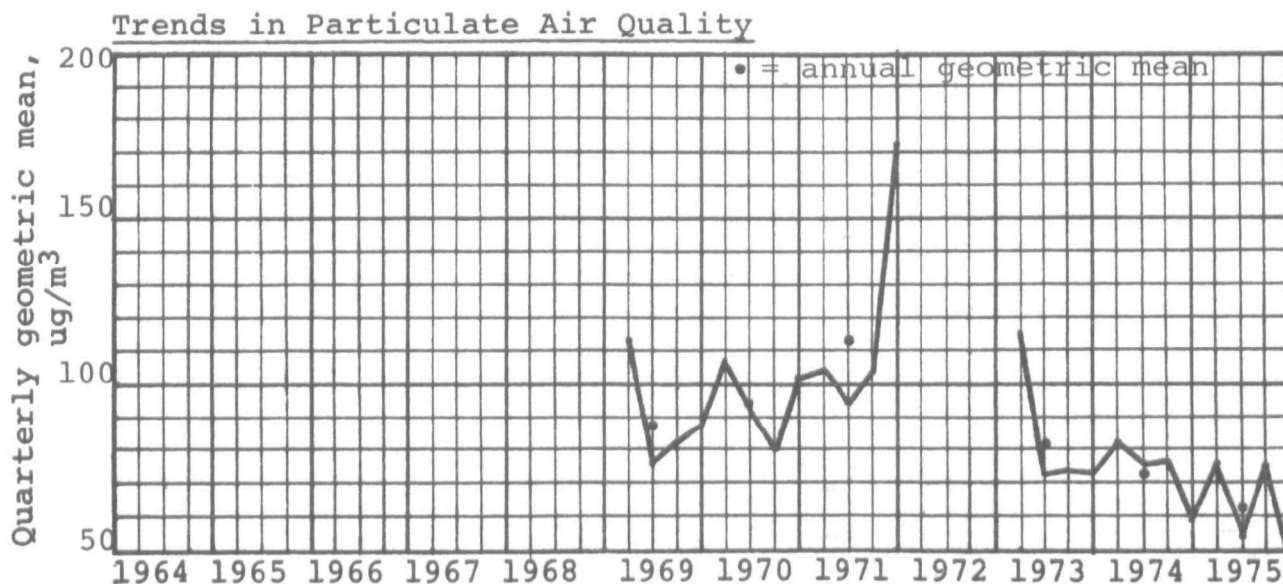
General site description - The sampler is located on the roof of a pumping station building (West Boules and Santa Fe) about 15 feet above ground level. It is in the middle of a large field and is immediately surrounded by sparsely vegetated open land.

Localized pollution influences - An unpaved road (15 feet wide) passes directly next to the building. It is an access road to the rear of a dirt race track, approximately 1/4 mile north, but does not appear to have any regular traffic. All the land in the immediate vicinity is open and a possible source of wind blown fugitive dust.

Physical interferences - There are no interfering obstructions or buildings in the immediate vicinity of the sampler.

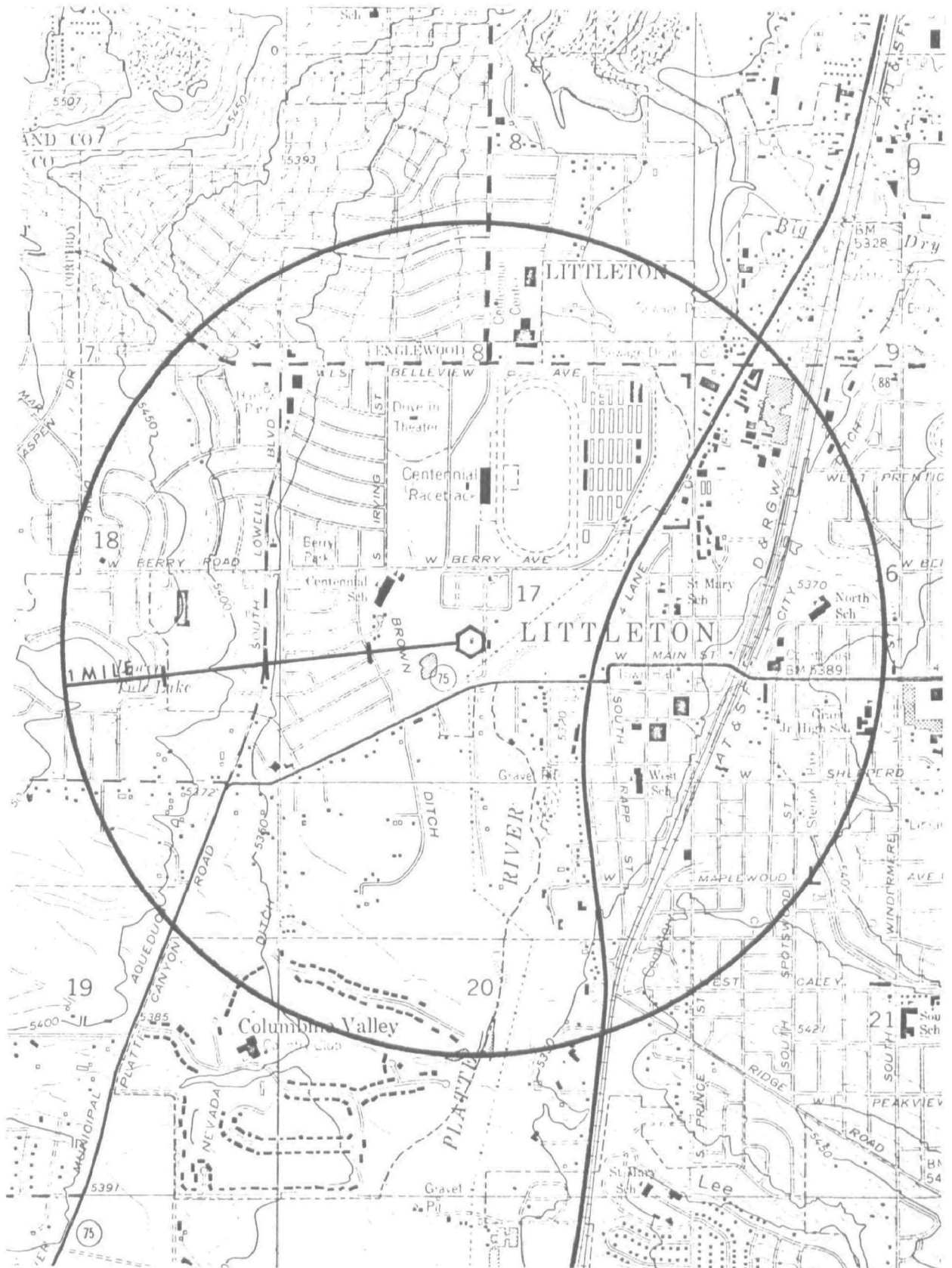
Terrain - The immediate sampler area and a 1/4 mile wide swath extending north-south through the middle of the 1 mile radius area is flat, while the land is rolling to either side. The mean elevation is about 5,350 feet msl.

Comments - The area within a 1/2 mile radius of the sampler is subject to wind erosion and probably high particulate emissions. The peripheral residential areas are clean and the streets are swept. The sampler location is not particularly biased, but it probably has higher than average concentration in the Littleton area.





Littleton sampler viewed to the north.



Littleton-Centennial Wells.

Sources in Microinventory Area (1 mile radius)

Littleton

Population = 6,100
VMT = 78,000

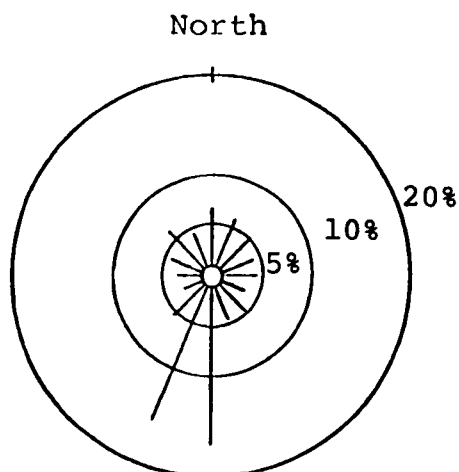
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|---|---|-----------------|--------------------------|
| Point sources: | | | |
| Ligault Fertilizer Electron Corporation | | | neg neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 3.8% of county pop 78000 VMT/day | 0.59 g/VMT | 25 |
| Other mobile | | | 3 |
| Motor vehicle exhaust | | | 19 |
| Fugitive dust sources: | | | |
| Unpaved roads | 1.9 mi, 10 ADT | 3.5 lb/VMT | 12 |
| Unpaved shoulders | 15 ac | 0.62 t/ac/yr | 9 |
| Paved roads | 78000 VMT/day | 3.5 g/VMT | 110 |
| Road sanding | From APCD analysis | | 52 |
| Unpaved parking lots | 47 ac | 1.4 lb/VMT | 27 |
| Construction | 40 ac, 4 mo | 0.62 t/ac/mo | 100 |
| Cleared areas | 77 ac | 0.31 t/ac/yr | 24 |
| RR yards and right-of-way | 26 ac | 0.7 t/ac/yr | 18 |
| Playgrounds | 3 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 401 |
| Emission density, ton/sq mi/yr | | | 128 |
| Percent fugitive dust | | | 88 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 200 ug/m³; 1975 = 245 ug/m³

Summary and Conclusions

The Littleton site has shown a distinct downtrend in annual mean concentrations during the past five years. In both 1974 and 1975, the short-term and annual readings were lower than the respective primary standards. The microinventory survey showed that paved roads and construction, both fugitive dust sources, were the major contributors. Emission density in the survey area was estimated to be 128 ton/sq mi/yr, a value consistent with the 1975 annual geometric mean of 62 ug/m³.

The sampler is located atop a small building in the middle of a large open area with sparse vegetation. It is not possible to quantify the effect of this exposure on readings, but it would appear to bias the measurements upward compared to other possible site locations in the Littleton area. All available information indicates that this site and the surrounding area which it represents have already attained the primary standard.

3.13 LONGMONT-CITY HALL
SAROAD Site No. 06-1460-001

Description

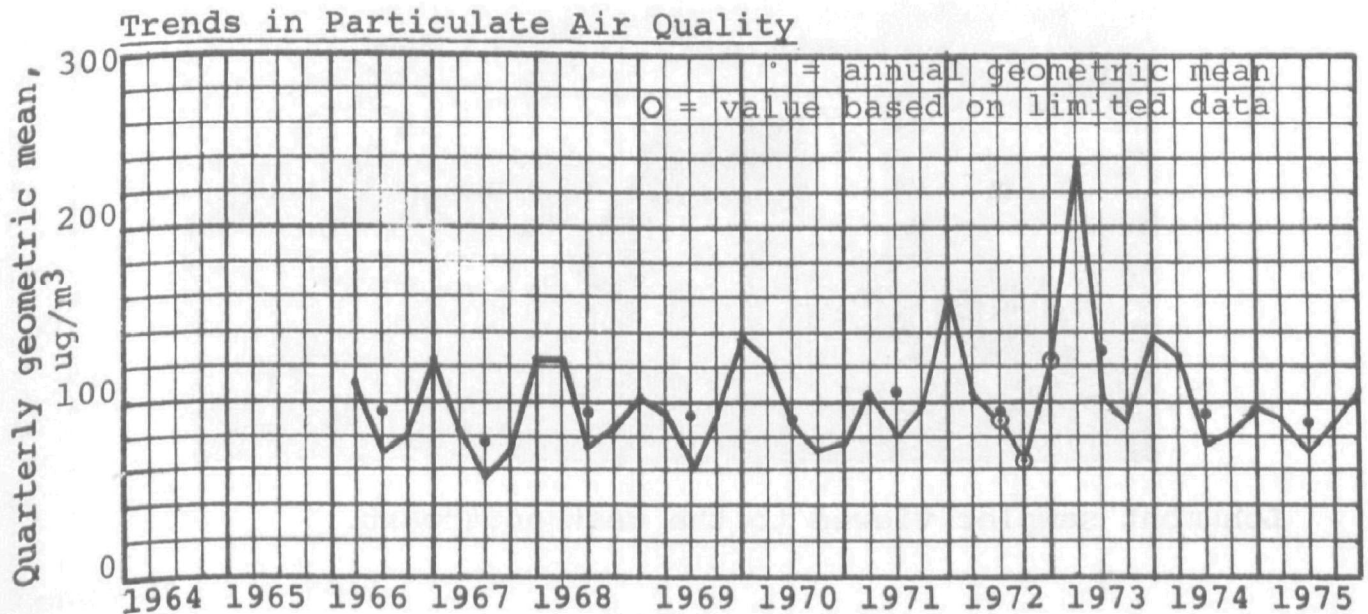
General site description - The sampler is located on the roof of City Hall (Fourth and Kimbart) about 30 feet above ground level. The local area is commercially developed.

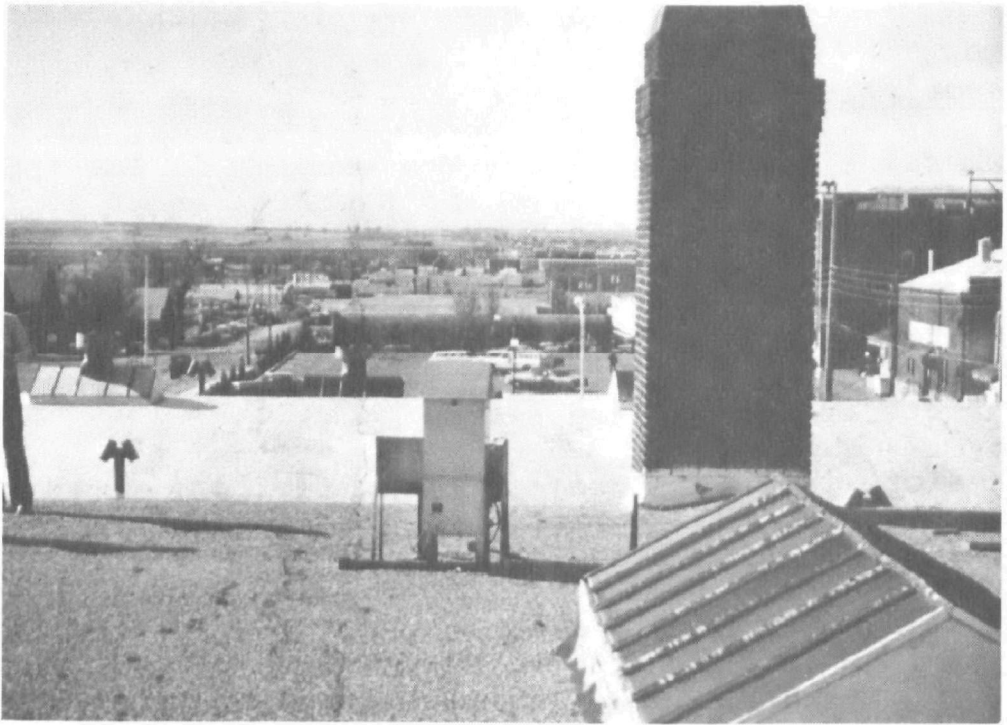
Localized pollution influences - A few furnace vents are located on the roof, while new construction is occurring at a new city complex directly southeast of the sampler. All streets are sanded and dirty.

Physical interferences - Various roof projections exist in proximity to the sampler, which is surrounded on three sides by a 3 foot high ledge or roof parapet.

Terrain - The entire area in general is quite flat. Many buildings in this central business district are lower in height than this one. In the south and west sectors of the 1 mile radius area, rolling hills predominate. There is a high level of agriculture surrounding the city.

Comments - There is a high probability that the measurements of air quality obtained are biased due to the roof obstructions close to the sampler; however, it is located well within the city of Longmont and would be representative of air quality in the central business district if not influenced by the roof obstructions.

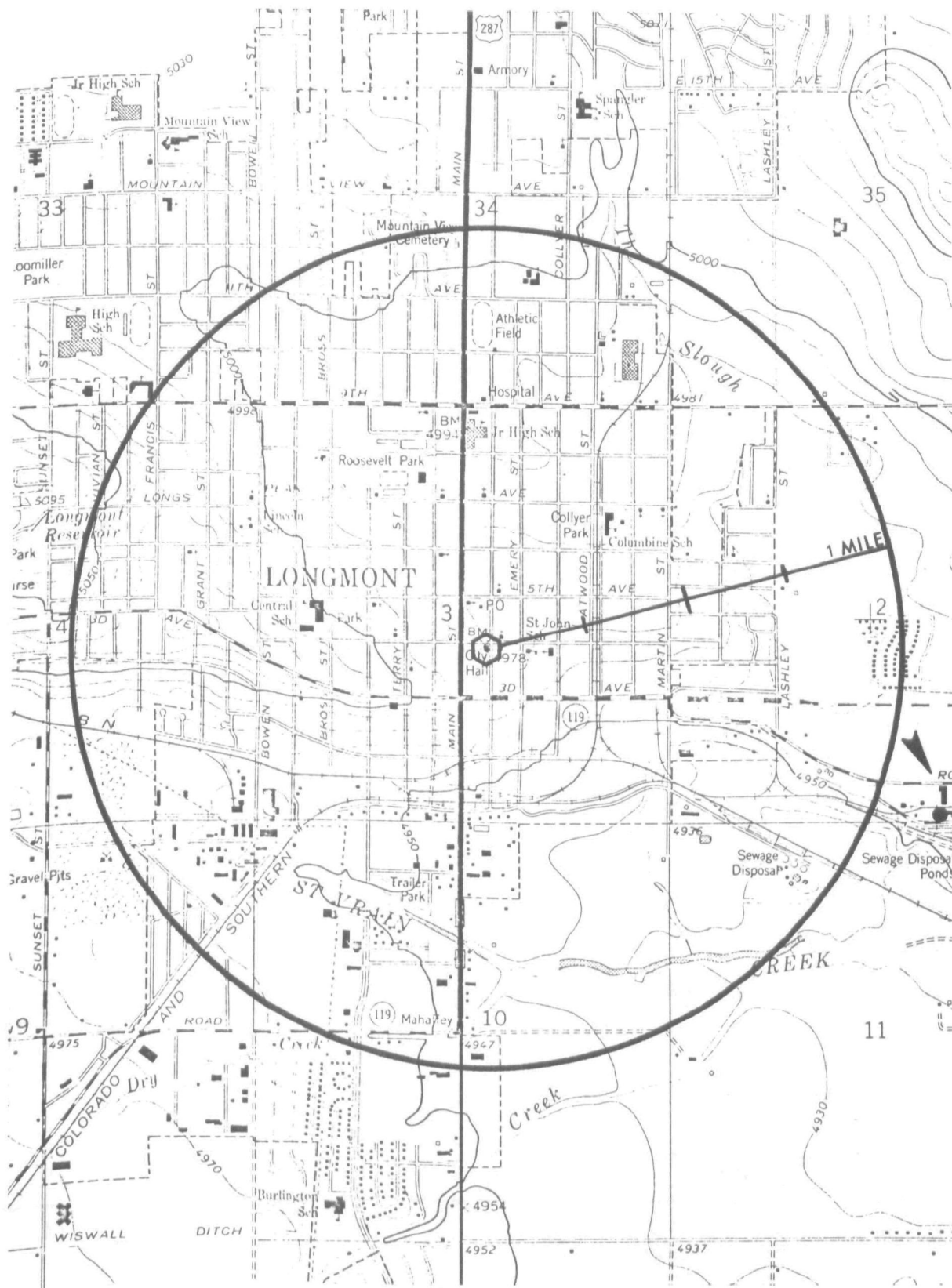




Longmont sampler viewed to the south.



Longmont sampler viewed to the west-northwest.



Longmont-City Hall.

Sources in Microinventory Area (1 mile radius)

Longmont

Population = 10,000
VMT = 59,300

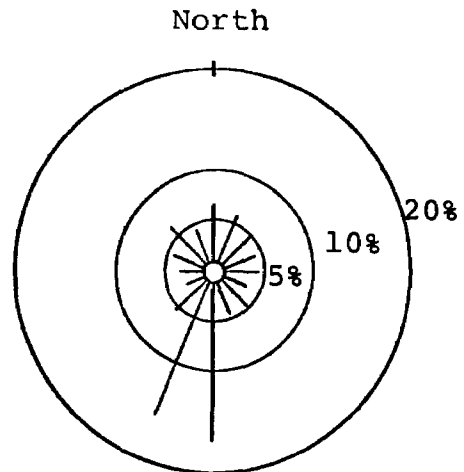
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| St. Vrain Block | | | neg |
| Slack Hoerner Foundry | | | neg |
| Western Foundry | | | neg |
| 1 Great Western Sugar | | | 46 |
| Co-op Feed | | | neg |
| Parma Industries | | | neg |
| Golden Gravel | | | 18 |
| Flatiron Paving | | | 16 |
| Golden West Mill | | | neg |
| Arapahoe Concrete | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 7.6% of county pop 59300 VMT/day | | 72 |
| Incineration | | | neg |
| Other mobile | | | 5 |
| Motor vehicle exhaust | | 0.59 g/VMT | 14 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.7 mi, 20 ADT | 3.24 lb/VMT | 32 |
| Unpaved shoulders | 1.0 mi | 0.62 t/ac/yr | 1 |
| Paved roads | 59300 VMT/day | 3.5 g/VMT | 84 |
| Unpaved parking lots | 20 ac | 1.3 lb/VMT | 11 |
| Agriculture | 99 ac | 0.25 t/ac/yr | 24 |
| Construction | 19 ac, 4 mo | 0.62 t/ac/mo | 47 |
| Cleared areas | 45 ac | 0.59 t/ac/yr | 26 |
| RR right-of-way | 31 ac | 0.7 t/ac/yr | 22 |
| RR yards | 15 ac | 0.7 t/ac/yr | 11 |
| Aggregate storage | 19 ac | 10.3 t/ac/yr | 195 |
| Total emissions, ton/yr | | | 624 |
| Emission density, ton/sq mi/yr | | | 199 |
| Percent fugitive dust | | | 73 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation -
1974 = 14.03"
1975 = 15.51"
Normal = 15.51"

No. of days
with precipitation = 84



Stapleton Airport - 1% calm

Maximum Recorded Concentrations

1974 = 563 $\mu\text{g}/\text{m}^3$; 1975 = 390 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Longmont site has consistently recorded annual mean concentrations of approximately $100 \mu\text{g}/\text{m}^3$ over the past 10 years. While the data do exhibit some seasonal variation, this variation is not nearly as great as in the Denver urban area. The estimated emission density of 199 ton/sq mi/yr from the microinventory is less than would be expected with the high measured concentrations. Some nearby construction activity may be temporarily increasing readings, but this would not explain the historically high concentrations. It is possible that, as with the Brighton site, more of the total measurement is due to background in the fringe areas of the Denver AQCR where surrounding land use is agricultural rather than urban or suburban. Thus, a lower emission density from inventoried sources would be required to produce the same ambient concentration as in the central Denver area.

The source category with greatest contribution in the survey area is aggregate storage (31%), followed by paved roads (13%), several point sources (13%), and residential/commercial fuel combustion (12%). Due to the many different contributing sources and the high percentage reduction needed for attainment, emission reductions from many sources would probably be required. A very comprehensive enforcement program for existing fugitive dust regulations might provide the necessary emission reductions.

3.14 GREELEY-CITY COMPLEX
SAROAD Site No. 06-1000-003

Description

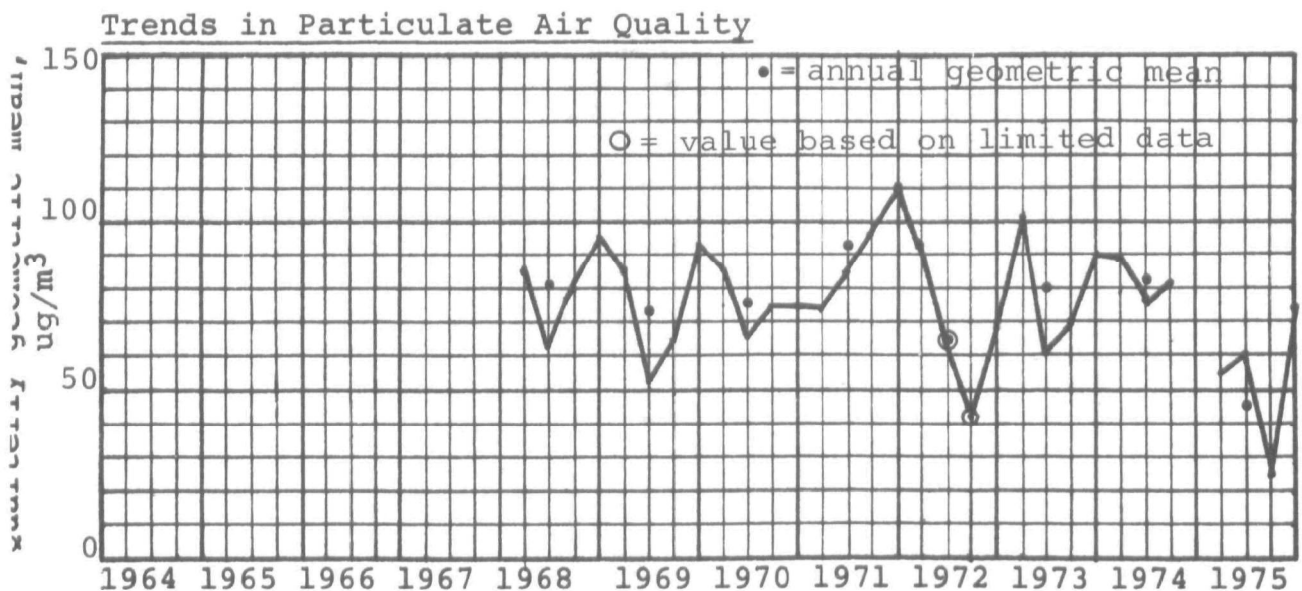
General site description - The sampler is situated on the roof of the City Complex/fire station (Sixth Street and Tenth Avenue) about 30 feet above ground level and set back 100 feet from Tenth Avenue. It is in an area composed of light commercial, fringe residential, and park land usage.

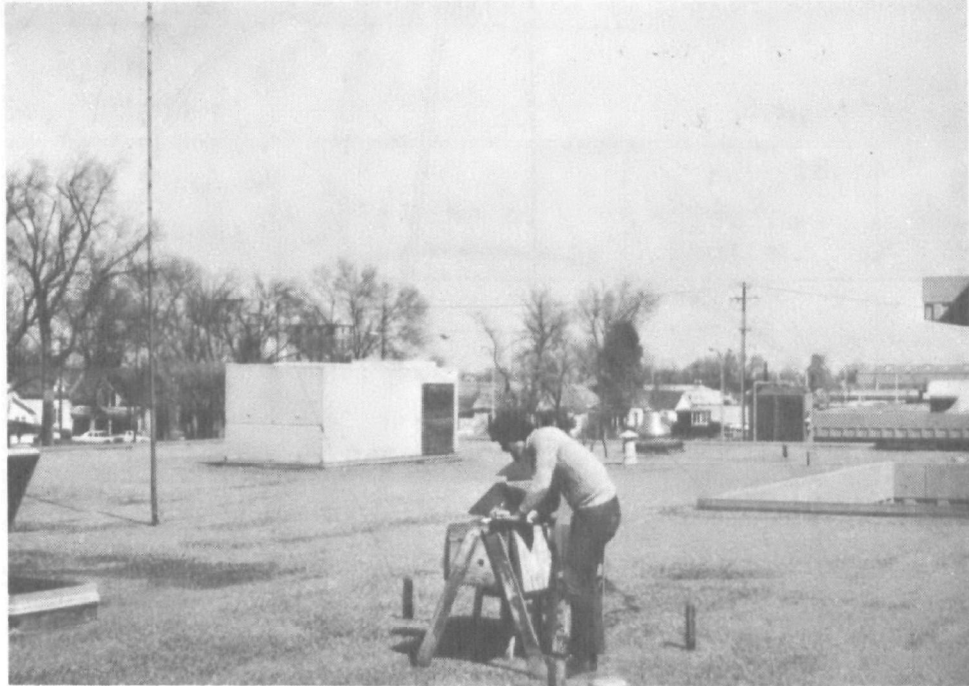
Localized pollution influences - The city streets in the immediate vicinity were very dusty.

Physical interferences - There are some small roof vents and an air conditioning compressor on the roof which would have no apparent effect on the sampler's readings.

Terrain - The site area is flat and consists mainly of developed urban/suburban areas. The mean elevation is about 4,650 feet msl.

Comments - This sampler is probably yielding a fairly representative picture of ambient air quality in Greeley. It is situated well and is removed from any possible severe localized pollution influences.

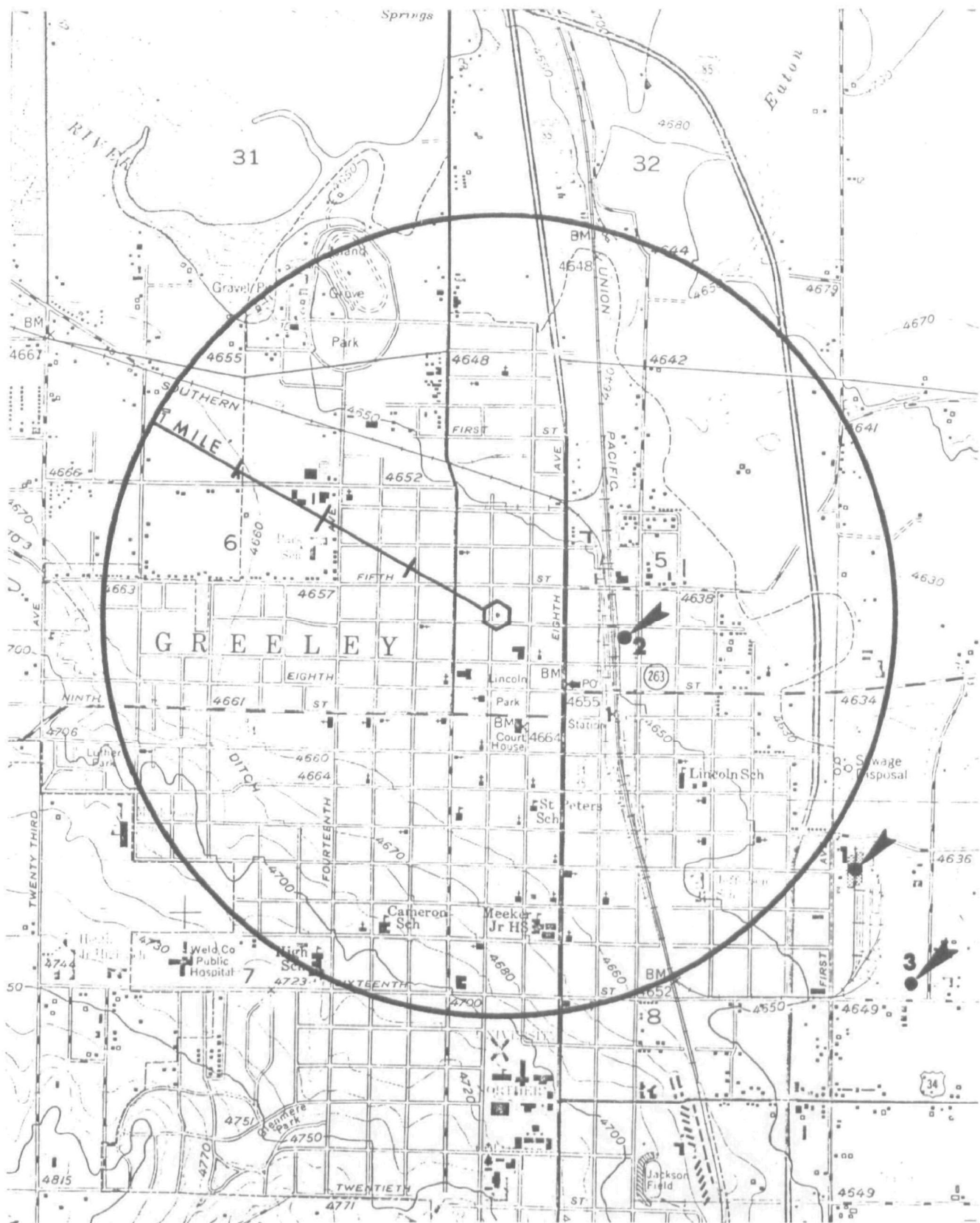




Greeley-City Complex sampler viewed to the northeast.



Greeley-City Complex sampler viewed to the south.



Greeley-City Complex.

Sources in Microinventory Area (1 mile radius)

Greeley-City Complex

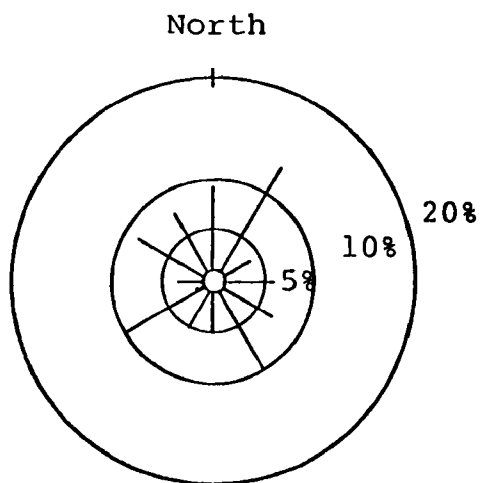
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Great Western Sugar | Outside mile radius | | 98 |
| 2 Greeley Elevator | | | 9 |
| 3 Farr Farms (feedlot) | | | 78 |
| D & D Bean | | | neg |
| (two locations) | | | |
| Nuffsinger Mfg | | | neg |
| Shank Feed | | | neg |
| Wellgro | | | 1 |
| Cowan Concrete | | | 3 |
| Monfort Packing | | | 18 |
| Greeley Sand & Gravel | Outside mile radius | | unknown |
| Flatiron Ready Mix | Outside mile radius | | unknown |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, 54.5% of total emissions in grids 7, 8, 11, and 12 | | 100 |
| Railroad | | | 2 |
| Motor vehicle exhaust | Included under Paved roads | | |
| Fugitive dust sources: | | | |
| Unpaved roads | From AQMA analysis | | 216 |
| Unpaved shoulders | 4.8 mi | 0.62 t/ac/yr | 3 |
| Paved roads, motor vehicle exhaust and sanding | From AQMA analysis | | 164 |
| Unpaved parking lots | 46 ac | 1.4 lb/VMT | 27 |
| Agriculture | 59 ac | 0.25 t/ac/yr | 14 |
| Construction | From AQMA analysis | | 3 |
| Cleared areas | 62 ac | 0.59 t/ac/yr | 36 |
| RR right-of-way | 14 ac | 0.7 t/ac/yr | 10 |
| RR yards | 46 ac | 0.7 t/ac/yr | 32 |
| Total emissions, ton/yr | | | 736 |
| Emission density, ton/sq mi/yr | | | 234 |
| Percent fugitive dust | | | 69 |

Meteorological Data

Average annual
wind speed = 7.5 mph

Annual precipitation -
1974 = 11.90"
1975 = 16.08"
Normal = 12.20"

No. of days
with precipitation = 80



Greeley - 0.6% calm
- 9.8% variable

Maximum Recorded Concentrations

1974 = 227 ug/m³; 1975 = 139 ug/m³

Summary and Conclusions

The Greeley-City Complex site had been reading near 80 ug/m³ annual mean for eight years before recording a value of 46 ug/m³ in 1975. The estimated emission density determined from the microinventory is 234 ton/sq mi/yr, a value more consistent with the concentrations of about 80 ug/m³ than the 1975 level. Based on this comparison, the 1975 data are suspect. However, this sampler is operated by the same personnel and the filters are analyzed in the same laboratory as other Weld County sites, which did not exhibit such changes.

The site appears to be well located and not subject to any physical interferences. The source category with the greatest emissions is unpaved roads, but reentrained dust from paved streets and point sources also make substantial contributions. Because this site had only been slightly exceeding the primary standard in previous years, a return to those levels in 1976 would require only a low percentage reduction in emissions for attainment. This could probably be accomplished best by changes in the enforcement of existing fugitive dust control regulations rather than by an SIP revision.

3.15 GREELEY-WASTEWATER TREATMENT PLANT
SAROAD Site No. 06-1000-004

Description

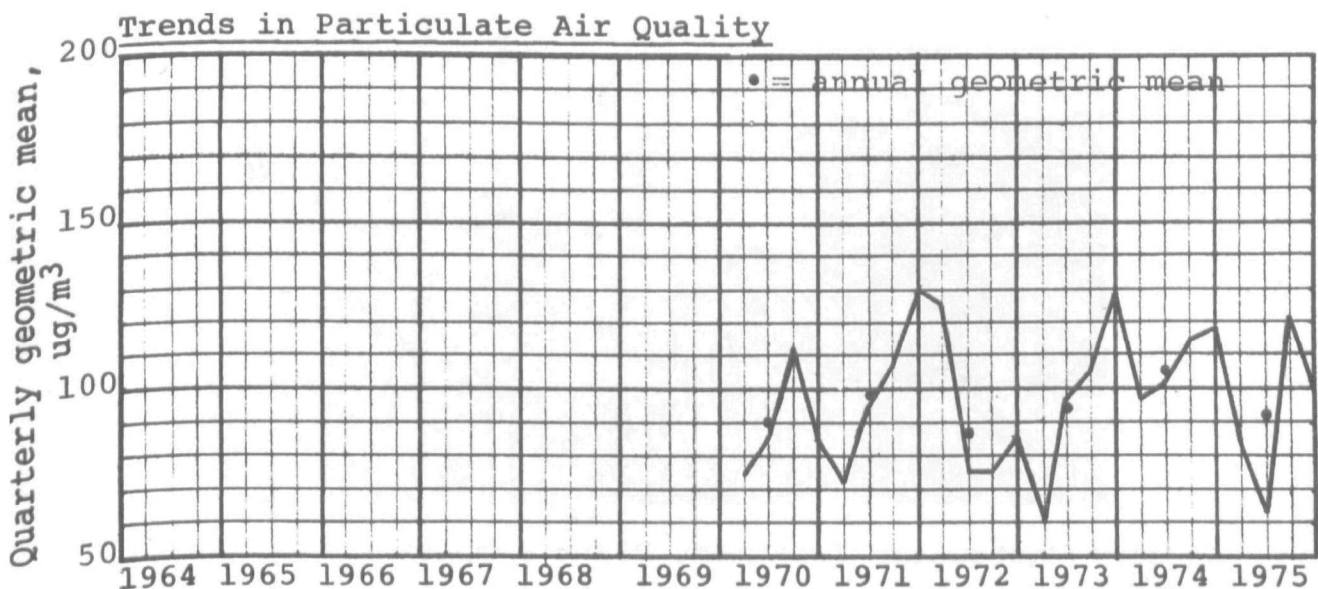
General site description - The sampler is located on the roof of a storage building at the sewage plant (1st Avenue and 10th Street) elevated 15 feet above the ground. It is surrounded by public use property and open land. The plant access road passes within 5 feet of the building.

Localized pollution influences - The sampler is fronted on two sides by an unpaved access road and an unpaved parking lot. Directly to the west (200 feet) is a 4 lane heavily travelled highway. There appeared to be a sewage sludge incinerator 100 feet to the southeast.

Physical interferences - No obstructions or taller buildings were noted in the vicinity of the sampler which could affect the readings.

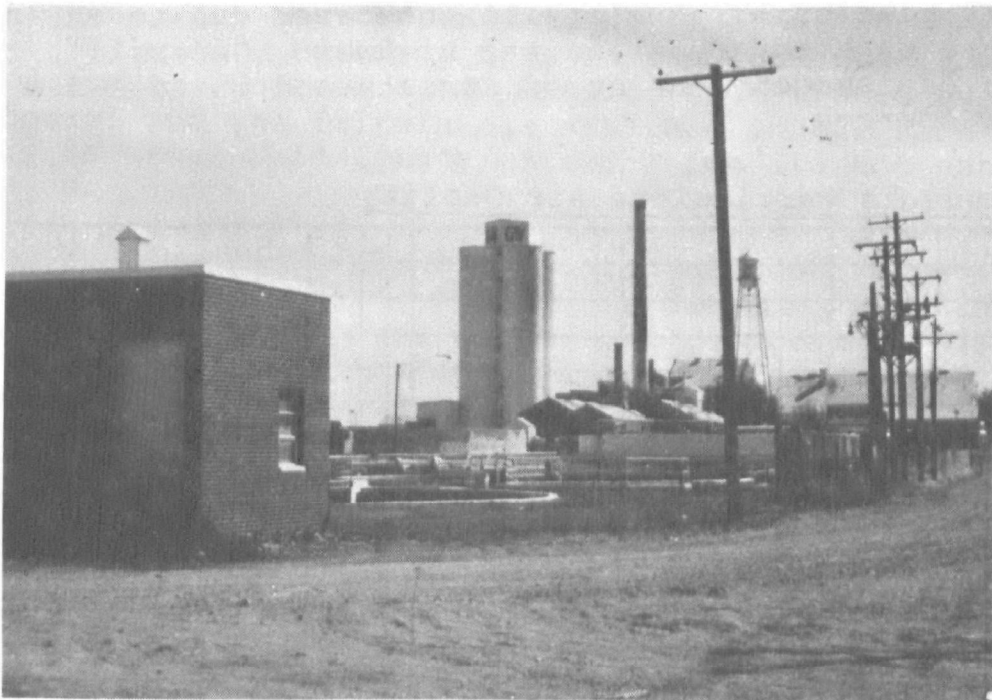
Terrain - The site area is flat with much open agricultural land to the east and a large 4 lane highway cutting through its middle, north to south. The mean elevation is about 4,650 feet msl.

Comments - It is possible that this sampler depicts a biased indication of air quality in this area due to the proximity of the unpaved areas and the highway. Generally, the survey area had sanded, uncleaned streets and quite a few fugitive dust sources.





Greeley-Wastewater Treatment Plant sampler viewed to the west.



Greeley-Wastewater Treatment Plant sampler viewed to the southeast.



Greeley-Wastewater Treatment Plant.

Sources in Microinventory Area (1 mile radius)

Greeley-Wastewater Treatment Plant

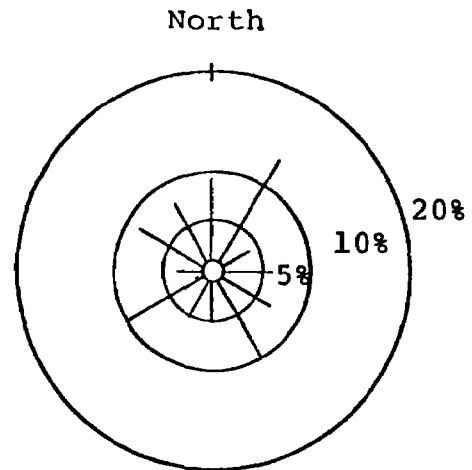
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--|---|----------------------------|--------------------------|
| Point sources: | | | |
| 1 Great Western Sugar | | | 98 |
| 2 Farr Farms | | | 78 |
| Unnamed elevator | | | unknown |
| D & D Bean | | | neg |
| (two locations) | | | |
| Nuffsinger Mfg | | | neg |
| Greeley Elevator | | | 9 |
| Shank Feed | | | neg |
| Wellgro | | | 1 |
| Cowan Concrete | | | 3 |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, 54.5% of total emissions in grids 8, 9, 12, and 13 | | 80 |
| Railroad | | | 1 |
| Motor vehicle exhaust | | Included under Paved roads | |
| Fugitive dust sources: | | | |
| Unpaved roads | From AQMA analysis | | 306 |
| Unpaved shoulders | 5.3 mi | 0.62 t/ac/yr | 3 |
| Paved roads, motor vehicle exhaust and sanding | From AQMA analysis | | 87 |
| Unpaved parking lots | 59 ac | 1.4 lb/VMT | 34 |
| Agriculture | 470 ac | 0.25 t/ac/yr | 115 |
| Construction | From AQMA analysis | | 6 |
| Cleared areas | 85 ac | 0.59 t/ac/yr | 50 |
| RR right-of-way | 21 ac | 0.7 t/ac/yr | 15 |
| RR yards | 34 ac | 0.7 t/ac/yr | 24 |
| Total emissions, ton/yr | | | 910 |
| Emission density, ton/sq mi/yr | | | 290 |
| Percent fugitive dust | | | 70 |

Meteorological Data

Average annual
wind speed = 7.5 mph

Annual precipitation -
1974 = 11.90"
1975 = 16.08"
Normal = 12.20"

No. of days
with precipitation = 80



Greeley - 0.6% calm
- 9.8% variable

Maximum Recorded Concentrations

1974 = 606 $\mu\text{g}/\text{m}^3$; 1975 = 305 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

This site in Greeley has not shown any distinct long-term trend or seasonal pattern over the past six years. Both the 24-hour and annual primary standards have been exceeded each year. The microinventory shows several source categories with a significant impact, including unpaved roads, agriculture, point sources, and residential/commercial fuel combustion. Fugitive dust area sources account for approximately 70 percent of the total emissions in the survey area.

The emission density is estimated to be 290 ton/sq mi/yr, which agrees well with the annual mean of 91 $\mu\text{g}/\text{m}^3$. However, the site survey revealed an apparent strong bias to the readings due to the presence of an unpaved road and parking lot adjacent to the sampler, as shown in the photographs. More comprehensive enforcement of existing fugitive dust regulations might result in attainment at this site, but the site should probably be moved to a more representative location rather than requesting an SIP revision in this AQCR.

3.16 LOVELAND-LARIMER COUNTY BUILDING
SAROAD Site No. 06-1480-002

Description

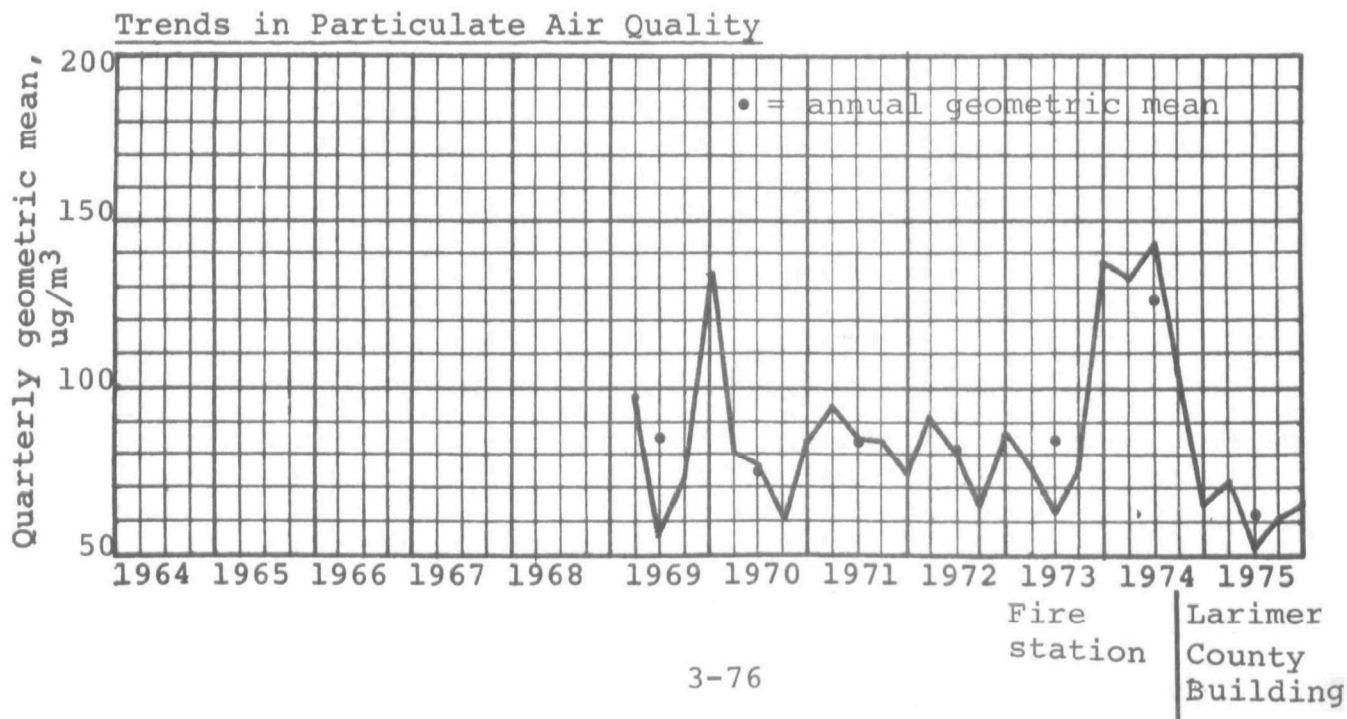
General site description - The sampler is located on the roof of the Larimer County Building (211 East Fourth, NE) about 40 feet above ground level. It is located in the central business district of town.

Localized pollution influences - There are no major influential sources in proximity to the sampler with the exception of traffic.

Physical interferences - The sampler is not visibly obstructed by any roof structures. There are no buildings in the vicinity that are taller.

Terrain - The immediate and surrounding terrain is flat with a mean elevation of 5,000 feet msl. Lake Loveland borders the northwest edge of the 1 mile radius area. There is a canal and associated depression in the south central part of the area.

Comments - Overall, area streets are sanded and were dirty on the edges at the time of the survey. The sampler was moved from 410 East Fifth Street in the fourth quarter of 1974. The present site is three blocks from the old one. The sampler probably obtains a representative sample of ambient air in this area.





Loveland-Larimer County Building.

Sources in Microinventory Area (1 mile radius)

Loveland Population = 12,900
VMT = 55,100

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Great Western Sugar | | | 33 |
| Loveland Packing | | | 1 |
| Flatiron Paving | | | 16 |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 14.3% of county pop 55100 VMT/day | | 62 |
| Incineration | | | neg |
| Other mobile | | | 10 |
| Motor vehicle exhaust | | 0.59 g/VMT | 13 |
| Fugitive dust sources: | | | |
| Unpaved roads | 1.9 mi, 10 ADT | 3.1 lb/VMT | 11 |
| Unpaved shoulders | 2.3 mi | 0.62 t/ac/yr | 3 |
| Paved roads | 2.9% of county VMT (1346 t/yr) | | 39 |
| Unpaved parking lots | 30 ac | 1.24 lb/VMT | 15 |
| Agriculture | 116 ac | 0.3 t/ac/yr | 35 |
| Cleared areas | 40 ac | 0.59 t/ac/yr | 24 |
| RR right-of-way | 24 ac | 0.7 t/ac/yr | 17 |
| RR yards | 15 ac | 0.7 t/ac/yr | 11 |
| Aggregate storage | 4 ac | 10.3 t/ac/yr | 41 |
| Gravel pits/quarries | 7 ac | 10.3 t/ac/yr | 72 |
| Playgrounds | 4 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 405 |
| Emission density, ton/sq mi/yr | | | 129 |
| Percent fugitive dust | | | 67 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 429 ug/m³; 1975 = 223 ug/m³

Summary and Conclusions

The Loveland site was located at a fire station in the central business district for six years, where it usually recorded annual mean concentrations slightly above the primary standard (except for the 127 ug/m³ reading in 1974). However, this station was removed from the network at the end of 1974 and replaced by a site three blocks away at the Larimer County Building. At this new location, the 1975 annual geometric mean was 62 ug/m³, well below the primary standard.

According to the microinventory for the new site, there are no sources or source categories with a major impact on the sampler. The estimated emission density is 129 ton/sq mi/yr, which checks with the ambient concentration of 62 ug/m³ and indicates that the former site may have been affected by local source biases. No localized influences were identified at the new site. Based on the 1975 air quality data and microinventory results, the Loveland area does not exceed the particulate primary standards.

3.17 STERLING-MAJESTIC SAVINGS AND LOAN
SAROAD Site No. 06-0800-001

Description

General site description - The sampler is located on the roof of the Majestic Savings and Loan building (South Third and Ash) about 20 feet above ground level. It is set back 30 feet from Third Street. The immediate area is the commercial district of town; the periphery of the survey area is residential and open land.

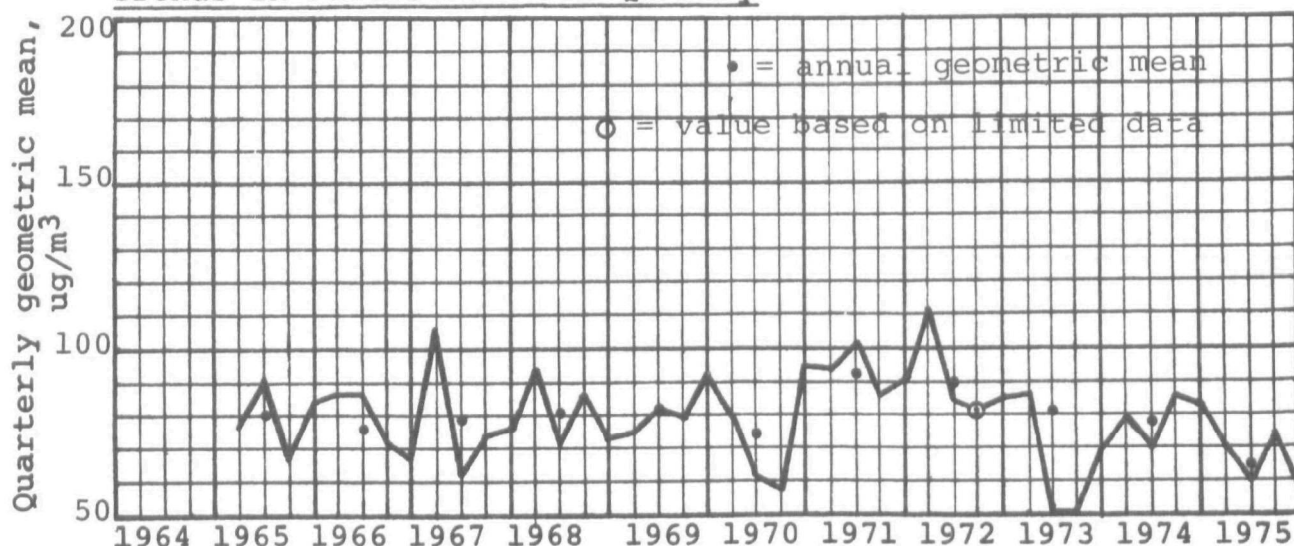
Localized pollution influences - There is a roof vent and an air conditioning compressor 50 feet from the sampler. The adjacent streets are clean.

Physical interferences - The walls of the adjacent buildings 50 feet to the southeast and northeast of the sampler extend above it about 20 feet. No other obstructions are in close proximity.

Terrain - The immediate and surrounding terrain is flat with a mean elevation of approximately 3,930 feet msl.

Comments - The downtown area in proximity to the sampler is generally clean. The streets were sanded and not swept at the time of the survey. The area contained many cleared areas subject to wind erosion. The soil is very sandy.

Trends in Particulate Air Quality





sterling sampler viewed to the south.



sterling sampler viewed to the northeast.



Sterling-Majestic Savings and Loan.

Sources in Microinventory Area (1 mile radius)

Sterling

Population = 10,000

VMT = 31,400

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| Agri Chem | | | neg |
| Lebsacks Feed & Seed | | | neg |
| Great Western Sugar | | | 8 (est) |
| D & C Bean | | | 6 (est) |
| Trinidad Bean & Elev | | | 24 (est) |
| Farr Feeds | | | neg |
| 1 Farr Feedlot | 9 ac | 3.0 t/ac/yr | 27 |
| McAtee-Renquist | Outside mile radius | | neg |
| Nutrena Feeds | | | neg |
| Area sources: | | | |
| Fuel combustion | [From TRW inventory report, 53% of county pop 31400 VMT/day | | 20 |
| Other mobile | | | 4 |
| Motor vehicle exhaust | | 0.59 g/VMT | 7 |
| Fugitive dust sources: | | | |
| Unpaved roads | 3.3 mi, 20 ADT | 3.6 lb/VMT | 43 |
| Unpaved shoulders | 5.7 mi | 1.84 t/ac/yr | 24 |
| Paved roads | 31400 VMT/day | 3.5 g/VMT | 44 |
| Unpaved parking lots | 35 ac | 1.43 lb/VMT | 21 |
| Agriculture | 10 ac | 0.3 t/ac/yr | 3 |
| Cleared areas | 153 ac | 1.75 t/ac/yr | 268 |
| RR right-of-way | 24 ac | 2.1 t/ac/yr | 50 |
| RR yards | 41 ac | 2.1 t/ac/yr | 86 |
| Playgrounds | 5 ac | 1.84 t/ac/yr | 9 |
| Total emissions, ton/yr | | | 644 |
| Emission density, ton/sq mi/yr | | | 205 |
| Percent fugitive dust | | | 85 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 231 ug/m³; 1975 = 307 ug/m³

Summary and Conclusions

The Sterling site recorded annual means slightly above the primary standard for its entire 10 year history prior to 1975. In 1975, the annual mean fell to 65 ug/m³. With an estimated emission density of 205 ug/m³, the comparable air quality should be in the range of 65 to 80 ug/m³, so this determination does not aid in deciding whether the Sterling site has attained the standards or experienced atypically low concentrations in 1975.

The indicated major contributing sources at this site are somewhat unusual--cleared areas (42%) and railroad yards and right-of-ways (21%). Fugitive dust sources account for approximately 85 percent of emissions in the survey area. If minor emission reductions would be necessary to permanently attain the standards based on subsequent air quality data, they could probably be best achieved by more thorough enforcement of existing fugitive dust regulations rather than by an SIP revision.

There do not appear to be any localized influencing sources near the sampler.

3.18 WINDSOR-FIRE STATION
SAROAD Site No. 06-2220-003

Description

General site description - The sampler is located on the roof of the Windsor Fire Station on Main Street, approximately 20 feet above ground level. It is set back about 50 feet from Main Street (a 4 lane road). The surrounding area is zoned residential, light commercial, and agricultural.

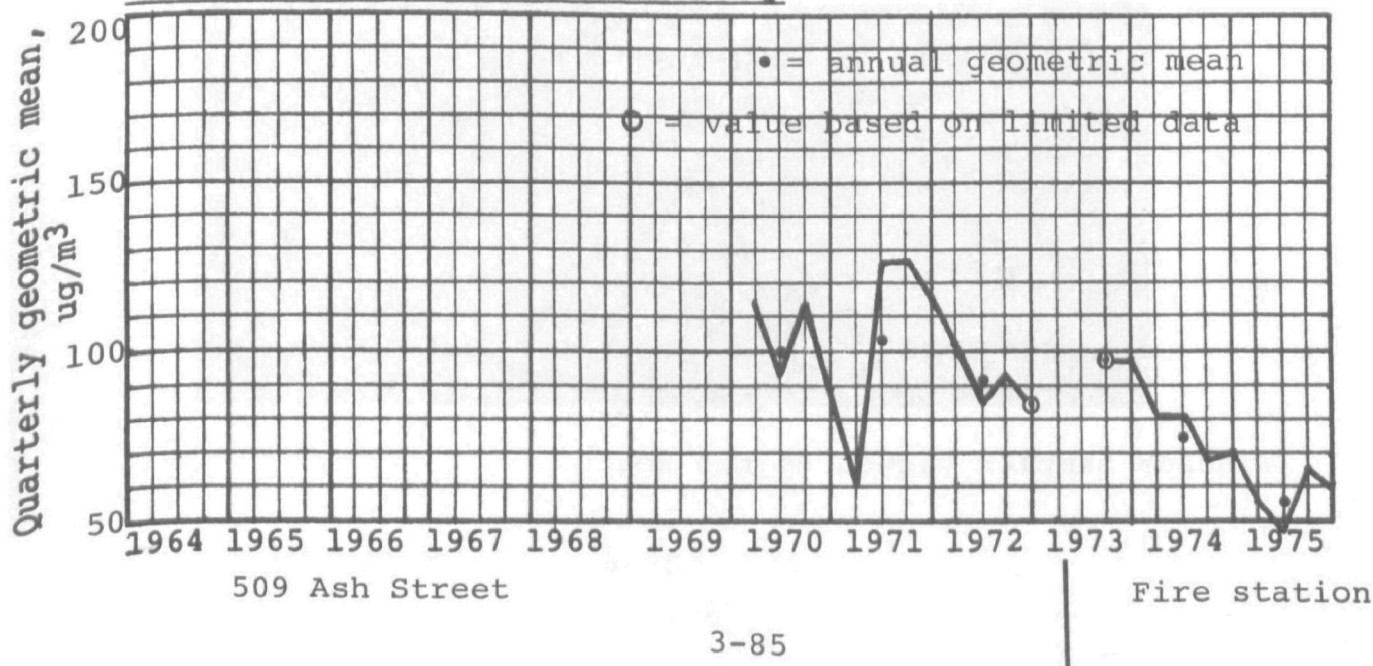
Localized pollution influences - Directly to the east and immediately adjacent to the sampler there are about 3 acres under construction (building). The area in the rear of the fire station is unpaved and to the north (300 feet) lies a plowed field. Main Street in front of the sampler appears clean.

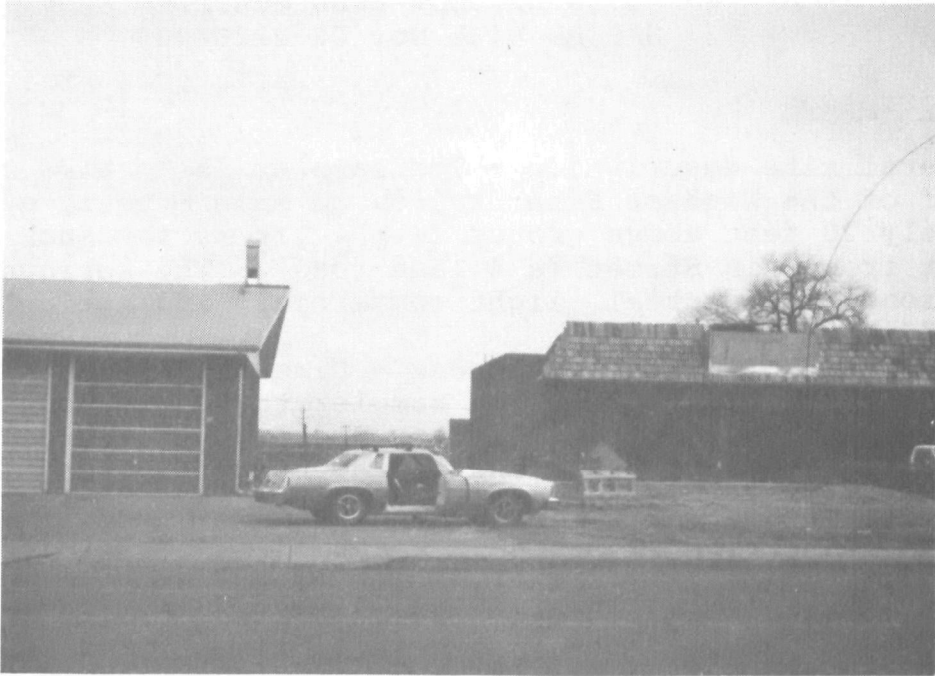
Physical interferences - No major obstructions were noted in the immediate vicinity of the sampler. There were no taller buildings in the immediate area.

Terrain - The site area is completely flat with a lake and agriculture comprising about 75 percent of the surface area. There are no predominant features. The mean elevation is approximately 4,800 feet.

Comments - This site appears to be biased by many localized interfering fugitive dust sources and may not be completely representative of air quality in Windsor. The streets in the area appeared to be swept but were still sandy and dirty at the time of the survey. This sampler was moved from 509 Ash Street during 1973. The former site was about 2 blocks from the present one.

Trends in Particulate Air Quality

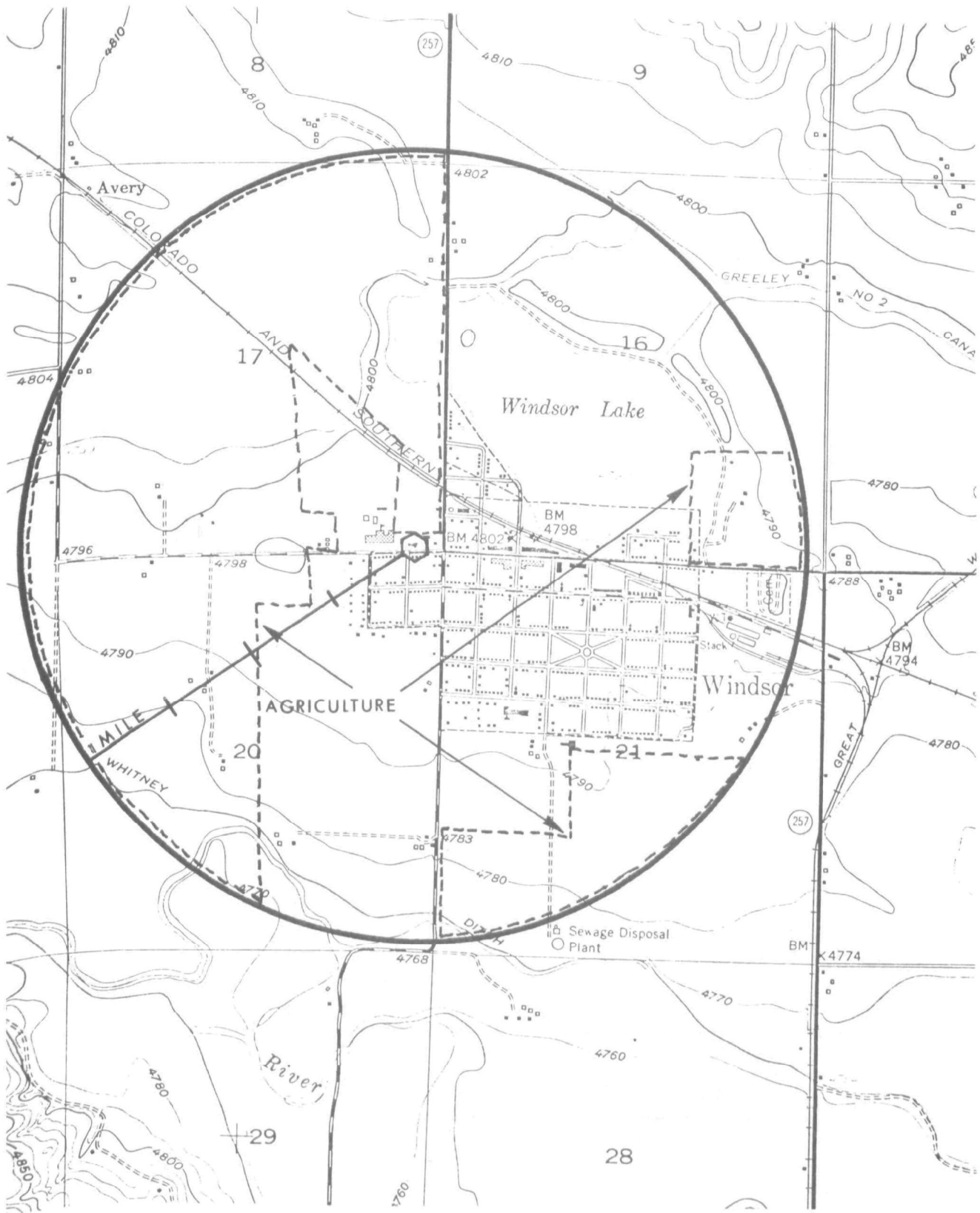




Windsor sampler viewed to the north.



Windsor sampler viewed to the south.



Windsor-Fire Station.

Sources in Microinventory Area (1 mile radius)

Windsor

Population = 1,735

VTM = 11,900

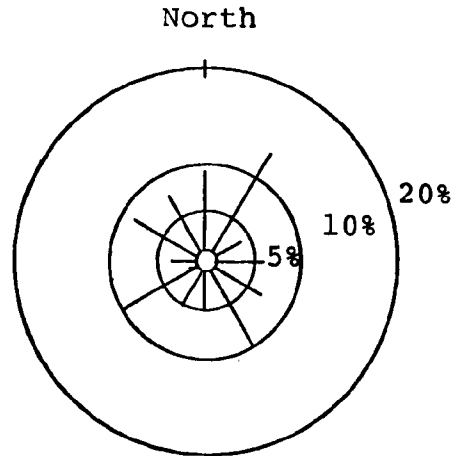
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------------|--------------------------|
| Point sources: | | | |
| Windsor Elevator | | | neg |
| Cowan Concrete | | | 3 |
| Western Alfalfa | | | 31 |
| Kerr Elevator | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 2.0% of county pop 11900 VMT/day | | 8 |
| Other mobile | | | 2 |
| Motor vehicle exhaust | | 0.59 g/VMT | 3 |
| Fugitive dust sources: | | | |
| Unpaved roads | 3.9 mi, 20 ADT | 3.5 lb/VMT | 43 |
| Unpaved shoulders | 0.5 mi | 0.62 t/ac/yr | 1 |
| Paved roads | 0.5% of county VMT (1837 t/yr) | | 9 |
| Unpaved parking lots | 13 ac | 1.4 lb/VMT | 8 |
| Agriculture | 1000 ac | 1.55 t/ac/yr | 245 |
| | | 0.99 t/ac/yr, tilling | |
| Cleared areas | 42 ac | 0.59 t/ac/yr | 25 |
| RR right-of-way | 11 ac | 0.7 t/ac/yr | 8 |
| RR yards | 2 ac | 0.7 t/ac/yr | 1 |
| Playgrounds | 5 ac | 0.62 t/ac/yr | 3 |
| Total emissions, ton/yr | | | 390 |
| Emission density, ton/sq mi/yr | | | 124 |
| Percent fugitive dust | | | 88 |

Meteorological Data

Average annual
wind speed = 7.5 mph

Annual precipitation -
1974 = 11.90"
1975 = 16.08"
Normal = 12.20"

No. of days
with precipitation = 80



Greeley - 0.6% calm
- 9.8% variable

Maximum Recorded Concentrations

1974 = 1048, second high = 170 ug/m^3
1975 = 208 ug/m^3

Summary and Conclusions

The sampler in Windsor recorded annual mean concentrations around 100 ug/m^3 for three years in the early 1970's. The site was temporarily shut down and then resumed operation in late 1973 at its present location on the fire station building. The annual geometric means for 1974 and 1975 were 75 and 56 ug/m^3 , respectively, neither above the primary standard. The high 24-hour reading of 1048 ug/m^3 in 1974 was obtained on a day with 15-26 knot winds recorded in Denver and 22-40 knot winds in Cheyenne. If this sample were eliminated from the 1974 data, the annual mean would be reduced to 73 ug/m^3 .

The estimated emission density of 124 ton/sq mi/yr appears to be consistent with the relatively low readings measured in 1975. The only major contributor to the ambient concentrations was shown to be agriculture (63%).

A large construction site immediately adjacent to the sampler is undoubtedly biasing the current readings, as shown in the photographs. This interference is temporary, but other nearby fugitive dust sources are probably more permanent. Therefore, even if the site were to exceed the standards in the future, it could be attributed to siting bias rather than high pollutant concentrations in Windsor.

3.19 LA SALLE-VOLUNTEER FIRE DEPARTMENT
SAROAD Site No. 06-2220-004

Description

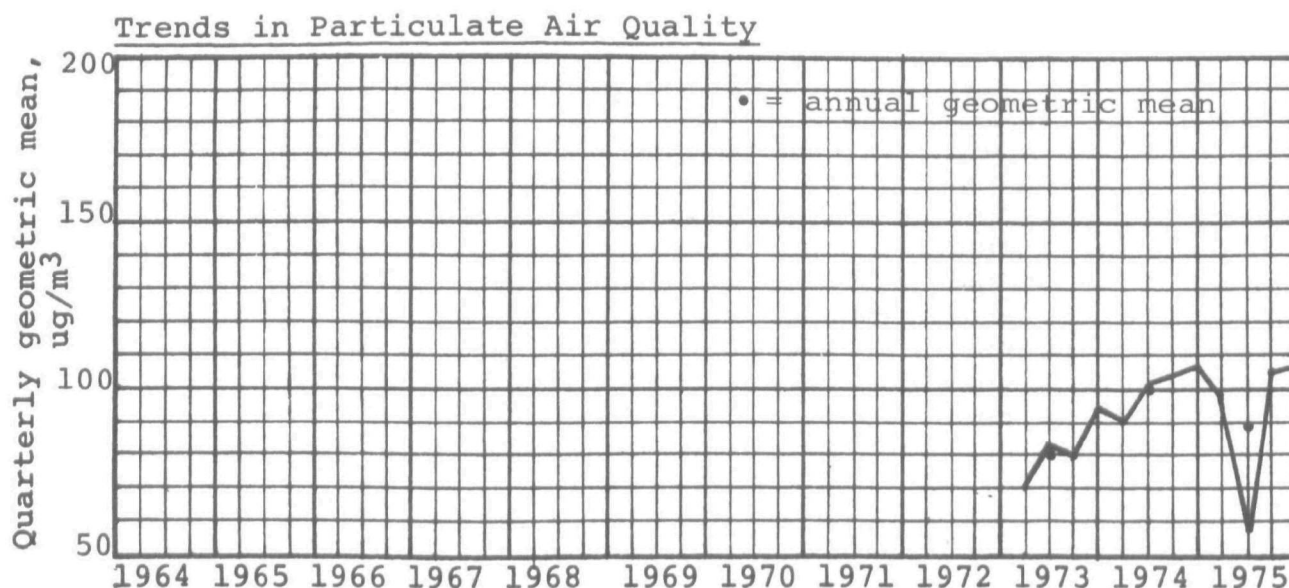
General site description - The sampler is located on the roof of the fire station (Main Street) about 15 feet above ground level. It is set back from Main Street about 75 feet in a primarily light commercial/residential zoned area.

Localized pollution influences - The sides and back of the fire station are bordered by large unpaved alleys.

Physical interferences - The only physical obstruction on the roof is a fire hose drier which should not interfere with the sampler's exposure. There are no taller buildings in the area.

Terrain - The site area is flat and sits in the South Platte River Valley. The mean elevation is approximately 4,670 feet msl.

Comments - It is possible that this sampler is presenting a biased indication of air quality due to the close proximity of the unpaved alleys alongside the fire station.

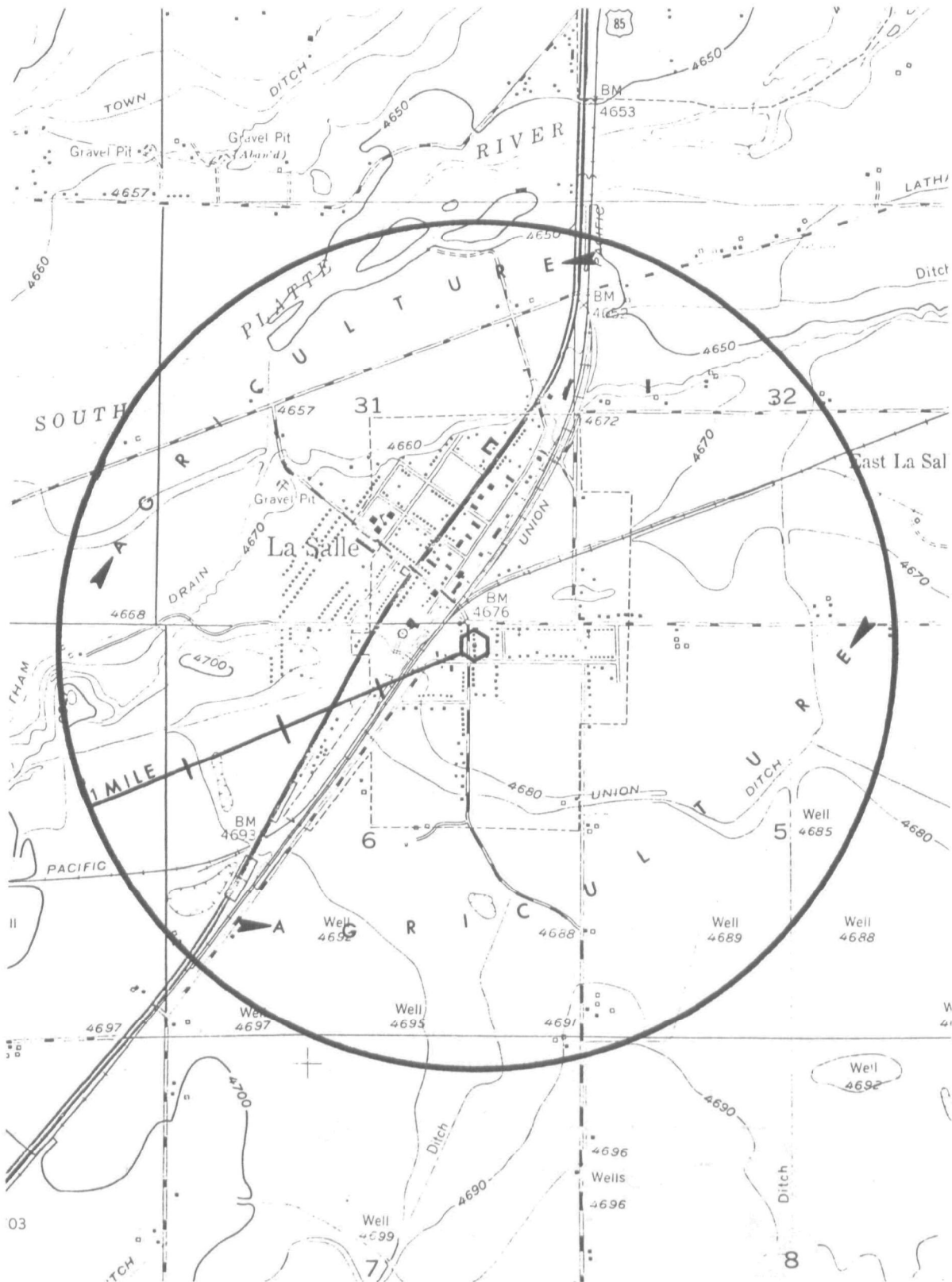




La Salle sampler viewed to the east.



La Salle sampler viewed to the west.



La Salle-Volunteer Fire Department.

Sources in Microinventory Area (1 mile radius)

La Salle

Population = 1,300

VMT = 21,200

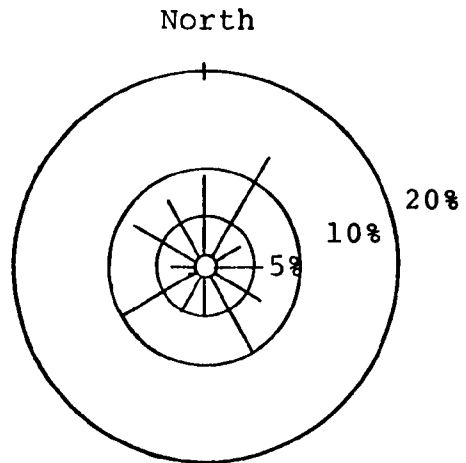
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| John Ewing | | | 15 |
| Weld Grain | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 1.4% of county pop 21200 VMT/day | | 6 |
| Other mobile | | | 2 |
| Motor vehicle exhaust | | 0.59 g/VMT | 5 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.4 mi, 30 ADT | 3.5 lb/VMT | 46 |
| Unpaved shoulders | 2.3 mi | 0.62 t/ac/yr | 3 |
| Paved roads | 0.9% of county VMT (1837 t/yr) | | 17 |
| Unpaved parking lots | 28 ac | 1.4 lb/VMT | 16 |
| Agriculture | 1280 ac | 0.25 t/ac/yr | 314 |
| Construction | 9 ac, 4 mo | 0.62 t/ac/mo | 22 |
| Cleared areas | 29 ac | 0.59 t/ac/yr | 17 |
| RR right-of-way | 20 ac | 0.7 t/ac/yr | 14 |
| RR yards | 10 ac | 0.7 t/ac/yr | 7 |
| Playgrounds | 2 ac | 0.62 t/ac/yr | 1 |
| Total emissions, ton/yr | | | 485 |
| Emission density, ton/sq mi/yr | | | 154 |
| Percent fugitive dust | | | 94 |

Meteorological Data

Average annual
wind speed = 7.5 mph

Annual precipitation -
1974 = 11.90"
1975 = 16.08"
Normal = 12.20"

No. of days
with precipitation = 80



Maximum Recorded Concentrations

1974 = 797 ug/m³; 1975 = 388 ug/m³

Summary and Conclusions

The La Salle site has exceeded the primary standards all three years since it was installed. The major source which appears to impact the sampler is agricultural dust, accounting for 65 percent of emissions in the survey area. All fugitive dust sources account for 94 percent. Estimated emission density of 154 ton/sq mi/yr is less than would be anticipated from the 1975 annual mean of 89 ug/m³.

A possible explanation for the high ambient measurements is the presence of unpaved alleys and parking areas on three sides of the sampler, as shown in the photographs. These localized influences could be responsible for elevating readings at the site above the standard. Because of the high percentage contribution from fugitive dust sources that cannot be controlled by reasonable measures, non-attainment at this site should be attributed to uncontrollable natural sources or to site bias.

3.20 PLATTEVILLE-TOWN HALL
SAROAD Site No. 06-2220-005

Description

General site description - The sampler is located on the roof of Platteville City Hall in the center of town, about 18 feet above ground level. The immediate surrounding land use is residential, agricultural, and light commercial.

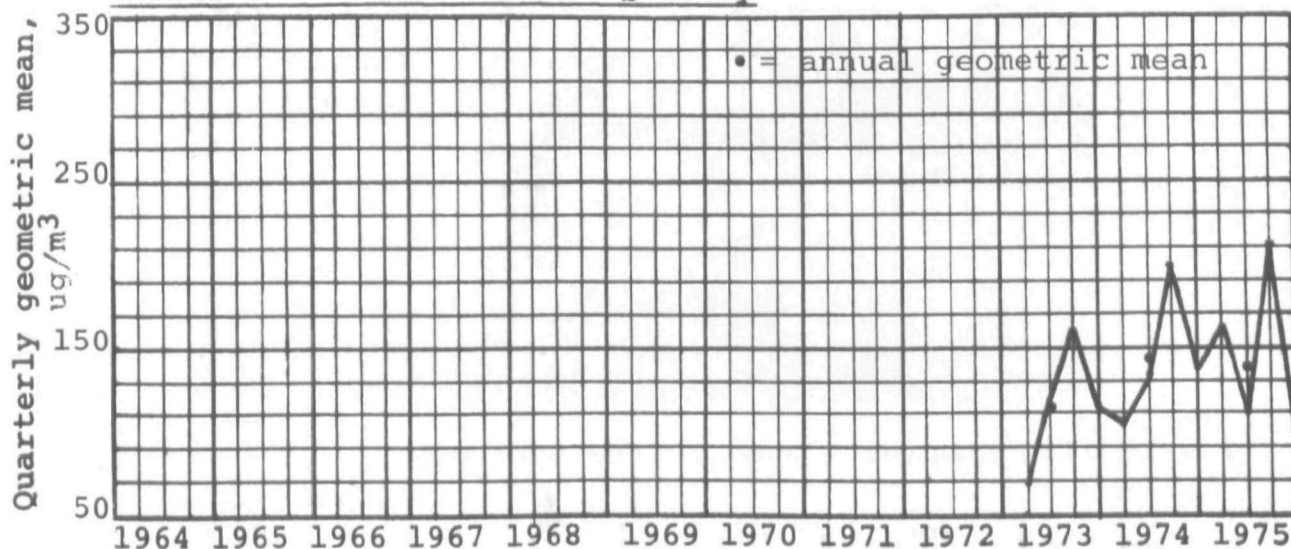
Localized pollution influences - The bordering street (50 feet wide) immediately adjacent to City Hall and the sampler is unpaved. There are unpaved lots surrounding the site. Generally, the whole town is unpaved and dirty.

Physical interferences - The adjacent building due east of the sampler is 10 feet higher and an effective obstruction.

Terrain - The terrain immediately surrounding the sampler is flat, while rolling hills and ridges predominate to the east and west sections of the 1 mile radius area.

Comments - Due to the overall dustiness of the entire area and the large quantity of unpaved roads and unvegetated areas, this site is probably yielding measurements quite representative of air quality in Platteville.

Trends in Particulate Air Quality

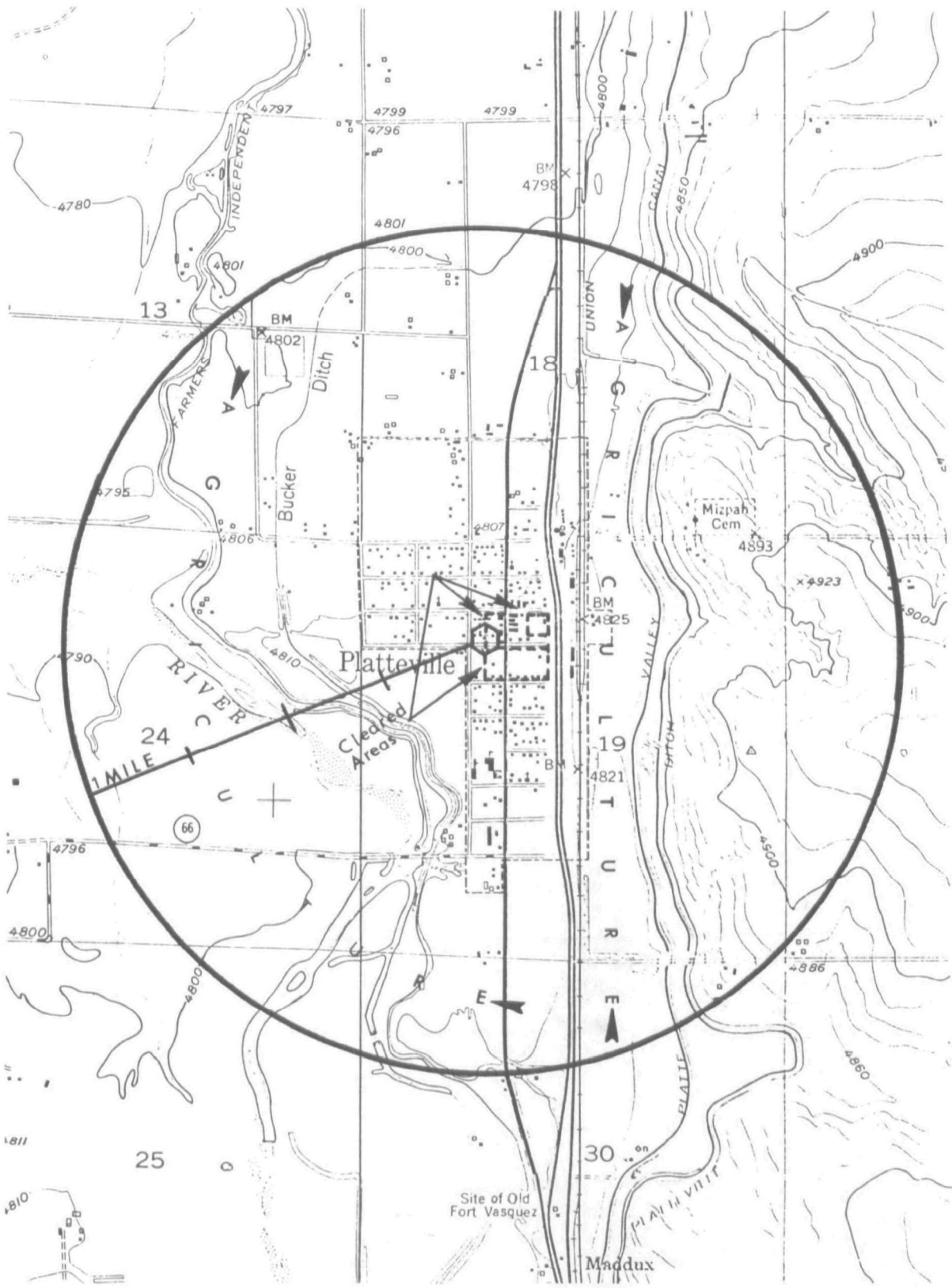




Platteville sampler viewed to the southeast.



Platteville sampler viewed to the southwest.



Platteville-Town Hall.

Sources in Microinventory Area (1 mile radius)

Platteville

Population = 700

VMT = 18,700

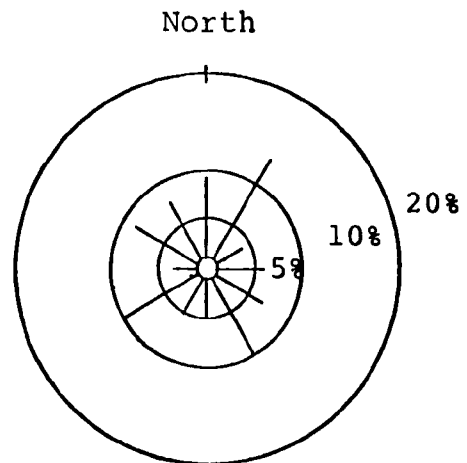
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Platteville Elevator | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 0.8% of county pop 18700 VMT/day | 0.59 g/VMT | 3 |
| Incineration | | | neg |
| Other mobile | | | 1 |
| Motor vehicle exhaust | | | 4 |
| Fugitive dust sources: | | | |
| Unpaved roads | 7.7 mi, 50 ADT | 3.5 lb/VMT | 246 |
| Unpaved shoulders | 8.0 mi | 0.62 t/ac/yr | 12 |
| Paved roads | 0.8% of county VMT (1837 t/yr) | | 15 |
| Unpaved parking lots | 15 ac | 1.4 lb/VMT | 9 |
| Agriculture | 280 ac | 0.25 t/ac/yr | 69 |
| Cleared areas | 25 ac | 0.59 t/ac/yr | 15 |
| RR right-of-way | 12 ac | 0.7 t/ac/yr | 8 |
| Playgrounds | 3 ac | 0.62 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 384 |
| Emission density, ton/sq mi/yr | | | 122 |
| Percent fugitive dust | | | 98 |

Meteorological Data

Average annual
wind speed = 7.5 mph

Annual precipitation -
1974 = 11.90"
1975 = 16.08"
Normal = 12.20"

No. of days
with precipitation = 80



Greeley - 0.6% calm
- 9.8% variable

Maximum Recorded Concentrations

1974 = 659 ug/m³; 1975 = 481 ug/m³

Summary and Conclusions

The Platteville site has exceeded the primary standards all three years since it was installed. Unlike most of the Colorado samplers, this site records its highest seasonal readings during the third (summer) quarter. The major source categories influencing the sampler were shown to be unpaved roads (64%) and agriculture (18%). The emission density of 122 ton/sq mi/yr does not appear to be high enough to justify average ambient concentrations in the 90's. However, a closer review of the location of the sources--almost all streets in the town are unpaved--indicates that most of the emissions are concentrated within a quarter mile of the site and therefore have a disproportionately large impact on the sampler. The higher summer readings also tend to substantiate the large influence of dust from unpaved roads at this site.

Although the readings are certainly inflated as a result of the nearby unpaved roads (see photographs), the same concentrations probably exist in all parts of Platteville. Control technology is available for reducing emissions from unpaved roads, e.g., paving, but it is questionable whether this is a reasonable control measure for this town. Since the State APCD already has a policy of encouraging road paving on the basis of its air quality benefit and has an existing program to implement this policy, an SIP revision does not seem to be needed.

3.21 COLORADO SPRINGS-HEALTH DEPARTMENT
SAROAD Site No. 06-0380-004

Description

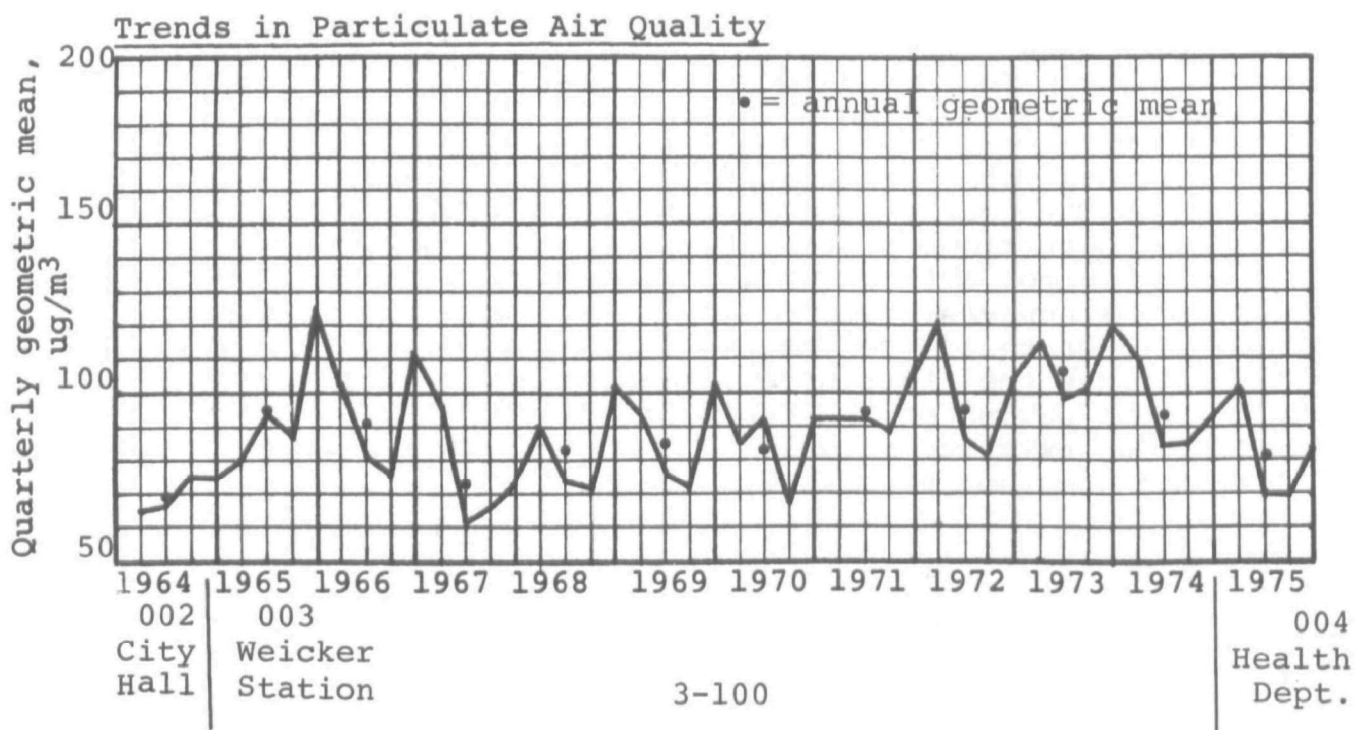
General site description - The sampler is located on the roof of the City-County Health Department building about ten feet above ground level. It is set back 100 feet from South Tejon Street. The surrounding area is combined light commercial and residential land use.

Localized pollution influences - The Health Department building is surrounded on three sides by single story houses. There is a paved parking lot at the rear of the building. The roof has two small exhaust vents and two air conditioner compressors, but none of these appear to affect the sampler's readings.

Physical interferences - No obstructions were noted in the vicinity of the sampler. There were no taller buildings in the immediate area.

Terrain - The surrounding area is generally flat, with rolling hills near the edge of the 1 mile radius to the west. The foothills of the Rocky Mountains start about three miles west of the site.

Comments - This site has a good general urban exposure. The streets in the area appear to be swept routinely and were clean at the time of the survey. The sampler was moved from 205 West Rio Grande (Weicker station) in January 1975. The former site was three blocks west of the present one.

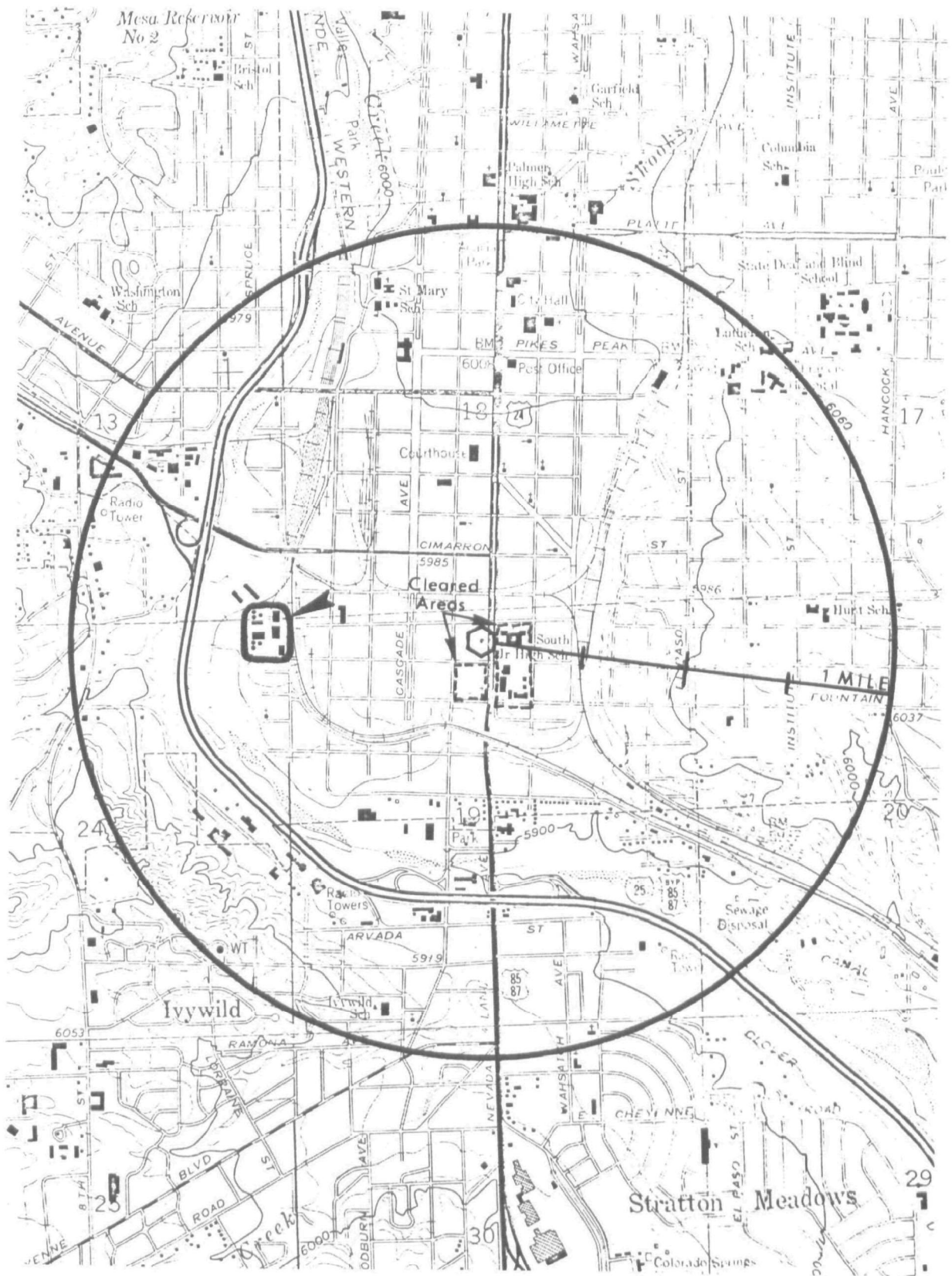




Colorado Springs sampler viewed to the west-northwest.



Colorado Springs sampler viewed to the southwest.



Colorado Springs-Health Department.

Sources in Microinventory Area (1 mile radius)

Colorado Springs

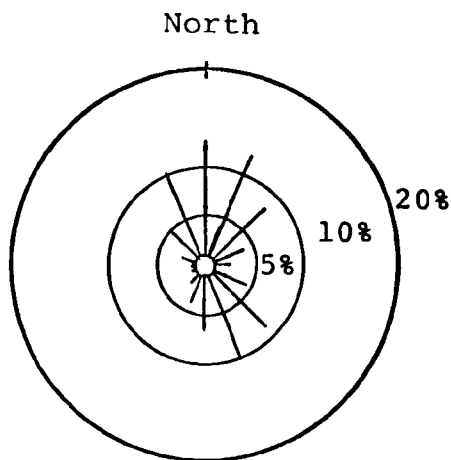
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| 1 Drake Power Plant | | | 55 |
| Denver Equipment | | | 1 |
| Simpson Company | | | neg |
| Colorado Concrete | | | neg |
| Transit Mix | | | 4 |
| School for Deaf | | | 7 |
| Ready Mix | | | 10 |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, 35% of emissions in grids 31,32,37,and 38 | | 135 |
| Other mobile | | | 4 |
| Motor vehicle exhaust | | | 58 |
| Fugitive dust sources: | | | |
| Unpaved roads | 5.3 mi | 3.5 lb/VMT | 39 |
| Unpaved shoulders | 3.8 mi | 0.617 t/ac/yr | 6 |
| Paved roads | From AQMA analysis grids | | 347 |
| Unpaved parking lots | 80 ac | 1.4 lb/VMT | 46 |
| Construction | 7 ac, 4 mos | 0.8 t/ac/mo | 22 |
| Cleared areas | 100 ac | 0.59 t/ac/yr | 59 |
| RR right-of-way | 29 ac | 0.7 t/ac/yr | 20 |
| RR yards | 57 ac | 0.7 t/ac/yr | 40 |
| Aggregate storage | 12 ac | 13.14 t/ac/yr | 158 |
| Playgrounds | 5 ac | 0.62 t/ac/yr | 3 |
| Total emissions, ton/yr | | | 1014 |
| Emission density, ton/sq mi/yr | | | 323 |
| Percent fugitive dust | | | 73 |

Meteorological Data

Average annual
wind speed = 10.0 mph

Annual precipitation
1974 = 9.50"
1975 = 11.77"
Normal = 15.73"

No. of days
with precipitation = 90



Colorado Springs Airport - 1% calm

Maximum Recorded Concentrations

1974 = 804 ug/m³; 1975 = 350 ug/m³

Summary and Conclusions

In its previous location (Weicker station), this site in Colorado Springs recorded annual means in the 80's and 90's for 10 years. At the end of 1974, the site was moved ³ to the Health Department building where it measured 81 ug/m³ for 1975. Seasonal concentrations are generally highest in the first and fourth quarters, but the seasonal variation is not as pronounced as in the Denver area. Possibly this is because less street sanding is needed for snow control in Colorado Springs.

The sampler appears to be well located in its new site and free from any localized influences. The estimated emission density of 323 ton/sq mi/yr certainly supports the recorded concentrations above the standard. About 40 percent of the emissions in this central residential/commercial area are traffic related, with most of the remainder being various fugitive dust sources. Point sources account for less than eight percent. One potential control measure for attainment would be improved street cleaning, while another would be increased enforcement of existing fugitive dust regulations. In the former case, an SIP revision would be needed; in the latter case, it would not.

3.22 PUEBLO-FIRE STATION
SAROAD Site No. 06-1820-003

Description

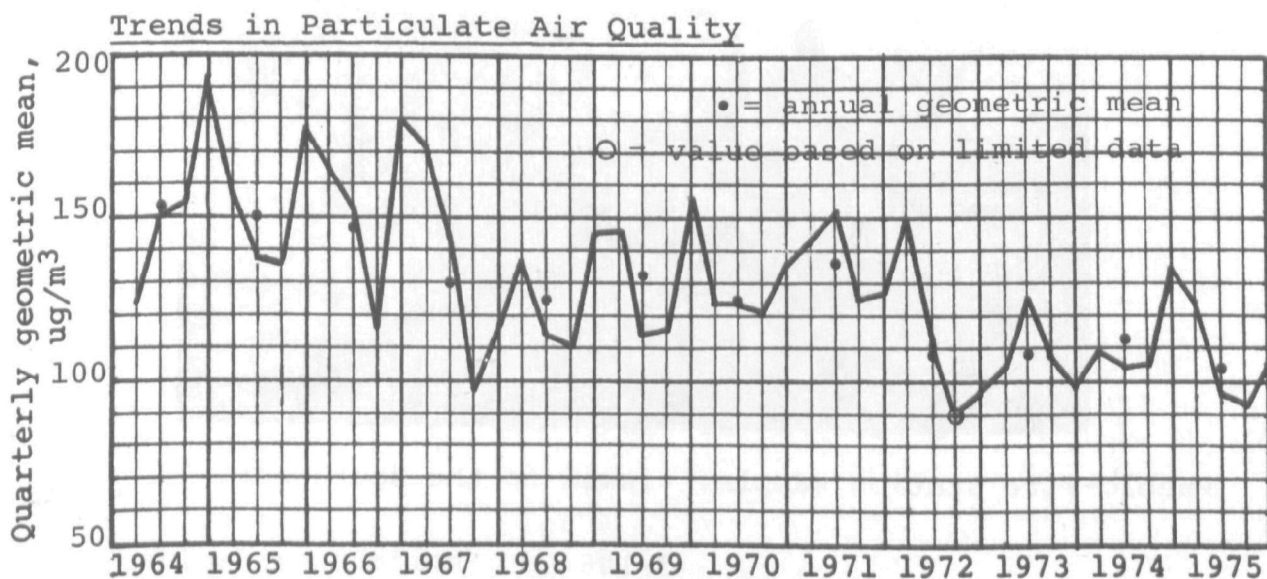
General site description - The sampler is located on the roof of the fire station (Mesa and Evans) about 20 feet above ground level in the commercially developed central business district of Pueblo. It is in an area of heavily traveled streets.

Localized pollution influences - There are no local adverse influences which would affect the sampler's readings.

Physical interferences - The sampler is sheltered on one side by a high wall 50 feet to the southeast.

Terrain - All surrounding terrain is flat.

Comments - The sampler is probably representative of air quality in this central business district area.

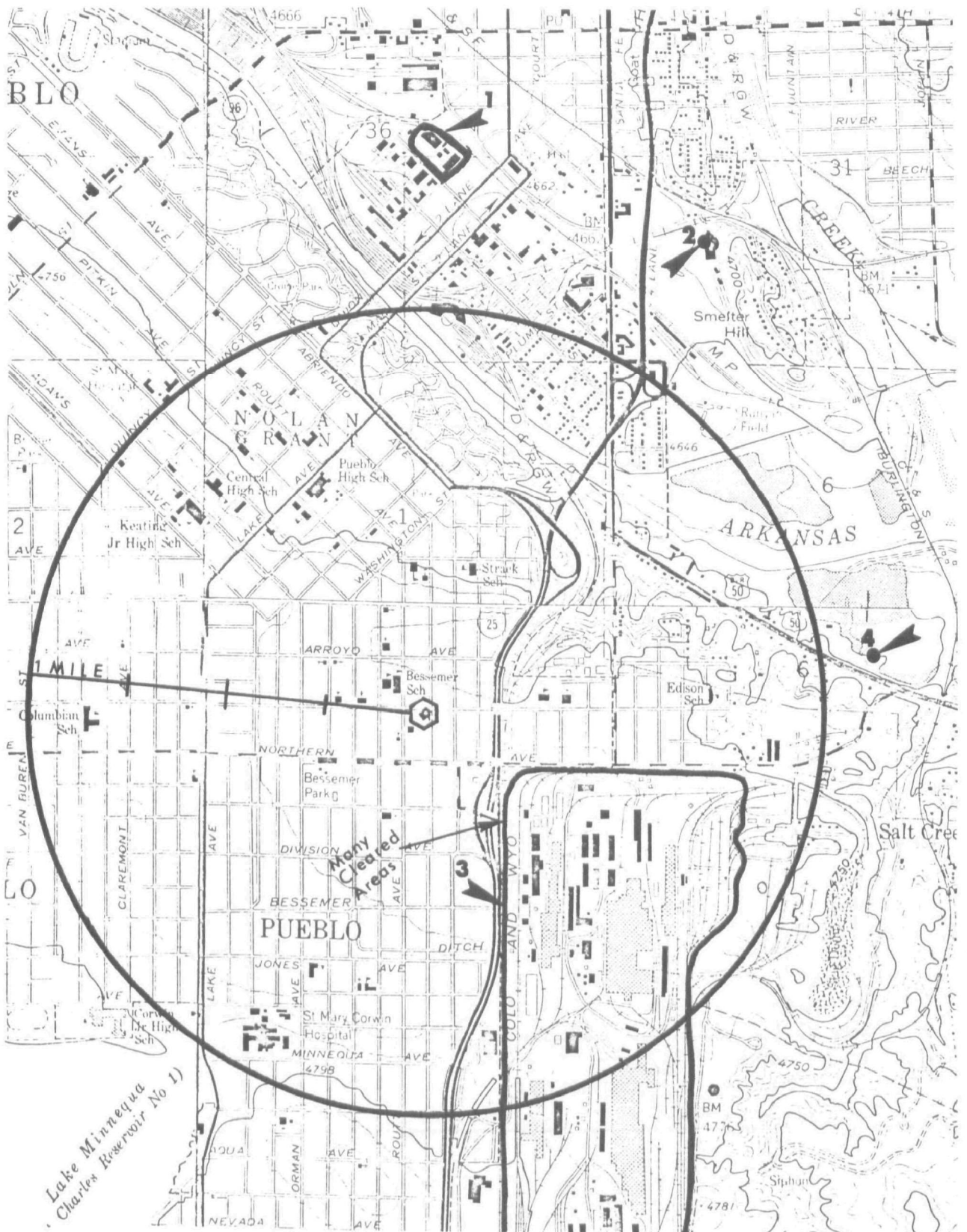




Pueblo-Fire Station sampler viewed to the northwest.



Pueblo-Fire Station sampler viewed to the southwest.



Pueblo-Fire Station.

Sources in Microinventory Area (1 mile radius)

Pueblo-Fire Station

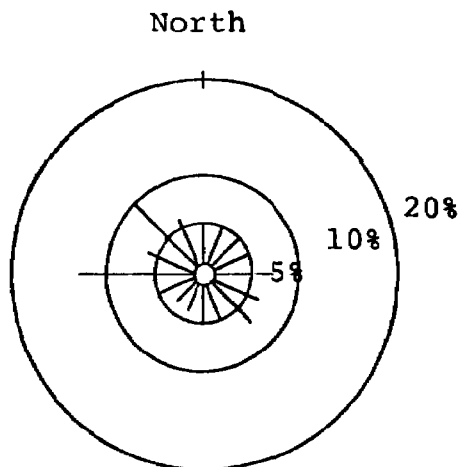
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|---------------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Southern Colorado Power Plant | Outside mile radius | | 23 |
| 2 Pueblo Rock Wool Alpha Beta Packing | Outside mile radius | | 129 |
| 3 CF&I Steel | | | 2 |
| Midwest Steel & Iron | | | 1500 (est) |
| Linde Company (Gases) | | | neg |
| Pueblo Metals | | | neg |
| 4 Fountain Sand & Gravel | | | 8 |
| Colorado Iron & Metal | Outside mile radius | | 81 |
| | | | unknown |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, 20% of emissions in 37, 60% in grid 38, and 30% in grid 30 | | 110 |
| Other mobile | | | 8 |
| Motor vehicle exhaust | | | 35 |
| | | | |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.1 mi, 20 ADT | 3.5 lb/VMT | 1 |
| Unpaved shoulders | 0.9 mi | 0.52 t/ac/yr | 1 |
| Paved roads | From AQMA analysis | | 74 |
| Unpaved parking lots | 20 ac | 1.4 lb/VMT | 12 |
| Cleared areas | 220 ac | 0.49 t/ac/yr | 108 |
| RR right-of-way | 21 ac | 0.59 t/ac/yr | 12 |
| RR yards | 55 ac | 0.59 t/ac/yr | 33 |
| Playgrounds | 2 ac | 0.52 t/ac/yr | 1 |
| Total emissions, ton/yr | | | 1986 |
| Emission density, ton/sq mi/yr | | | 632 |
| Percent fugitive dust | | | 12 |

Meteorological Data

Average annual
wind speed = 7.7 mph

Annual precipitation
1974 = 9.68"
1975 = 9.88"
Normal = 11.91"

No. of days
with precipitation = 65



Pueblo - 2% calm

Maximum Recorded Concentrations

1974 = 454 ug/m^3 ; 1975 = 317 ug/m^3

Summary and Conclusions

This Pueblo site has shown a steady decrease in annual mean concentrations from 153 ug/m^3 in 1964 to 104 ug/m^3 in 1975. Seasonal variations do not show a set pattern. Most of the emissions (80%) in the microinventory survey area are from a few major point sources. Fugitive dust sources (outside the industrial point sources' property) account for only 12 percent of the emissions. The emission density of 632 ton/sq mi/yr is quite consistent with the high ambient measurements. There do not appear to be any localized sources unduly influencing the readings at the site.

It appears that emission reductions by the largest point source, CF&I Steel, would be necessary in order for this site to attain the primary standards. However, it cannot be determined at this time whether an SIP revision is necessary in order to obtain these emission reductions, as the compliance status of CF&I Steel is being contested in a court case between the company and the state. Until a decision is reached in this case, no SIP revision for this area should be requested.

3.23 PUEBLO-HEALTH DEPARTMENT
SAROAD Site No. 06-1820-001

Description

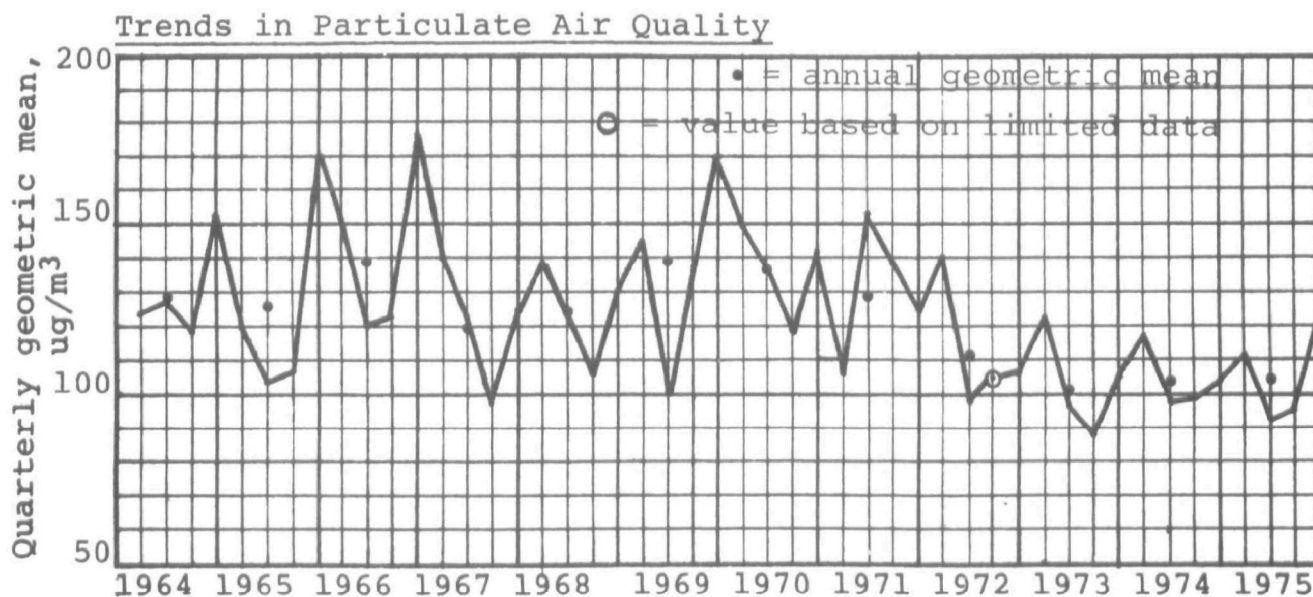
General site description - The sampler is located on the roof of the Health Department building (151 Central Main Street) about 25 feet above ground level. It is in the central business district or downtown, but very near a heavy industrial district.

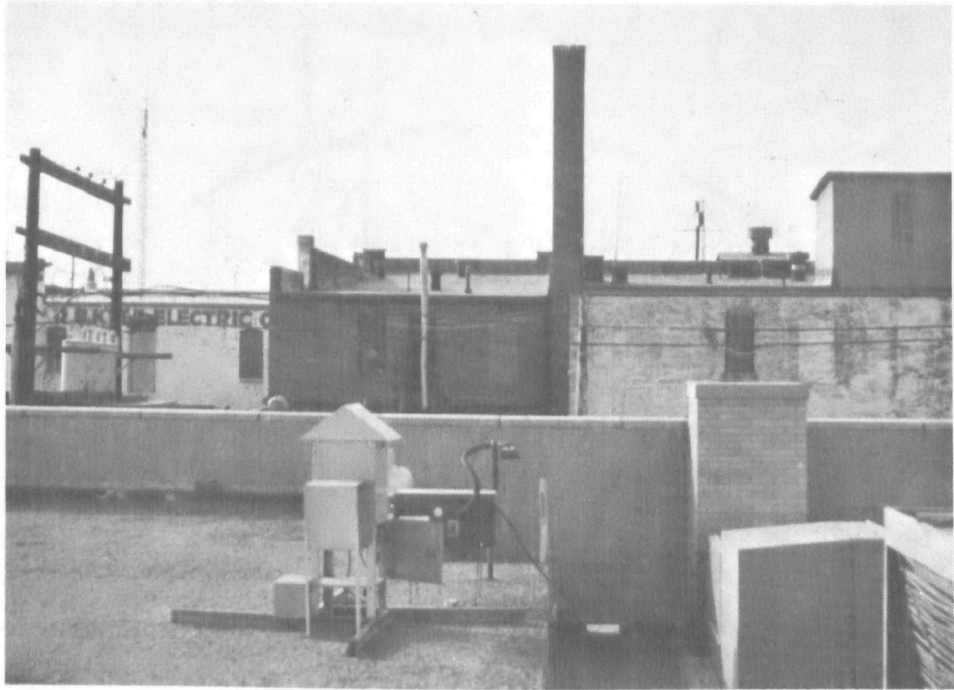
Localized pollution influences - There are three roof vents on the building in proximity to the sampler and an unidentified industrial facility west of the site. The area has many heavily traveled streets.

Physical interferences - The sampler is severely sheltered on all four sides by roof retaining walls and parapets and a stairway tower.

Terrain - The immediate and surrounding area is generally flat. Many buildings are in the vicinity but none are higher than the sampler.

Comments - The area generally has a high incidence of point source pollution, especially steel mill operations and sand and gravel operations. Fugitive dust sources predominate throughout. With the exception of the obstructions caused by the roof parapet, the sampler is probably obtaining a representative indication of air quality in this area.

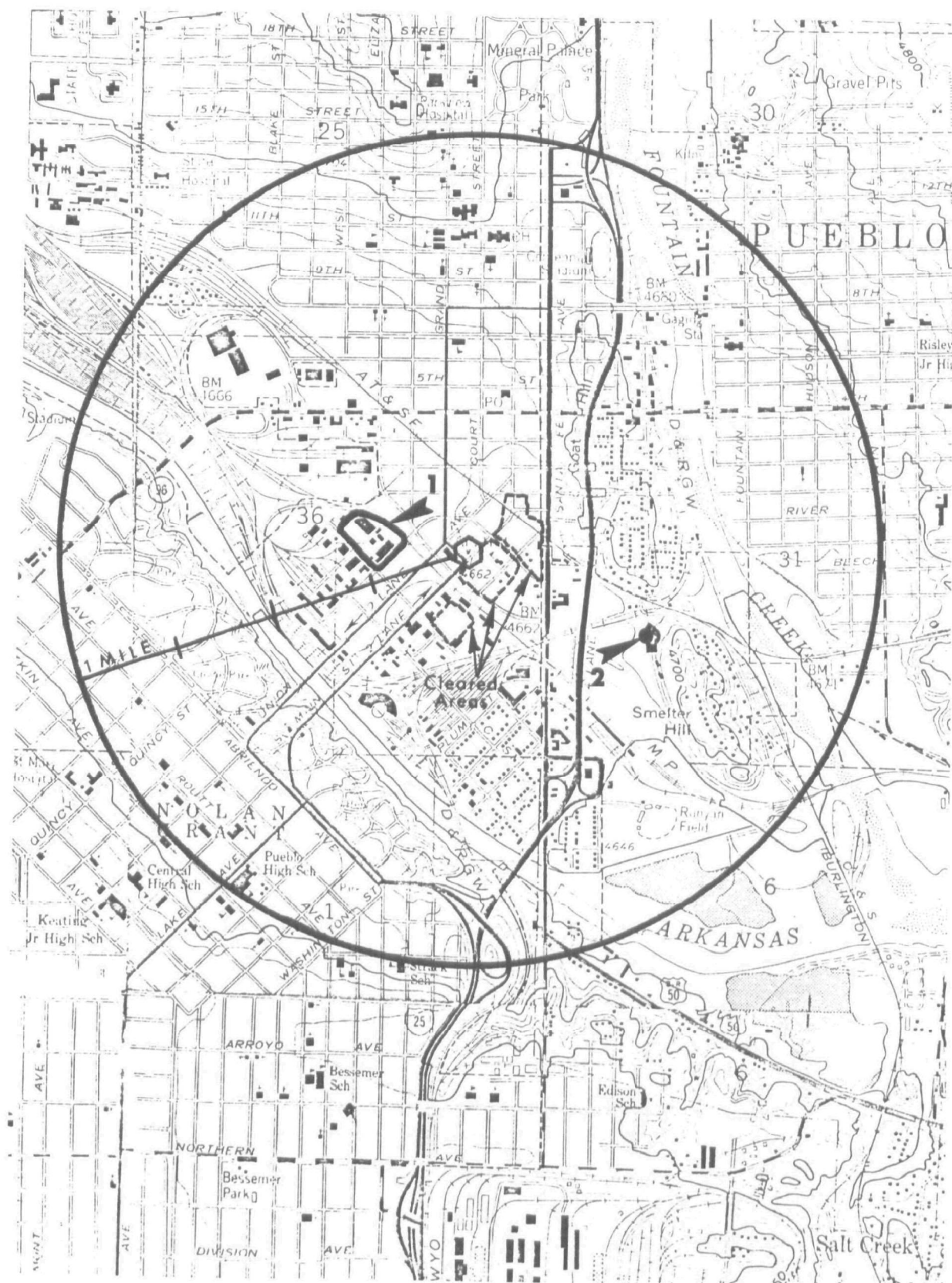




Pueblo-Health Department sampler viewed to the northwest.



Pueblo-Health Department sampler viewed to the southeast.



Pueblo-Health Department.

Sources in Microinventory Area (1 mile radius)

Pueblo-Health Department

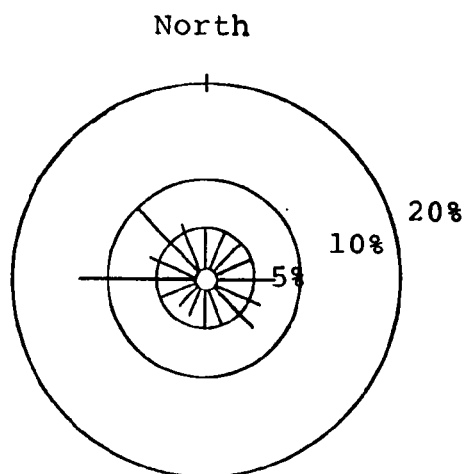
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Southern Colorado Power Plant | | | 23 |
| 2 Pueblo Rock Wool Sweeney Feed Mill | | | 129 |
| Alpha Beta Packing | | | 2 |
| CF&I Steel | | | 2 |
| Outside mile radius | | | 1500 (est) |
| Fountain Sand & Gravel | Outside mile radius | | 81 |
| Colorado Iron & Metal | Outside mile radius | | unknown |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, 80% of emissions in 30, 10% in grid 29, and 20% in grid 24] | | 148 |
| Other mobile | | | 10 |
| Motor vehicle exhaust | | | 62 |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.9 mi, 40 ADT | 3.5 lb/VMT | 23 |
| Paved roads | From AQMA analysis | | 132 |
| Unpaved parking lots | 28 ac | 1.4 lb/VMT | 16 |
| Cleared areas | 48 ac | 0.49 t/ac/yr | 24 |
| RR right-of-way | 34 ac | 0.59 t/ac/yr | 20 |
| RR yards | 120 ac | 0.59 t/ac/yr | 71 |
| Aggregate storage | 3 ac | 13.14 t/ac/yr | 39 |
| Playgrounds | 3 ac | 0.52 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 703 |
| Emission density, ton/sq mi/yr | | | 224 |
| Percent fugitive dust | | | 47 |

Meteorological Data

Average annual
wind speed = 7.7 mph

Annual precipitation
1974 = 9.68"
1975 = 9.88"
Normal = 11.91"

No. of days
with precipitation = 65



Pueblo - 2% calm

Maximum Recorded Concentrations

1974 = 280 ug/m³; 1975 = 261 ug/m³

Summary and Conclusions

The Health Department site has experienced an irregular decrease in annual mean concentrations over the past 12 years, but has always reported annual averages above 100 ug/m³. Seasonal variations have tended to become smaller in recent years. The microinventory survey showed that a wide variety of sources and source categories contribute to the high measured concentrations: point sources within the mile radius (22%), residential/commercial fuel combustion (21%), reentrained dust from paved streets (19%), other fugitive dust sources (28%), and the unquantified impact from more distant major point sources. The emission density of 224 ton/sq mi/yr is relatively low for the measured ambient values, possibly reflecting a significant contribution from these major point sources.

No nearby sources which might bias the sampler's readings were identified. Roof parapets may block the sampler's exposure somewhat, thus reducing the recorded measurements from actual levels.

Attainment at this site will probably require emission reductions from several types of sources, possibly including CF&I Steel (which may also have to reduce emissions for the other Pueblo site to reach the standards). Fugitive dust sources with potential for emission reductions include paved streets, unpaved roads and parking lots, railroad yards, and cleared areas. The compliance status of Pueblo Rock Wool was not determined.

3.24 TRINIDAD-RECTORY
SAROAD Site No. 06-2160-002

Description

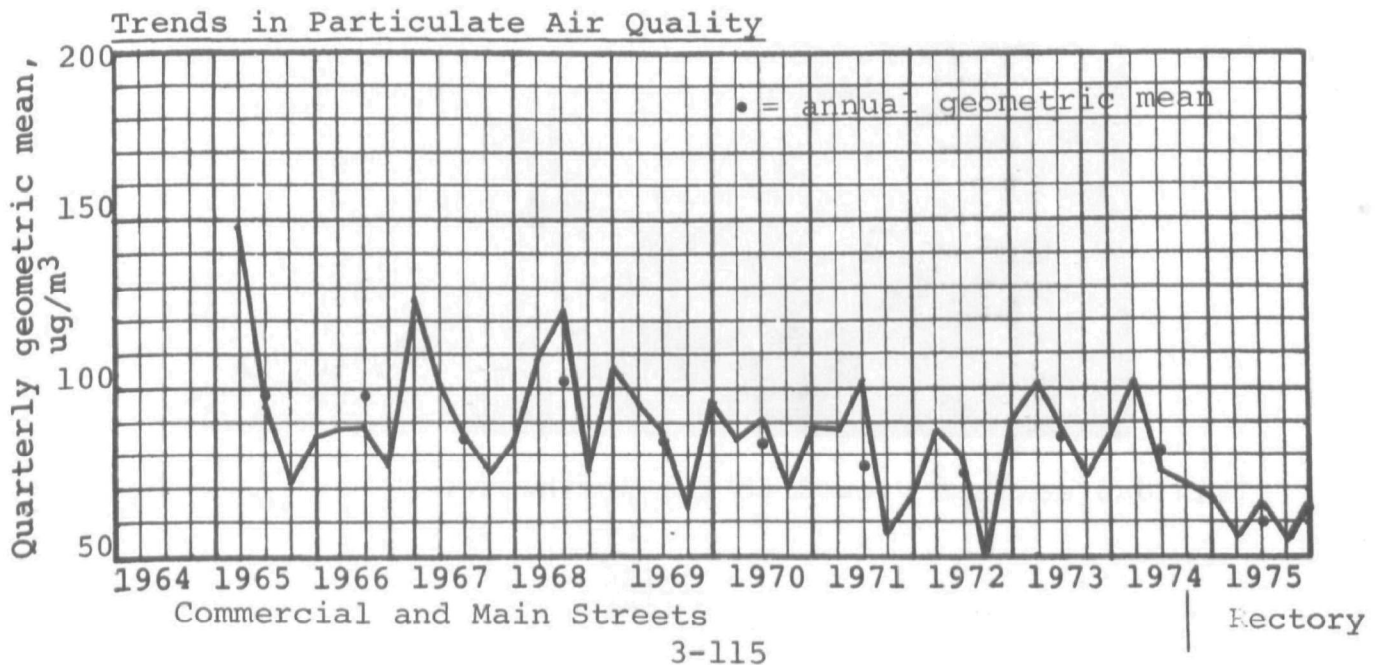
General site description - The sampler is located on the roof of a garage to the rear of a church rectory (235 Convent Street) about 8 feet above ground level. It is about 50 feet off of Convent Street and borders on a school parking lot in a residential area.

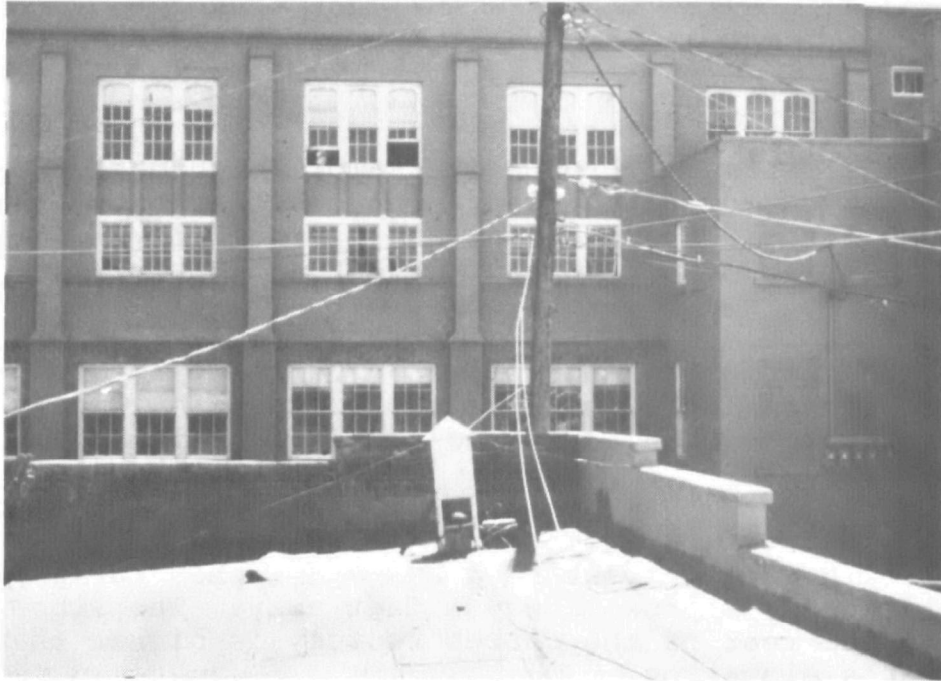
Localized pollution influences - There are no obvious localized pollution influences in the immediate vicinity of the sampler, other than the paved parking lot immediately behind the site.

Physical interferences - The sampler is bordered on two sides by a wall (4 feet high and 6-8 inches lower than the sampler head) approximately 6 feet away. The school building to the rear of the church rectory is higher than the sampler's elevation.

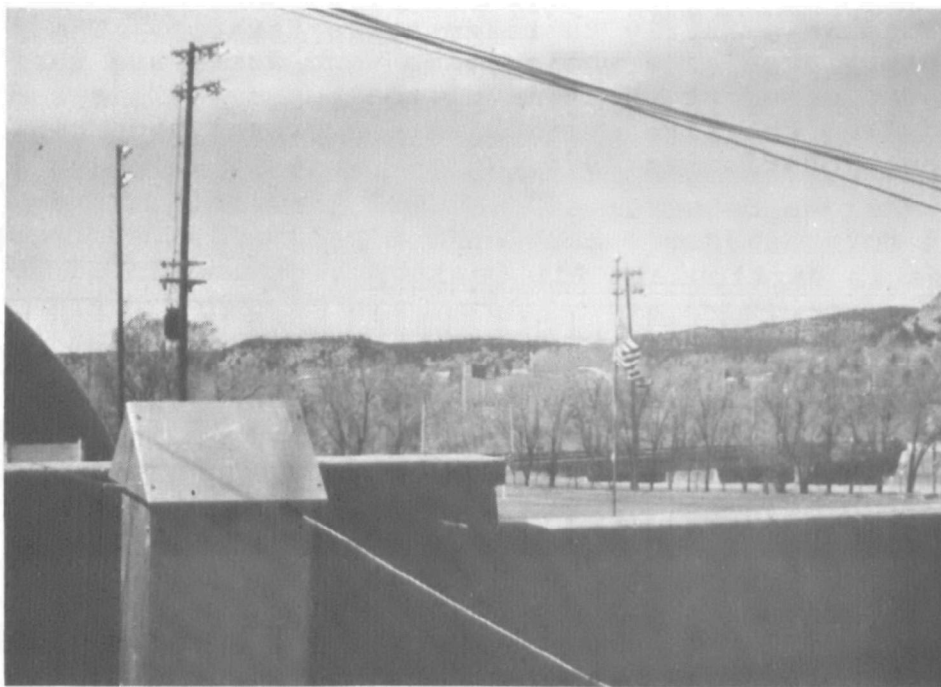
Terrain - The area is rolling with steep ridges to the northwest and southeast and a river valley extending through its center from southwest to northeast. The elevation of the sampler is about 6,000 feet msl.

Comments - The site probably depicts the air quality in Trinidad in a fairly representative fashion. The micro-inventory area as a whole seems very dusty and the streets were uncleaned at the time of the survey. This sampler was moved from the fire station at Commercial and Main to its present location in 1974.





Trinidad sampler viewed to the south-southeast.



Trinidad sampler viewed to the northwest.

Sources in Microinventory Area (1 mile radius)

Trinidad

Population = 8,000

VTM = 33,200

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Municipal Power Plant | Outside mile radius | | 6 |
| 2 Rede Mix Concrete | | | 2 (est) |
| 3 Marty Feeds | | | 2 (est) |
| Area sources: | | | |
| Fuel combustion | [From TRW inventory report, 51% of county pop 33200 VMT/day | 0.59 g/VMT | 40 |
| Other mobile | | | 5 |
| Incineration | | | 17 |
| Motor vehicle exhaust | | | 8 |
| Fugitive dust sources: | | | |
| Unpaved roads | 7.3 mi, 30 ADT | 3.6 lb/VMT | 145 |
| Unpaved shoulders | 9.9 mi | 0.86 t/ac/yr | 21 |
| Paved roads | 33200 VMT/day | 3.5 g/VMT | 47 |
| Unpaved parking lots | 40 ac | 1.4 lb/VMT | 24 |
| Cleared areas | 132 ac | 0.82 t/ac/yr | 108 |
| RR right-of-way | 29 ac | 0.99 t/ac/yr | 29 |
| RR yards | 63 ac | 0.99 t/ac/yr | 62 |
| Playgrounds | 5 ac | 0.86 t/ac/yr | 4 |
| Total emissions, ton/yr | | | 514 |
| Emission density, ton/sq mi/yr | | | 164 |
| Percent fugitive dust | | | 86 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 197 ug/m³; 1975 = 147 ug/m³

Summary and Conclusions

The Trinidad site consistently measured annual mean concentrations above the primary standard from 1965 through 1974. However, in late 1974 the site was moved a few blocks from its historic location to a new site where the 1975 mean was 60 ug/m³. The estimated emission density of 164 ton/sq mi/yr agrees well with the relatively low concentrations now being measured and indicates that the previous site may have had some localized sources inflating the readings. The new site has no obvious localized sources or obstructions biasing its measurements.

Most of the emissions within the mile radius were determined to be from difficult-to-control fugitive dust sources. Unpaved roads (28%), cleared areas (21%), railroad yards and right-of-ways (18%), and paved roads (9%) were the major sources.

Although Trinidad was observed to be quite dusty, the particulate concentrations and inventory results both indicate that the area is not exceeding the primary standards. If another site only a few blocks away recorded concentrations above the standards, it is assumed that some source with a very localized effect was causing this violation.

3.25 WALSENBURG-HUERFANO COUNTY SHOP BUILDING
SAROAD Site No. 06-2180-002

Description

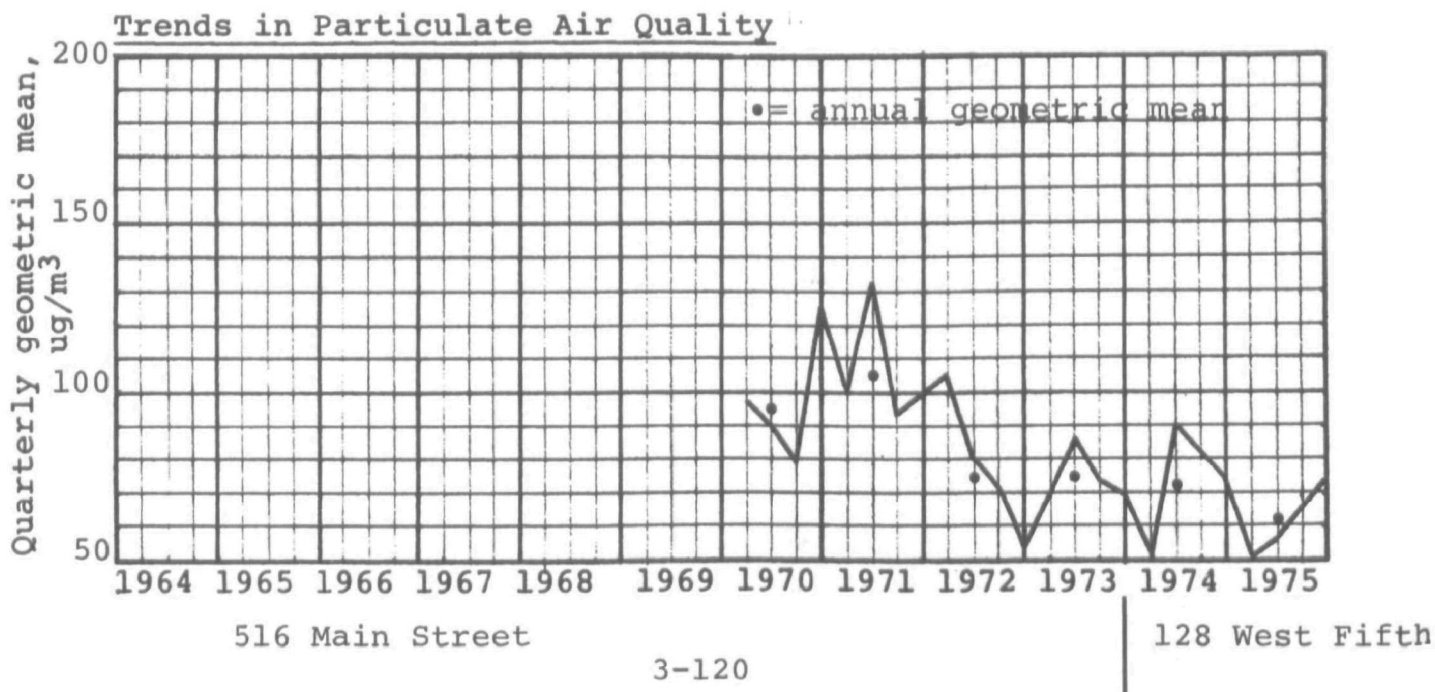
General site description - The sampler is located on the roof of the Huerfano County Shop Building (128 West Fifth) about 20 feet above ground level. The location is in the central business district of town and is right off of Fifth Street.

Localized pollution influences - The Walsenburg Creamery (not in operation at the writing of this report) has a stack 200 feet to the northwest and the site building is surrounded on three sides by unpaved parking lots.

Physical interferences - There are no obstructions or taller buildings near the sampler which may affect readings.

Terrain - The terrain in the immediate vicinity of and within a 1/2 mile radius of the sampler is flat, while rolling hills and ridges predominate in the north and south portions of the survey area.

Comments - The town is universally dusty. All the streets are uncleaned and the town is surrounded by open, dry land. The site was moved one block southwest to its present location in 1974 from 516 Main Street. The particulate air quality measured is probably representative of the arid southern part of Colorado.





Walsenburg sampler viewed to the northeast.



Walsenburg sampler viewed to the northwest.

Sources in Microinventory Area (1 mile radius)

Walsenburg

Population = 4,200

VMT = 18,500

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Walsenburg Mill | | | neg |
| 1 Walsenburg Power Plant | | | 225 |
| Sig Sporleder Feeds | | | neg |
| Area sources: | | | |
| Fuel combustion | [From TRW inventory report, 66% of county pop 18500 VMT/day | 0.59 g/VMT | 51 |
| Incineration | | | 8 |
| Other mobile | | | 9 |
| Motor vehicle exhaust | | | 4 |
| Fugitive dust sources: | | | |
| Unpaved roads | 13.3 mi, 40 ADT | 3.6 lb/VMT | 353 |
| Unpaved shoulders | 2.7 mi | 0.56 t/ac/yr | 4 |
| Paved roads | 18500 VMT/day | 3.5 g/VMT | 26 |
| Unpaved parking lots | 32 ac | 1.4 lb/VMT | 19 |
| Cleared areas | 25 ac | 0.54 t/ac/yr | 13 |
| RR right-of-way | 25 ac | 0.64 t/ac/yr | 16 |
| RR yards | 50 ac | 0.64 t/ac/yr | 32 |
| Playgrounds | 3 ac | 0.56 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 762 |
| Emission density, ton/sq mi/yr | | | 243 |
| Percent fugitive dust | | | 61 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 181 ug/m³; 1975 = 241 ug/m³

Summary and Conclusions

The Walsenburg site was started in 1970 and exceeded the primary standards its first two years of operation. For the past four years, the readings have been at or below the standards, with a reduction in the annual mean each year. In 1974, the site was moved one block to its present location.

The two sources with greatest emissions in the survey area are unpaved roads (46%) and the Walsenburg power plant (29%). Although the estimated emission density of 243 ton/sq mi/yr is somewhat higher than would be expected for an annual mean of 61 ug/m³, much of this apparent emission density is contributed by the power plant located at the edge of the survey area (one mile from the sampler). The emissions from its tall stack at this distance obviously have a much lower effect on ambient concentrations at the sampler than indicated by its portion of the emission density.

The site has unpaved parking lots on three sides, as partially shown in the photographs. These localized sources probably increase measured concentrations, but it appears that the readings will still be well under the primary standards. This site should be classified as having attained the primary standards.

3.26 STEAMBOAT SPRINGS-MUNICIPAL BUILDING
SAROAD Site No. 06-1920-002

Description

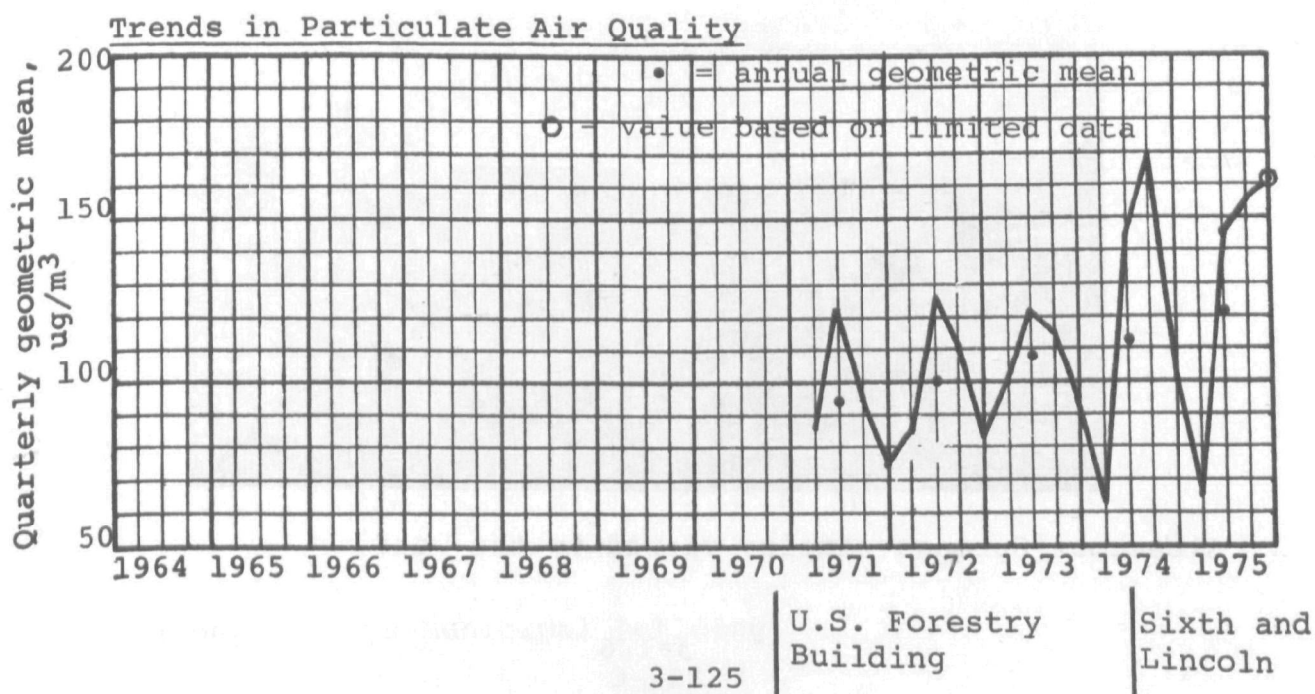
General site description - The sampler is located on the roof of the Municipal Building (Sixth and Lincoln) about 15 feet above ground level and set back from Sixth Street about 40 feet. It is in an area of residential and light commercial land use.

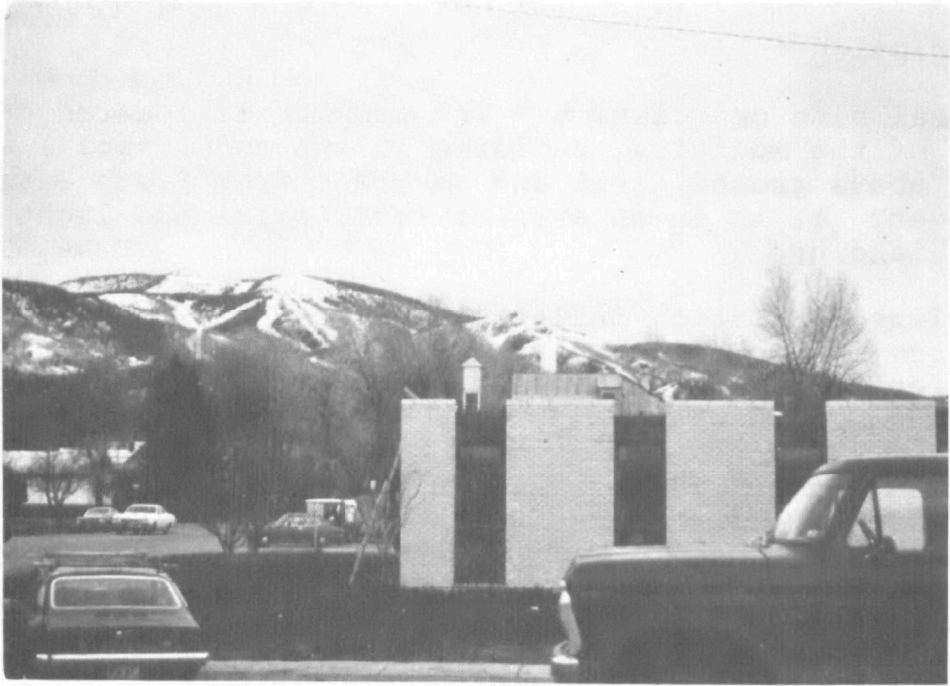
Localized pollution influences - The closest adverse influence is the boiler stack on the Municipal Building about 100 feet southeast. Overall, the surrounding streets were all sanded and unswept.

Physical interferences - There were no physical obstructions or tall structures which would affect the sampler's readings.

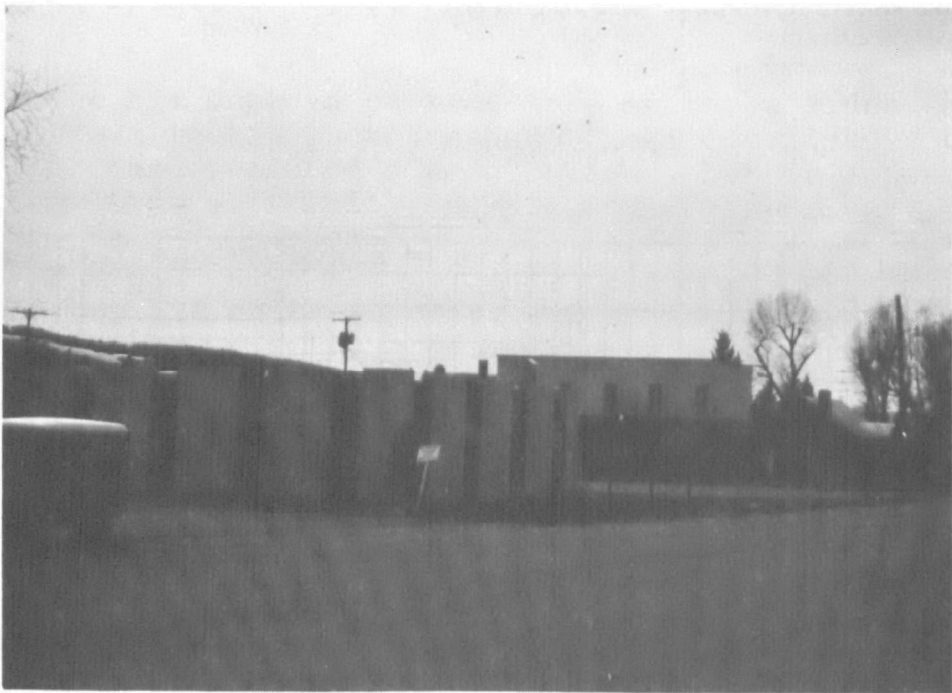
Terrain - The immediate vicinity is flat, while the surrounding area is composed of rolling hills and mountains in all directions from the sampler.

Comments - The site is placed well and is probably indicating representative values of air quality. Generally, all the streets in Steamboat Springs are dirty and unswept. The major particulate sources appear to be unpaved road shoulders and unpaved roads. The site was moved in mid-1974 from the U. S. Forestry building.

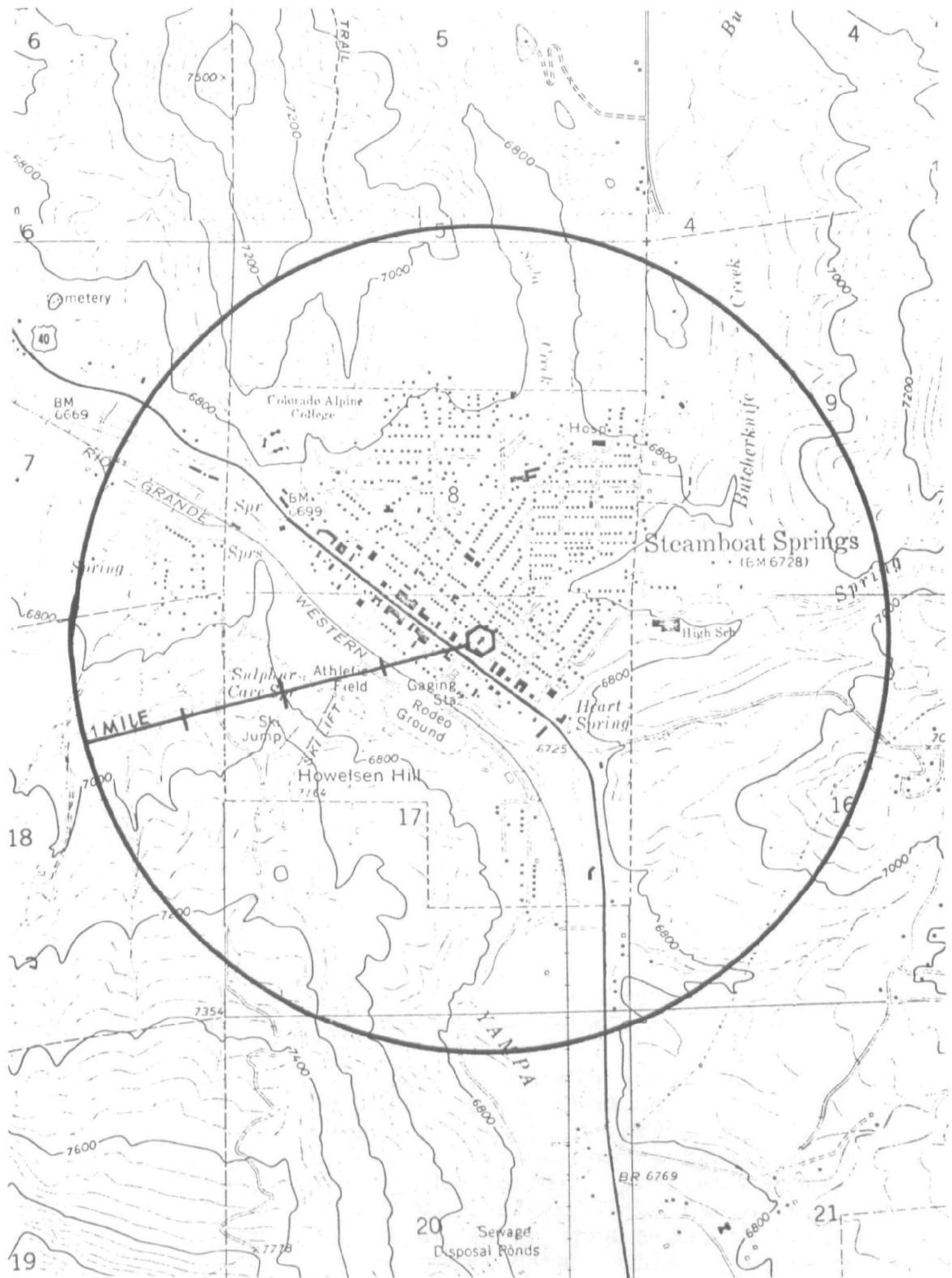




Steamboat Springs sampler viewed to the southeast.



Steamboat Springs sampler viewed to the west.



Steamboat Springs-Municipal Building.

Sources in Microinventory Area (1 mile radius)

Steamboat Springs

Population = 2,500
VMT = 18,500

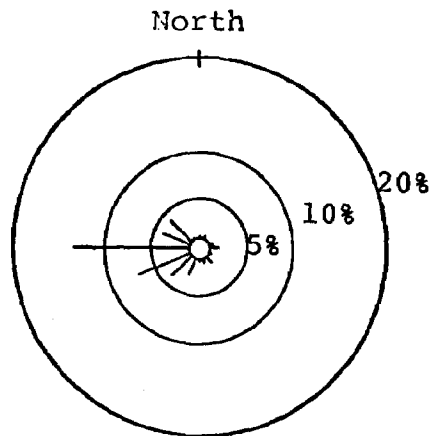
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | [From TRW inventory report, 32% of county pop 18500 VMT/day | 0.59 g/VMT | 12 |
| Incineration | | | 5 |
| Other mobile | | | 1 |
| Motor vehicle exhaust | | | 4 |
| Fugitive dust sources: | | | |
| Unpaved roads | 4.9 mi, 40 ADT | 3.1 lb/VMT | 111 |
| Unpaved shoulders | 21 ac | 0.41 t/ac/yr | 9 |
| Paved roads | 18500 VMT/day | 3.5 g/VMT | 26 |
| Unpaved parking lots | 15 ac | 1.2 lb/VMT | 8 |
| Cleared areas | 20 ac | 0.39 t/ac/yr | 8 |
| RR right-of-way | 14 ac | 0.5 t/ac/yr | 7 |
| Playgrounds | 15 ac | 0.4 t/ac/yr | 6 |
| Total emissions, ton/yr | | | 197 |
| Emission density, ton/sq mi/yr | | | 63 |
| Percent fugitive dust | | | 89 |

Meteorological Data

Average annual
wind speed = 5.5 mph

Annual precipitation
1974 = 23.50"
1975 = 20.62"
Normal = 23.87"

No. of days
with precipitation = data not
available



Steamboat Springs - 54% calm (< 2 mph)

Maximum Recorded Concentrations

1974 = 518 ug/m³; 1975 = 407 ug/m³

Summary and Conclusions

The Steamboat Springs site has been in operation for five years and recorded higher annual mean concentrations each year. In 1975, the annual mean was 121 ug/m³. The sampler was moved to its present location in mid-1974. The readings show distinct seasonal variations, with high concentrations in the second and third quarters and low concentrations in the other two quarters when there is snow cover.

No point sources were identified in the survey area. Most of the area source emissions are fugitive dust--from unpaved roads and shoulders (61%) or paved roads (13%). The estimated emission density of 63 ton/sq mi/yr does not correspond with the ambient measurements at all, indicating that some major contributing sources were overlooked, their emissions were poorly estimated, or there is extreme site bias resulting from some nearby source. The site survey did not reveal any problem with the sampler location (see photographs), and it is unlikely that both of the sites that have been used in Steamboat Springs would be strongly biased.

In rechecking for possible contributing sources, it was found that fireplace burning of wood had not been included in the fuel combustion emissions. However, fireplace emissions would contribute most to winter concentrations and the high readings occur during the summer. Poor atmospheric dispersion in the mountainous terrain might cause emissions to have a greater impact than in an open area, but certainly not to the extent shown by these data. This site seems to be a legitimate non-attainment site, but it is difficult to determine the need for an SIP revision without first adequately identifying the sources contributing to the high concentrations and assessing their compliance status and further controllability.

3.27 RIFLE-MIDLAND HOTEL
SAROAD Site No. 06-0880-001

Description

General description - The sampler is located on a second story back porch of the Midland Hotel (111 East Third Avenue) approximately 15 feet above ground level. The hotel is centered in the central business district of town. The sampler is not near any major roads.

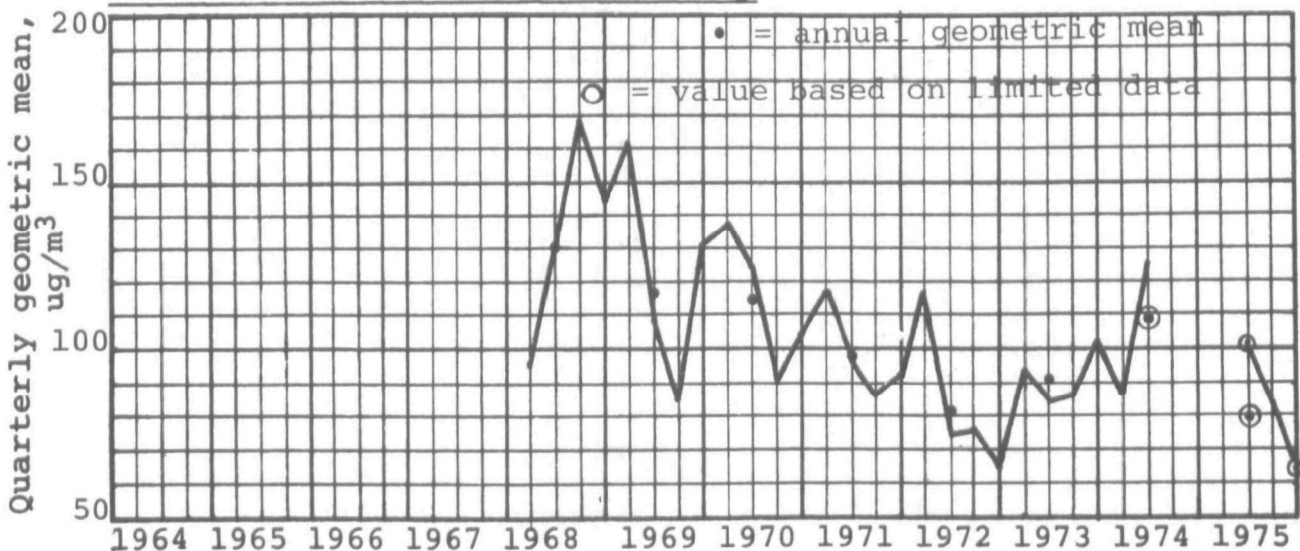
Localized pollution influences - Directly south of the sampler is a large, open, cleared area. There are no roof vents or other obvious influential sources nearby.

Physical interferences - The sampler on the porch is sheltered on three sides (north, west, south) by the hotel walls which rise one story above it.

Terrain - The immediate area surrounding the sampler is flat, while the majority of the town enclosed in the 1 mile radius survey area is hilly.

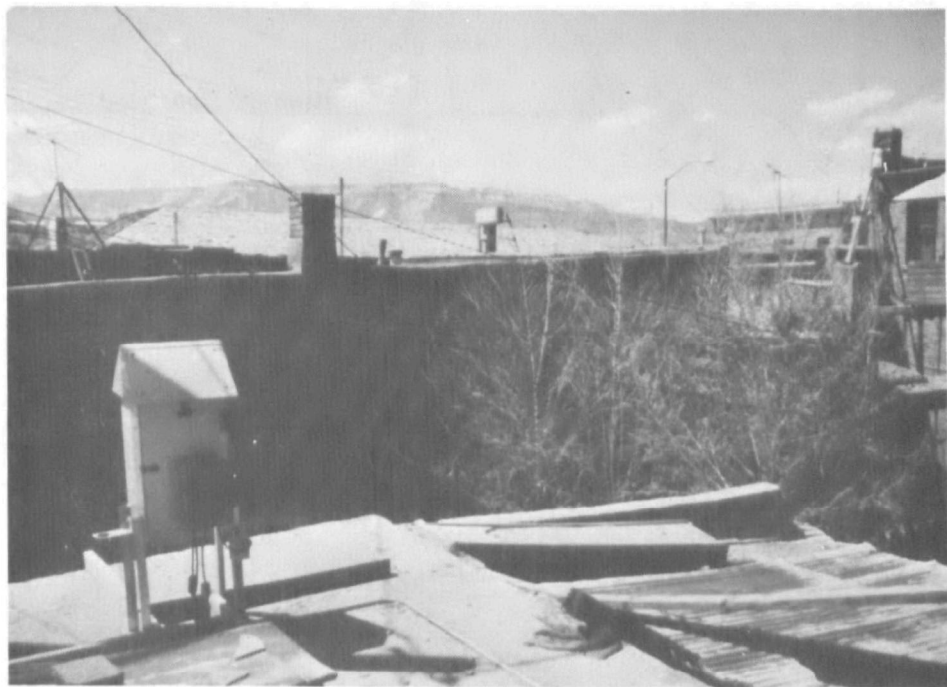
Comments - There is a significant potential for high fugitive dust emissions in the town, due to the quantity of unpaved shoulders and dusty streets. The sampler is well sited and, although very sheltered, probably measures a representative sample of the urban ambient air quality.

Trends in Particulate Air Quality

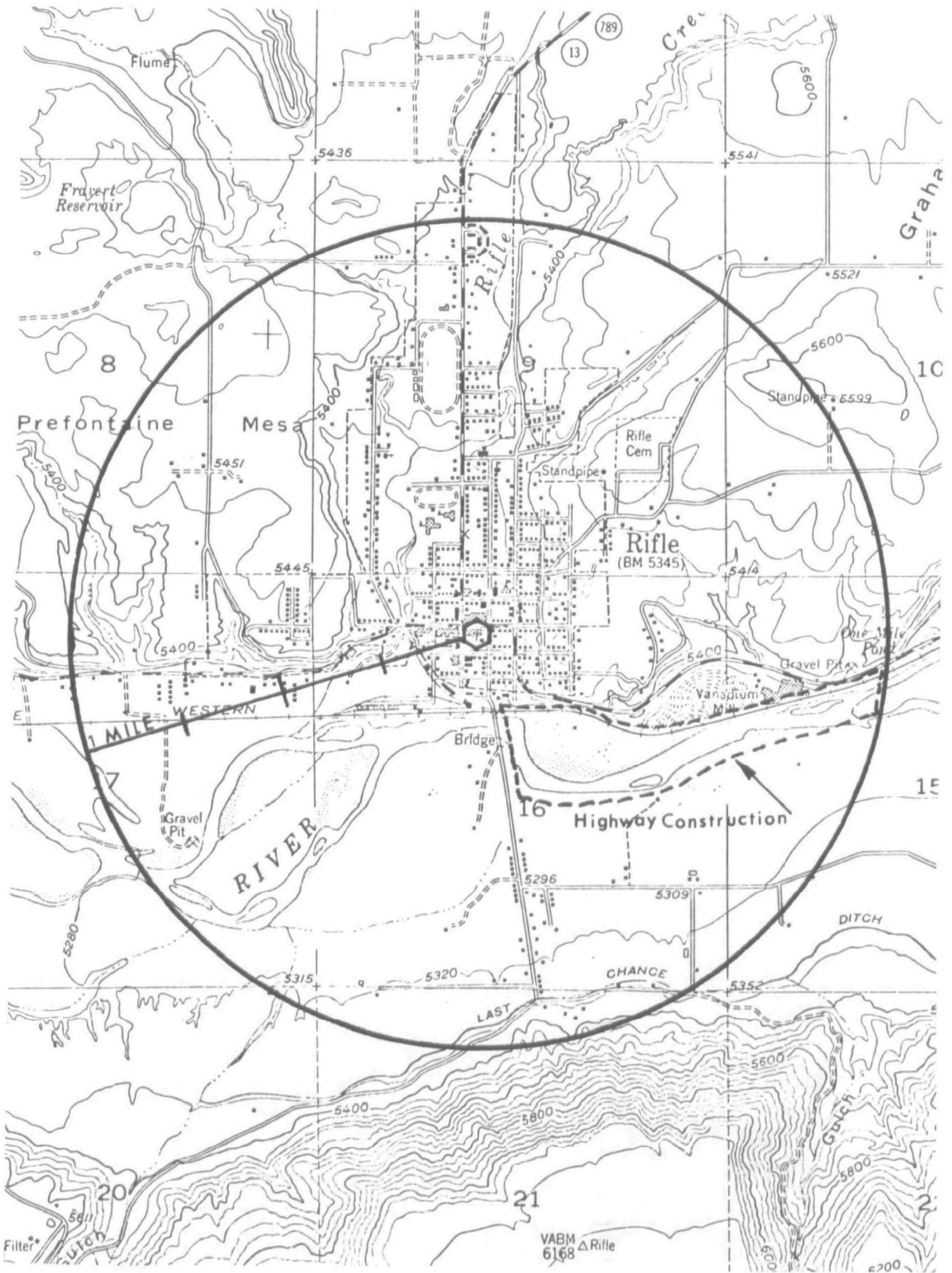




Rifle sampler viewed to the south.



Rifle sampler viewed to the northwest.



Rifle-Midland Hotel.

Sources in Microinventory Area (1 mile radius)

Rifle

Population = 3,000

VMT = 17,400

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 14.5% of county pop 17400 VMT/day | | 6 |
| Other mobile | | | 3 |
| Motor vehicle exhaust | | 0.59 g/VMT | 4 |
| Fugitive dust sources: | | | |
| Unpaved roads | 3.2 mi, 50 ADT | 3.5 lb/VMT | 102 |
| Unpaved shoulders | 26 ac | 0.39 t/ac/yr | 10 |
| Paved roads | 17400 VMT/day | 3.5 g/VMT | 25 |
| Unpaved parking lots | 10 ac | 1.4 lb/VMT | 6 |
| Agriculture | 19 ac | 0.15 t/ac/yr | 3 |
| Construction | 40 ac, 6 mo | 0.44 t/ac/mo | 106 |
| Cleared areas | 28 ac | 0.37 t/ac/yr | 10 |
| RR right-of-way | 14 ac | 0.4 t/ac/yr | 6 |
| Playgrounds | 4 ac | 0.39 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 283 |
| Emission density, ton/sq mi/yr | | | 90 |
| Percent fugitive dust | | | 95 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 545 ug/m³; 1975 = 155 ug/m³

Summary and Conclusions

The Rifle site has been in operation since 1968 and has shown highly variable readings on both a seasonal and annual basis. With limited available data in both 1974 and 1975, the annual means were 109 and 79 ug/m³, respectively. The microinventory showed that fugitive dust sources, unpaved roads and construction in particular, were the major contributors in the survey area. No point sources with impact on the sampler were identified.

The estimated emission density of 90 ton/sq mi/yr does not support the measured ambient concentration of 79 ug/m³ in 1975. The sites in western Colorado generally have lower emission densities than sites with comparable readings in the eastern part of the state, possibly indicating higher background concentrations in the very arid Western Slope areas. Evaluation of the sampling site revealed an unpaved parking area adjacent to the site and obstructions in the other directions, plus the erratic nature of the air quality data may be a sign of some interference.

If a full year of sampling data shows the Rifle site is still exceeding the primary standard, some emission reduction could probably be achieved by better enforcement of existing fugitive dust regulations. Since fugitive dust accounts for 95 percent of emissions in the survey area, there are no obvious new or more stringent regulations (as part of an SIP revision) that could produce further emission reductions.

3.28 GRAND JUNCTION-CITY HALL
SAROAD Site No. 06-0980-010

Description

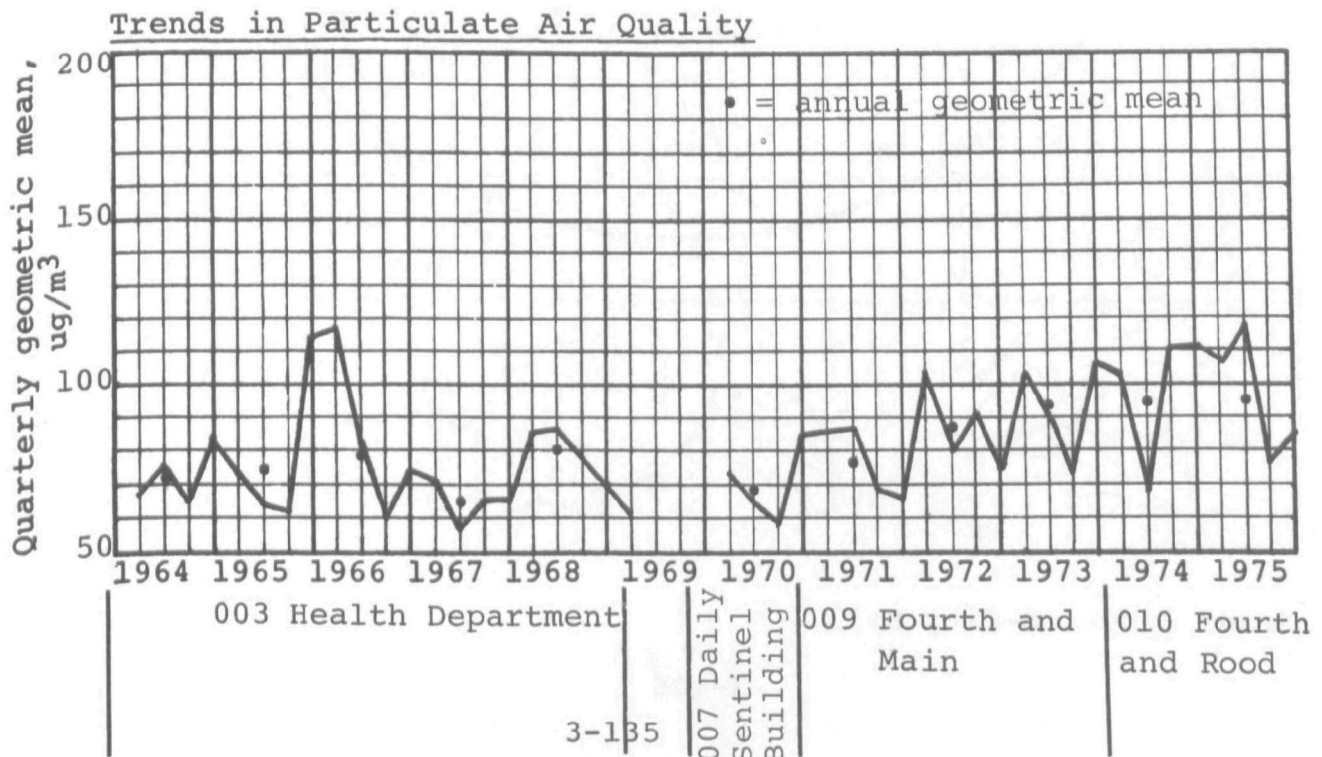
General site description - The sampler is presently located on the roof of City Hall (Fourth and Rood) in the commercial central business district about 15 feet above ground level. It is removed about 100 feet from the streets on two sides.

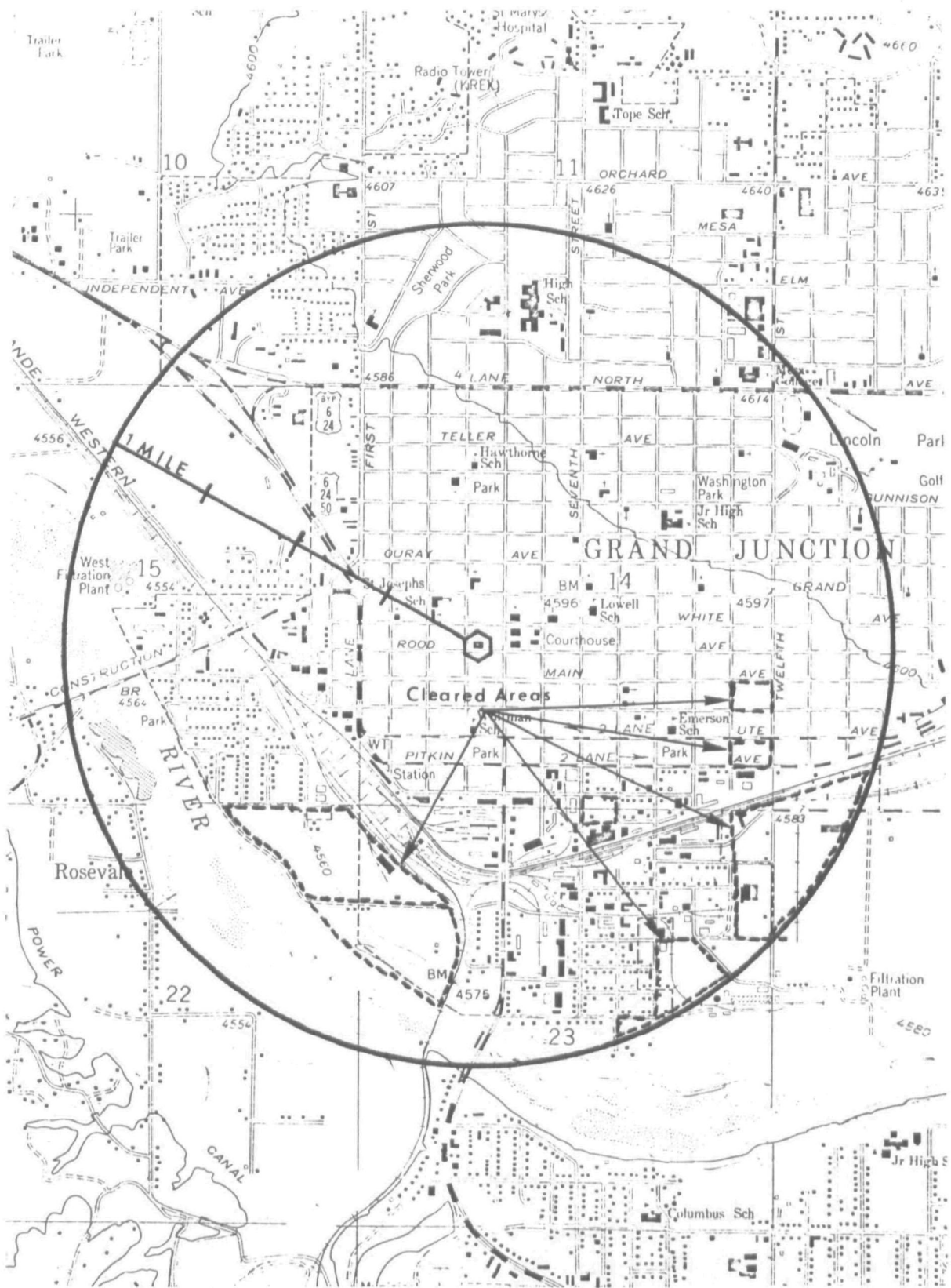
Localized pollution influences - There are no adverse influential sources in close proximity to the sampler with the exception of traffic in the central business district.

Physical interferences - There are no obvious obstructions near the sampler or tall buildings which would affect the readings.

Terrain - The area immediately surrounding the sampler is flat, as is the remainder of the 1 mile radius survey area down to the Colorado River, which borders the periphery of the area in the southwest quadrant.

Comments - In general, the area surrounding the sampler and the central business district is clean, while the north and south sectors of the survey area contain many cleared areas and unpaved parking lots. The sampler is probably situated in a good representative location. The sampler has been moved several times since 1964. The various locations are shown below on the graph.





Grand Junction-City Hall.

Sources in Microinventory Area (1 mile radius)

Grand Junction

Population = 6,600

VMT = 116,600

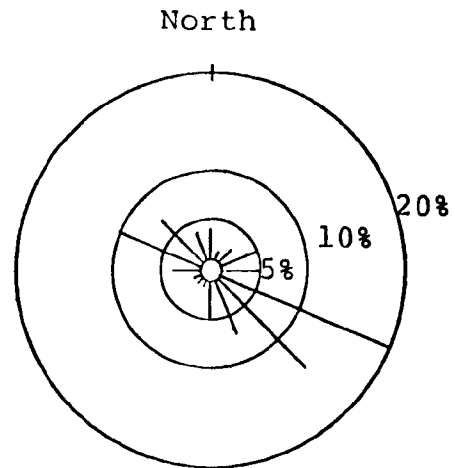
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Whitewater Building Materials | | | neg |
| Mesa Feed & Farm Supply | | | 1 |
| Mix-Mill Feed Factory | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 11.4% of county pop 116600 VMT/day | | 22 |
| Other mobile | | | 4 |
| Motor vehicle exhaust | | 0.59 g/VMT | 28 |
| Fugitive dust sources: | | | |
| Unpaved roads | 1.7 mi, 30 ADT | 3.5 lb/VMT | 33 |
| Unpaved shoulders | 10.6 ac | 0.43 t/ac/yr | 5 |
| Paved roads | 116600 VMT/day | 3.5 g/VMT | 164 |
| Unpaved parking lots | 21 ac | 1.4 lb/VMT | 12 |
| Construction | 6 ac | 0.43 t/ac/mo | 10 |
| Cleared areas | 210 ac | 0.41 t/ac/yr | 86 |
| RR right-of-way | 25 ac | 0.5 t/ac/yr | 12 |
| RR yards | 61 ac | 0.5 t/ac/yr | 30 |
| Playgrounds | 15 ac | 0.43 t/ac/yr | 6 |
| Total emissions, ton/yr | | | 413 |
| Emission density, ton/sq mi/yr | | | 131 |
| Percent fugitive dust | | | 87 |

Meteorological Data

Average annual
wind speed = 8.2 mph

Annual precipitation
1974 = 8.20"
1975 = 9.18"
Normal = 8.41"

No. of days
with precipitation = 90



Grand Junction Airport - 4% calm

Maximum Recorded Concentrations

1974 = 361 $\mu\text{g}/\text{m}^3$; 1975 = 522 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Grand Junction site has been at four different locations during the past 12 years. Since 1971, annual mean concentrations have exceeded the primary standard every year and have shown a steady increase. The air quality data do not exhibit consistent seasonal variations. The present site location on the City Hall building seems to be representative of the urban area and free of local biases.

Major contributing sources identified by the microinventory were paved streets (40%), cleared areas (21%), unpaved roads (8%), and motor vehicle exhaust (7%). Point source contributions were less than one percent. The steady increase in ambient concentrations in recent years provides some confirmation of the major impact of the traffic-related emissions. While the estimated emission density of 131 ton/sq mi/yr does not appear adequate to generate an annual average concentration of 96 $\mu\text{g}/\text{m}^3$, this same relationship has been found at other western Colorado non-attainment sites such as Rifle and Steamboat Springs.

Reentrained dust from streets could be reduced by improved street cleaning and some other fugitive dust emissions could be reduced by more comprehensive enforcement of existing state regulations. The latter control measure would not require an SIP revision. It is possible that the combined effect of these two measures would still not result in attainment because of the low control efficiencies achievable for most fugitive dust sources:

3.29 TRACT CB TRAILER 020

Description

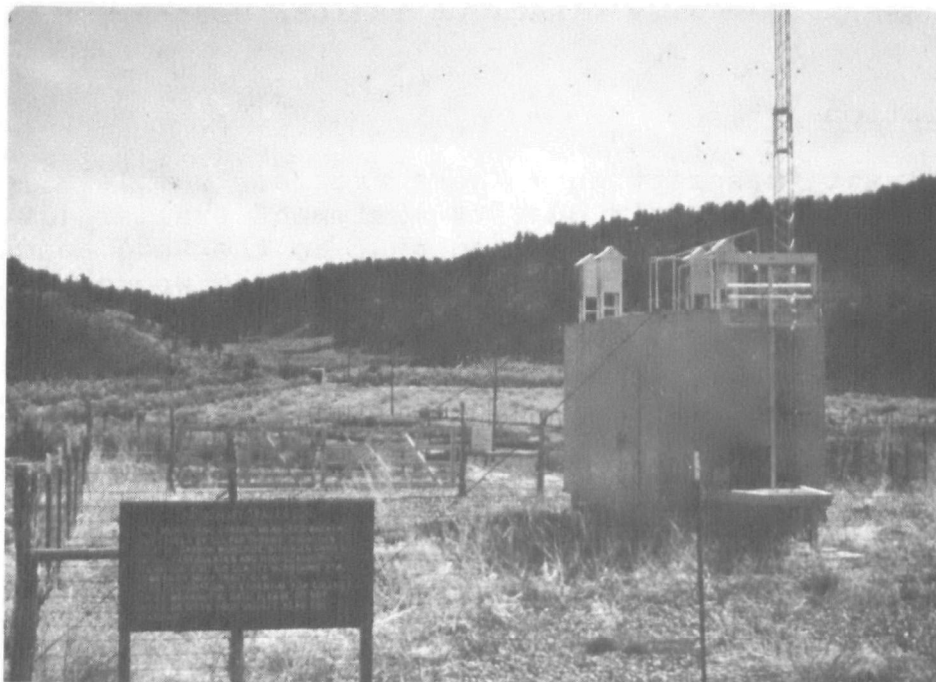
General site description - There are four samplers located on the roof of the air quality equipment trailer (10 feet above ground level) in a field next to the Redd Ranch. The surrounding area is ranchland, fields, and wooded areas removed from any development.

Localized pollution influences - There are no major influential sources with the exception of a 500 foot wide strip of bare earth parallel to and across the road from the sampler site (300 feet).

Physical interferences - There are no physical interferences in the vicinity of the samplers.

Terrain - The entire tract area and site location can be characterized as rolling to semi-mountainous. The site actually sits in a valley between two ridges.

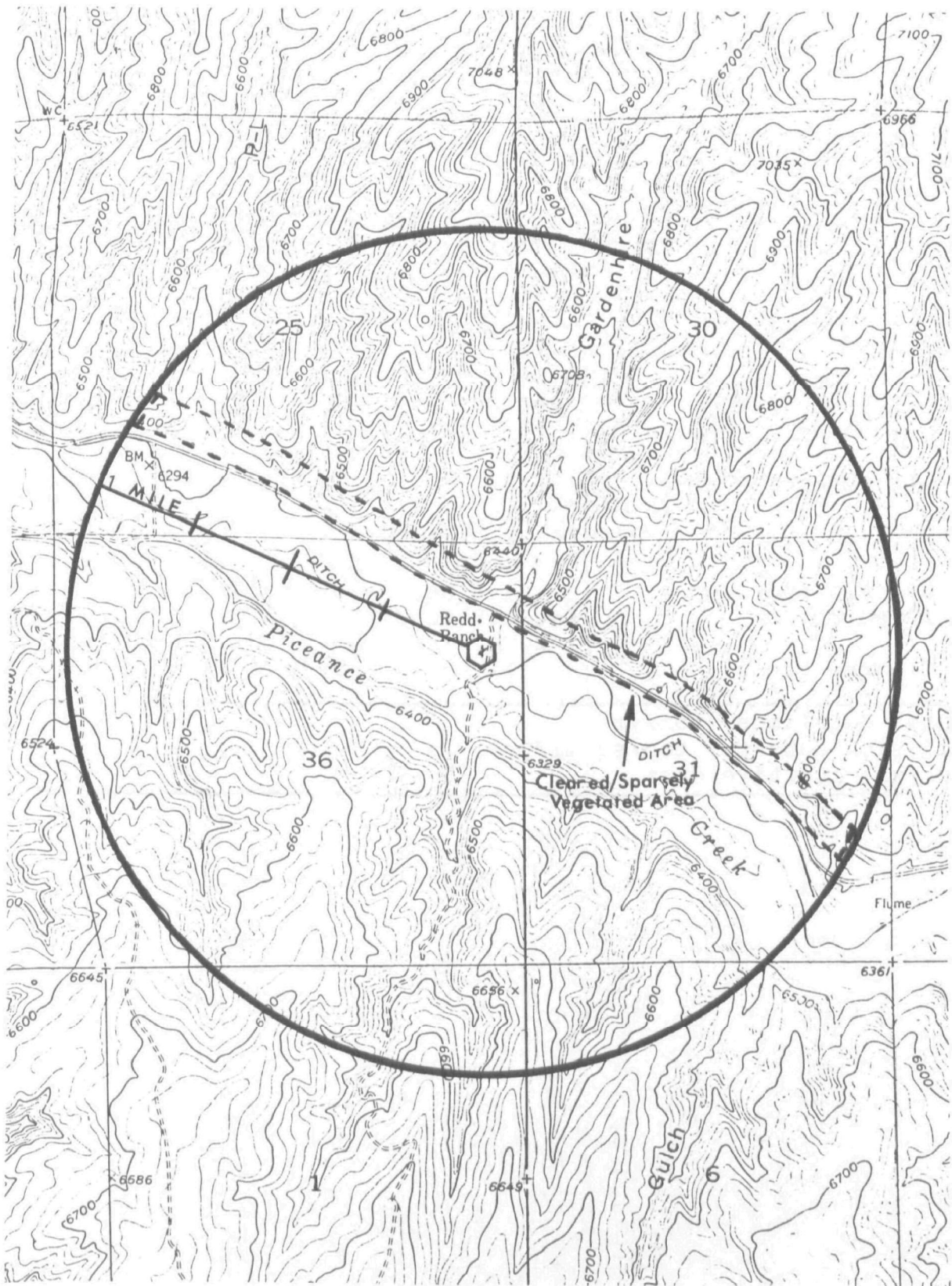
Comments - The site appears to present a good indication of background baseline air quality in Tract CB.



Tract CB Trailer 020 sampler viewed to the south.



Tract CB Trailer 020 sampler viewed to the north.



Tract CB Trailer 020.

Sources in Microinventory Area (1 mile radius)

Tract CB 020

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|-------------------------------|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | | | neg |
| Incineration | | | neg |
| Other mobile | | | neg |
| Motor vehicle exhaust | 200 VMT/day | 0.59 g/VMT | neg |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.2 mi, 4 ADT | 3.5 lb/VMT | 6 |
| Unpaved shoulders | 4.8 ac | 0.41 t/ac/yr | 2 |
| Paved roads | Est 100 veh/dy x 2 VMT/veh | 3.5 g/VMT | neg |
| Cleared areas | 71 ac | 0.39 t/ac/yr | 28 |
| Total emissions, ton/yr | | | 36 |
| Emission density, ton/sq mi/yr | | | 11 |
| Percent fugitive dust | | | 100 |

Meteorological Data

No local data available.

Summary and Conclusions

This site was included in the particulate non-attainment study because some initial readings exceeded the 24-hour secondary standard, even though the station was established to measure background air quality prior to any development of the area. The site survey showed that the site was indeed a good location for a background monitor, having very few identifiable particulate emission sources and an estimated emission density of only 11 ton/sq mi/yr. Any short-term excursions above the standard would have to be attributed to either local natural sources (wind erosion across unprotected soil surfaces) or long-range transport of dust. Readings taken at this site would provide good background values for the Rifle sampling site.

3.30 TRACT CB TRAILER 022

Description

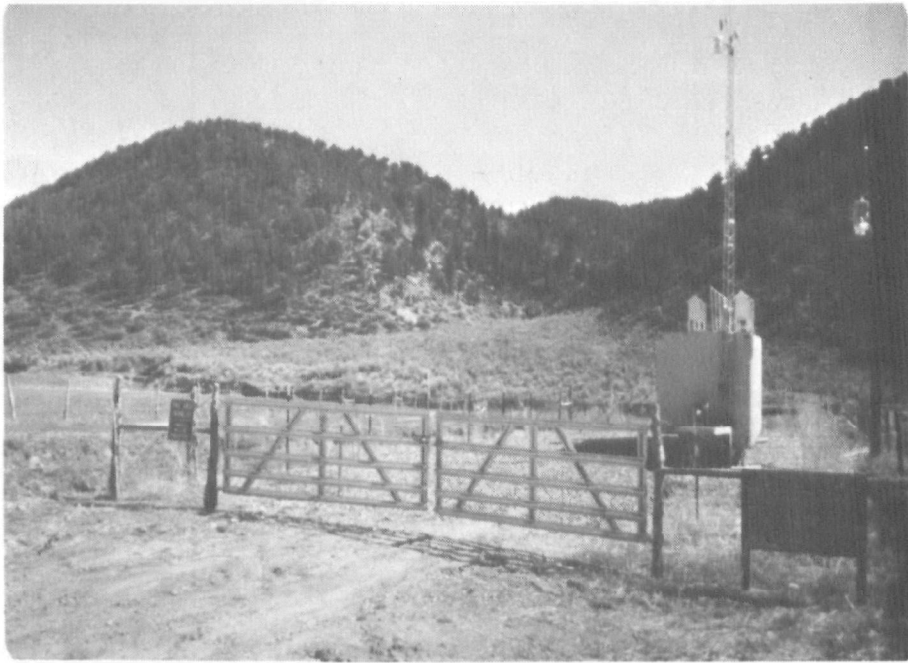
General site description - There are four samplers located on the roof of the air quality equipment trailer (10 feet above ground level) in a cattle grazing field next to the Gerald Oldland Ranch. It is 300 feet from the paved access road. The surrounding area is fields, ranchland, and wooded hillsides removed from any development.

Localized pollution influences - There are no major influential sources with the exception of a 500 foot wide strip of uncovered ground parallel to and across the road from the sampler site (300 feet).

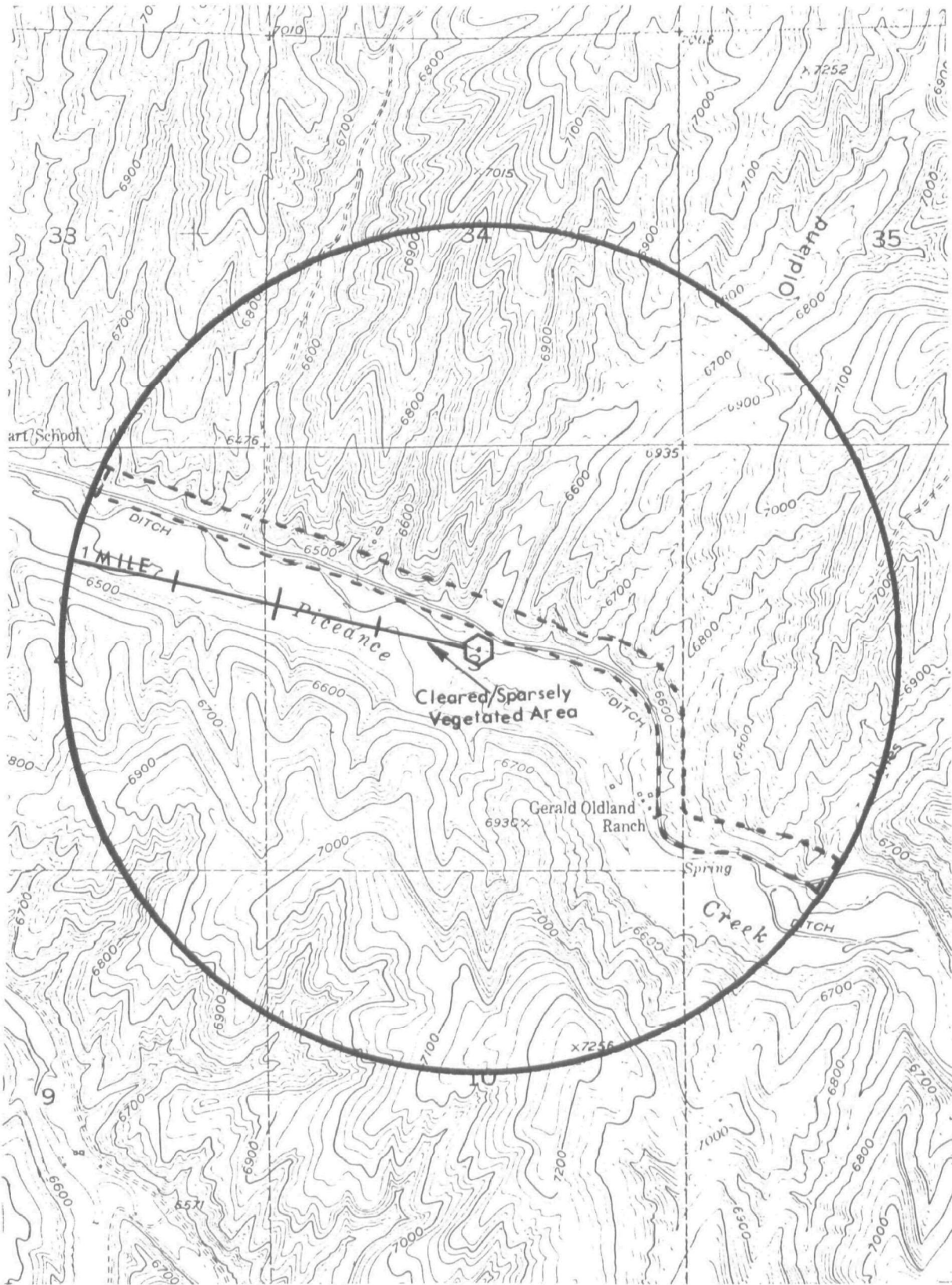
Physical interferences - There are no physical interferences or obstructions in the vicinity of the samplers.

Terrain - The entire tract area and site location can be characterized as rolling to semi-mountainous land. The site is situated in a valley between two ridges.

Comments - The sampling site is completely isolated and probably presents an excellent indication of background baseline air quality in Tract CB.



Tract CB Trailer 022 sampler viewed to the south-southeast.



Tract CB Trailer 022.

Sources in Microinventory Area (1 mile radius)

Tract CB 022

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|----------------------------|-----------------|--------------------------|
| Area sources: | | | |
| Fuel combustion | | | neg |
| Incineration | | | neg |
| Other mobile | | | neg |
| Motor vehicle exhaust | 200 VMT/day | 0.59 g/VMT | neg |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.8 mi, 4 ADT | 3.5 lb/VMT | 2 |
| Unpaved shoulders | 5.5 ac | 0.41 t/ac/yr | 2 |
| Paved roads | Est 100 veh/dy x 2 VMT/veh | 3.5 g/VMT | neg |
| Cleared areas | 83 ac | 0.39 t/ac/yr | 33 |
| Total emissions, ton/yr | | | 37 |
| Emission density, ton/sq mi/yr | | | 12 |
| Percent fugitive dust | | | 100 |

Meteorological Data

No local data available.

Summary and Conclusions

This site was included in the non-attainment study for the same reasons as the Trailer 020 site and yielded the same findings: the site is a good background sampling location; there are no significant anthropogenic sources of particulate in the vicinity of the sampler; and any short-term excursions above the standard could only be attributed to natural sources or long-range transport.

3.31 GREAT FALLS-FIRE STATION
SAROAD Site No. 27-0660-009

Description

General site description - The sampler is located on the roof of the fire station (First Avenue, South and Ninth Street, South) about 20 feet above ground level. It is in an area of residential/light commercial land use and fronts on a paved alley immediately adjacent to the building.

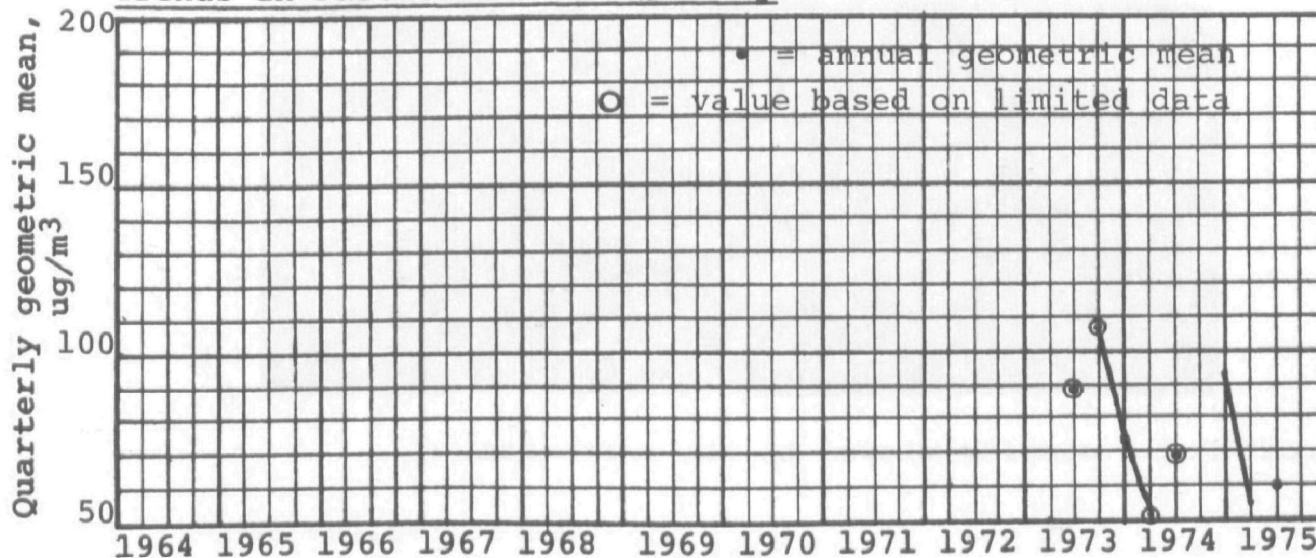
Localized pollution influences - There are several unpaved driveways and a small incinerator stack 50 feet to the south of the sampler.

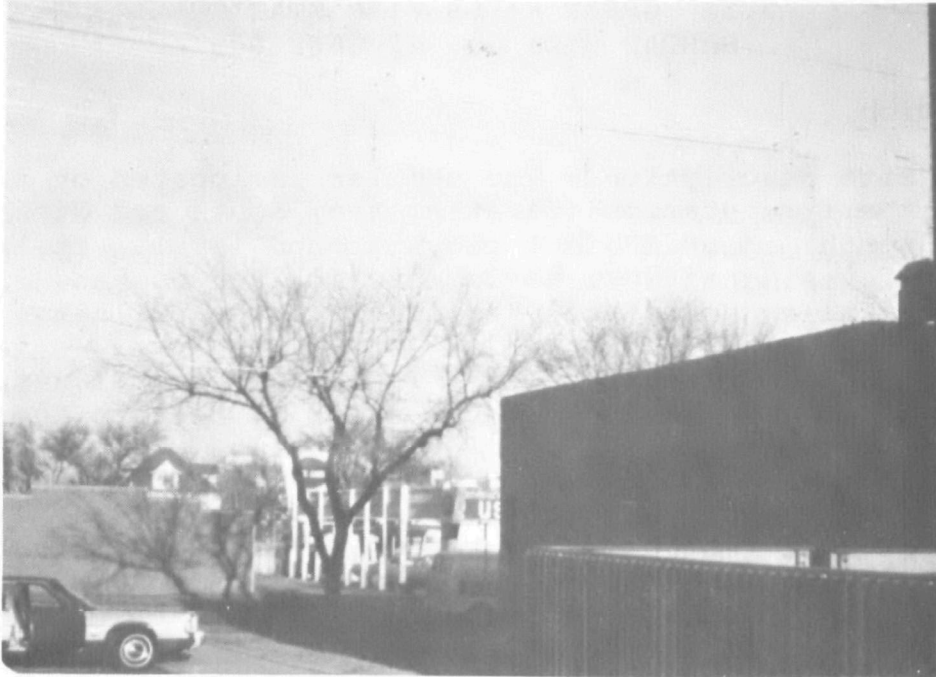
Physical interferences - The fire station wall extends upward 20 or more feet about 10 feet east of the sampler and effectively blocks air movement from that direction.

Terrain - The area in the immediate vicinity of the sampler is flat to rolling and slopes down into the Missouri River Valley one mile to the west.

Comments - The major downtown streets appeared swept and flushed, but the majority of other streets in the city were not. Visible suspended dust from street traffic was noted. With the exception of the physical interference, the sampler probably gives representative samplings of air quality.

Trends in Particulate Air Quality





Great Falls sampler viewed to the northwest.



Great Falls sampler viewed to the northeast.

Sources in Microinventory Area (1 mile radius)

Great Falls

Population = 20,400

VMT = 127,600

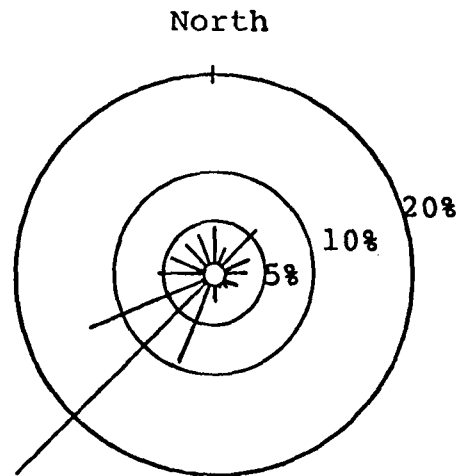
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------------|-----------------------|-----------------|--------------------------|
| Point sources: | | | |
| Concrete Service | | | neg |
| 1 Ceretana Feeds | | | 70 |
| Western Grain Exchange | | | neg |
| General Mills | | | 32 |
| Great Falls Redi-Mix | | | neg |
| Phillips Refinery | Outside mile radius | | 72 |
| Burlington Northern Maintenance Shop | Outside mile radius | | unknown |
| Area sources: | | | |
| Fuel combustion | 1 ton/200 pop | | 102 |
| Other mobile | 13 gal/capita | 25 lb/1000 gal | 3 |
| Motor vehicle exhaust | 127600 VMT/day | 0.59 g/VMT | 30 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.1 mi, 20 ADT | 3.3 lb/VMT | 25 |
| Unpaved shoulders | 1.1 mi | 0.26 t/ac/yr | 1 |
| Paved roads | 127600 VMT/day | 3.5 g/VMT | 180 |
| Unpaved parking lots | 55 ac | 1.3 lb/VMT | 30 |
| Cleared areas | 8 ac | 0.25 t/ac/yr | 2 |
| RR right-of-way | 14 ac | 0.3 t/ac/yr | 4 |
| RR yards | 47 ac | 0.3 t/ac/yr | 14 |
| Playgrounds | 2 ac | 0.26 t/ac/yr | 1 |
| Total emissions, ton/yr | | | 494 |
| Emission density, ton/sq mi/yr | | | 157 |
| Percent fugitive dust | | | 52 |

Meteorological Data

Average annual
wind speed = 13.2 mph

Annual precipitation
1974 = 15.26"
1975 = 25.24"
Normal = 14.99"

No. of days
with precipitation = 100



Great Falls Airport - 1.5% calm

Maximum Recorded Concentrations

1974 = 477, second high = 288 ug/m^3
1975 = 310, second high = 208 ug/m^3

Summary and Conclusions

The Great Falls site began operation in the third quarter of 1973. Until 1975, only two quarters of data with sufficient samples to be statistically accurate were generated. The data for 1975 show an annual mean of 60 ug/m^3 and the second highest 24-hour reading of 208 ug/m^3 , both well below the corresponding primary standards.

The estimated emission density is 157 ton/sq mi/yr, lower than would be expected of a non-attainment site. There are no significant localized sources which would inflate the sampler's readings.

The major sources contributing to the ambient concentrations are several medium sized point sources in or near the mile radius, reentrained dust from paved streets (36%), and residential/commercial fuel combustion (21%). Fugitive dust sources other than paved streets contribute about 15 percent of the emissions in the survey area. If subsequent air quality data would show that emission reductions are necessary, two potential strategies would be improved street cleaning and more stringent point source regulations. However, current data indicate that Great Falls should no longer be classified as a non-attainment area.

3.32 BUTTE-GREELEY SCHOOL
SAROAD Site No. 27-0160-005

Description

General site description - The sampler is located on the roof of the Greeley School (Silver Bow Boulevard) about 15 feet above ground level. The site is in an older residential section of town, approximately 1/3 mile from the Weed concentrator and 1/2-1 mile from the Berkeley Pit area.

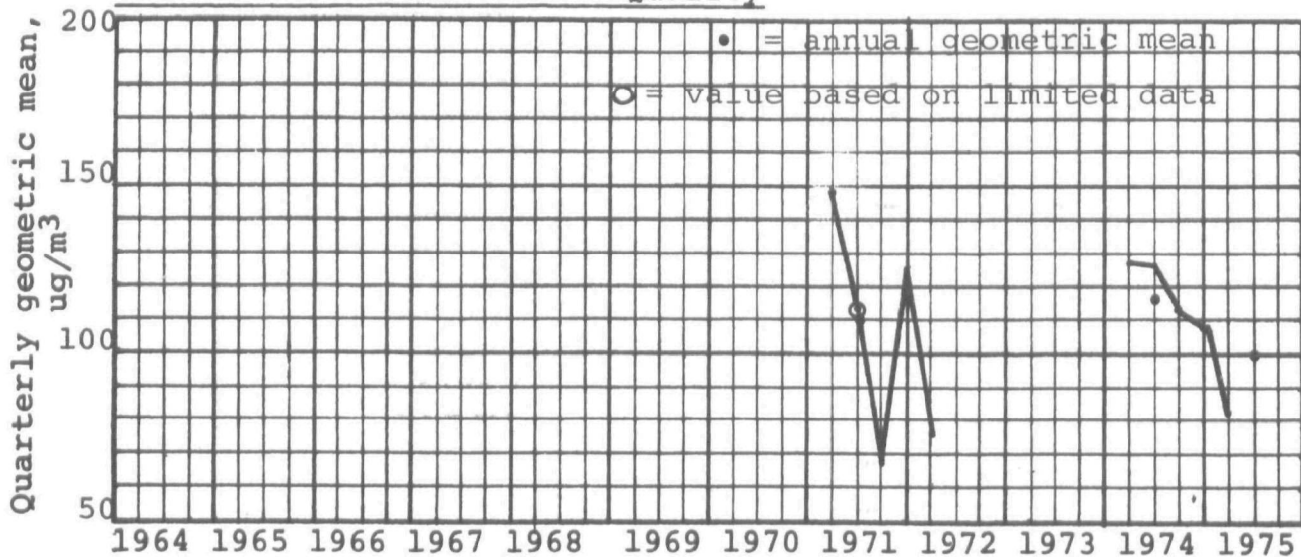
Localized pollution influences - In the immediate vicinity, an unpaved road runs in front of the school 25 feet from the sampler and a dirt playground is adjacent to the school to the west. There is a boiler vent on the school roof 25 feet from the sampler.

Physical interferences - The school roof extends upward and shelters the sampler on two sides.

Terrain - The entire area, both in the immediate vicinity of the sampler and the surrounding periphery of the survey area, is flat. The Berkeley Pit is a predominant depression to the north.

Comments - The entire site area, town, and mine area are extremely dirty and dusty with a high potential for fugitive dust emissions. The sampler is probably yielding representative readings for Butte, although it may be biased somewhat by the unpaved road in front of the school and the playground.

Trends in Particulate Air Quality

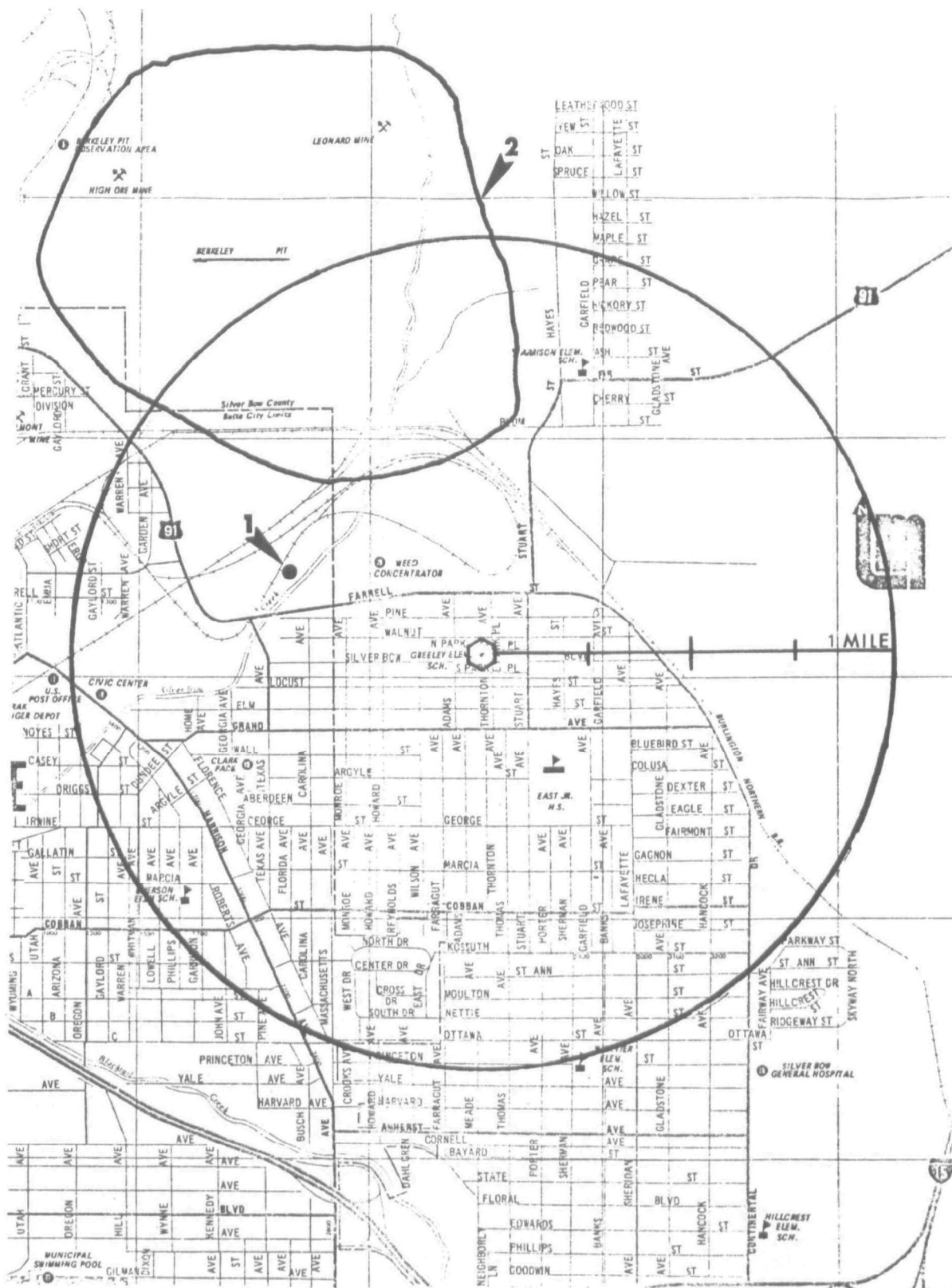




Butte sampler viewed to the south.



Butte sampler viewed to the southeast.



Butte-Greeley School.

Sources in Microinventory Area (1 mile radius)

Butte

Population = 7,300

VMT = 65,800

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| Gillman Excavating | See Sept 1975 PEDCo report | | neg |
| Continental Concrete | | | neg |
| Weed Concentrator | | | neg |
| 1 Berkeley Pit Crusher | | | 283 |
| 2 Berkeley Pit | | | 6080 |
| Area sources: | | | |
| Fuel combustion | From AQMA emission inventory report, 16.9% of county pop 65800 VMT/day | | 12 |
| Other mobile | | | 6 |
| Motor vehicle exhaust | | 0.59 g/VMT | 16 |
| Fugitive dust sources: | | | |
| Unpaved roads | 3.0 mi, 50 ADT | 3.65 lb/VMT | 100 |
| Unpaved shoulders | 27 mi | 0.19 t/ac/yr | 13 |
| Paved roads | 65800 VMT/day | 3.59 g/VMT | 93 |
| Road sanding | | | |
| Unpaved parking lots | 25 ac | 1.5 lb/VMT | 15 |
| Cleared areas | 600 ac | 0.18 t/ac/yr | 110 |
| RR right-of-way | 16 ac | 0.2 t/ac/yr | 4 |
| RR yards | 31 ac | 0.2 t/ac/yr | 7 |
| Playgrounds | 14 ac | 0.19 t/ac/yr | 3 |
| Total emissions, ton/yr | | | 6742 |
| Emission density, ton/sq mi/yr | | | 2146 |
| Percent fugitive dust | | | 94 ^a |

^a includes most emissions from Berkeley Pit

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 966, second high = 560 ug/m³
1975 = 368, second high = 302 ug/m³

Summary and Conclusions

The three full years of sampling at this site have all produced annual means of 100 ug/m³ or greater. Because the site does not have a long record of continuous operation, conclusions cannot be drawn relative to air quality trends or seasonal variations. The survey area has a very high estimated emission density of 2146 ton/sq mi/yr, which would support even higher ambient concentrations than those observed. However, 90 percent of the emissions are from the Berkeley Pit which lies only partially within the one mile radius circle. Also, emissions from the pit are from various depths up to 1300 feet and are already quite dispersed by the time they reach ground level. Emission density resulting from all sources except the pit is 211 ton/sq mi/yr.

The other contributing sources include the crushing and conveying operations for the pit, unpaved roads, cleared areas, and reentrained dust from paved roads. Although it is not apparent from the available data, emission reductions from sources other than the Berkeley Pit would probably be required in order to obtain the standards. An SIP revision in the form of fugitive dust control regulations would be one feasible approach.

The site appears to be strongly influenced by a nearby unpaved road and a dirt playground. However, it is likely that the site would continue to exceed the standards without these local biases.

3.33 MISSOULA-COURTHOUSE
SAROAD Site No. 27-1100-001

Description

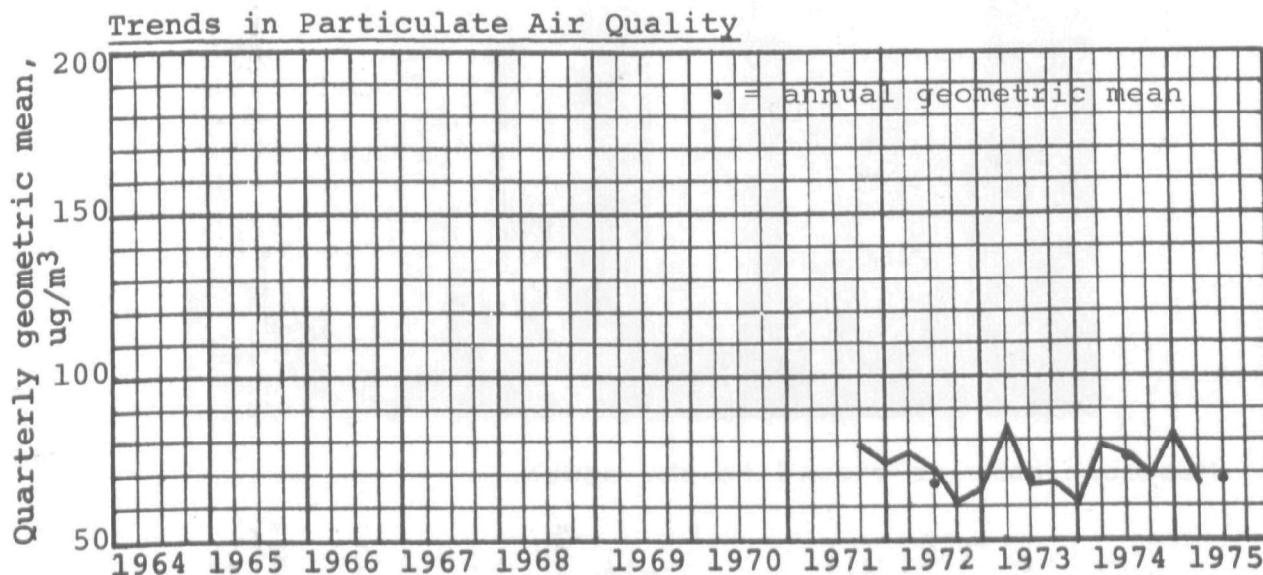
General site description - The sampler is located on the roof of the Courthouse, approximately 40 feet above ground level. It is in a commercial area and surrounded on all sides by paved streets, with a paved parking lot on one side bordering the building.

Localized pollution influences - There are no localized sources other than traffic in the immediate vicinity of the sampler.

Physical interferences - No obstructions or taller buildings were noted in the vicinity of the sampler which could affect the readings.

Terrain - The immediate site area is flat, while the north-east portion of the 1 mile radius area rises in a steep gradient. The elevation of the sampler is about 3,200 feet msl.

Comments - This sampler is probably giving a fairly representative sampling of the ambient air quality in Missoula. It is well situated and removed from severe localized pollution influences.

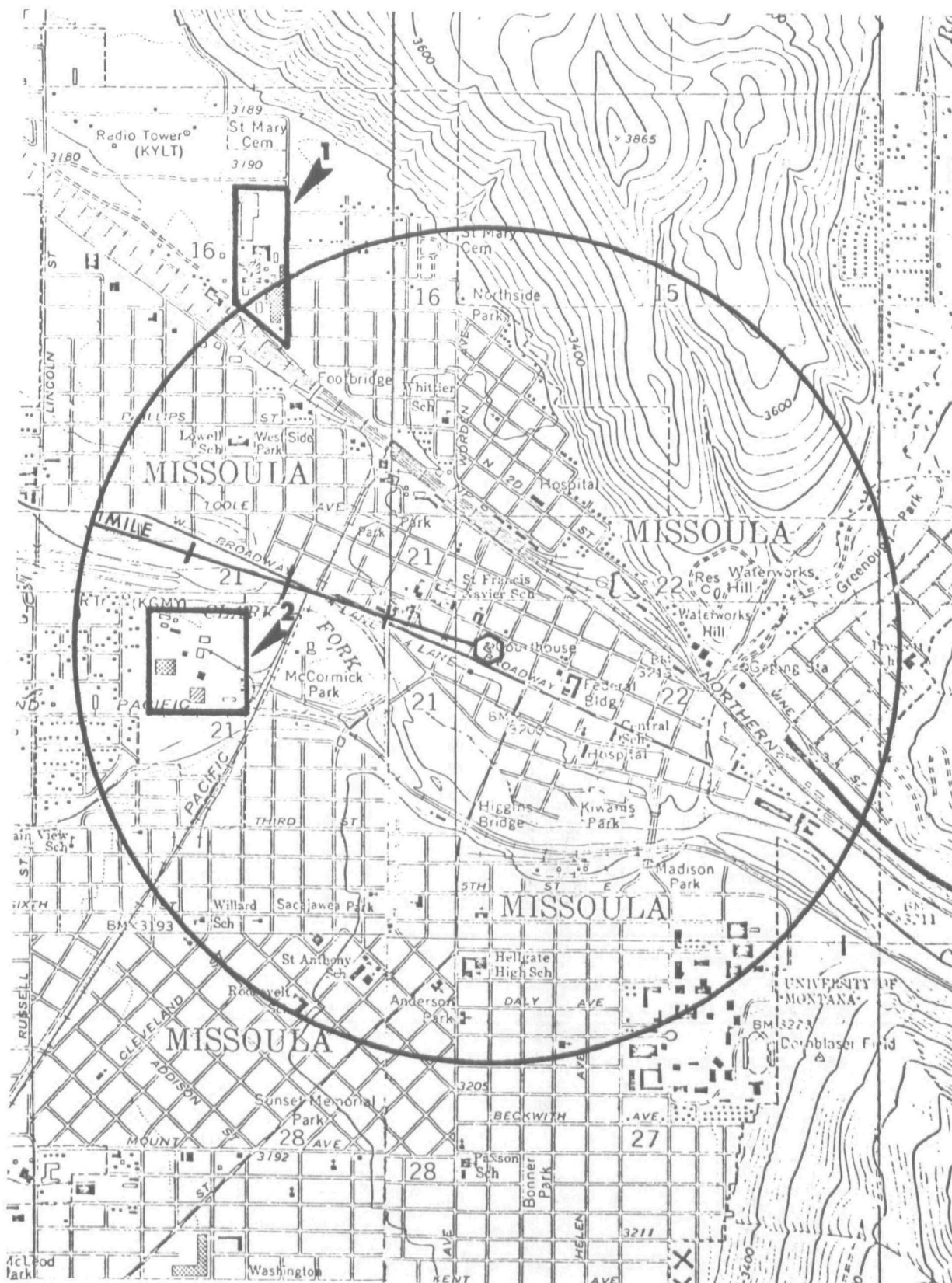




Missoula sampler viewed to the east.



Missoula sampler viewed to the south.



Missoula-Courthouse.

Sources in Microinventory Area (1 mile radius)

Missoula

Population = 11,800
VMT = 120,000

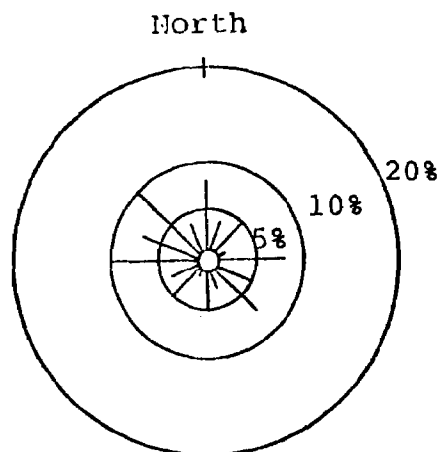
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Ceretona Feeds | | | neg |
| 1 Missoula White Pine Sash | | | 164 |
| 2 Intermountain Company | | | 49 |
| Montana Feed & Grain | | | neg |
| Area sources: | | | |
| Fuel combustion | [From AQMA emission inventory report, 18.5% of county pop 120000 VMT/day | | 42 |
| Other mobile | | | 13 |
| Motor vehicle exhaust | | 0.59 g/VMT | 28 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.5 mi, 30 ADT | 3.0 lb/VMT | 41 |
| Unpaved shoulders | 6.6 mi | 0.1 t/ac/yr | 2 |
| Paved roads | 120000 VMT/day | 3.59 g/VMT | 169 |
| Unpaved parking lots | 35 ac | 1.2 lb/VMT | 17 |
| Cleared areas | 12 ac | 0.10 t/ac/yr | 1 |
| RR right-of-way | 47 ac | 0.1 t/ac/yr | 5 |
| RR yards | 34 ac | 0.1 t/ac/yr | 4 |
| Total emissions, ton/yr | | | 535 |
| Emission density, ton/sq mi/yr | | | 170 |
| Percent fugitive dust | | | 45 |

Meteorological Data

Average annual
wind speed = 5.6 mph

Annual precipitation
1974 - 10.76"
1975 = 18.48"
Normal = 13.34"

No. of days
with precipitation = 124



Missoula Airport - 12% calm

Maximum Recorded Concentrations

1974 = 420, second high = 361 $\mu\text{g}/\text{m}^3$
1975 = 240, second high = 202 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Missoula Courthouse site has had annual means in the high 60's for three of its four years of operation. During 1974, it marginally exceeded the primary standard with an annual mean of $75.5 \mu\text{g}/\text{m}^3$. The estimated emission density of 170 ton/sq mi/yr seems to confirm the 1975 annual mean of $69 \mu\text{g}/\text{m}^3$.

The major contributors to particulate concentrations at this site are two point sources (31% and 9%) and reentrained dust from paved streets (32%). The point sources are indicated to be in compliance with existing regulations. If, based on 1976 air quality data, slight emission reductions would be necessary to attain the standard, these could be achieved by improved street cleaning, fugitive dust control regulations, or more stringent regulations for the wood products industry. However, at present no SIP revision or emission reductions appear to be required to attain the primary standard.

3.34 LIBBY-LARCH STREET
SAROAD Site No. 27-0900-009

Description

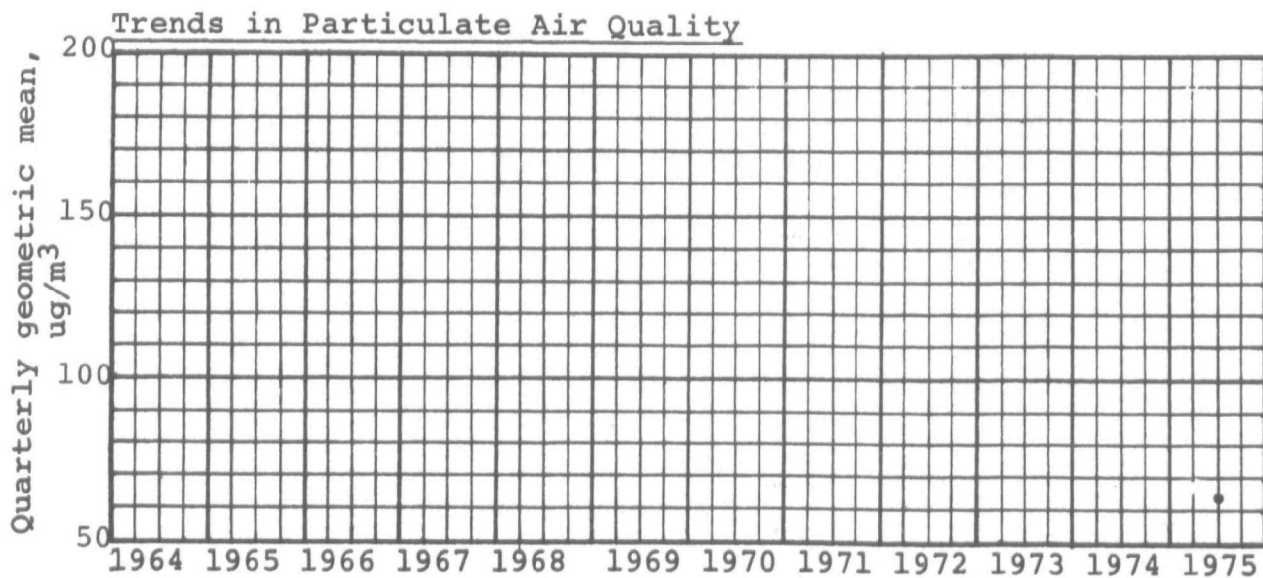
General site description - The sampler is located on the roof of a small shed at a private residence (120 West Larch) about 7 feet above ground level. The site is in an older residential area and is set back 100 feet from the road.

Localized pollution influences - A small dirt alley runs behind the shed, 15 feet from the sampler, probably not heavily travelled. There is a dirt driveway leading to the shed, 25 feet from the sampler.

Physical interferences - The site is sheltered in the backyard by a high concentration of pine trees.

Terrain - The immediate site area is flat, while steep hills rise to the south. The Kootenai River borders the 1 mile radius survey area to the northeast.

Comments - The town is very dusty, overall. Open burning is very prevalent in April. The sampler is probably reading representative samples of air quality in the area.

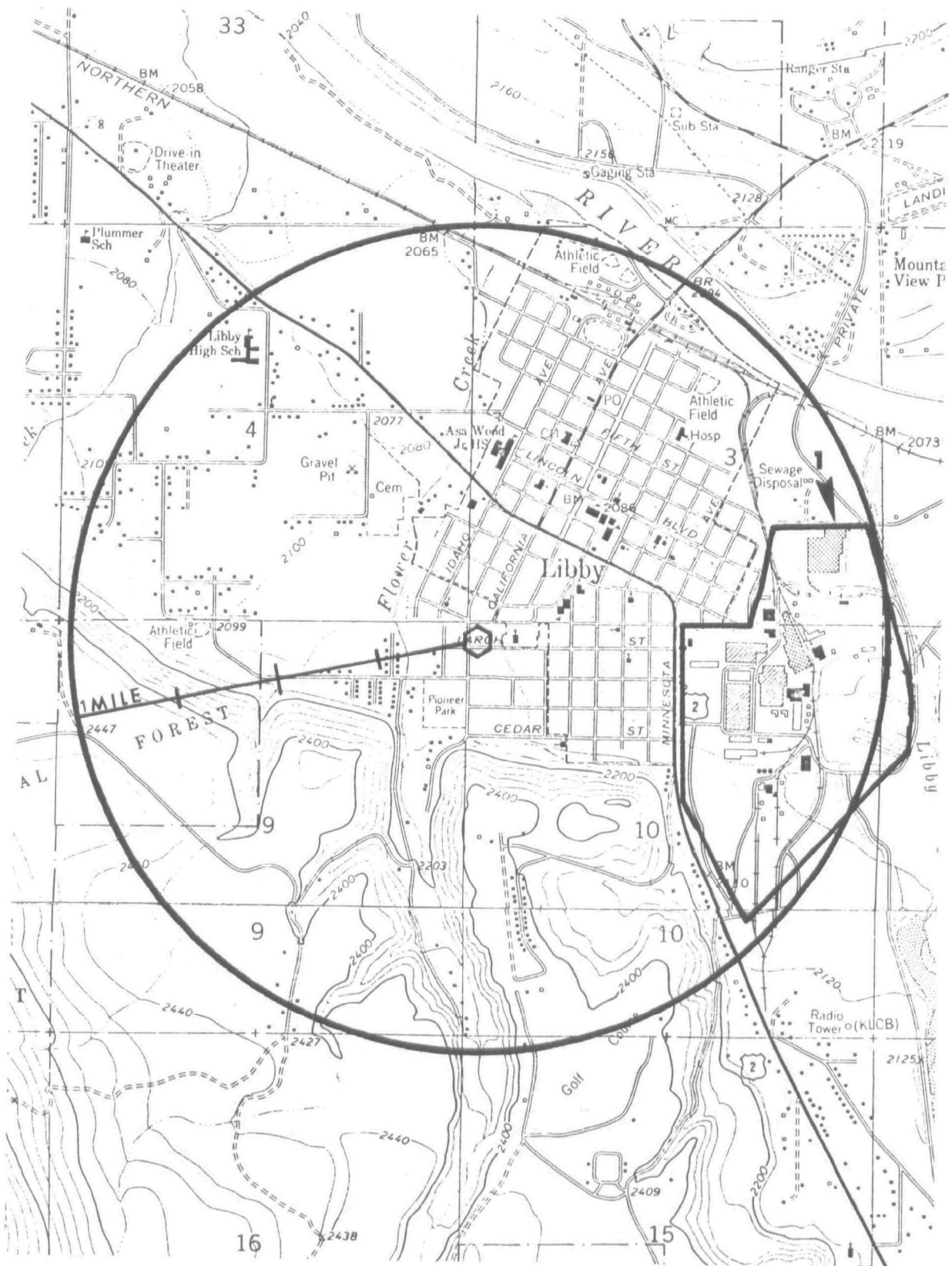




Libby sampler viewed to the west.



St. Regis Paper Company, located one mile east of the sampler site, viewed to the northeast.



Libby-Larch Street.

Sources in Microinventory Area (1 mile radius)

Libby

Population = 3,300

VMT = 57,000

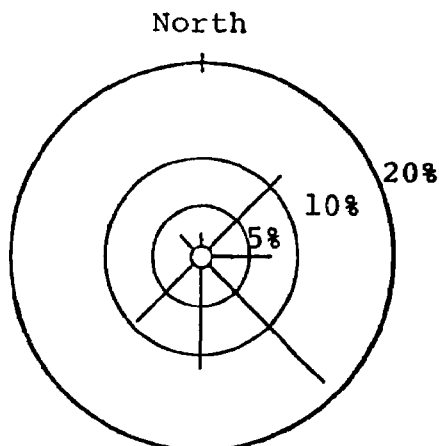
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|-----------------------|-----------------|--------------------------|
| Point sources: | | | |
| 1 St. Regis Paper | | | 370 |
| Area sources: | | | |
| Fuel combustion | 1 ton/200 pop | | 16 |
| Other mobile | 13 gal/capita | 25 lb/1000 gal | 1 |
| Motor vehicle exhaust | 57000 VMT/day | 0.59 g/VMT | 14 |
| Fugitive dust sources: | | | |
| Unpaved roads | 8.6 mi, 50 ADT | 2.82 lb/VMT | 221 |
| Unpaved shoulders | 21.6 mi | 0.1 t/ac/yr | 5 |
| Paved roads | 57000 VMT/day | 3.5 g/VMT | 80 |
| Unpaved parking lots | 36 ac | 1.13 lb/VMT | 17 |
| Cleared areas | 107 ac | 0.10 t/ac/yr | 10 |
| RR right-of-way | 5.4 ac | 0.1 t/ac/yr | 1 |
| RR yards | 26.4 ac | 0.1 t/ac/yr | 3 |
| Playgrounds | 11 ac | 0.1 t/ac/yr | 1 |
| Total emissions, ton/yr | | | 739 |
| Emission density, ton/sq mi/yr | | | 235 |
| Percent fugitive dust | | | 46 |

Meteorological Data

Average annual
wind speed = approximately 3 mph

Annual precipitation
1974)
1975) data not available
Normal)

No. of days
with precipitation = data not
available



Libby - 28% calm (< 1 mph)

Maximum Recorded Concentrations

1974 = 227, second high = 218 $\mu\text{g}/\text{m}^3$ (based on limited data)
1975 = 196, second high = 161 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

Only one year of continuous air quality data was found for the Libby site. The annual geometric mean in 1975 was $63 \mu\text{g}/\text{m}^3$, well below the primary standard. With no recent sampling data indicating a violation of the standard, it would be difficult to document this AQCR as a non-attainment area.

The estimated emission density of 235 ton/sq mi/yr is sufficient to cause average concentrations above the standard, but half of this emission density is from a single point source almost a mile from the sampler. This point source would probably have a lesser effect on ambient concentrations than indicated by its portion of the emission density.

The other two sources (in addition to the point source) with a major effect on ambient concentrations are unpaved roads (30%) and paved streets (11%). The compliance status of the point source, St. Regis Paper, was not determined. If subsequent air quality data show that emission reductions are necessary, the reductions might be obtained by more stringent regulations for paper mills or by fugitive dust regulations. However, at present this site should be considered to have attained the standard.

The sampler does not appear to be particularly biased by localized sources, but it may be blocked from obtaining higher readings by a screen of tall pine trees (see photograph).

3.35 MAGNA-BROCKBANK JUNIOR HIGH SCHOOL
SAROAD Site No. 46-0520-001

Description

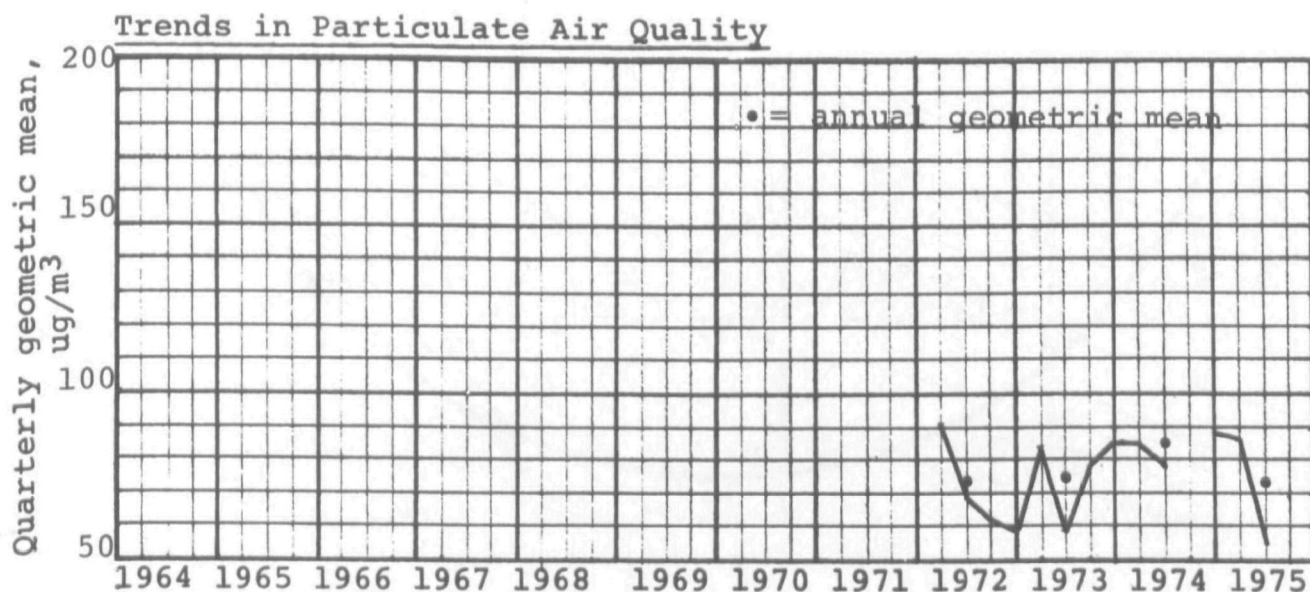
General site description - The sampler is located on the roof of the Brockbank Junior High School about 20 feet above ground level. It is in a residential neighborhood and set back from the street 75 feet.

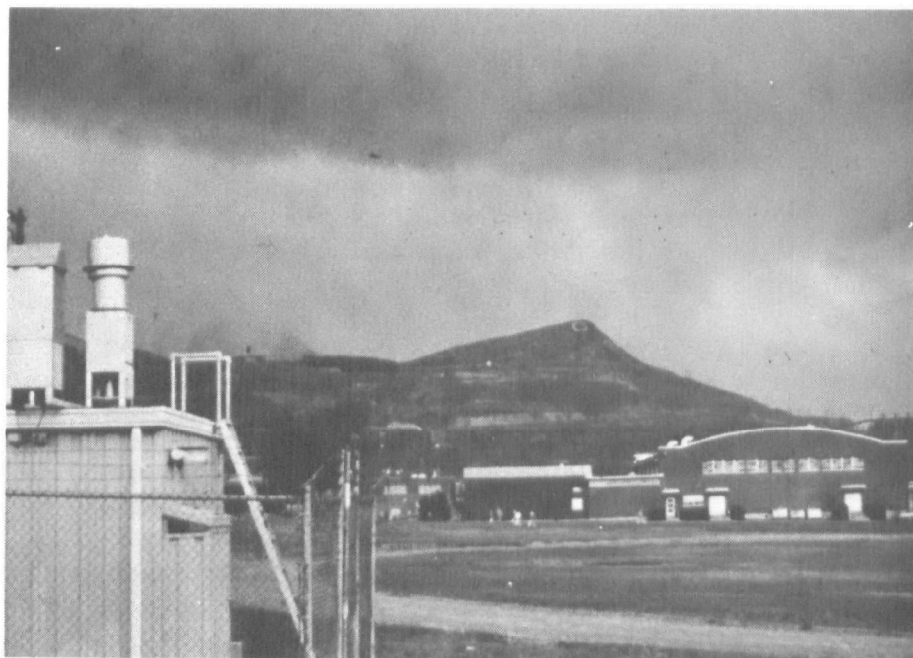
Localized pollution influences - The only unpaved area in the immediate vicinity which may impact the sampler is the athletic track 300 feet to the rear of the school. To the northwest about 5 miles lies the Kennecott Copper Smelter and to the northwest and north about 1 mile the tailings ponds.

Physical interferences - There are no obstructions or taller buildings in the vicinity of the sampler which may affect the readings.

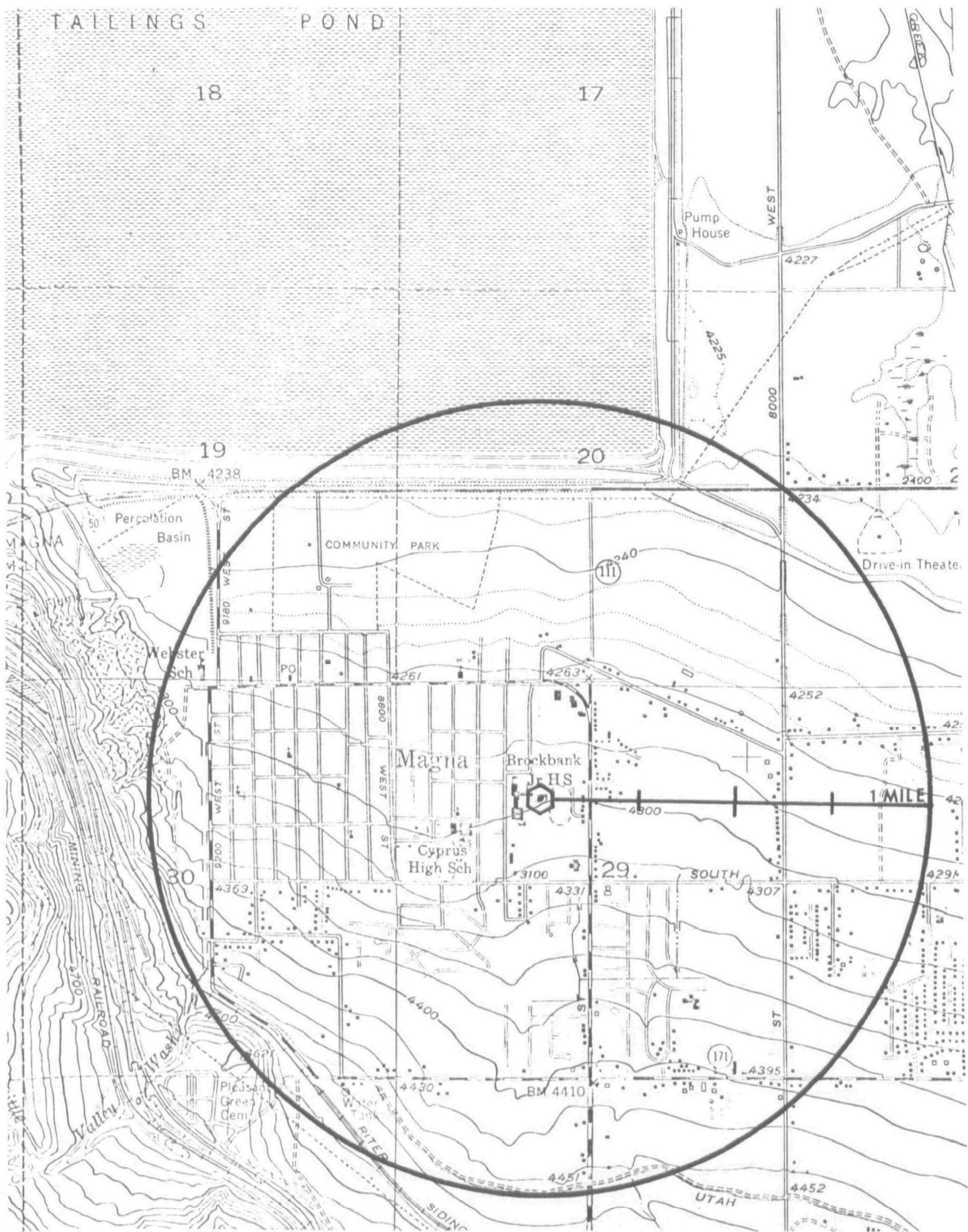
Terrain - The immediate area is flat. Beyond the 1 mile radius to the west, about 1.2 miles, the terrain rises in a steep gradient toward the smelter. The mean elevation of the survey area is 4,300 feet msl.

Comments - The sampler is well situated and probably provides a reasonably representative sampling of ambient air in Magna.





Magna sampler viewed to the west.



Magna-Brockbank Junior High School.

Sources in Microinventory Area (1 mile radius)

Magna

Population = 2,040

VMT = 32,000

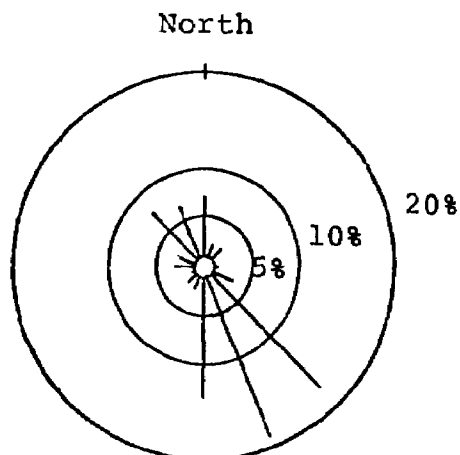
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|---|---|--|--------------------------|
| Point sources: | | | |
| Western Ready Mix Kennecott Smelter | Outside mile radius | | unknown 12020 |
| Area sources: | | | |
| Fuel combustion Incineration Other mobile | [From 1974 state emission inventory, 25.5% of total Magna emissions] | | 18 |
| Motor vehicle exhaust | 32000 VMT/day | 0.59 g/VMT | 8 |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.1 mi, 20 ADT | 3.5 lb/VMT | 1 |
| Unpaved shoulders | 7.7 mi | 0.3 t/ac/yr | 7 |
| Paved roads | 32000 VMT/day | 3.5 g/VMT | 45 |
| Unpaved parking lots | 5 ac | 1.4 lb/VMT | 3 |
| Agriculture | 95 ac | 0.004 t/ac/yr | neg |
| Construction | 14.7 ac, 4 mo | 0.7 t/ac/mo | 45 |
| Cleared areas | 3 ac | 0.36 t/ac/yr | |
| RR right-of-way | 4.6 ac | 0.4 t/ac/yr | 2 |
| Tailings piles | 40 ac in area (5580 ac outside mile radius) | 0.54 t/ac/yr (2.7 t/ac/yr @ 80% control) | 22 3013 |
| Total emissions, ton/yr | | | 152 |
| Emission density, ton/sq mi/yr | | | 48 |
| Percent fugitive dust | | | 83 |

Meteorological Data

Average annual
wind speed = 8.7 mph

Annual precipitation
1974 = 14.46"
1975 = 17.92"
Normal = 15.17"

No. of days
with precipitation = 87



Salt Lake City Airport - 5.4% calm

Maximum Recorded Concentrations

1974 = 3080, second high = 460 $\mu\text{g}/\text{m}^3$
1975 = 1456, second high = 725 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Magna site has been recording air quality measurements just slightly under the annual primary standard from 1972 to 1975, with the exception of 1974, when the geometric mean was 83 $\mu\text{g}/\text{m}^3$. The 1975 value was 69 $\mu\text{g}/\text{m}^3$, but this and the 1974 value was based on limited available data, and included unusually high maximum annual readings. Seasonal variations are not pronounced at this site. The microinventory showed that emissions from construction activities and tailings piles were the major contributors in the survey area. No point sources with probable impact on the sampler were identified within the one mile radius.

The calculated emission density of 48 ton/sq mi/yr does not support the measured 1975 concentration of 69 $\mu\text{g}/\text{m}^3$ and is much lower than normal for a non-attainment site. The site location appears to be free of physical obstructions or localized pollution influences which could adversely bias the sampler's readings. Thus, it would appear that two major sources outside the survey area, the Kennecott smelter and the major portion of the tailings piles (5580 acres) could, with a northwesterly wind, contribute to high particulate loadings measured at the sampler.

If a full year of sampling data shows the Magna site is still exceeding the primary standard, some emission reduction could probably be achieved by stringent enforcement of fugitive dust control regulations and ensuring the Kennecott smelter is operating under compliance.

3.36 OGDEN-COUNTY HEALTH DEPARTMENT
SAROAD Site No. 46-0680-001
OGDEN-NASN SAMPLING STATION
SAROAD Site No. 46-0680-001/P01

Description

General site description - The two samplers are located on the roof of the County Health Department in the commercial business district, about 15 feet above ground level.

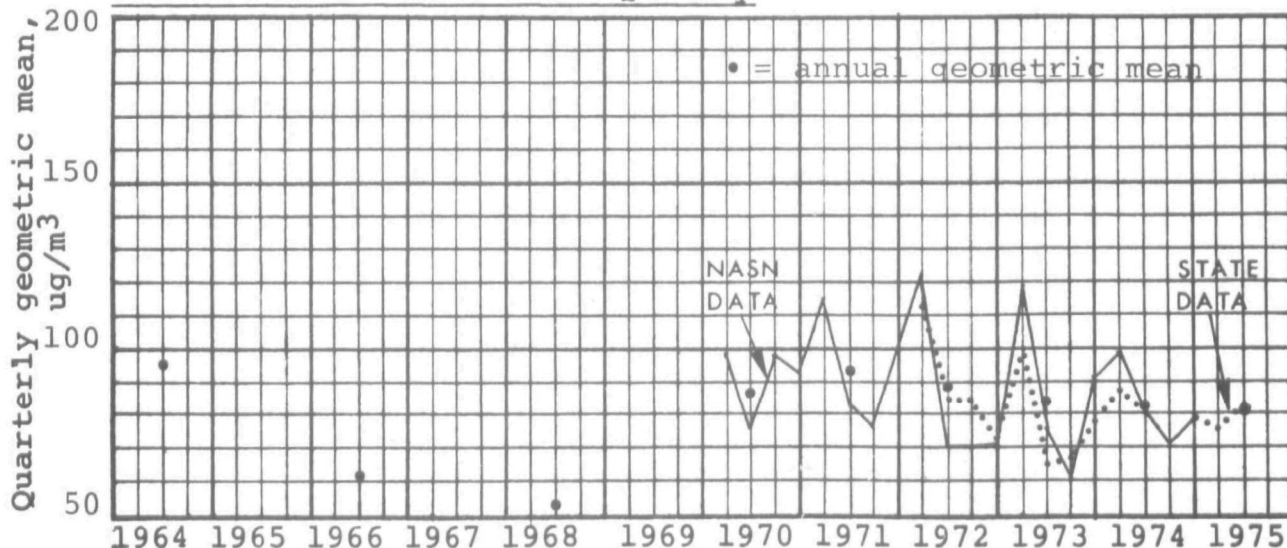
Localized pollution influences - The area in close proximity to the sampling site is generally clean and free of pollution bias. There are several vents and an incinerator stack on the roof close to the samplers.

Physical interferences - A stairway exit extends 6 feet above the roof and 10 feet behind the samplers. The fire station, 100 feet east of the samplers, is also higher.

Terrain - All the immediate and peripheral surrounding terrain is flat.

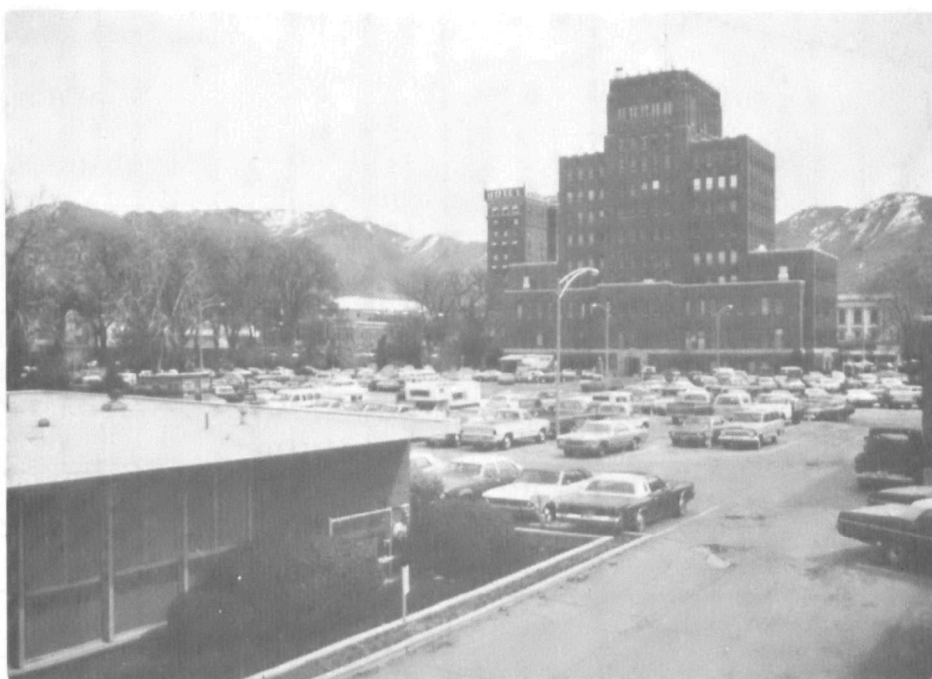
Comments - Downtown, in the areas surrounding the sampler site, the streets appeared to have coarse, sandy surfacing but were swept clean. Only the edges (shoulders) were dirty in the residential areas.

Trends in Particulate Air Quality

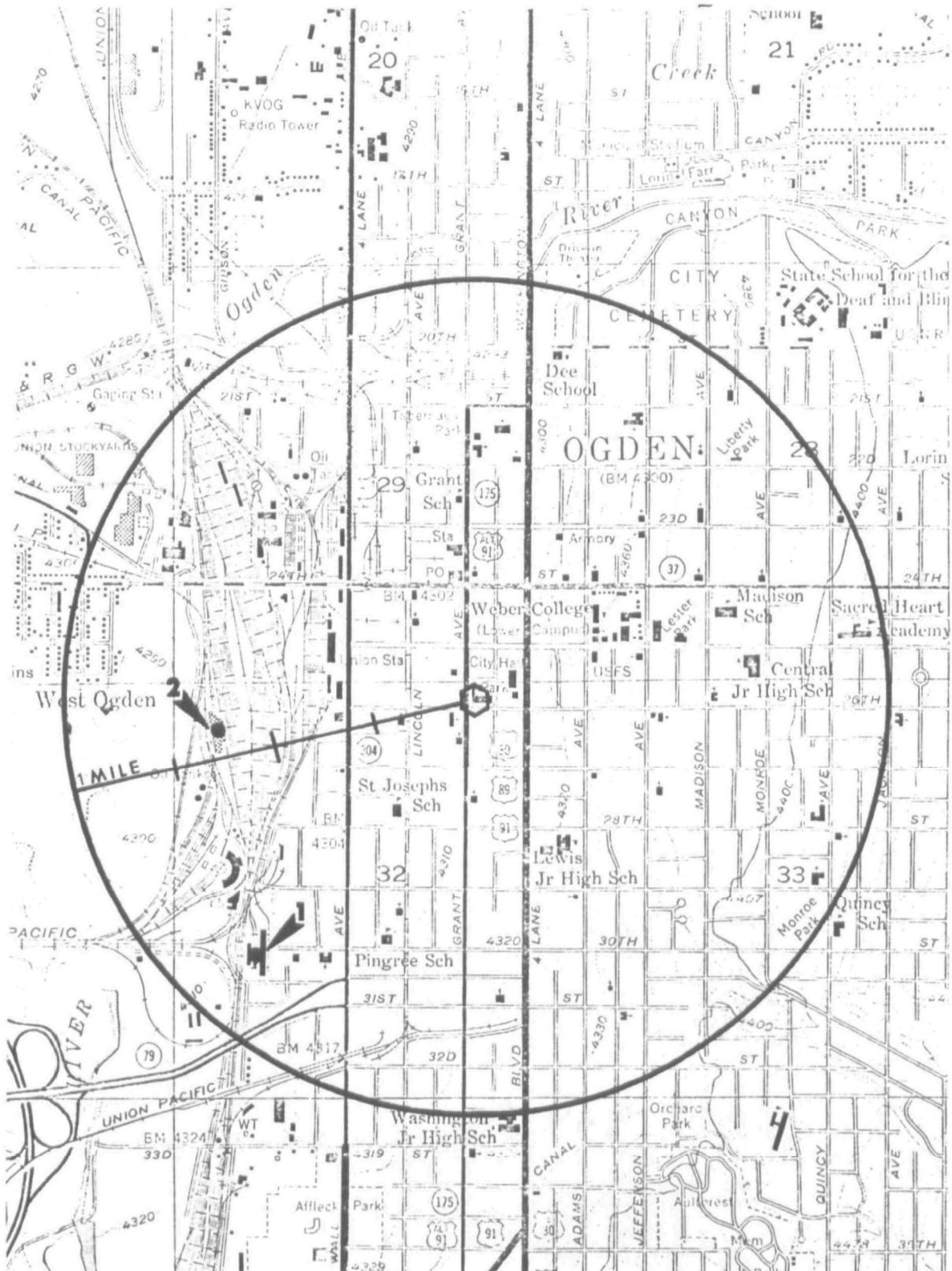




Ogden sampler viewed to the southwest.



Ogden sampler viewed to the northeast.



Ogden-County Health Department and Ogden-NASN Sampling Station.

Sources in Microinventory Area (1 mile radius)

Ogden-Health Department/NASN

Population = 2,040

VT = 172,000

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Fieldcrest Corporation | Outside mile radius | | unknown |
| American Can | | | unknown |
| Farrell Elevator | | | 8 |
| Fife Rock Products | | | unknown |
| W. R. White | | | unknown |
| 1 CM&E Elevator | | | 76 |
| 2 Evans Elevator | | | 25 |
| Area sources: | | | |
| Fuel combustion | [From 1974 state emission inventory, 2.9% of total Ogden emissions | | 20 |
| Incineration | | | |
| Other mobile | | | |
| Motor vehicle exhaust | 172000 VMT/day | 0.59 g/VMT | 41 |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.9 mi, 30 ADT | 3.5 lb/VMT | 17 |
| Unpaved shoulders | 3.2 mi | 0.1 t/ac/yr | 1 |
| Paved roads | 172000 VMT/day | 3.5 g/VMT | 242 |
| Unpaved parking lots | 54 ac | 1.4 lb/VMT | 31 |
| Construction | 2 ac, 6 mo | 0.7 t/ac/mo | 9 |
| Cleared areas | 17 ac | 0.1 t/ac/yr | 2 |
| RR right-of-way | 31 ac | 0.1 t/ac/yr | 4 |
| RR yards | 280 ac | 0.1 t/ac/yr | 33 |
| Playgrounds | 2 ac | 0.1 t/ac/yr | neg |
| Total emissions, ton/yr | | | 509 |
| Emission density, ton/sq mi/yr | | | 162 |
| Percent fugitive dust | | | 67 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 556, second high = 356 ug/m³ (State)
231, second high = 185 ug/m³ (NASN)
1975 = 437, second high = 345 ug/m³ (State)
125, second high = 96 ug/m³ (NASN)

Summary and Conclusions

The Ogden sites (State and NASN) have recorded annual geometric means over 80 ug/m³ since 1970 with a slight downtrend since 1972. In all these years, the highest quarterly average has occurred in the first (winter) quarter, indicating a strong seasonal impact from a source such as road sanding. The 1975 State site annual geometric mean, based on two quarters of data, was 79 ug/m³. Major impacting sources in the one mile radius area were identified to be two grain elevators, reentrained dust from paved roads, motor vehicle exhaust, unpaved parking lots, and railroad yards, which in the aggregate account for 88 percent of the emissions.

The samplers appear to be well located and free from localized pollution influences which could adversely affect the readings. However, the estimated emission density of 162 ton/sq mi/yr for the area surrounding the site does not appear sufficient to cause the annual average of around 80 ug/m³ at the site. It is possible that sources external to the survey area are contributing significantly to the loadings.

Most of the source categories identified as contributing to the high readings at these sites appear to be further controllable (e.g., dust from paved roads, unpaved parking lots, railroad yards). All fugitive dust sources account for approximately 67 percent of the emissions in the survey area. If minor emission reductions would be necessary to attain the standards based on subsequent air quality data, they could best be achieved through an SIP revision to promulgate fugitive dust control regulations.

3.37 PROVO-COURTHOUSE
SAROAD Site No. 46-0800-001

Description

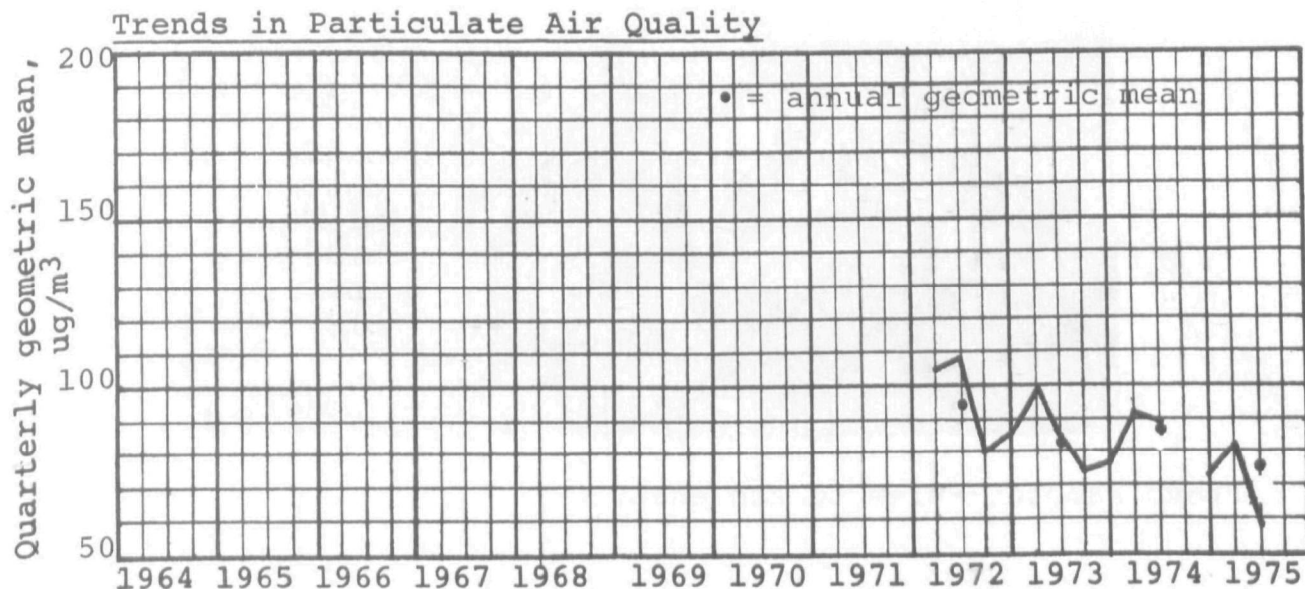
General site description - The sampler is located on the roof of the Courthouse (17 South University Avenue) in the commercial central business district of town. It is 50 feet above ground level.

Localized pollution influences - There are no adverse sources of particulates which could bias the sampler's readings other than traffic.

Physical interferences - On the roof, a five foot wall surrounds the sampler and there are several other roof and building projections on the Courthouse.

Terrain - The immediate area around the sampler is flat. Just beyond the eastern perimeter of the 1 mile radius circle, the Wasatch Range mountains begin.

Comments - Overall, the town is not highly influenced by fugitive dust sources. The streets are clean and appear swept, and there is little agriculture. The sampler siting is adequate and its measurements probably are representative of the air quality in Provo.

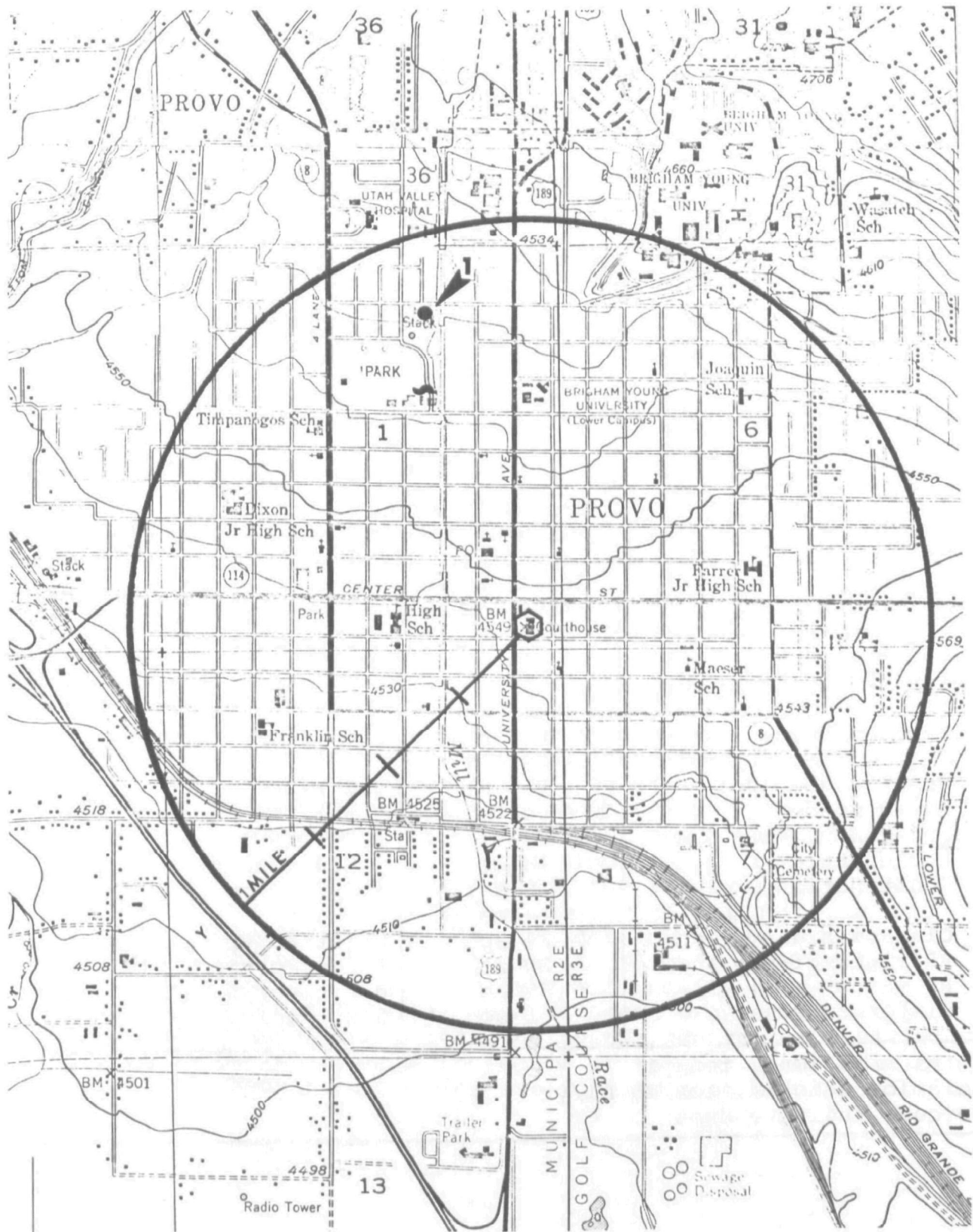




View of Provo sampler.



Provo sampler--view to the east.



Provo-Courthouse.

Sources in Microinventory Area (1 mile radius)

Provo

Population = 2,040
VMT = 187,500

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|-----------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| 1 Provo City Power | Outside mile radius Outside mile radius | | 65 |
| U.S. Steel | | | 6557 |
| Denver & Rio Grande | | | unknown |
| Western Railroad maintenance shop | | | |
| Area sources: | | | |
| Fuel combustion | From 1974 state emission inventory, 3.8% of total Provo emissions | | 16 |
| Incineration | | | |
| Other mobile | | | |
| Motor vehicle exhaust | 187500 VMT/day | 0.59 g/VMT | 44 |
| Fugitive dust sources: | | | |
| Unpaved roads | 0.6 mi, 20 ADT | 3.5 lb/VMT | 8 |
| Unpaved shoulders | 2.5 mi | 0.2 t/ac/yr | 1 |
| Paved roads | 187500 VMT/day | 3.5 g/VMT | 264 |
| Unpaved parking lots | 34 ac | 1.4 lb/VMT | 20 |
| Agriculture | 18 ac | 0.004 t/ac/yr | neg |
| Construction | 8 ac, 4 mo | 0.7 t/ac/mo | 24 |
| Cleared areas | 14 ac | 0.1 t/ac/yr | 3 |
| RR right-of-way | 20 ac | 0.2 t/ac/yr | 5 |
| RR yards | 39 ac | 0.2 t/ac/yr | 9 |
| Playgrounds | 1 ac | 0.2 t/ac/yr | neg |
| Total emissions, ton/yr | | | 459 |
| Emission density, ton/sq mi/yr | | | 146 |
| Percent fugitive dust | | | 73 |

Meteorological Data

No local data available.

Maximum Recorded Concentrations

1974 = 639 ug/m³ (three quarters)

1975 = 226 ug/m³ (two quarters)

Summary and Conclusions

The Provo site has recorded annual geometric means between 69 and 100 ug/m³ since 1972. The trend has been toward a steady decrease in measured concentration since 1972, with the 1975 value at 69 ug/m³. However, the 1974 and 1975 values were based on three and two quarters of data, respectively, lessening the statistical significance of those averages. The calculated emission density of 146 ton/sq mi/yr is somewhat low in comparison with the 1975 air quality data. The site has no obvious localized pollution sources biasing the measurements, although a roof parapet surrounding the sampler (see photographs) could interfere with normal air movements.

The microinventory indicated the major contributing sources at this site to be dust from paved roads (58%), Provo City Power Company (14%), and motor vehicle exhaust (10%), with secondary impacts from fugitive dust sources such as unpaved parking lots and construction (10%). It is a distinct possibility that the sampler could be reflecting an impact caused by the U.S. Steel facility to the north, as well as other point sources outside the survey area, thus accounting for the low emission density relative to air quality. Nevertheless, a positive determination of the attainment status of this site should be made at a future date when a full year of post-1974 air quality data can be analyzed. At that time, if an attainment problem is still indicated, regulations pertaining to the control of fugitive dust could be implemented to reduce emissions, since most of the problem source categories are further controllable.

3.38 SALT LAKE CITY-COUNTY HEALTH DEPARTMENT
SAROAD Site No. 46-0920-001
SALT LAKE CITY-NASN SAMPLING STATION
SAROAD Site No. 46-0920-001/P01

Description

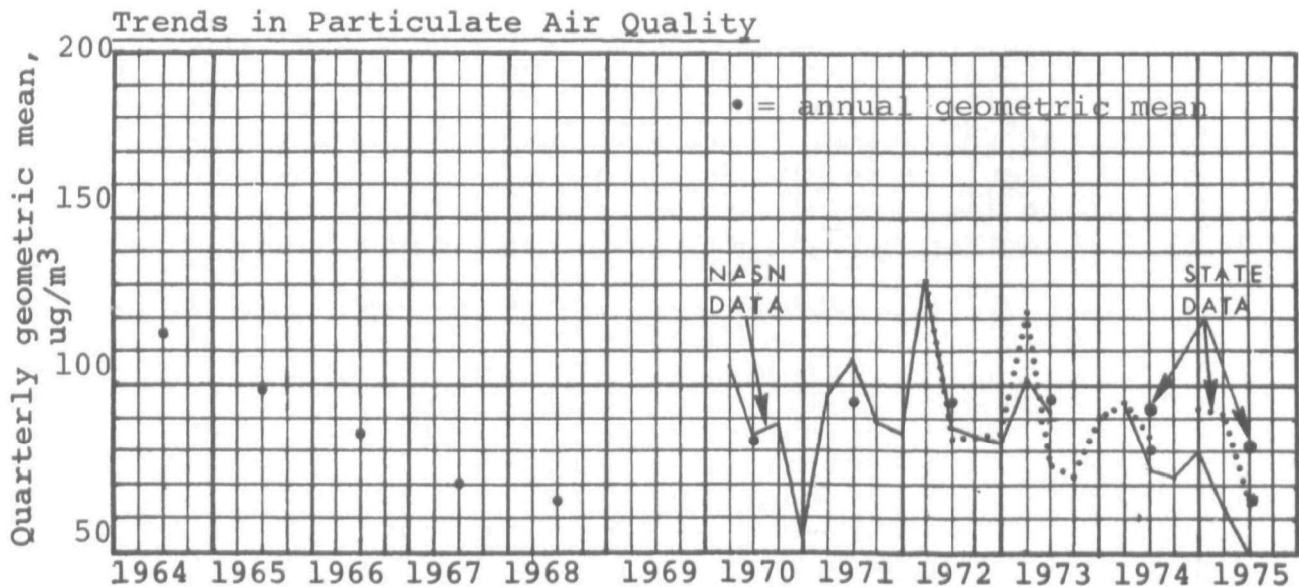
General site description - The two samplers are located on the roof of the County Health Department (610 South Second, East) approximately 25 feet above ground level. The building is in an area of light commercial land use and surrounded by paved streets and parking lots.

Localized pollution influences - The only source of significance that could impact the samplers is a construction equipment storage lot 50 feet to the south. Traffic is moderate in the area.

Physical interferences - There are no obstructions or taller buildings in the immediate vicinity which might affect the samplers' readings.

Terrain - The terrain in the vicinity of and throughout the 1 mile radius microinventory area is flat with no predominant features.

Comments - The samplers should be providing representative indications of air quality as they are situated well and have good urban exposure.

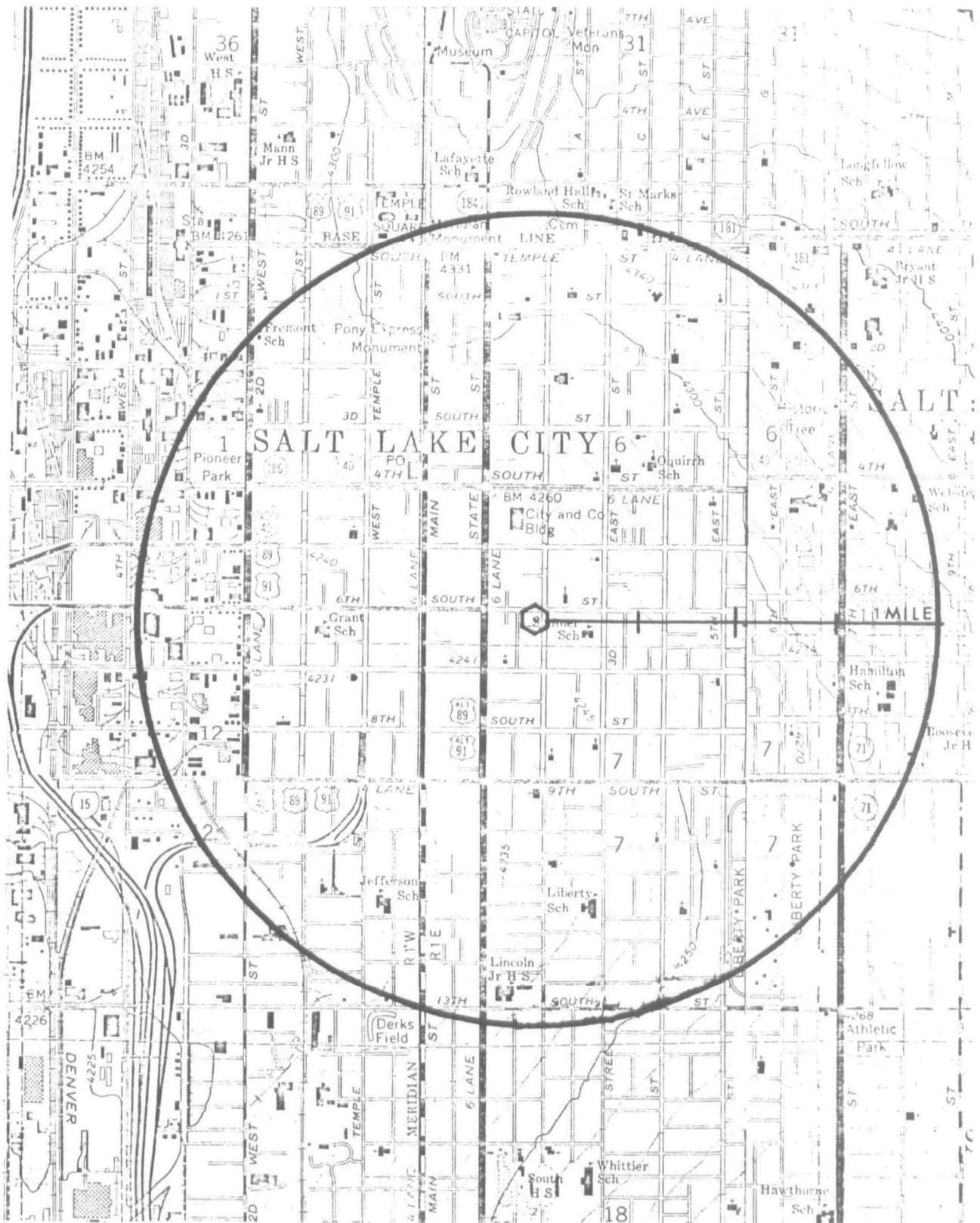




Salt Lake City-County Health Department sampler viewed to the west.



Salt Lake City-County Health Department sampler viewed to the east.



Salt Lake City-County Health Department and Salt Lake City-NASN Sampling Station.

Sources in Microinventory Area (1 mile radius)

Salt Lake City-Health Department/NASN

Population = 2,040

VTM = 240,000

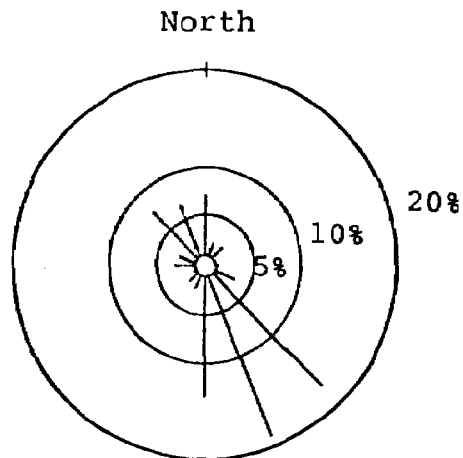
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| CM&E Elevator | Outside mile radius | | 43 |
| Ideal Cement | Outside mile radius | | unknown |
| Portland Cement | Outside mile radius | | unknown |
| Area sources: | | | |
| Fuel combustion | From 1974 state emission inventory, 1.2% of total Salt Lake City emissions | | 15 |
| Incineration | | | |
| Other mobile | | | |
| Motor vehicle exhaust | 240000 VMT/day | 0.59 g/VMT | 57 |
| Fugitive dust sources: | | | |
| Unpaved shoulders | 1.7 mi | 0.2 t/ac/yr | 1 |
| Paved roads | 240000 VMT/day | 3.5 g/VMT | 338 |
| Unpaved parking lots | 7 ac | 1.4 lb/VMT | 4 |
| Construction | 8 ac, 4 mo | 0.7 t/ac/mo | 24 |
| Cleared areas | 20 ac | 0.1 t/ac/yr | 4 |
| RR right-of-way | 8 ac | 0.2 t/ac/yr | 2 |
| RR yards | 7 ac | 0.2 t/ac/yr | 2 |
| Playgrounds | 5 ac | 0.2 t/ac/yr | 1 |
| Total emissions, ton/yr | | | 448 |
| Emission density, ton/sq mi/yr | | | 143 |
| Percent fugitive dust | | | 74 |

Meteorological Data

Average annual
wind speed = 8.7 mph

Annual precipitation
1974 = 14.46"
1975 = 17.92"
Normal = 15.17"

No. of days
with precipitation = 87



Salt Lake City Airport - 5.4% calm

Maximum Recorded Concentrations

1974 = 704, second high = 634 ug/m^3 (State)
235, second high = 175 ug/m^3 (NASN)
1975 = 691, second high = 335 ug/m^3 (State)
180, second high = 135 ug/m^3 (NASN)

Summary and Conclusions

The two Health Department sites have been recording concurrently since 1972 and have shown the annual geometric mean decreasing each year, although there has been limited available data for the sites since 1973. The 1974 NASN reading was 80 ug/m^3 , and the 1975 value was 66 ug/m^3 (the average of the State and NASN means, since only two quarters of data were available for each). Seasonal variations in data from the two sites are directly comparable, with the winter quarter the highest. From 1964 to 1972, the NASN site indicated cyclical fluctuating annual averages, varying from 115 to 65 ug/m^3 . The calculated emission density of 143 ton/sq mi/yr for the survey area appears too low to support the 1974 or 1975 air quality data.

The major sources identified as impacting the sampler are traffic related (motor vehicle exhaust and dust from paved roads--88 percent). Secondary fugitive dust sources do not appear to play a large role in this area, nor do point sources. Contributing to the measured air quality in the area may be impacts from outlying point sources in the industrial area to the west. Future non-attainment determinations based on post-1974 air quality data will be necessary before additional control strategies or needs can be assessed. If found necessary, an SIP revision incorporating improved street cleaning or traffic controls to reduce reentrained dust emissions from paved roads may be instituted.

3.39 SALT LAKE CITY-AIRPORT
SAROAD Site No. 46-0920-004

Description

General site description - The sampler is located on the roof of the National Weather Service (NWS) building at the airport (175 North and 2400 West) about 15 feet above ground level. It is totally surrounded by public use land in a rather sparsely populated area of the city. There are paved parking lots on three sides of the NWS building.

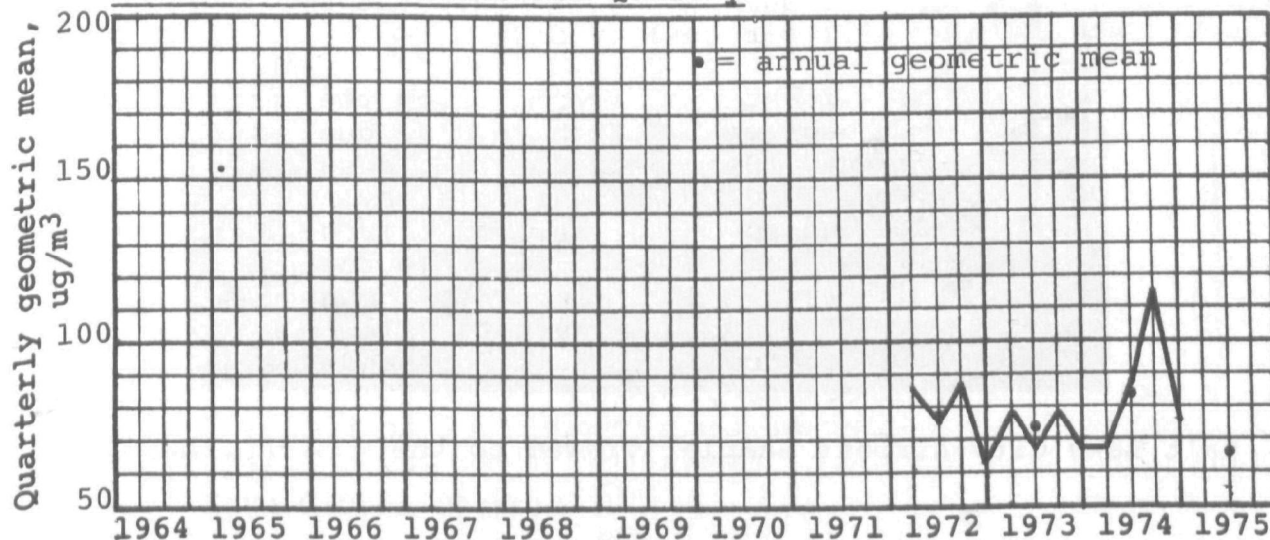
Localized pollution influences - There are an incinerator and a heating stack on the roof 20 feet from the sampler. The predominant secondary influences in the vicinity would be traffic and aircraft.

Physical interferences - With the exception of one small air conditioning compressor 10 feet from the sampler, there are no obstructions or tall buildings which would impede its performance.

Terrain - The immediate vicinity and surrounding areas out to the edge of the 1 mile radius are flat. The Great Salt Lake begins about 10 miles northwest.

Comments - The measured particulate concentrations at this site are probably representative of the air quality at the airport, since the site is almost entirely influenced by aircraft-related sources. However, the traffic on North Temple Street may possibly have a significant impact on the sampler's readings.

Trends in Particulate Air Quality

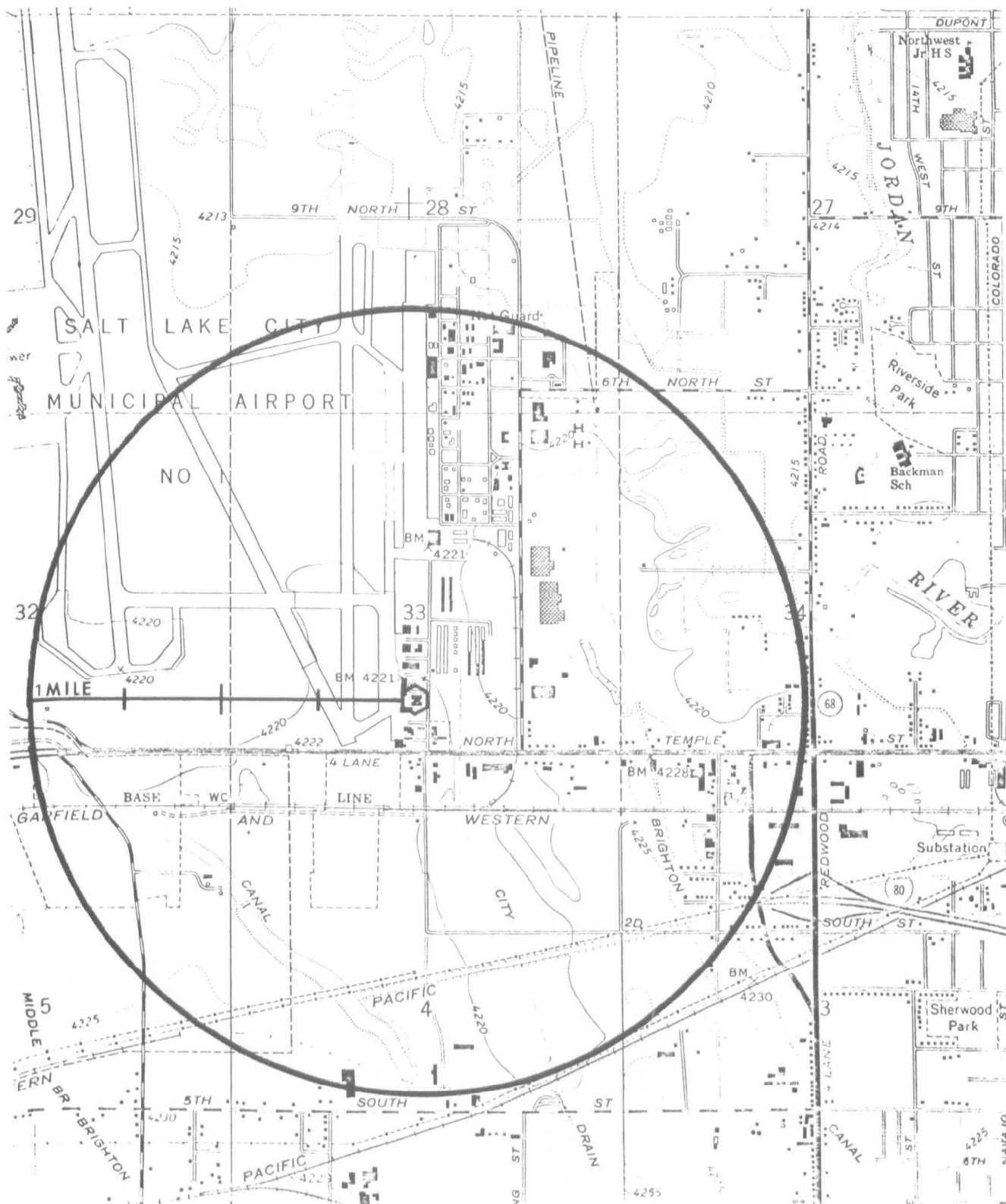




Salt Lake City-Airport sampler viewed to the east.



Salt Lake City-Airport sampler viewed to the west-northwest.



Salt Lake City-Airport.

Sources in Microinventory Area (1 mile radius)

Salt Lake City-Airport

Population = 314

VMT = 73,500

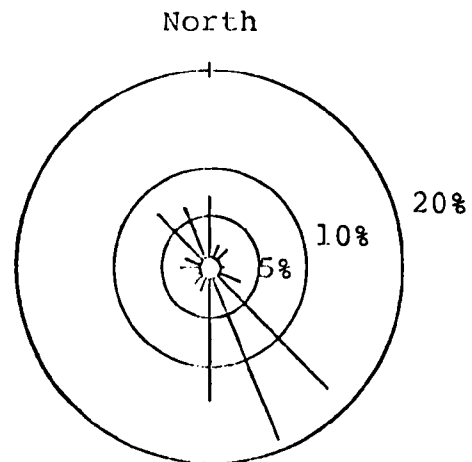
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|---|--|-----------------|--------------------------|
| Point sources: | | | |
| Utah Power & Light | Outside mile radius | | 396 |
| Area sources: | | | |
| Fuel combustion Incineration Other mobile | [From 1974 state emission inventory, 0.2% of total Salt Lake City emissions 73500 VMT/day] | | 3 |
| Motor vehicle exhaust | | 0.59 g/VMT | 17 |
| Fugitive dust sources: | | | |
| Unpaved roads | 2.0 mi, 20 ADT | 3.5 t/ac/yr | 26 |
| Unpaved shoulders | 4.5 mi | 0.2 t/ac/yr | 2 |
| Paved roads | 73500 VMT/day | 3.5 g/VMT | 104 |
| Unpaved parking lots | 5 ac | 1.4 lb/VMT | 3 |
| Construction | 22 ac, 4 mo | 0.7 t/ac/mo | 67 |
| Cleared areas | 110 ac | 0.1 t/ac/yr | 21 |
| RR right-of-way | 15 ac | 0.2 t/ac/yr | 4 |
| Total emissions, ton/yr | | | 247 |
| Emission density, ton/sq mi/yr | | | 79 |
| Percent fugitive dust | | | 92 |

Meteorological Data

Average annual
wind speed = 8.7 mph

Annual precipitation
1974 = 14.46"
1975 = 17.92"
Normal = 15.17"

No. of days
with precipitation = 87



Maximum Recorded Concentrations

1974 = 827, second high 508 $\mu\text{g}/\text{m}^3$
1975 = 239, second high 225 $\mu\text{g}/\text{m}^3$

Summary and Conclusions

The Airport sampler has been recording annual geometric means in excess of $70 \mu\text{g}/\text{m}^3$ since 1972, with the exception of 1975, when the reading was $66 \mu\text{g}/\text{m}^3$. The seasonal variations have fluctuated during that period and no distinct trends are evident. The sampler does not appear to be unduly influenced by localized pollution influences.

The calculated emission density of 79 ton/sq mi/yr is mostly (92%) composed of impacts from fugitive dust sources, specifically dust from paved and unpaved roads and construction. This value correlates well with the 1975 air quality data (which is incomplete) but is much too low to be in agreement with the 1974 value ($84 \mu\text{g}/\text{m}^3$).

Based on a 1974 base year, it is indicated that an SIP revision to include measures for fugitive dust control is warranted for this site.

3.40 ROCK SPRINGS-BRIDGER AVENUE
SAROAD Site No. 52-0620-001

Description

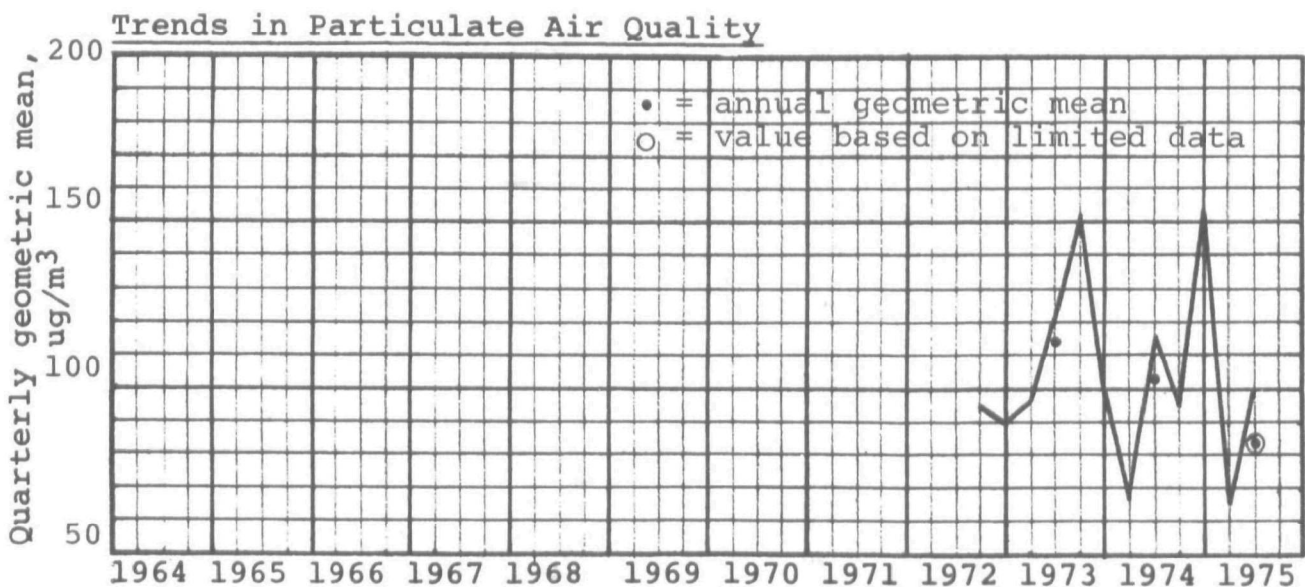
General site description - The sampler is located on the roof of a garage at a private residence (416 Bridger Avenue) placed approximately 12 feet above ground level. It is set back from Bridger Avenue about 75 feet to the south.

Localized pollution influences - Unpaved driveways exist on both sides of the garage and there are numerous roof vents on the closely spaced surrounding houses. The Rainbow Coal Company is located about 250 feet to the west.

Physical interferences - There are no obvious obstructions in the close vicinity. One story houses surround the sampling site.

Terrain - The immediate area around the sampler is flat, while the terrain is hilly in the north and west quadrants of the 1 mile radius survey area.

Comments - Overall, all the streets in town are very dirty and unswept. There are a lot of new developments and associated open construction sites and a lot of cleared open areas. The sampler is probably yielding representative readings of the air quality.

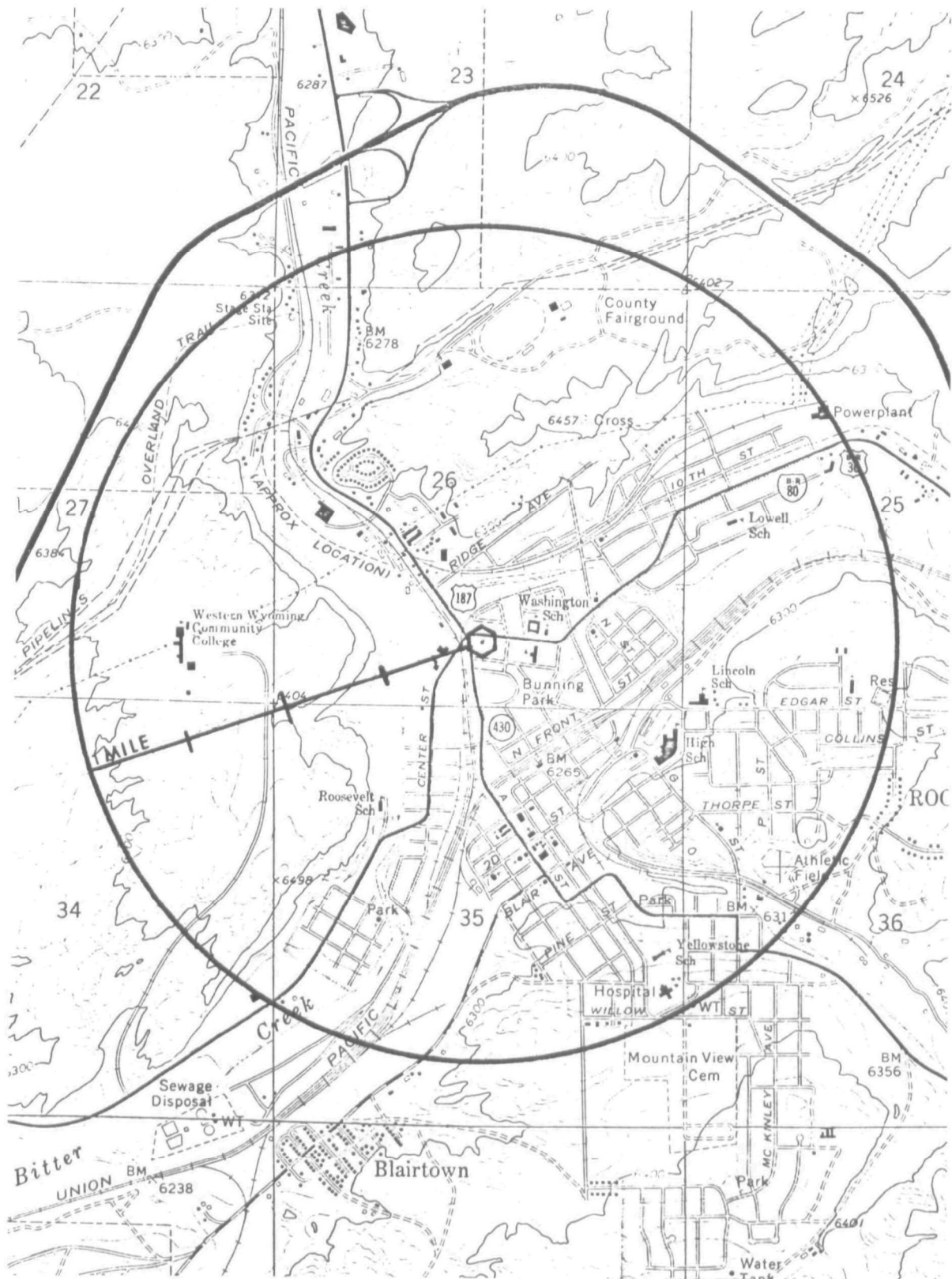




Rock Springs sampler viewed to the northwest.



Rock Springs sampler viewed to the west.



Rock Springs-Bridger Avenue.

Sources in Microinventory Area (1 mile radius)

Rock Springs

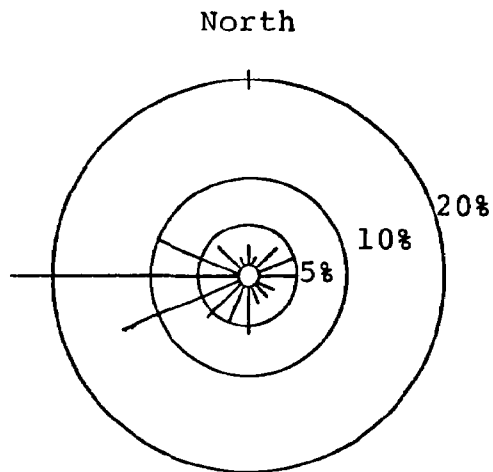
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| Rainbow Coal | | | unknown |
| Constantino Building | | | unknown |
| Mountain Fuel Supply | | | unknown |
| Area sources: | | | |
| Fuel combustion | From AQMA analysis, emissions in grids 2, 3, 25% of 4, and 60% of 5 | | 49 |
| Highway vehicles | | | 25 |
| Railroads | | | 1 |
| Fugitive dust sources: | | | |
| Unpaved roads | 6.1 mi, 80 ADT (shown as 314 ton in AQMA analysis) | 3.3 lb/VMT | 294 |
| Unpaved shoulders | From AQMA analysis | | 18 |
| Paved roads | 77700 VMT/day (shown as 487 ton in AQMA analysis) | 3.5 g/VMT | 110 |
| Road sanding | From AQMA analysis | | 110 |
| Unpaved parking lots | 30 ac | 1.3 lb/VMT | 16 |
| Construction | 39 ac 4 mo (shown as 140 ton in AQMA analysis) | 1.06 t/ac/mo | 165 |
| Cleared areas | 73 ac | 0.36 t/ac/yr | 27 |
| RR right-of-way | 42 ac | 0.4 t/ac/yr | 18 |
| RR yards | 20 ac | 0.4 t/ac/yr | 9 |
| Playgrounds | 5 ac | 0.38 t/ac/yr | 2 |
| Total emissions, ton/yr | | | 844 |
| Emission density, ton/sq mi/yr | | | 269 |
| Percent fugitive dust | | | 91 |

Meteorological Data

Average annual
wind speed = 7.0 mph

Annual precipitation
1974 = 4.54"
1975 = 8.97"
Normal = 8.79"

No. of days
with precipitation = data not
available



Rock Springs Airport

Maximum Recorded Concentrations

1974 = 347, second high = 308 ug/m^3
1975 = 231, second high = 207 ug/m^3

Summary and Conclusions

This Rock Springs site has been in operation since mid-1972 and has had readings consistently above the primary standard. The site has not yet shown any regular seasonal variations, but has had large quarter-to-quarter variations. The sampler appears to be well located and free from local biases. Another sampler placed in Rock Springs more recently has recorded similar concentrations well above the standard, indicating that the non-attainment problem in the city is widespread.

The estimated emission density is 269 ton/sq mi/yr, a value which supports the recent measured ambient concentration of 83 ug/m^3 . Most of the emissions (91%) are from fugitive dust source categories, primarily unpaved roads, paved roads and sanding, and construction. Emission estimates made from the microinventory survey in general agreed closely with emissions estimated in the AQMA analysis for Rock Springs for corresponding areas.

It appears that attainment of the standard will require regulations to reduce emissions from some or all of the above fugitive dust source categories. Control techniques are available to obtain a low percent emission reduction for these types of sources.

3.41 RAPID CITY-PENNINGTON COUNTY HEALTH DEPARTMENT
SAROAD Site No. 43-1380-001

Description

General site description - The sampler is located on the roof of the Pennington County Health Department building (615 Kansas City Street) about 25 feet above ground level. The immediate site area is the core of the central business district, and is two blocks south of Main Street.

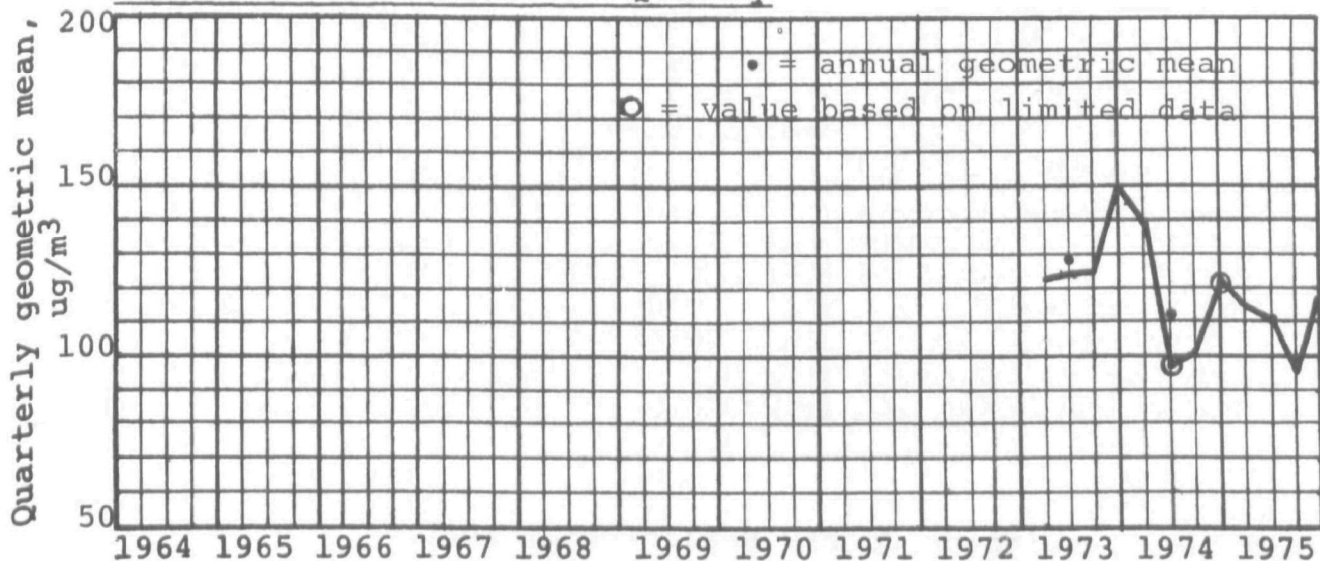
Localized pollution influences - The impact from traffic constitutes the only localized source which may be measured by the sampler. There are no localized fugitive dust influences in proximity to the site.

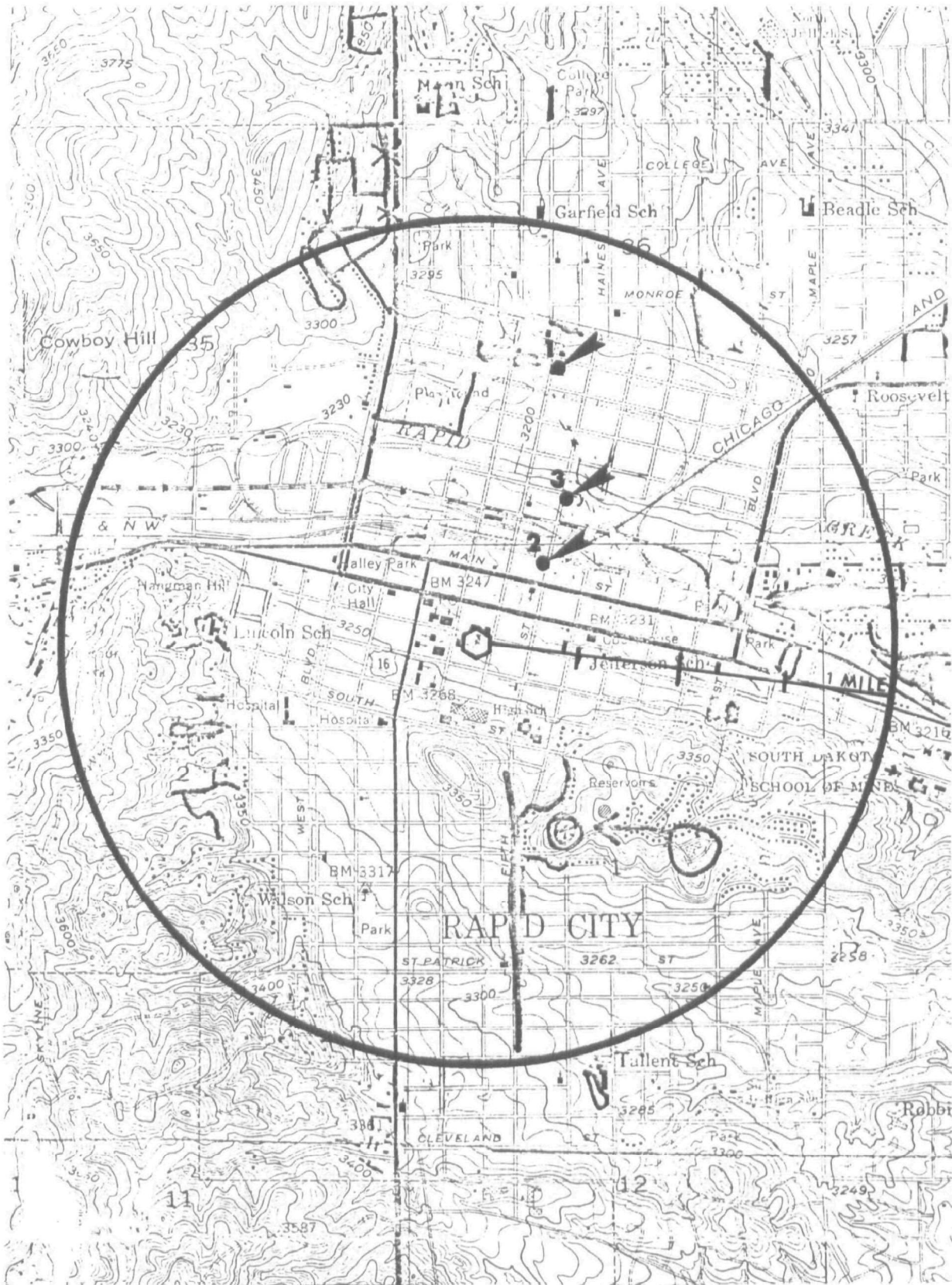
Physical interferences - The sampler is relatively removed from obstructions on the building and from surrounding taller buildings which could affect the readings or otherwise obstruct the ambient airflow patterns.

Terrain - The immediate site area is flat, but the periphery of the 1 mile radius study area is composed of steep ridges and semi-mountainous terrain. The steep north-south ridge which is due west of the sampler effectively bisects the city into two distinct aisheds--an eastern section and a western section.

Comments - In all probability, the particulate concentrations measured by this sampler are representative of the ambient air quality in the Rapid City urban area. The sampler is sited well and appears to be free from localized external source biases.

Trends in Particulate Air Quality





Rapid City-Pennington County Health Department.

3-200

Sources in Microinventory Area (1 mile radius)

Rapid City-Pennington County Health Department

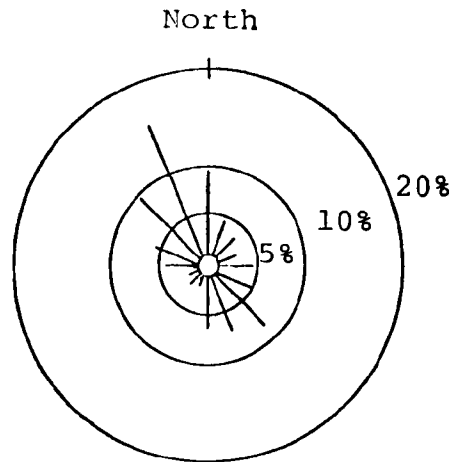
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--------------------------------|---|-----------------|--------------------------|
| Point sources: | | | |
| 1 Light Aggregates | | | 306 |
| Hill's Materials | | | 11 |
| Birdsall Sand & Gravel | | | 8 |
| 2 Aby's Feed & Seed | | | 2 |
| 3 Hubbard Milling | | | 33 |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, apportioned from emission estimates by grid | | 18 |
| Incineration | | | 5 |
| All mobile sources | | | 9 |
| Fugitive dust sources: | | | |
| Unpaved roads | 7.3 mi, 21 ADT | 4.0 lb/VMT | 112 |
| Unpaved shoulders | 1.3 mi, 3.2 ac | 0.3 t/ac/yr | 1 |
| Paved roads | 25800 VMT/day | 0.04 lb/VMT | 188 |
| Unpaved parking lots | 4 ac | 0.29 t/ac/yr | 1 |
| Construction | 11 ac | 6.4 t/ac/mo | 70 |
| Cleared areas | 0.5 ac | 0.26 t/ac/yr | neg |
| RR right-of-way | 4.2 mi, 20.4 ac | 0.3 t/ac/yr | 6 |
| RR yards | 15 ac | 0.3 t/ac/yr | 4 |
| Playgrounds | 16 ac | 0.26 t/ac/yr | 4 |
| Total emissions, ton/yr | | | 778 |
| Emission density, ton/sq mi/yr | | | 248 |
| Percent fugitive dust | | | 50 |

Meteorological Data

Average annual
wind speed = 11.0 mph

Annual precipitation
1974 = 9.12"
1975 = 17.46"
Normal = 17.12"

No. of days
with precipitation = 100



Rapid City Airport - 5.2% calm

Maximum Recorded Concentrations

1974 = 242 ug/m³; 1975 = 473 ug/m³

Summary and Conclusions

The Health Department site has recorded annual mean concentrations above 100 ug/m³ for all three years since it was established. The readings have exhibited consistent seasonal variations, with the highest concentrations in the fourth (fall) quarter. In contrast to the other sampling sites in the Rapid City area, this one seems to be well located and not unduly influenced by nearby sources.

The estimated emission density within a one mile radius was 248 ton/sq mi/yr, slightly lower than would be expected for an ambient concentration of 110 ug/m³. The unusual topography and meteorology in the Rapid City area can explain the high measured concentrations. Contributing sources included at least five point sources which accounted for 46 percent of the identified emissions, plus several fugitive dust source categories--paved streets (24%), unpaved roads (14%), and construction (9%). It is probable that both further point source controls and fugitive dust regulations will be required, in the form of an SIP revision, in order to attain the primary standards at this site. New point source regulations should be directed at the mineral products industry.

3.42 RAPID CITY-KEN FREIZE ENTERPRISES
SAROAD Site No. 43-1380-003

Description

General site description - The sampler is located on the roof of a commercial building (Ken Freize Enterprises, 5001 Sturgis Road). It is approximately 15 feet above ground level and set back from Sturgis Road about 50 feet. The area is primarily industrial, just beyond the fringes of the commercial district.

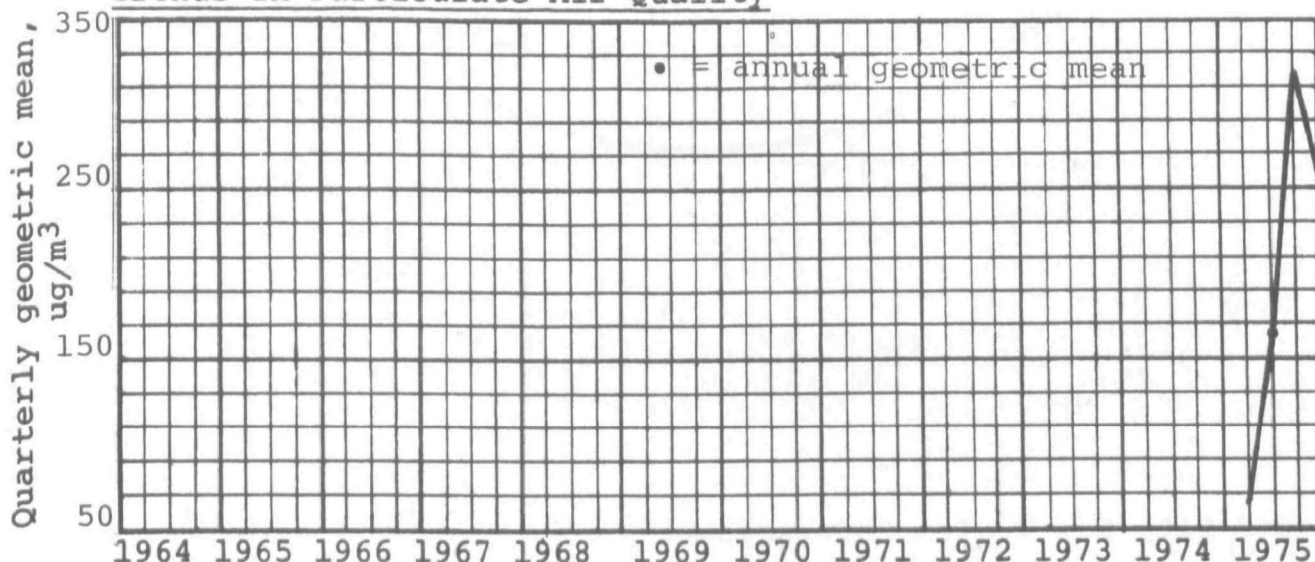
Localized pollution influences - A large (about one acre) unpaved parking lot surrounds the sampler on all four sides. An unpaved road passes on the northwest side of the building about 100 feet from the sampler. Directly across the highway to the northeast, Hill's Materials Company operates a large quarrying, sand and gravel, and limestone crushing operation.

Physical interferences - No major obstructions were noted in the immediate vicinity of the sampler.

Terrain - The immediate site area is flat, but the remainder of the area enclosed by the 1 mile radius is characterized by rolling and hilly land. Several main highways pass through the area, including Sturgis Road, which passes through a shallow valley to the northwest of the sampler.

Comments - Due to its extreme source oriented exposure with respect to the localized fugitive influences and the proximity to Hill's Materials Company, the sampler is probably not recording representative readings of the ambient air in Rapid City.

Trends in Particulate Air Quality



Sources in Microinventory Area (1 mile radius)

Rapid City-Ken Freize Enterprises

| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|---------------------------------------|--|-----------------|--------------------------|
| Point sources: | | | |
| 1 Hill's Materials | | | 132 |
| 2 Pete Lien & Sons | | | 2130 |
| 3 South Dakota Cement Dakota Block | | | 221 2 |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, apportioned from emission estimates by grid | | 5 |
| Incineration | | | 1 |
| All mobile sources | | | 5 |
| Fugitive dust sources: | | | |
| Unpaved roads | 8.7 mi, 21 ADT | 4.0 lb/VMT | 133 |
| Unpaved shoulders | 1.7 mi, 4.1 ac | 0.3 t/ac/yr | 1 |
| Paved roads | 12900 VMT/day | 0.04 lb/VMT | 94 |
| Road sanding | 12900 VMT/day | 0.003 lb/VMT | 7 |
| Unpaved parking lots | 5 ac | 0.29 t/ac/yr | 1 |
| Cleared areas | 4 ac | 0.26 t/ac/yr | 1 |
| RR right-of-way | 2.6 mi 12.6 ac | 0.3 t/ac/yr | 4 |
| Gravel pits/quarries | 240 ac | 9.4 t/ac/yr | 2256 |
| Total emissions, ton/yr | | | 4993 |
| Emission density, ton/sq mi/yr | | | 1590 |
| Percent fugitive dust | | | 50 |

Meteorological Data

Average annual
wind speed = 11.0 mph

Annual precipitation

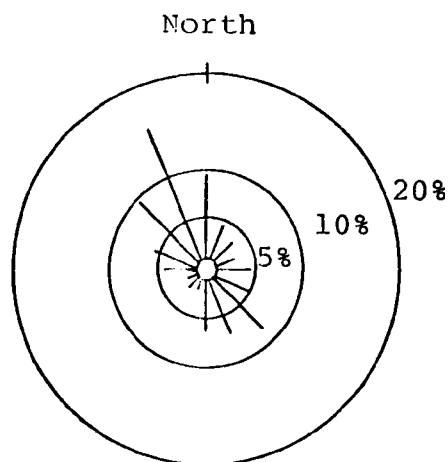
1974 = 9.12"

1975 = 17.46"

Normal = 17.12"

No. of days

with precipitation = 100



Maximum Recorded Concentrations

1975 = 1507 ug/m³

Summary and Conclusions

This site was installed in early 1975 and registered an annual geometric mean of 166 ug/m³ for that year. The site inspection revealed that the sampler is located in the middle of a large unpaved lot directly across the highway from a large open pit quarry. These nearby sources probably overshadow the impact from other particulate sources in the Rapid City area and prevent representative samples from being obtained. Therefore, this site should not be used to monitor attainment of the air quality standards for the Black Hills-Rapid City AQCR.

The survey of the microinventory area showed an extremely high emission density--1590 ton/sq mi/yr--caused by process emissions and fugitive dust from quarrying and associated operations. Even though the readings from this site are biased for use in determining regional attainment, they do indicate the need for further control of these mineral products industry sources in Rapid City.

3.43 RAPID CITY-SOUTH DAKOTA CEMENT PLANT
SAROAD Site No. 43-1380-004

Description

General site description - The sampler is located on one of the process buildings on the north side of the cement plant, approximately 100 feet above ground level. The immediate area is surrounded by the cement plant property, which is removed from outlying urban/suburban areas.

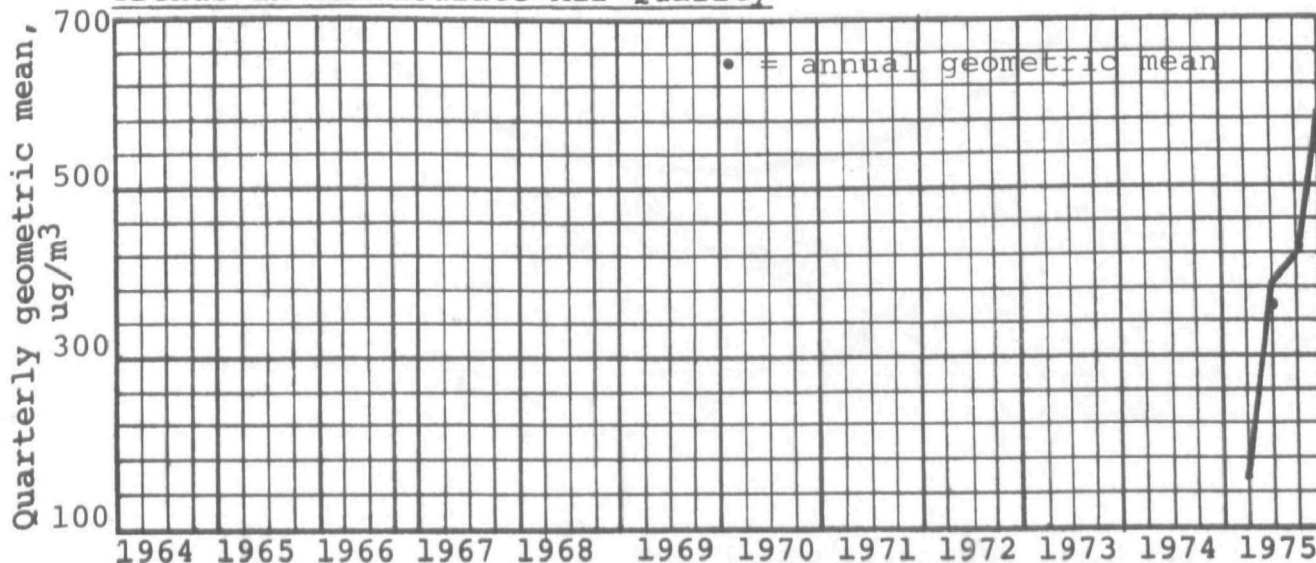
Localized pollution influences - Bordering the immediate sampler area on all sides are various fugitive and point particulate emissions from many operations at the cement plant. There are no major highways in the immediate area, although several do pass through the 1 mile radius area. To the west (1/4 to 1/2 mile) is a large quarrying, sand and gravel, and rock crushing operation owned by Hill's Materials Company and 1/4 mile to the east is the power plant.

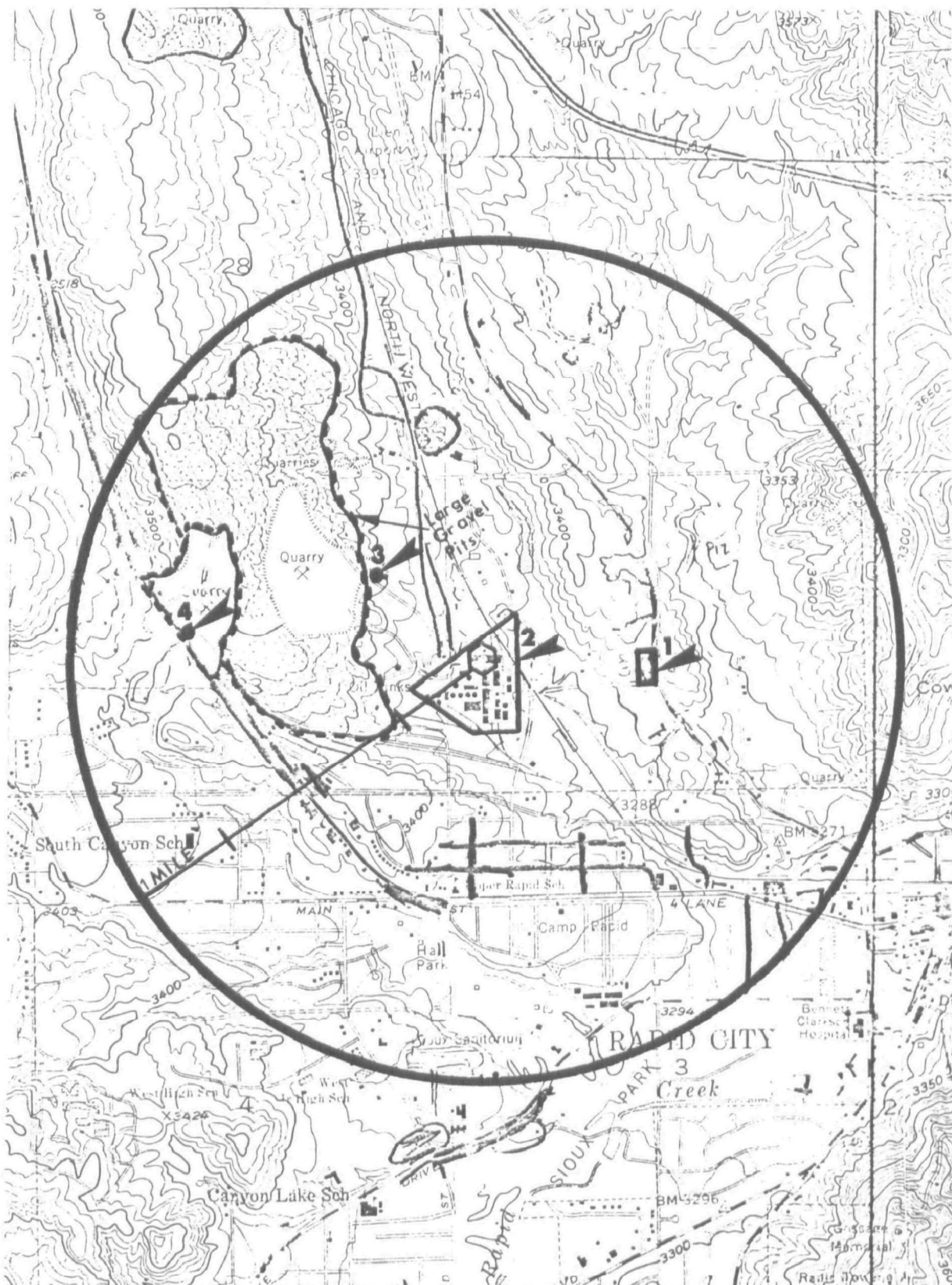
Physical interferences - The building on which the sampler is placed has some protrusions and extensions which could possibly shield the sampler.

Terrain - The immediate site area is flat while the remainder of the area enclosed by the 1 mile radius is characterized by rolling and hilly land. The cement plant sits in a shallow valley.

Comments - It appears that the sampler is clearly providing unrepresentative indications of the ambient air quality in Rapid City due to sampling bias arising from its extreme source-oriented placement.

Trends in Particulate Air Quality





Rapid City-South Dakota Cement Plant.

Sources in Microinventory Area (1 mile radius)

Rapid City-South Dakota Cement Plant

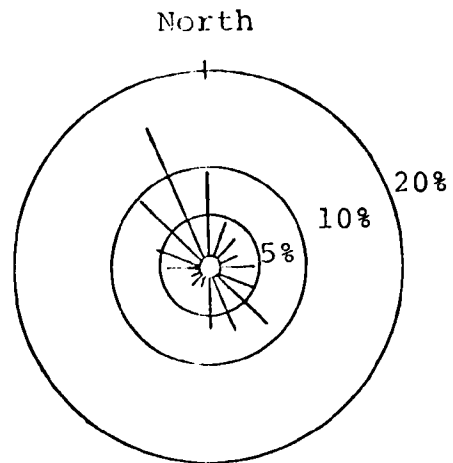
| Source category | Size or activity rate | Emission factor | Partic emissions, ton/yr |
|--|---|-----------------|--------------------------|
| Point sources: | | | |
| 1 Black Hills Power & Light Hill's Materials | | | 449 |
| 2 South Dakota Cement Plant | | | 8 |
| 3 Pete Lien & Sons | | | 221 |
| 4 Hill's Materials | | | 2130 |
| Dakota Block | | | 132 |
| James E. Simon | | | 2 |
| | | | 10 |
| Area sources: | | | |
| Fuel combustion | [From AQMA analysis, apportioned from emission estimates by grid | | 7 |
| Incineration | | | 1 |
| All mobile sources | | | 4 |
| Fugitive dust sources: | | | |
| Unpaved roads | 8.7 mi, 21 ADT | 4.0 lb/VMT | 133 |
| Unpaved shoulders | 2.5 mi, 6.1 ac | 0.3 t/ac/yr | 2 |
| Paved roads | 9000 VMT/day | 0.04 lb/VMT | 66 |
| Road sanding | 9000 VMT/day | 0.003 lb/VMT | 5 |
| Unpaved parking lots | 5 ac | 0.29 t/ac/yr | 1 |
| Construction | 2 ac | 6.4 t/ac/mo | 13 |
| Cleared areas | 22 ac | 0.26 t/ac/yr | 6 |
| RR right-of-way | 3.8 mi, 18.4 ac | 0.3 t/ac/yr | 6 |
| Gravel pits/quarries | 260 ac | 9.4 t/ac/yr | 2444 |
| Total emissions, ton/yr | | | 5640 |
| Emission density, ton/sq mi/yr | | | 1796 |
| Percent fugitive dust | | | 47 |

Meteorological Data

Average annual
wind speed = 11.0 mph

Annual precipitation
1974 = 9.12"
1975 = 17.46"
Normal = 17.12"

No. of days
with precipitation = 100



Rapid City Airport - 5.2% calm

Maximum Recorded Concentrations

1975 = 1530 ug/m³

Summary and Conclusions

The State Cement Plant site was started in early 1975 and recorded an annual geometric mean of 364 ug/m³ for that year. The sampler is located on the roof of a process building at the plant, surrounded by stack emissions and fugitive dust sources. Due to the bias imposed by the proximity of the sampler to these major sources, this site should definitely not be used in assessing the attainment status of the Black Hills-Rapid City AQCR.

This site is located only 0.7 mile from the Ken Freize Enterprises site. There is a definite need for a particulate sampler in the northwest quadrant of Rapid City, but it should be located without the source-specific orientation of the two present sites. It is likely that a well located sampler would show ambient levels above the standards in this area.

The microinventory survey area had an extremely high emission density of 1796 ton/sq mi/yr from the cement plant and surrounding quarrying and processing operations. As with the Ken Freize site (which encompasses much of the same survey area), the high particulate concentrations and emission density do indicate the need for further control of the mineral products industry sources.

4.0 SUMMARY

4.1 REASONS FOR NON-ATTAINMENT IN REGION VIII

The specific reasons for particulate concentrations above the standards at each of 43 sites in Region VIII states are summarized in Table 4-1. The reasons generally fell into one of three categories--excessive impact from point sources (out of compliance with existing state regulations), excessive impact from fugitive dust sources, or bias in the readings caused by location of the sampler too close to a low-level emission source. In addition, 14 of the sites investigated were judged to have attained the primary standards based on recently available air quality data for 1975. It is important to consider that those sites may or may not continue to demonstrate attainment based on currently unavailable air quality data for 1976. One site (Libby, Montana) had inadequate sampling data to determine whether the standards were being exceeded. Four sites in Colorado (Englewood, Steamboat Springs, Rifle, and Grand Junction) have concentrations above the primary standards, but the reason(s) for the high readings could not be identified from the site surveys.

Another potential reason for high readings would be incorrect filter handling, sampler operation, or laboratory analysis procedures. Agency personnel responsible for air quality data and field operators were interviewed to determine the adequacy of their present procedures. The questionnaires shown in Appendix A were completed in each state. However, it was beyond the scope of this project to personally monitor the individual steps to confirm that acceptable procedures were being followed. The interviews did not reveal any problems with sample handling or analysis that

Table 4-1. EPA REGION VIII NON-ATTAINMENT SUMMARY

| AQCR/Site | Reason for non-attainment | | | | | |
|----------------------|---------------------------|----------------------|-----------|----------------|---------------------------|----------------------|
| | Pt source impact | Fugitive dust impact | Site bias | Cannot explain | Has ^a attained | Inadequate a.q. data |
| <u>Denver</u> | | | | | | |
| Adams City | | x | | | | |
| Arvada | | | x | | | |
| Aurora | | | | | x | |
| Brighton | x | x | | | | |
| School Admin. | | x | | | | |
| CAMP | | x | | | | |
| Gates Rubber | | x | | | | |
| Wastewater Plant | | x | | | | |
| C.A.R.I.H. | | x | | | | |
| Englewood | | | | x | | |
| Lakewood | | | | | x | |
| Littleton | | | | | x | |
| Longmont | x | x | | | | |
| <u>Pawnee</u> | | | | | | |
| Greeley - City | | | | | x | |
| Greeley - Ttmt. Plt. | | x | x | | | |
| Loveland | | | | | x | |
| Sterling | | | | | x | |
| Windsor | | | x | | x | |
| La Salle | | | x | | | |
| Platteville | | x | x | | | |
| <u>San Isabel</u> | | | | | | |
| Colorado Springs | | x | | | | |
| Pueblo Fire Stn. | x | | | | | |
| Pueblo Health Dept. | x | x | | | | |
| Trinidad | | | | | x | |
| Walsenburg | | | | | x | |
| <u>Yampa</u> | | | | | | |
| Steamboat Springs | | | | x | | |

^a based on 1975 air quality data.

Table 4-1 (continued). EPA REGION VIII NON-ATTAINMENT SUMMARY

| AQCR/Site | Reason for non-attainment | | | | | |
|---------------------------|---------------------------|-------------------------|--------------|-------------------|-------------------|-------------------------|
| | Pt source impact | Fugitive dust impact | Site bias | Cannot explain | Has a attained | Inadequate a.q. data |
| <u>Grand Mesa</u> | | | | | | |
| Rifle | | | | x | | |
| Grand Junction | | | | x | | |
| Tract CB 020 | | | | | x | |
| Tract CB 022 | | | | | x | |
| <u>Great Falls</u> | | | | | | |
| Great Falls | | | | | x | |
| <u>Helena</u> | | | | | | |
| Butte - Greeley School | x | x | x | | | |
| <u>Missoula</u> | | | | | | |
| Missoula Cthse. | | | | | x | |
| Libby | x | | | | | x |
| <u>Wasatch Front</u> | | | | | | |
| Magna | | | | | x | |
| Ogden | | x | | | | |
| Provo | x | x | | | | |
| Salt Lake City | | x | | | | |
| S.L.C. Airport | | x | | | | |
| <u>Wyoming</u> | | | | | | |
| Rock Springs | | x | | | | |
| <u>Black Hills</u> | | | | | | |
| Ken Freize | x | | x | | | |
| Cement Plant | x | | x | | | |
| Health Dept. | x | x | | | | |

^a based on 1975 air quality data.

could cause high readings. All of the agencies routinely void data for damaged filters and recheck data handling and analytical steps for high reported values. It was originally planned to discuss quality assurance aspects of the data for each site, but no problems worthy of note (which might contribute to the indicated non-attainment) were identified at any of the sites.

The percentage of sampling sites in a regional sampling network that are reading concentrations above the primary standards provides an indication of the extent of the non-attainment problem in an AQCR. The total numbers of high volume samplers operating in 1975 in each AQCR are summarized below:

| <u>AQCR</u> | <u>Preliminary no. of n.a. sites</u> | <u>Confirmed no. of n.a. sites</u> | <u>Total network sites</u> |
|---------------|--|--|--------------------------------|
| Denver | 13 | 10 | 22 |
| Pawnee | 7 | 3 | 11 |
| San Isabel | 5 | 3 | 8 |
| Yampa | 1 | 1 | 7 |
| Grand Mesa | 2 | 2 | 15 |
| Great Falls | 1 | 0 | 3 |
| Helena | 1 | 1 | 7 |
| Missoula | 2 | 0 | 7 |
| Wasatch Front | 5 | 4 | 13 |
| Wyoming | 1 | 1 | 10 |
| Black Hills | <u>3</u> | <u>3</u> | <u>7</u> |
| Total | 41 | 28 | 110 |

In general, the sources associated with non-attainment areas in the large urban centers of Region VIII such as Denver, Salt Lake City and Colorado Springs were traffic related (reentrained dust from streets, winter road sanding, and motor vehicle exhaust). In some moderate sized cities such as Grand Junction and Rapid City, traffic related

emissions also appeared to be a major cause of non-attainment. However, in most of the medium and small cities, the major sources were point sources, unpaved roads, construction, and/or windblown dust from agricultural and open areas. None of the non-attainment sites were in rural locations. Point sources were major contributors to high readings at 10 of the 28 sites which currently have annual mean concentrations above 75 ug/m³.

4.2 NEED FOR IMPLEMENTATION PLAN (SIP) REVISIONS

In most of the AQCR's, attainment will require emission reductions from fugitive dust sources. Where the fugitive dust sources are traffic related, possible control measures include improved street cleaning, control of material deposition on street surfaces, and traffic controls. These are probably new areas of regulation for the state agencies and may require innovative approaches such as administrative agreements with local governments specifying minimum street cleaning schedules. EPA's Office of Air Quality Planning and Standards is currently preparing a guidelines document for use by states in evaluating potential measures to reduce dust emissions from streets.

Most SIP's already have some regulation, such as a nuisance provision or fenceline opacity restriction, for control of general fugitive dust sources. However, with the exception of the Colorado regulation, more enforceable provisions will probably be needed in the SIP's for control of such sources as construction sites and unpaved roads. In the Pawnee, Yampa, and Grand Mesa AQCR's in Colorado, more comprehensive enforcement programs for the state's existing regulations appear to be a preferable approach to the addition of more regulations in the SIP. For some of the sites with large contributions from fugitive dust sources, reasonably available control techniques may not provide the needed emission reductions.

Most of the sites with major point source impact are affected by one or two very large sources rather than a group of diverse sources. While there was usually no information in state agency files to indicate that these sources were not in compliance, the magnitude of emission estimates makes it doubtful that they are in full compliance. Thus, it is difficult to assess whether an SIP revision or a compliance schedule under existing regulations is required.

Of the 11 AQCR's investigated, it appears that new strategies for attainment of particulate standards and/or implementation of existing controls will definitely be required for six AQCR's in five different states:

Denver
San Isabel
Helena
Wasatch Front
Wyoming
Black Hills

Three of the AQCR's in Colorado--Pawnee, Yampa, and Grand Mesa--have ill-defined problems and may be able to utilize existing fugitive dust regulations in the SIP to bring about necessary emission reductions. Two AQCR's in Montana--Great Falls and Missoula--had significant improvements in air quality in 1975 and appear to have attained the standards.

4.3 OBSERVATIONS ON AIR QUALITY DATA

In analyzing the air quality data during this study, several important observations were made relative to the question of determining attainment of air quality standards. These are discussed briefly below.

In Colorado, seven of the non-attainment sites outside the Denver metropolitan area were relocated during 1974. These moves, most of them only a few blocks, resulted in four of the sites (Loveland, Windsor,* Trinidad, and Walsenburg) having annual geometric means lower than 75 ug/m^3 in 1975. However, there was no evidence that the samplers were relocated into areas with lower emission densities (the sites were usually only moved a few blocks, which would not affect their exposure on a regional scale). It is assumed that the samplers were moved because of site biases which were identified or for operational or maintenance reasons. In all seven cases, the new site locations are in areas where high particulate concentrations for the respective cities would be expected.

Almost all of the sites had lower concentrations in 1975 than in 1974, as shown in Figure 4-1. One explanation for this, given the high incidence of fugitive dust emissions in these areas, is that 1974 was a very dry year and/or that 1975 had higher than normal amounts of precipitation. Large yearly variations in air quality as a function of weather conditions could present a problem if 1975 was an extreme year--areas which apparently attained the standard would again have concentrations above the standard in subsequent years with a return to average weather conditions. In order to evaluate the possible effect of precipitation on 1974 and 1975 particulate concentrations, the precipitation data for these two years at the 11 weather

* moved in late 1973

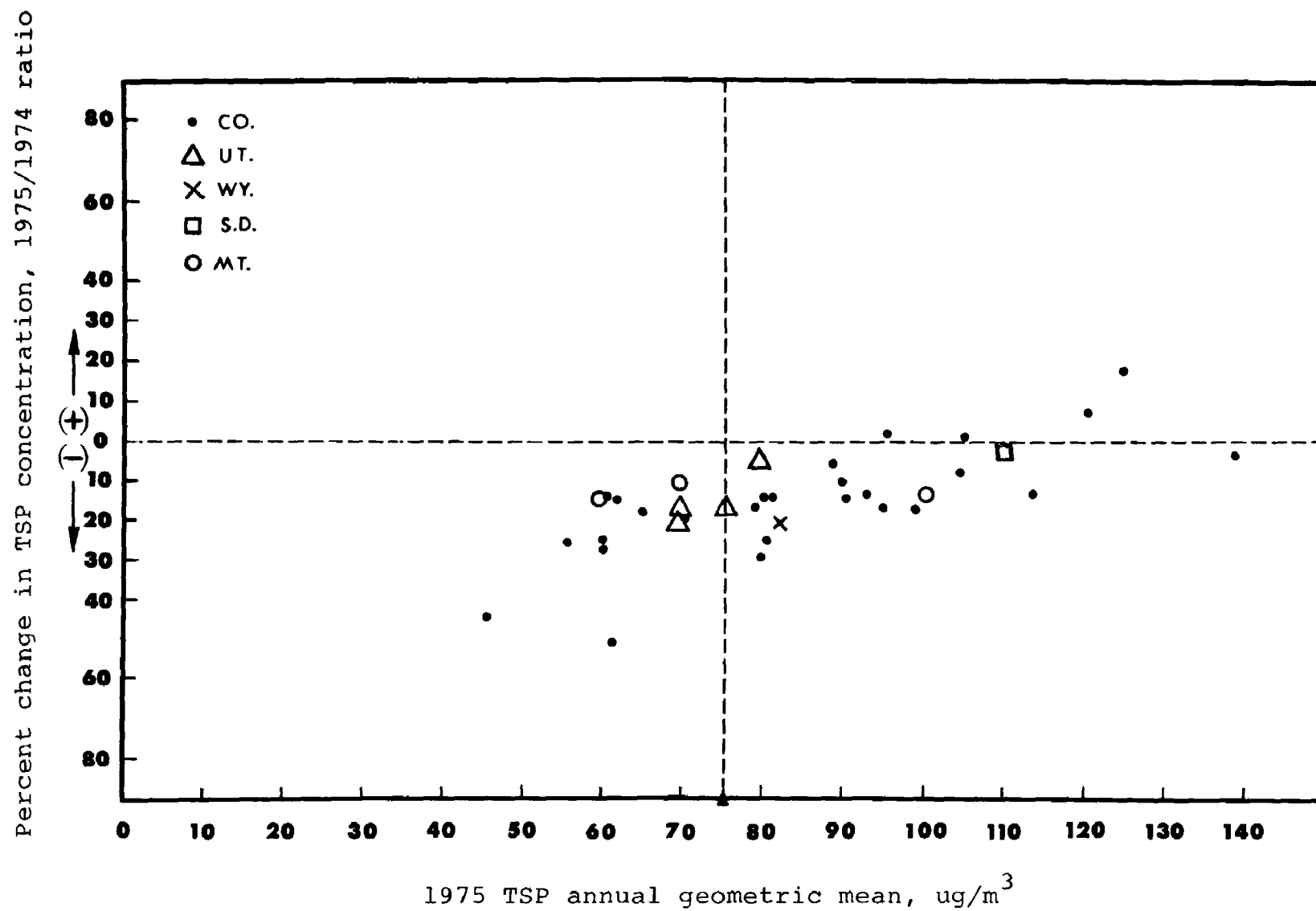


Figure 4-1. Relative change in measured TSP concentration for Region VIII sites, 1974 to 1975.

stations used in this study (see the fifth pages of the site evaluation packages) were compared with the 30 year averages for annual precipitation at the same stations. In 1974, six of the stations had less than average precipitation and five had about average; in 1975, three had less than average, four had an average amount, and four had more than average precipitation. Therefore, it can be concluded that 1974 was a dry year and that 1975 was fairly typical for the Region VIII states as a group.

Although they weren't evaluated for their possible impacts, other explanations for the decrease in concentrations from 1974 to 1975 may be a greater than normal decrease in overall average wind speeds or the distribution of precipitation during the year.

Several of the sites had maximum 24-hour readings above 500 ug/m³. Such a high reading increases the annual arithmetic mean by more than 7 ug/m³ (assuming 60 samples and an annual arithmetic mean of 80 ug/m³). However, it should be pointed out that the geometric mean on which the air quality standard is based is not nearly as sensitive to these extremely high values. A single reading of 500 ug/m³ only increases the annual geometric mean for the same data set by 2.5 ug/m³. Therefore, these occasional very high concentrations are violations of the short-term standard but do not have an inordinate effect on attainment of the annual standard.

There does not appear to be a general pattern for peak concentrations relative to annual average concentrations. A few sites exceed only the 24-hour or annual standard, but most exceed both or have attained both. The maximum and second highest concentrations are much more variable from year to year than the geometric mean and are therefore more difficult to use in assessing the magnitude of the standards' violations. Also, the observed maximum values for a

site are a function of the sampling frequency, as shown very clearly by comparing the NASN data (every sixth day) and State data (every day) obtained concurrently at the Salt Lake City and Ogden sites.

4.4 RELATIONSHIP BETWEEN EMISSION DENSITIES AND AIR QUALITY

Estimated emission densities were plotted as a function of 1975 annual geometric means for all of the sites except those shown in Table 4-1 to have siting biases. Linear regression analysis of these 32 data points (Tract CB 020 and 022 were also eliminated due to lack of air quality data) gave a line of best fit with a slope of 16.92, an intercept on the ambient concentration axis of 63.5 ug/m³, and a correlation coefficient of 0.57, as shown in Figure 4-2. These data thus exhibited a poor to fair linear relationship, but the slope and intercept were both somewhat higher than had been observed in other similar studies. When data in Kansas City, Wyoming, South Dakota, Las Vegas, and Reno were tested separately for relationships between emission density and air quality, the range of slopes was 6.1 to 8.3 and the range of intercepts was 16 to 38 ug/m³. It was hypothesized that the intercept value (zero emission density) provided a good estimate of the particulate background concentration in an area.

The high values for slope and intercept obtained in the present case could be attributed to either of two reasons: (1) the sites are in several different geographic and climatic areas with widely varying backgrounds, causing scatter in the resulting combined data set; or (2) all of these sites are non-attainment sites, indicating that their air quality values are mainly bunched in the range of 75 to 125 ug/m³ and therefore do not have as well defined line of best

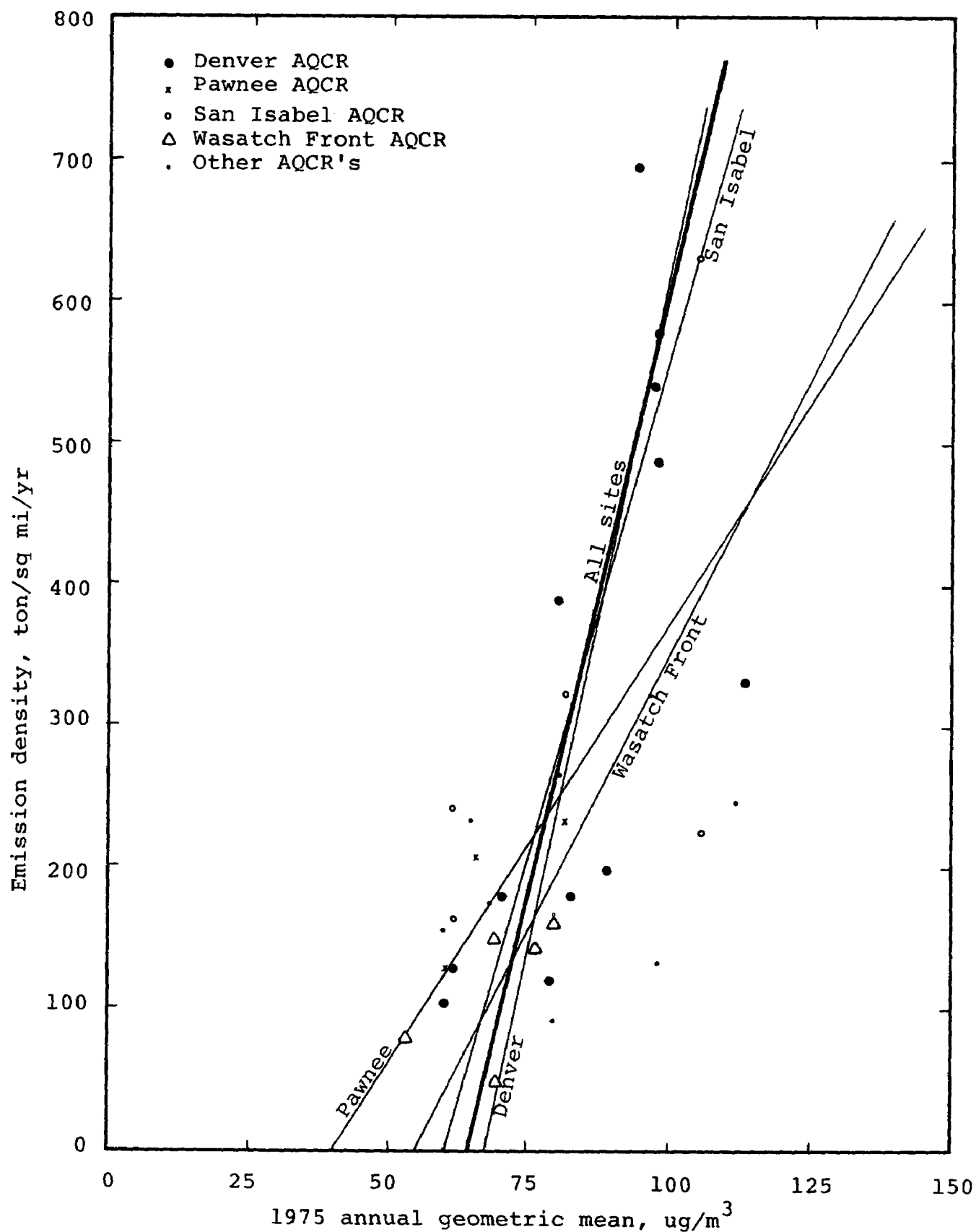


Figure 4-2. Particulate emission density versus measured air quality.

fit as a data set with a wider range of air quality data values. It does not seem to be appropriate to use this line to estimate background concentrations or to estimate the emission density equivalent to an ambient concentration of about 75 ug/m³.

It is recognized that linear regression and correlation do not account for all the variability in a data set and that a more sophisticated model may provide a better fit. Investigation of this possibility was beyond the scope of this work, however.

For the AQCR's with several sampling sites, it is possible to plot individual emission density versus air quality curves, thereby eliminating the possible problem of widely varying background concentrations in different geographic areas. The AQCR's with multiple sites are Denver, Pawnee, San Isabel, and Wasatch Front. The lines of best fit for each of these areas are shown in Figure 4-2 and summarized below:

| <u>AQCR</u> | <u>Data points</u> | <u>Slope</u> | <u>Intercept</u> | <u>r</u> |
|---------------|------------------------|--------------|------------------|----------|
| Denver | 12 | 19.61 | 68.0 | 0.67 |
| Pawnee | 3 | 6.25 | 39.4 | 0.80 |
| San Isabel | 5 | 14.08 | 59.7 | 0.60 |
| Wasatch Front | 5 | 7.81 | 54.5 | 0.63 |

The individual AQCR data sets show good correlations, but still have high indicated background levels. Two of the areas have slopes similar to that for the combined data set and the other two have slopes within the range of the previously reported studies. In all four of the AQCR's, an emission density of about 200 ton/sq mi/yr is associated with the air quality of 75 ug/m³. This is consistent with the relationships in other states and AQCR's where this same analysis was carried out.

APPENDIX A

**SITE DESCRIPTION AND QUALITY
ASSURANCE FORMS**

Date _____
By _____

Site Description: _____

Site No.: _____

1. Land use of general surroundings:
2. Sampler location:
3. Localized pollution influences:
4. Physical interferences:
5. Terrain features:
6. Estimate of background concentration: _____
7. Significance or representativeness of site:
8. Photographs taken: _____

QUALITY ASSURANCE - PN 3155-DD

1. Do filters meet recommended specifications?
 - a. 99% collection of particles 0.3 μ m?
 - b. pH between 6.5 and 7.5?
2. Are the filters inspected visually?
3. How are the filters marked?
4. Are filters equilibrated before weighing?
5. How often is the analytical balance calibrated?
 - a. by what method?
 - b. is the calibration date recorded?
 - c. is the balance accurate to \pm .5 mg?
6. Is the filter serial number recorded along with its weight?
7. How is the filter packaged for shipping?
8. Are the filters installed correctly?
9. Are before and after sample flow rate measurements taken?
 - a. how often is the hi-vol calibrated?

- b. by what method?
 - c. is the normal hi-vol flow rate between 40-60 cfm?
 - d. how often is the elapsed time meter checked?
 - e. what met parameters are recorded for each sample?
 - f. what information is recorded in each hi-vol log book?
10. How is the filter packaged for transport?
11. What remarks are included on sample folder?
12. What verification procedure is used for the samples?
13. How are the values reported? To whom?
Comments:
14. Are the current procedures associated with sample collection, transfer, validation, and reporting adequate? If not, why not?

Agency: _____

Contact: _____

Date: _____

Signature: _____

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2. Development of Emission Factors for Fugitive Dust Sources. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. Publication Number EPA 450/3-74-037. June 1974.
3. Analysis of Probable Particulate Non-Attainment in the Kansas City AQCR. PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio. Prepared for U.S. Environmental Protection Agency. February 1976.

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