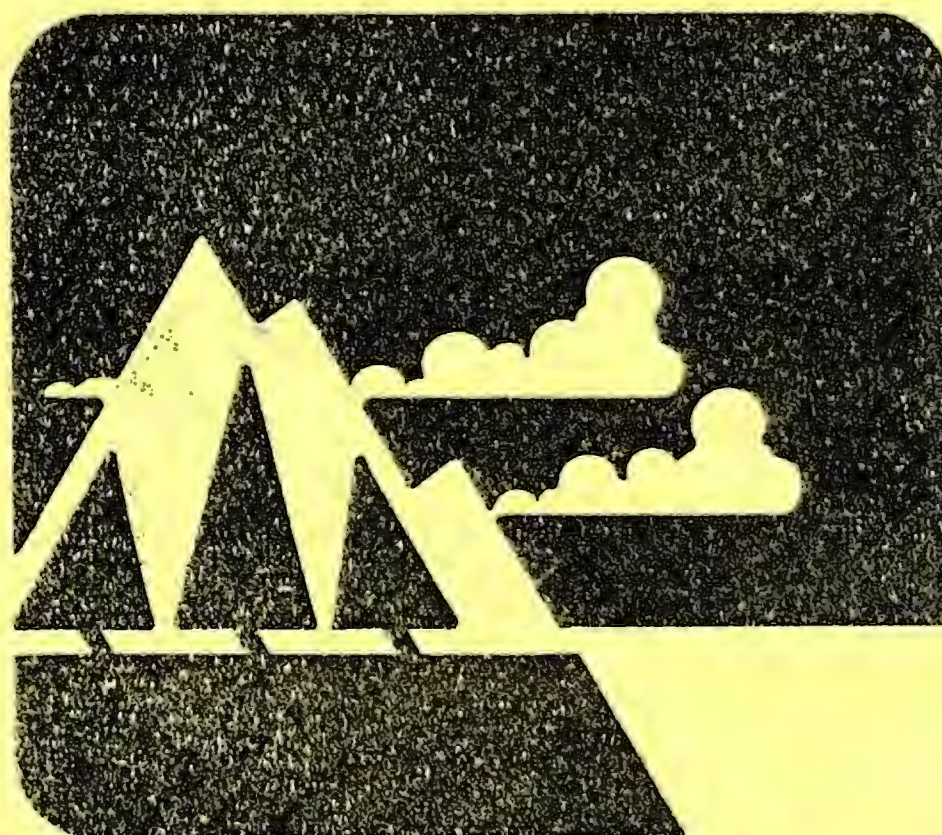


# **Air Quality Trends in Region VIII**

1980 Data



EPA - 908/1-81-002

U.S. Environmental Protection Agency

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AIR QUALITY TRENDS

IN REGION VIII  
(1980 DATA)

Data Analysis Branch  
Surveillance and Analysis Division  
Denver, Colorado  
September 1981

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## ABSTRACT

Air quality trend and status for the calendar year 1980 were determined for the six states in Region VIII. These states include Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming. Data resident in the SAROAD national data bank were analyzed.

Statistical tests which detect significant differences between two populations were utilized to identify trends. The status and severity of air pollutants were reported in terms of observed concentrations exceeding air quality standards or alert level limits. The report also includes a summary of air quality for each nonattainment area.



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SECTION I

## GENERAL DESCRIPTION

### Introduction

Air quality monitoring activities have increased substantially in Region VIII over the past few years both in scope and frequency. These increases are due to public demand for accurate information about harmful pollutants in the environment and to the passage of Federal Legislation, namely, The Clean Air Act Amendments. To fulfill the requirements of these legislative mandates State agencies have planned and developed intensive monitoring networks which have generated a mass of air quality data. This report presents a portrayal of current ambient air quality status and trends in the six states comprising EPA's Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming).

### Summary of Analysis and Related Events

During 1980 the air-quality monitoring network was streamlined by decreasing the number of samples collected and eliminating certain monitoring stations. It was noted that considerably fewer counties are taking samples for sulfur dioxide and nitrogen dioxide. Areas exhibiting sulfur dioxide or nitrogen dioxide problems are few and monitoring for these pollutants has decreased considerably. The total number of air-quality sampling sites in Region VIII decreased from 412 in 1979 to 327 in 1980.

Trend analyses performed on the 1978 and 1980 air quality data available in the SAROAD System indicate that only 19 of the 252 counties, where sufficient data were available, experienced statistically significant changes for at least one pollutant group. Air quality was found to be deteriorating in 8 counties and improving in 11 counties. Table 1 summarizes these trends.

### Total Suspended Particulates (TSP)

The severity analyses performed on 1980 air data reveal that total suspended particulates continue to be the most wide-spread pollutant problem in the region. It was found that 17 of the 22 counties which exceeded the primary standard also exceeded the alert levels. TSP was sampled in 100 counties. Twelve counties had deteriorating air quality trends from 1977 to 1979, while only 3 counties showed a deteriorating trend in air quality for the 1978-1980\* period. The four counties with improved air quality during 1977-79 continued to show this trend during the 1978-80 period.

The volcanic eruption of Mount St. Helens in Washington caused high TSP readings in Montana and North Dakota. High readings in excess of  $1500 \text{ ug/m}^3$  occurred from May 19, 1981 to May 23, 1981. For the purposes of this report, TSP values during this time period were ignored. No unusually high pollution readings were noted during this time for the remaining parameters addressed in this report ( $\text{SO}_2$ ,  $\text{NO}_2$ , CO,  $\text{O}_x$  and lead).

### Sulfur and Nitrogen Dioxide ( $\text{SO}_2$ and $\text{NO}_2$ )

No appreciable trend was observed for sulfur dioxide or nitrogen dioxide concentrations for the years 1978, 1979, and 1980. The number of counties sampling in 1980 for  $\text{SO}_2$  and  $\text{NO}_2$  was less than half those counties sampling in 1979. This reduction is due to the fact that so few violations have been observed in the past.

\* See Trending Methods For Air Pollutants in Analytical Procedures - Air Quality Section.

## Carbon Monoxide (CO)

During 1980, 14 counties monitored for carbon monoxide. Of the 11 counties where violations of the primary standard occurred, 4 of those counties also experienced alert level violations. There were 13 counties with primary CO violations in 1978 and 1979. The number of counties with alert violations for those years were 3 and 7, respectively. During 1980 5 counties displayed decreasing trends in carbon monoxide concentrations.

## Ozone

Twenty-one counties in the region had ozone sampling programs in 1980. No statistical trends were apparent in the ozone data collected but the ozone concentration in all but one of the counties exceeded the standard. During 1979 only 5 counties reported ozone violations. One reason for this drastic increase in counties reporting violations was a change in the method of determining exceedences. A change in the National Primary and Secondary Ambient Air Quality Standards for ozone is described in the Federal Register, Thursday, February 8, 1979, Part V, 850.9, pages 8220 and 8221. Basically it states that the expected number of exceedences per year averaged over the past three years must be less than or equal to one. If a site has two or more observed exceedences each year the standard is not met and it is not necessary to calculate expected exceedences. If missing value days occur and no other exceedences occur for that year an estimate of the number of exceedences for a year can be made. All calculations were based on February 8, 1979 change of primary violation level to 0.12 part per million for maximum hourly average concentrations.



## Lead

Lead, a newly designated criteria pollutant, was sampled in 33 counties during 1980 as compared to 19 counties that collected samples in 1979. Two counties reported violations of the primary standard. Because half of the sites sampling for lead are located in rural rather than in urban settings it is difficult to draw meaningful results from the data in terms of health effects or in terms of trends in concentrations due to vehicular emissions. Composite lead data obtained by the State of Colorado were used in this report and the composite data were not utilized in the trend analysis where no individual daily lead values were present. A lead smelter in one county in Montana caused all 3 of the calendar quarters sampled to be in violation of the primary standard which is based on a  $1.5 \text{ ug/m}^3$  quarterly average exceedence.

It is expected in the future that with the increased use of unleaded gas in motor vehicles and with retirement of older vehicles, lead pollution will cease to be a problem in the region except in the vicinity of a few industrial sources.

## Other Considerations

The comparisons of single year observations of pollutant concentrations is generally considered inadequate for measuring and describing trends. Nevertheless, at sites which lacked long-term monitoring data or had frequent missing periods of data it was considered better to calculate short-term trends rather than perform no analysis whatsoever. Meteorological considerations such as precipitation, solar intensity, wind speed and direction have a major effect on year-to-year

short-term changes in pollutants. These considerations were beyond the scope of this analysis. Current trends referenced in this report are approximated from the 1977, 1978, 1979, and 1980 data bases.

The map in Figure 1 gives a county-by-county picture of Regional air quality status during 1980. Air quality for an entire county was determined by a site within the county that exhibited the most severe pollutant violations. Counties with dotted areas are those which sampled at least one of the criteria pollutants for 75 percent of the total possible sampling time and no violations of health standards were noted. A cross hatched area indicates that at least one of the sampled sites in the county violated primary air quality standards. Solid areas indicate where at least one of the sites in the county exceeded the alert level. Counties without current monitoring data or with less than 75 percent of the total possible sample are left blank.

TABLE I

## Air Quality Monitoring

Summary of Air Monitoring in  
Region VIII in 1980

	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>	<u>CO</u>	<u>OZONE</u>	<u>LEAD</u>	<u>TOTAL</u>
Total sites	179	29	16	18	24	61	327
Counties with data	100	19	16	14	21	33	203
Counties exceeding primary standard	22	3	0	11	20	2	58
Counties exceeding alert level	17	1	0	4	0	0	22
Counties with deteriorating air quality (1978-1980)	3	0	3	1	1	0	8
Counties with improving air quality (1978-1980)	4	0	2	5	0	0	11
Counties with insufficient data or no discernible trend	93	19	11	8	20	33	184

1 U.S. EPA. "Guideline for Public Reporting of Daily Air Quality - Pollutant Standards Index (PSI)," EPA 450/2-76-013, August 1976.

2 Instrumentation measures ozone which is the primary constituent of oxidants.

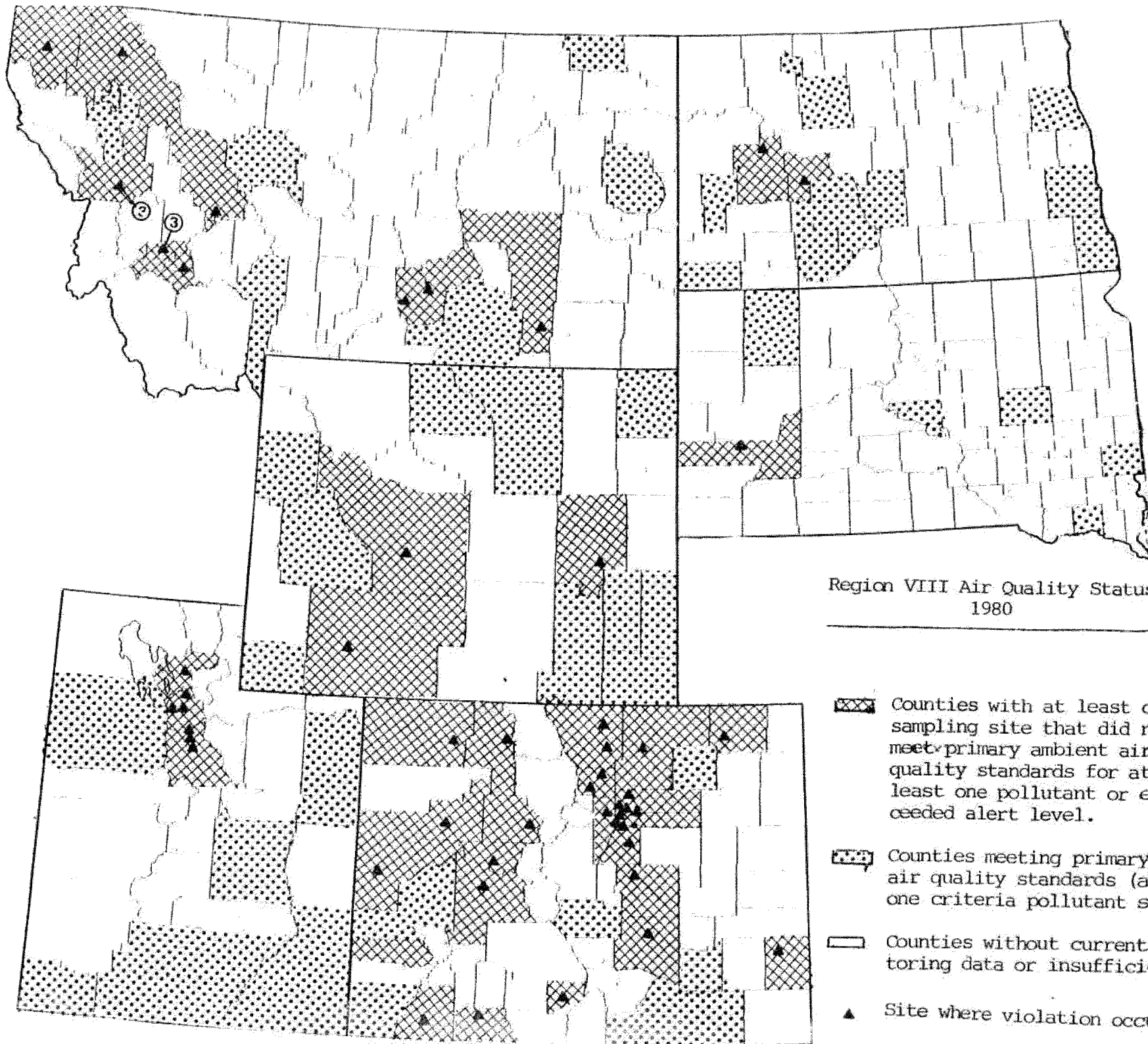


TABLE 2

## Air Quality Pollutants and Health Effects

Pollutant	Physical Description	Health Effect at Concentrations above the Primary Standard
Total Suspended Particulates (TSP)	TSP is a measurement of particles in the air (such as soot, mist, and sprays) and includes non-toxic materials (dust and dirt) as well as toxic materials (lead, asbestos, sulfates). Natural and man-made sources contribute to TSP which affects the respiratory system in varying degrees depending on particle size and chemical composition. Particle sizes up to 15 micron size can be inhaled into the lungs and particles smaller than 2.5 can become lodged deeply in the lungs. Normally the size of major concern is from .1 to 3 microns.	Aggravation of asthma and chronic lung diseases, increased cough, chest discomfort, restricted activity, aggravation of heart and lung disease symptoms in the elderly, increased death rate; long term exposure to TSP levels from 100-300 Mg/m <sup>3</sup> may cause multiple lung function changes.
Sulfur Dioxide (SO <sub>2</sub> )	SO <sub>2</sub> is a colorless gas with a arid/pungent odor that is detectable by most people at concentrations greater than .3 to a part per million. When combined with water it forms sulfuric acid. When in the air insufficient quantity it can combine with rain to form "acid rain." This is a problem whose frequency is just being recognized. The most common form of SO <sub>2</sub> in the atmosphere, results from combustion of coal and gas or as a by-product in mineral smelting operations. SO <sub>2</sub> reacts readily with other atmospheric pollutants to form sulfates, a group of compounds responsible for aggravation of respiratory ailments.	Aggravation of asthma, aggravation of heart and lung disease symptoms in the elderly, increased lung illness, increased death rate; long term exposure to SO <sub>2</sub> levels from 05-1ppm may cause multiple lung function changes.

Carbon Monoxide (CO)	CO is a colorless, odorless, tasteless gas--a toxic product of combustion. The automobile engine represents the major single source of this pollutant.	Interference with mental and physical activity, reduced capacity in persons suffering from heart and other circulatory disorders; decreases visual perception and general alertness.
Ozone (O <sub>3</sub> )	Ozone and other photochemical oxidant compounds are formed by a complex series of chemical reactions occurring when hydrocarbons and nitrogen oxides from motor vehicles or other emission sources are exposed to sunlight. Ozone, the critical constituent in oxidants, is a severe irritant to human tissue.	Aggravation of asthma and chronic lung disease, irritation of the eye and of the respiratory tract, decreased vision, reduced heart and lung capacity.
Nitrogen Dioxide (NO <sub>2</sub> )	NO <sub>2</sub> is a reddish-brown gas with a pungent odor. It is corrosive and is an oxidizing agent which reacts with hydrocarbon in sunlight to form photochemical oxidants (ozone primarily). NO <sub>2</sub> is formed during high temperature combustion (motor vehicle engines and powerplant boilers).	Increased chronic bronchitis, reduced resistance to disease, aggravation of chronic lung disease.
Lead (Pb)	Lead is a gray-white metal with a high luster and low melting point. It is produced in a much larger quantity than any other toxic metal. The major use of lead is as a knock retardant (tetraethyl lead) in gasoline. More than half the lead in the country goes into gasoline to produce almost 90% of the total lead in the atmosphere, a large majority of which is in particulate form (usually less than 2 microns).	Impairs hemoglobin production, causes anemia, often fatal to infants.

## AIR QUALITY STANDARDS

The Environmental Protection Agency was given the authority to establish ambient air quality standards which specify, for the principal and most widespread classes of air pollutants, limitations necessary to protect the public health and welfare. These pollutants currently are total suspended particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide and lead.

Two types of standards were established. Primary standards are set at levels to protect human health. Secondary standards are set at levels to protect against other forms of damage to such things as vegetation and materials. The numerical value for each standard is listed in Appendix A.

### Air Quality Nonattainment Areas

The Clean Air Act Amendments of 1977 placed additional requirements on the States and EPA. Section 107(d) directed each State to submit a list of the NAAQS attainment status for all areas within the State. These designations were to be based on air quality levels that existed at the time the Amendments were enacted. States were required by EPA guidance to consider the most recent four quarters of monitored ambient air quality data available. If these data showed no standards violations, then the previous four quarters of monitoring data were to be examined to assure that the current indication of attainment was not the result of a single year's data reflecting unrepresentative meteorological conditions. In the absence of sufficient



monitored air quality data, other evaluation methods were used, including air quality dispersion modeling. The Act specified that the designated areas could be based on air quality control regions (AQCRs) or any subportions of these areas. EPA advised States they could divide (AQCRs) into various nonattainment, attainment, or unclassified portions, i.e., county, subcounty, or other geographic areas as long as the area could be clearly defined in a written narrative. Additionally, a different geographic area could be used in designating the status for each pollutant. The section 107(d) designations were meant to provide a starting point for States in their effort to correct existing air quality problems and to implement programs under the 1977 CAA Amendments. But the designation of an area as nonattainment or attainment must be considered only a point of departure and not a final, inflexible end in itself. Table 2 indicates, on a state-by-state, pollutant-by-pollutant basis, the attainment status of every area as submitted by the appropriate State agency and approved, or as designated by the Environmental Protection Agency. No distinctions have been made as to the severity of the violations recorded in the areas designated by nonattainment in this table. Each area was designated nonattainment for primary or secondary standard violations. A "P" indicates "does not meet primary standards" and "S" indicates "does not meet secondary standards". The 1980 status and trends for each nonattainment area in Region VIII are described in the appropriate state summary.

TABLE 3  
EPA NONATTAINMENT AREAS IN REGION VIII  
FEDERAL REGISTER - MARCH 3, 1978

		<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>3</sub></u>
Montana	Colstrip Area	P				
	City of Columbia Falls	P				
	City of Missoula	P				
	Missoula Area	S				
	Billings Area	S				
	Great Falls Area	S				
	Butte Area	S				
	East Helena Area	S	PS			
	Laurel Area		P			
	Anaconda Area		PS			
	City of Billings				P	
	Yellowstone County					P
	Rosebud County					P
So. Dak.	Rapid City Area	P				
Utah	Davis County	S				P
	Salt Lake County	P	PS		P	P
	Utah County	P				P
	Weber County	P				P
	City of Price	P				
	Cedar City	S	PS			
	Tooele County		PS			
	Uintah County					P
	City of Bountiful				P	
	City of Ogden				P	
	City of Provo				P	
Wyoming	Trona Industrial Area	P				
	Sweetwater County					
Colo.	Larimer-Weld	P				P
	Designated Area					
	Denver Designated Area	P		P	P	P
	Colo. Springs 3-C	P			P	
	Pueblo 3-C	P				
	Mesa Designated Area	P				
	El Paso County					P
	Ft. Collins-Greeley				P	

P - Does not meet primary standard  
S - Does not meet secondary standard

TABLE 4  
EPA NONATTAINMENT AREAS IN REGION VIII  
CURRENT

		<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>x</sub></u>
CO	Denver Designated Area	PS		P	P	P
	Colo. Springs 3-C	PS		P	P	P
	Pueblo 3-C	PS				P
	Mesa Designated Area	P				
	Ft. Collins-Greeley	S			P	P
MT	Colstrip Area	P				
	City of Columbia Falls	P				
	City of Missoula	P			P	
	Missoula Area	S				
	City of Billings	S			P	
	Great Falls Area	S			P	
	Butte Area	P				
	East Helena Area	S	PS			
	Laurel Area		P			
	Anaconda Area		PS			
SD	Rapid City Area	P				P
UT	Davis County Designated Area	S				P
	Salt Lake Co. Designated Area	P	PS			P
	Utah County Designated Area	P				
	Weber County Designated Area	P				
	Cedar City		PS			
	Tooele County Designated Area		PS			
	City of Bountiful				P	
	City of Ogden				P	
	City of Provo				P	
	Salt Lake City				P	
WY	Trona Industrial Area	P				

P - Does not meet primary standard  
S - Does not meet secondary standard

TABLE 5

## EPA NONATTAINMENT AREAS IN REGION VIII

## CURRENT

		TSP	SO <sub>2</sub>	NO <sub>2</sub>	CO	O <sub>x</sub>
CO	Denver Designated Area	P		P	P	P
	Colo. Springs 3-C	P			P	
	Pueblo 3-C	P				
	Mesa Designated Area	P				
	Ft. Collins-Greeley	S			P	
MT	Colstrip Area *	P				
	City of Columbia Falls	P				
	City of Missoula	P			P	
	Missoula Area	S				
	City of Billings	S			P	
	Great Falls Area	S			P	
	Butte Area	P				
	East Helena Area	S	PS			
	Laurel Area		P			
	Anaconda Area		PS			
SD	Rapid City Area	P				
UT	Davis County Designated Area	S				P
	Salt Lake Co. Designated Area	P	PS			P
	Utah County Designated Area	P				
	Weber County Designated Area	P				
	Cedar City		PS			
	Tooele County Designated Area		PS			
	City of Bountiful				P	
	City of Ogden				P	
	City of Provo				P	
	Salt Lake City				P	
WY	Trona Industrial Area	P				

P - Does not meet primary standard  
 S - Does not meet secondary stan

## ANALYTICAL PROCEDURES

### Status and Severity Analysis

Status and severity of air quality are determined by comparing measurements made at monitoring stations to air pollution standards. The indicator used to characterize air quality status in this manner was the number of days in which measurements exceed the primary standards at the worst site in each county. The indicator may not actually represent air quality for the entire county, however the worst site is always selected in an area where measured concentrations are affecting some segment of the population. Complete procedures for determining status are documented in Appendix C.

Another indicator is used to demonstrate the severity of the problem. Each pollutant has been assigned an alert level, the concentration at which the public must be notified of possible adverse health affects. These values shown in Appendix B are significantly higher than the standards and are not frequently encountered.

These two indicators correspond to break points in the Pollutant Standards Index (PSI) which is becoming the nationwide index for reporting air quality levels to the public. In the PSI the worst site pollutant concentration in each metropolitan is chosen, and the index is calculated from the concentration at the site referenced to primary standards and alert levels. PSI breakpoints are detailed by pollutant in Appendix B.

### Trend Methods For Air Pollutants

Modification to Trending Methods used to analyze the data for this report attempted to concentrate on two heretofore elusive statistical considerations: Censoring and Autocorrelation. Censoring is present when one or more observations are at or below the detection limit of the sample. Autocorrelation is present when each observation in the data set is not independent of each of the other observations. Both of these variable characteristics affect the variance of any estimator obtained from the data. Since the trending technique used in this analysis utilizes confidence intervals for true means, which incorporate variances in their construction, it is important to adequately incorporate the censoring and autocorrelation effects.

Autocorrelation studies on air pollutants sampled once every hour show no significant 24-hour autocorrelation. In other words, each 1:00 A.M. reading is independent of each other 1:00 A.M. reading. Likewise, each 2:00 P.M. reading is independent of each other 2:00 P.M. reading, etc. There is, however, very high 1-hour autocorrelation, being on the order of 0.7. This lead to the logical grouping together of all of the 1:00 A.M. data, then all of the 2:00 A.M. data, etc. A further grouping was done on season, due to significant shifts in pollutant populations from season to season. From each grouping of independent hourly observations, a sample average and sample variance were computed. Censoring was handled by computer simulations for the censored values. Each of the 24 sample averages was then used to compute an overall seasonal average. In order to realistically estimate the variance of each seasonal average, the autocorrelation in the 24-hourly averages was incorporated into the formulae. Next, the four seasonal averages were used to

compute an overall yearly average. The variance of this overall yearly average was estimated from the variance estimates of the 4 seasonal averages. The averages and estimated variances were then used in constructing confidence intervals for the true yearly means. These intervals were then examined for any overlap in order to detect no significant shifts in the mean values. Non-overlapping intervals indicated significant shifts, the nature of which (i.e. either up or down) was gotten from the relative positions of the confidence intervals.

TSP is not sampled on an hourly basis. Autocorrelation studies on TSP data show very little first order autocorrelation. Also, TSP values are rarely censored. The TSP analysis, therefore, need not incorporate autocorrelation corrections of the variance estimates and the TSP data need not be grouped into sets of independent observations since the observations are independent at the start. Hence, each season's grouping of data may be considered as a sample with independent observations from which the seasonal means and variances are estimated.

This year's analysis was done primarily on pollutant years and not on calendar years. A pollutant year is defined from December 1 to November 30. So, pollutant year 1980 is from December 1, 1979 to November 30, 1980. This is done so as to preserve seasonal continuity since seasonal grouping is an important part of this year's trending technique.



## SECTION II

### STATE AIR QUALITY SUMMARIES

## BASIC CONTENTS OF STATE SUMMARIES

The following graphics and charts appear as a part of each state summary:

1. A map showing the location of all active air quality monitoring sites in the state. Stations with more than 75 percent of all possible data are represented by squares. Circles identify stations where less than 75 percent of the data were collected.
2. A table specifying stations and pollutants used for trends and/or status in each county. Stations with less than three years of data were not used for trending but were used for determining current status. Each station used for either status or trends was required to have 75 percent of the maximum possible data.
3. A table showing the number of violation days for the years 1977, 1978, 1979 and 1980 for each pollutant at sites within designated nonattainment areas. Both alert level and primary level violation days were noted along with a count of sampling days.
4. A bar chart showing total days sampled and alert and primary

violation days in 1980 by county and specific site. Each site with a violation or criteria pollutants is displayed.

- 5. A chart showing current status and trends by county and pollutant. If there were no data or insufficient data in the county, arrows were not shown. Status was determined by comparing the 1977, 1978, and 1980\* data. Ozone status was based on a three year average of 1-hour primary level violation.

\* See Trending Methods For Air Pollutants in Analytic Procedures - Air Quality Section.

## COLORADO AIR QUALITY

The Denver metropolitan area, Colorado Springs area Pueblo and the Fort Collins/Greeley areas still are the major air pollution problem areas in Colorado. High TSP violation rates were recorded at Denver's 21st and Broadway site. TSP violations were also noted at sites in 13 other counties. Nearly 30 percent of all instances in which the TSP health primary standard was exceeded involved concentrations at or above the alert level, not only in heavily populated Denver County, but also throughout most of the State. Carbon monoxide violations tend to be confined to the metropolitan areas of Denver, Colorado Springs, Fort Collins and Greeley. Denver has by far the most numerous CO violations although the quality trend is improving. Seven percent of the total CO exceedences of the primary health standard involved concentrations above the alert level. This is down from 21 percent in 1979. The Denver metro area had all except one of the 10 alert level violations (10) in the State. One expected and one actual ozone standard exceedence were recorded in the Denver metro area, the Fort Collins/Greeley area and the Colorado Springs area.

### Status of Nonattainment Areas in Colorado

Larimer-Weld Designated Areas - The State of Colorado Air Pollution Control, Division with the approval of EPA, changed the primary nonattainment status for TSP. The designation for TSP was changed to a secondary standard for Fort Collins and Greeley. On November 26, 1979, the Larimer-Weld designated area was changed to unclassified for ozone. The only station sampling ozone during

1978, 1979 was at Greeley. This station showed one violation each year in 1978, 1979 and 1980. Fort Collins started an ozone monitoring station in 1980. No violations occurred at that station.

El Paso County - This area was changed to unclassified for ozone on November 25, 1979. No violations were observed at the Colorado Springs station for 1976 to 1979. However, seven expected exceedences were calculated for 1980 because of missing data.

Denver Designated Area - Total suspended particulates were sampled in an area shown by the map in Appendix D. Causes of violations are the power plants, fireplaces, auto and truck exhaust, street cleaning, winter sanding, unpaved roads, construction work, demolition activities, unpaved alleys and parking areas.

The number of sampling stations remained approximately the same, i.e., 25 in 1977, 22 in 1978, 23 in 1979, and 20 in 1980, but the sampling days increased from 91 in 1977 to 144 in 1978, 177 in 1979 and 162 in 1980. No significant trend in pollution was noted. However, overall primary and alert level violations decreased slightly from 1979 to 1980. Increased downtown construction appears to be one of the causes of the 1979-1980 increase in TSP violation levels.

The nitrogen dioxide nonattainment area generally represented by the Denver metro area is shown on the map in Appendix D. The carbon monoxide and

ozone nonattainment areas consist of Adams, Arapahoe, Boulder, Denver, Douglas and Jefferson Counties. Automobile emissions as affected by meteorological phenomenon common to the Rocky Mountains are the main cause of NO<sub>2</sub>, CO and O<sub>x</sub> pollutant problems. There were 3 stations monitoring NO<sub>2</sub> during 1980, 2 in 1979, 3 in 1978, and 5 in 1977. No violations were noted in 1978, 1979 or 1980.

Eight stations were used to monitor CO with an improvement trend in violation rates for the four year period. Of the 359 days sampled in 1980, 82 days showed primary or alert level violations - down considerably from the 160 days in 1979. Seven ozone stations operating in 1978, 1979, and 1980 (5 in 1977) showed no specific trend during this period. There were 3 primary violations in 1980 compared with 12 in 1979.

Colorado Springs 3C Area - The area of El Paso County in and around Colorado Springs comprises this area. CO problems are primarily caused by automobiles and the meteorology and topography of the area. The last four years have shown a general primary violation day increase from 0 and 4 in 1977 and 1978 respectively to 11 and 7 violations in 1979 and 1980 respectively.

Along with the semi-arid climate which promotes the potential for air borne dust, winter sanding, grading and construction activities contribute to TSP problems. The one station which sampled this area for an average of 81 days per year showed no primary violations during 1977, 1978, 1979 or 1980.

Pueblo 3C Area - The map in Appendix D shows the area of nonattainment for TSP which consists of the City of Pueblo and its immediate outskirts. The C&I

Steel Company is one of the major contributors to TSP along with nontraditional sources. Four stations were sampled for TSP an average of 86 days from 1977 to 1980. During 1977 six primary violation days were observed. There were only 5 total primary violations in the 1978 to 1980 period.

Mesa Designated Area - This area is in and around Grand Junction. Three stations were sampled in 1977 and 1978 with four stations used in 1979 and 1980. No violations for TSP were noted in any of the four years which were sampled an average of 84 days per year.

Fort Collins - Greeley Area - The City limits of Fort Collins and Greeley constitute the limits of this area. This area showed only 1 primary level violation of TSP but 23 secondary level violations in 1980. Motor vehicles cause the vast majority of CO emissions in these two cities with the meteorology and topography of the area being of some consideration in pollution dispersion. The two stations (one in Greeley and one in Fort Collins) were sampled daily and showed a marked decrease in carbon monoxide alert and primary standard violations from 1979 to 1980. Nine alert level violations were observed in 1979 versus 0 in 1980.

The TSP sampling done at these stations showed no apparent increase in primary violation levels between 1977, 1978, 1979 and 1980 (1,2,2,1). The average number of sampling days was 85 per year. This area was changed to a secondary level nonattainment area in 1979. The year 1980 showed only one primary violation but 23 secondary level violations.



Other Problem Areas - No Nonattainment Status - The worst continuing TSP problem area which is currently not a TSP nonattainment area is Steamboat Springs (Routt County). Fugitive dust problems are the main causes of violations here. During 1980 there were 4 alerts and 11 primary level violations.



COLORADO

STATIONS USED FOR TRENDS AND/OR STATUS

<u>County</u>	<u>City or Location</u>	<u>Station No.</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>x</sub></u>	<u>LEAD</u>
Adams	Adams	060020001F01	X					X*
	Aurora	060140001F01	X					
	Brighton	060240001F01	X					X*
	Welby	062210001F01		X	X	X	X	
	Westminster	062240002F01	X					
Alamosa	Alamosa	060040001F01	X					X*
Arapahoe	Cherry Cr. Dam	060080001F01	X					X*
	Englewood	060780001F01	X					X*
	S. Univ. Blvd.	060080002F01	X*			X	X	X*
	Aurora	060440002F01	X*				X*	
Archuleta	Pagosa Spgs	060100001F01	X					
Boulder	Boulder	060200001F01	X					X*
	Boulder	060200008G05				X*		
	Boulder	060200006G05					X*	
	Longmont	061460001F01	X					X*
Clear Cr.	Idaho Springs	060360001F01	X*					
Delta	Delta	060540001F01	X					X*
Denver	Denver/Annex	060580001F01	X					X*
	Denver 21st/Bdwy.	060580002F01	X	X	X	X	X	X*
	Denver Health Dept.	060580007F01	X					X*
	Denver/Colo. Blvd.	060580010F01				X		
	Denver/Marion	060580012F01	X					X*
	Denver/Julian	060580009F01	X			X	X	X*
	Denver/1050S. Bdwy.	060580003F02						X*
Douglas	Castle Rock	060660001F01	X					
Eagle	Vail	060700002F01	X					
El Paso	Colorado Springs	060380004F01	X		X*	X	X	X*
	Colorado Springs	060380006F01				X		
Fremont	Canon City	060300001F01	X					
Garfield	Glenwood Springs	060920001F01	X*					
	Rifle	060880001F01	X					X*
Gunnison	Crested Butte	061020001F01	X*					
	Crested Butte	061040002F01	X					

\*Status Only

COLORADO

STATIONS USED FOR TRENDS AND/OR STATUS

<u>County</u>	<u>City or Location</u>	<u>Station Number</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>3</sub></u>	<u>LEAD</u>
Jefferson	Arvada	060120002F01				X	X	
	Arvada	060120003F01	X					X*
	Golden	060940001F01	X*					
	Lakewood	061260001F01	X					
	Rocky Flats	061140001F02	X*					X*
La Plata	Durango	060680003F01	X					X*
Larimer	Ft Collins	060820001F01	X			X*	X*	X*
	Loveland	061480002F01	X					
Las Animas	Trinidad	062160002F01	X					X*
Logan	Sterling	062080001F01	X*					
Mesa	Fruita	061520001F01	X					X
	Grand Jct	060980010F01	X					X*
	Palisade	061520002F01	X					X*
	Grand Jct	060980011F01	X*					X*
	Grand Jct	060980012F01				X*		
Moffat	Craig	060480001F01	X*					
Montezuma	Mesa Verde	061530003F03	X					X*
	Cortez	060440002F01						X*
Montrose	Montrose	061620001F01	X*					X*
Morgan	Brush	060280001F01	X*					
Otero	La Junta	061220001F01	X					
Pitkin	Aspen	061780001F01	X					
Prowers	Lamar	061280001F01	X					
Pueblo	Pueblo	061820001F01						X*
	Pueblo Fire Sta.	061820003F01	X					X*
	Pueblo Health Department	061820007F01		X				
Routt	Steamboat Spgs	061920003F01	X					X*
San Miguel	Telluride	062000001F01	X*					X*
Weld	Greeley	061000003F01	X*					X*
	Greeley	061000005F01				X	X*	
	Greeley	061000006F01	X					
	Johnstown	062720005F01	X*					
	Platteville	062720005F01	X					

\*Status Only

COLORADO

STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN  
75% OF MAXIMUM DAYS

<u>County</u>	<u>City or Location</u>	<u>Station No.</u>	<u>TSP</u>	<u>O<sub>x</sub></u>
Boulder	Broomfield	060260001F01	X	
	Boulder	060200008G05		X
Denver	Denver-Gates Rubber	060580003F01	X	
	Denver-1010 S Bdwy	060580003F02	X	
	E Colfax & Colo Blvd	060580010F01	X	
Fremont	Florence	060800001F01	X	
Rio Blanco	Rangely	061860002F01	X	

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

COLORADO

NONATTAINMENT AREAS

Nonattainment Area	Year	Total Suspended Particulates				Nitrogen Dioxide				Carbon Monoxide			
		Days Sampled	Geom. Mean <sup>a</sup> ( $\mu\text{g}/\text{m}^3$ )	Viol. Days	Stas.	Avg. Percent Ob./Sta.	Arith. Mean <sup>a</sup> ( $\mu\text{g}/\text{m}^3$ )	Stas. W/Yrly. Avg. Viola.	Stas.	Days Sampled	Arith. Mean <sup>a</sup> ( $\text{Mg}/\text{m}^3$ )	Viol. Days	Stas.
Denver Designated Area	1977	91	85	A-4/P-17	25	86%	66	P-2	5	365	2.7	A-18/P-145	9
	1978	144	88	A-8/P-26	22	72%	75	P-0	3	365	2.7	A-34/P-184	9
	1979	177	93	A-27/P-52	23	91%	76	P-0	2	365	2.7	A-34/P-160	9
	1980	162	95	A-23/P-54	20	90%	68	P-0	3	359	2.3	A-8/P-82	8
Colorado Springs 3C	1977	80	78	P-0	1					350	2.0	P-0	2
	1978	71	87	P-0	1					365	2.2	A-1/P-4	2
	1979	82	87	P-0	1					365	2.3	A-1/P-11	2
	1980	91	86	P-0	1					365	2.1	P-7	2
Pueblo 3C	1977	90	99	A-1/P-6	2								
	1978	79	97	P-1	2								
	1979	96	95	A-1/P-2	2								
	1980	79	88	P-2	4								

<sup>a</sup> Average of the geometric or arithmetic means for all stations

A = Alert Violation Days

P = Primary Standard Violation Days

S = Secondary Standard Violation Days Where Nonattainment Area

AIR QUALITY TRENDS (Contd)  
BASED ON STANDARD VIOLATIONS

COLORADO

NONATTAINMENT AREAS

Nonattainment Area	Year	Total Suspended Particulates				Nitrogen Dioxide				Carbon Monoxide			
		Days Sampled	Geom. Mean $\bar{x}$ ( $\mu\text{g}/\text{m}^3$ )	Viol. Days	Stas.	Avg. Percent Ob./Sta.	Arith. Mean $\bar{x}$ ( $\mu\text{g}/\text{m}^3$ )	Stas. W/Yrly. Avg. Viols.	Stas.	Days Sampled	Arith. Mean $\bar{x}$ ( $\text{Mg}/\text{m}^3$ )	Viol. Days	Stas.
Mesa Designated Area	1977	91	62	P-0	3								
	1978	77	61	P-0	3								
	1979	86	69	P-0	4								
	1980	80	67	P-0	4								
Fort Collins Greeley	1977	81	62	P-1	3					365	1.4	P-6	1
	1978	81	68	P-2	3					361	1.4	P-4	1
	1979	87	68	A-1/P-2	3					362	2.5	A-9/P-20	1
	1980	90	73	P-1	3					332	1.6	P-12	2

<sup>a</sup> Average of the geometric or arithmetic means for all stations

A = Alert Violation Days

P = Primary Standard Violation Days

S = Secondary Standard Violation Days Where Nonattainment Area

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

COLORADO

NONATTAINMENT AREAS

<u>Nonattainment Area</u>	<u>Year</u>	<u>Days Sampled</u>	<u>Average Arithmetic Mean of Stations (Parts/Million)</u>	<u>Ozone</u>	
				<u>Actual Violation Days</u>	<u>No. of Stations</u>
Denver Designated Area	1977	363	.020	P-15	5
	1978	356	.022	A-1/P-5	7
	1979	365	.025	P-12	7
	1980	365	.024	P-3	7

A - Alert Violation Days  
P - Primary Standard Violation Days



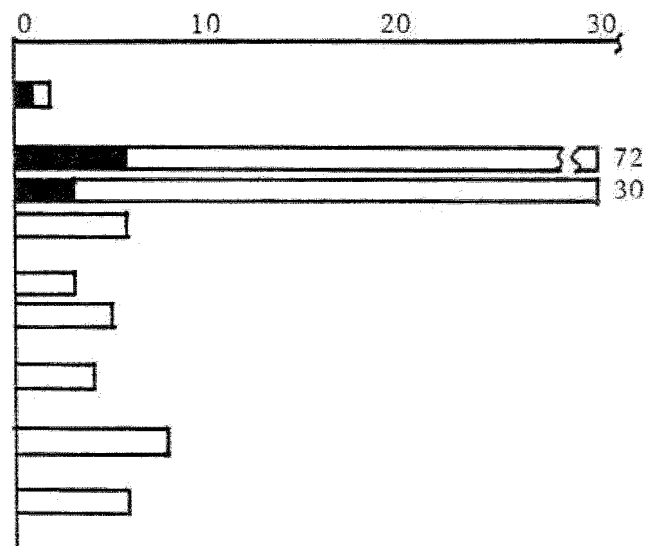
NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS  
EXCEEDED IN 1980

COLORADO

CARBON MONOXIDE

Days/Year

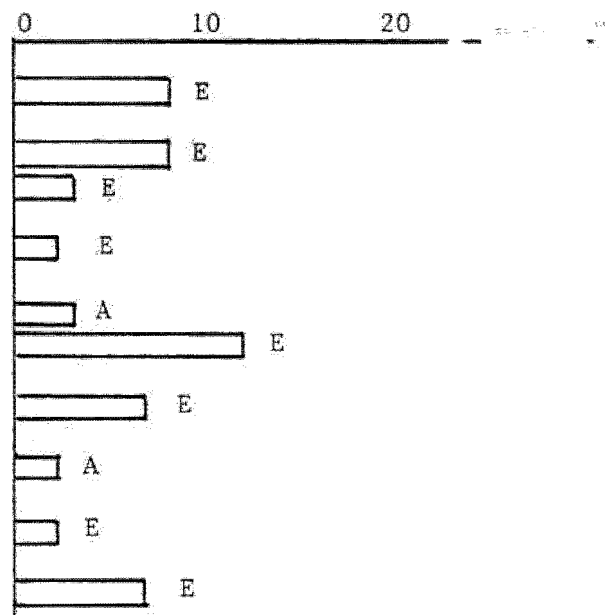
County	(City or Location)	Days Sampled (% of Maximum)
Boulder	(Boulder)	76
Denver	(Colo. Blvd.)	84
	(2105 Broadway)	90
	(Julian)	87
El Paso	(Colo. Spgs.)	95
	(Colo. Spgs. Uinta)	99
Jefferson	(Arvada)	90
Larimer	(Ft. Collins)	79
Weld	(Greeley)	83



OZONE

Expected or actual exceedence  
Days/Year (1978-1980 average)

Adams	(Welby)	89
Arapahoe	(So. Univ.)	71
	(Aurora)	6
Boulder	(Boulder)	78
Denver	(Julian)	88
	(Broadway)	91
El Paso	(Colo. Spgs.)	91
Jefferson	(Arvada)	91
Larimer	(Ft. Collins)	9
Weld	(Greeley)	78

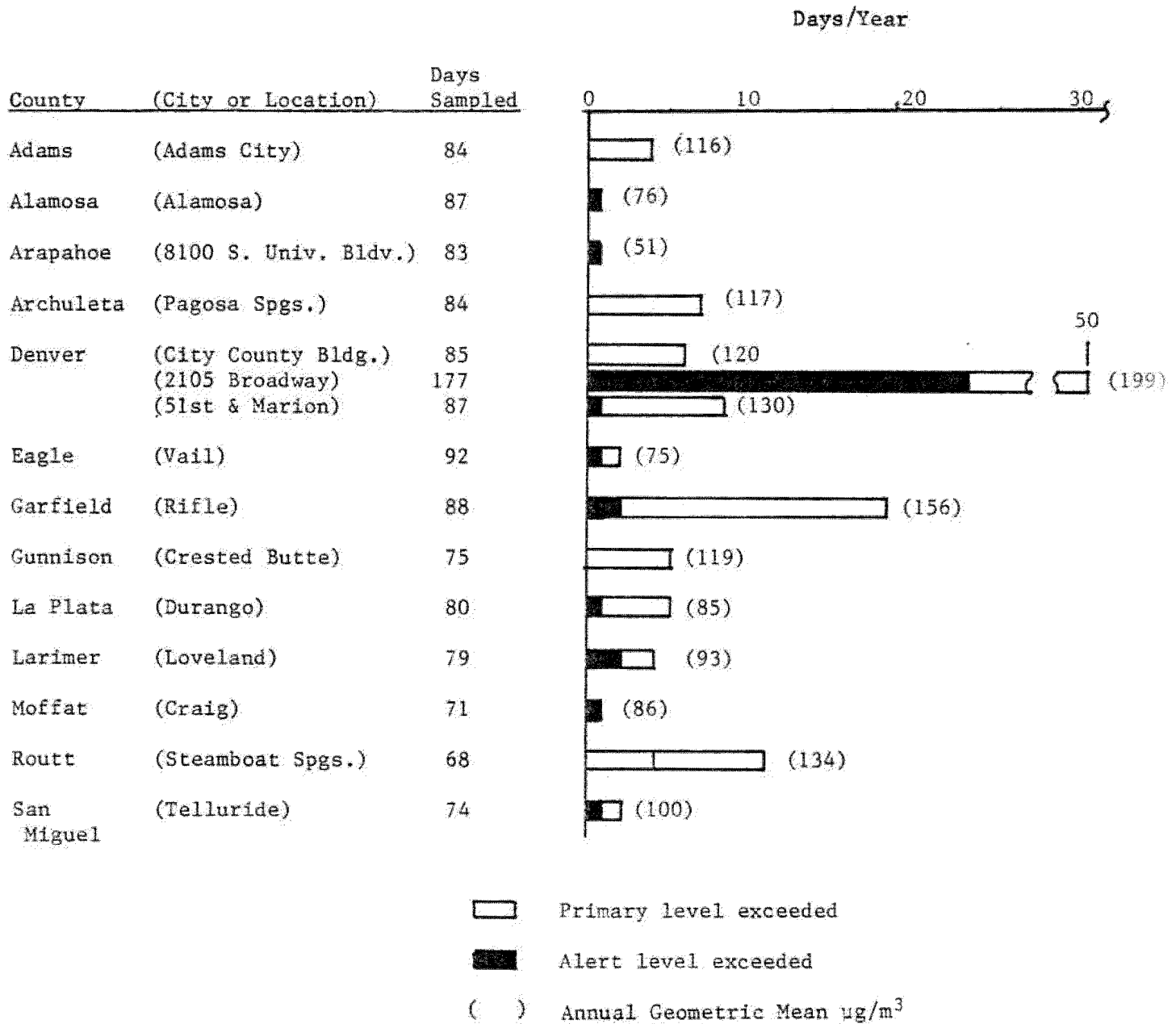


□ Primary level exceeded  
■ Alert level exceeded

NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS  
EXCEEDED IN 1980

COLORADO

TOTAL SUSPENDED PARTICULATES



# STATUS AND TRENDS IN AIR QUALITY

## COLORADO

County	TSP	SO2	NO2	CO	Ox	LEAD	County	TSP	SO2	NO2	CO	Ox	LEAD
Adams							Larimer						
Alamosa							Las Animas						
Arapahoe							Logan						
Archuleta							Mesa						
Boulder							Moffat						
Delta							Montezuma						
Denver							Montrose						
Douglas							Morgan						
Eagle							Otero						
El Paso							Pitkin						
Fremont							Prowers						
Garfield							Pueblo						
Gunnison							Routt						
Jefferson							San Miguel						
La Plata							Weld						

	No evidence standard exceeded
	Exceeds primary standard
	Exceeds alert level
	Improvement
	No apparent trend
	Deterioration

a/ Status Based on Annual Mean Only

## MONTANA AIR QUALITY

Improving and degrading air quality trends were detected at some of the monitoring sites in the state. Improvements in air quality were noted at the City of Missoula and the Anaconda area. Decreases in carbon monoxide violations were evident in the Missoula area even though the city is situated in a valley where air stagnation and pollution entrapment have been a problem. The number of sulfur dioxide violations in the Anaconda area continues to decline. The Anaconda smelter was shut down in September 1980.

### Status of Nonattainment Areas in Montana

Rosebud County - This area was changed from nonattainment to unclassified for ozone. No ozone sampling was done in Montana during 1976, 1978 or 1979. At the City of Rosebud there were no ozone violations during the 290 sampling days in 1977.

Colstrip Area - The Rosebud County area is a square approximately 11 miles on a side centered at Colstrip, Montana. This area had been designated nonattainment for TSP for both 24 hour and annual primary standards. Five sampling sites in the area had no primary violations and only two secondary violations during the 32 days of sampling in 1979. At the Ashland site, the only site sampled in prior years, no violations were detected for the years 1976, 1977 and 1978.

City of Columbia Falls - The city limits of Columbia Falls describes the TSP nonattainment area located in Flathead County. This area was designated nonattainment for the primary standard. Fugitive dust from Highway 40 and

Nucleus Avenue is the major TSP contributor. These streets will be rebuilt and maintained by the city to alleviate this problem. Even though no daily violations were observed for the 27 samples taken in 1977, there were 5 violations observed in 1978 and 1979. The total samples taken were 55 in 1978 and 8 in 1979.

City of Missoula - The city limits of Missoula make up the area which is a primary standard nonattainment area for TSP and CO. A broader area around Missoula has a secondary standard nonattainment designation. The TSP problem can be attributed primarily to dust from unpaved roads. Primary standard violations occurred 7 days in 1977, 16 days in 1978 and 10 days in 1979.

Carbon monoxide due primarily to motor vehicles and the air stagnation producing topography of this area (a valley) cause the continuing CO alert and primary standard violation occurrences. Most of the data for 1977 and 1978 was accumulated from the station near the center of the city at Brooks and South Avenue. This station was moved for part of 1978 and 1979 to a location at Bancroft and Kent (a suburban residential location). The number of daily violations diminished but there were still one alert and 9 primary violation days for the 136 days sampled at the Bancroft and Kent site.

Billings Area - Because of frequent secondary TSP violations the area bounded by 6th Avenue N on the north, 2nd Avenue S on the south, 25th Street on the east and 33rd Street on the west comprise the designated nonattainment area. Reentrained dust from paved roads is a major problem. A planned pilot sweeping and flushing program will be started to alleviate the TSP problem. Six stations showed no primary standard violation days in 1979. However, the

six stations had 11 secondary violation days of the 165 days sampled. No primary violations were noted in 1977 or 1978, with only 3 primary violation days in 1979.

Great Falls Area - This area is bounded by 2nd Avenue N on the north, 2nd Avenue S on the south, 10th Street on the east and the Missouri River on the south. It is designated nonattainment for secondary violations of TSP. Windblown particulate matter from street sanding is a major problem. No primary violations were noted in 1978, 1979 and 1980 for the stations that sampled 93, 126 and 57 days respectively. Only 4 secondary violations were recorded in 1980.

Great Falls has recently been made a primary level violation nonattainment area for carbon monoxide. One station was used for sampling CO and this showed 4 primary level violation out of 94 sampling days in 1979. The years 1977 and 1978 also showed 4 and 10 primary level violations respectively. The station location between 1977 and 1979 was at the center of the city near the commercial district. The 1980 sampling of 128 days showed only 1 primary level violation. However, the station was moved in 1980 to a suburban-commercial district. This might have accounted for the lower violation rate and arithmetic mean.

Butte Area - The northeast section of Butte is currently designated nonattainment for primary TSP violations. Fugitive dust emission violations declined in 1980. This pollutant is caused by the open pit mine owned by Anaconda Copper Company and unpaved roads. Only one primary violation day was noted for 133 days sampled. Five primary violation days were noted out of 240

days sampled at six stations in 1979. Only two primary standard violations were noted in 1977 and no violations occurred in 1978. These stations were sampled for 44 days in 1977 and 181 days in 1978.

East Helena Area - The designation of nonattainment for primary level  $\text{SO}_2$  violations covers an area of about one-half mile radius around the ASARCO smelter. A 1400-foot square area in the northeast corner of the  $\text{SO}_2$  area has been designated a nonattainment TSP area because of secondary standard violations. The ASARCO lead smelter causes the majority of the TSP emission problems. One TSP sampling site is located in the East Helena area. Starting in 1980 Helena sites showed no primary level TSP violations in 1977 thru 1979. The East Helena site showed 2 secondary standard violations of 39 samples taken in 1980.

A station is set up in Montana City four miles SSE of the ASARCO plant to monitor  $\text{SO}_2$ . No violations of the primary standard were shown at this site for 1977 thru 1979 even though there were 290, 183 and 133 days of sampling respectively. Eighty percent of the emissions are from 400-foot stacks, while the remaining 20 percent of the emissions are from 110-foot stacks and subject to down wash. Taller stacks (375 feet) have been suggested as a replacement to the 110-foot stacks to solve down wash problems. In 1980 a station was functioning in East Helena. No violations occurred for 272 sampling days.

Laurel Area - An area of about 1.5 mile radius around the Cenex Refinery is the area designated nonattainment for primary  $\text{SO}_2$  standard violations. One site used for monitoring showed 14 and 10 primary violation days in 1978 and 1979, respectively, down from 33 in 1977. The number of days sampled has decreased over the trend period to 94 days in 1980 (only January thru June). Only two primary level violations occurred in 1980.

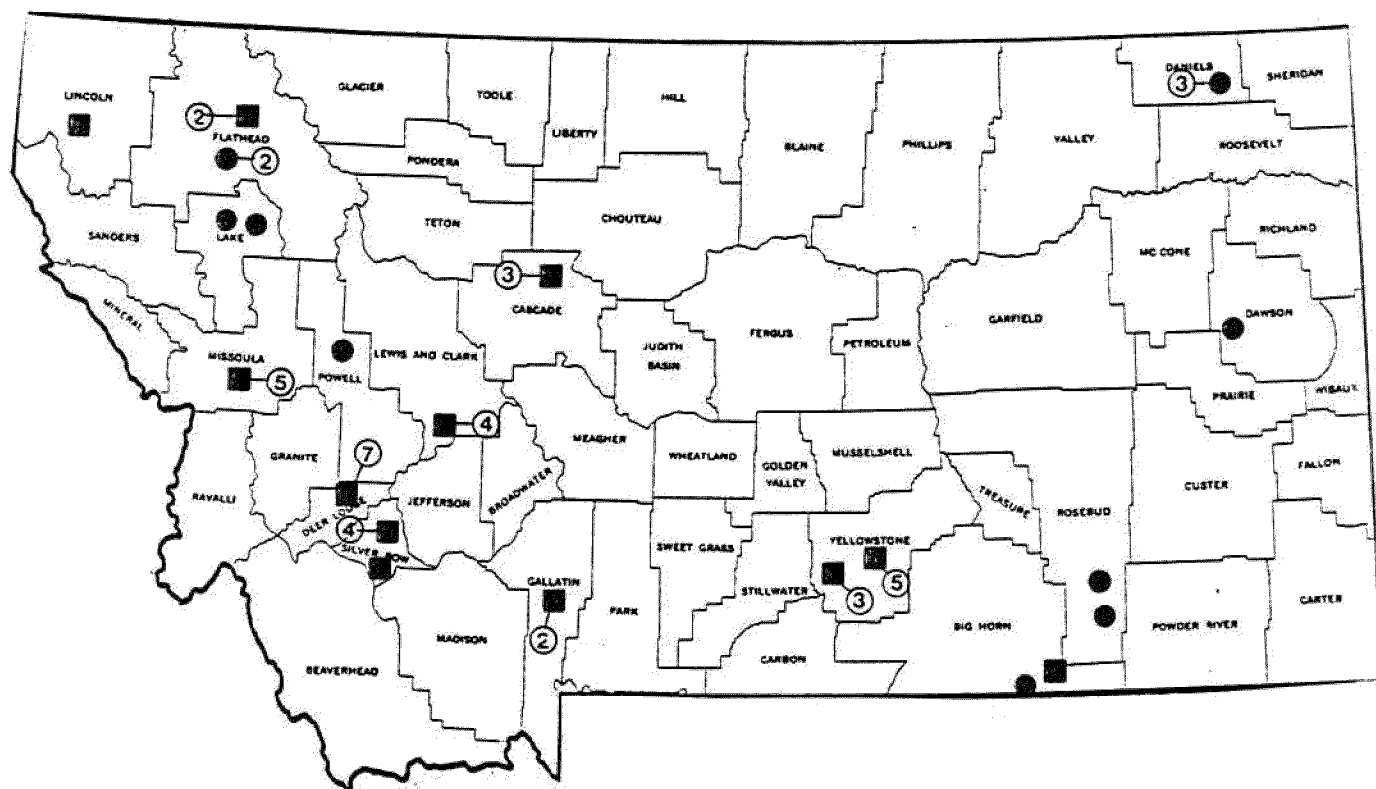
Anaconda Area - A 6 mile square area centered at the Anaconda Copper smelter constitutes the nonattainment area designated because of SO<sub>2</sub> violations.

The Anaconda smelter was shut down in September 1980. No violations occurred after August 2, 1980.

City of Billings - The area bounded by 6th Avenue N on the north, the Burlington Northern tracks on the south, U.S. 87 on the east and Division Street on the west has been designated as nonattainment for carbon monoxide violations. Motor vehicle emissions cause almost all the CO problems. No data were collected in 1979 or 1980 at any site in Billings. Only one station was used for 1977, 1978 and 1980. This showed three daily violations of 276 sample days taken in 1977, no violations for 82 sample days taken in 1978, and no violations for 73 sample days in 1980. Three major intersections need modifications to help alleviate this problem area.

Billings was changed from nonattainment to unclassified for ozone. No ozone data was collected in 1978, 1979, or 1980.





## MONTANA

### MONITORING SITES

- Stations with 75% or more of maximum possible data
- Stations with less than 75% of maximum possible data

## MONTANA

## STATIONS USED FOR TRENDS AND/OR STATUS

<u>County</u>	<u>City or Location</u>	<u>Station No.</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>x</sub></u>	<u>Lead</u>
Big Horn	N.E. of Decker	270060009F03	X				
Cascade	Great Falls	270660016F01					X
Dawson	Lindsay	270360004F03	X*				
Deer Lodge	Anaconda-Lincoln Highway Jct.	270020007F01	X*	X		X	X
	Mill Cr. Crossing	270400004F02					X*
	Mill Creek	270400012F02		X*			
	Water Office	270400804J02		X*			
	Opportunity	270400801J01		X*			
	Westgate	270400803J02		X*			
		270400807J02		X*			
Flathead	Columbia Falls	270270005F01	X				
	Columbia Falls	270480029F02	X				
	Kalispell	270480304F05	X*				
	Kalispell	270800014F01	X*				
Gallatin	Bozeman	270120001F01	X				
	Bozeman	270120002F01	X*				
Lake	Ronan	270820010F05	X*				
	Ronan	270820011F05	X*				
	Polson	270820010F05	X*				
Lewis & Clark	Helena	270720001F01	X*				
	Helena	270860002F02	X				X
	Helena	270720001F07	X*				X*
	E. Helena	270860008F02	X				
Lincoln	Libby	270900010F01	X				
Missoula	Missoula-Lions Pk.	271100019F01	X*		X*	X*	X*
	Missoula	271100020G01	X*				
	Missoula	271100001G01	X				
	Missoula	271100015G02	X*				
	Missoula	271100016G02	X*				
Powell	Ovando	271260024F03	X*				
Rosebud	Ashland	270310101A02				X*	

\*Status Only

# MONTANA

## STATIONS USED FOR TRENDS AND/OR STATUS

<u>County</u>	<u>City or Location</u>	<u>Station No.</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>x</sub></u>	<u>LEAD</u>
Silverbow	Butte	270160006F01	X				X*
	Tierney	271480014F02	X				
	Butte	270160020F01	X*				X*
	Butte	270160018F01				X*	X*
	Butte	270160019F01	X				X*
Yellowstone	Billings	270080059F01	X*			X*	X*
	Billings	270080007G01	X				
	Billings	270080008G01	X				
	Billings	270080009G01	X				
	Laurel	270840001G02	X	X*			
	Laurel	270840009F01		X*			
	Laurel	270840009F05		X*			

Status Only

MONTANA  
STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN  
75% OR MAXIMUM DAYS

<u>County</u>	<u>City or Location</u>	<u>Station Number</u>	<u>TSP</u>
Big Horn	Decker-Warren Ranch	270060009F03	X
Cascade	Great Falls	270660009G01	X
	Kiwanis Park	270660016F01	X
Daniels	Scoby	270340001F03	X
	Scoby	270340002F03	X
	Scoby	270340003F03	X
Rosebud	BN Site	271360027F02	X
Yellowstone	Billings	270080006F05	X

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

MONTANA

NONATTAINMENT AREAS

Nonattainment Area	Year	Total Suspended Particulates				Carbon Monoxide			
		Days Sampled	Geometric Mean <sup>a</sup> (ug/m <sup>3</sup> )	Violation Days	No. of Stations	Days Sampled	Arithmetic Mean <sup>a</sup> (mg/m <sup>3</sup> )	Violation Days	No. of Stations
Colstrip Area	1977	27	19	P-0	1				
	1978	13	14	P-0	1				
	1979	32	22	P-0	5				
	1980	4	68	P-0	2				
City of Columbia Falls	1977	27	82	P-0	1				
	1978	55	93	A-3/P-5	2				
	1979	60	111	A-2/P-8	1				
	1980	53	86	A-2/P-2	2				
City of Missoula	1977	365	52	P-7	8	290	5.9	A-12/P-133	1
	1978	360	66	A-6/P-16	9	150	5.9	A-21/P-66	2
	1979	365	60	A-1/P-10	6	136	2.0	A-1/P-9	1
	1980	249	65	A-5/P-8	5	7	2.6	P-1	1

<sup>a</sup> Average of the Geometric or Arithmetic Means for all Stations

A = Alert Violation Days

P = Primary Standard Violation Days

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

MONTANA

NONATTAINMENT AREAS

Nonattainment Area	Year	Total Suspended Particulates				Carbon Monoxide			
		Days Sampled	Geometric Mean <sup>a</sup> (ug/m <sup>3</sup> )	Violation Days	No. of Stations	Days Sampled	Arithmetic Mean <sup>a</sup> (mg/m <sup>3</sup> )	Violation Days	No. of Stations
Billings Area	1977	60	46	P-0	4				
	1978	138	39	P-0	7				
	1979	303	63	P-3	5				
	1980	165	60	P-0	6				
Great Falls Area	1977	99	62	A-1/P-1	2	161	2.7	P-4	1
	1978	93	40	P-0	4	57	3.6	P-10	1
	1979	126	51	P-0	4	94	3.0	P-4	1
	1980	57	48	P-0	9	128	.9	P-1	1
Butte Area	1977	44	52	P-2	5				
	1978	131	46	P-0	8				
	1979	240	67	P-5	6				
	1980	133	57	P-1	6				

<sup>a</sup> Average of the Geometric or Arithmetic Mean for all Stations

A = Alert Violation Days

P = Primary Standard Violation Days

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

MONTANA

NONATTAINMENT AREAS

Nonattainment Days	Year	Total Suspended Particulates				Sulfur Dioxide				Carbon Monoxide			
		Days Sampled	Geom. Mean <sup>a</sup> (ug/m <sup>3</sup> )	Viol. Days	No. of Stations	Days Sampled	Arith. Mean <sup>a</sup> (ug/m <sup>3</sup> )	Viol. Days	No. of Stations	Days Sampled	Arith. Mean <sup>a</sup> (Mg/m <sup>3</sup> )	Viol. Days	No. of Stations
E. Helena Area	1977	48	54	P-0	2	290	27	P-0	1				
	1978	68	53	P-0	3	183	18	P-0	1				
	1979	59	60	P-0	2	133	19	P-0	1				
	1980	40	54	P-0	1	266	24	P-0	1				
⊗ Laurel Area	1977					191	151	P-33	2				
	1978					75	130	A-2/P-14	2				
	1979					172	104	P-10	2				
	1980					94	48	P-2	2				
Anaconda Area	1977					365	54	A-8/P-28	10				
	1978					363	71	A-48/P-136	11				
	1979					335	81	A-3/P-18	9				
	1980					324	84	A-13/P-60	7				
City of Billings	1977									226	2.6	P-3	1
	1978									82	2.0	P-0	1
	1979									0	---	---	0
	1980									73	7.3	P-0	1

<sup>a</sup> Average of the Geometric or Arithmetic means for all Stations

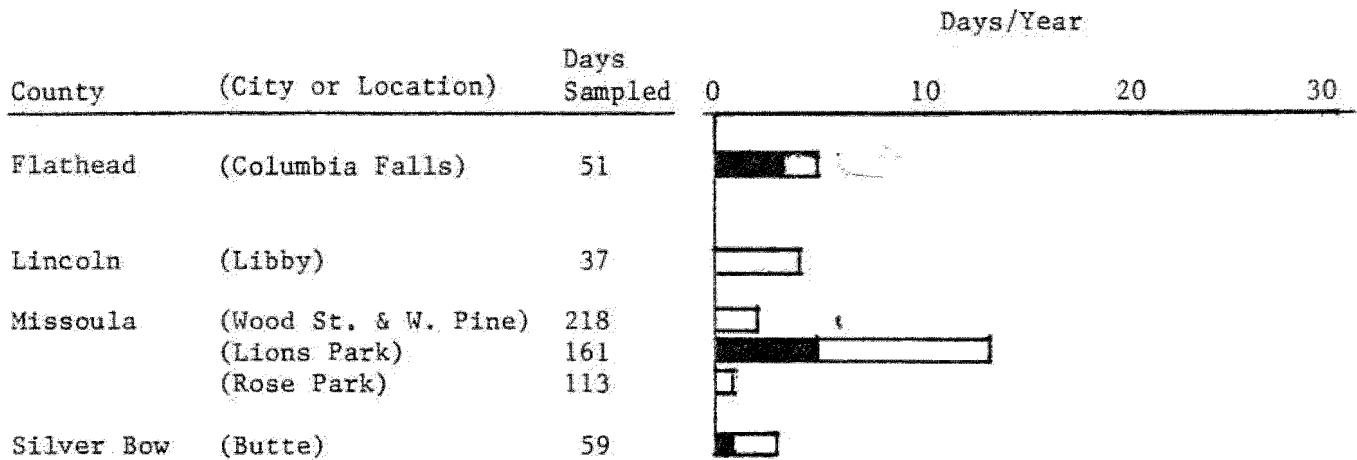
A = Alert Violation Days

P = Primary Standard Violations

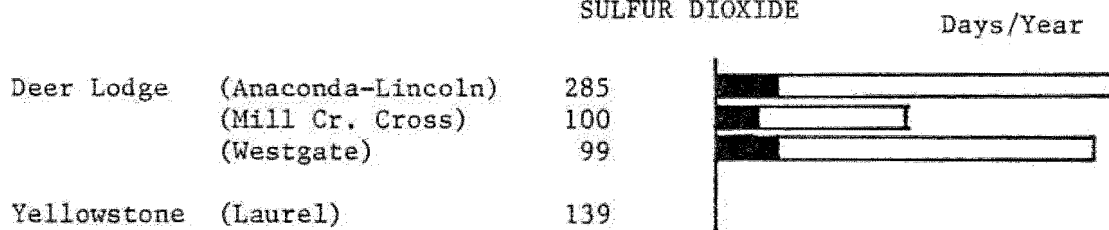
NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS  
EXCEEDED IN 1980

MONTANA

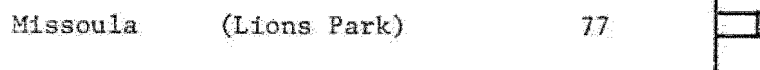
TOTAL SUSPENDED PARTICULATES



SULFUR DIOXIDE



CARBON MONOXIDE

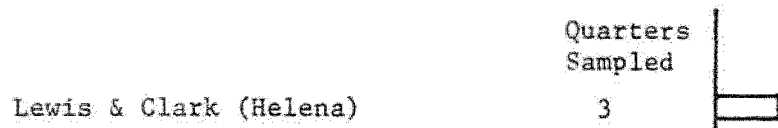


OZONE

Expected and Actual Exceedence  
Days/Year (1978-1980 Average)



LEAD - VIOLATIONS-QUARTERLY AVERAGE



Primary level exceeded  
 Alert level exceeded  
 ( ) Annual Geometric Mean  $\mu\text{g}/\text{m}^3$



# STATUS AND TRENDS IN AIR QUALITY

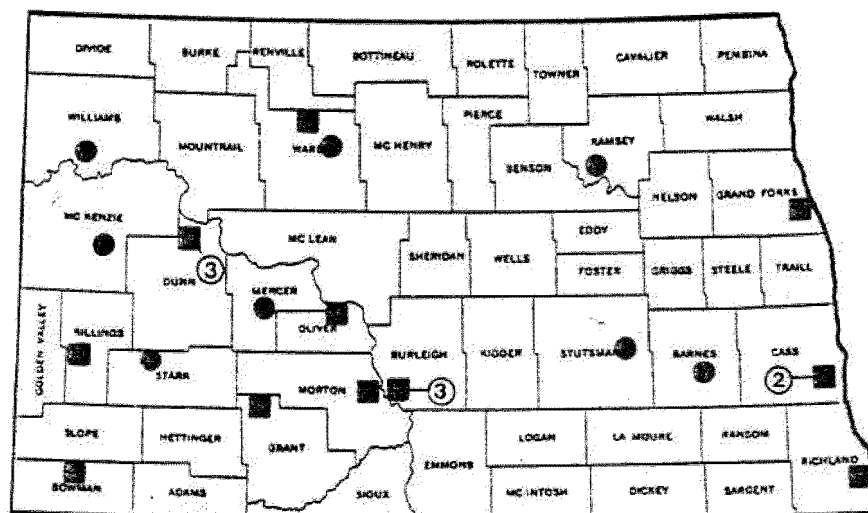
## MONTANA

<u>County</u>	<u>TSP</u>	<u>SO2</u>	<u>CO</u>	<u>LEAD</u>	<u>County</u>	<u>TSP</u>	<u>SO2</u>	<u>CO</u>	<u>LEAD</u>
Big Horn	→				Lake	□			
Cascade	□			□	Lewis and Clark	→			■
Daniels	→				Lincoln	↑			
Dawson	□				Missoula	→		■	□
Deer Lodge	□	→		□	Rosebud	□			
Flathead	↓				Silver Bow	→			□
Gallatin	→				Yellowstone	→	■		□
Jefferson				□					

□	No evidence standard exceeded
■	Exceeds primary standard
■	Exceeds alert level
↑	Improvement
→	No apparent trend
↓	Deterioration

## North Dakota Air Quality

Total suspended particulates were sampled in 16 counties. High readings caused by the Mt. St. Helen's eruption debris were ignored. No station exceeded primary TSP standards in the State in 1980. Two stations sampled  $\text{SO}_2$  and  $\text{NO}_2$ . These sites showed no violations for these pollutants. Ozone was sampled in two stations during 1980, (even though no actual violations occurred). The average level of expected exceedences for 1978-1980 was 3 per year. Lead sampling started during the last half of 1979 at 6 stations on 6 day intervals. No violations occurred for any of these stations during 1980.



## NORTH DAKOTA MONITORING SITES

- Stations with 75% or more of maximum possible data
- Stations with less than 75% of maximum possible data

NORTH DAKOTA  
STATIONS USED FOR TRENDS AND/OR STATUS

<u>County</u>	<u>City or Location</u>	<u>Station No.</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>	<u>CO</u>	<u>O<sub>3</sub></u>	<u>LEAD</u>
Barnes	Valley City	351240001F01	X*					
Billings	Medora	350080001F03	X	X*				
Bowman	Bowman	350160001F01	X					
Burleigh	Bismarck	350200003F09						X*
	Bismarck	350100001F01	X					X*
	Bismarck	350200011F03					X*	
Guss	Fargo	350400001F01						X*
Dunn	Dunn	350340003F03					X*	
Grand Forks	Grand Forks	350480001F01	X					X*
Grant	Glen Ullin	350520001F03	X					
McKenzie	Roosevelt N.F.	350700002F03	X	X*				
Mercer	Beulah	350760001F01	X*		X*			
Morton	Mandan	350740001F01	X					
Oliver	Stanton	350860001F03		X				
Ramsey	Devils Lake	350260001F01	X*					
Richland	Wahpeton	351260001F01	X					
Stark	Dickinson	350300001F01	X*					
Stutsman	Jamestown	350580001F01	X*					
Ward	Minot	350780001F01	X*					X*
	Lake Darling	351300001F03	X					X*
Williams	Williston	351360001F01	X*					

\*Status Only

NORTH DAKOTA

STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN  
75% OF MAXIMUM DAYS

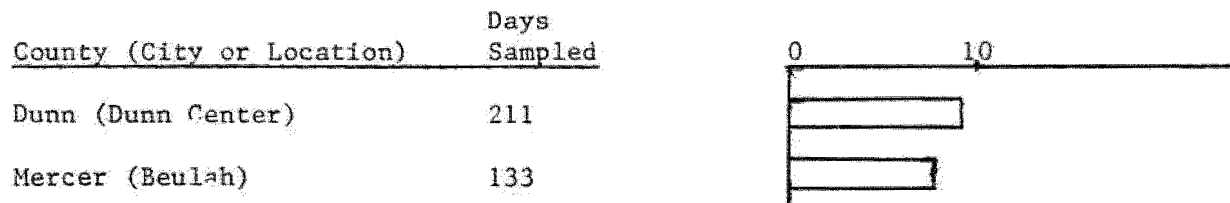
County	City or Location	Station Number	TSP	SO <sub>2</sub>
Cass	Fargo	350220001FO3	X	
Dunn	Mandaree	350340001FO1	X	
	Dunn	350340003FO3		X

NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT  
LEVEL WAS EXCEEDED IN 1980

NORTH DAKOTA

OZONE

Expected Exceedence  
Days/Year  
(1978-1980 Data Average)



# STATUS AND TRENDS IN AIR QUALITY

## NORTH DAKOTA

<u>County</u>	<u>TSP</u>	<u>SO2</u>	<u>NO2</u>	<u>Ox</u>	<u>LEAD</u>	<u>County</u>	<u>TSP</u>	<u>SO2</u>	<u>NO2</u>	<u>Ox</u>	<u>LEAD</u>
Barnes						Mercer					
Billings						Morton					
Bowman						Ramsey					
Burleigh						Richland					
Cass						Oliver					
Dunn						Stark					
Grand Forks						Stutsman					
Grant						Ward					
McKenzie						Williams					
McLean											



No evidence standard exceeded

Exceeds primary standard

Exceeds alert level

Improvement

No apparent trend

Deterioration

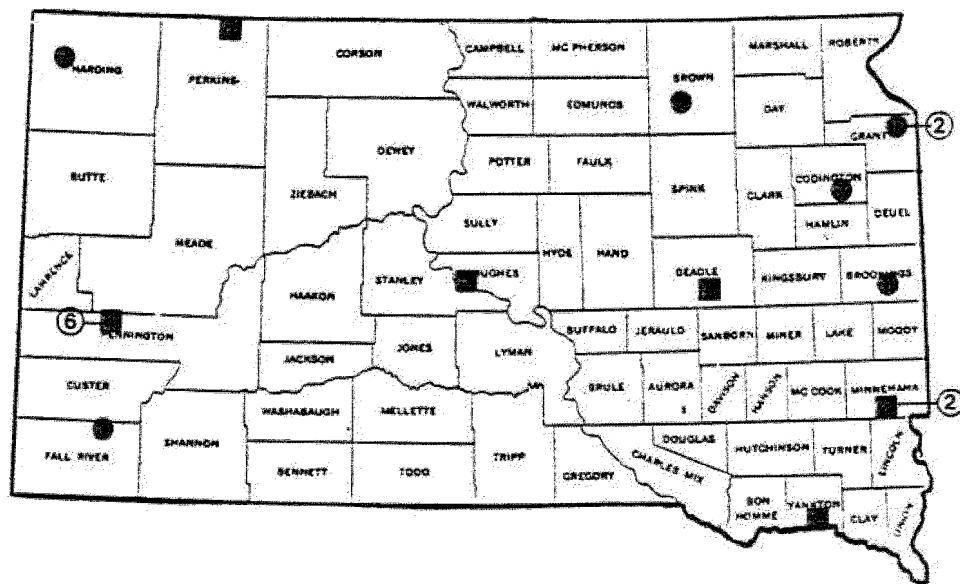
## South Dakota Air Quality

Total suspended particulate (TSP),  $\text{SO}_2$  and  $\text{NO}_2$  are the only air pollutants monitored in South Dakota. The five stations located in the Rapid City area showed 1 alert level and 5 primary level TSP violation days in 1980. This is a deterioration from the 1977 and 1978 levels, but remains approximately the same as 1979. Measurements for  $\text{SO}_2$  and  $\text{NO}_2$  in 6 counties showed no primary or secondary violations. The concentrations were generally at minimum levels.

### Status of Nonattainment Areas in South Dakota

Rapid City Area - The nonattainment area designated for TSP primary violations is a 10 mile (north-south) by 11 mile (east-west) rectangular area centered at Rapid City. Most of the violations have been caused by fugitive emissions from quarry operations. Requirements have been adopted for fugitive dust emission controls which should result in attainment by 1982. Five stations measured five primary and one alert violation days for 61 days sampled in 1980. There were three primary violation days in 1977, one in 1978, and 3 primary plus 2 alert level violations in 1979.





## SOUTH DAKOTA MONITORING SITES

- Stations with 75% or more of maximum possible data
- Stations with less than 75% of maximum possible data

SOUTH DAKOTA  
STATIONS USED FOR TRENDS AND/OR STATUS

County	City or Location	Station No.	TSP	SO <sub>2</sub>	NO <sub>2</sub>
Beadle	Huron	430820001F01	X		
Brookings	Brookings	430140001F01	X*		
Codington	Waterton	431760001F01	X*		
Fall River	Hot Springs	430780001F03	X*		
Hughes	Pierre	431340001F01	X	X*	X
Minnehaha	Sioux Falls	431480004F01	X	X*	X*
Pennington	Rapid City	431380001F01	X	X	X
	Rapid City	431380007F01	X*		
	Rapid City	431380002F01	X		
	Rapid City	431380005F01	X		
	Rapid City	431380006F01	X		
Perkins	Lemmon	431320001F03	X	X*	X*
Yankton	Yankton	431800001F03	X		

\*Status Only

SOUTH DAKOTA

STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN  
75% OF MAXIMUM DAYS

<u>County</u>	<u>City or Location</u>	<u>Station No.</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>
Brown	Aberdeen	430020001F01	X		
Grant	NE Big Stone Plant	430640002F02	X		
	SE Big Stone Plant	430640001F02	X	X	X
Harding	Buffalo	430760001F01	X	X	X
Minnehaha	Sioux Falls	430180002F01	X		
Pennington	Rapid City	431380009F01	X		

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

SOUTH DAKOTA

NONATTAINMENT AREAS

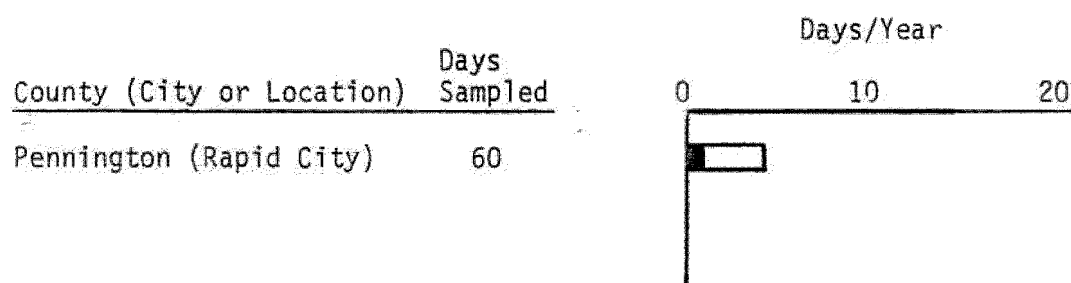
Nonattainment Area	Year	Total Suspended Particulates			Number of Stations
		Days Sampled	Avg. of Geom. Mean of Stas. ( $\mu\text{g}/\text{m}^3$ )	Violation Days	
Rapid City Area	1977	53	42	P-3	4
	1978	56	52	P-1	4
	1979	62	70	A-2/P-3	7
	1980	61	67	A-1/P-4	5



A - Alert Violation Days  
P - Primary Standard Violation Days

NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS  
EXCEEDED IN 1980

SOUTH DAKOTA



















TOTAL SUSPENDED PARTICULATES



 Primary level exceeded  
 Alert level exceeded

# STATUS AND TRENDS IN AIR QUALITY

## SOUTH DAKOTA

<u>County</u>	<u>TSP</u>	<u>SO<sub>2</sub></u>	<u>NO<sub>2</sub></u>
Beadle			
Brookings			
Codington			
Fall River			
Grant			
Hughes			
Minnehaha			
Pennington			
Perkins			
Richland			
Yankton			



No evidence standard exceeded



Exceeds primary standard



Exceeds alert level



Improvement



No apparent trend



Deterioration

## Utah Air Quality

Total suspended particulate violations increased in 1980 compared to 1979 for Salt Lake and Utah Counties. Only Weber County showed a decrease in TSP violations (0 in 1980). Even though the TSP emitted by Kennecott Copper has diminished, U.S. Steel in Orem appears to be a contributor to TSP pollution in the Wasatch Front Counties. All of the cities in the Wasatch Front Counties (Davis, Salt Lake, Utah and Weber) still have actual and expected violations for ozone and carbon monoxide. Three SO<sub>2</sub> violation days occurred in Salt Lake County of 364 days sampled in 1980. No lead data is in the EPA SAROAD data system for 1980. Both industrial and motor vehicle pollution prevail in this area.

### Status of Nonattainment Areas in Utah

Changes in nonattainment status - The City of Price in Carbon County was changed in 1979 from a nonattainment area with primary violation status in TSP to an unclassified area. No samples were taken in 1979 but 1978 data showed that the site had not exceeded the primary standard. The nonattainment status for TSP of Cedar City in Iron County was changed in 1979 to an unclassified designation. No ozone data from Uintah County was found in the EPA data system for 1977, 1978, or 1979. Uintah County ozone nonattainment status was dropped in 1979. The ozone nonattainment status for Utah and Weber County has also been changed to unclassified. For 1980 Utah and Weber Counties show an expected exceedence rate for ozone of 4 and 9 days respectively.

A nonattainment designation for total suspended particulates still remains for Davis, Salt Lake, Utah, and Weber Counties, although boundaries were recently changed to make the areas smelter, subcounty designations. Fugitive dust from unpaved roads and industrial emission sources are the main causes of TSP problems.

Davis County - City of Bountiful Areas - The only TSP data taken for 1978, 1979, and 1980 was at the Bountiful site. Davis County was designated nonattainment for secondary TSP violations. The years 1978, 1979, and 1980 showed no primary level TSP violation but each year showed 6, 18, and 16 secondary level violation days respectively for 333, 334, and 337 days sampled. In 1977 one alert level and two primary level violations were noted. Davis County is also a nonattainment area for ozone because of primary level violations. Refineries in the area and motor vehicle emissions are the main causes. The meteorology and topography of the area inhibit dispersion. Mountains are on both sides of this area. Air inspection and maintenance program being implemented by Salt Lake and Davis County agencies should help reduce both the ozone and carbon monoxide problems in the county. The ozone violation day level remained relatively constant from 1977 to 1979. There have been primary violations of 8, 8 and 10 in 1977 thru 1979 respectively. The year 1980 showed only 2 primary level violations. The City of Bountiful was designated nonattainment for primary level carbon monoxide violations. Again motor vehicles appear to be the primary cause of the CO violations. The 1977 thru 1979 average of primary violation days is less than 4 per year. The year 1980 showed 3 primary violation days for 343 days sampled.

Salt Lake County - Salt Lake City Areas - TSP primary and alert level violations occurred in Salt Lake County. Part of the high concentrations were



contributed by sources at the Kennecott Copper Company. The number of primary violations have remained the same for 1978 thru 1980 (9, 9 and 11 violation days each year). This is down considerably from 33 violation days in 1977. TSP alert level violations ranged from 2 to 4 per year for this period.

Ambient air quality violation of the sulfur dioxide standard have diminished considerably since the construction of the new tall stack at the Kennecott Copper Company smelter near Magna. The primary violation days have decreased in the last four years. They were 64, 15, four and three days for 1977 thru 1980 respectively.

Salt Lake County ozone problems caused primarily by motor vehicles should be reduced with the implementation of the county-operated inspection and maintenance program. The Salt Lake Health Department monitoring site showed three and four primary level violations exceedences in 1978 and 1979. An increased amount of violations (11 violation days) occurred in 1980.

Carbon monoxide violation days for the City of Salt Lake still remain high. They have declined from 40 violation days in 1977 to 16 in 1980. However, there were still two alert level days in 1980.

Utah County - Provo Areas - One of the main causes of TSP violations in this area is the U.S. Steel plant west of Orem. Of the three TSP measuring sites located in Utah County, a drastic rise of daily TSP violations were noted in 1980. The years 1978 and 1979 had 0 and 2 primary violation days while 1980 showed 10 alert and 17 primary violation days.

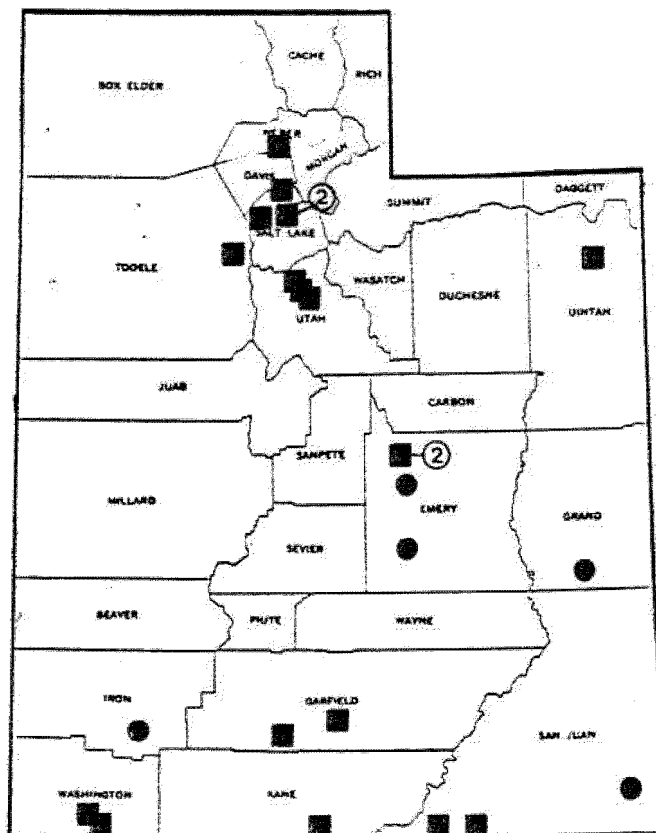
The CO site at Provo showed a rise to 17 primary violations in 1980 versus 7 and 4 in 1978 and 1979 respectively.

Weber County - Ogden Areas - The station at Ogden is the only station used to monitor TSP for Weber County. Primary level daily violations have remained approximately the same for 1977 thru 1979 with three primary and one alert level violation day being noted in 1979. No primary violations were recorded for TSP in 1980.

Motor vehicle emissions still are a major problem in Ogden. However, only 6 primary CO violations occurred in 1980. Primary daily CO violations numbered 12 and 14 in 1978 and 1979. This is down from 36 CO violation days in 1977.

Cedar City Area - Cedar City in Iron County was designated a nonattainment area for SO<sub>2</sub>. The cause for the designation was the burning of high sulfur oil for heating a building. No primary violations occurred in 1979 or 1980 because the fuel oil was changed to low sulfur type in accordance with State regulations.

Tooele County Area - The East Tooele monitoring site showed no primary level TSP violations in 1978, 1979, or 1980. The original cause of violations was the emissions from the copper smelter owned by Kennecott Copper Company. The corrective change made by Kennecott has caused this decrease in primary violations.



# UTAH MONITORING SITES

- Stations with 75% or more of maximum possible data
- Stations with less than 75% of maximum possible data

UTAH

STATIONS USED FOR TRENDS AND/OR STATUS

County	City or Location	Station Number	TSP	SO <sub>2</sub>	NO <sub>2</sub>	CO	O <sub>3</sub>	LEAD
Davis	Bountiful	460060001F01	X	X	X	X	X	
Emery	Castledale	460280004F02	X*	X*	X*			
	Green River	460280005F02	X*					
	Huntington Canyon	460280001K03						X
	Huntington #2	460280003K03						X
Garfield	Escalante	460300002K03						X
	Henrieville	460300003K03						X
Iron	Cedar City	460160002F01	X*	X*				
Kane	Glen Canyon	460400003K03						X
Salt Lake	Health Dept. (SLC)	460920001F01	X	X	X	X	X	
	Magna	460520001F02	X	X				
	State Park	460900002F02		X*				
San Juan	Navajo Mtn.	460960001K03						X
	Olsato	460960002K03						X
Tooele	East Tooele	461160001F01	X	X				
Uintah	East Vernal	461200001F01	X*	X*	X			
Utah	Lindon	461120001F01	X					
	Pleasant Grove	460760001F01	X					
	Provo	460800001F01	X		X	X*	X	
Washington	Bloomington	461280001K03						X
	George	461280002K03						X
Weber	Ogden	460680001F01	X		X	X*	X	

\*Status Only

UTAH

STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN  
75% OF MAXIMUM DAYS

County	City or Location	Station No.	TSP	SO <sub>2</sub>	NO <sub>2</sub>	LEAD
Emery	Green River	400280005F02		X		
	Castledale	460280004F02				X
Grand	Moab	460580002F01	X			
Iron	Cedar City	460160002F01		X		
San Juan	Aneth	460960003K03				X

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

UTAH

NONATTAINMENT AREAS

Nonattainment Area	Year	Total Suspended Particulates				Sulfur Dioxide				Ozone			
		Days Sampled	Geom. Mean <sup>a</sup> (ug/m <sup>3</sup> )	Viol. Days	Stas.	Days Sampled	Arith. Mean <sup>a</sup> (ug/m <sup>3</sup> )	Viol. Days	Stas.	Days Sampled	Arith. Mean <sup>a</sup> (ppm)	Actual Viol. Days	Stas.
Davis County	1977	334	61	P-2/S-25	1					364	.025	P-8	1
	1978	333	52	P-0/S-6	1					364	.029	A-1/P-8	1
	1979	334	61	P-0/S-18	1					358	.030	P-10	1
	1980	337	57	P-0/S-16	1					248	.014	P-2	1
Salt Lake County	1977	365	86	A-3/P-33	8	361	165	A-17/P-64	5	355	.020	P-0	1
	1978	363	74	A-4/P-9	4	261	56	A-2/P-15	2	179	.015	P-3	1
	1979	364	79	A-2/P-9	3	263	54	P-4	2	362	.025	P-4	1
	1980	363	71	A-4/P-11	2	364	51	P-3	4	354	.017	P-11	1
Utah County	1977	365	78	A-4/P-19	6								
	1978	356	73	P-0	3								
	1979	356	78	P-2	2								
	1980	365	70	A-10/P-17	3								
Weber County	1977	350	77	A-1/P-3	2								
	1978	301	75	P-1	2								
	1979	350	85	A-1/P-3	1								
	1980	347	68	P-0	1								

<sup>a</sup> Average of the geometric or arithmetic means for all stations

A = Alert Violation Days

P = Primary Standard Violation Days

S = Secondary Standard Violation Days

AIR QUALITY TRENDS (Contd)  
BASED ON STANDARD VIOLATIONS

UTAH

NONATTAINMENT AREAS

Nonattainment Area	Year	Total Suspended Particulates				Sulfur Dioxide				Ozone			
		Days Sampled	Geom. Mean $\bar{g}$ ( $\mu\text{g}/\text{m}^3$ )	Viol. Days	Stas.	Days Sampled	Arith. Mean $\bar{a}$ ( $\mu\text{g}/\text{m}^3$ )	Viol. Days	Stas.	Days Sampled	Arith. Mean $\bar{g}$ (ppm)	Actual Viol. Days	Stas.
Cedar City	1977					272	74	P-11	1				
	1978					334	72	P-7	1				
	1979					334	21	P-0	2				
	1980					239	7	P-0	1				
Tooele County	1977					306	54	P-7	1				
	1978					305	28	P-0	1				
	1979					231	27	P-0	1				
	1980					274	12	P-0	1				

$\bar{g}$  Average of the geometric or arithmetic means for all stations

A = Alert Violation Days

P = Primary Standard Violation Days

S = Secondary Standard Violation Days

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

UTAH

NONATTAINMENT AREAS

<u>Nonattainment Area</u>	<u>Year</u>	<u>Days Sampled</u>	<u>Carbon Monoxide</u>		
			<u>Average Arithmetic Mean of Stations (Mg/m<sup>3</sup>)</u>	<u>Violation Days</u>	<u>No. of Stations</u>
City of Bountiful	1977	228	2.1	P-7	1
	1978	334	1.4	P-0	1
	1979	334	1.4	P-4	1
	1980	343	1.5	P-3	1
City of Ogden	1977	341	3.0	A-3/P-36	1
	1978	349	2.1	P-12	1
	1979	337	2.2	P-14	1
	1980	245	2.0	P-6	1
City of Provo	1977	365	3.5	P-23	1
	1978	277	2.6	P-7	1
	1979	212	2.5	P-4	1
	1980	201	3.5	A-1/P-17	1
Salt Lake City	1977	359	1.6	A-3/P-40	1
	1978	352	1.8	P-18	1
	1979	364	1.7	A-3/P-18	1
	1980	361	4.4	A-2/P-16	2

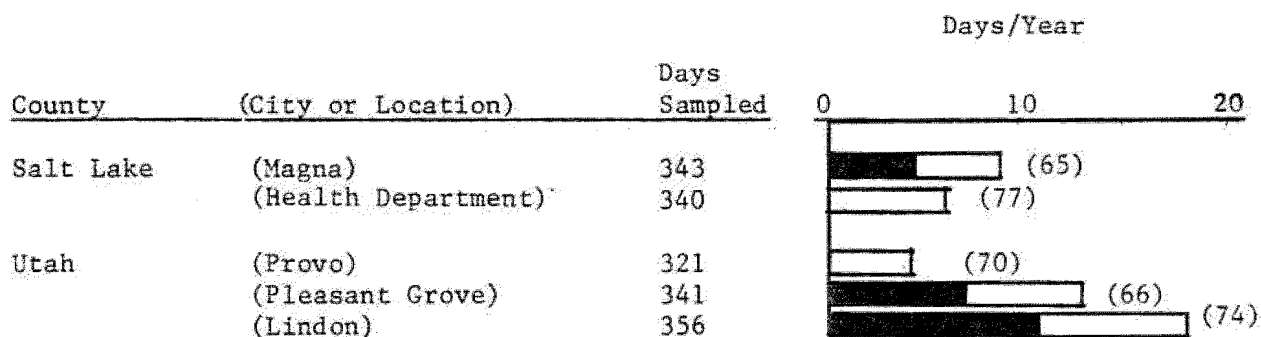
A - Alert Violation Days  
P - Primary Standard Violation Days



NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS  
EXCEEDED IN 1979

UTAH

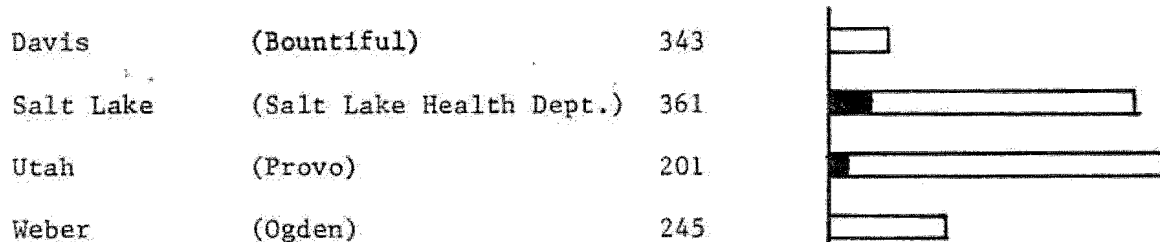
TOTAL SUSPENDED PARTICULATES



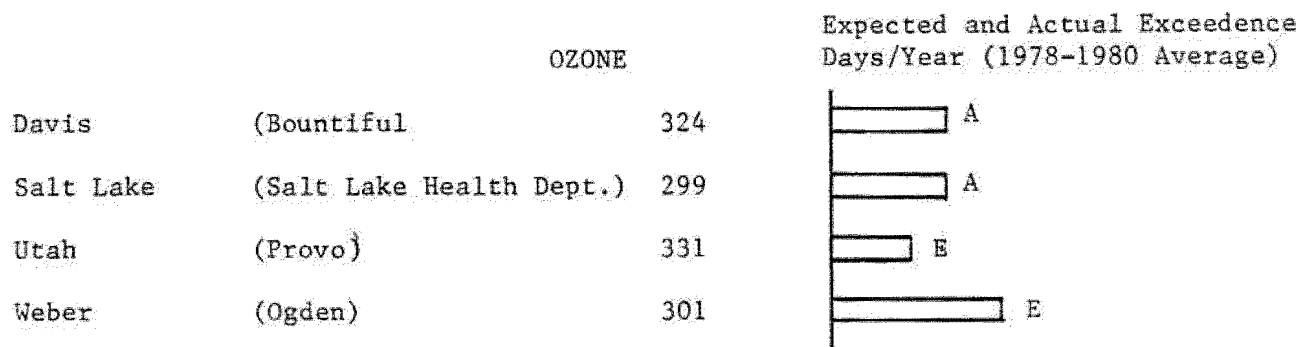
SULFUR DIOXIDE



CARBON MONOXIDE



OZONE



[White Box] Primary level exceeded

[Black Box] Alert level exceeded

( ) Annual Geometric Mean  $\mu\text{g}/\text{m}^3$

# STATUS AND TRENDS IN AIR QUALITY

## UTAH

County	TSP	SO <sub>2</sub>	NO <sub>2</sub>	CO	O <sub>3</sub>	LEAD
Davis						
Emery						
Garfield						
Grand						
Iron						
Kane						
Salt Lake						
San Juan						
Tooele						
Uintah						
Utah						
Washington						
Weber						



No evidence standard exceeded



Exceeds primary standard



Exceeds alert level



Improvement



No apparent trend

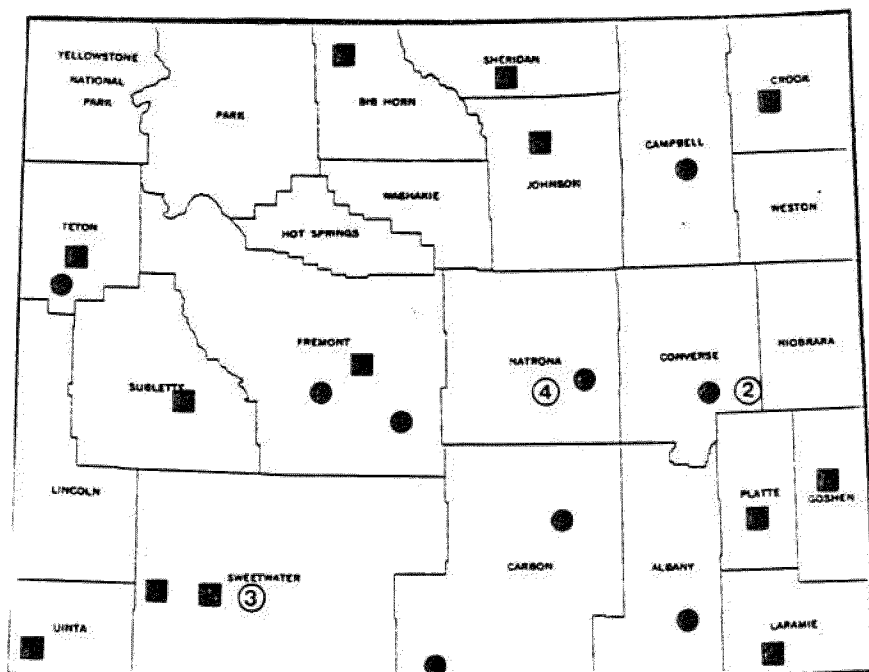


Deterioration

## Wyoming Air Quality

The only current air pollution monitoring in the State of Wyoming is for total suspended particulates and sulfur dioxide. The nonattainment area for TSP in the Trona industrial area (about 28 miles WSW of the City of Rock Springs) showed no primary level violations in 1980. Three stations at Rock Springs had 18 primary level violations and 1 alert level violation for TSP in 1980. Lander (Fremont County) showed 3 primary daily TSP violations and a yearly mean standard violation in 1980. Five counties sampled for  $\text{SO}_2$  with an average arithmetic mean of  $3 \text{ Mg/m}^3$ .

Trona Industrial Area - A nonattainment area for primary TSP violations was designated for an area 10-miles square at the location mentioned above. No primary level violations were shown for 1977 thru 1980 at the Granger station. An average of 56 days were sampled during each of these four years.



## WYOMING MONITORING SITES

- Stations with 75% or more of maximum possible data
- Stations with less than 75% of maximum possible data

# WYOMING

## STATIONS USED FOR TRENDS AND/OR STATUS

<u>County</u>	<u>City or Location</u>	<u>Station Number</u>	<u>TSP</u>	<u>O<sub>x</sub></u>
Albany	Laramie	520400005F01	X*	
Big Horn	Lovell	520040001F01	X*	
Campbell	Gillette	520280002F01	X*	
Carbon	Savery	52010004F03	X*	
	Hanna	52010005F02	X*	
Converse	Douglas	520220002F02	X*	
	Douglas	520180006F03		X*
Crook	Devils Tower	520200002F03	X	
Fremont	Riverton	520600001F01	X	
Lander		520380001F01	X*	
Goshen	Lingle	520300003F03	X	
Johnson	Southwest of Buffalo	520360001F03	X	
Laramie	Cheyenne	520140001F01	X	
Natrona	Casper	520120003F01	X*	
	Casper	520120004F01	X*	
Platte	Wheatland	520830001F01	X	
Sheridan	Sheridan	520660002F03	X	
Sublette	Boulder	520680001F03	X	
Sweetwater	Rock Springs	520620001F01	X	
	Rock Springs	520620003F01	X	
	Rock Springs	520620004F01	X*	
	Grander	520680001F03	X	
Teton	Kelly	520720001F03	X	
Uinta	Evanston	520240001F01	X	

\*Status Only

# WYOMING

## STATIONS NOT USED FOR STATUS AND/OR TRENDS - LESS THAN 75% OF MAXIMUM DAYS

County	City or Location	Station Number	TSP
Fremont	Jefferson	520260002FO2	X
Natrona	Casper	520120001F09	X
Teton	Jackson	520720002FO1	X

AIR QUALITY TRENDS  
BASED ON STANDARD VIOLATIONS

WYOMING

NONATTAINMENT AREAS

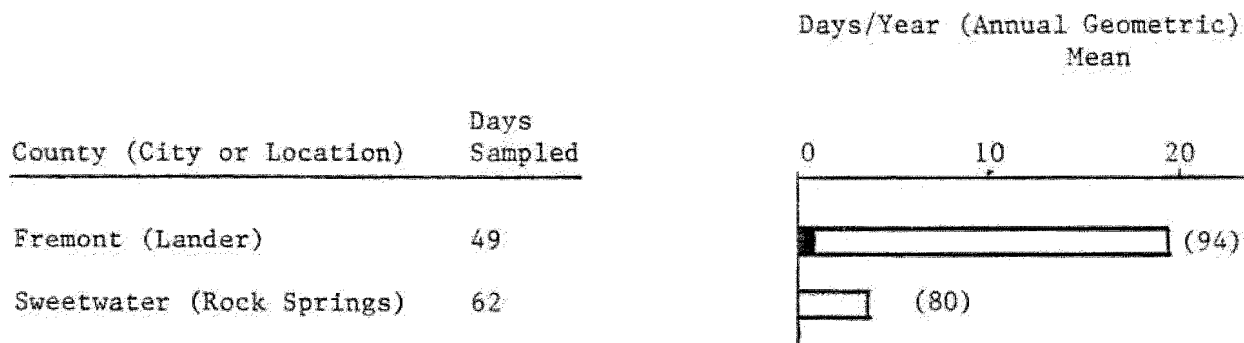
Nonattainment Area	Year	Arithmetic Mean <sup>a</sup> (ug/m <sup>3</sup> )	Total Suspended Particulates		
			Days Sampled	Violation Days	No. of Stations
Trona Industrial Area	1977	32	58	P-0	1
	1978	29	55	P-0	1
	1979	44	55	P-0	1
	1980	44	55	P-0	1

<sup>a</sup>/ Average of the Geometric or Arithmetic Means for all Stations  
<sup>A</sup> = Alert Violation Days  
<sup>p</sup> = Primary Standard Violation Days

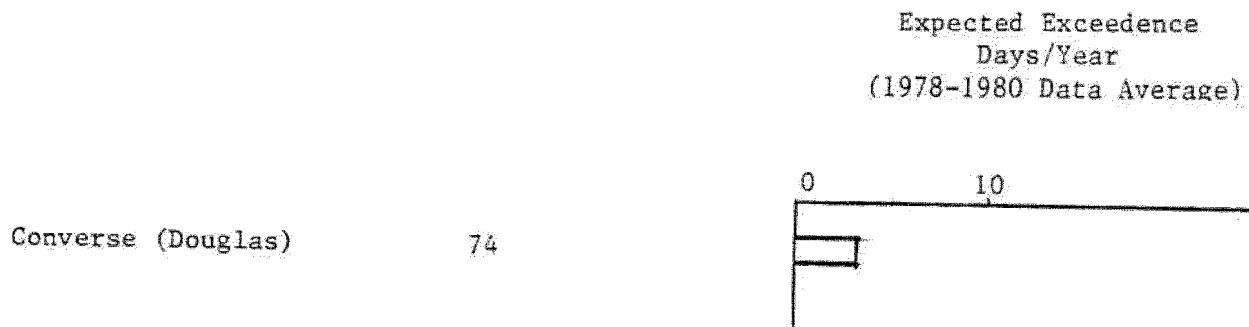
NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS  
EXCEEDED IN 1980



WYOMING

TOTAL SUSPENDED PARTICULATES



OZONE




















 Primary Level Exceeded  
 Alert Level Exceeded



# STATUS AND TRENDS IN AIR QUALITY

## WYOMING

<u>County</u>	<u>TSP</u>	<u>OZONE</u>	<u>County</u>	<u>TSP</u>	<u>OZONE</u>
Albany			Laramie		
Big Horn			Natrona		
Campbell			Platte		
Converse			Sheridan		
Crook			Sublette		
Fremont			Sweetwater		
Goshen			Teton		
Johnson			Uinta		



No evidence standard exceeded



Exceeds primary standard



Exceeds alert level



Improvement



No apparent trend or insufficient data to determine trend



Deterioration

APPENDIX A  
National Ambient Air Quality Standards

# NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Time period/standard	Maximum permissible concentration
Suspended particulate matter	Annual, secondary	60 $\mu\text{g}/\text{m}^3$
(Total suspended particulates)	Annual, primary <sup>a</sup>	75 $\mu\text{g}/\text{m}^3$
(TSP)	24-hour, secondary <sup>b</sup>	150 $\mu\text{g}/\text{m}^3$ <sup>c</sup>
	24-hour, primary	260 $\mu\text{g}/\text{m}^3$ <sup>c</sup>
Sulfur dioxide	Annual, primary	80 $\mu\text{g}/\text{m}^3$
(SO <sub>2</sub> )	24-hour, primary	365 $\mu\text{g}/\text{m}^3$ <sup>c</sup>
	3-hr, secondary	1300 $\mu\text{g}/\text{m}^3$ <sup>c</sup>
Carbon monoxide	1-hr, primary	40 $\text{mg}/\text{m}^3$ <sup>c</sup>
(CO)	8-hr, primary	10 $\text{mg}/\text{m}^3$ <sup>c</sup>
Oxidants/ozone	1-hr, primary	235 $\mu\text{g}/\text{m}^3$ <sup>c</sup>
(O <sub>x</sub> + O <sub>2</sub> or O <sub>3</sub> )		
Nitrogen dioxide	Annual, primary	100 $\mu\text{g}/\text{m}^3$
(NO <sub>2</sub> )		
Lead	Quarterly, primary	1.5 $\mu\text{g}/\text{m}^3$

<sup>a</sup>Primary: to protect public health.

<sup>b</sup>Secondary: to protect public welfare.

<sup>c</sup>These values are not to be exceeded more than once per year.

APPENDIX B  
Breakpoints For Pollutant  
Standards Index  
(Includes Alert Level For Each Pollutant)

# Breakpoints for PSI ( ) in Metric Units

Breakpoints	PSI Value ( )	TSP ug/m <sup>3</sup> 24-hr.	SO <sub>2</sub> ug/m <sup>3</sup> 24-hr.	TSPxSO <sub>2</sub> (ug/m <sup>3</sup> ) <sup>2</sup>	CO mg/m <sup>3</sup> 8 hours	O <sub>3</sub> ug/m <sup>3</sup> 1-hr.	NO <sub>2</sub> ug/m <sup>3</sup> 1-hr.
50% of primary short-term NAAQS	50	75 <sup>a</sup>	80 <sup>a</sup>	b	5.0	118	b
Primary short-term NAAQS	100	260	365	b	10.0	235	b
Alert Level	200	375	800	65x10 <sup>3</sup>	17.0	400	1130
Warning Level	300	625	1600	261x10 <sup>3</sup>	34.0	800	2260
Emergency Level	400	875	2100	393x10 <sup>3</sup>	46.0	1000	3000
Significant Harm Level	500	1000	2620	490x10 <sup>3</sup>	57.5	1200	3750

<sup>a</sup>Annual primary NAAQS.

<sup>b</sup>No index value reported at concentration levels below those specified by the Alert Level Criteria.

## APPENDIX C

### Procedures Used To Determine Status

PROCEDURES USED TO DETERMINE STATUS  
TOTAL SUSPENDED PARTICULATES

County Status

1. Select worst site in each county based on:
  - Number of days per year with a concentration of greater than 260  $\text{ug/m}^3$
  - Data available in 1980 (must have greater than 75% of maximum possible data)
  - Population exposure of site. Should be representative populated area
2. For the selected site the number of days with a concentration value greater than 260  $\text{ug/m}^3$  for 1980
3. For same site, number of days with a concentration value greater than 375  $\text{ug/m}^3$  for 1980

Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
  - Any site with a daily concentration value greater than 260  $\text{ug/m}^3$  in the county
  - Any site with a daily concentration value greater than 375  $\text{ug/m}^3$  in the county
  - Compare violation days at all sites to total days sampled at all sites for the year

## NITROGEN DIOXIDE

### County Status

1. Select worst site in each county based on:
  - Highest annual average
  - Data available in 1980
2. Determine whether annual average concentration is greater than  $100 \text{ ug/m}^3$ 
  - Actual data are used
  - Years without valid annual average are disregarded

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
  - Any site with an annual average concentration greater than  $100 \text{ ug/m}^3$
2. Compare the sites with yearly average concentration values of  $100 \text{ ug/m}^3$  to the total number of sites sampled for the year



## SULFUR DIOXIDE

### County Status

1. Select site in each county based on:
  - Population exposure. Must be in area where people are present
  - Representativeness within county
  - Number of days for 1980 greater than 24-hour average concentration of  $365 \text{ ug/m}^3$
  - Data available in 1980
2. For the selected site, number of days in 1980 greater than primary 24-hour standard for the year
  - Actual data used
  - Continuous data preferred over noncontinuous
3. For same site count number of days per year with at least one concentration value greater than  $730 \text{ ug/m}^3$ 
  - Actual data used

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
  - Any site with a 24-hour concentration greater than  $365 \text{ ug/m}^3$  in the county
  - Any site with a 24-hour concentration greater than  $730 \text{ ug/m}^3$  in the county
2. Compare violation days at all sites to the total days sampled at all sites for the year

## OZONE

### County Status

1. Select worst site in county based on:
  - Number of days with a 1-hour concentration greater than  $235 \text{ ug/m}^3$
  - Data available for at least one year (1978-1980)  
during the months April through September
2. For selected site, count the number of days per year  
1978-1980, with at least one hourly concentration value greater than  
 $235 \text{ ug/m}^3$ 
  - For periods with no data, estimate by examining data  
from nearby sites and for the same site during same  
period of other years
  - Data are insufficient if unavailable during the peak  
ozone season (April-September)
3. For same site, count number of days with at least 1-hour concentration  
value greater than  $400 \text{ ug/m}^3$ 
  - Actual number is always used

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
  - Any site with a day having a 1-hour concentration  
of greater than  $235 \text{ ug/m}^3$
  - Any site with a day having 1-hour concentration of  
greater than  $400 \text{ ug/m}^3$
2. Compare violation days at all sites to total days sampled  
at all sites for the year

## CARBON MONOXIDE

### County Status

1. Select worst site in each county based on:
  - Number of days greater than  $10 \text{ mg/m}^3$  8-hour average concentration
  - Data available for 1980
2. For selected site, count the number of days in 1980 with at least one 8-hour average concentration greater than  $10 \text{ mg/m}^3$ 
  - For periods with no data estimate by examining data for same site for same period of other years and by looking at data for other nearby sites
3. For same site count number of days with at least one 8-hour average concentration value greater than  $17 \text{ mg/m}^3$ 
  - Actual number always used

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
  - Any site with a day having an 8-hour concentration greater than  $10 \text{ mg/m}^3$
  - Any site with a day having an 8-hour concentration greater than  $17 \text{ mg/m}^3$
2. Compare violation days at all sites to total days sampled at all sites for the year

## LEAD

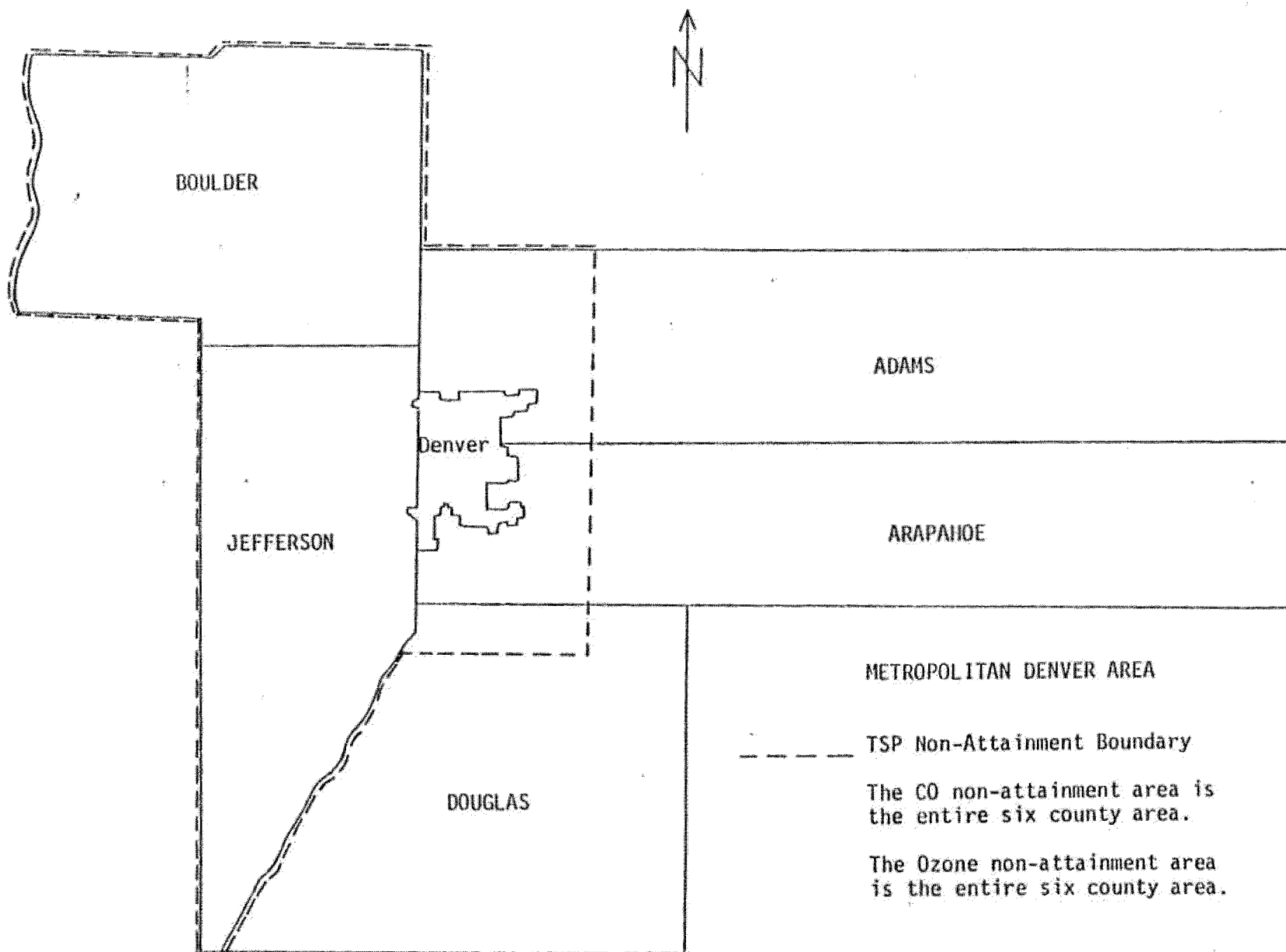
### County Status

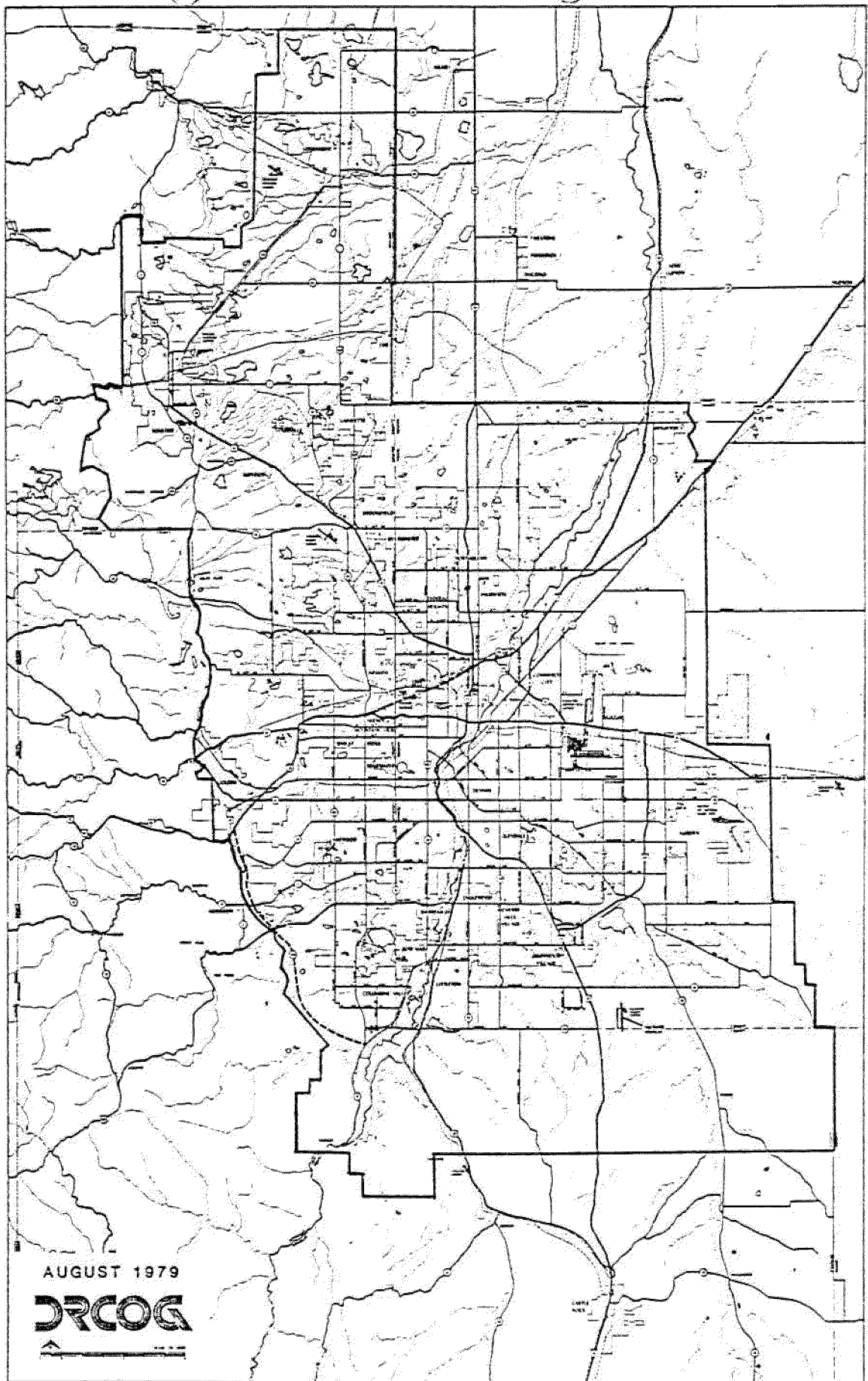
1. Select the worst site in each county based on:
  - Quarterly average concentration periods greater than  $1.5 \text{ ug/m}^3$
  - Data available in 1980
2. For selected site, count number of quarters in 1980 with quarterly concentration value greater than  $1.5 \text{ ug/m}^3$

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
  - Any site with a quarterly average concentration greater than  $1.5 \text{ ug/m}^3$
2. Compare violation quarters at all sites to total quarters sampled at all sites for the year

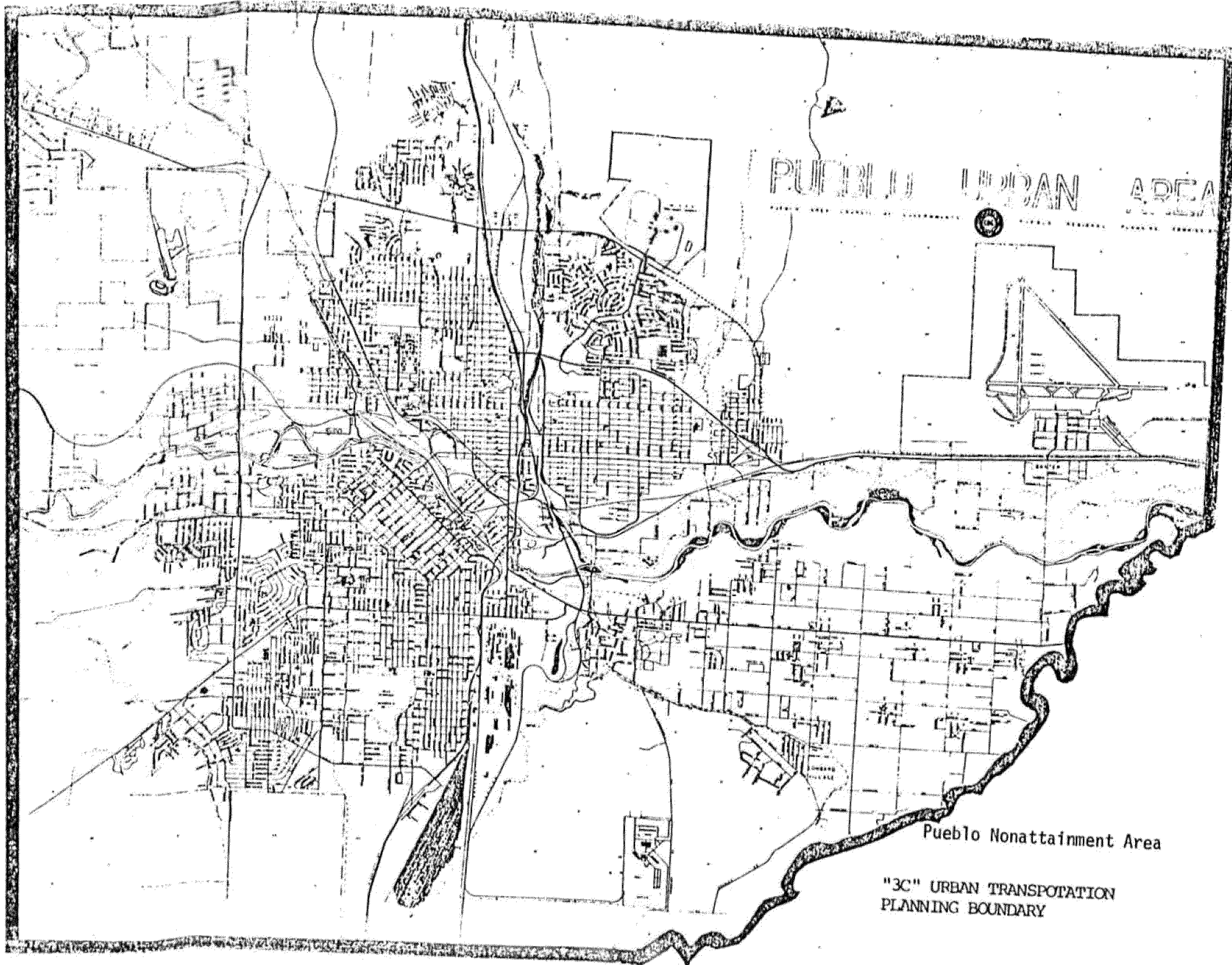
APPENDIX D  
Nonattainment Area Maps



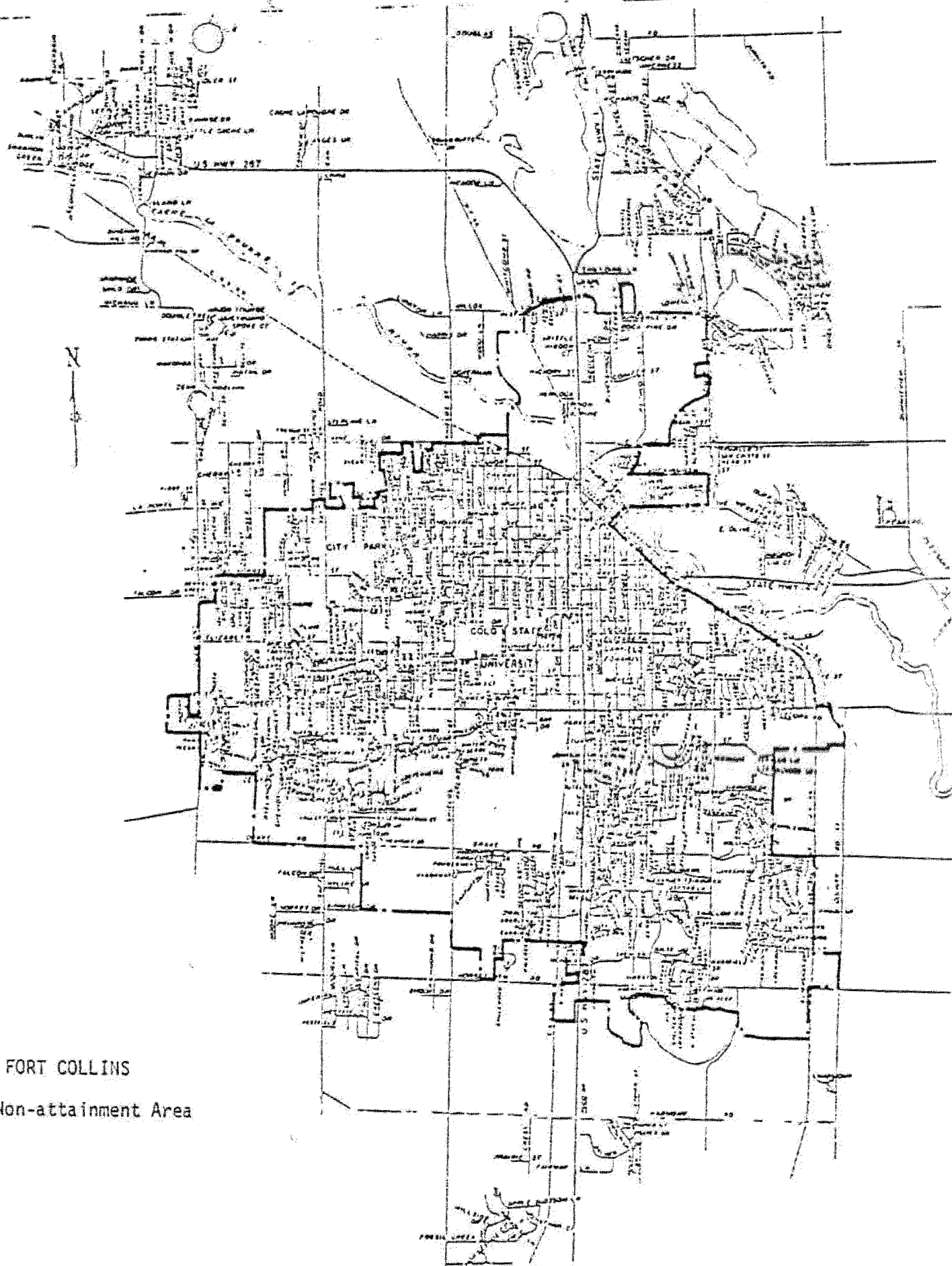


DENVER 3-C  
TRANSPORTATION PLANNING AREA

NO<sub>2</sub> Non-attainment Area



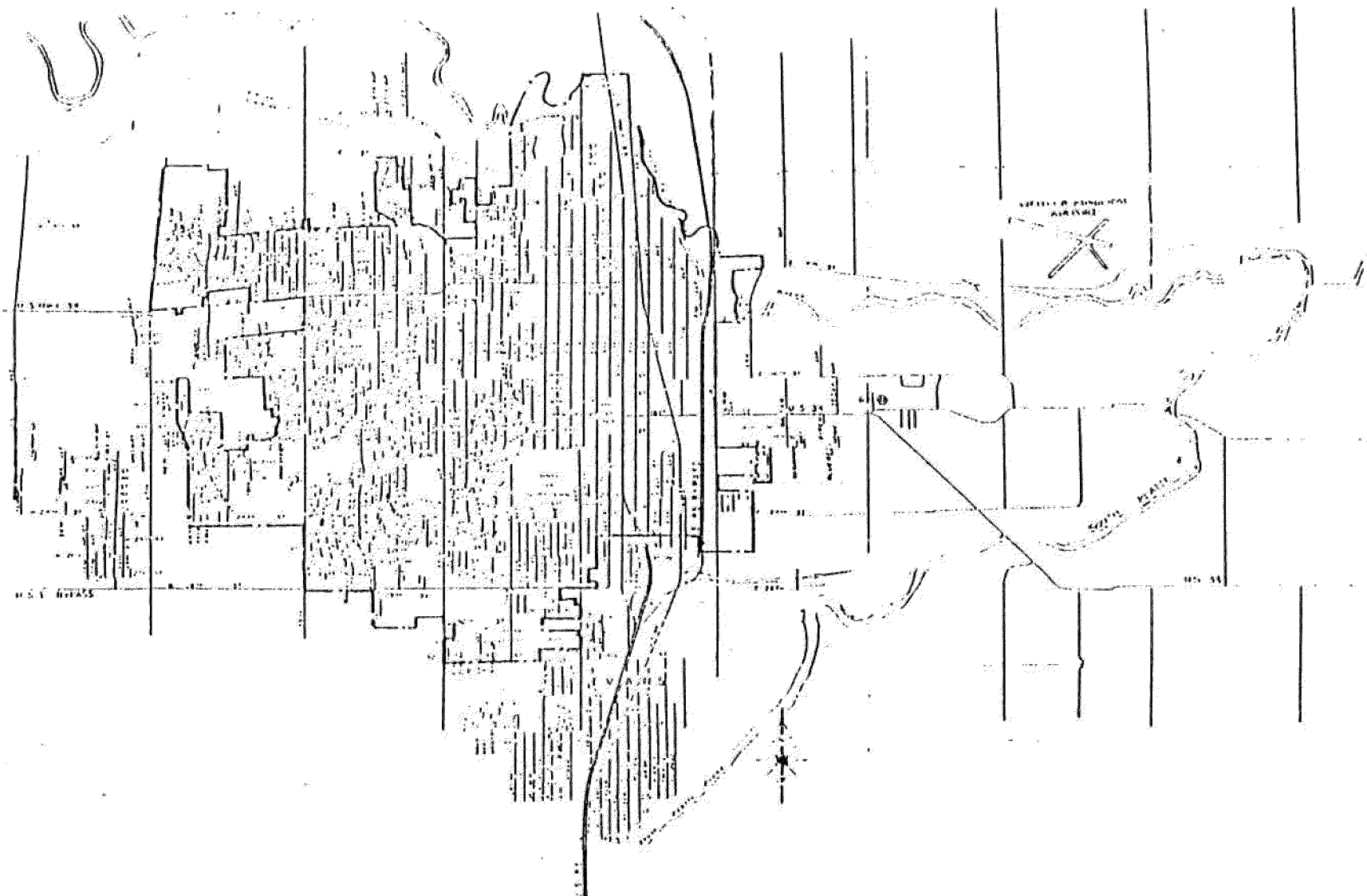




FORT COLLINS

TSP Non-attainment Area





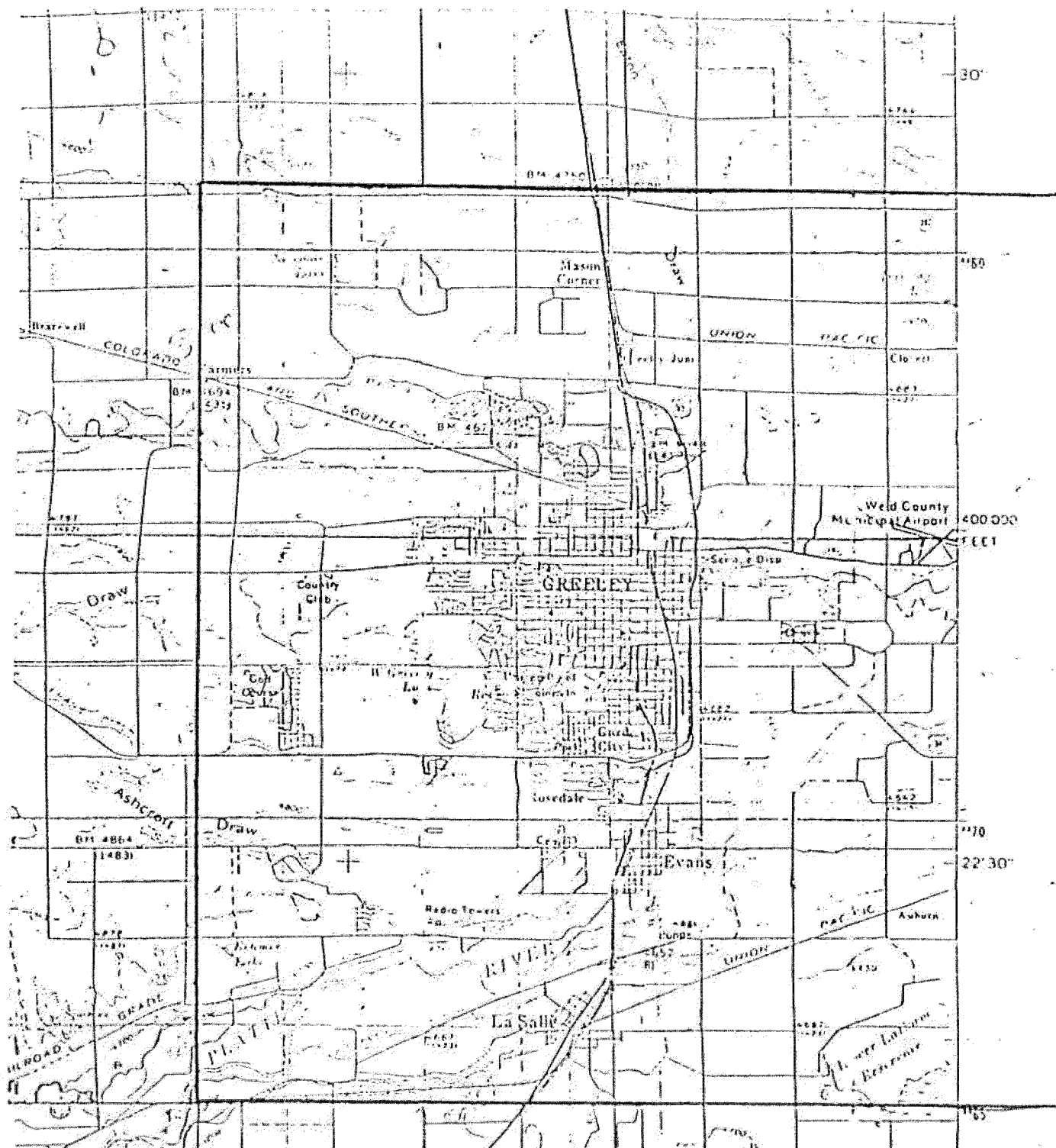
## GREELEY

TSP Non-attainment Area

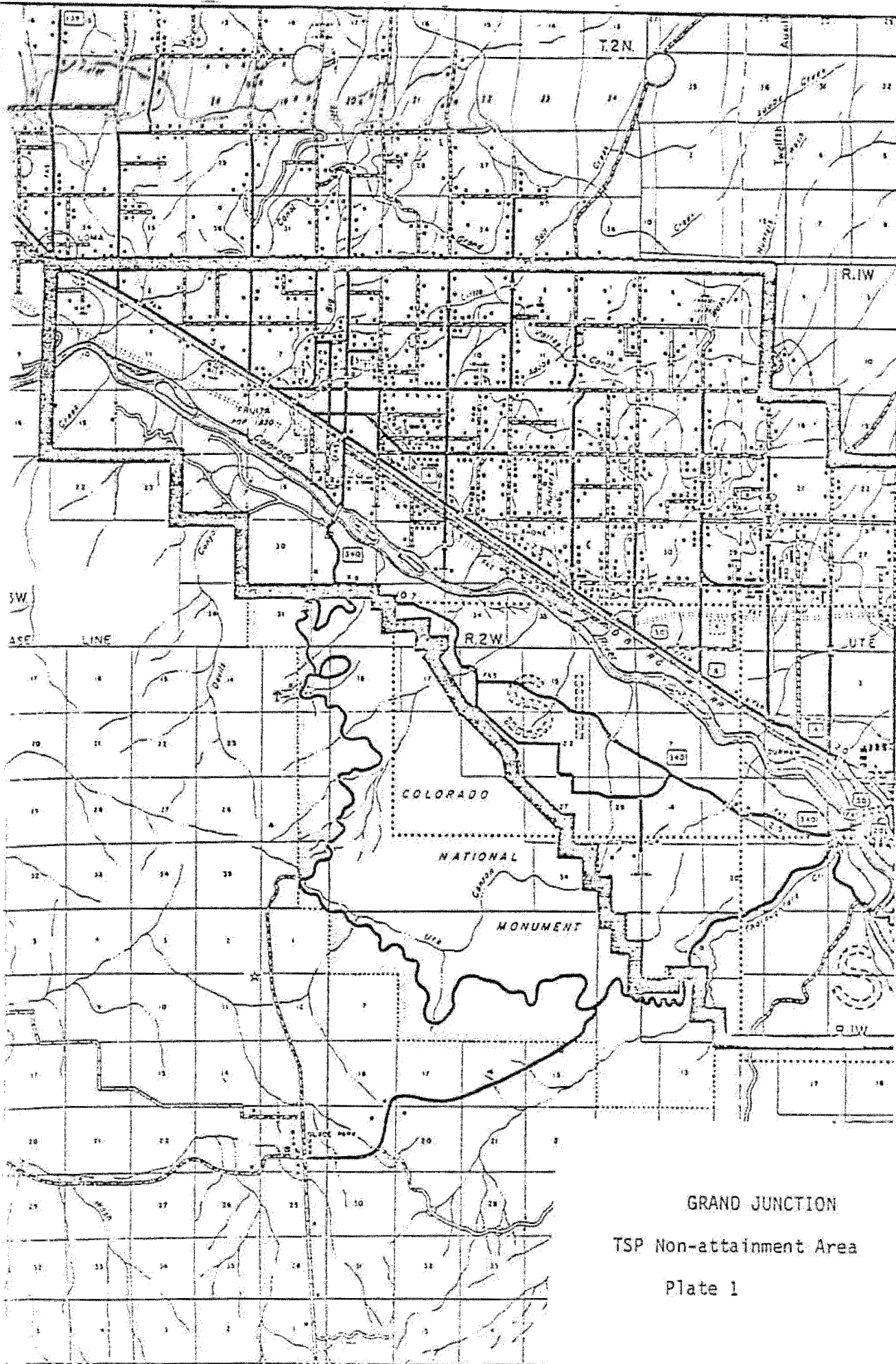
# GREELEY

CO Non-attainment Area

101

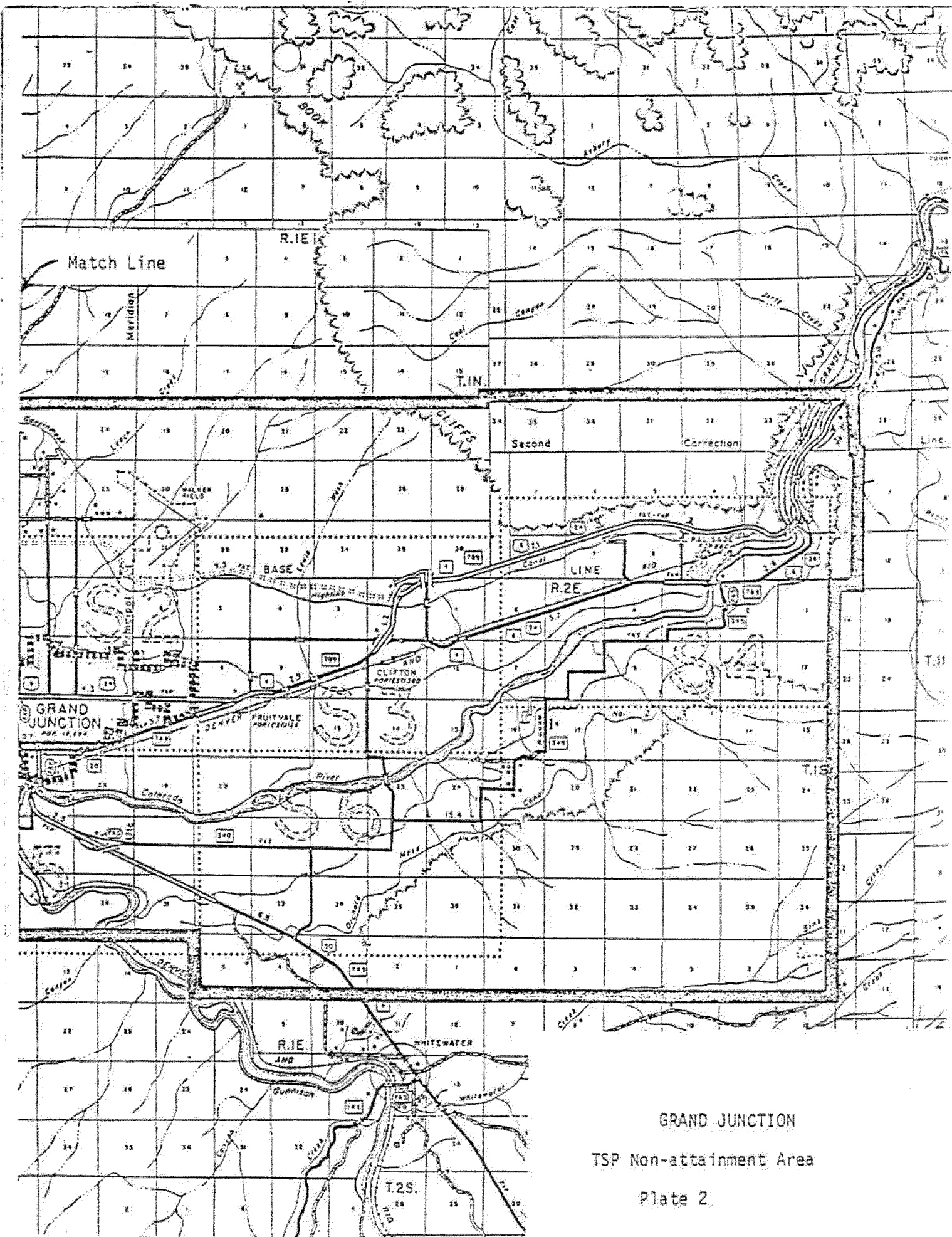


COLORADO SPRINGS  
CO and TSP  
Non-attainment Area

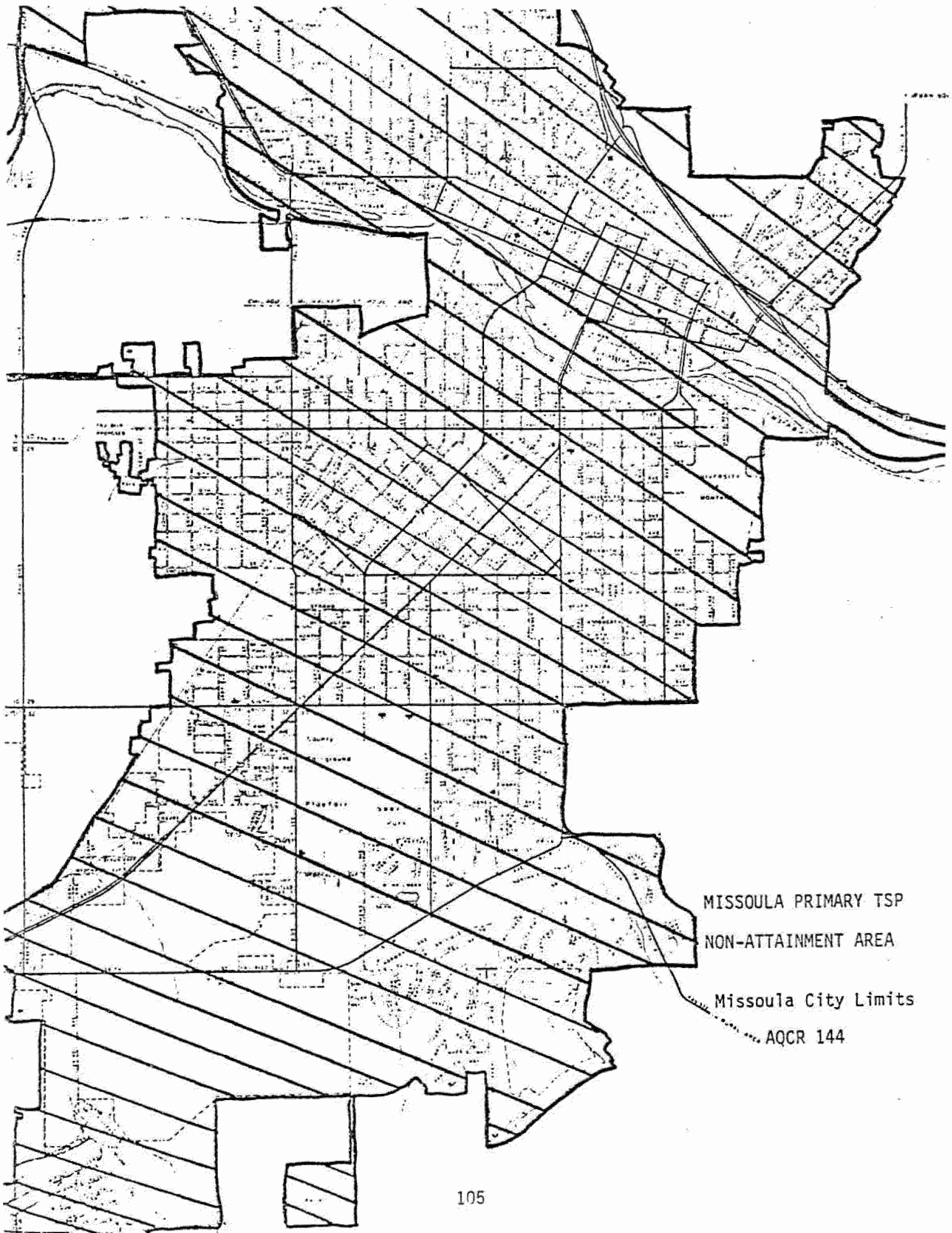


GRAND JUNCTION  
TSP Non-attainment Area  
Plate 1

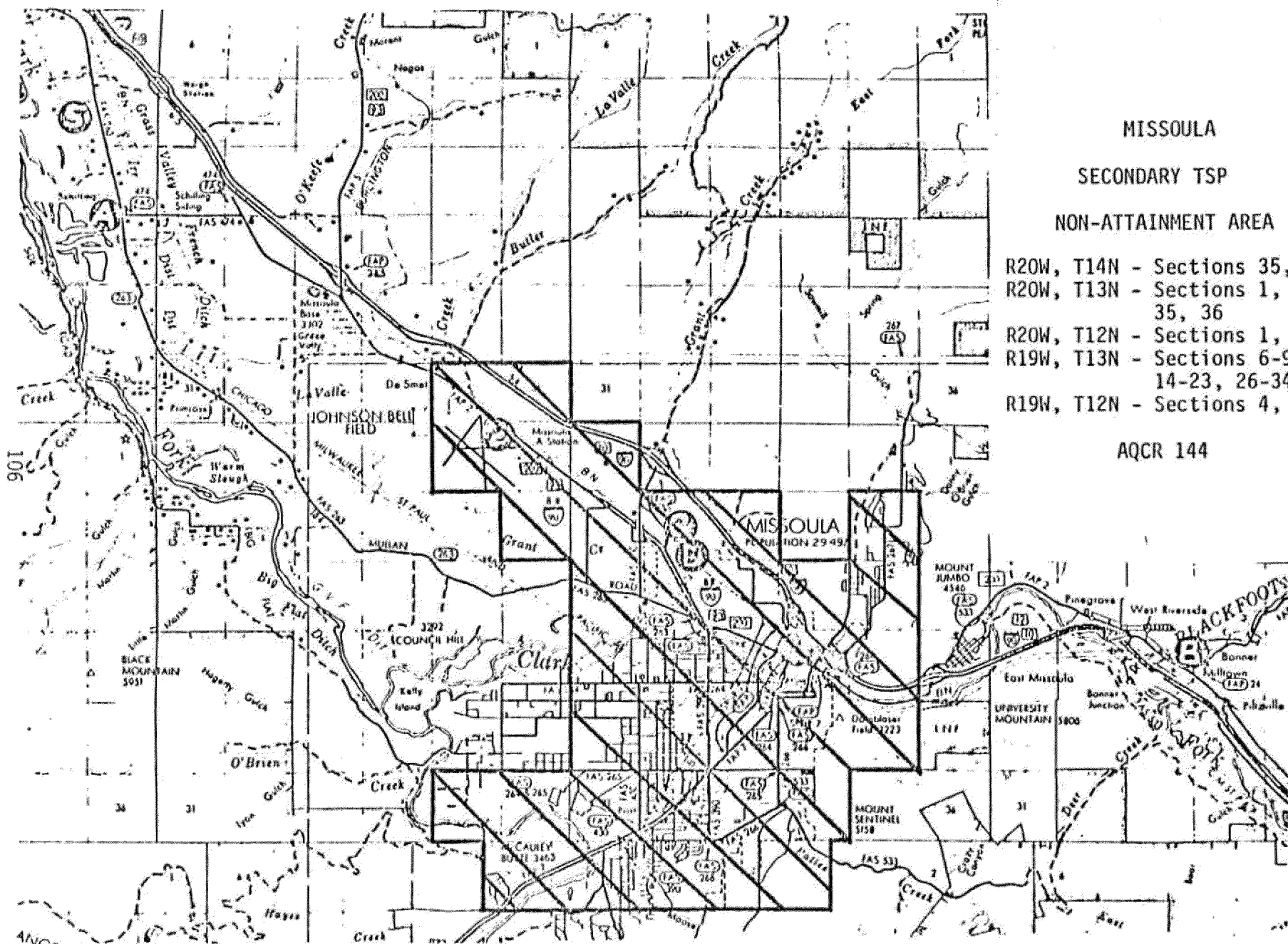




GRAND JUNCTION  
TSP Non-attainment Area  
Plate 2







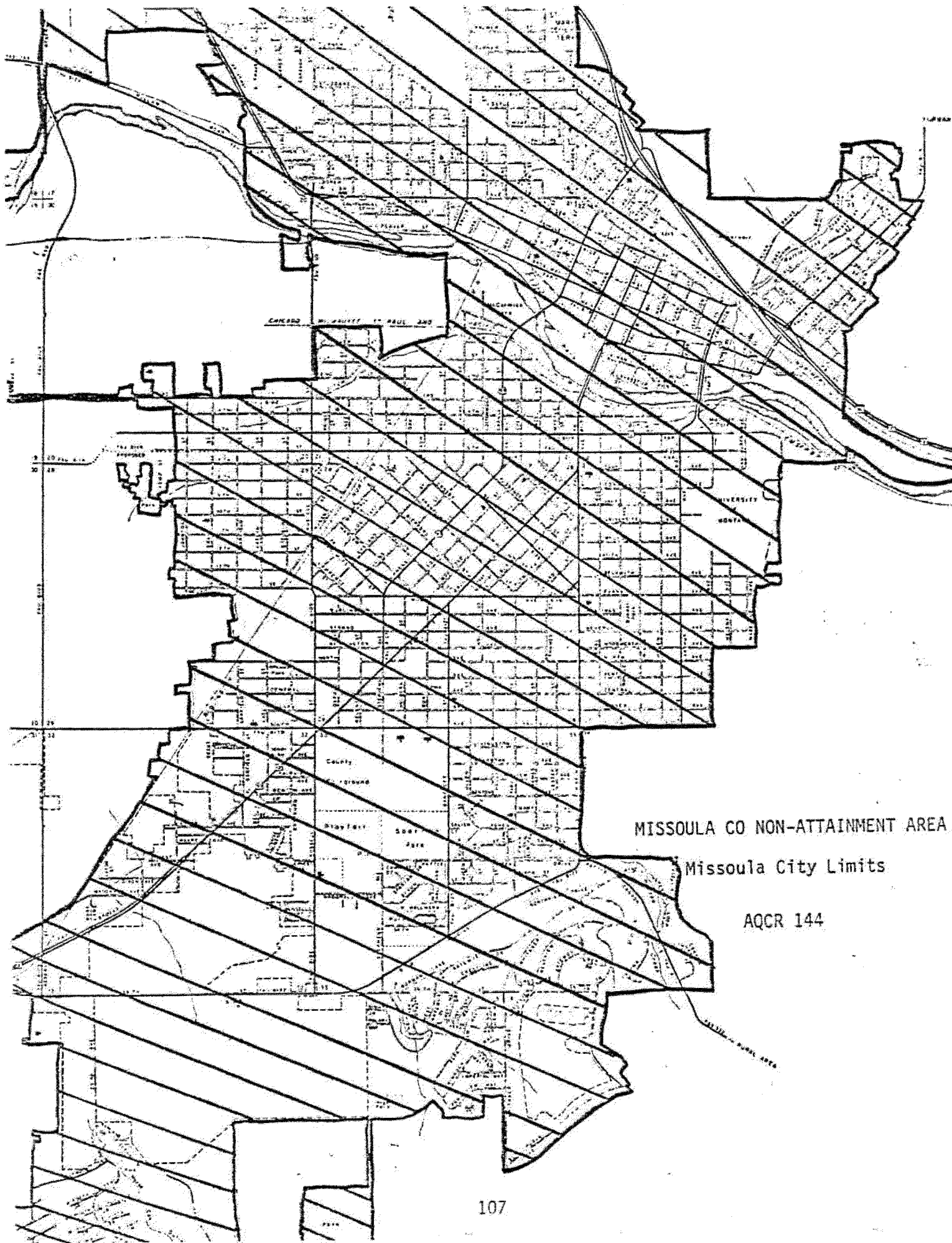
# MISSOULA

## SECONDARY TSP

### NON-ATTAINMENT AREA

- R20W, T14N - Sections 35, 36
- R20W, T13N - Sections 1, 2, 12, 35, 36
- R20W, T12N - Sections 1, 2
- R19W, T13N - Sections 6-9, 11, 14-23, 26-34
- R19W, T12N - Sections 4, 5, 6

AQCR 144



# COLUMBIA FALLS

TSP NON-ATTAINMENT AREA

CITY LIMITS OF COLUMBIA FALLS

AQCR 144

## LEGEND

- PROPOSED ROAD
- GRAVEL AND GRAINED ROAD
- GRAVEL OR STONE ROAD
- LOW TYPE BITUMINOUS ROAD
- PAVED ROAD
- DIVIDED ROAD - TRAFFIC FLOW
- FAT1 FEDERAL AID INTERSTATE SYSTEM
- FAP FEDERAL AID PRIMARY SYSTEM
- FAS FEDERAL AID SECONDARY SYSTEM
- INTERSTATE ROUTE MARKER
- U.S. NUMBERED ROUTE MARKER
- STATE ROUTE MARKER
- OTHER ROUTE MARKER
- CORPORATE BOUNDARY LINE
- NON-EXISTENT DEDICATED STREET
- CENTRAL BUSINESS DISTRICT
- URBAN EXTENSION BOUNDARY
- RAILROAD AND STATION
- POST OFFICE
- COURT HOUSE
- ELEMENTARY SCHOOL
- HIGH SCHOOL
- HOSPITAL
- X 8888 ELEVATION



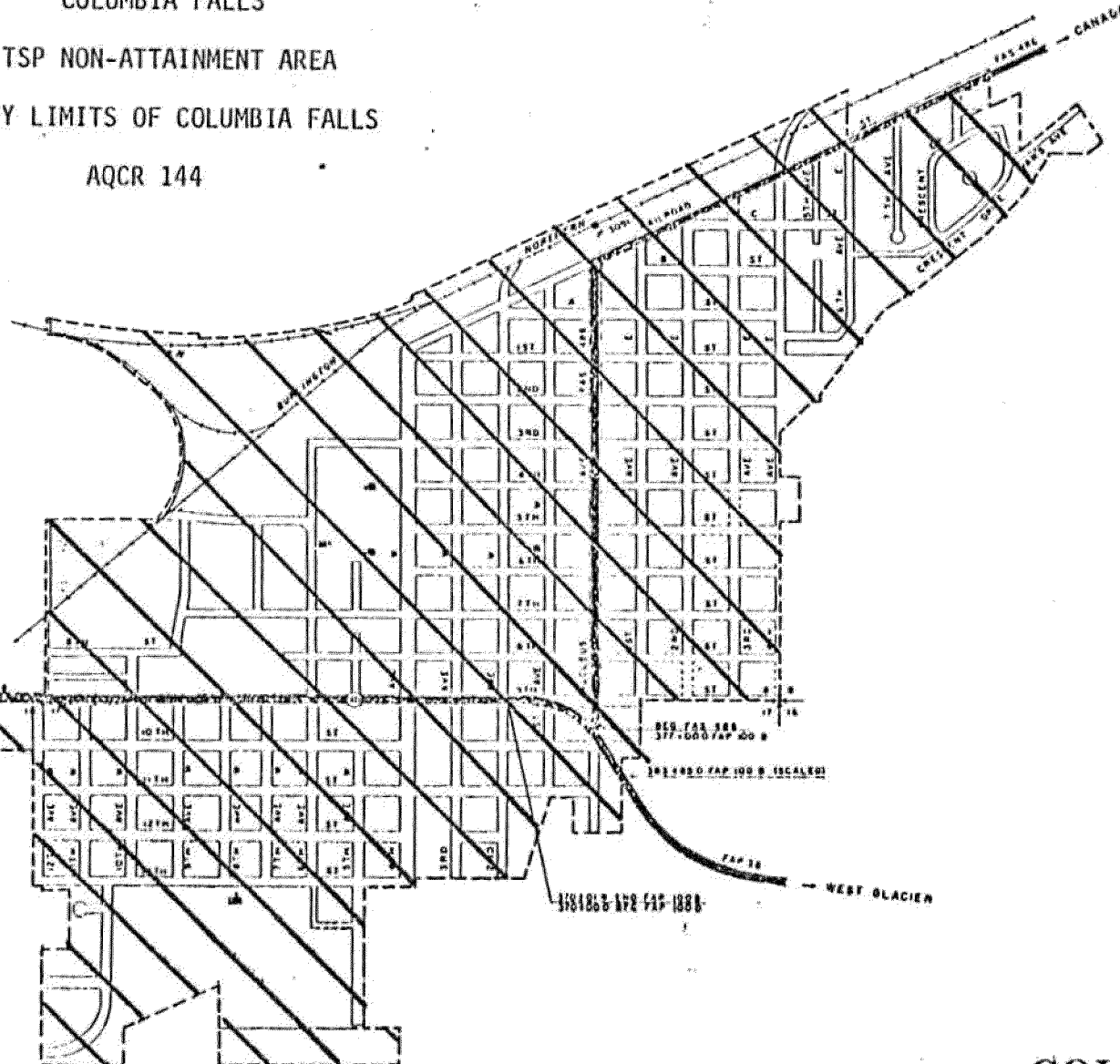
CITY PLAT  
COLUMBIA FALLS  
FLATHEAD COUNTY  
MONTANA

1970 CENSUS 2,652

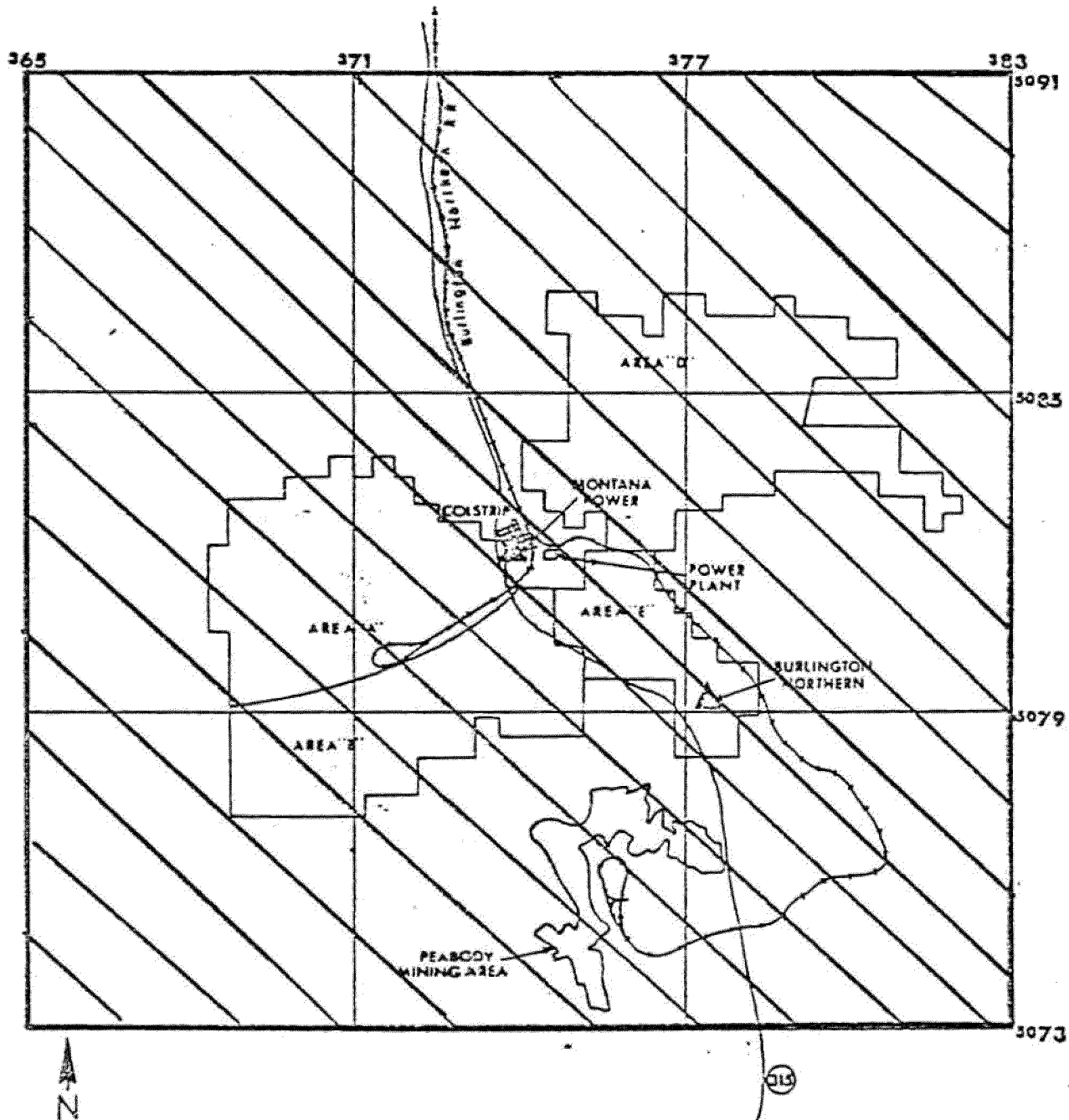
SCALE IN FEET

0 400 800 1200

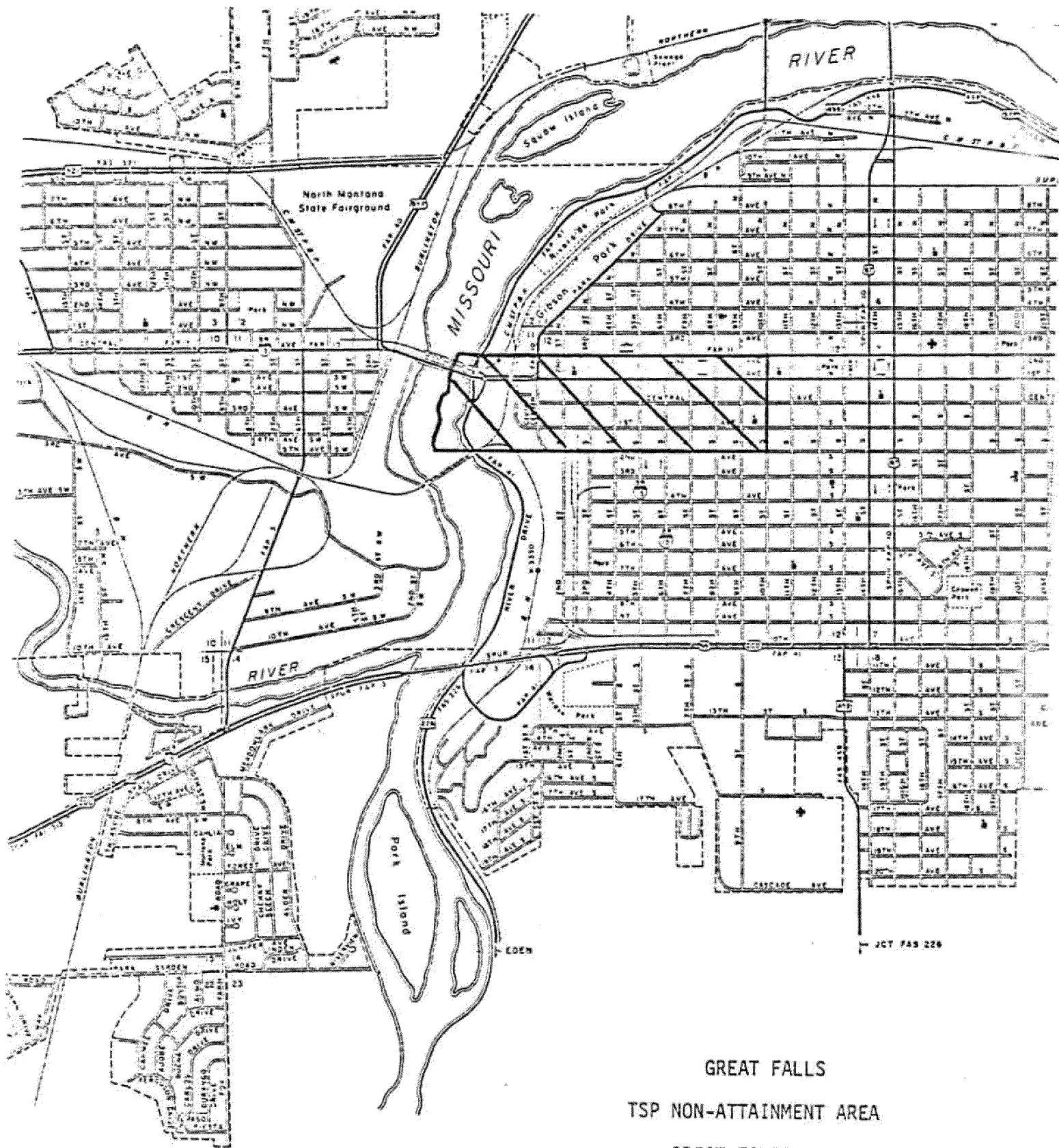
REVISED DEC. 31, 1971



COLSTRIP  
TSP NON-ATTAINMENT AREA  
AQCR 143

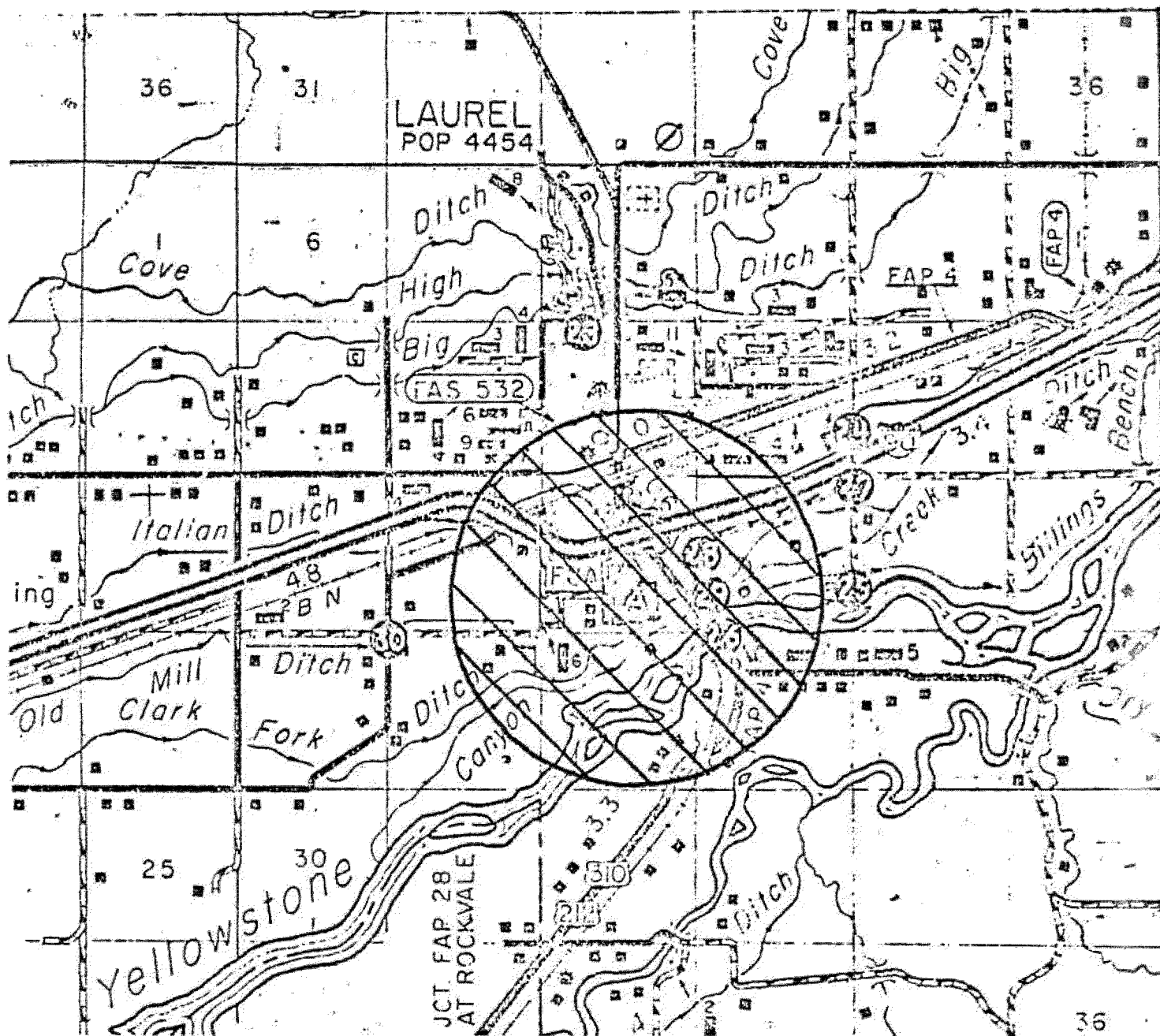


Boundaries - VTM coordinates as indicated.







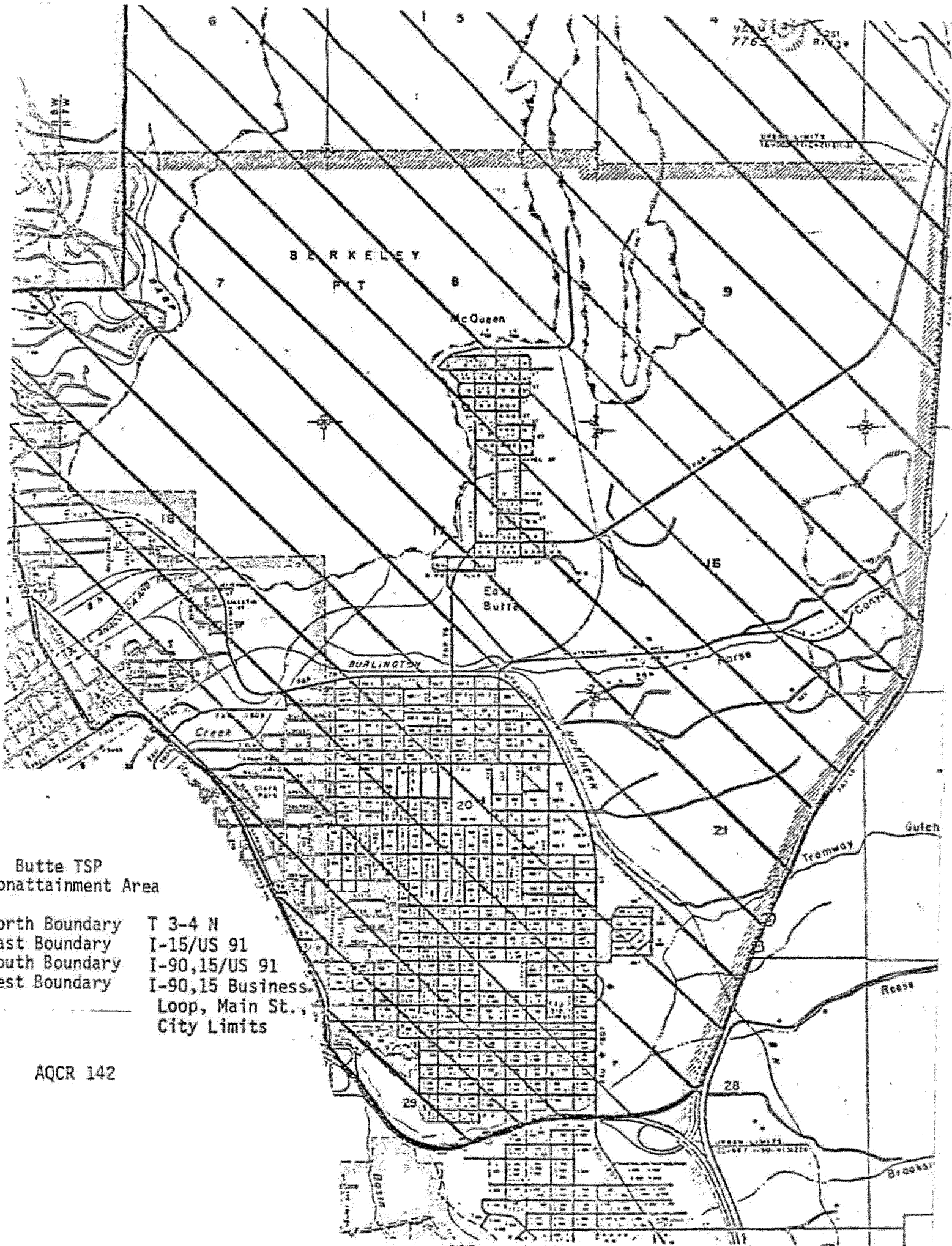


LAUREL

SO<sub>2</sub> NON-ATTAINMENT AREA

2.0 km Radius Around  
Cenex Refinery (Point A)

AQCR 140

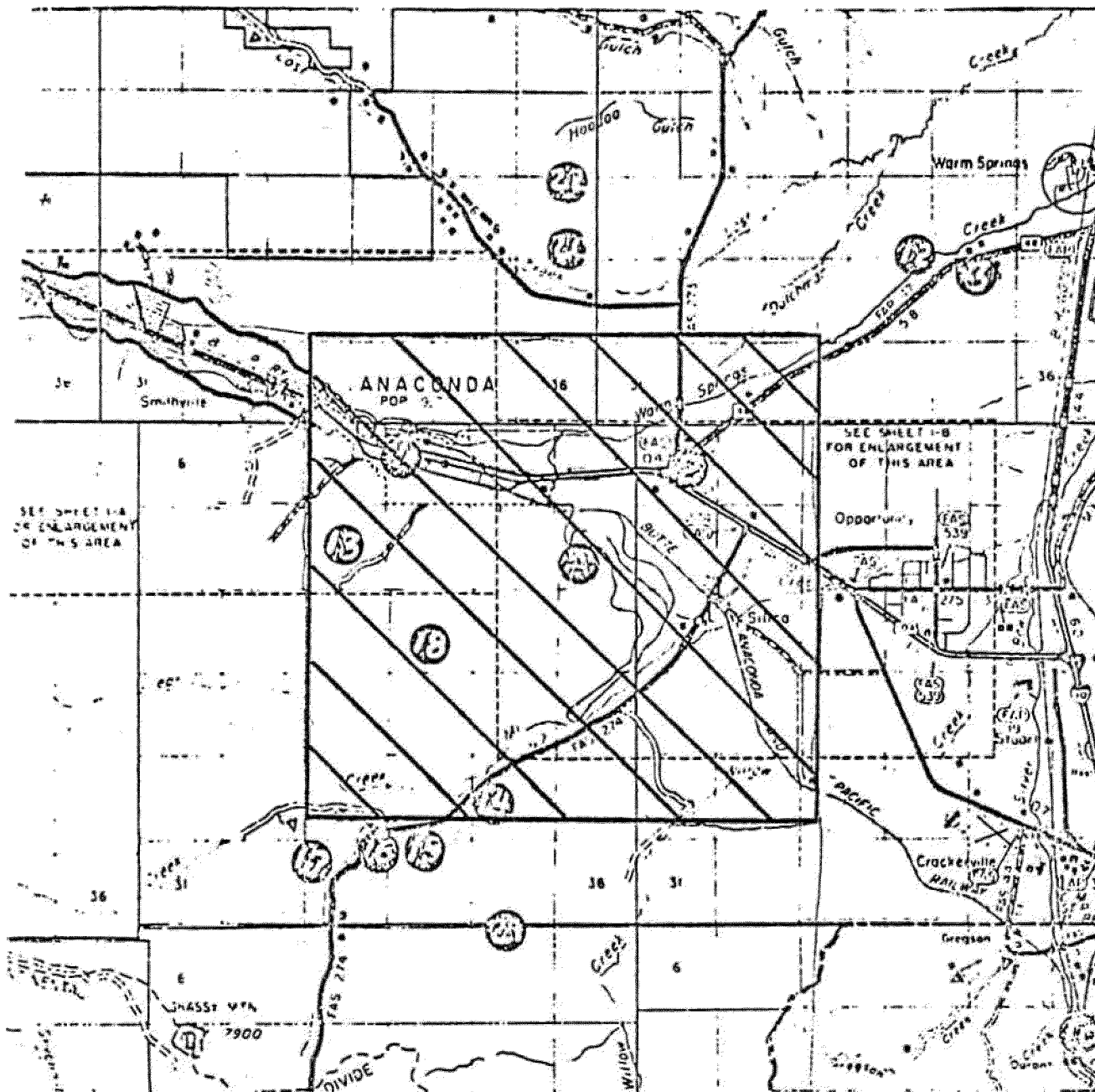


Butte TSP  
Nonattainment Area

North Boundary T 3-4 N  
East Boundary I-15/US 91  
South Boundary I-90, 15/US 91  
West Boundary I-90, 15 Business Loop, Main St., City Limits

AQCR 142





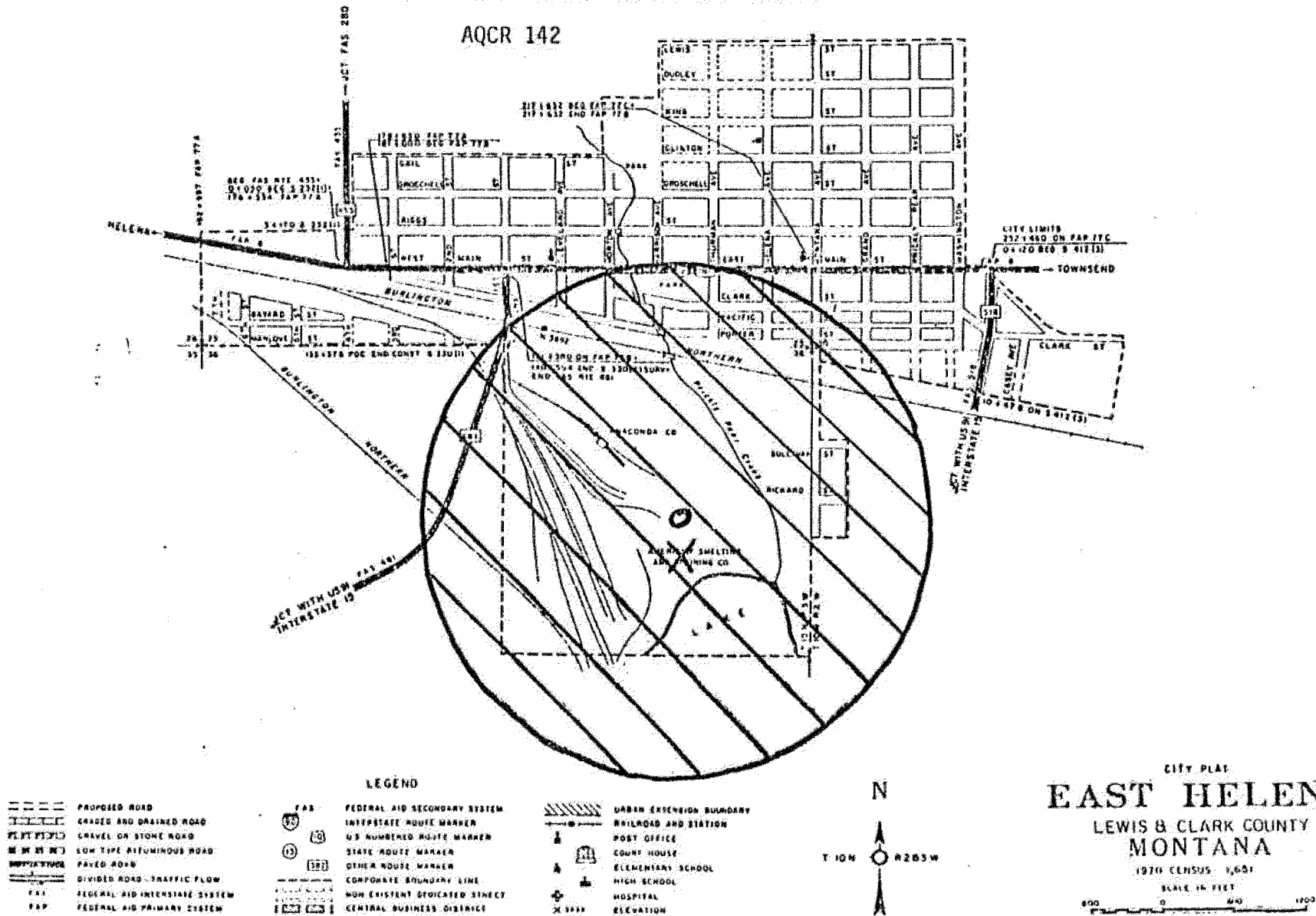
ANACONDA  
 SO<sub>2</sub> NON-ATTAINMENT AREA  
 ANACONDA SMELTER - POINT A  
 AQCR 142

## EAST HELENA

SO<sub>2</sub> NON-ATTAINMENT AREA

0.67 Km Radius Around Smelter

AQCR 142

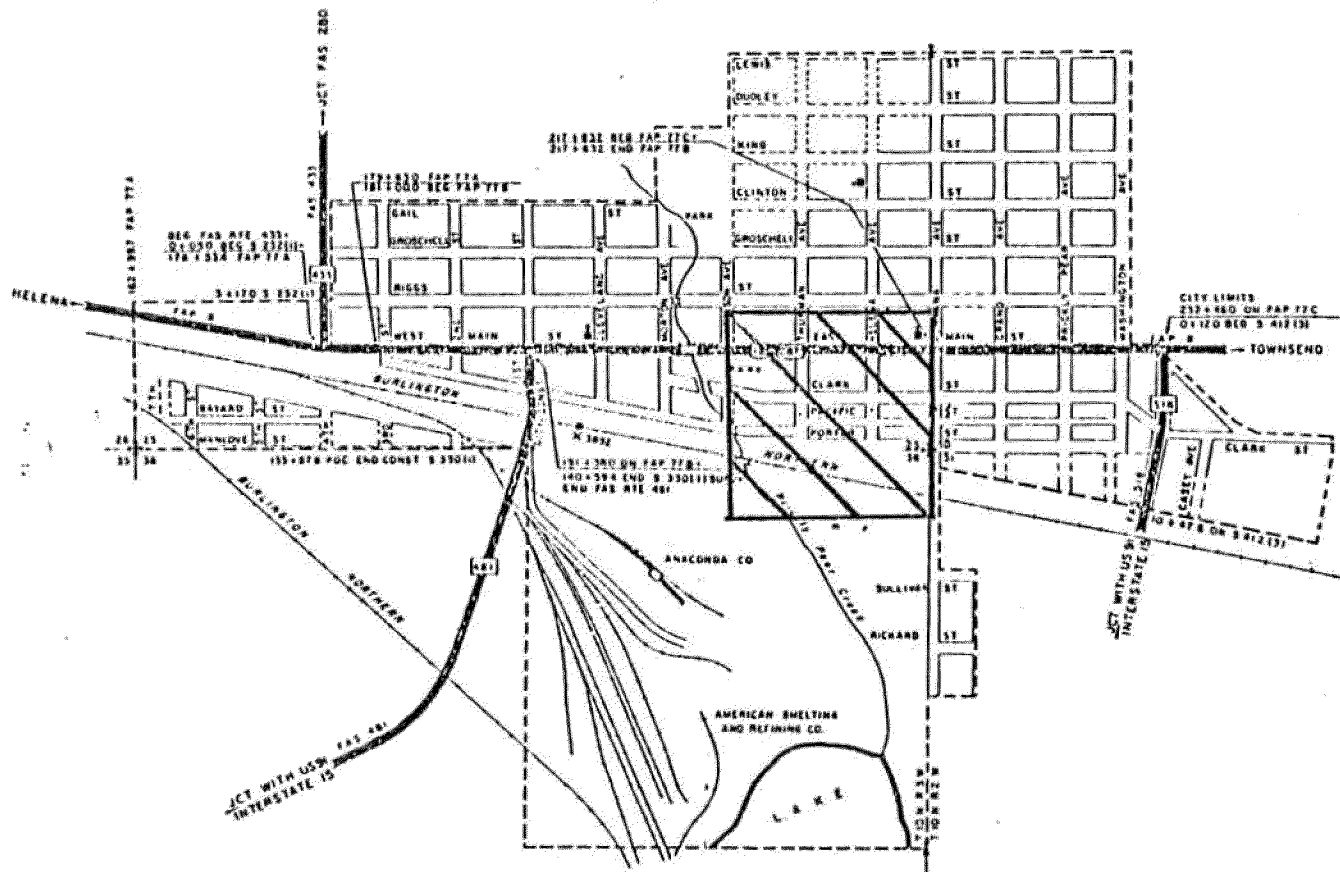


# EAST HELENA

## TSP NON-ATTAINMENT AREA

### AQCR 142

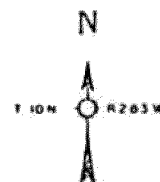
Copies of this map are available for a nominal cost at the Montana Department of Highways—Helena, Montana 59601



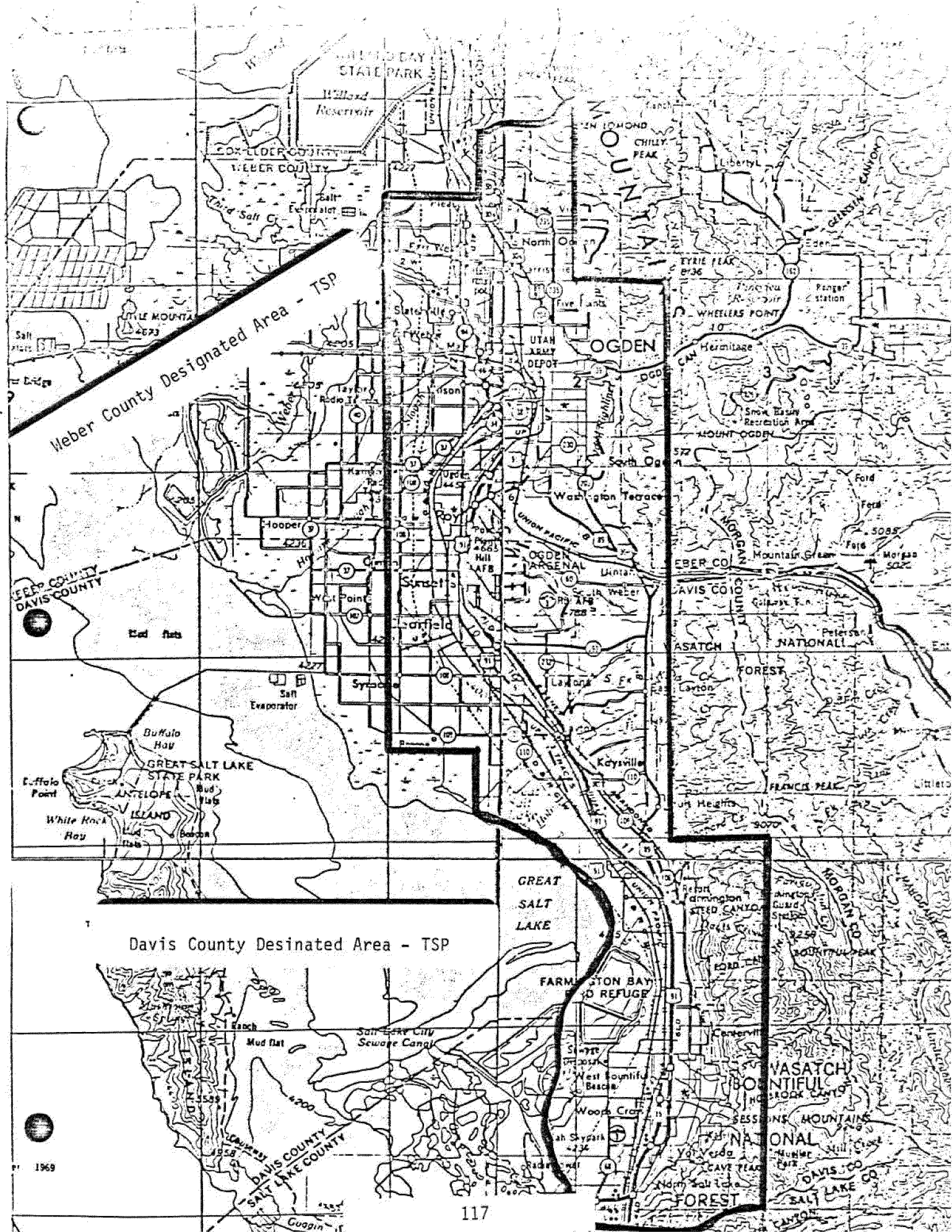
- PROPOSED ROAD
- GRAVEL AND GRAINED ROAD
- GRAVEL ON STONE ROAD
- LOW TYPE BITUMINOUS ROAD
- PAVED ROAD
- DIVIDED ROAD - TRAFFIC FLOW
- FAS FEDERAL AID INTERSTATE SYSTEM
- PAK FEDERAL AID PRIMARY SYSTEM

- #### LEGEND
- FAS FEDERAL AID SECONDARY SYSTEM
  - INTERSTATE ROUTE MARKER
  - U.S. NUMBERED ROUTE MARKER
  - STATE ROUTE MARKER
  - OTHER ROUTE MARKER
  - CORPORATE BOUNDARY LINE
  - NON-EXISTENT DEDICATED STREET
  - CENTRAL BUSINESS DISTRICT

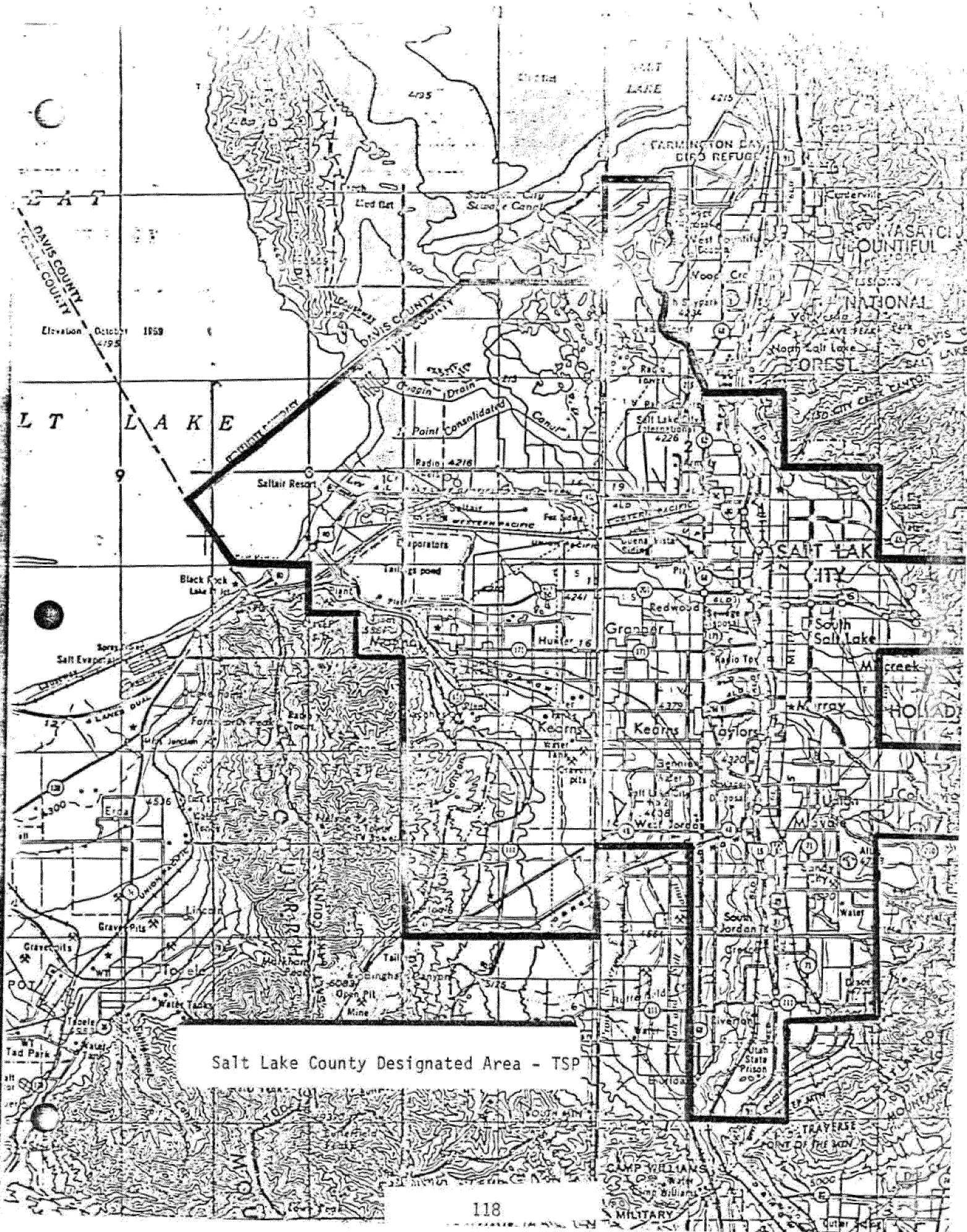
- URBAN EXTENSION BOUNDARY
- RAILROAD AND STATION
- POST OFFICE
- COURT HOUSE
- ELEMENTARY SCHOOL
- HIGH SCHOOL
- HOSPITAL
- ELEVATION



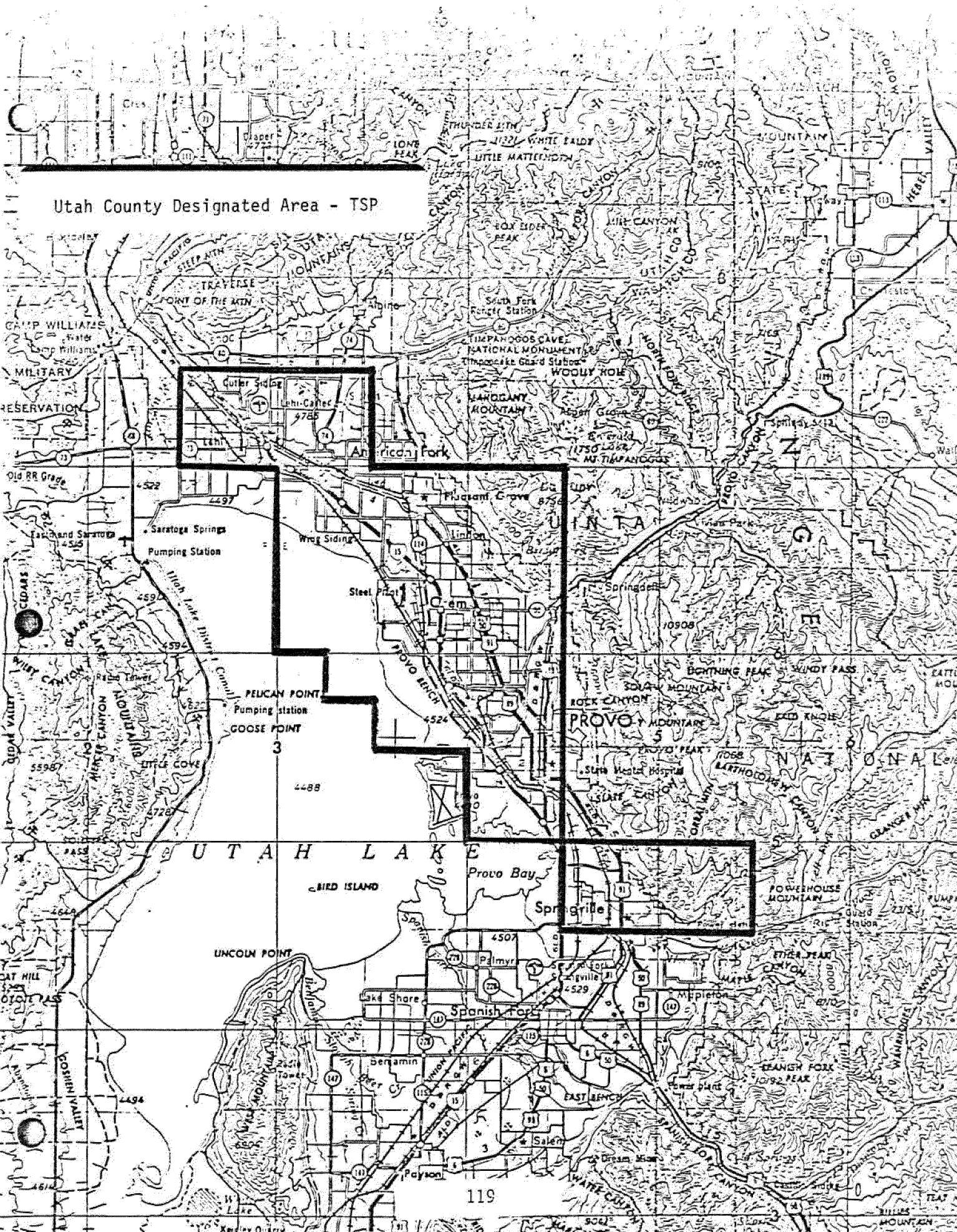
CITY PLAT  
**EAST HELENA**  
LEWIS & CLARK COUNTY  
MONTANA  
1970 CENSUS 1,651  
SCALE IN FEET  
400 0 800 1200





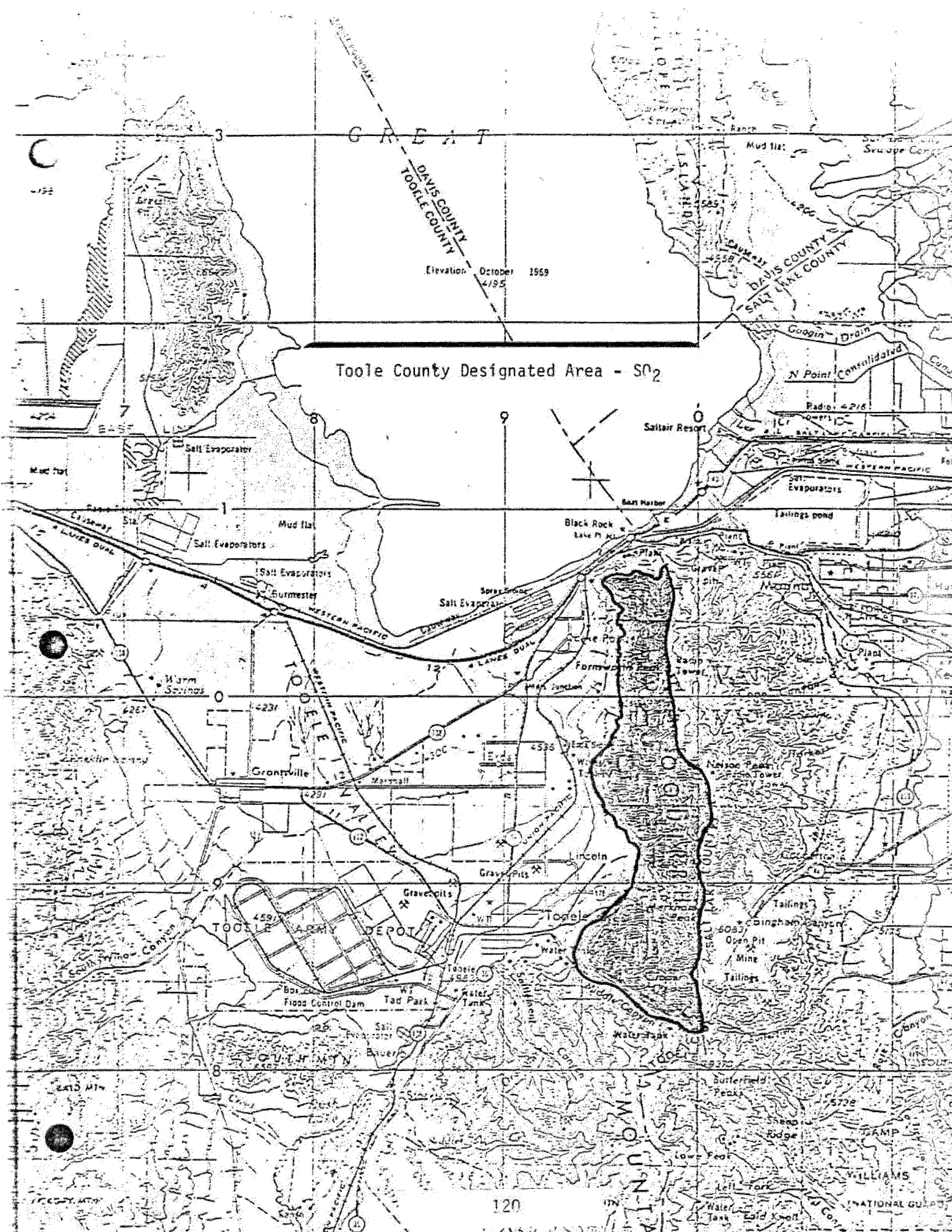


Salt Lake County Designated Area - TSP



Utah County Designated Area - TSP

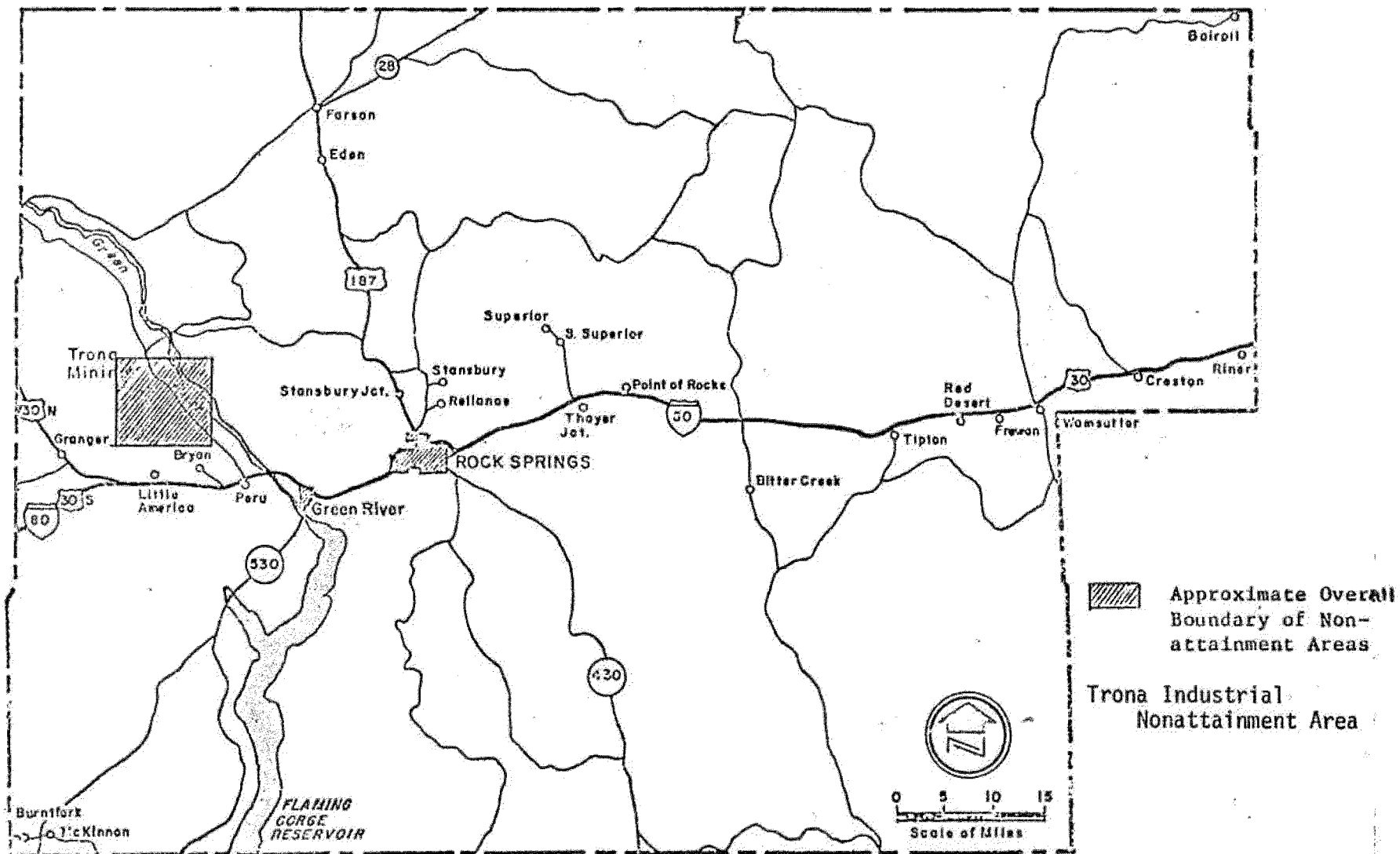




Toole County Designated Area - S02







SWEETWATER COUNTY

<b>TECHNICAL REPORT DATA</b> <i>(Please read Instructions on the reverse before completing)</i>		
1. REPORT NO. EPA - 908/1-81-002	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE AIR QUALITY TRENDS IN REGION VIII (1980 Data) U.S. Environmental Protection Agency		5. REPORT DATE September 1981
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) William H. Tabor, Thomas A. Entzminger, Stephen C. Bell		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency Surveillance and Analysis Division 1860 Lincoln Street Denver, Colorado 80295		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS		13. TYPE OF REPORT AND PERIOD COVERED Final
		14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES		
16. ABSTRACT  <p>Air quality trends and status for the calendar year 1980 were determined for the six states in Region VIII. These states include Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming. Data resident in the SAROAD national data bank was analyzed.</p> <p>Statistical test which detect significant differences between two populations were utilized to identify trends. The status and severity of air pollutants was reported as a direct measure of air quality standard and alert level exceedences. The report includes a summary of air quality in each nonattainment area.</p>		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Trends Air Quality Nonattainment Areas	Colorado SAROAD Montana North Dakota South Dakota Utah Wyoming	
18. DISTRIBUTION STATEMENT Release to public	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES
	20. SECURITY CLASS (This page) Unclassified	22. PRICE