SECTION IX

AIR QUALITY SURVEILLANCE PLAN

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STATEMENT OF PROGRESS TOWARD MEETING IMPLEMENTATION PLAN

The Implementation Plan, as revised February, 1973, proposes the installation of 12 continuous monitoring stations in 1973 and an additional 14 stations in 1974. The first 12 station shelters and associated equipment were purchased in the latter part of 1972. However, due to lack of adequate manpower and delays in delivery of the shelters from the contractor, initiation of assembly of the monitoring station components in the shelters was unavoidably delayed until early 1973. Subsequent negotiations with the contractor and the time required for him to complete necessary modifications to the shelters to meet specifications further delayed completion and deployment of all 12 stations. Five stations were deployed in 1973, and construction of two additional stations was completed. Deployment of the last seven stations will be completed in 1974. The locations and dates of installation of the 12 stations are shown below.

Continuous Monitoring Station Installation Schedule

Station Number	Region	Location	Approximate Date of Installation
1	VII	Houston	April 5, 1973
2	X	Nederland	May 31, 1973
3	III	Austin	January 7, 1974
4	V	Corpus Christi	May 21, 1973
5	VIII	Dallas	September 4, 1973
6	XI	El Paso	October 26, 1973
7	IX	San Antonio	January 16, 1974
8	VII	Houston	February 11, 1974
9	X	Orange	March 4, 1974
10	VIII	Fort Worth	April 1, 1974
11	VII	Texas City Area	April 29, 1974
12	XI	El Paso	May 27, 1974

Funds requested for Fiscal Year 1974 will be adequate for purchase of only two of the 14 additional continuous monitoring stations proposed in the Implementation Plan for installation in 1974. However, availability of these funds is uncertain at this time (January 30, 1974). It is proposed that the two stations be installed in the Houston and Beaumont areas.

On page IX-21 are listed the minimum federally prescribed high-volume and gas bubbler sampling requirements, to be met by May 31, 1974, based on the current Regional priority classifications

appearing in the February, 1973, Implementation Plan revision. As of the end of 1973, these requirements have been met in each Region of the State with one exception. One gas bubbler is required in Region 4; arrangements for its installation were completed in 1973, and it will be installed in early 1974.

During 1973, installation of 26 hi-vols and 38 gas bubblers which had been proposed (February, 1973, Plan revision) for this year was not completed. Two of these hi-vols and two of these bubblers will be installed in early 1974, with arrangements for these installations having been completed by the end of 1973. During 1973, installations of seven hi-vols and five bubblers were made at locations not proposed for 1973 in the February, 1973, Plan revision. These installations were required in major cities in which the State had no samplers and in other areas of concern. The large number of installations proposed in the Plan for 1973 could not be completed due to lack of adequate manpower. Completion of these installations and those proposed in the Plan for 1974 will be extended into 1974 and 1975.

In the present revision of the Implementation Plan, the proposed TASN and monitoring station installation schedules (pages IX 23-50) have not been revised; these were last revised February, 1973. Pages 52-55 and 57-60 have not been updated since August, 1973, to reflect existing and proposed installations. Information on city-county program sampling networks (pages IX 23-50 and 55) has not been updated since January, 1972.

FEDERAL GUIDELINES

FOR

THE AIR QUALITY SURVEILLANCE PLAN

The following outline summarizes the compliance of the Air Quality Surveillance Plan with the requirements set forth in Paragraph 420.17 of the Federal Register, Volume 36, Number 158, August 14, 1971.

(a) (1) Establishment of a State air quality surveillance system which meets the minimum requirements indicated in the Federal Register, Paragraph 420.17, and which is in operation no later than two years after Environmental Protection Agency approval of the plan. Contingent upon availability of resources and demonstrated need, a comprehensive air quality surveillance network is proposed, with completion scheduled by the end of calendar year 1977. Within this system plan, all minimum requirements for high volume and gas bubbler sampling for each Region of the State, as specified in the Federal Register, Paragraph 420.17, (See Attachment 1) will be met or, in most cases, exceeded by May 31, 1974 (See Attachments 2 and 4). Requirements for continuous monitoring (See Attachment 1) will be met as expeditiously as possible, within the limits of available funds and time required to recruit and train an adequate number of personnel to operate and maintain the required equipment. In most cases these minimum requirements will be met prior to the end of 1974 (See Attachments 2 and 4).

(2) Location of one or more sampling sites in the area of estimated maximum concentration of each pollutant. These sampling sites are designated in Attachment 2.

(b) Description of the existing and proposed air quality surveillance system.

(1) Basis for the design of the surveillance system and for the selection of samplers and sampling sites. Paragraphs A, B, and C present the basis for system design and monitoring equipment requirements in terms of the objectives of air quality surveillance and the rationale for proposing a comprehensive air quality surveillance system which is not limited to the minimum Federally-prescribed requirements.

Specific reference to Region VII supports this presentation. Attachment 2 indicates criteria for selection of each sampling site and for installation priority.

(2) Locations of samplers by Universal Transverse Mercator (UTM) grid coordinates or the equivalent. Latitude and longitude are given in Attachment 2 for existing sampling sites and those proposed for completion by the end of 1974. Sampling sites proposed for installation in 1975-77 generally are indicated only by city or town. Precise locations will be determined later.

(3) Sampling schedules. See Paragraph C. Sampling frequency will equal or exceed that specified in the Federal Register, Paragraph 420.17.

(4) Methods of sampling and analysis. Sampling methods will be as prescribed in the Federal Register, Volume 36, Number 84, April 30, 1971. In addition, at some locations, continuous monitoring is planned for sulfur dioxide/hydrogen sulfide/total sulfur by gas chromatographic analysis and for nitrogen dioxide by chemiluminescence analysis. (See Attachment 5). Standard procedures will be developed and published by the Texas Air Pollution Control Services for pollutants not governed by Federal standards.

(5) Method of data handling and analysis procedures. See Paragraph D and Attachment 5.

(6) Timetable for installation of additional equipment to complete the system. Development of the total air quality surveillance system is planned in three phases (See Paragraph C), with completion scheduled for the end of 1977. The timetable is detailed in Attachments 2 and 4. Attachment 4 summarizes the

monitoring and sampling equipment proposed for each Region. The complete network (Phases I-III) is mapped in Attachment 3.

(c) Emergency episode air monitoring. Sampling sites designated as Emergency Episode stations in each Region are indicated in Attachment 2. For each Region which is Priority I for any given pollutant, monitoring equipment for that pollutant will be installed during calendar year 1973 in the area of estimated maximum concentration of that pollutant (Emergency Episode Station). Although Region II is currently classified Priority I for sulfur dioxide, it is anticipated that the only significant industrial source of sulfur dioxide in this Region will cease operation in 1974. The proposed buildup of the air quality surveillance system during 1973-1977 and installation of communications equipment will provide a comprehensive Emergency Episode network (See Paragraph F and Paragraph B.2.).

SECTION IX

AIR QUALITY SURVEILLANCE PLAN

A. General

An adequate air quality surveillance network is an essential part of a reasonable and effective air pollution control program. Information that can be provided only by the network is required for planning and decision making within every phase of the control program. Because of its vital nature, such information should be comprehensive, accurate, and timely. Within the State of Texas, industrial and population centers are widely dispersed over a large geographic area stretching from Brownsville to Amarillo and from El Paso to Port Arthur. Equipment and manpower required for a network to cover this great expanse of territory and great diversity of industry are very costly; therefore, every attempt must be made to maximize the effectiveness of the resources used in the surveillance effort.

B. Objectives of Air Quality Evaluation

This plan sets forth the requirement for a system that will satisfy the broad and important objectives of atmospheric surveillance. The plan recognizes that care must be taken to insure that surveillance efforts are not carried beyond the level needed to satisfy these objectives at the expense of other aspects of the control program. However, control regulations based on other than accurate and timely knowledge of pollutant concentrations may be unfair and extremely costly to industry in terms of unnecessary controls and to the citizens in terms of health and materials damage. Providing such knowledge is the principal and vital purpose of air quality evaluation. To fulfill this purpose, the evaluation system, as described in Paragraph C, is assigned the task of providing data for the accomplishment or support of the following specific objectives and functions. As an example of the importance of these objectives, a brief analysis of AQCR VII system requirements is included.

1. To verify compliance with and/or progress made toward meeting air quality standards. Within Region VII, population is concentrated in the Harris-Galveston County complexes, and it is here that monitoring and

sampling activities must be concentrated. Major industrial plants, however, are located throughout the entire 13-county region. Short-term as well as long-term exposure to emissions from these scattered plants may pose health and other problems for persons living in rural areas and small towns. Frequent and, in some cases, continuous monitoring of the air at numerous locations in the Region is required to insure that pollution buildups during atmospheric stagnation periods will be detected and measured before damaging concentration levels are reached. Continuous monitoring is required if the 30-minute, 1-hour, and 3-hour ambient standards are to have real meaning. Intermittent monitoring on a random basis can be used in assessing long-term trends; however, operators of emission sources who have a knowledge of the sampling schedules can thwart and distort the results of such intermittent efforts by controlling emissions on sampling days.

2. To provide data during Emergency Episode conditions. Emergency Episodes in Region VII are generally associated with meteorological stagnation conditions. When such conditions prevail, winds are low or nonexistent, clouds and/or haze limit the solar heating action, and temperature inversions exist. At such times, pollution pockets tend to form and remain in the vicinity of emission sources. The lack of dispersion by wind and lack of vertical mixing by thermal currents create severe problems for those charged with providing adequate data on which control actions must be based. In Region VII, it is estimated that over 100 continuous monitoring stations would be required for total region coverage. Obviously, it would be very expensive to provide, at this time, this number of stations - each costing over $50,000. As a minimum, an attempt should be made to locate at least one station in the area of estimated maximum concentration for each pollutant and one station in each other area where dangerous concentrations would be likely to occur. Maximum concentration stations will have to be located in downtown Houston to monitor hydrocarbons, carbon monoxide, and nitrogen dioxide concentrations; along the extreme northeast portion of Houston to monitor oxidants. To be of value during Emergency Episode conditions, data derived from continuous monitoring stations must be available to decision makers in time for appropriate control measures to be taken. For this reason, telemetering lines and equipment will be required to remote live data from the monitoring stations to the Austin and Baytown offices of the Air Pollution Control Services and to the offices of local

Air Pollution Control Agencies, all of whom are vitally involved in abatement and control programs. For Region VII, appropriate data should be telemetered to Austin, to Baytown, to Houston, and to Galveston County Air Pollution Control offices.

3. To observe pollution trends throughout the Region including non-urban areas. Information on the non-urban areas is needed in order to determine whether air quality in the cleaner portions is deteriorating significantly and to gain knowledge about natural background levels. In Region VII, high-volume air samplers, gas bubblers, and a limited number of continuous monitors will be required in the cleaner areas outside Harris and Galveston counties. High-volume air samplers and gas bubblers will be needed in such cities as Palacios, El Campo, Conroe, Columbus, and Cleveland. These cities are located in the cleaner areas of the Region; however, in most cases they are near oil fields and will, in some few instances, require continuous monitoring stations. These continuous stations should be equipped with gas chromatographs or equipment which is equally sensitive and precise. This type equipment is essential for accurate measurement of very low concentrations of gaseous pollutants. Only through such measurements can determinations be made as to whether the quality of air is deteriorating and natural background levels be assessed.

4. To provide a data base for application in:

   a. Evaluation of effects.

   b. Land use and transportation planning.

   c. Development and evaluation of abatement strategies.

   d. Development and validation of diffusion models.

   The significance of each of these actions warrants a comprehensive and accurate knowledge of past and present pollution levels and their trends. Under normal atmospheric conditions, smog and other gaseous pollutants originating in the Houston complex can affect persons, animals, crops, and materials far outside the city limits, thus necessitating monitoring in such areas. Alteration of zoning and transportation patterns would affect thousands of people and such actions must be based on valid information. Adequate continuous monitoring must, therefore, be provided in all parts of the heavily populated portions of Region VII and suburban and rural areas as well.

Numerous stations will be required around the periphery of Houston, along the Ship Channel, and in Galveston County. Within an area such as Region VII, control strategies can become extremely complex. Arbitrary controls which may unjustly penalize nonpolluting plants must be avoided. Only by current knowledge of the true composition of the atmosphere over the entire Region can logical abatement actions be taken. This requirement forces the air quality evaluator to obtain data from many points within the Region and is a primary factor in determining the number and location of stations. Diffusion modeling, although a useful tool, can at best provide only an order-of-magnitude approximation of true ambient levels. Ground truth, in the form of frequent and actual measurements, is essential for validation and/or adjustment of such mathematical equations.

5. To discover and define air pollution problems not now recognized and to provide a basis for developing future regulations. Rapid industrial and population growth within Texas, and particularly in Region VII, has introduced into the Texas atmosphere many pollutants which did not exist only a short time ago. Acceleration of this process is likely to continue into the future. Of particular concern are emissions from the petrochemical industry along the Houston Ship Channel. Additionally, new knowledge concerning damaging effects of atmospheric contaminants once thought harmless is being developed. New methods of analysis have recently revealed that the atmosphere in many areas of Texas contains significant amounts of these materials, which include heavy metals and other potentially dangerous elements and compounds. Design of the air quality network must be flexible to allow for the economical introduction of new monitors as they are needed. Information derived from such instruments will serve as the base for future control regulations.

6. To provide data for epidemiological studies involving human beings and animals. Data on a continuing basis from numerous points within rural and suburban areas, as well as highly congested urban areas, are needed to assess health effects of various pollutants. Without accurate, comprehensive data, correct conclusions concerning effects are impossible. The variety of contaminants emitted into the air within Region VII dictates a modern, sophisticated air surveillance system. Skimping on such a system may be "penny-wise, pound-foolish". Control strategies based on incorrect assessments can cost industry hundreds of millions of dollars for the installation of control equipment and

fail to produce the improvements in air quality required to protect the health of hundreds of thousands of people.

C. Network Design

1. System Coverage. From the above discussion, it can be seen that obtaining adequate air surveillance information for Texas will be neither cheap nor easy. Widespread sampling and monitoring stations covering numerous pollutants will be required to give an accurate and representative picture of the quality of the atmosphere in which Texans live. This plan proposes an Air Quality Surveillance System which will fulfill minimum monitoring equipment requirements as prescribed by the Federal government.

   a. Minimum Federal Equipment Requirements. The Federal Register, Vol. 36, No. 158, August 14, 1971, requires that each state acquire a minimum of monitoring/sampling equipment to be in operation no later than two years after Environmental Protection Agency approval of the State's implementation plan. The equipment needed to satisfy this minimum requirement in each Texas Air Quality Control Region is shown in Attachment 1. While the Federally-prescribed air surveillance requirements recognize the primary needs of a surveillance system, they appear to have been oriented toward urban areas with high population concentrated in relatively small land areas. None of the objectives stated in Paragraph B above would be realized by a network limited in scope or size to the minimum set out by the Environmental Protection Agency. This can be demonstrated by a brief review of the types and quantities of monitoring equipment which would be required for Region VII if only the minimum equipment standards contined in Federal Register, August 14, 1971, were applied. The minimum thus prescribed would be thirteen high-volume air samplers, nine NASN-type gas bubblers, nine tape samplers (coefficient-of-haze type), four sulfur dioxide monitors, and four ozone monitors. In a large, industrialized, 13-county area containing over 2 million persons, such sparse coverage would be totally inadequate. In fact, considerably more monitoring/sampling equipment than these quantities will be required in the city of Houston alone to meet basic surveillance needs. With such limited resources, compliance with and/or progress made toward meeting air quality standards would, for most areas within the Region, be impossible to

determine, and emergency episode data would be inadequate for control and abatement decisions. Emergency episodes could occur in the Texas City or Freeport area or even along the near coastal portion of the Ship Channel without detection; or, if detected, there would be no way to rapidly obtain qualitative or quantitative data on the pollutants involved. Such limited monitoring/ sampling would provide no data on background or natural levels simply because all equipment would have to be placed in the higher priority Houston city area. Another serious deficiency in the Federally-prescribed minimum network would be its limited ability to discover and define air pollution problems not now recognized. For example, present studies have indicated that short-term exposure to nitrogen dioxide may present health hazards. In a special 1971 90-day survey, elevated levels of nitrogen dioxide were discovered and measured in several Texas cities. Although continuous monitoring of nitrogen dioxide is not yet prescribed by the Federal government, we believe that continuous monitoring should be performed to detect and measure short-term (1-hour and 3-hour maximums) nitrogen dioxide concentrations. Data from a number of points within the Region will be required to determine the distribution and significance of high short-term concentrations of nitrogen dioxide. The Texas Air Control Board has adopted standards for pollutants not presently covered by Federal Ambient Air Quality Standards. Beryllium, hydrogen sulfide, and hydrogen fluoride are presently covered by State standards and not by Federal standards. If these standards are to have real significance, it will be necessary to detect and monitor these pollutants in the atmosphere. Therefore, the State of Texas has elected to go beyond the minimum Federal requirements in order to realize fulfillment of the stated objectives.

b. <u>The Proposed Texas Air Quality Surveillance System.</u> To provide the information needed for development of logical and effective air pollution control strategies which will protect the health and welfare of all Texans without unduly hampering industrial operations or development, and to meet the other broad objectives discussed above, the State of Texas proposed to acquire and operate an adequate air surveillance control system. While it would appear desirable to implement the entire system as soon as possible, a more practicable approach

from financial and other standpoints will be to acquire the system in phased increments. Advantages will accrue from an orderly phased buildup. For example, specific equipment needs probably will require adjustment as measurements are made and additional knowledge is gained. Such changes can be made more economically under a phased acquisition program. Also, skilled manpower required for designing, building, operating, and maintaining the full system will be considerable. Time is needed to recruit and train these operators and technicians. System acquisition, as planned, with incremental buildup, allows for such time and helps eliminate waste due to rushed planning and "crash" procurements. This plan identifies three separate phases for system development with system completion scheduled for the end of 1977. The system acquisition schedule and completion date have necessarily been delayed by two years, since sufficient funds and manpower were not made available to execute the second part of Phase II as previously proposed. The complete system layout, as revised, for each region is contained in Attachment 2. The location, sampler type, installation date, and site selection criteria are indicated for each sampling site. Total statewide and regional monitoring equipment requirements and equipment costs for the proposed system (Phase I through III) are summarized in Attachment 4. Equipment locations are mapped in Attachment 3.

(1) Phase I. This phase represented those sampling stations in operation as of the end of calendar year 1971 and consisted primarily of noncontinuous high-volume suspended particulate and bubbler-type gas samplers. Forty static effects packages were operated by various agencies throughout the State for Texas Air Pollution Control Services. Data obtained from laboratory analyses of exposed materials gave an indication of the effects of atmospheric pollutants on common materials, such as rubber, fabric, and metal, but was of no value in quantitative determinations of pollutant concentrations. Statewide, 140 hi-vols and 51 bubblers were installed and in operation by the end of 1971. Data derived from these networks is currently stored in the Texas Air Quality Data Bank, which is maintained in the central computer facility located in the main offices of the Texas State Department of Health.

(2) Phase II. Expansion and augmentation of the existing surveillance system was begun in FY-1972 and will be continued through FY-1973. During this phase, the first deployment of continuous monitoring equipment at permanent sites in the State for gaseous pollutants will be completed. Specific sites for monitoring stations to be added during this phase are contained in Attachment 2. In FY-1972, components for twelve (12) trailer-mounted continuous monitoring stations were procured for assembly by engineers and technicians of the Air Pollution Control Services staff. During Phase II, the effects packages will be phased out in order to make additional manpower available for application on more advanced monitoring equipment.

(3) Phase III. During this phase, which embraces Fiscal Years 1974 through 1977, additional continuous monitoring stations, hi-vols, and bubblers will be installed (Attachments 2 and 4). Monitoring locations for Phase III are shown in Attachment 2. Because of changing patterns of pollution that result from population and industrial growth, relocations, and make-up, exact locations for most stations which are to be installed during Phase III will be selected later. For the purposes of this plan, general locations such as towns, cities, and counties have been identified as probable monitoring/sampling sites. Knowledge gained during Phase II will be useful in the selection of monitoring locations for Phase III. Full system completion by the end of calendar year 1977 is planned. During Phase III, telemetering will be introduced into the surveillance system. Use will be made of the planned Texas State communications system (TEX-AN). In order to minimize the time lag between the measurement and availability of data during an emergency episode, circuitry and equipment for remoting data to local air pollution control offices and to the Austin and regional offices of the Air Pollution Control Services will be added.

2. Sampling Methods will be as prescribed in Federal Register, Vol. 84, dated April 30, 1971. Standard procedures will be developed and published by the Texas Air Pollution Control Services for pollutants not governed by Federal standards.

3. Sampling Schedules. Hi-vol and gas bubbler samples will be taken over a 24-hour period (0000 to 2400 hours on the designated sampling day) at 6-day intervals. Samples will be taken simultaneously across the State on the designated sampling dates. The schedule thus provides 61 sampling days per year, with approximately an equal number of samples taken on each day of the week.

   Continuous monitors will be operated on a scan-every-5-minutes sampling schedule. At 5-minute intervals, each instrument's instantaneous indication will be recorded on punched paper tape. Instrument scanning is automatic. The paper tape will later be collected and analyzed by a computer program.

4. Sampling/Monitoring Station Housing. Except where they are associated with a continuous monitoring station, hi-vols and gas bubblers will generally be located on or in public buildings and facilities. Easy access, availability of electric power, and relative freedom from vandalism are factors which must be considered in placing this equipment. Housing and placement of continuous monitoring equipment are much more involved and require careful, detailed planning. The following are additional considerations in such actions:

   a. Temperature and humidity control. The sensitivity and precision of most continuous monitoring equipment are dependent on control and stability of these factors.

   b. Storage of flammable, explosive, and toxic gases. Such gases as hydrogen, ethylene, and carbon monoxide are required for operation and calibration of these monitors. In most cases these are stored in high pressure tanks. For those instruments requiring hydrogen, a hydrogen generator will be employed. Adequate ventilation is always requisite.

   c. Access to representative ambient atmosphere. Certain of the pollutants, such as ozone, are highly perishable and must be brought to the monitor via glass inlets. Long runs of such glass plumbing are difficult and expensive to procure, install, and maintain.

   d. Electrical shielding, bonding, and grounding. Equipment must be free from influence of spurious radiation and stray electrical inpulses to prevent erroneous measurements; therefore, access to common ground potential and adequate shielding for all monitors within a station are essential.

Because of these factors, housing of continuous monitoring stations in public or leased private buildings is not practical. Occupants of such buildings object to the continuous noise of air pumps and electric motors and to the presence of high pressure gas lines which they feel may rupture. Therefore, priority will be given to the procurement of a trailer for adequate shelter for each continuous monitoring station. The trailer will be sufficiently large to allow for flexibility and future growth. Each trailer will be equipped with appropriate pollutant and meteorological sensors, a dynamic gaseous calibration system, a data conversion/recording system, and other necessary support items. The trailer will also serve as an office for an equipment operator during alerts and emergency episode conditions.

D. Data Acquisition and Analysis

1. Data Bank. Pollutant and meteorological data that will be available from the network and other sources will be handled by automatic data storage, retrieval, and processing. A repository of all ambient atmospheric data has been established at the central computer facility at the headquarters of the Texas State Department of Health. Historical data, as well as current information, will be retained so that trends may be observed and special data studies and analyses performed as required for planning purposes. Data from the following sources will be input to the bank as shown in Attachment 5.

   a. The Texas Air Surveillance and Monitoring Networks.

   b. Selected stations from local city and county networks.

   c. The National Air Surveillance Network.

   d. Meteorological records.

2. Data Format. The Federal Environmental Protection Agency (EPA) has developed and adopted a standard coding structure and format known as Storage and Retrieval of Aerometric Data (SAROAD) to facilitate the exchange of technical information needed for air pollution abatement, control, and research. The SAROAD system is described in the SAROAD Users Manual dated July, 1971, and published by EPA's Office of Air Programs, at Research Triangle Park, North Carolina. Noncontinuous data obtained from hi-vols and gas bubblers operated by the State and

local air pollution control programs will be recorded in SAROAD format prior to forwarding to the State Health Department's computer facility for entry into the Texas Air Quality Data Bank and/or to EPA for entry into the National Aerometric Data Bank. Local agencies will forward ambient air data recorded in SAROAD format at least monthly to Texas Air Pollution Control Services.

3. Computer Programming Requirements

   a. Data Validation. Computer software will be developed to assist in the validation of all data that is input into the data bank. Computer programs will be structured so that all measurements are compared against a previously established table of limits for:

      (1) High values.

      (2) Low values.

      (3) Extreme changes in values for consecutive observations.

      Limits for high values will be based on air quality standards. Limits for low values will represent the minimum detection capability of the instruments and methods of analysis. Computer-produced validation listings resulting from these data comparisons will be printed and will be manually reviewed by air quality network operations control personnel in the State office. After verification, the manually corrected listings will be returned to the central computer facility for correction or removal of incorrect entries.

   b. Data Storage and Retrieval. Data will be stored indefinitely on magnetic disc or tape at the Texas State Health Department's central computer facility and will be available for prompt retrieval when needed for compilation of historical summaries and special data analyses. Access to specific measurements will also be provided. The most recent twelve months of data will be kept available for rapid access from a satellite computer, remote console, or other input-output unit.

   c. Data Reduction

      (1) Means and Deviations. Computer programs will be developed to provide pollutant data averaging and other mathematical

computations. Specifically the following will be required for data received from each atmospheric sensor.

(a) Thirty-minute means of values recorded for sulfur dioxide. Program must compute all 30-minute means. Each 30-minute period will be considered as starting on either the even or half hour.

(b) Thirty-minute means of values recorded for hydrogen sulfide.

(c) Hourly means of values recorded for carbon monoxide, photochemical oxidants, wind speed, wind direction, and inside and outside station temperatures. Times start and stop on the even hours so that 24 means will be calculated each day for each parameter.

(d) Three-hour period means for sulfur dioxide. This will require averaging for all consecutive three-hour periods beginning and ending on the even hour.

(e) Mean value of non-methane hydrocarbon concentrations for the values recorded during the three-hour period occurring each day between 6:00 AM to 9:00 AM.

(f) Eight-hour means for carbon monoxide. This will require averaging for all consecutive eight-hour periods beginning and ending on the even hour.

(g) Annual and quarterly geometric mean, standard deviation, and geometric standard deviation for total suspended particulate.

(h) Annual and quarterly arithmetic mean, standard deviation, and geometric standard deviation for all pollutants other than suspended particulate on which data is gathered.

Data means (averages) provide a useful measure of central tendency of a pollutant concentration, while the standard deviations are useful for characterizing the spread of the data values about the mean value.

(2) Meteorological Comparisons. Programs will be developed to have the computer produce wind roses and pollution roses and for automatically comparing these roses to determine possible general and specific emission sources.

(3) Isopleths. Programs will also be developed to produce computer-generated isopleths which will show distribution of pollutants over the entire State of Texas.

(4) Reports. The following routine reports will be computer-generated and produced and will be distributed as indicated.

(a) Validation listings will be handled as discussed above.

(b) Weekly summaries of all mean values exceeding State and/or Federal ambient standards will be printed by the central computer facility and mailed to all interested agencies, including city and county air pollution control agencies and Texas Air Pollution Control Services Regional Offices. All mean values will be accompanied by averaged meteorological data prevailing during the sampling period for which the mean applies.

(5) Monthly Reports. Will be as follows:

(a) Monthly summaries of mean values computed in accordance with the requirements set out in Paragraph D. 3 above. Appropriate meteorological data will be included and reports will be distributed as specified for the weekly report.

(b) On a monthly basis, a tape will be prepared by the central computer facility which will contain all hourly average information for pollutants of interest to EPA. The tape, which will be prepared in SAROAD format, will be forwarded to EPA for inclusion in The National Aerometric Data Bank.

(6) Quarterly and Annual Reports. Each quarter year a comprehensive report will be computer generated and produced for each Region which will show for each pollutant the following information:

(a) Sampling site location.

(b) Sampling interval.

(c) Start date of sampling.

(d) End date of sampling.

(e) Number of samples recorded.

(f) Maximum 30-minute sample recorded (where appropriate) and total number of deviations above ambient standard (deviations).

(g) Maximum one-hour sample recorded (where appropriate) and total number of deviations.

(h) Maximum three-hour sample recorded (where appropriate) and total number of deviations.

(i) Maximum eight-hour sample recorded (where appropriate) and total number of deviations.

(j) Maximum twelve-hour sample recorded (where appropriate) and total number of deviations.

(k) Maximum twenty-four hour sample recorded (where appropriate) and total number of deviations.

(l) Arithmetic mean for all values.

(m) Standard deviation for all values.

(n) Geometric mean for all values.

(o) Geometric standard deviation for all values.

The Administrator of EPA requires a quarterly report on ambient air quality in each Air Quality Control Region but has not yet prescribed the exact format or content. Information contained in the quarterly and annual State report described above should satisfy EPA's requirement. Ambient network control personnel within Air Pollution Control Services will work closely with Technical Programs personnel and with the Texas Health Department computer facility personnel to develop detailed procedures for the preparation and handling of these reports.

E. Manpower Requirements.

During the latter part of 1971 an intensive testing program was conducted by Texas Air Pollution Control Services (TAPCS) to evaluate different types of continuous atmospheric monitoring equipment. One of the conclusions reached as a result of these evaluations is that highly skilled technicians are required to operate and maintain such equipment. These instruments employ sophisticated gas flow and control systems, latest state-of-the-art electronics circuitry, and complex electromechanical devices. Careful calibration and maintenance are absolutely essential if useful and reliable data are to be obtained. We, therefore, propose to place one additional technician on a full-time basis in the appropriate TAPCS Regional Office to operate and maintain each station on a full-time basis. In some cases, local city-county air pollution control agencies will provide this technician who will be supported by a small force of very highly skilled technicians working out of the Austin shops of TAPCS. The support force will assist with maintenance tasks that are beyond the capability of the on-station technician and will perform shop maintenance that cannot be performed in the trailer. Scheduled equipment overhaul at regular intervals will also be a central shop responsibility. Administrative responsibility for on-station technicians will be assigned to the TAPCS Regional Office in which the sampling station is located.

F. Emergency Episode Data Collection Capabilities.

This plan describes a monitoring system which will provide Emergency Episode protection in the Air Quality Control Regions as required. The system is scheduled to be completed in Fiscal Year 1977. However, as during Phase I, very limited real time data will be available during Phase II for use in evaluating pollution buildups during atmospheric stagnation conditions.

In the first quarter of 1973, the first real time monitoring station will be in operation. This station will be installed in Houston and will make data on the five major pollutants readily available to the control agency. A number of continuous-type instruments are now available to the Houston City Health Department; however, their effectiveness in an Emergency Episode situation is limited because manpower and time required to operate the instruments and to reduce the data to the required form once it has been collected are excessive. The resources of both the State and local agencies are limited and manpower priorities must be assigned if total program responsibilities are to be fulfilled.

During Phases I and II, the State and participating local agencies will collect and analyze as much data as possible during adverse meteorological conditions. True episode warning and monitoring capabilities will not exist in any meaningful sense, however, until a sufficient number of the new continuous monitoring stations are available in all critical areas of Priority I Regions.

Attachment 1

Minimum Federally-Prescribed Equipment

Minimum Federally-Prescribed Equipment

Region	Hi-Vols	Tape Samplers	Gas Bubblers	Continuous Monitors SO_2	CO	O_3
I	3	1	3	1	-	-
II	3	1	6	2	-	-
III	3	1	1	-	-	2
IV	7	2	1	-	-	-
V	7	2	5	2	-	2
VI	3	1	3	1	-	-
VII	13	9	9	4	-	4
VIII	3	1	1	-	-	5
IX	3	1	1	-	-	3
X	3	1	5	2	-	2
XI	6	1	4	2	5	2
XII	3	1	1	-	-	-
Total	57	22	40	14	5	~~18~~ 20

Attachment 2

Air Quality Surveillance System:
Sampling Locations, Site
Selection Criteria, Sampler
Types, Installation Dates

REGION I

Non-continuous Samplers+

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Wichita Falls	HP MC	NASN/TASN	1/58		98-29-45	33-54-30
Wichita Falls	HP MC	NASN		7/70	"	"
Wichita Falls	HP MC	TASN		12/70	"	"
Abilene	HP	TASN	5/71	3/72	99-44-30	32-27-00
Brownwood	SR	TASN	6/72	9/72	98-59-05	31-43-00
Snyder	MS	TASN	1973	1973	100-55-15	32-44-30
Childress	SR	TASN	1973	1973	100-14-00	34-25-30
Sweetwater	SR	TASN	1974	1974	To be determined	
Eastland	SR	TASN	1974	1974	To be determined	
Coleman	SR	TASN	1975	1975	To be determined	
Breckenridge	SR	TASN	1975	1975	To be determined	
Throckmorton	SR	TASN	1976	1976	To be determined	

TAMN Continuous Monitors +

Site Name	Site Category		Monitors	Installation Date	Site Longitude W	Site Latitude N
Wichita Falls	SO_2	HP MC EE	Trailer I	1974	98-29-45	33-54-30
	O_3	HP MC EE				
	CO	HP MC EE				
	NO_2	HP MC EE				
Abilene	SO_2	HP	Trailer I	1975	To be determined	
	O_3	HP				
	CO	HP				
	NO_2	HP				

+ See following explanatory notes.

NASN	National Air Surveillance Network
TASN	Texas Air Sampling Network
NASN/TASN	Joint NASN-TASN
TAMN	Texas Air Monitoring Network
EPA	Environmental Protection Agency (U.S.)
HP	High population density
HE	High emissions density
MS	Major source
PG	Projected growth
SR	Small town (background, population with little industry)
RB	Predominantly rural (background)
MC	Estimated maximum pollutant concentration
EE	Emergency episode alert network

Continuous Monitoring Station Configuration

Monitoring Trailer I	Unit Cost
Trailer Temperature-controlled, with electric power circuitry, plumbing, instrument and work benches, sinks, desks, gas storage, flow, and ventilation systems, atmospheric intakes, manifold and exhaust systems, and the following instruments and associated items installed or furnished:	$10,000
Total Sulfur Monitor	6,000
Ozone Monitor	4,000
Nitrogen Oxides Monitor	6,000
Carbon Monoxide, Methane, Total Hydrocarbon Monitor (Gas Chromatograph)	7,500
Data Logger	4,000
Line Printer	2,000
Strip Chart Recorder	1,100
Wind Direction and Speed Instrument	1,500
Dynamic Calibration System	1,500
Hydrogen Generator	1,300
Special Tools and Test Equipment	1,000
Intake Manifold System	1,000
Uncommon Spare Parts, One-year supply	2,000
High-Volume Suspended Particulate Sampler	350
Total Cost	$49,250

Monitoring Trailer II

Same as Monitoring Trailer I except that Total Sulfur Monitor is not included.

Monitoring Trailer III

Same as Monitoring Trailer I except that Nitrogen Oxides Monitor and Carbon Monoxide, Methane, Total Hydrocarbons Monitor are not included.

REGION II

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Lubbock	HP	NASN/TASN	1/61		101-50-50	33-35-20
Lubbock	HP	NASN		3/69	"	"
Lubbock	HP	TASN		9/72	"	"
Lubbock	HP	City #1	1970		101-52-00	33-34-22
Lubbock	HP	City #2	1970		101-55-04	33-32-53
Lubbock	HP	City #4	1970		101-50-50	33-32-53
Lubbock	HP	City #5	1970		101-48-40	33-33-00
Lubbock	MS	City #7	1970		101-49-40	33-34-20
Lubbock	HP	City #8	1970		101-56-20	33-34-50
Lubbock	HE	City #9	1970		101-54-28	33-34-40
Lubbock	MS	City #11	1970		101-50-30	33-34-58
Lubbock	HP	City #12	1970		101-47-50	33-34-49
Lubbock	HE MS	City #13	1970		101-53-05	33-36-25
Lubbock	HP	City #14	1970		101-51-03	33-36-42
Lubbock	HE	City #16	1970		101-49-10	33-39-35
Lubbock	HP	City #19	1970	1970	101-51-23	33-31-42
Lubbock	HP	City #20	1970	1970	101-48-30	33-35-20
Lubbock	RB	City #21	1970		102-02-00	33-36-00
Slaton	SR	City #22	1970		101-38-15	33-26-00
Idalou	SR	City #23	1970		101-41-00	33-39-45
Shallowater	SR	City #24	1970		101-59-30	33-41-25
Wolfforth	SR	City #25	1970		102-00-30	33-30-30
Amarillo	HP MS MC	NASN/TASN	2/69		101-51-30	35-12-45
Amarillo	HP MS MC	NASN		2/69	"	"
Amarillo	HP MS MC	TASN		5/71	"	"
Pampa	SR	TASN	1/72	1/72	100-57-30	35-33-10
Dumas	HE	TASN	1973	1973	101-58-00	35-51-45
Plainview	SR	TASN	1974	1974	101-42-45	34-11-45
Littlefield	SR	TASN	1976	1976	102-17-30	33-55-30

REGION II

TAMN Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Lubbock	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1975	101-52-30	33-35-00
Amarillo	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE	Trailer I	1976	101-51-30	35-12-45
Lubbock	SO_2 HP PG O_3 HP PG CO HP PG NO_2 HP PG	Trailer I	1977	To be determined	
Amarillo	SO_2 HP PG O_3 HP PG CO HP PG NO_2 HP PG	Trailer I	1977	To be determined	

REGION III

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Austin	HP PG MC	NASN/TASN	1/58		97-42-42	30-18-56
Austin	HP PG MC	NASN		3/69	"	"
Austin	HP PG	TASN	6/72	6/72	97-44-00	30-16-45
Austin	HP PG	TASN	5/72		97-46-00	30-14-10
Austin	HP PG	TASN	6/72		97-42-30	30-21-00
Austin	HP	TASN	6/72		97-41-40	30-15-45
Austin	HP PG	TASN	6/72	5/73	97-45-30	30-20-15
Austin	HP PG	TASN	12/72		97-48-45	30-17-00
Waco	HP PG	TASN	1/58		97-07-15	31-33-15
San Marcos	HP PG	TASN	6/71	6/71	97-56-00	29-52-45
Bryan	HP PG	TASN	10/71	10/72	96-22-15	30-40-30
Temple	HP PG	TASN	1973	1973	97-20-45	31-05-45
Rockdale	MS	TASN	1973	1973	96-59-45	30-39-15
Rockdale	MS	TASN	1974		"	"
Belton	SR PG	TASN	1974	1974	To be determined	
Luling	SR	TASN	1975	1975	97-38-45	29-41-00
Hillsboro	SR	TASN	1975	1975	To be determined	
Brenham	SR	TASN	1976	1976	96-23-45	30-10-00
Killeen	SR PG	TASN	1974	1974	97-40-45	31-06-30
Waco	HP PG	TASN	1/73	2/73	97-10-00	31-33-15
Austin	HP PG	TASN	1/74		97-44-10	30-22-22

TAMN Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Austin	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE	Trailer I	1/74	97-44-10	30-22-22
Waco	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1974	97-07-45	31-33-15

REGION III

TAMN Continuous Monitors
(continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Austin	SO_2 HP PG O_3 HP PG CO HP PG NO_2 HP PG	Trailer I	1975	To be determined	
Austin	O_3 HP PG CO HP PG NO_2 HP PG	Trailer II	1976	To be determined	
Bryan-College Station	O_3 HP PG CO HP PG NO_2 HP PG	Trailer II	1977	To be determined	

REGION IV

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Laredo	HP MC	TASN	1/64	1973	99-30-15	27-31-15
Laredo	HP HE	TASN	1973	1973	99-30-30	27-30-00
Laredo		City #1	1969		99-30-35	27-30-02
Laredo		City #2	1969		99-31-25	27-30-25
Laredo		City #3	1969		99-30-50	27-30-30
Laredo		City #4	1969		99-28-50	27-30-30
Laredo		City #5	1969		99-28-45	27-25-00
Laredo		City #6	1971		99-28-01	27-30-01
Laredo		City #7	1969		99-30-01	27-33-35
Laredo		City #8	1969		99-30-40	27-32-20
Laredo	HP	City #9	1969		99-30-05	27-31-30
Laredo		City #10	1971		99-29-40	27-31-10
Laredo		City #11	1971		99-28-25	27-31-10
Brownsville	HP HE	TASN	1973	1973	97-30-00	25-54-00
Harlingen	HP	TASN	2/61	1974	97-41-30	26-11-30
McAllen	HP	TASN	1/66	1974	98-14-30	26-12-15
San Benito	HP	TASN	5/68	1975	97-38-00	26-08-00
Weslaco-Mercedes	SR	TASN	1975	1975	To be determined	
Rio Grande City	SR	TASN	1976	1976	98-48-30	26-22-30

TAMN Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Laredo	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE COH HP MC EE	Trailer I*	1974	99-30-30	27-30-00
Brownsville	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1975	To be determined	
Laredo	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1976	To be determined	

* Will include tape sampler (coefficient-of-haze type).

REGION V

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Corpus Christi	HP HE MC	NASN/TASN	1/57		97-25-30	27-46-45
Corpus Christi	HP HE MC	NASN		2/69	"	"
Corpus Christi	HP HE MC	TASN		1973	"	"
Corpus Christi	HP HE	TASN	1/69	1973	97-27-20	27-49-08
Corpus Christi		TASN	2/69	1973	97-23-15	27-44-15
Corpus Christi		TASN		12/70	97-25-45	27-47-45
Corpus Christi		City #A	1970		97-16-10	27-39-40
Corpus Christi		City #C	1970		97-23-15	27-44-15
Corpus Christi		City #F	1970		97-23-52	27-47-17
Corpus Christi		City #H	1970		97-25-55	27-45-35
Corpus Christi		City #I	1970		97-25-30	27-46-45
Corpus Christi		City #J	1970		97-25-45	27-47-45
Corpus Christi		City #K	1970		97-23-45	27-48-53
Corpus Christi		City #N	1970		97-27-20	27-49-08
Corpus Christi		City #O	1970		97-26-05	27-49-12
Corpus Christi		City #P	1970		97-25-45	27-49-30
Point Comfort	RB	TASN	12/70	4/71	96-34-00	28-40-30
ngleside	RB	TASN	1975	1975	97-12-45	27-51-30
Victoria	HP	TASN	1973	1973	96-59-30	28-48-15
Kingsville	SR	TASN	1974	1974	97-54-00	27-32-30
Beeville	SR	TASN	1973	1973	97-45-00	28-24-15
Cuero	SR	TASN	1974	1974	97-17-30	29-05-45
Goliad	SR	TASN	1974	1974	To be determined	
Seadrift	MS	TASN	1974		96-40-30	28-24-30
Alice	SR	TASN	1975	1975	To be determined	
Driscoll	RB	TASN	1975	1975	"	
Aqua Dulce	RB	TASN	1976	1976	"	
Gregory	RB	TASN	1975	1975	"	
Sinton	RB	TASN	1975	1975	"	
Robstown	SR	TASN	1976	1976	"	
Tilden	RB	TASN	1973	1973	"	
Corpus Christi	HP HE	TASN	5/73		97-26-00	27-47-22

REGION V

TAMN* Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Corpus Christi	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE COH HP MC EE	Trailer I**	5/73	97-26-00	27-47-22
Corpus Christi	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1974	97-27-30	27-49-08
Corpus Christi	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1975	To be determined	
Corpus Christi	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1976	To be determined	
Victoria	CO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1975	To be determined	
Kingsville	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1977	To be determined	

* Except as noted.
** Will include tape sampler (coefficient-of-haze type).

REGION VI

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Odessa	HP HE	TASN	1/63	5/71	102-20-45	31-52-15
Odessa	HP HE MC	TASN	1973	1973	102-23-00	31-50-45
San Angelo	HP	NASN	8/69	8/69	100-26-06	31-27-40
San Angelo	HP	TASN	5/71	5/71	100-26-15	31-27-45
Big Spring	HP	TASN	5/71	9/72	101-28-00	32-14-45
Midland	HP HE	TASN	5/71	9/72	102-04-15	32-00-15
Fort Stockton	SR	TASN	1973	1973	102-52-15	30-53-45
Lamesa	SR	TASN	1975	1975	101-57-15	32-44-15
Monahans	SR	TASN	1976	1976	To be determined	

TAMN Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Odessa	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE	Trailer I	1974	102-23-00	31-50-45
Odessa	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1977	To be determined	
Midland	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1975	To be determined	
San Angelo	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1976	To be determined	

REGION VII

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Texas City	HP HE	TASN	1/59		94-55-05	29-23-05
Texas City	HP HE	TASN		1973	94-56-00	29-23-30
Texas City	HP HE	County #3	1969		95-54-20	29-23-20
Texas City	HP HE	County #4	1969	1969	95-55-50	29-23-00
Texas City	HP HE	County #8		1969	94-54-10	29-22-50
Texas City	HP HE	County #11	1969		94-55-05	29-23-05
Texas City	HP HE	County #12		1969	94-56-40	29-21-28
Texas City	HP HE	County #31		1969	94-53-55	29-23-00
Texas City	HP HE	County #33		1969	94-56-55	29-22-45
Texas City	HP HE	County #43	1969		94-58-55	29-22-55
Texas City	HP HE	County #45	1969		94-56-50	29-23-55
Galveston	HP	TASN	1/59	1973	94-47-45	29-18-00
Galveston	HP	County #47	1969		94-49-25	29-17-00
La Marque	HP	County #24	1969		94-57-00	29-21-50
La Marque	HP	County #35		1969	94-57-00	29-22-07
Kemah	HP HE	County #25	1969		95-01-35	29-32-45
Friendswood	HP HE	County #27	1969		95-11-55	29-31-50
League City	HE	County #26	1969		95-06-00	29-30-35
League City	HE	TASN	11/71	11/71	95-04-30	29-31-30
Baytown	HP HE	TASN	12/66		94-56-45	29-43-15
Baytown	HP HE	TASN	12/66	1/59	94-58-45	29-44-50
Baytown	HP HE	TASN	1/70		95-01-45	29-46-15
Houston	HP HE	NASN	9/65	9/65	95-22-13	29-45-38
Houston	HP HE	City #1	1969	1969	95-22-13	29-45-38
Houston	HP HE	City #2	1969	1969	95-22-13	29-45-23
Houston	HP HE	City #3	1969	1969	95-17-02	29-43-05
Houston	HP HE	City #4	1969	1969	95-13-42	29-38-05
Houston	HP HE	City #5	1969	1969	95-21-19	29-38-07
Houston	HP HE	City #6	1969	1969	95-20-45	29-43-14
Houston	HP HE	City #7	1969	1969	95-23-02	29-43-07
Houston	HP HE	City #8	1969	1969	95-26-24	29-41-52
Houston	HP HE	City #9	1969	1969	95-30-43	29-42-28
Houston	HP HE	City #10	1969	1969	95-26-21	29-44-18
Houston	HP HE	City #11	1969	1969	95-29-02	29-49-04
Houston	HP HE	City #12	1969	1969	95-22-54	29-51-14
Houston	HP HE	City #13	1969	1969	95-17-05	29-49-38
Houston	HP HE	City #14	1969	1969	95-18-27	29-46-26
Houston	HP HE	City #15	1969	1969	95-12-14	29-46-02
Houston	HP HE	City #16	1969	1969	95-11-15	29-46-32
Houston	HP HE	City #17	1969	1969	95-12-47	29-44-00
Ship Channel	HP HE	City #19	1969	1969	95-12-10	29-44-45
Ship Channel	HP HE	City #21	1969	1969	95-16-30	29-43-23
Ship Channel	HE	City #18	1969	1969	95-10-30	29-44-50
Houston	HP HE	TASN	4/73		95-13-20	29-46-10

REGION VII

Non-continuous Samplers
(continued)

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Ship Channel	HE	City #20	1969	1969		
Ship Channel	HE	City #22	1969	1969		
Ship Channel	HE	City #23	1969	1969		
Deer Park	HP HE	City #DP1	1969	1969	95-07-15	29-41-18
Pasadena	HP HE	City #P2	1969	1969	95-13-40	29-42-45
Pasadena	HP HE	NASN	7/69	7/69	"	"
Pasadena	HP HE	TASN	6/72	5/72	95-07-05	29-39-15
Clute	SR	TASN	1/66	1974	95-24-30	29-01-30
Mont Belview	SR	TASN	11/66		94-53-45	29-51-15
Beach City	RB	TASN	11/66		94-55-00	29-40-15
Matagorda	RB	NASN	4/67	4/67	95-58-24	28-49-59
Winnie	SR	TASN	11/68		94-22-40	29-49-05
Harris County	HP HE	TASN	1973	1973	To be determined	
Alvin	HP	TASN	8/72	8/72	95-14-08	29-23-43
South Houston	HP	TASN	6/72	5/72	95-14-28	29-39-50
La Porte	HP	TASN	5/72	6/72	95-00-57	29-39-34
Alief	HP	TASN	7/72	7/72	95-34-04	29-41-47
Cypress	HE	TASN	7/72	7/72	95-39-02	29-56-12
Tomball	HP	TASN	6/72	6/72	95-37-21	30-05-37
Spring	HP	TASN	6/72	6/72	95-25-51	30-03-07
Channelview	HP	TASN	6/72	6/72	95-07-27	29-47-28
Freeport	HE	TASN	1973	1973	95-21-15	28-57-15
Freeport	HE	TASN		1973	To be determined	
Rosenberg	SR	TASN	1973	1973	95-48-45	29-33-30
Liberty	SR	TASN	1973	1973	To be determined	
El Campo	SR	TASN	1974	1974	"	
Cleveland	SR	TASN	1974	1974	"	
Wharton	SR	TASN	1974	1974	"	
Angleton	SR	TASN	1974	1974	"	
Huntsville	SR	TASN	1975	1975	"	
Bay City	SR	TASN	1975	1975	"	
Columbus	SR	TASN	1975	1975	"	
Palacios	RB	TASN	1975	1975	"	
Conroe	SR	TASN	1975	1975	"	
Sealy	SR	TASN	1975	1975	"	

REGION VII

TAMN* Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Houston	O_3 HP MC EE	O_3 (EPA-TAMN)	5/72	95-21-30	29-45-15
Houston	SO_2 HP MC EE O_3 HP EE CO HP EE NO_2 HP EE COH HP MC EE	Trailer I**	4/73	95-13-20	29-46-10
Houston (Downtown)	SO_2 HP EE O_3 HP EE CO HP MC EE NO_2 HP MC EE	Trailer I	1973	95-21-15	29-44-30
Houston (NW)	SO_2 HP EE O_3 HP MC EE CO HP EE NO_2 HP EE	Trailer I	1973	94-56-00	29-23-30
Houston	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1974	To be determined	

* Except as noted.
** Will include tape sampler (coefficient-of-haze type).

REGION VII

TAMN* Continuous Monitors
(continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Houston	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer (EPA)	9/72	95-22-12	29-45-52
Houston	SO_2 HP HE CO HP HE NO_2 HP HE	Trailer (City)	1971	95-15-40	29-44-10
Houston	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer (City)	1971	95-21-30	29-45-15
Houston	SO_2 HP HE O_3 HP HE CO HP HE NO_2 HP HE	Penthouse Sta. (City)	1971	95-23-02	29-43-07
Baytown	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1974	To be determined	
Galveston	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1974	To be determined	
Texas City	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	To be determined	
Harris County	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	To be determined	

* Except as noted.

REGION VII

TAMN Continuous Monitors
(continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Pasadena	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	To be determined	
Freeport	SO_2 HP MS HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	To be determined	
Houston	SO_2 HP HE O_3 HP CO HP HE NO^2 HP HE	Trailer I	1976	To be determined	
San Jacinto City	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1976	To be determined	
San Jacinto Ordinance Depot	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1976	To be determined	
LaMarque	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1976	To be determined	
Harris County	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1976	To be determined	
Northern Harris Co.	SO_2 HP PG O_3 HP PG CO HP PG NO_2 HP PG	Trailer I	1977	To be determined	

REGION VII

TAMN Continuous Monitors
(continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Morgans Point	SO_2 HP PG O_3 HP PG CO HP PG NO_2 HP PG	Trailer I	1977	To be determined	
Bay City	SO_2 HE O_3 SR	Trailer III	1977	To be determined	
Bay Port	SO_2 HE O_3 PG CO PG NO_2 PG	Trailer I	1977	To be determined	
Conroe	SO_2 HE O_3 SR	Trailer III	1977	To be determined	
Liberty	SO_2 HE O_3 SR	Trailer III	1977	To be determined	

REGION VIII

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Bubblers	Site Longitude W	Site Latitude N
Fort Worth	HP HE	TASN	1/61		97-19-45	32-45-00
Fort Worth	HP HE	TASN		1973	97-20-00	32-45-00
Fort Worth	HP HE	NASN	2/68	2/68	97-19-45	32-45-00
Fort Worth	HP HE	City # 1	1966		"	"
Fort Worth	HP HE	City # 2	1966		97-21-38	32-45-27
Fort Worth	HP HE	City # 4	1966		97-23-00	32-48-11
Fort Worth	HP HE	City # 5	1966		97-19-55	32-47-55
Fort Worth	HP HE	City # 5E	1966		"	"
Fort Worth	HP HE	City # 9	1966		97-13-05	32-44-02
Fort Worth	HP HE	City # 9E	1966		"	"
Fort Worth	HP HE	City #10	1966		97-16-32	32-43-41
Fort Worth	HP HE	City #14	1966		97-19-21	32-40-35
Fort Worth	HP HE	City #14E	1966		"	"
Fort Worth	HP HE	City #15	1966		97-23-42	32-39-28
Fort Worth	HP HE	City #16E	1966		97-21-02	32-44-17
Fort Worth	HP HE	City #17	1966		97-27-20	32-44-05
Fort Worth	HP HE	City #17E	1966		"	"
Fort Worth	HP HE	City # 1G		1966	97-20-04	32-45-00
Fort Worth	HP HE	City # 2G		1966	97-23-00	32-48-11
Fort Worth	HP HE	City # 3G		1966	97-19-47	32-45-18
Dallas	HP HE MC	NASN	8/67	8/67	96-47-25	32-46-50
Dallas	HP HE	City #23	1967	1967	"	"
Dallas	HP HE	City # 1	1967	1967	96-50-00	32-46-15
Dallas	HP HE	City # 2	1967		96-51-20	32-46-50
Dallas	HP HE	City # 8	1967		96-50-10	32-50-10
Dallas	HP HE	City #18	1967		96-46-50	32-44-45
Dallas	HP HE	City #20	1967		96-47-30	32-41-25
Dallas	HP HE	City #27	1967		96-41-10	32-44-10
Dallas	HP HE	City #28	1967		96-42-10	32-51-50
Dallas	HP HE	City #29	1967		96-48-30	32-51-50
Dallas	HP HE	City #35	1967		96-46-10	32-54-50
Dallas	HP HE	City #36	1967		96-44-50	32-46-20
Dallas	HP HE	City #38	1967		96-41-45	32-48-25
Dallas	HP HE	City #40	1967		96-53-25	32-43-10
Dallas	HP HE	City #42	1967	1967	96-45-00	32-49-00
Dallas	HP HE	TASN		1973	96-48-00	32-47-00
Sherman	SR PG	TASN	6/72	6/72	96-36-40	33-38-30
Denton	SR PG	TASN	6/72	6/72	97-08-00	33-13-00
Arlington	HP PG	TASN	9/72	9/72	97-03-16	32-45-00
Arlington	HP PG	City/TASN	9/72		97-05-48	32-42-12
Arlington	HP PG	City/TASN	9/72		97-06-57	32-44-12
Arlington	HP PG	City/TASN	9/72		97-08-09	32-45-23
Dallas	HP PG	TASN	9/73		96-48-28	32-55-35

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REGION VIII

Non-continuous Samplers
(continued)

Site Name	Site Category	Network	Installation Date Hi-Vols	Bubblers	Site Longitude W	Site Latitude N
Grand Prairie	HP PG	TASN	10/72	10/72	97-00-30	32-44-30
Grand Prairie	HP PG	TASN	10/72		96-58-00	32-45-30
Hurst	HP PG	TASN	1973	1973	To be determined	
Denison	SR	TASN	1974	1974	96-32-15	33-44-45
Corsicana	SR	TASN	1975	1975	96-27-30	32-03-30
Waxahachie	SR	TASN	12/73	12/73	96-50-50	32-23-15
Greenville	SR	TASN	1974	1974	96-06-30	33-08-30
Gainesville	SR	TASN	1974	1974	To be determined	
Cleburne	SR	TASN	1975	1975	"	
Ennis	SR	TASN	1976	1976	"	
McKinney	SR PG	TASN	1973	1973	"	
Commerce	SR	TASN	1976	1976	"	
Mineral Wells	SR	TASN	1974	1974	"	

TAMN* Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Dallas	SO_2 HP HE EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE CCH HP MC EE	Trailer I**	9/73	96-48-28	32-55-35

* Except as noted.
** Will include tape sampler (coefficient-of-haze type).

REGION VIII

TAMN Continuous Monitors
(continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Dallas	O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer II	1974	96-48-00	32-48-30
Dallas	O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer II	1975	96-47-00	32-46-00
Fort Worth	SO_2 HP MC EE O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer I	1973	97-18-30	32-44-00
Fort Worth	O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer II	1974	97-20-00	32-45-00
Fort Worth	O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer II	1975	To be determined	
Dallas	O_3 HP CO HP HE NO_2 HP HE	Trailer II	1976	To be determined	
Fort Worth	O_3 HP CO HP HE NO_2 HP HE	Trailer II	1976	To be determined	
Arlington	O_3 HP PG CO HP PG NO_2 HP PG	Trailer II	1976	To be determined	
Irving	O_3 HP PG CO HP PG NO_2 HP PG	Trailer II	1976	"	
Garland	O_3 HP PG CO HP PG NO_2 HP PG	Trailer II	1977	"	

REGION VIII

TAMN Continuous Monitors
(continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Mesquite	O_3 HP PG CO HP PG NO_2 HP PG	Trailer II	1977	To be determined	
Sherman	O_3 SR PG CO SR PG NO_2 SR PG	Trailer II	1977	"	

REGION IX

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Bubblers	Site Longitude W	Site Latitude N
San Antonio	HP HE MC	NASN	1/67	1/67	98-29-55	29-25-24
San Antonio	HP HE	City #14	1968	1968	"	"
San Antonio	HP HE	City #21	1968		98-23-10	29-16-00
San Antonio	HP HE	City #23	1968		98-33-52	29-26-16
San Antonio	HP HE	City #24	1968		98-29-16	29-29-52
San Antonio	HP HE	City #25	1968	1968	98-32-37	29-22-04
San Antonio	HP HE	City #26	1968	1968	98-24-58	29-26-07
San Antonio	HP HE	City #28	1968		98-24-12	29-30-30
San Antonio	HP HE	City #30	1968		98-36-51	29-26-32
San Antonio	HP HE	City #31	1968	1968	98-28-28	29-31-39
San Antonio	HP HE	City #32	1968	1968	98-26-56	29-21-34
San Antonio	HP HE	TASN		1973	98-30-00	29-26-30
San Antonio	HP HE	TASN		1973	98-31-00	29-29-00
Eagle Pass	SR	TASN	6/71	1973	100-30-00	28-41-00
Del Rio	SR	TASN	1973	1973	100-54-00	29-22-00
Kerrville	SR	TASN	1976	1976	99-08-30	30-02-45
New Braunfels	SR	TASN	1973	1973	98-07-30	29-42-15
Fredericksburg	SR	TASN	1975	1975	98-52-15	30-16-30
Uvalde	SR	TASN	1974	1974	99-47-00	29-12-45
Karnes City	SR	TASN	1973	1973	97-54-00	28-53-15
San Antonio	HP HE	TASN	1/74		98-32-22	29-30-16

TAMN Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
San Antonio	SO_2 HP HE EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE COH HP MC EE	Trailer I*	1/74	98-32-22	29-30-16

* Will include tape sampler (coefficient-of-haze type).

REGION IX

TAMN Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
San Antonio	SO_2 HP MC EE O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer I	1974	98-31-00	29-29-00
San Antonio	O_3 HP EE CO HP HE EE NO_2 HP HE EE	Trailer II	1975	98-29-00	29-24-00
San Antonio, W	O_3 HP CO HP HE NO_2 HP HE	Trailer II	1976	To be determined	
Bexar County, NE	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	98-21-00	29-33-00
Bexar County, SW	SO_2 HP HE O_2 HP CO HP HE NO_2 HP HE	Trailer I	1976	To be determined	

REGION X

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Beaumont	HP HE MC	NASN/TASN	1/59		94-05-30	30-03-30
Beaumont	HP HE MC	NASN		1/59	"	"
Beaumont	HP HE	TASN	1973	1973	94-06-00	30-05-00
Beaumont	HP HE	County#1.1	1969	1969	94-02-45	30-03-45
Beaumont	HP HE	County#5.1	1969		94-05-45	30-05-45
Orange	HP HE	TASN	2/66	6/72	93-44-00	30-05-40
Port Arthur	HP HE	TASN	3/66	6/72	93-56-28	29-54-43
Port Arthur	HP HE	County#2.1	1969		93-57-30	29-50-75
Port Arthur	HP HE	County#7.2	1969		93-58-45	29-53-45
Port Arthur	HP HE	County#10.2	1969		93-54-05	29-57-55
Port Arthur	HP HE	TASN		11/72	93-58-30	29-53-45
Port Neches	HP HE	TASN		11/72	93-57-15	29-59-30
Nederland	SR	TASN		1973	To be determined	
Port Neches		County#6.2	1969		93-57-15	29-59-30
Port Neches		County#8.2	1969		93-56-45	29-57-00
Nederland		County#11.2	1969		94-01-00	29-57-15
Jefferson Co.		County#3.3	1969		94-20-15	29-50-00
Kountze	HE	TASN	1974	1974	94-18-45	30-22-45
Evadale	HE	TASN	1973	1973	94-04-30	30-20-30
Lufkin	SR	TASN	1974	1974	94-43-45	31-20-30
Nacogdoches	SR	TASN	1975	1975	94-39-15	31-36-15
Livingston	SR	TASN	1974	1974	To be determined	
Crockett	SR	TASN	1976	1976	95-27-30	31-19-00
Beaumont (Nederland)	HP HE MC	TASN	6/73		94-01-00	29-57-15

TAMN* Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Beaumont (Nederland)	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE COH HP MC EE	Trailer I**	5/73	94-01-00	29-57-15

* Except as noted.
** Will include tape sampler (coefficient-of-haze type).

REGION X

TAMN Continuous Monitors
(Continued)

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Port Arthur	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1973	93-56-00	29-53-00
Orange	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1974	93-46-00	30-05-45
Beaumont	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	94-05-00	30-03-00
Port Arthur NE	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1976	To be determined	
Orange NW	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1977	To be determined	

REGION X

Non-continuous Samplers

Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
El Paso	HP HE MC	NASN	1/62	1/62	106-29-00	31-45-30
El Paso	HP HE	TASN	1/62		"	"
El Paso	HP HE	TASN/City		1/73	"	"
El Paso	HP HE	TASN/City		11/72	106-35-30	31-50-30
El Paso	HP HE	TASN/City		11/72	106-25-04	31-46-16
El Paso	HP HE	City #1	1969		106-34-45	31-50-15
El Paso	HP HE	City #4	1969		To be determined	
El Paso	HP HE	City #5	1969		106-32-30	31-50-00
El Paso	HP HE	City #6	1969		106-30-50	31-47-40
El Paso	HP HE	City #7	1969		106-26-20	31-51-30
El Paso	HP HE	City #8	1969		106-32-30	31-54-20
El Paso	HP HE	City #9	1969		106-23-40	31-47-55
El Paso	HP HE	City #10	1969		106-21-15	31-47-30
El Paso	HP HE	City #11	1969		To be determined	
El Paso	HP HE	City #12	1969		106-19-45	31-41-20
El Paso	HP HE	City #13	1969		106-21-40	31-44-20
El Paso	HP HE	City #14	1969		106-24-15	31-46-25
El Paso	HP HE	City #15	1969		106-24-40	31-45-35
El Paso	HP HE	City #16	1969		106-26-20	31-46-00
Anthony		City #3	1969		106-35-50	31-59-30
Canutillo		City #2	1969		106-35-00	31-54-50
Clint		City #18	1969		103-13-50	31-35-15
Alpine	RB	TASN	1973	1973	103-39-45	30-20-45
Van Horn	RB	TASN	1973	1973	104-50-00	31-02-30
Fort Davis	RB	TASN	1975	1975	103-53-15	30-35-00
El Paso	HP HE	TASN/City		11/72	106-24-30	31-53-30
El Paso	HP HE	TASN/City		11/72	106-27-15	31-47-15
El Paso	HP HE	TASN/City		11/72	106-30-30	31-46-30
El Paso	HP HE	TASN	11/73		106-29-10	31-45-45

REGION XI

TAMN* Continuous Monitors

Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
El Paso	CO HP HE	CO(EPA-TAMN)	8/72	106-30-00	31-37-30
El Paso	SO_2 MS HP MC EE O_3 HP EE MC CO HP HE EE NO_2 HP HE COH HP MC EE	Trailer I**	11/73	106-29±0	31-45-45
El Paso	SO_2 HP HE EE O_3 HP EE CO HP MC EE NO_2 HP MC EE	Trailer I	1973	106-27-45	31-46-30
El Paso, N	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1974	To be determined	
El Paso, S	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	"	
El Paso	SO_2 HP HE O_3 HP CO HP HE NO_2 HP HE	Trailer I	1975	"	
SE of El Paso	SO_2 PG O_3 PG CO PG NO_2 PG	Trailer I	1977	"	

* Except as noted.

** Will include tape sampler (coefficient-of-haze type).

REGION XII

Non-continuous Samplers

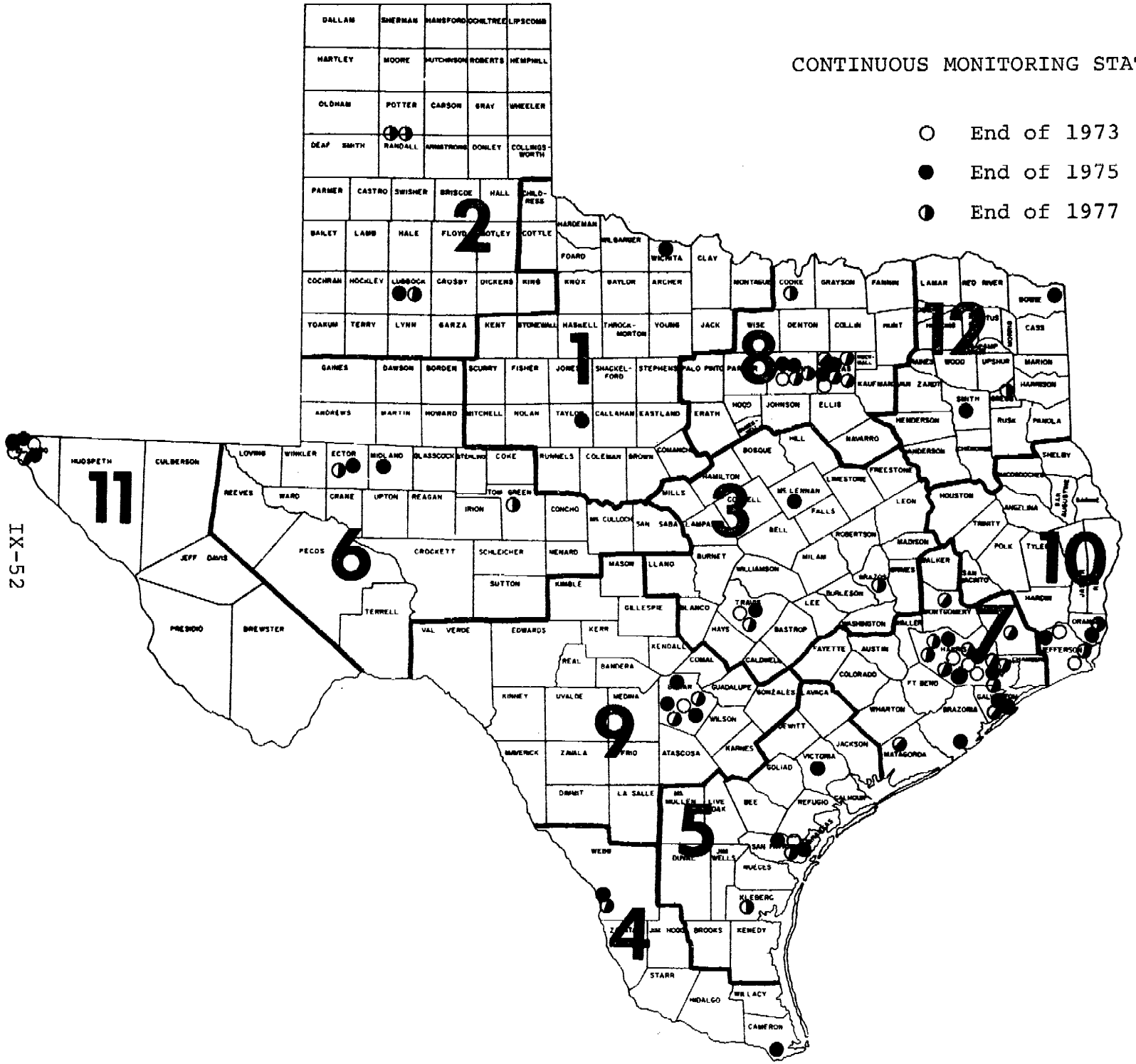
Site Name	Site Category	Network	Installation Date Hi-Vols	Installation Date Bubblers	Site Longitude W	Site Latitude N
Tyler	HP PG	TASN	1/63	12/73	95-18-00	32-21-00
Texarkana	HP MC	TASN	1/64	12/73	94-02-33	33-25-30
Daingerfield	MS	TASN	1973	1973	94-43-15	33-01-45
Longview	HP	TASN	1973	1973	94-44-30	32-29-15
Marshall	SR	TASN	1974	1974	94-22-15	32-33-00
Paris	SR	TASN	1975	1975	95-38-30	33-39-45
Palestine	SR	TASN	1976	1976	To be determined	
Henderson	SR	TASN	1976	1976	"	
Mount Pleasant	SR	TASN	12/73	12/73	94-58-37	33-10-48

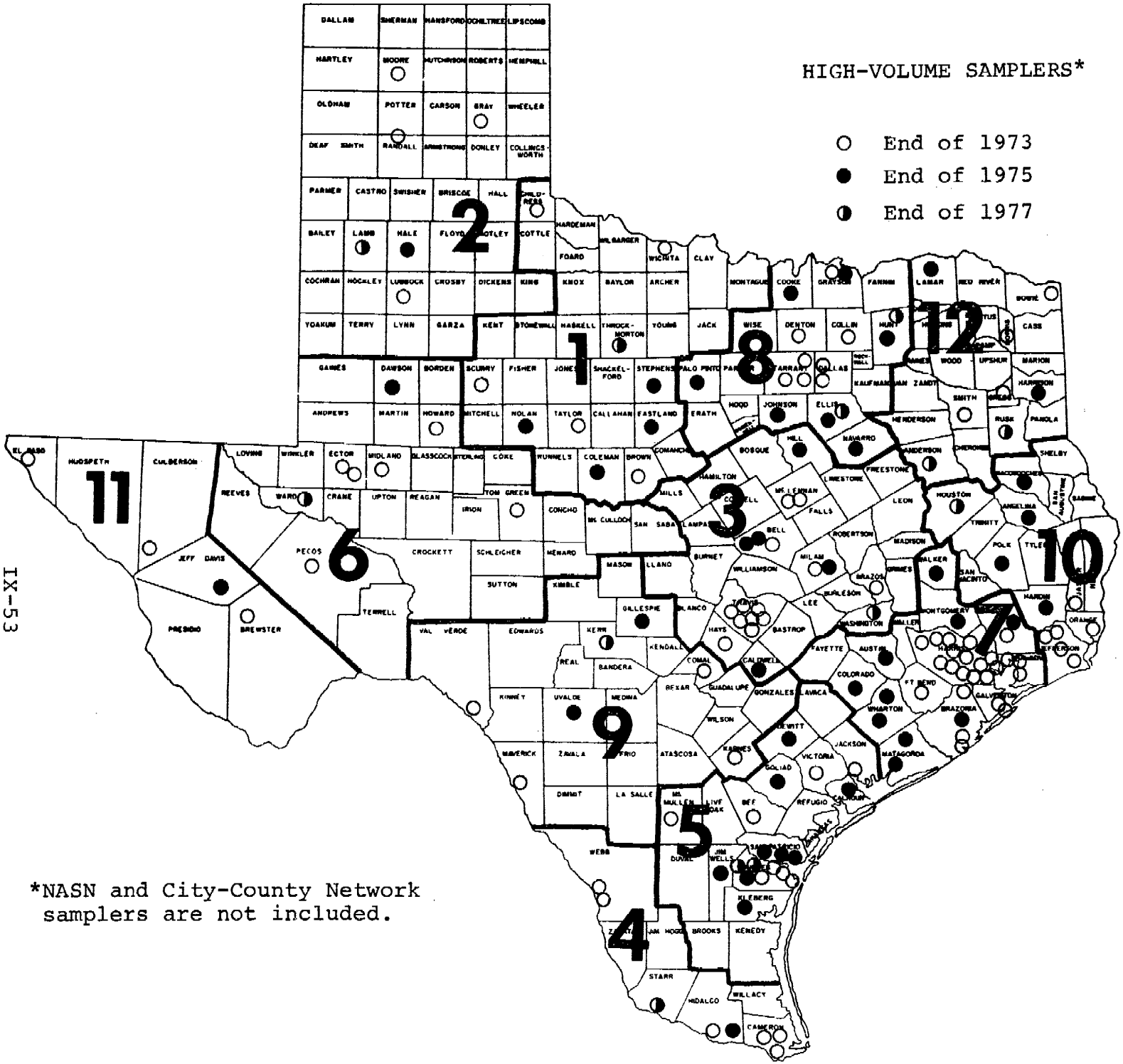
TAMN Continuous Monitors

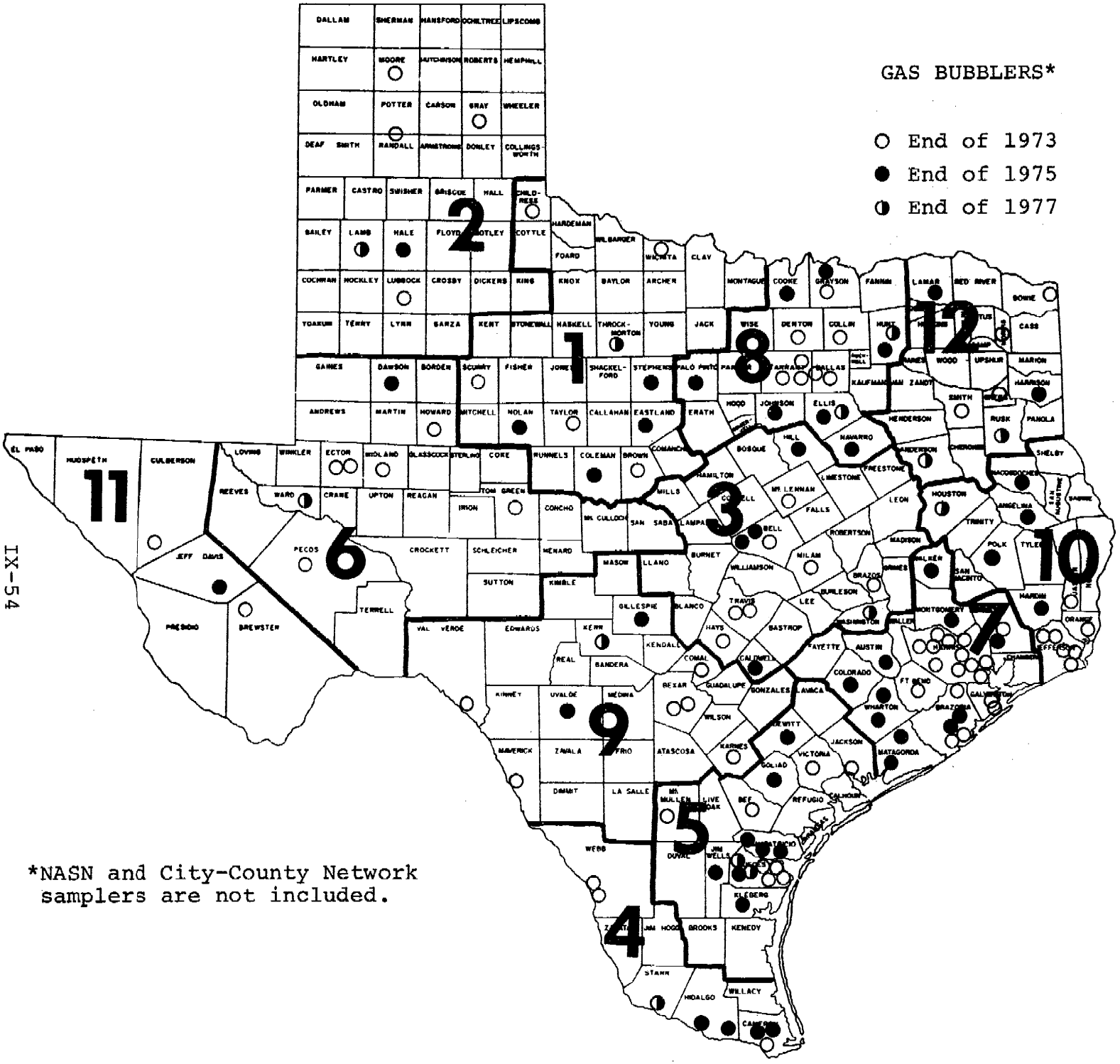
Site Name	Site Category	Monitors	Installation Date	Site Longitude W	Site Latitude N
Texarkana	SO_2 HP MC EE O_3 HP MC EE CO HP MC EE NO_2 HP MC EE	Trailer I	1974	94-02-30	33-25-30
Tyler	SO_2 HP PG O_3 HP PG CO HP PG NO_2 HP PG	Trailer I	1975	To be determined	
Longview	SO_2 HP O_3 HP CO HP NO_2 HP	Trailer I	1977	"	

Attachment 3

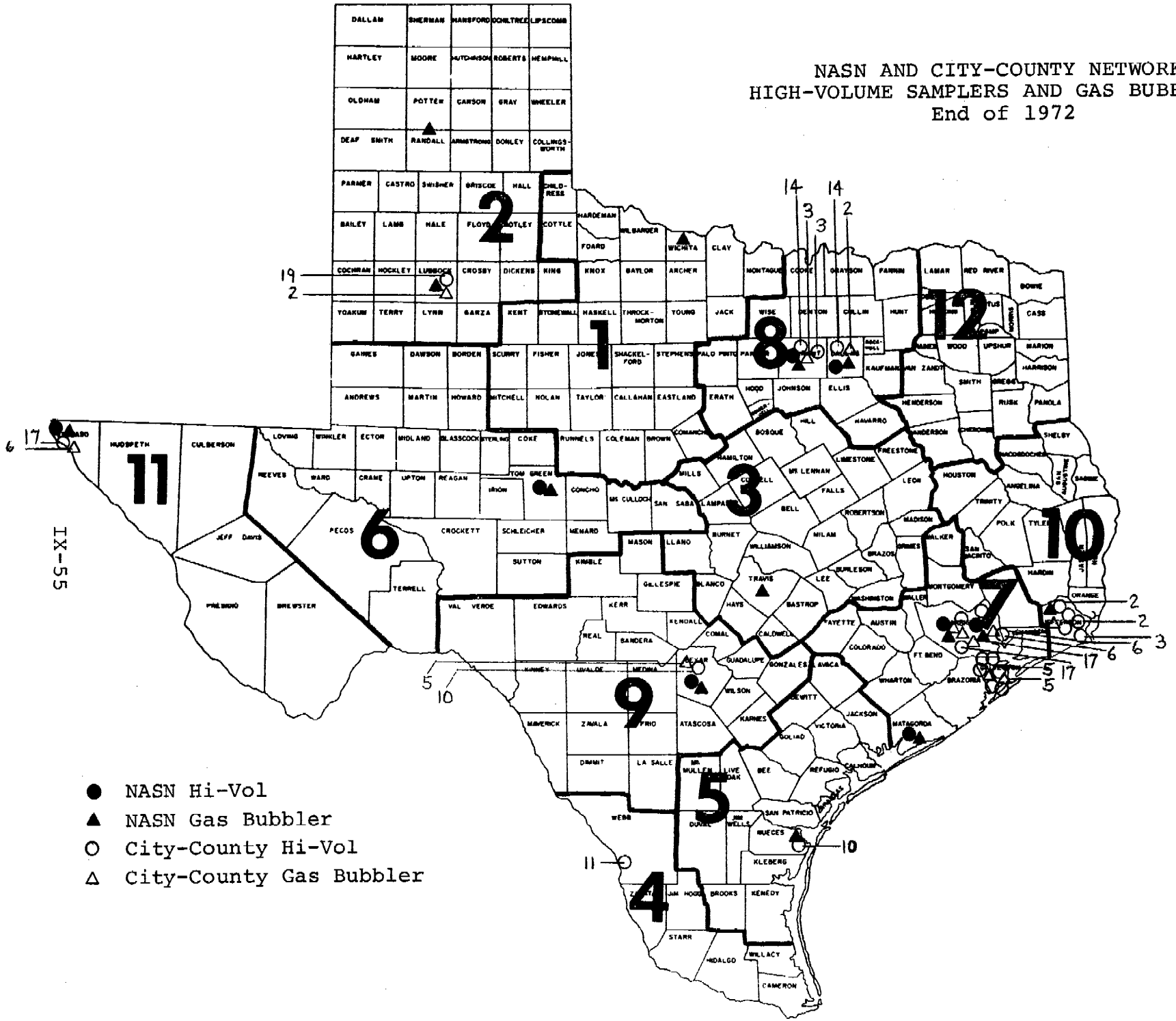
Sampling Sites (Maps)


CONTINUOUS MONITORING STATIONS
End of 1973
End of 1975
End of 1977
1
2
3
4
5
6
7
8
9
10
11
12


HIGH-VOLUME SAMPLERS*
End of 1973
End of 1975
End of 1977
1
2
3
4
5
6
7
8
9
10
11
12
*NASN and City-County Network samplers are not included.



*NASN and City-County Network samplers are not included.


NASN AND CITY-COUNTY NETWORK
HIGH-VOLUME SAMPLERS AND GAS BUBBLERS
End of 1972
● NASN Hi-Vol
▲ NASN Gas Bubbler
○ City-County Hi-Vol
△ City-County Gas Bubbler

Attachment 4

Regional Equipment Requirements
Phases I-III

Air Quality Surveillance System
Regional Equipment Requirements*

Phases I-II
(through 1973)

Region	Hi-Vols	Gas Bubblers	Continuous Monitoring Trailers	Total Cost
I	5	5	-	$ 3,925
II	4	4	-	3,140
III	13	7	1	56,845
IV	6	3	-	3,405
V	8	8	1	55,530
VI	6	6	-	4,710
VII	24	18	3	163,980
VIII	8	8	2	104,780
IX	4	6	1	56,360
X	6	7	2	103,645
XI	3	2	2	100,420
XII	4	4	-	3,140
Total:	87	79	12	$ 660,315

*NASN and City-County Network equipment is not included.

Air Quality Surveillance System
Regional Equipment Requirements*

Phase III
(1974-1975)

Region	Hi-Vols	Gas Bubblers	Continuous Monitoring Trailers	Total Cost
I	4	4	2	$ 104,780
II	1	1	1	50,035
III	5	4	2	101,990
IV	1	4	2	100,590
V	9	8	3	157,180
VI	1	1	2	99,285
VII	10	11	7	353,035
VIII	7	7	4	178,495
IX	2	2	3	143,320
X	4	4	2	104,780
XI	1	1	3	148,535
XII	2	2	2	100,070
Total:	47	49	33	$ 1,642,095

*NASN and City-County Network equipment is not included.

Air Quality Surveillance System
Regional Equipment Requirements*

Phase III
(1976-1977)

Region	Hi-Vols	Gas Bubblers	Continuous Monitoring Trailers	Total Cost
I	1	1	-	$ 785
II	1	1	3	148,535
III	1	1	2	87,285
IV	1	1	1	50,035
V	2	2	2	100,070
VI	1	1	2	99,285
VII	-	-	11	501,250
VIII	2	2	7	304,320
IV	1	1	2	103,285
X	1	1	2	99,285
XI	-	-	1	49,250
XII	2	2	1	50,820
Total:	13	13	34	$1,594,205

*NASN and City-County Network equipment is not included.

Air Quality Surveillance System
Regional Equipment Requirements*

Phases I-III
(through 1977)

Region	Hi-Vols	Gas Bubblers	Continuous Monitoring Trailers	Total Cost
I	10	10	2	$ 109,490
II	6	6	4	201,710
III	19	12	5	246,120
IV	8	8	3	154,030
V	19	18	6	312,780
VI	8	8	4	203,280
VII	34	29	21	1,018,265
VIII	17	17	13	587,595
IX	7	9	6	302,965
X	11	12	6	307,710
XI	4	3	6	298,205
XII	8	8	3	154,030
TOTAL:	147	141	79	$3,896,615

*NASN and City-County Network equipment is not included.

Attachment 5

Summary of Data Sources
With Data Flow Diagrams

Data Sources

High-Volume Air Samplers

The data outlined below will be generated from high-volume air sampler filters.

Total Suspended Particulate

Total suspended particulate data will be obtained from the State network on five samples per month at each station using methods prescribed in the Federal Register, Volume 36, No. 84, April 30, 1971. Data will be forwarded routinely from the laboratory to the central computer facility on a log sheet in SAROAD format. Similarly, log sheets will be obtained from participating local air control programs on a weekly basis. The data will show the areas that fail to meet national and/or state standards for total suspended particulate and will be used to alert both State and local personnel to the need for increased control of source emissions in that locality.

Benzene Solubles, Sulfates, and Nitrates

Benzene soluble data will be generated once each month from each station by taking an equal section of the five filters of the month and extracting the resulting composite in a single analysis. Sulfates and nitrates will be run once each quarter on the heaviest filter received from each station. This data will be forwarded on keypunch coding sheets. Similar data will be obtained from participating local programs.

Lead

Lead loading will be determined by atomic absorption on the heaviest filter of each quarter from each station. The same information will be obtained from local programs which possess atomic absorption equipment. This data will be forwarded to the central computer facility on log sheets. Local programs that do not possess atomic absorption equipment will be requested to forward a section from the heaviest filter of each quarter for analysis in Austin.

Other Heavy Metals and Trace Elements

X-ray fluorescence (XRF) equipment is being purchased to allow us to obtain a much greater volume of information than

by any other available technique. The validity of this technique in examining hi-vol filter samples has been well demonstrated. The information will be in the form of airborne loading of many potentially harmful heavy elements, such as arsenic, cadmium, lead, chromium, nickel, and manganese. Data on other less harmful elements will be generated at the same time, with no increase in cost or analysis time. This data will include loadings for barium, bromine, calcium, cobalt, iron, molybdenum, titanium, zinc, and zirconium. This extensive volume of information for each sample will be of significant value to the program in enforcing the provisions of the Clean Air Act of Texas and the Regulations of the Texas Air Control Board in two ways.

First, the XRF technique will allow us to find sources of heavy metal pollution that are not now known. With the use of cellulose filters with all State network hi-vols, all filters will be analyzed routinely by the XRF technique for all of the elements indicated above. The resulting data will be examined to find any samples having unusually heavy loadings of any potentially toxic metals.

For each sample showing an unusually heavy loading of a toxic metal, we will request additional hi-vol sampler filters from either temporary or permanent sites near the site of the original sample. These will also be analyzed by XRF to determine metal loadings, and the resulting data will be plotted to determine isopleths for the toxic metal of immediate interest. This should allow determination of the source to be made readily, and the results will be forwarded to an enforcement group so that abatement can be required, as allowed under the provisions of the Clean Air Act of Texas. Thus, the data can be used to find sources and to force their compliance with Texas laws. The validity of this concept has been proven by work undertaken by an outside contractor. Filters were analyzed by XRF from State network hi-vol samplers, and several unexpected high levels of heavy metals were found. In one of the cities, the local program was requested to run cellulose filters on its local hi-vol network. Analysis of the filters by XRF pinpointed the source of the pollution, and the data is now being prepared for submission to the compliance group so that abatement can be required.

Second, the XRF equipment can be used to identify the source of a particulate. In heavily industrialized areas, particulate matter from one source often settles on another source, so that attempts to measure obvious sources sometimes result in obtaining heavier loadings upwind than downwind. This makes it difficult to enforce Regulation I of the Texas Air Control Board. However, XRF data will make it easy to demonstrate the true source of the particulate in question and will thus facilitate enforcement of Regulation I.

This vast volume of information is obtained by XRF techniques with no sample preparation, and the sample is not destroyed. The x-ray count is rapid and takes little operator time, so that many samples can be run without excessive load on the laboratory staff. The nondestructive nature of this technique, coupled with the ability to reanalyze and to present the sample actually analyzed as evidence, will give extra significance to XRF data presented in court in support of a case filed under the Clean Air Act of Texas.

Data from XRF analysis will be recorded on magnetic or paper tape and forwarded for processing.

Gas Bubblers

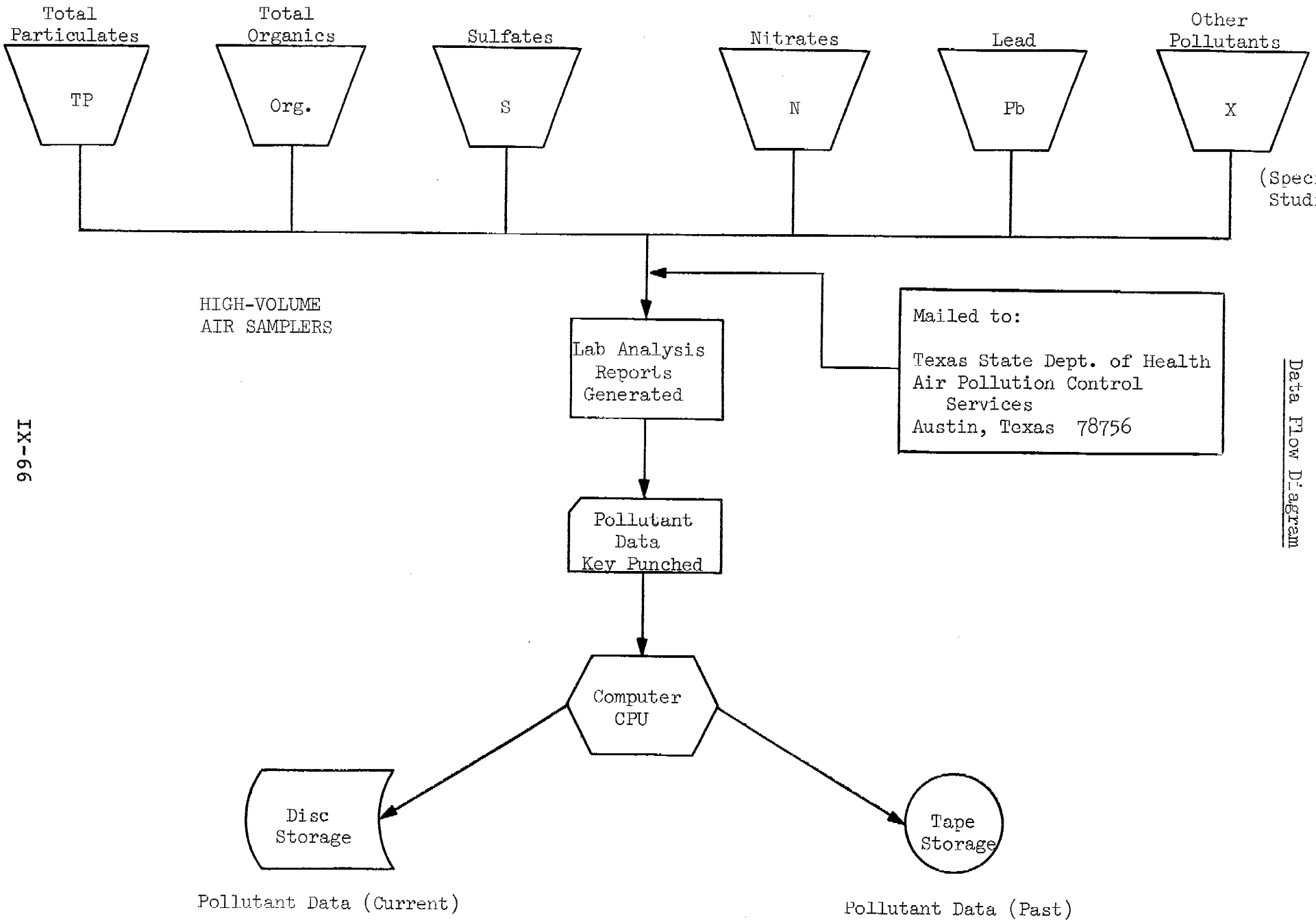
Data from the gas bubblers in the State network will be obtained five times per month and forwarded on log sheets. The gas bubblers in use are capable of taking five individual samples simultaneously. The identity of the pollutant measured is determined by the choice of absorbing reagent and analytical method used by the laboratory. Gas absorption tubes are mailed to each network station prior to each sampling date and are returned to the laboratory for analysis. Thus, the identity of the pollutants to be measured is under the direct control of the State laboratory, and changes can be made easily.

The more important pollutants, SO_2 and NO_2, will be measured on each of the five sampling days within each month. The less common pollutants, such as ammonia, total oxidants, and aldehydes, will be measured at a frequency dependent on the concentrations found at each local site. The tube slots freed will be used for running ambient air surveys across the State for other pollutants, such as mercury vapor, hydrogen sulfide, and fluorides. In this manner, the network can be used to the best advantage, and pollutant measurement can be tailored to the needs of each locality.

Continuous Monitors

Data from continuous monitoring equipment in the State network will be recorded on magnetic and/or punched paper tape, which will be forwarded weekly for processing and evaluation. During Phase III, a program to provide for telemetering of data will begin. When received in the Austin offices of TAPCS, either by mail or electrical circuitry, the data will be converted to proper format and then processed by the central computer. Other continuous monitoring equipment used in special projects will be connected to strip chart or digital recorders. This information will be entered onto keypunch sheets and forwarded. In the same

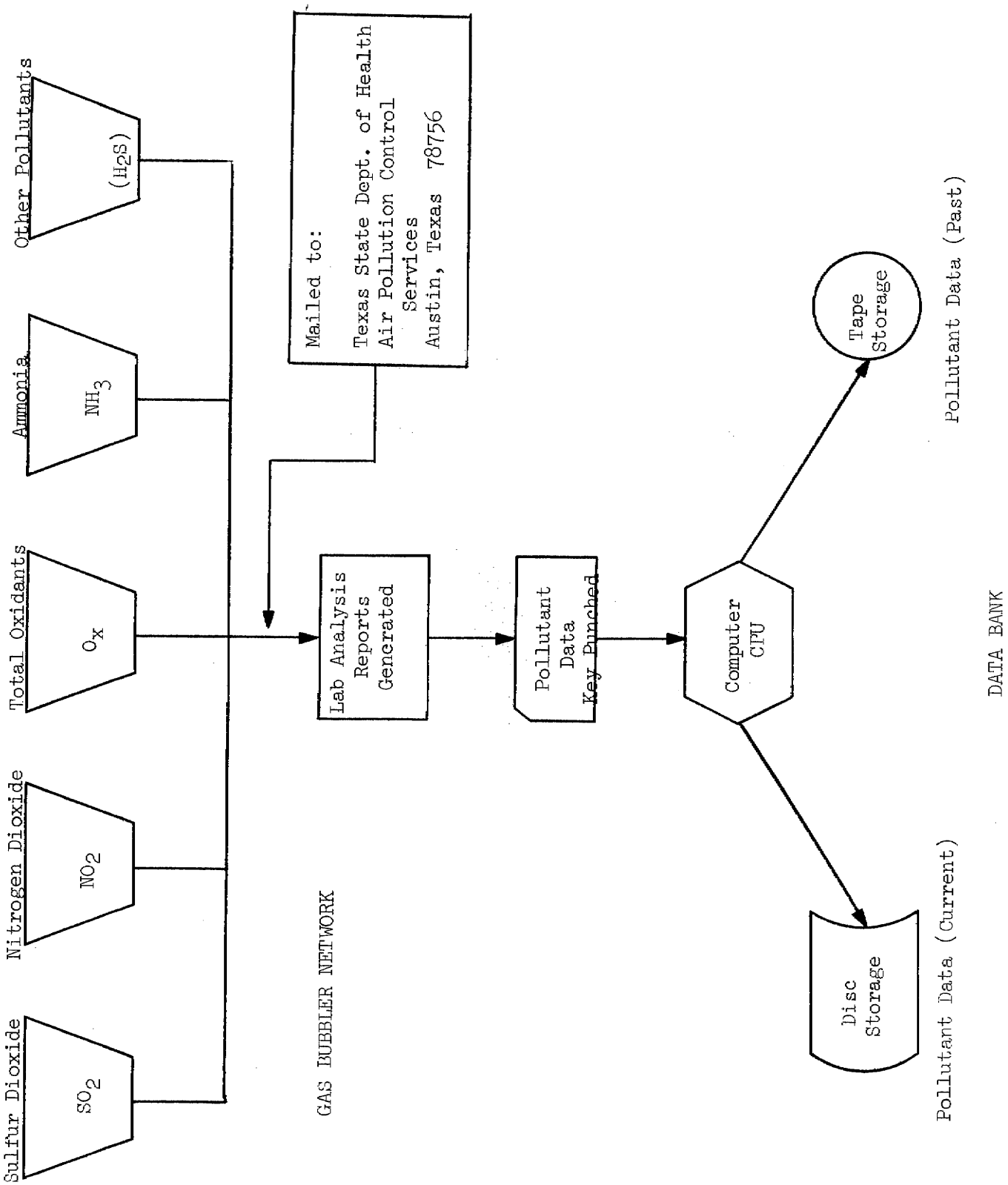
manner, participating local programs with continuous monitoring equipment will enter their data onto log sheets and forward it. Automatic data acquisition equipment will be used as much as possible to minimize the manpower required for manual data reduction.

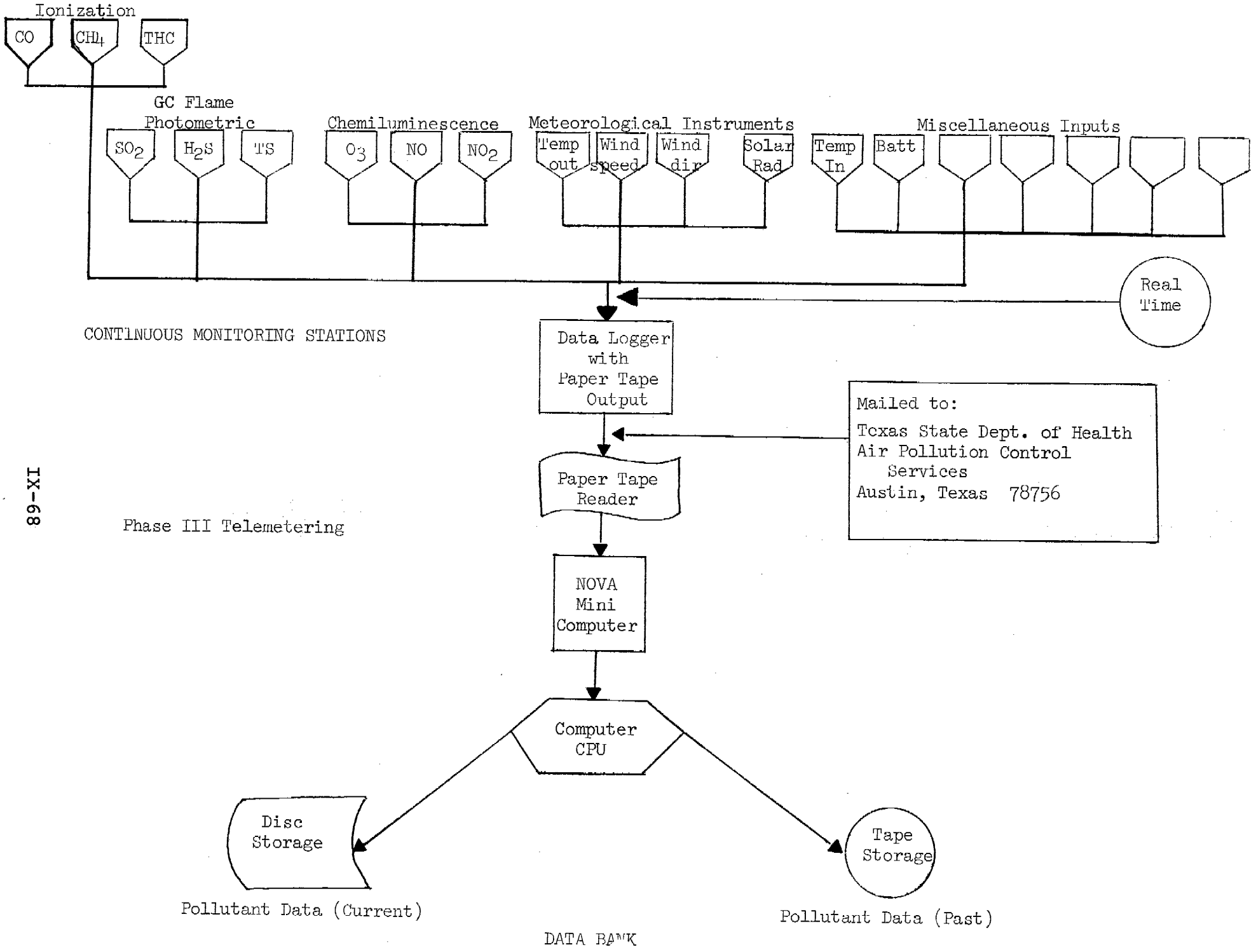


Data Flow Diagram

DATA B

Data Flow Diagram





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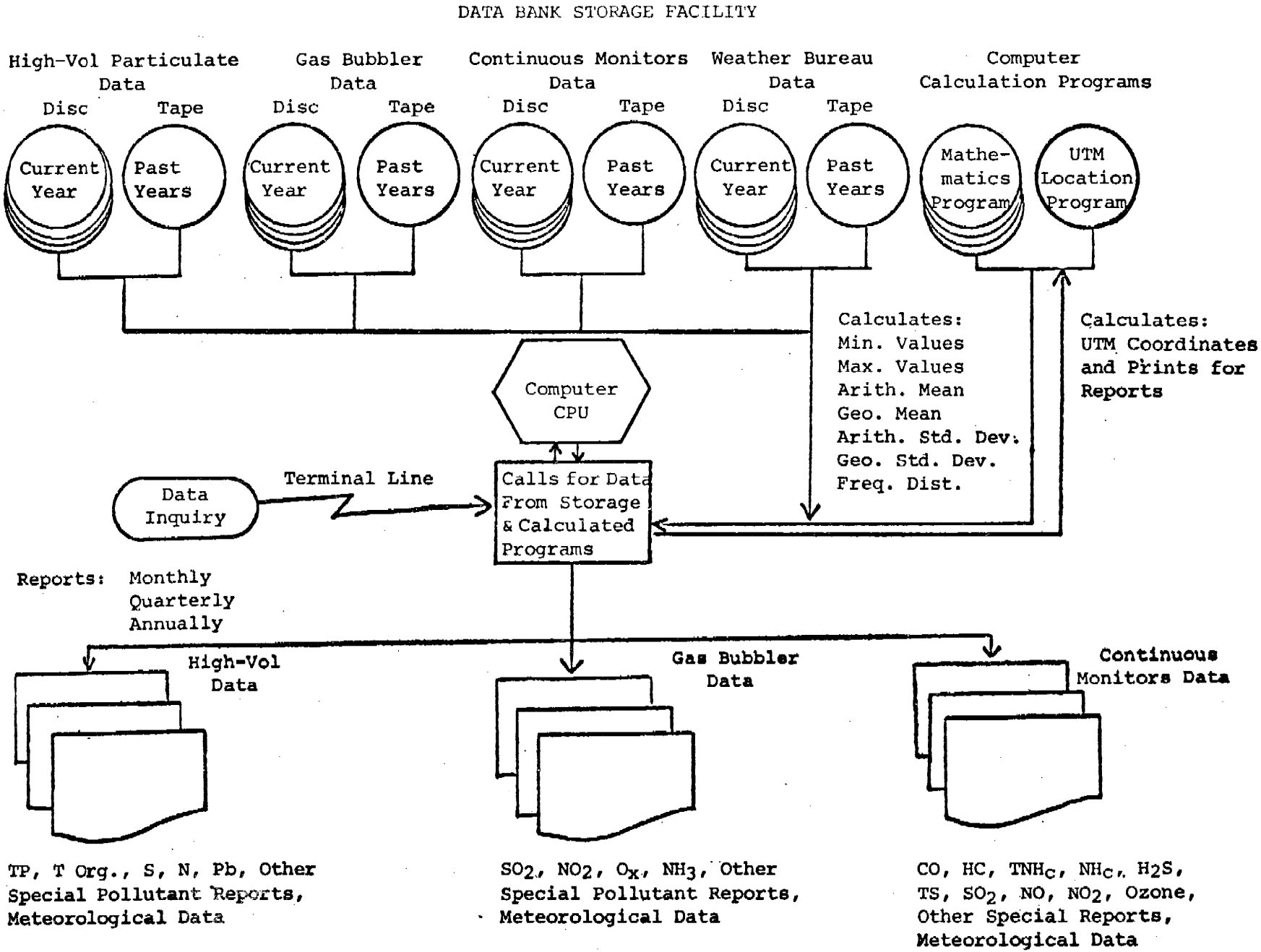
Phase III Telemetering


DATA BANK STORAGE FACILITY
High-Vol Particulate Data
Gas Bubbler Data
Continuous Monitors Data
Weather Bureau Data
Computer Calculation Programs
Disc
Tape
Current Year
Past Years
Mathe-matics Program
UTM Location Program
Computer CPU
Calculates:
Min. Values
Max. Values
Arith. Mean
Geo. Mean
Arith. Std. Dev.
Geo. Std. Dev.
Freq. Dist.
Calculates:
UTM Coordinates and Prints for Reports
Data Inquiry
Terminal Line
Calls for Data From Storage & Calculated Programs
Reports: Monthly
Quarterly
Annually
High-Vol Data
Gas Bubbler Data
Continuous Monitors Data
TP, T Org., S, N, Pb, Other Special Pollutant Reports, Meteorological Data
SO_2, NO_2, O_x, NH_3, Other Special Pollutant Reports, Meteorological Data
CO, HC, TNH_C, NH_C, H_2S, TS, SO_2, NO, NO_2, Ozone, Other Special Reports, Meteorological Data