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National Air Monitoring Stations (NAMS) Network Procedural Manual

NAMS NETWORK
PROCEDURAL MANUAL

by

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ABBREVIATIONS

AQ	Air quality
CMS	Chief, Monitoring Section
EMSL	Environmental Monitoring Systems Laboratory
HQNC	Headquarters NAMS Coordinator
MDAD	Monitoring and Data Analysis Division
MIS	Management Information System
MRB	Monitoring and Reports Branch
NADB	National Air Data Branch
NADBNC	National Air Data Branch NAMS Coordinator
NAMS	National Air Monitoring Stations
NHCI	NAMS Hard Copy Information
P&A	Precision and accuracy
QA	Quality assurance
RONC	Regional Office NAMS Coordinator
ROQAC	Regional Office Quality Assurance Coordinator
SAROAD	Storage and Retrieval of Aerometric Data
SLAMS	State and Local Air Monitoring Stations

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SECTION 1

INTRODUCTION

With the promulgation of new monitoring regulations in the Code of Federal Regulations (CFR), Title 40, Part 58,[1] the U.S. Environmental Protection Agency (EPA) established a plan for obtaining reliable ambient air quality data on a timely basis throughout the Nation. This plan requires a network of National Air Monitoring Stations (NAMS). These regulations cover the components of data collection and reporting for State and local air pollution control agencies and are external to EPA. The purpose of this report is to provide procedures for NAMS work that is internal to EPA.

1.1 OBJECTIVES OF THE NATIONAL AIR MONITORING STATIONS

The primary objective of NAMS is to monitor areas where pollutant concentration and population exposure are expected to be highest. Thus, NAMS will be located in areas of expected maximum concentration and in areas that combine high population density with poor air quality (although they are not necessarily areas of expected maximum concentration).

The aim of NAMS is not to monitor every area where National Ambient Air Quality Standards (NAAQS) are violated, but rather to

provide a representative sample of the worst conditions and exposures. This sample can be used to assess trends and form national policy decisions.

Estimates indicate that the United States will need 600 to 700 NAMS for total suspended particulates (TSP), 200 to 300 NAMS for sulfur dioxide (SO_2), and fewer than 200 NAMS each for carbon monoxide (CO), ozone (O_3), and nitrogen dioxide (NO_2). Because they will be a subset of the State and Local Air Monitoring Stations (SLAMS), the NAMS must meet all the requirements for SLAMS contained in 40 CFR 58. Also, NAMS are subject to the additional data reporting and monitoring methodology requirements contained in Subpart D of 40 CFR 58.

1.2 SUMMARY

This manual presents procedures that are to be followed in the handling of NAMS data by EPA personnel. Section 2 summarizes the regulations and guidelines for the collection and transmittal of NAMS data. Primary references for the information are given so that the user can find more complete explanations, if necessary.

Section 3 describes the flow of data from collection through entry into the data bank of the National Air Data Branch (NADB). Three types of data are discussed: air quality data, quality assurance data, and site information. The flow of air quality data includes normal checks required for Storage and Retrieval of Aerometric Data (SAROAD) and additional checks required by 40 CFR 58. Air quality data go from state and local agencies through

the SAROAD contact to the NADB; the Regional Office NAMS Coordinator (RONC) and Headquarters NAMS Coordinator (HQNC) have access to, but do not directly handle, the data.

Quality assurance data go from state and local agencies to the Regional Office Quality Assurance Coordinator (ROQAC) with a copy to the Environmental Monitoring and Support Laboratory (EMSL) at Research Triangle Park (RTP), North Carolina. The NADB, RONC, and HQNC have access to, but do not directly handle, the data. Quality assurance data are checked for completeness, representativeness, precision, accuracy, comparability, and traceability by the ROQAC.

Site information goes from state and local agencies and the Regional Office through the RONC and Regional Office SAROAD contact to the NADB and HCNC. Site information is separately handled by SAROAD site identification, the Management Information System (MIS), and NAMS Hard Copy Information (NHCI).

Section 3 also details the uses of NAMS air quality data. These uses require that the data be complete and timely.

Section 4 presents step-by-step procedures for NAMS data handling in the Regional Office and at the NADB and at Headquarters. The section describes active responsibilities (i.e., actions that must be performed) and passive responsibility information (i.e., background knowledge required for proper performance of duties).

SECTION 2

AIR MONITORING REGULATIONS AND GUIDELINES

The authority to establish National Ambient Air Quality Standards (NAAQS) for various pollutants was contained in the Clean Air Act Amendments of 1970. Responsibility for controlling and preventing air pollution was delegated to state and local governments. Furthermore, the Clean Air Act required that the states adopt State Implementation Plans to facilitate attainment and maintenance of NAAQS. The establishment of an extensive network for monitoring air quality was necessary to determine whether the NAAQS were being attained and maintained.

The Clean Air Act Amendments of 1977 required that the EPA establish monitoring criteria to be followed uniformly on a nationwide basis. Complying with the 1977 Amendments and following the recommendations of the Standing Air Monitoring Work Group, the EPA promulgated ambient air monitoring regulations under 40 CFR 58.[1]

As defined in 40 CFR 58, all National Air Monitoring Stations (NAMS) are also State and Local Air Monitoring Stations (SLAMS); thus, all SLAMS criteria apply to NAMS. The NAMS, however, are subject to additional requirements. This section discusses monitoring criteria for all criteria pollutants, including

lead, as they pertain to network establishment, network design, monitoring instruments, probe siting, reporting requirements, and quality assurance.

2.1 NETWORK ESTABLISHMENT

Section 58.20 of 40 CFR 58 required each state to submit a revised implementation plan to the Regional Administrator by January 1, 1980. Each plan was to provide for (1) the measurement of ambient concentrations of TSP, SO_2, CO, O_3, NO_2, and lead by establishment and operation of a sampling network; (2) meeting the Part 58 requirements pertaining to quality assurance, network design, monitoring methodology, and probe siting criteria; (3) the operation of at least one monitor per pollutant during any stage of an air pollution episode; (4) an annual review of the monitoring system; and (5) a sampling network description that is available for public inspection and has been submitted to the Regional Administrator for his approval.

The network description must include the SAROAD site identification form for existing stations, proposed location of scheduled stations, identity of urban areas represented, sampling and analysis methods, operating schedule, monitoring objectives, and spatial scale. Also included should be a schedule for submitting a SAROAD site identification form and implementing quality assurance procedures for sites not in operation at the time of submittal.

The EPA has set a deadline of January 1, 1981, for the operation of all NAMS in appropriate locations per SAROAD site

identification forms and the implementation of quality assurance requirements.

2.2 NETWORK DESIGN

Specific monitoring objectives and physical dimensions of air parcels to be monitored are defined for NAMS. The SLAMS are designed to determine the highest concentrations in the network, representative concentrations in areas of highest population density, impact of significant sources on air quality, and general background levels of pollution. The primary objective of NAMS is to monitor areas of maximum pollutant concentration and maximum population density, especially urban and multisource areas. Thus, two categories of NAMS are needed: those where pollutant concentration is worst (without being unduly influenced by a single source) and those where both poor air quality and high population density are found. In urban areas requiring NAMS, the two categories must be incorporated. If only one monitoring station is needed for TSP and SO_2, the maximum pollutant concentration area must be monitored.

The NAMS have been designed to provide data for national policy analyses and trends. The aim is not to monitor every area where NAAQS have been violated. Site selection requires background information, which must be obtained primarily from emission inventories and past dispersion modeling.

Table 2-1 indicates the number of permanent TSP and SO_2 stations necessary for areas with different populations. As

TABLE 2-1. GUIDELINES FOR TSP AND SO_2 NAMS NETWORK SIZE (approximate number of stations per area)[a]

Population of area	Pollutant concentration		
	High[b]	Medium[c]	Low[d]
High (>500,000 persons)	6-8	4-6	0-2
Medium (100,000-500,000 persons)	4-6	2-4	0-2
Low (50,000-100,000 persons)	2-4	1-2	0

[a] Actual number and location of stations are determined by EPA and state agency.

[b] TSP: 20 percent or more >primary NAAQS.
SO_2: >primary NAAQS.

[c] TSP: >secondary NAAQS.
SO_2: $\geq$secondary NAAQS or >60 percent of primary NAAQS.

[d] TSP: <secondary NAAQS.
SO_2: $\leq$secondary NAAQS or <60 percent of primary NAAQS.

evidenced by the ranges in the number of stations, some flexibility is necessary because specific sources of emissions and local control efforts can vary across the country. Where more than one station is required, both categories of NAMS should be used. The specific number and location of NAMS are determined by EPA Regional Offices and state agencies and approved by EPA Headquarters.

Local factors affecting the actual number of monitors needed in a specific area are meteorology, topography, urban and regional air quality gradients, and the potential for air quality improvement or degradation. Normally, greatest monitor density would be in the northeastern portion of the United States because of high population density and pollutant concentrations. The worst air quality in an area should be used to determine the number of NAMS for TSP and SO_2. Nationally, there should be more than twice as many TSP stations as SO_2 stations because urban areas with high TSP levels outnumber those with high SO_2 levels; whereas SO_2 is primarily emitted from a few point sources, TSP is generated from a large number of point and area sources, many fugitive in nature.

The neighborhood spatial scale is required for TSP and SO_2 NAMS monitoring. This scale represents a reasonably homogeneous urban subregion of fairly uniform shape with dimensions of a few kilometers. Homogeneity refers to the pollutant concentration as well as the land use and surface characteristics.

Nationally, fewer NAMS are required for CO than for TSP and SO_2. The CO monitors are principally needed to assess the overall air quality progress resulting from the Federal Motor Vehicle Control Program. Sometimes as few as two monitors are needed for a major urban area (generally an area with more than 500,000 persons).

The areas requiring CO NAMS are those with peak concentration such as heavily travelled downtown streets (microscale) and those with significant population exposure (neighborhood scale). A peak concentration monitor (microscale) should represent several similar source configurations in an urban area to which the general population has access. A neighborhood scale station should be located in an area with a stable, high population density and high traffic density.

Plans for future growth should be investigated so that zoning changes and new highways or shopping centers do not interfere with monitoring selection criteria. The NAMS should indicate the overall effect of CO emissions from significant sources, but should not be unduly influenced by a particular line source.

Lead monitoring requires a minimum of two urban stations to obtain data once every six days, so that data are gathered for each day of the week twice in each quarter. The Regional Administrator may require the use of additional monitors to determine whether ambient air quality standards are being attained and maintained. The purpose of these NAMS is to measure pollutant

concentrations in areas where persons, especially children, are exposed to maximum lead concentration from automobiles and to determine the effect on air quality of the Federal program for reducing lead in gasoline.[2]

Roadway (microscale) and neighborhood stations are required for NAMS monitoring of lead. A roadway station must be adjacent to a major roadway with an average daily traffic (ADT) volume of at least 30,000 vehicles; in areas where there are no roadways exceeding 30,000 ADT, the station should be located near the roadway with the largest traffic volume. The neighborhood station must be in an area of high traffic density and high population density.

Ozone NAMS are required in urban areas with populations greater than 200,000. Ozone is not directly emitted, but results from complex photochemical reactions of organic compounds and nitrogen oxides in the presence of solar radiation. Major sources of hydrocarbons tend to be far from areas of high O_3 concentration. Because hydrocarbon emissions come from very diverse mobile and stationary sources, both local and national control strategies are used. Thus, more sampling stations are needed for O_3 than for CO.

Each urban area will generally require two O_3 NAMS: one in the urban scale, the other in the neighborhood scale. The urban station should monitor maximum concentrations downwind from the highest purcursor concentration and provide information concerning trends in the overall area. The neighborhood station should

indicate O_3 levels in an area of high population density on the fringes of the downtown along the predominant summer/fall daytime wind direction.

Because NO_2 is primarily formed in the atmosphere from the oxidation of nitrous oxide (NO), large volumes of air and long mixing times usually reduce the importance of monitoring on a small spatial scale. The NO_2 NAMS are required in urban areas whose populations are greater than 1,000,000. Each such area should contain a station in the neighborhood scale and one in the urban scale. The neighborhood station should measure photochemical production of NO_2 and be in the area where NO_2 emission density is highest. The urban station should measure NO_2 produced from the reaction of NO with O_3 and be downwind of peak NO_2 emission areas.

2.3 MONITORING INSTRUMENTS

Appendix C specifies the monitoring methods which must be used in NAMS/SLAMS. Reference or equivalent methods are required for monitoring at all NAMS/SLAMS. Analyzers whose cancellation dates have been exceeded may be used for a reasonable period of time to be determined by the Administrator.

Provisions have been made for use of nonconforming analyzers purchased before February 18, 1976 in certain geographical areas. These analyzers must meet all other requirements for a reference method, and the concentration of substances that could cause the analyzer to fail should be insignificant in the geographical area where the analyzer is to be used. Requests for approval under

these conditions must provide data about the analyzer and the area to be sampled, especially past monitoring data from the area. Once approval has been granted, assurance must be provided that the instrument will be used only in the specified area. As noted in Section 2.4, Appendix C, a report must be submitted to the Administrator within 60 days of any significant increase in the concentration of an interfering substance or within 60 days of the discovery of pertinent new information. Further, a semi-annual report must be submitted about interfering substances that occur in insignificant concentrations.

Additionally, provisions have been made for analyzers with nonconforming ranges if they were purchased before February 18, 1975. These analyzers must meet all other requirements, and their ranges should not extend more than two times the upper approved range limits. Requests for approval under these conditions must include information about the analyzer and representativeness of the data. Also, if the analyzer has more than one scale, the request must specify that the scale with the range not extending more than two times the upper approved range limit will be used.

Analyzers with unapproved ranges may be used without special approval until January 1, 1983, if the following three conditions are met: the upper range must be not more than two times the approved upper limit, the analyzer must be located in an area where pollutant levels are expected to be higher than the approved ranges, and the unapproved ranges are used only when these higher concentrations are expected.

An analyzer with a nonconforming range greater than twice the upper limit may be used if it has more than one range and has been designated a reference or equivalent method on at least one of the ranges when the pollutant to be measured is likely to occur in the range with greater than twice the approved upper limit. Further, the Administrator must determine that the resolution of the range is adequate. See Section 2.6.2, Appendix C, for further detail.

Requests for approval under Section 2.4, 2.5, or 2.6.2, Appendix C, must be made to the Director of the Environmental Monitoring and Systems Laboratory (EMSL), Department E (MD 75), Research Triangle Park, North Carolina 27711. A request should contain information concerning the analyzer, testing information, and identification of geography. The Administrator may withdraw an approval if any of the information provided is found to be invalid or no longer valid.

Finally, approval may be requested for a modification that may alter the performance characteristics of a reference or equivalent method. The request must describe the nature and purpose of the modification, discuss the effect on performance characteristics, and include any additional relevant information. The Administrator has 75 days to act on the matter. Temporary modifications may be made without approval if the approved method is malfunctioning and parts are not available for at least 45 days. The repairs must be made as soon as practicable, but no longer than 4 months after the temporary modification unless the Administrator has granted an extension. Unless and until the

temporary modification is approved, air quality data obtained with the method as temporarily modified must be clearly identified as such, and must be accompanied by a report containing the information specified in Subsection 2.8.3, Appendix C.

2.4 PROBE SITING

When the number of monitors, spatial scale of representativeness, and objectives have been determined, siting criteria for the probe must be specified.

The TSP monitor probe must be 2 to 15 meters above ground level. Ideally it should be at breathing level, but security problems sometimes preclude this. If located on a roof or other structure, the monitor must be at least 2 meters from the walls, parapets, and other obstacles. No furnace or incinerator stack should be nearby. The sampler should be at least 20 meters from trees. The distance between any other obstacle and the sampler must be at least twice the height that the obstacle protrudes above the sampler. Airflow must be unrestricted in an arc of at least 270 degrees around the sampler with the predominant wind direction for the greatest pollutant concentration in the 270 degree arc. Monitors that measure the plume of a single source cannot be considered representative. Therefore, when monitors are placed along roadways, the traffic volume must be less than 3000 vehicles per day, and the monitor must be placed more than 5 meters from the edge of the nearest traffic lane. If the roadway is elevated and the monitor is below the roadway level, the distance from the nearest lane to the monitor may be no less than 25

meters. Sampling sites should not be located in unpaved areas unless the areas are covered throughout the year by vegetation.

The sulfur dioxide monitor probe inlet should preferably be located at breathing height, although they may be situated anywhere in the range from 3 to 15 meters above ground. If the equipment is located on a building, then it should be on the windward side of the building relative to the prevailing winter wind direction. The probe must be more than 1 meter away from supporting structures and located away from dusty areas. As with TSP, no furnace or incinerator should be nearby. If located on a roof, the monitor must be at least 1 meter from walls, parapets, and other obstacles. The distance from trees should be at least 20 meters. Further, the distance between obstacles and the inlet probe must be at least twice the height that the obstacle protrudes above the monitor. Airflow must be unrestricted in an arc of at least 270 degrees around the inlet, and the predominant wind direction during the season of maximum concentration must be in the 270 degree arc. Clearance of 180 degrees is necessary if the probe is located on the side of a building.

Breathing height is the preferred distance above ground for the CO monitor probe inlet. The required distance is 2.5 to 3.5 meters for microscale sampling and 3 to 15 meters for neighborhood scale sampling. The probe must be 1 meter away from any supporting structure. Airflow must be unrestricted in an arc of at least 270 degrees around the probe, and the predominant wind direction for the season of greatest pollutant concentration must be in the 270 degree arc. If located on the side of a building,

clearance of 180 degrees is necessary. The purpose of microscale measurements in street canyons and traffic corridors is to indicate the effect of the immediate source on the population. Therefore, the probe must be 2 to 10 meters from the nearest edge of the traffic lane and at least 10 meters from an intersection (preferably in the middle of a block). Table 2-2 shows the minimum distance that neighborhood scale stations must be from the edge of the nearest traffic lane.

TABLE 2-2. MINIMUM DISTANCE REQUIRED BETWEEN A NEIGHBORHOOD SCALE CO STATION AND THE EDGE OF THE NEAREST TRAFFIC LANE

Roadway average daily traffic, vehicles	Minimum distance, meters
≤10,000	≥10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥60,000	≥150

Lead monitors must be placed 2 to 7 meters above ground at roadway stations (microscale or middle scale). A lead roadway monitor must be 5 to 15 meters away from the nearest traffic lane, and the probe must be kept away from tollgate and metered ramps because higher lead concentrations are known to occur at higher constant speeds. A lead neighborhood scale monitor must be at least 15 meters from roadways traveled by more than 10,000 vehicles per day. Roadways with larger traffic volumes require

greater separation distances. The probe should be placed as close to ground level as possible, but not more than 7 meters above ground level. If located on a roof, a roadway or neighborhood scale monitor must be at least 2 meters from walls, parapets, and other obstacles and should be at least 20 meters from trees. A monitor must be so located that the distance from an obstacle is at least twice the height of the obstacle above the sampler. Airflow must be unrestricted in an arc of at least 270 degrees around the monitor with the predominant wind direction in the 270 degree arc.

Ozone and NO_2 monitor probe inlet should preferably be as close as possible to breathing height; they must be 3 to 15 meters above ground level and at least 1 meter away from supporting structures. Obstacles should disrupt sampling. Therefore, the distance between any obstacle and the probe must be at least twice the height that the obstacle protrudes above the sampler. Trees should be at least 20 meters away. Airflow must be unrestricted in an arc of at least 270 degrees around the inlet with the predominant wind direction for the season of greatest pollutant concentration included in the arc. If the probe is on the side of a building, a clearance of 180 degrees is necessary. Table 2-3 provides information concerning the required distance that O_3 and NO_2 monitors must be from roadways.

TABLE 2-3. MINIMUM DISTANCE REQUIRED BETWEEN A NEIGHBORHOOD OR URBAN SCALE O_3 OR NO_2 STATION AND THE EDGE OF THE NEAREST TRAFFIC LANE

Roadway average daily traffic, vehicles	Minimum distance, meters
≤10,000	≥10
15,000	20
20,000	30
40,000	50
70,000	100
≥110,000	≥250

Because SO_2, NO_2, and O_3 are reactive gases, only borosilicate glass and FEP Teflon or their equivalent are acceptable materials for intake sampling lines. Residence time is also critical, particularly for O_3 and NO; therefore, the residence time in sampling probes for reactive gases must be less than 20 seconds.

Waivers may be granted for one or more probe siting criteria if the appropriate state agency writes to the Regional Administrator about the purpose of establishing a monitor at a particular location. Issuance of a waiver to a new station requires that the station be as representative with the waiver as it would be if all criteria were met and that physically the criteria cannot be met. For issuance of a waiver to an existing station, only one of these two requirements need be met.[3]

2.5 REPORTING REQUIREMENTS

The NAMS network must be reviewed each year, and all inadequacies determined by the annual review must be corrected per a

schedule. The final schedule for modification of the network will be made through consultation with the Regional Administrator.

As noted in Section 58.35 of the regulations, each state must report quarterly to the Regional Office all ambient air quality data and information specified by the "AEROS User Manual." [4] Data must be submitted in SAROAD Air Quality Data format. The quarterly periods are: January 1 to March 31, April 1 to June 30, July 1 to September 30, and October 1 to December 31. Each report must be submitted to NADB within 90 days of the end of the quarter that it covers and must contain all air quality data collected during the quarter. Thus, data obtained from the first quarter of 1981 will be due at NADB before June 30, 1981. Data contained in the quarterly report must be edited and validated by the state and checked by the Region so that such data are ready to be entered into the SAROAD data files.

Because all NAMS are also SLAMS, an annual report is due by July 1 of each year on data collected from January 1 to December 31 of the previous year. The annual summary report must include a computation of the simple unweighted arithmetic average of the probability limits for precision and accuracy for the four quarterly periods. The report should include a listing by pollutant of the city name, county name, address of the site, SAROAD site code, and SAROAD monitoring method code. Further, the report must show the number of daily observations for TSP and lead, hourly observations for CO and O_3, and daily and hourly

observations for SO_2 and NO_2. The location, date, pollution source, and duration of each incident of air pollution during which ambient levels reached or exceeded the standard must also be included.

The annual report must be certified by the senior air pollution control official in the state to assure that the data is accurate. The manner in which the data were obtained must be certified to conform to all monitoring criteria. These certifications must be included in the annual report package.

The annual report must present annual summary statistics for each pollutant. The TSP data must include the annual geometric mean, highest and second highest daily values with dates of occurrence, number of times that the 24-hour primary and secondary standards were exceeded, and number of 24-hour average concentrations in the eight ranges, beginning with the range from 0 to 65 $\mu g/m^3$ and ending with the range greater than 445 $\mu g/m^3$.

The SO_2 annual summary statistics must show the annual arithmetic mean, the highest and second highest 24-hour averages with dates of occurrence, highest and second highest 3-hour averages with dates of occurrence, number of times that the 3-hour secondary standard was exceeded, and number of 24-hour concentrations in eight ranges beginning with the range from 0.00 to 0.04 ppm and ending with the range greater than 0.28 ppm.

The CO data must include the highest and second highest 1-hour values with dates and times of occurrence, highest and

second highest 8-hour averages with dates and times of occurrence, number of times that the 1-hour primary and 8-hour average primary standards were exceeded, and number of 8-hour concentrations in the eight ranges beginning with the range from 0 to 4 ppm and ending with the range greater than 28 ppm.

Statistics required for NO_2 include the annual arithmetic mean, highest and second highest hourly averages with dates and times of occurrence, highest and second highest 24-hour averages with dates of occurrence, and number of hourly concentrations in the eight ranges beginning with the range from 0.00 to 0.04 ppm and ending with the range greater than 0.28 ppm.

The required O_3 data are the four highest daily maximum 1-hour values with dates and times of occurrence, number of times that the daily maximum 1-hour standard was exceeded, and number of observations in the eight ranges beginning with the range from 0.00 to 0.04 ppm and ending with the range greater than 0.28 ppm.

The required lead data include annual submittal of the four quarterly arithmetic averages in $\mu g/m^3$ given to two decimal places and the number of 24-hour samples included in the quarterly averages.

2.6 QUALITY ASSURANCE

Appendix A of 40 CFR 58 specifies minimum requirements to provide quality assurance in the data submitted by the states. These requirements must be fully implemented by January 1981.

Quality Assurance consists of two distinct and equally important functions. One function is the assessment of the quality

of the monitoring data by estimating their precision and accuracy. The other function is the control, and improvement of the quality of the monitoring data by implementation of quality control policies, procedures, and corrective actions. The quality control requirements are included in Section 2, and the assessment procedures are specified explicitly in Sections 3, 4, and 5 of Appendix A.

A quality control program to cover the control and improvement functions is necessary to provide data capable of meeting monitoring objectives and minimize loss of air quality data caused by malfunctions. Such a program as noted earlier is required by Section 2 of Appendix A and must be described in detail and documented by the agency operating the monitor and approved by the Regional Administrator. Guidance for setting up a program can be found in Volumes I and II of the EPA document "Quality Assurance Handbook for Air Pollution Measurement Systems."[5,6]

General activities that require set procedures are: (1) selection of methods, analyzers and samplers, (2) equipment installation, (3) calibration, (4) zero/span checks and adjustments of automated analyzers, (5) control checks, (6) correction of unacceptable zero/span limits and other problems indicated by control checks, (7) calibration and zero/span checks of multiple-range analyzers, (8) preventive and remedial maintenance, (9) quality control procedures for air pollution episode monitoring, (10) recording and validation of data, and (11) documentation of

quality control information. Also, gaseous standards for SO_2, CO, and NO_2 must be working standards certified by comparison with a gaseous Standard Reference Material (SRM) from the National Bureau of Standards (NBS). Ozone tests must be made in accordance with ultraviolet photometric calibration procedures, and flow measurements must be traceable to an authoritative volume or other standard. The National Performance and Systems Audit program will audit quality assurance and monitoring programs of NAMS.

With regard to reporting the assessment of the quality of the data in terms of precision and accuracy the state must prepare for each pollutant, a list of all monitoring sites and their SAROAD site identification codes in each reporting organization. This list must be submitted to the ROQAC who reviews and approves the list before submitting a copy to EMSL. Each reporting organization is defined such that precision and accuracy among all stations in the organization can be expected to be reasonably homogeneous, as a result of common factors. Common factors which should be considered by States in defining reporting organizations include: (1) operation by a common team of field operators, (2) common calibration facilities, and (3) support by a common laboratory or headquarters. Where there is uncertainty in defining the reporting organizations or in assigning specific sites to reporting organizations, States must consult with the appropriate EPA Regional Office for guidance.

The requirements for data quality precision include a one-point precision check against a gas of known concentration at least once every 2 weeks for each automated analyzer used to measure SO_2, NO_2, O_3, and CO. The analyzers must be operated in normal sampling mode during the precision check.

The accuracy requirements include a quarterly audit of at least 25 percent of the SO_2, NO_2, O_3, or CO analyzers, so that each analyzer is audited at least once a year. The audit is accomplished by challenging the analyzer with a gas of known concentration within four specific concentration ranges.

For precision determination of TSP, two sites with the expected highest geometric mean concentration must be selected by the States for side-by-side sampling (at least 2 meters apart). If such sites are impractical, alternate sites approved by the Regional Administrator or his designee may be selected. Criteria for the samplers such as calibration, sampling, and analysis must be identical. Only one site is necessary for lead.

The accuracy requirements for TSP (and lead) include a quarterly audit of the flow rate of 25 percent of the high-volume samplers against a device with a known flow rate so that each sampler is audited at least once per year. For lead, an audit of the analysis using glass fiber filter strips must also be performed.

A series of calculations must be included for determining the precision and accuracy of each analyzer and of the reporting organization. Estimates of precision are determined from results

of individual precision checks and results are reported at the end of each calendar quarter. Accuracy estimates are also calculated from results of the individual audits and results are reported at the end of each calendar quarter. The precision of the reporting organization is determined from the average of the percentage difference between monitors, the pooled standard deviation, and the 95 percent probability limits. The accuracy of the reporting organization is also determined from the average of percentage differences, the standard deviation, and the 95 percent probability limits.

For each pollutant, a list of all monitoring sites and SAROAD site identification codes must be prepared and sent to the Quality Assurance Coordinator at the Regional Office; a copy must be sent to EMSL. Whenever the assignment of a monitoring site changes, the change must be approved by the Regional Office, and EMSL/RTP must be informed of the change.

SECTION 3

NAMS DATA AND INFORMATION FLOW AND USES

Effective management of the National Air Monitoring Stations (NAMS) network must consider all systems associated with the collection of NAMS air quality data. They provide three main types of data: air quality data, monitoring site information, and quality assurance data.

3.1 DATA AND INFORMATION FLOW

Figure 3-1 shows the overall flow of NAMS data. Air quality data generally go from state or local agencies to the Regional Office (RO) SAROAD contact and then to the data processing section of NADB. Information about SAROAD site identification (ID) is handled in essentially the same way as air quality data.

Site information included in the NAMS Hard Copy Information (NHCI) and Management Information System (MIS) goes from state and local agencies to the Regional Office NAMS Coordinator (RONC) to Headquarters NAMS Coordinator (HQNC). In most Regions the RONC also enters the MIS information into the S2K system through a computer terminal located at the Regional Office.

Quality Assurance (QA) data go from state and local agencies to the Regional Office Quality Assurance Coordinator (ROQAC). The quality assurance data is reported on data assessment report

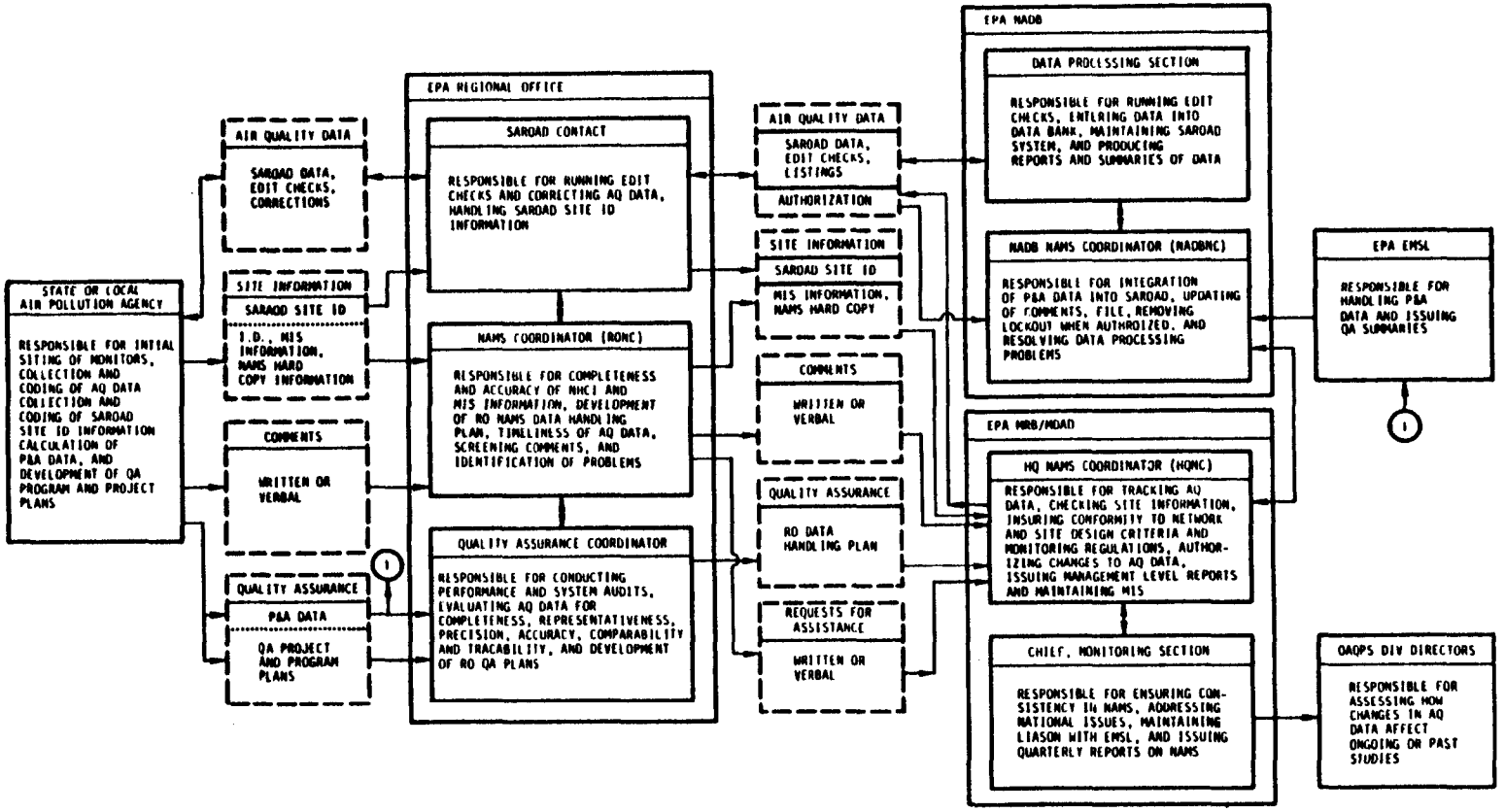


Figure 3-1. Overall flow of NAMS data.

forms referred to in Appendix A. State and local agencies also send copies of the quality assurance data to EMSL.

3.1.1 Air Quality Data

Air quality data flow from the local or state agency to the SAROAD Contact at the EPA Regional Office and then to the Data Processing Section at NADB. Figure 3-2 shows this data flow.

The state or local agency collects the air quality data. Although the local agency may by agreement submit reduced air quality data directly to the EPA Regional Office, such data are generally submitted through the state agency. The submitting agency reduces the data, codes them into SAROAD format, runs data checks specified in the agency quality control program plans, and makes necessary corrections. The state then submits the data in the form of punched cards, air quality data forms, or a magnetic tape to the SAROAD Contact at the EPA Regional Office.

The SAROAD Contact at the EPA Regional Office is the person responsible for handling and running standard checks on air quality data after the state or local agency. Upon receipt of the data, the SAROAD Contact enters the date and description of the submittal into the SAROAD Control Log, which is used to track data through the Regional Office. If submitted on air quality data forms, data must be keypunched so that a magnetic tape can be created. A computerized pre-edit program (NAØ26) is used by the SAROAD Contact to check data for completeness and obvious errors or omissions. A data summary produced by the edit check is sent to the submitting agency, which is responsible for verifying the summary and correcting questioned data.

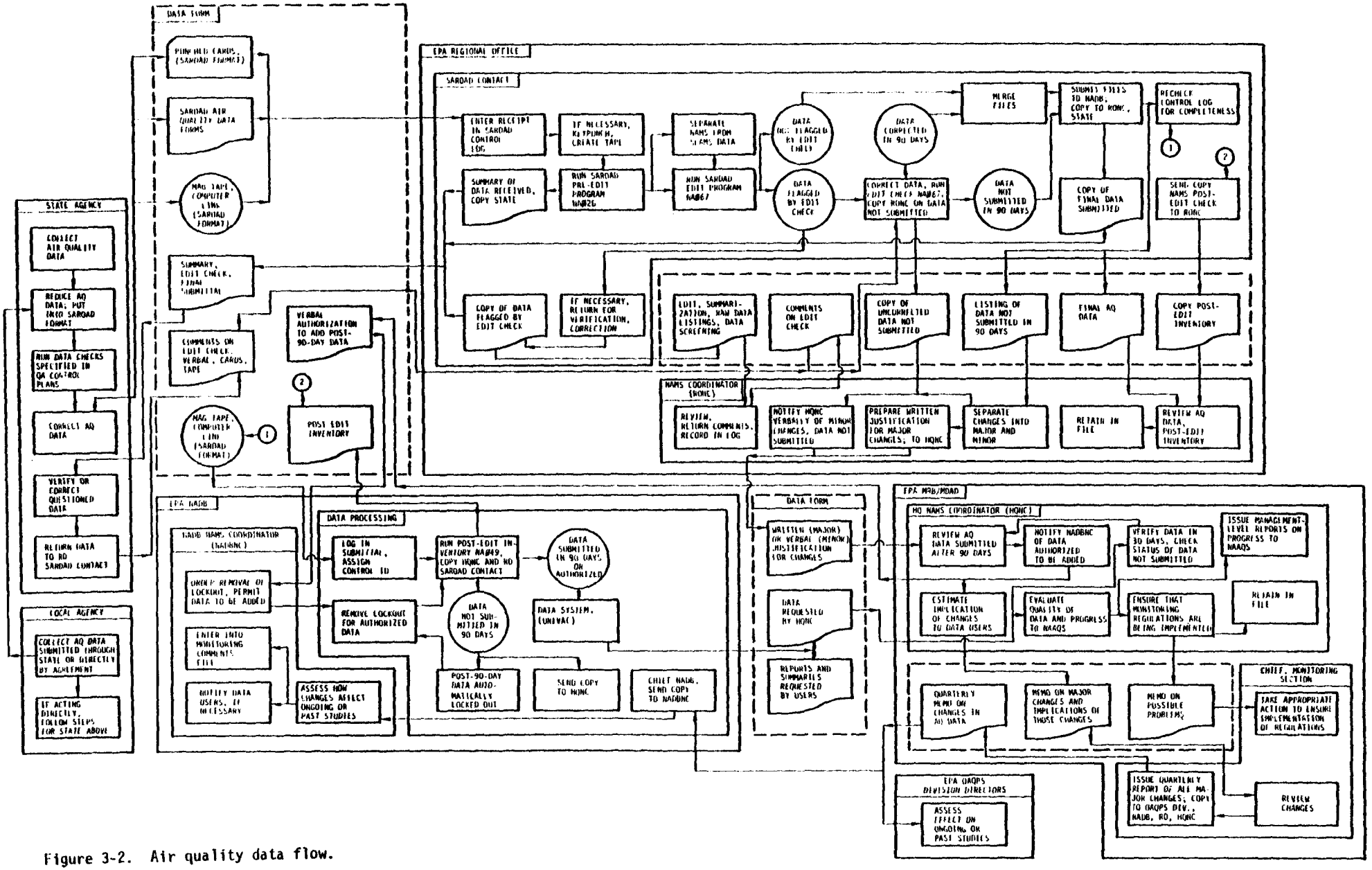


Figure 3-2. Air quality data flow.

The computer analysis run by the SAROAD Contact can also separate the air quality data into NAMS and SLAMS data. Although optional, this separation is highly recommended. The following description of air quality data flow applies only to NAMS data.

A second computer check, SAROAD Edit Program NAØ67, is run on the NAMS air quality data. Data rejected by the edit check are corrected by the SAROAD Contact, often with the help of the state or local agency.

Air quality data not rejected by the edit check and corrected data are then merged into one file. The SAROAD Contact submits them to the data processing section at EPA NADB. At this point the SAROAD contact notifies the RONC of all data not submitted within the 90-day deadline. Copies of the submitted data are given to the RONC and sent to the state. This transaction is entered into the SAROAD Control Log.

The functions of the RONC with respect to the air quality data flow are to oversee the progress of the data flow through the Regional Office and to serve as contact person with the HQNC. The RONC reviews the raw data listings and edit summaries, returns comments on them, and records the transactions in the SAROAD Control Log. Changes to the data file resulting from addition of air quality data not submitted within 90 days are separated by the RONC into minor and major changes. Major changes involve addition of previously missing data or large changes in values of previously submitted data; minor changes involve correction of less important data, such as dates. The

HQNC is notified verbally of minor changes; written explanation is required for major changes.

Upon receipt of the the submittal, the NADB data processing sections logs it in and assigns a control ID to the air quality data. A post-edit inventory (NAØ49) is run on the data, and a copy of the post-edit inventory is sent to the HQNC and RO SAROAD Contact. Data that have been through the post-edit inventory and were either submitted before the 90-day deadline or authorized by the HQNC to be submitted after the 90-day deadline are entered into NADB system. Data not submitted within 90 days are automatically locked out of the system and must be sent by NADB data processing to the HQNC for review and authorization before addition to the files.

The NADB NAMS Coordinator (NADBNC) oversees changes to the files by addition of data after the 90-day deadline only upon authorization from the HQNC. Upon receiving authorization to add data to the system, the NADBNC removes the lockout and permits the additions or changes to be made.

The main responsibilities of the HQNC are to conduct periodic post-edit reviews of the data, authorize changes to the data system and issue reports on air quality. Air quality data submitted after the 90-day deadline are reviewed by the HQNC, who decides whether or not the data should be added to the system. Data additions authorized by the HQNC are carried out by the NADBNC. The HQNC also estimates implications of the changes to data users and issues a memo on the major changes and their

implications. Further, the HQNC monitors the progress of all air quality data through EPA and ensures that data are finalized within 120 days.

The Chief of the Monitoring Section reviews the memo from the HQNC on major changes to the system and their implications and issues a quarterly report of all major changes to the system. Copies of the quarterly report are sent to the Division Directors of the Office of Air Quality Planning and Standards (OAQPS), NADB, EPA Regional Offices and HQNC.

The EPA OAQPS Division Directors assess the effect of changes to the system on ongoing or past studies.

3.1.2 Monitoring Site Information

The flow of monitoring site information is shown in Figure 3-3. The major responsibility for collecting and updating site information lies with the RONC. Two types of site information, the MIS and the NHCI report, are completed by the RONC. The forms for these types of site information are filled out by the RONC or RONC designee, or by the state or local agency, if requested by the RONC. The RONC checks the MIS and NHCI report forms for completeness and accuracy. The NHCI report forms are also confirmed during site visits by the RONC or RONC designee, and appropriate blocks of the NHCI are completed during site visits.

The RONC reviews the site information and decides whether each site still meets design objectives. If a site does not, the RONC submits a request to the HQNC to delete the site from the

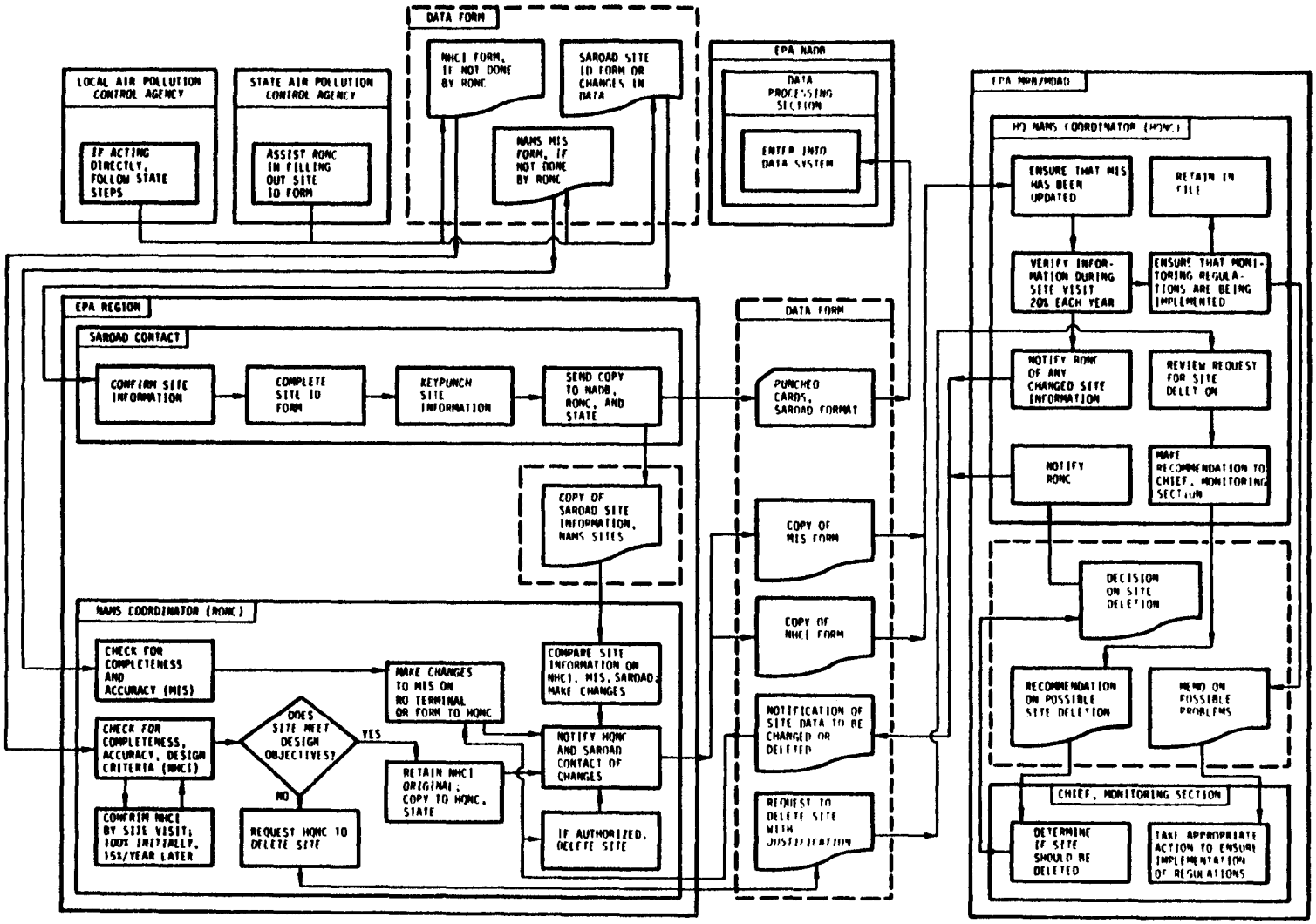


Figure 3-3. Site information data flow.

NAMS network. If a site does meet objectives, the RONC sends copies of the NHCI report (or changes made) to the HQNC and state agency. The RONC compares the MIS information, NHCI report, and SAROAD ID information to ensure that they are comparable. If the three presentations of site information are not consistent, the RONC determines the correct information and makes the appropriate changes. The HQNC and the Regional Office SAROAD Contact are notified by the RONC of changes.

The SAROAD form is completed by the SAROAD contact or the state or local agency. The information on the form is keypunched by the SAROAD Contact, and copies of the SAROAD site information are sent to the NADB, RONC, and state agency. The punched cards are sent to the NADB Data Processing Section to be entered into the data system.

The MIS and NHCI report site forms are sent to the HQNC for review. The HQNC checks the forms to make sure that the information is current; the MIS information is verified during site visits by the HQNC. Changes in MIS information are entered into the Regional Office terminal by the RONC; the original of the NHCI report is kept on file by the RONC. If any site information has changed, the RONC is notified.

The HQNC reviews requests from the RONC for deletion or addition of a NAMS monitoring site and makes a recommendation to the Chief of the Monitoring Section. The Chief decides whether a site should be deleted or added and informs the HQNC of the decision; the HQNC in turn notifies the RONC, who then implements

the decision. Final approval of the NAMS networks and all subsequent additions or deletions are made by the Director, MDAD.

3.1.3 Quality Assurance Data

The QA data are handled by the state agency, Regional Office QA Coordinator (ROQAC), and Environmental Monitoring Systems Laboratory (EMSL). This data flow is shown in Figure 3-4. The state or local air pollution control agency runs the data checks specified in the state QA control plan, which is developed by the submitting agency and must be approved by the ROQAC. Also, the state or local agency submits precision and accuracy (P&A) data on a quarterly basis to the ROQAC and EMSL.

The ROQAC reviews the quarterly P&A data, verifies the use of QA data checks, and notifies the RONC of all potential problems. Further, the ROQAC may verify the use of QA data checks if requested by the HQNC.

The quarterly P&A data are sent to the EMSL and entered into the UNIVAC computer file. The EMSL prepares summaries of the QA data and sends them to the RONC and HQNC.

Precision and accuracy data entered into the UNIVAC computer file are accessible by NADB. Since P&A data are on a reporting organization basis while SAROAD is on a site basis, EMSL will provide MRB with cross-reference lists for sites and reporting organizations. NADB issues P&A data reports and summaries that users may request.

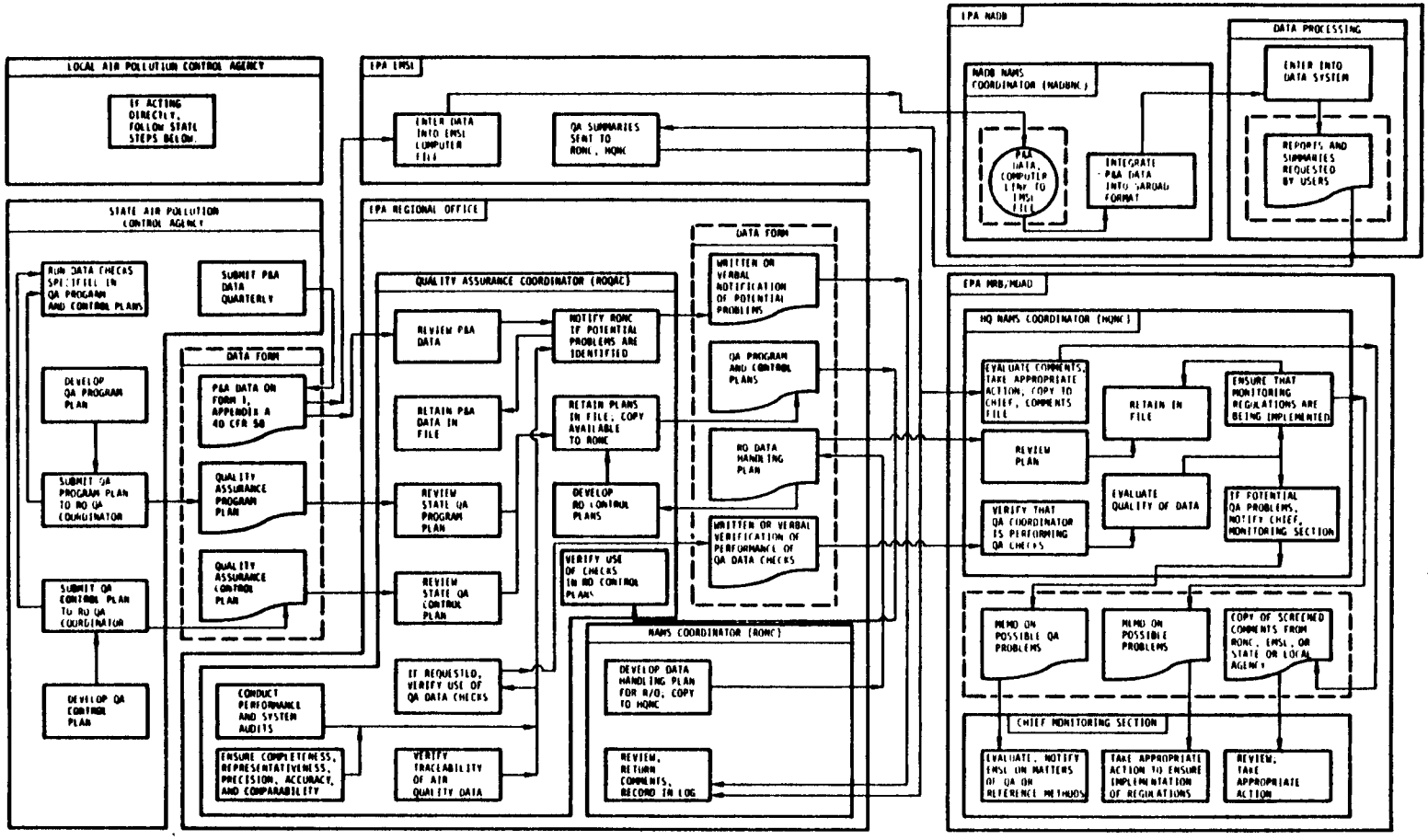


Figure 3-4. Quality assurance data flow.

After the RONC develops data handling plans for the Regional Office, a copy is sent to the HQNC, who verifies the use of checks in the Regional Office Program and QA Control Plans.

The HQNC reviews the QA summaries issued by EMSL and may request a verification of data checks by the ROQAC. If problems are found in either step, the HQNC notifies the Chief of the Monitoring Section in the form of a memo.

The Chief of the Monitoring Section reviews the information and takes appropriate action to correct the problem.

3.2 DATA USES

The NAMS concept was developed by the Standing Air Monitoring Work Group (SAMWG). Although monitoring of national air quality trends was the primary reason for establishment of the NAMS network, NAMS data have other uses. These include assessment of how well control strategies are working on a national level and whether NAAQS for a pollutant should be reevaluated. The NAMS will provide data that are more useful for these purposes than present data because the NAMS will reduce the quantity of data reported to EPA Headquarters, correct site information deficiencies, provide for more complete and timely data, and substantially enhance data quality.

Before the establishment of NAMS, determining air quality trends and comparing the air quality of major population centers were difficult. These problems resulted from different monitor siting procedures, quality assurance procedures, and sampling

methods used by various agencies submitting data. Besides inconsistencies, the data were not as timely as necessary, and data were sometimes changed without the knowledge of the data users. The NAMS network will provide data that will help to answer the following questions:

Is air quality generally improving throughout the country?

Are these improvements roughly consistent with emission trends?

Are the improvements different among various sectors of the country?

What areas of the country are experiencing broad-scale air qulaity deteriorations? Why?

Are certain seasons more pronounced in terms of air quality trends or levels? Why?

The NAMS were established to provide consistent and timely air quality data, and the NAMS data base allows management level decisions concerning the progress toward attainment of NAAQS.

Related to progress toward NAAQS attainment is the evaluation of how well national strategies are working at the national level. The NAMS data can be used to assess the effectiveness of strategies for inspection/maintenance (I/M), new car emission standards, and fugitive dust control.

Also related to progress toward NAAQS attainment is the possible reassessment of NAAQS. Ambient standard establishment was primarily based on health effects associated with a pollutant. For most pollutants the NAMS network was designed so that population exposure can also be taken into account if a standard is reevaluated.

SECTION 4

STEP-BY-STEP PROCEDURES

This section presents procedures for the flow of NAMS data from receipt by the Regional Office until entry into the NADB data bank. Procedures are presented for the Regional Offices, Monitoring and Data Analysis Division (MDAD), and NADB. Procedures for each office are divided into active and passive responsibilities. Active responsibilities are specific actions to be performed; passive responsibilities include the background knowledge necessary to perform the duties of a position.

4.1 REGIONAL OFFICES

In general, the Regional Office accepts data from state and local agencies, reviews data, makes necessary changes in data or procedures, and transfers data to NADB or MDAD. Four types of data are handled in the Regional Office: air quality data, site information, comments, and quality assurance data. These data are handled by three individuals: the SAROAD Contact, Regional Office NAMS Coordinator (RONC), and Regional Office Quality Assurance Coordinator (ROQAC).

4.1.1 Active Responsibilities

The RONC has a number of active responsibilities relating to the NAMS. Table 4-1 lists each responsibility and the RONC's corresponding authority and access to information.

TABLE 4-1. ACTIVE RESPONSIBILITIES OF THE REGIONAL OFFICE NAMS COORDINATOR

Responsibility	Authority and access to needed information
Ensure that NHCI is accurate and complete	The RONC has authority to make any changes deemed necessary to the NHCI form; the RONC also has authority to visit NAMS sites to check information and should visit 10-20% the sites annually; the original of the HNCI is maintained by the RONC
Keep MIS current	The RONC has authority to make changes to the MIS; ideally, the RONC would be the only person to make such changes after initial loading
Verify use of QA checks	The RONC or the ROQAC must verify the use of checks in the QA plans; if checks are not used, the RONC has authority to enter a comment in the comments file or to withhold the data from submittal
Inspect, correct, and validate NAMS air quality data	The RONC has authority to withhold data from submittal and has access to all NAMS submittals
Develop the Regional Office data handling plan	The RONC has authority for the content of the Regional Office data handling plan. Input should be obtained from the ROQAC and RO SAROAD contact
Screen comments from state and local agencies	The RONC has authority to decide whether a comment should be passed on to a higher level
Ensure submittal of data within 90 days	The RONC shares authority with the RO SAROAD contact to ensure submittal of data within 90 days

Figure 4-1 shows the flow of data in the state and local agencies before entry into the Regional Office. Because this figure is presented only to show data flow as it relates to the Regional Office, no explanation of specific state and local actions is provided in the text.

Figure 4-2 is a flow diagram showing specific tasks performed in the Regional Office. All tasks (rectangular boxes) are numbered, and explanations of them follow. The headings for these explanations are the same as the boxes to which they apply in Figure 4-2.

1. ENTER RECEIPT IN SAROAD CONTROL LOG

Upon receipt of air quality data by the Regional Office, the SAROAD Contact should record receipt of the data identifying information in the SAROAD Control Log (see Figure 4-3). The purpose of this log is to allow tracking of the data within the Regional Office. The items that should be filled out are:

State or local agency that submitted the data

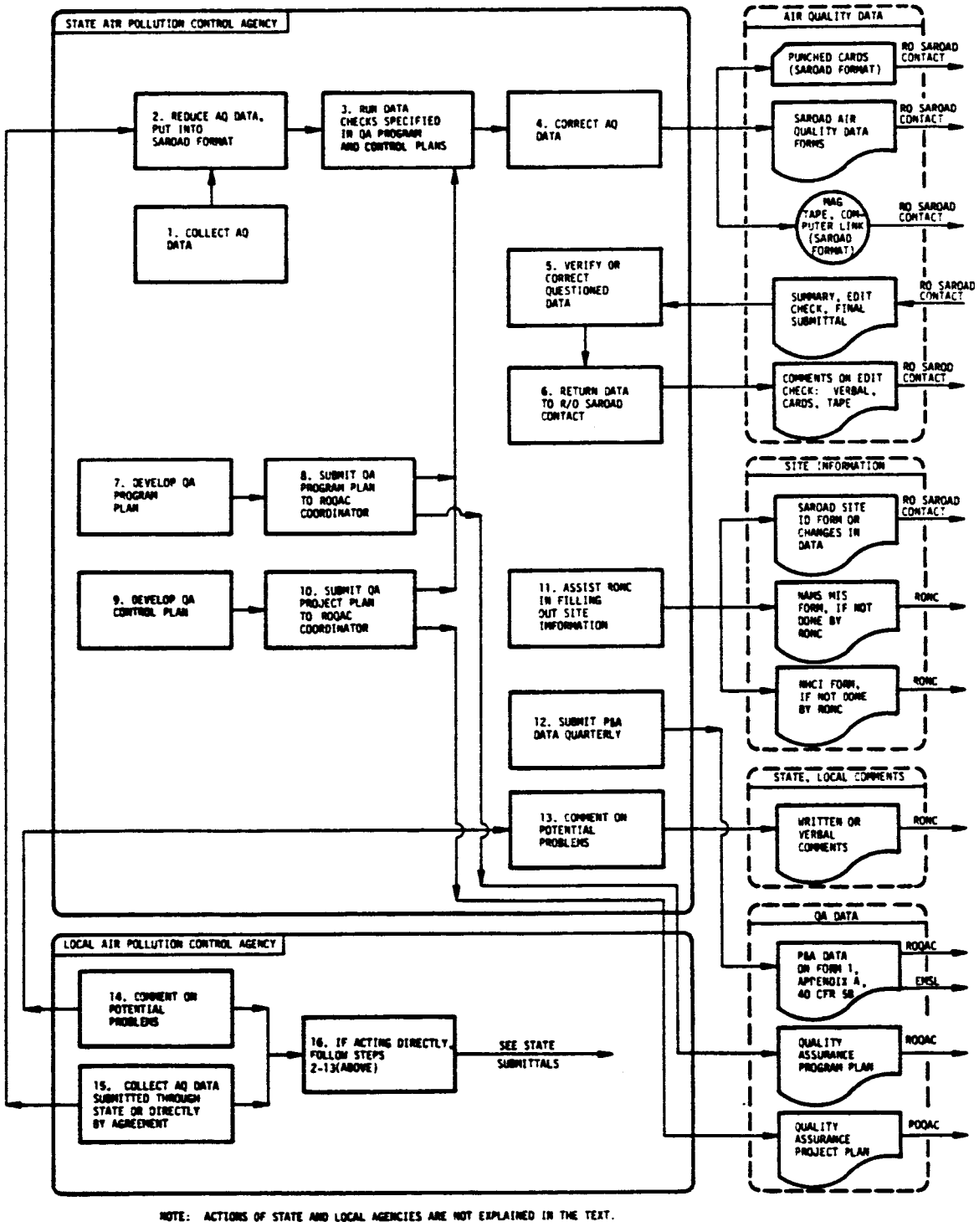
Description that distinguishes the data from other data

Form of data (forms, cards, or tape, indicated as F, C, or T)

Date received

Regional Office identification in this format:

State Year Quarter Batch



NOTE: ACTIONS OF STATE AND LOCAL AGENCIES ARE NOT EXPLAINED IN THE TEXT.

Figure 4-1. Data flow in state and local agencies before Regional Office entry.

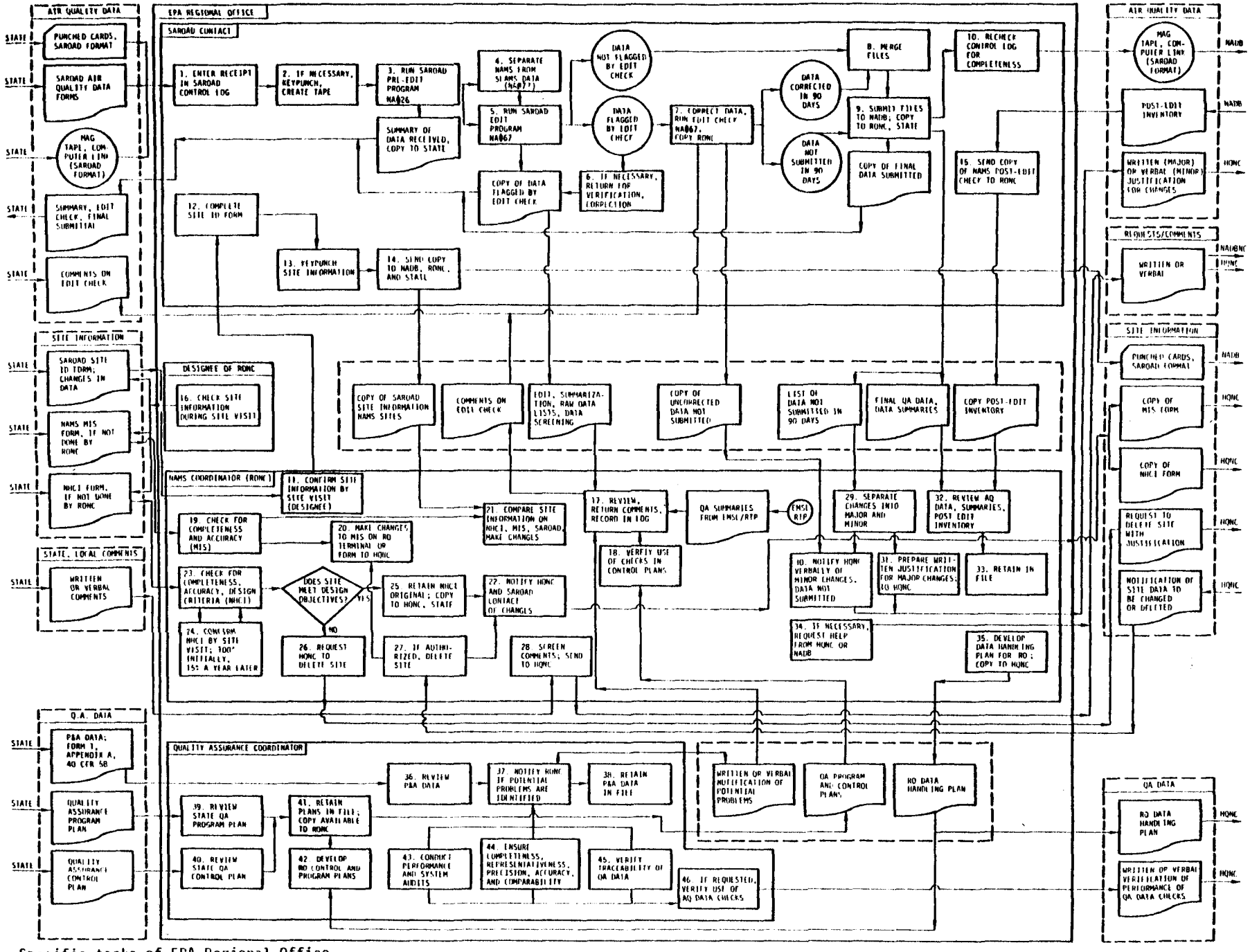


Figure 4-2. Specific tasks of EPA Regional Office.

SAROAD CONTROL LOG FOR _____ Qtr 19__

STATE	DESCRIPTION	FORMS/CARDS/TAPE	DATE REC'D	R.O. I.D.	RECEIPT LETTER TO STATE*	TAPE TO NCC*/ R-NO.	LISTINGS TO STATE*	ERROR RESOLUTION				NADB CONTROL I.D.	NADB UPDATE NUMBER/ COMPLETE DATE*	DATA TO STATE*	TAPE FROM NCC*	TAPE TO STATE*
								NEW R.O. I.D.	BY R.O.	BY STATE	DATE COMPLETE*					

*DATES

Figure 4-3. Sample of SAROAD Control Log form.[4]

Date on which letter of receipt was sent to the submitting state or local agency

The description can be taken from the SAROAD State Transmittal Form, which should accompany the data from the submitting agency. (A copy of this form should also accompany the data to NADB.) Instructions on filling out the form are in "AEROS Manual Series Volume II".[4]

2. IF NECESSARY, KEYPUNCH, CREATE TAPE

Air quality data can be submitted by state or local agencies on paper forms, punched cards, or magnetic tape, or by computer link. All forms of the data must be in SAROAD format. Depending on the form in which data is submitted from the state or local agency, the Regional Office may have to keypunch the data and/or create a tape that can be used on the UNIVAC computer.

3. RUN SAROAD PRE-EDIT PROGRAM NAØ26

The SAROAD Contact (or staff) runs a SAROAD pre-edit program that checks the data for obvious and consistent errors in format and content. The pre-edit program reads records from a standard labeled magnetic tape file. As the records are read, they are sorted by site, pollutant, method, interval, year, month, and units code. Records that cannot be sorted because of invalid card type, or data type are not included in the report, but

will be listed with an error message before any report data. The SAROAD Contact should resolve all errors found, either by correction if the error is obvious or by checking with the state or local submitting agency. Many of the types of checks made in the pre-edit program should already have been made at the state or local level. After the pre-edit is complete and errors have been resolved, a copy of the summary report generated by the program is sent to the submitting agency. (For further details, see "AEROS Manual Series, Volume II,"[4] page 7.1.2-4.)

4. SEPARATE NAMS FROM SLAMS DATA

Separation of NAMS data from SLAMS data is highly desirable because only NAMS data need be sent to the RONC or HQNC and because NAMS data must be submitted more quickly than SLAMS data. Program NAØ77 is used to separate NAMS from SLAMS data.

5. RUN SAROAD EDIT PROGRAM NAØ67

The SAROAD Contact (or staff) processes air quality data through a SAROAD edit program (NAØ67) to edit and update transactions in the data base. The data must meet minimum requirements before updating of the files. The tape used in the pre-edit program and program control cards for each of four functions desired are put into the system. The four functions that can be

run are: edit, summarization, raw data listing, and data screening. An additional function (STAN) lists only violations of the short-term standards.

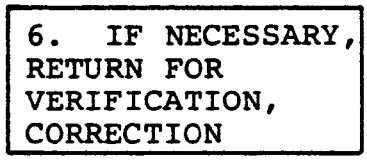
The edit subprogram requires a master control card with an action code to change, add, or delete data. The edit subprogram checks each data field for content and checks several fields together for consistency. It produces a transaction tape, an error tape, and printed output.

The summarization subprogram (TRAN) produces printed summaries of raw data by site, pollutant, or year. These summaries display information related to the air quality standards.

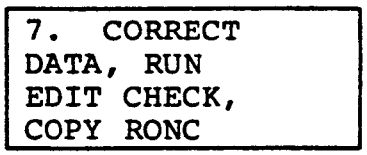
The raw data listing subprogram (LIST) produces a raw data listing for all data on the tape.

The data screening subprogram (MRBV) is used to review automatically raw data for data anomolies and must be executed on each data set to ensure that data are valid and that suspicious data are identified. The Gap Test and the Pattern Test are used. Suspicious data should be verified or removed from the tape before submission to NADB. (For further details see "AEROS Manual Series Volume II,"[4] Subsection 7.1.2.)

At a minimum the edit, STAN, TRAN, LIST, SHEW, and MRBV functions should be run. Two copies should be printed. One copy should be filed and the other sent to the State for problem resolution. For data flagged by MRBV, the reporting agency should supply corrections or written verification of data.



Errors or suspicious data discovered in the edit check are verified or corrected by the SAROAD Contact with the submitting state or local agency. If errors can be easily and quickly resolved, the SAROAD Contact may do this by phone. If errors are numerous or complex, the edited print-out should be returned to the submitting agency for review and correction.



The SAROAD contact should make every effort to add, correct, or delete data before the 90-day deadline and thus avoid changes after the lockout applies. All air quality data not received by NADB within 90 days of the end of the reporting period will automatically be locked out of the data bank. Submittal on time necessitates prompt and sometimes frequent interaction with the submitting state or local agency to correct errors, supply missing data, or handle other anomalies. Although the SAROAD Contact performs the error resolution with the state or local agency, the RONC has the responsibility to make sure that the 90-day deadline is met. A copy of data not corrected and therefore not submitted is sent to the RONC.

8. MERGE FILES

After the corrections made within the 90 days are completed and have passed the edit check, the corrected data and the data that initially passed the edit checks are merged into one data file. Corrections are merged only with data not yet submitted to NADB. This file contains all data that have been checked and approved for submission to NADB within 90 days after the end of the quarter in which the data was collected.

9. SUBMIT FILES TO NADB; COPY TO RONC, STATE

The file containing data approved within the 90 days and the file containing data corrected but not submitted within the 90 days are sent to NADB. All data submitted are corrected data; data not corrected are held until corrections are made. The data are submitted in SAROAD edit format and compatible with the UNIVAC computer. All data should be accompanied by a copy of the SAROAD State Transmittal Form. A listing of submitted data is sent to the RONC and the state.

10. RECHECK CONTROL LOG FOR COMPLETENESS

The SAROAD Control Log is filled out when data are first received from the submitting agency (see Figure 4-3). As errors are resolved with the state or local agency, the flow of data

should be tracked on the control log. The log is checked before submittal to ensure that all necessary entries have been made. The final entries in the log are the date of data transmittal to NADB and record of any other copies sent.

11. CONFIRM SITE INFORMATION BY SITE VISIT (DESIGNEE)

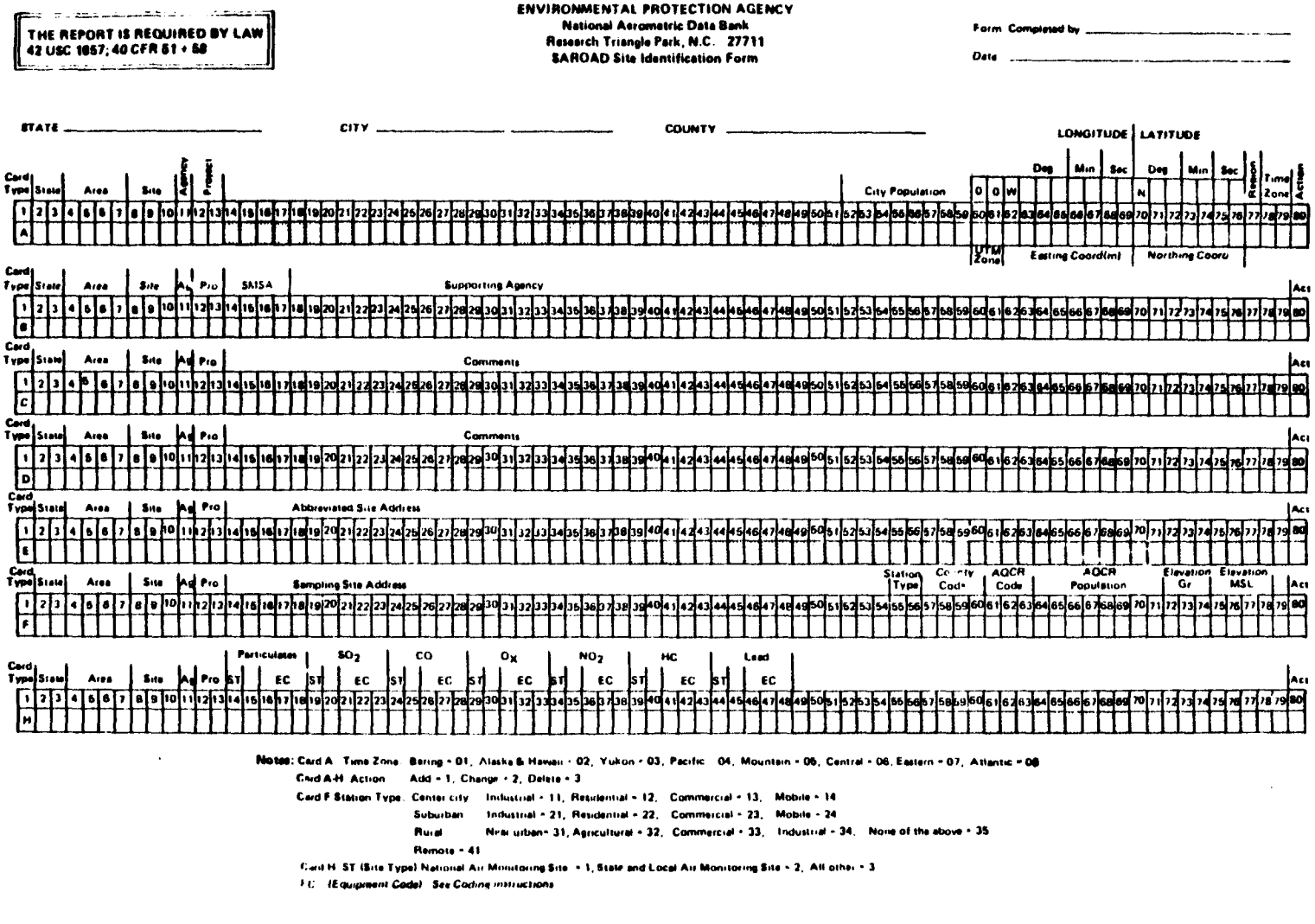
Site information must be confirmed by a site visit. In some EPA Regions these site visits will be conducted by the RONC; in others the site visit is done by designees in the Regional Office or the state or local agency. The RONC is responsible for visiting 15 percent of NAMS sites each year.

12. COMPLETE SITE ID FORM

In many EPA Regions the SAROAD site ID form is completed by the state or local agency; in some Regions it is filled out in the Regional Office by the SAROAD Contact on the basis of information from the state or local agency. A copy of the SAROAD site ID form is shown in Figure 4-4. The RONC is responsible for assuring completion by the SAROAD Contact of SAROAD site ID forms for all NAMS sites.

13. KEYPUNCH SITE INFORMATION

The SAROAD Contact (or staff) checks to ensure that site information is in proper SAROAD format and then has the information



Notes: Card A Time Zone Bering = 01, Alaska & Hawaii = 02, Yukon = 03, Pacific 04, Mountain = 05, Central = 06, Eastern = 07, Atlantic = 08

Card A-H Action Add = 1, Change = 2, Delete = 3

Card F Station Type. Center city Industrial = 11, Residential = 12, Commercial = 13, Mobile = 14

Suburban Industrial = 21, Residential = 22, Commercial = 23, Mobile = 24

Rural Near urban = 31, Agricultural = 32, Commercial = 33, Industrial = 34, None of the above = 35

Remote = 41

Card H ST (Site Type) National Air Monitoring Site = 1, State and Local Air Monitoring Site = 2, All other = 3

EC (Equipment Code) See Coding Instructions

Figure 4-4. Sample of SAROAD site identification form.

keypunched for submittal to NADB. Keypunch instructions are contained in AEROS Volume II.[4]

14. SEND COPY TO NADB, RONC, AND STATE

Copies of the completed, keypunched SAROAD site information are sent to the RONC, the data processing section at NADB, and state or local agency that submitted the data.

15. SEND COPY NAMS POST-EDIT CHECK TO RONC

The data processing section at NADB runs a post-edit check for all air quality data submitted and sends a copy to the Regional Office SAROAD contact. The SAROAD contact should copy the post-edit check of NAMS data and make the check available on request to the RONC for review and retention.

16. CHECK SITE INFORMATION DURING SITE VISIT

Because the NHCI contains more detailed site information than the MIS or SAROAD system, the NHCI is used as the basis for NAMS site visits. Regardless of who conducts the site visit, the HQNC maintains a copy of the NHCI. The RONC is responsible for the correctness of information in the NHCI.

The NHCI contains information about the following: site identification, site classification, topographic characteristics,

obstructions that influence the site, meteorology and climatology, probe siting, monitor, site and data record histories, site representativeness, and custody and control of data.

Site identification information covers the following:

State
City
Urbanized area as designated by the Bureau of Census
Census tract
SAROAD site code number
State agency site number
Local agency site number
Site address
Name of nearest intersecting street
Pollutants monitored at the site (NAMS and SLAMS)
Name of preparer
Telephone number of preparer
Date of report
Description of landmarks
Site sketch
Site photographs
Universal Transverse Mercator coordinates (UTM's)

Site classification information covers the following:

Dominant sources by pollutant
Description of land use (within a radius of 1/4 mile)
Description of land use (within a radius of 2 to 3 km)
History of stationary industrial sources influencing the site
Mobile source information

Information about topographic characteristics includes general and specific terrain features. A description of obstructions that influence the site includes buildings, trees, elevated

roadways, and other obstacles near the site. The meteorology and climatology data include the source of meteorological data, summary of wind speed and direction frequencies, UTM's of the meteorological data, and location of the meteorological station in relation to the monitoring site.

Probe siting information shows that the requirements of Appendix E, 40 CFR 58, are being met. Monitor information includes:

Monitor manufacturer

Model number

SAROAD method code

Date monitoring began

Frequency of measurement

Probe material

Residence time

Site and data record histories are necessary to identify the times when air quality data may not be valid for use in determining air quality trends. Changes that can invalidate data for such use include:

Changes in the inlet probe

Changes in the manifold

Instrument changes

Breaks in the data record

Information about site representativeness specifies whether the site is microscale (several meters to 0.1 km), middle scale (0.1 to 0.5 km), neighborhood scale (0.5 to 4.0 km), or urban

scale (4.0 to 50.0 km). Also included are averaging times and monitoring objectives.

Information about the custody and control of data includes the current names and telephone numbers of persons in the chain of custody.

17. REVIEW, RETURN COMMENTS, RECORD IN LOG

A copy of data flagged by the edit check of the SAROAD Contact is sent to the RONC for review. The copy may contain data summaries, raw data listings, and results of data screening. The RONC reviews the information, comments on data flagged by the edit check, returns the data and comments to the SAROAD Contact, and records the transaction in the SAROAD Control Log. (If the SAROAD Contact and RONC are not in the same location, the SAROAD Contact records the transaction in the log.)

18. VERIFY USE OF CHECKS IN RO CONTROL PLANS

Action 42 in this subsection describes the performance and system audits conducted by the ROQAC. The RONC verifies that these audits are actually used as described in the QA control plans.

19. CHECK FOR COMPLETENESS AND ACCURACY (MIS)

The Management Information System (MIS) describe specific NAMS in detail and is maintained jointly by MDAD and the Regional Offices. It is a small computerized tracking system used to produce management reports that summarize progress in designating NAMS and achieving conformity with specific instrument and siting criteria. The MIS form may be filled out by the state or local agency or by the RONC (or RONC designee), and the RONC checks the form for completeness and accuracy. The RONC (or RONC designee) may obtain needed information by visiting a site or telephoning the state or local agency.

If MIS information is not complete or accurate, the RONC is responsible for ensuring that the necessary information is obtained. Information in the MIS must agree with that in the NHCI. If discrepancies are found the RONC must verify questionable information. After initial loading of the MIS, the RONC should be the only person to change site information from the Regional Office terminal.

20. MAKE CHANGES TO MIS ON RO TERMINAL OR FORM TO HQNC

As additional site information is obtained by the RONC, it is entered into the MIS tracking system (by the RONC) at the Regional Office computer terminal. The NAMS MIS operates on an EPA UNIVAC 1110 computer using the Systems 2000 data base management system and an English-oriented language. The RONC can access the system and enter necessary site information according

to instructions in the users manual distributed in June 1979. After approval by the RONC, the MIS information is entered into the data bank to allow both the RONC and the HQNC to access the current information. Ideally, only the RONC should change the MIS.

21. COMPARE SITE INFORMATION ON NHCI, MIS, SAROAD; MAKE CHANGES

Site information is compiled in three files: SAROAD site information, MIS, and NHCI. Periodically (at least annually) the RONC should compare data in the three files to make sure that all data are consistent. If discrepancies are found, the RONC resolves them by contacting state or local agencies or making site visits. Necessary changes to the MIS and NHCI files containing incorrect or incomplete information are made by the RONC. The SAROAD Contact is notified of all changes necessary in the SAROAD identification file and is responsible for making them.

22. NOTIFY HQNC AND SAROAD CONTACT OF CHANGES

If information changes in any of the three site files (SAROAD site information, MIS, or NHCI), the RONC notifies the HQNC and SAROAD Contact to ensure that they know the current progress and status of NAMS. Depending on the complexity and impact of the changes, the RONC may make the notification written or verbal. The SAROAD Contact is responsible for changing the

SAROAD site file information; the RONC is responsible for changing the MIS and NHCI files.

23. CHECK FOR COMPLETENESS, ACCURACY, DESIGN CRITERIA (NHCI)

The NAMS Hard Copy Information is detailed supplementary site information used in addition to SAROAD site data and MIS information. The NHCI report is designed to provide information about the following: site identification, site classification, topographic characteristics, obstructions that influence the site, meteorology and climatology, probe siting, monitors, site and data record histories, site representativeness, and custody and control of data. The explanation of Action 16 in this subsection describes the information provided.

Routine evaluations of the NAMS site information are made by the RONC and HQNC. The evaluations include completion of the NHCI form and the submittal to the HQNC, RONC, and state and local agencies that operate the sites.

The RONC checks each completed NHCI form for completeness and accuracy and resolves problems whenever possible. The RONC and HQNC also document compliance with design and siting criteria (40 CFR 58).[3]

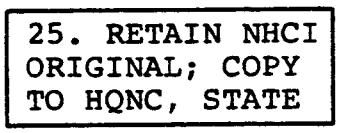
The RONC is responsible for ensuring that all stations found to be in non-compliance with required NAMS siting criteria correct

deficiencies within a reasonable period of time (usually 30 days). If correction requires more than 30 days, the RONC establishes a schedule for complying with siting and design criteria. In either case, the RONC documents these changes and provides copies to each agency receiving the original site evaluation report.

24. CONFIRM NHCI BY SITE VISIT; AS MANY AS POSSIBLE FIRST YEAR, 10-20% A YEAR LATER

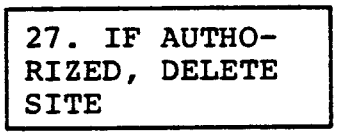
Site information contained in the NHCI report is confirmed during site visits by the RONC. During the first year of the NAMS operation, the RONC or RONC designee should visit a major portion of the sites. Although the RONC may designate someone else to visit the site, the RONC is responsible for correctness of the information. Each year thereafter, 10 to 20 percent of the sites are visited by the RONC or RONC designee as deemed necessary by the Regional Office.

The explanation of Action 16 in this subsection describes the necessary checks. If any changes are made to the NHCI report as a result of the site visits, the RONC documents them and notifies the HQNC and the state and local agencies that operate the affected sites. The RONC also notifies the RO SAROAD Contact to make the appropriate changes to the SAROAD site information file. The MIS file is corrected by the RONC.



When completed and verified, the original NHCI report is retained by the RONC. Copies are sent both to the HQNC and to the state or local agency operating the monitoring site.

If an evaluation of the NHCI report and a site visit by the RONC indicate that a site does not and cannot meet siting and design criteria (40 CFR 58),[3] the RONC must submit a request to the HQNC for deletion of the site from the NAMS network. The request documents the criteria that are not met at the site and the reasons why the site cannot be made suitable. This step ensures that unrepresentative monitoring sites are not retained in the NAMS network. The RONC should also review other candidate sites as possible replacements for the deleted site.



If a monitoring site does not meet siting and design criteria (40 CFR 58), the RONC requests deletion of the site from the NAMS network. If the HQNC approves the RONC's request, the site is deleted after formal approval by the Director MDAD. The RONC must notify the state or local agency operating the site and should assist the agency in locating a suitable replacement site.

The RONC should eliminate information about the deleted site from the NHCI active site file, but retain the information in a retired site file for 3 years. Also, the RONC should eliminate the site from the MIS and notify the SAROAD Contact that the site is no longer a NAMS site. Deletion from the SAROAD file depends on whether the site continues to operate as a SLAMS site.

28. SCREEN COMMENTS: SEND TO HQNC

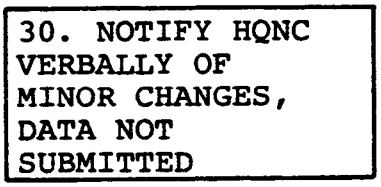
State and local agencies that run monitoring sites often submit comments with site data. The RONC reviews the comments on NAMS sites, clarifies them if necessary with the submitting agency, and sends relevant comments to the HQNC.

Some types of comments on unusual conditions such as construction activity, dust storms, or traffic jams can explain apparent data anomalies. Depending on the purpose of data collection, this information could be used to explain why no data are reported for a specified time interval or could be the basis for deleting data from a file for specific analytical purposes. Although comments are reviewed at the local and state level, the RONC must also screen the comments.

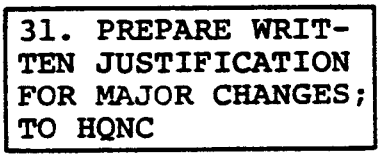
29. SEPARATE CHANGES INTO MAJOR AND MINOR

Data received by the SAROAD Contact after the 90-day deadline or data corrected after the deadline may not be added to

the file without steps to ensure that the HQNC is aware of the changes. The first step is for the RONC to classify all changes or additions to the file as major or minor. Major changes involve addition of previously missing data or large changes in the values of previously submitted data; minor changes involve correction of less important matters, such as dates. Classification of changes as major or minor depends on the RONC's judgment about their impact on interpretation and use of air quality data.

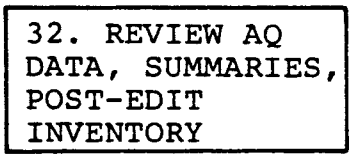


After the RONC has reviewed the list of changes to be submitted after the 90-day deadline and has divided them into major and minor changes, the RONC verbally notifies the HQNC of minor changes. It is the RONC's responsibility to ensure that the HQNC is made aware of all changes after 90 days. The RONC should also notify the HQNC of data that will not be submitted by the 90-day deadline.



Major changes submitted after the 90-day deadline must be justified in writing by the RONC to the HQNC. The HQNC must be informed by the RONC of changes in the file that affect the use

and interpretation of air quality (AQ) data. This is a key element of the lockout system, which was devised to prevent major changes to the data file without notification of appropriate personnel.



After the SAROAD Contact has reviewed and corrected air quality data that are to be submitted within the 90-day deadline, a copy of these data is given to the RONC. The final air quality data and data summaries are reviewed by the RONC. These data are sent to NADB by the SAROAD contact.

The NADB creates a post-edit inventory and sends a copy to the RO SAROAD Contact, who in turn submits it to the RONC. The RONC reviews the post-edit inventory.

The purpose of these reviews by the RONC is to identify any additional problems not observed by the SAROAD contact. If the post-edit inventory reveals any additional problems with the data, the RONC takes appropriate action to resolve them.

Copies of the final submittal of air quality data and of data summaries are reviewed by the RONC. Because data flagged by the edit check were previously reviewed and corrected, this final review is primarily an overview of the air quality trends that the data represent, rather than a check on the correctness of

the data. The data and data summaries are placed on file by the RONC and retained until the data have been updated. Any update rejections must be resolved and summaries from the data bank retained in the files.

34. IF NECESSARY, REQUEST HELP FROM HQNC OR NADB

If problems that cannot be resolved within the Regional Office occur, the RONC requests assistance from the HQNC or NADB personnel. Requests may include assistance in program modification to produce new summaries or classification on NAMS guidelines. Requests may be written or verbal at the discretion of the RONC.

The RONC has much of the responsibility for timely and complete NAMS data flow. He or she must be able to recognize when problems may hinder the program and determine when changes or clarifications in the system are necessary.

35. DEVELOP DATA HANDLING PLAN FOR RO; COPY TO HQNC

The RONC or the ROQAC is the person most familiar with all functions of personnel involved in NAMS data flow and therefore most qualified to develop a data handling plan for the Regional Office. This plan further defines responsibilities and interactions within the RO and may later be altered and refined by the RONC or ROQAC as necessary.

A copy of the data handling plan for the Regional Office is sent to the HQNC, ROQAC, and RONC. Because the ROQAC incorporates the data handling plan in the RO Project and Program Plans, the ROQAC should be consulted during the preparation and updating of the data handling plan if the plan is developed by the RONC. This plan is updated as appropriate.

36. REVIEW P&A DATA

The Regional Office Quality Assurance Coordinator (ROQAC) receives quarterly precision and accuracy (P&A) reports on special forms from state and local agencies. The data on these forms are reviewed by the ROQAC to see whether any problems are evident. Review decisions are currently based on the judgment of the ROQAC. The review generally involves a comparison of P&A data from different submitting agencies and a comparison of P&A data on the same site over a period of time to identify outliers and trends. If P&A data for a given reporting agency are getting worse, the ROQAC should investigate this trend.

Figure 4-5 shows a two-page sample form for P&A data. Precision is estimated from the results of biweekly precision checks; these data are used to calculate a combined precision probability interval. The calculation is based on the precision of analyzer measurement of a test gas and the known concentration of the test gas. Accuracy is estimated from the results of independent audits. At the end of each calendar quarter a combined accuracy probability interval is calculated; this is

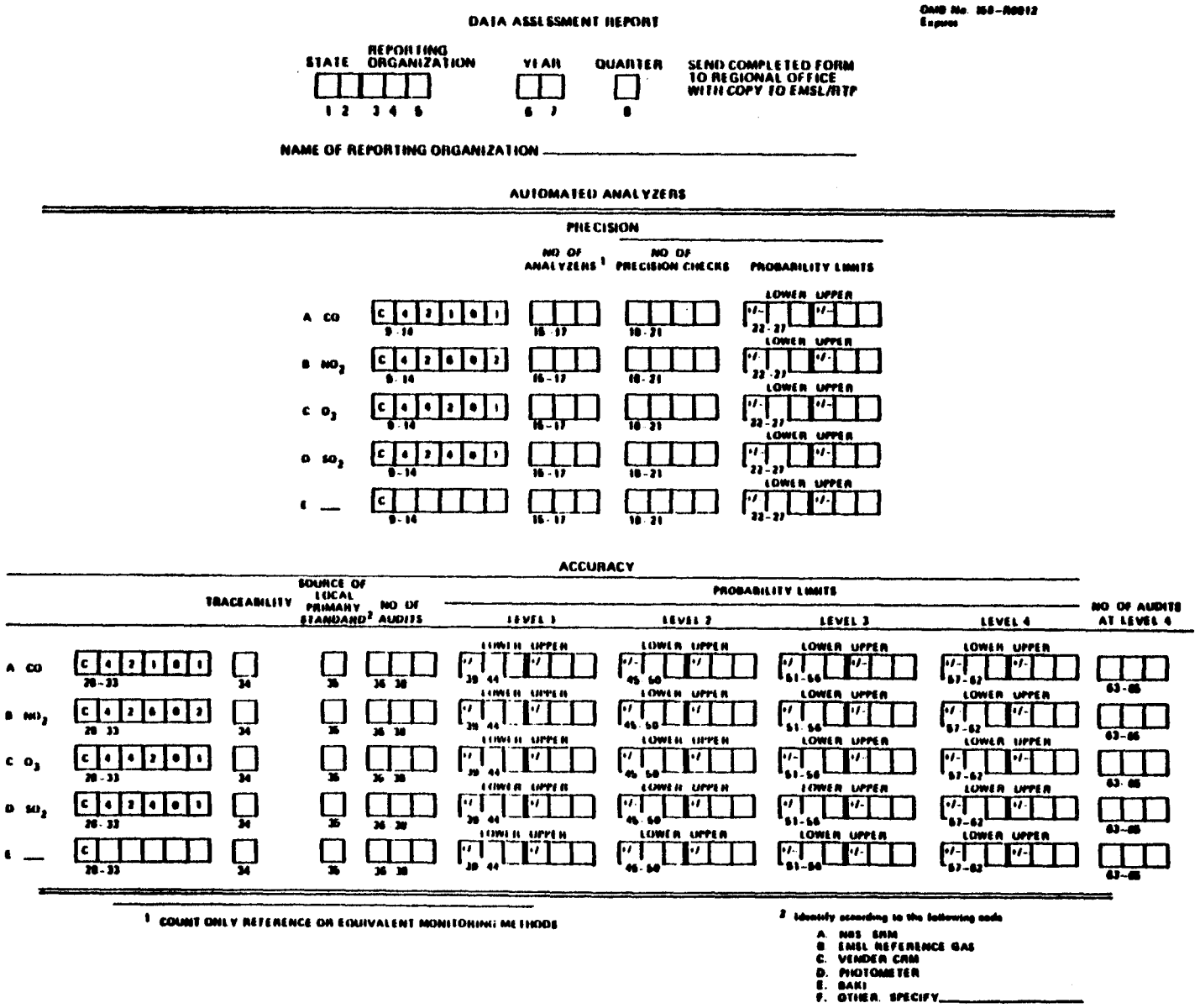
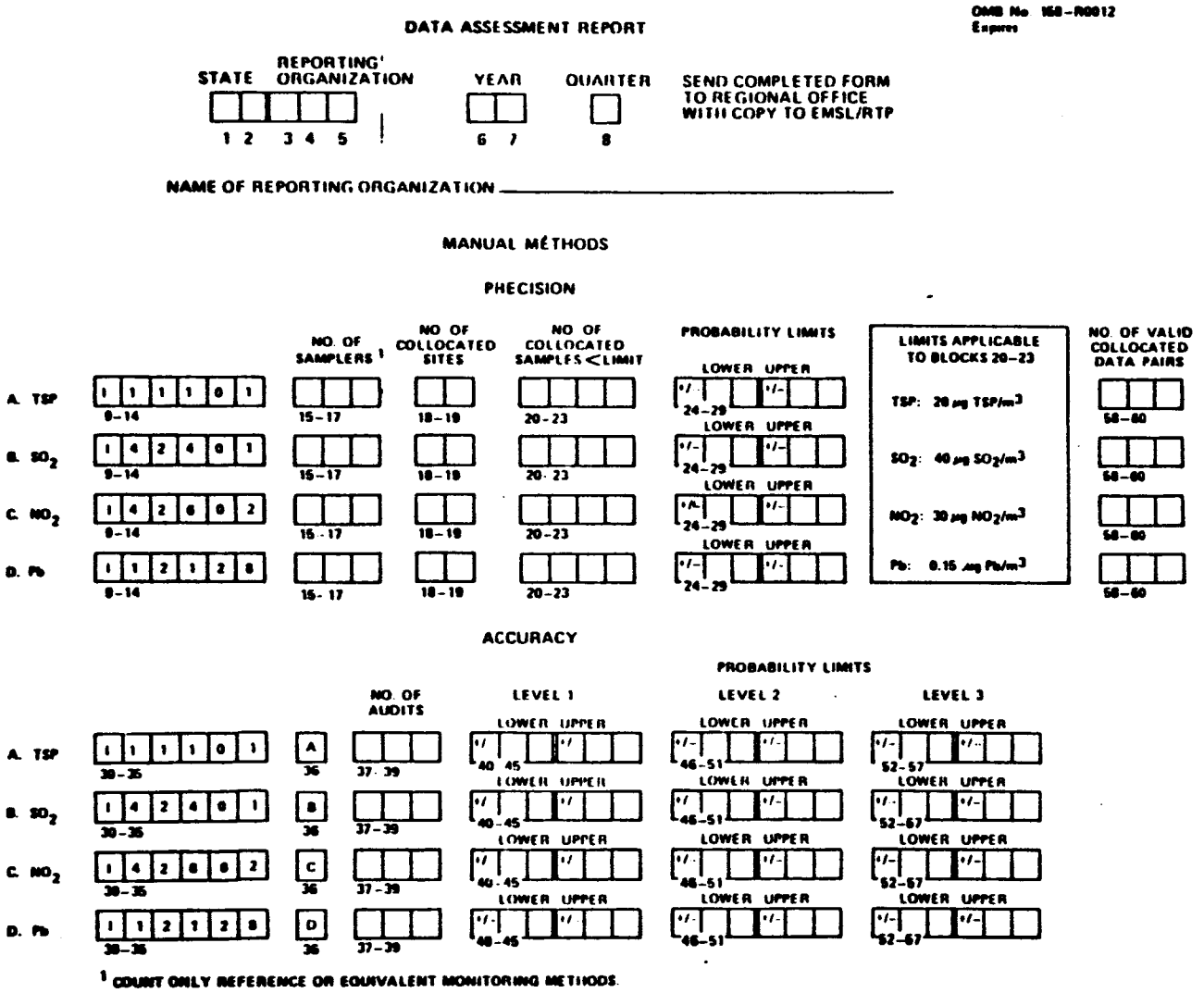


Figure 4-5. Sample of precision and accuracy form.[3]

(continued)

Figure 4-5 (continued)



based on the percentage difference for each audit concentration between the analyzer measurement and the known audit gas concentration. In the future, limits will be set for P&A data, and values outside these limits will have to be checked. Problems identified by the ROQAC are reported to the RONC.

37. NOTIFY RONC IF POTENTIAL PROBLEMS ARE IDENTIFIED

The RONC is informed, either verbally or in writing, about all problems identified by the ROQAC. The purpose of this step is to make sure that the RONC is aware of potentially invalid data and that invalid data are not entered into the data base. The P&A data that appear to pose problems are investigated by the ROQAC, first by phone and then by visits to the agency if necessary. Also, the ROQAC should carefully analyze P&A data from agencies where problems have been identified, to ensure the accuracy of the data.

38. RETAIN P&A DATA IN FILE

The ROQAC retains a copy of P&A data sent to the Regional Office from the state or local agency on the special form shown in Figure 4-5. A copy is also sent by the submitting agency to EMSL to be entered into the EMSL data bank. Copies are kept on file for as long as the data remains on file.

39. REVIEW STATE QA PROGRAM PLAN

Under EPA's mandatory quality assurance policy the states must prepare a quality assurance (QA) program plan to submit to the ROQAC for review and approval. The QA program plan, which represents a commitment by management to develop a QA program, includes a policy statement that sets forth how management will develop the quality assurance program and what items it will include. The ROQAC will review the program plan submitted by the state and submit comments for necessary revisions until the state devises a program plan acceptable to the ROQAC.

40. REVIEW STATE QA CONTROL PLAN

As required by Section 2, Appendix A, the state agency must submit a NAMS/SLAMS quality control program plan to the ROQAC for review and approval. The quality control Program Plan must cover methods, equipment, calibration, and maintenance, etc.; 40 CFR 58 lists all the elements required.[3] The ROQAC must also review the state QA control plan and submit comments for necessary revisions until the state devises an acceptable plan.

41. RETAIN PLANS IN FILE; COPY AVAILABLE TO RONC

The ROQAC retains a copy of the accepted state Quality Assurance Program Plan and Quality Control Plan. A copy of each is also made available to the RONC.

42. DEVELOP RO QA CONTROL AND PROGRAM PLANS

After review and approval of the state QA Program and Control Plans, the ROQAC must under EPA's mandatory quality assurance policy develop Regional Office Control and Program Plans. These latter plans contain elements similar to those in the state plans. The Regional Office QA Program Plans must be submitted to the Quality Assurance Management Staff, Office of Research and Development, in Washington, D.C. At a latter date the States under EPA's mandatory quality assurance policy must develop a SLAMS quality assurance Project Plan which is reviewed and approved by the ROQAC.

43. CONDUCT PERFORMANCE AND SYSTEM AUDITS

The ROQAC conducts performance and system audits to make sure that the QA program performs as intended. The audits verify the use of checks in QA control plans. Performance audits are independent checks to evaluate the quality of data produced by the total measurement system (sample collection, sample analysis, and data processing) and are normally a quantitative appraisal of quality. They are to be performed by an operator or

analyst different from the person responsible for routine QA measurements.

Sample collection audits include tests of flow rate devices and checks of instrument calibration and instrument calibration gases. Analysis audits involve analysis by the auditor of routine samples with known concentrations. Data processing audits involve spot checks of calculations and submission of dummy raw data to obtain and check resulting validated data.

A system audit is an onsite inspection and review of the QA system used to assess the total measurement system (sample collection, sample analysis and data processing) of each monitoring sensor. System audits are qualitative appraisals usually performed before or just after monitoring has been initiated and annually thereafter, although they may be performed anytime during the life of the monitoring site. Quality assurance plans should be used as the basis for conducting a system audit. Some of the important items that should be reviewed in the audit include:

Quality assurance organization and responsibility
Sample collection procedures
Sample analysis procedures
Data validation criteria
Calibration procedures
Control charts
Interlaboratory tests
Preventive maintenance schedules and procedures

Subsection 1.4.16 of Reference 5 provides further details on performance and system audits.

44. ENSURE COMPLETENESS, REPRESENTATIVENESS, PRECISION, ACCURACY, AND COMPARABILITY

The ROQAC must evaluate air quality data for completeness, representativeness, precision, accuracy, and comparability. A good guideline for completeness of data is that at least 75 percent of all possible data for a quarter are present. Data are representative if they were gathered at a time typical of normal operation and therefore if they measure what they were intended to measure. For example, ambient CO levels gathered at midnight are not representative of CO levels during weekday rush hours. The ROQAC can best assess representativeness by site visits. Precision and accuracy are checked from the P&A forms submitted by the states (see Figure 4-5). Comparability refers to the existence of standard temperature and pressure during testing and the use of standard units for a given site and pollutant with data in SAROAD format; data that need to be converted to standard conditions or other units are referred back to the state agency by the ROQAC.

45. VERIFY TRACEABILITY OF AQ DATA

The ROQAC must verify the traceability of data annually as part of the systems audit (Action 43). Traceability refers to following raw data from measurement to determination of end values. Roughly 2 to 5 percent of the total raw data and all values exceeding NAAQS should be traced. This provides a check of recordkeeping procedures and requires all data transformations to be defended.

46. VERIFY USE OF QA DATA CHECKS

The HQNC may request the ROQAC to verify that certain QA data checks are being performed. The ROQAC should supply the information requested by the HQNC. In most cases this information may be supplied verbally.

4.1.2 Passive Responsibilities

Proper fulfillment of active responsibilities requires that the RONC have knowledge of specific documents and site information and that contact be maintained with specific individuals.

The RONC must be thoroughly familiar with information in the following documents:

"Guideline for the Implementation of the Ambient Air Monitoring Regulations" (40 CFR 58)[1]

"Ambient Air Quality Surveillance Regulations" (40 CFR 58)[3]

"Quality Assurance Handbook for Air Pollution Measurement Systems," Volumes I and II[5,6]

Appropriate State and Local Program and Project Quality Assurance Plans

Regional Office Program and Project Quality Assurance Plans

"NAMS Management Information Users Manual"[7]

"AEROS Manual Series, Volume II"[4]

The RONC must be familiar with the sites where NAMS monitors are located. At a minimum this means knowledge of the information contained on the NHCI form and confirmation of this information through site visits. The RONC must be familiar enough with sites to recommend necessary site changes if monitoring guidelines change. The RONC is the main person within EPA responsible for ensuring that SAROAD, MIS, and NHCI site information is accurate and current.

The RONC must maintain contact with state and local personnel responsible for the collection of air quality data and familiar with activities at NAMS. When questions arise within EPA about NAMS conditions, the RONC will be expected to contact the appropriate state and local personnel to resolve the questions.

4.2 HEADQUARTERS

Headquarters is the Monitoring and Reports Branch (MRB) of the Monitoring and Data Analysis Division (MDAD) in Durham, North Carolina. Although they do not handle air quality data, site information, or quality assurance data, headquarters staff have access to the data and information and have overall responsibility to ensure the attainment of NAMS monitoring objectives. The Monitoring Section of MRB does screen data; review site information; and recommend network approval, site additions, and deletions. They must notify users of important changes in the data base and issue management-level reports on such changes.

4.2.1 Active Responsibilities

The HQNC has a number of active responsibilities relating to the NAMS. Table 4-2 lists each responsibily and the HQNC's corresponding authority and access to information.

The Chief, Monitoring Section (CMS), has a number of active responsibilities relating to the NAMS. Table 4-3 list each responsibility and the CMS's corresponding authority and access to information.

Figure 4-6 is a flow diagram showing specific tasks performed at MRB/MDAD. All tasks (rectangular boxes) are numbered, and explanations of them follow. The headings for these explanations are the same as the boxes to which they apply in Figure 4-6.

1. ENSURE MIS HAS BEEN UPDATED

Whenever changed site information is received, the HQNC should check that the MIS has been updated. The HQNC is kept informed of the status of the monitoring stations through copies of the MIS and NHCI forms received from the RONC. If the MIS needs to be updated, this should be done by the RONC.

2. VERIFY INFORMATION DURING SITE VISIT: 20%/yr

Twenty percent of the monitoring sites are planned to be visited by the HQNC each year. During site visits the HQNC verifies information in the NHCI and ensures that all information

TABLE 4-2. ACTIVE RESPONSIBILITIES OF THE HEADQUARTERS NAMS COORDINATOR

Responsibility	Authority and access to needed information
Track timeliness and completeness of air quality data	The HQNC has direct access to the SAROAD data bank and authority on lockout
Ensure that RONC keeps site information updated	The HQNC should visit 20% of the NAMS sites per year and has authority to request RONC to make more frequent visits if necessary
Inform Chief, Monitoring Section, of areas not meeting NAMS network or site design criteria	The HQNC has a copy of NHCI and authority to recommend site additions or deletions to Chief, Monitoring Section; the HQNC also has access to NHCI, MIS, and SAROAD site information
Evaluate whether monitoring regulations are being implemented	The HQNC has access to MIS, NHCI, and SAROAD data bank; should visit 20% of sites per year; and should examine sites with the three highest AQ values quarterly
Issue memo to Chief, Monitoring Section on major changes to data base	All changes must be authorized by the HQNC to remove lockout
Issue management-level reports on changes to the data base	The HQNC has direct access to SAROAD data bank
Authorize all changes to air quality data made after 90 days	Lockout provision ensures authority

TABLE 4-3. ACTIVE RESPONSIBILITIES OF THE CHIEF, MONITORING SECTION

Responsibility	Authority and access to needed information
Manage activities of HQNC	The CMS can institute changes in procedures used by the HQNC
Issue quarterly reports to all Division directors in OAQPS and NADB about changes and updates in the AQ data base	Information is provided by the HQNC; the CMS has authority to require more complete information if necessary
Identify and address national issues affecting NAMS	The CMS has authority to recommend changes in the operations of the entire NAMS network but the final decision is made by the Director, MDAD
Provide for consistency in establisting NAMS and implementing monitoring regulations	Potential problems are identified by the HQNC; the CMS has the authority to recommend changes in the system, including the addition or deletion of NAMS sites but the final decision is made by the Director, MDAD
Serve as principal liason with EMSL on QA and reference or equivalent methods	The HQNC must provide the CMS with information that suggests potential QA or monitoring method problems

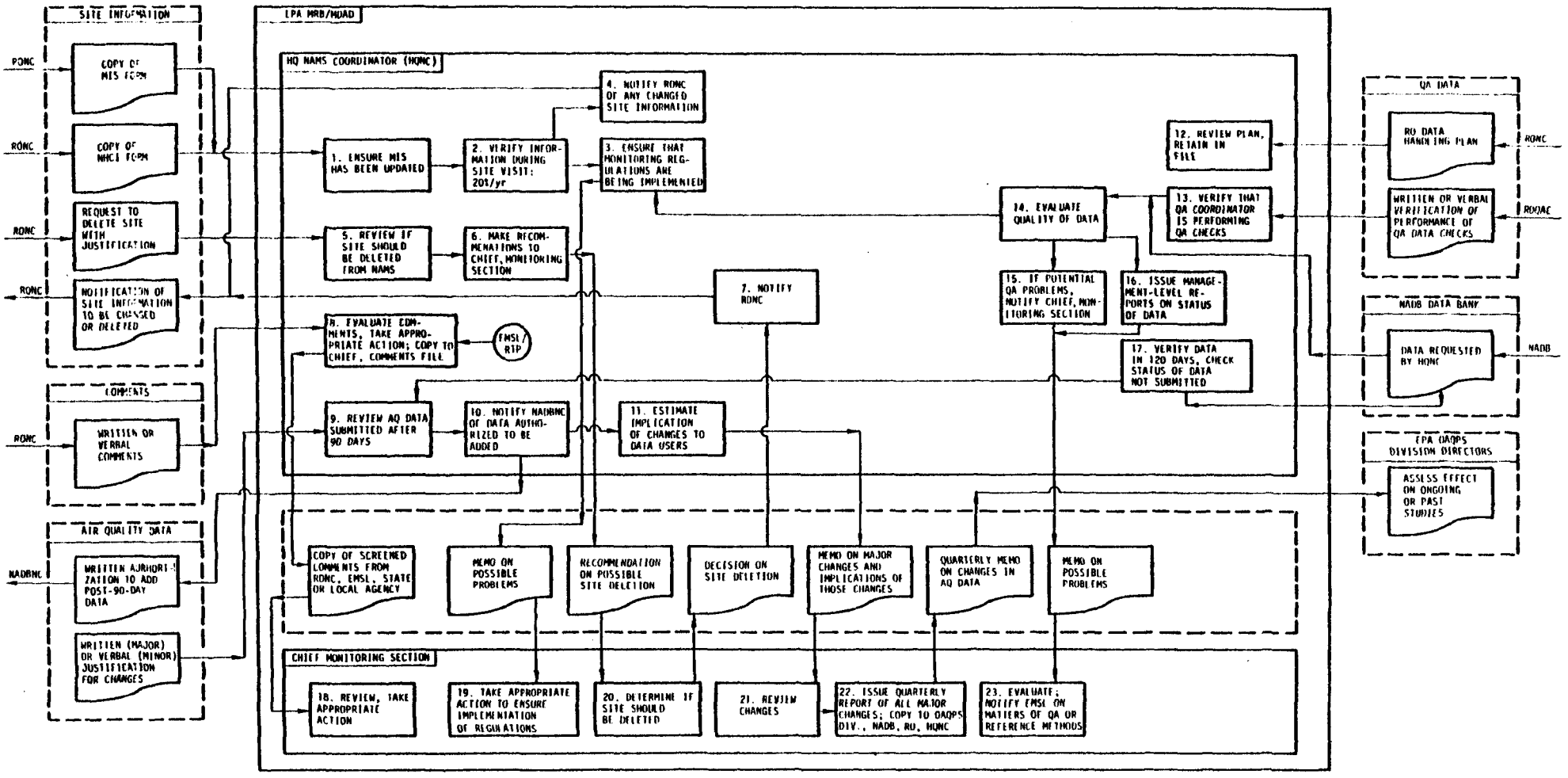


Figure 4-6. Tasks performed by MRB/MDAD.

is accurate and current. The explanation of Action 16 in Subsection 4.1.1 describes the NHCI.

3. ENSURE THAT MONITORING REGULATIONS ARE BEING IMPLEMENTED

The HQNC is expected to know all regulations that apply to NAMS monitoring. During site visits and review of MIS and NHCI information, the HQNC must ensure that sites comply with applicable regulations.

4. NOTIFY RONC OF ANY CHANGED SITE INFORMATION

If site visits indicate information that should be changed, the HQNC should notify the RONC of the necessary changes to the MIS and NHCI. The RONC is responsible for notifying the RO SAROAD Contact to change the SAROAD ID information.

5. REVIEW IF SITE SHOULD BE DELETED FROM NAMS

If the RONC requests that a monitoring site be deleted from NAMS, the request is submitted to the HQNC, who reviews it and decides whether it is justified. The HQNC may also initiate a request to delete a site. If a deletion appears likely, the RONC should begin looking for a replacement site.

6. MAKE RECOMMENDATIONS TO CHIEF, MONITORING SECTION

If the HQNC agrees with the request for removal of a monitoring site from NAMS, the HQNC makes such a recommendation to the CMS, who makes a decision on the recommendation. However, final approval is made by the Director MDAD. The RONC should provide a list of possible replacement sites so that the monitoring objectives will still be met.

7. NOTIFY RONC

A formal memorandum is sent from the MDAD to the Regional Office notifying them of the decision. In turn, if the site is to be deleted the HQNC notifies the RONC of that decision, actually deletes the site from the MIS and removes information about the deleted site from the NHCI active file. The RONC notifies the SAROAD Contact, and notifies the appropriate state or local agency.

8. EVALUATE COMMENTS, TAKE APPROPRIATE ACTION; COPY TO CHIEF, COMMENTS FILE

Along with data, state and local air monitoring agencies may submit major comments that could be useful in interpreting results; for instance, a major change in the ozone calibration technique, widespread (entire state) dust storms, volcanic

eruptions, etc. The RONC reviews these comments and submits them to the HQNC, who evaluates the comments and takes appropriate action. This could be modifying, deleting, or adding data to the data base, or including comments with some data. Copies of comments and evaluations and notifications of actions taken are submitted to the CMS and sent to the comments file for record. The comments file is not to be used for explaining data anomalies.

9. REVIEW AQ DATA SUBMITTED AFTER 90 DAYS

Air quality data submitted after the 90-day deadline must be reviewed by the HQNC, who must determine whether the further data should be added to the data base. The authorization of the HQNC is necessary before the data can be added. The primary purpose of this review is to estimate the implications of changes to the data base and to identify and correct potential future problems.

10. NOTIFY NADBNC OF DATA AUTHORIZED TO BE ADDED

When authorizing addition of data submitted after the 90-day deadline, the HQNC must provide written notification to the NADBNC of this authorization. The NADBNC will then remove the lockout and permit the data to be added to the data base.

11. ESTIMATE IMPLICATION OF CHANGES TO DATA USERS

The addition of data to the data base after the 90-day deadline may or may not affect the use and interpretation of data submitted before the deadline. The HQNC evaluates the impact of the added data on the data base and sends to the CMS a memo summarizing the major changes and their possible implications.

12. REVIEW PLAN, RETAIN IN FILE

The RONC submits the Regional Office data handling plan to the HQNC for review. If acceptable, the plan is retained by the HQNC for reference. If the plan is not acceptable because of major deficiencies, the HQNC sends it back to the RONC for modifications.

13. VERIFY THAT QA COORDINATOR IS PERFORMING QA CHECKS

The ROQAC verifies performance of QA checks verbally or in writing through the RONC to the HQNC, who is responsible for ensuring that required QA checks are made on NAMS data. The ROQAC will respond to requests from the HQNC.

14. EVALUATE QUALITY OF DATA

The HQNC must periodically assess the data from the Regional Office to determine the quality of such data. These assessments will be used in issuing management-level reports pertaining to data quality, completeness, and timeliness.

15. IF POTENTIAL QA PROBLEMS, NOTIFY CHIEF, MONITORING SECTION

If the evaluation of data quality indicates potential QA problems, the HQNC must write a memo summarizing the evaluation and submit it to the CMS.

16. ISSUE MANAGEMENT-LEVEL REPORTS ON STATUS OF DATA

After evaluating data to determine the overall status, the CMS must write a management-level report on the progress. This report is prepared at least two times a year.

17. VERIFY DATA IN 120 DAYS, CHECK STATUS OF DATA NOT SUBMITTED

The HQNC must verify the data actually in the data bank within 120 days of the end of the quarter in which these data were collected and must check the status of missing and incomplete data. If the RONC has not already notified the HQNC about missing and incomplete data, the HQNC should contact the RONC for an explanation.

18. REVIEW, TAKE APPROPRIATE ACTION

The HQNC screens comments submitted by the RONC from the state and local agencies and sends these comments to the CMS (Action 8). The CMS reviews the comments and HQNC's actions, determines whether the actions were appropriate, and takes any further necessary steps.

19. TAKE APPROPRIATE ACTION TO ENSURE IMPLEMENTATION OF REGULATIONS

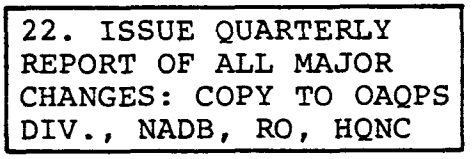
The HQNC is responsible for making sure that monitoring regulations are being implemented (Action 3) and sends a memo on possible problems to the CMS, who then takes appropriate actions to ensure implementation of regulations. This entails notifying the RONC of monitoring problems and recommending solutions to problems.

20. DETERMINE IF SITE SHOULD BE DELETED

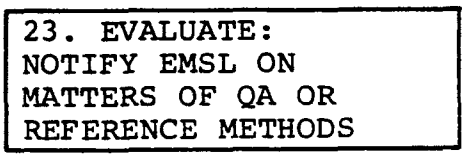
When the RONC determines that a monitoring site should be deleted from the NAMS network, a recommendation is made to the HQNC. If in agreement, the HQNC recommends site deletion to the CMS who decides on what action is to be taken. However, final decision is to be made by the Director MDAD. In some cases, site alteration can satisfy monitoring requirements; the possibility of alteration should be determined by the HQNC and evaluated by the CMS. Along with the request to delete the site should be a

list of potential replacement sites. The CMS should recommend a replacement site if a site is deleted.

Data approved by the CMS for inclusion in the NAMS data base after the 90-day deadline represent changes to the data base; the HQNC should estimate the implications of changes and report them in a memo to the CMS. The CMS reviews the changes and implications as reported by the HQNC and issues a memo on the major changes and their implications to data users (Actions 9, 10, and 11).



The CMS issues quarterly reports summarizing all major changes to the data base after the 90-day deadline and sends copies to the Division Directors of the Office of Air Quality Planning and Standards Division, Chief of the National Air Data Branch, the Regional Office, and the HQNC's.



The HQNC assesses data quality and notifies the CMS of potential QA problems. The CMS evaluates the findings of the

HQNC and notifies EMSL of potential QA problems or problems with reference methods used in monitoring.

4.2.2 Passive Responsibilities

Proper fulfillment of active responsibilities requires that the HQNC have knowledge of specific documents and individuals. The HQNC must be thoroughly familiar with information contained in the following documents:

"Guideline for the Implementation of the Ambient Air Monitoring Regulations" (40 CFR 58)[1]

"Ambient Air Quality Surveillance Regulations" (40 CFR 58)[3]

Regional Office Program and Project Quality Assurance Plans

"NAMS Management Information Users Manual[7]

"AEROS Manual Series, Volume II[4]

Current major reports and programs that use NAMS data Further, the HQNC must maintain close contact with the appropriate RONC's and the NADBNC.

Proper fulfillment of active responsibilities requires that the CMS also have knowledge of specific documents, issues, and individuals. The CMS must be thoroughly familiar with the information contained in the "Guideline for the Implementation of the Ambient Air Monitoring Regulations" (40 CFR 58)[1] and "Ambient Air Monitoring and Equivalent Methods" (40 CFR 53).[8] In addition, the CMS must be knowledgeable about national issues that can affect NAMS and the general status and operation of the NAMS. The CMS must also maintain contact with EMSL, OAQPS Division

Directors, HQNC's, and Regional Office Surveillance and Analysis (S&A)and Air and Hazardous Materials (A&HM) Divisions.

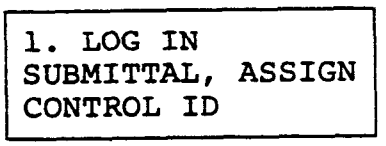
4.3 NATIONAL AIR DATA BRANCH

The National Air Data Branch (NADB) accepts air quality data and SAROAD site information from the Regional Offices, loads the data and information into the data bank, and maintains the data and information for various users. Also, the NADB stores P&A data received from the EMSL data file and combines this data with the SAROAD data in reports. The MIS is maintained by MRB/NADB and data are added, changed, or deleted directly by the RONC.

4.3.1 Active Responsibilities

The NADBNC has a number of active responsibilities relating to the NAMS. Table 4-4 lists each responsibility and the NADBNC's corresponding authority and access to information.

Figure 4-7 is a flow diagram showing specific tasks performed at NADB. All tasks (rectangular boxes) are numbered, and explanations of them follow. The headings for these explanations are the same as the boxes to which they apply in Figure 4-7.



After the RO SAROAD Contact has completed required data checks, the EPA NADB data processing section is notified that the tape is ready for processing. The NADB data processing staff logs in each submittal and assigns it a control ID. The log

TABLE 4-4. ACTIVE RESPONSIBILITIES OF THE NATIONAL AIR DATA BRANCH NAMS COORDINATOR

Responsibility	Authority and access to needed information
Ensure that NADB performs update within 30 days of receipt of data	The NADBNC may delay processing of SLAMS so that NAMS data can be processed on time
Serve as chief contact for NADB on NAMS	All questions relating to NAMS should be directed to NADBNC
Ensure proper integration of P&A data into SAROAD system	The P&A data are accessed from the EMSL file
Ensure that comment file is updated and maintained	Comments supplied by the HQNC are added to comments file
Remove lockout to permit entry of AQ data	Authority given by HQNC
Resolve processing problems with NAMS data	Requests for assistance are made by RONC or HQNC

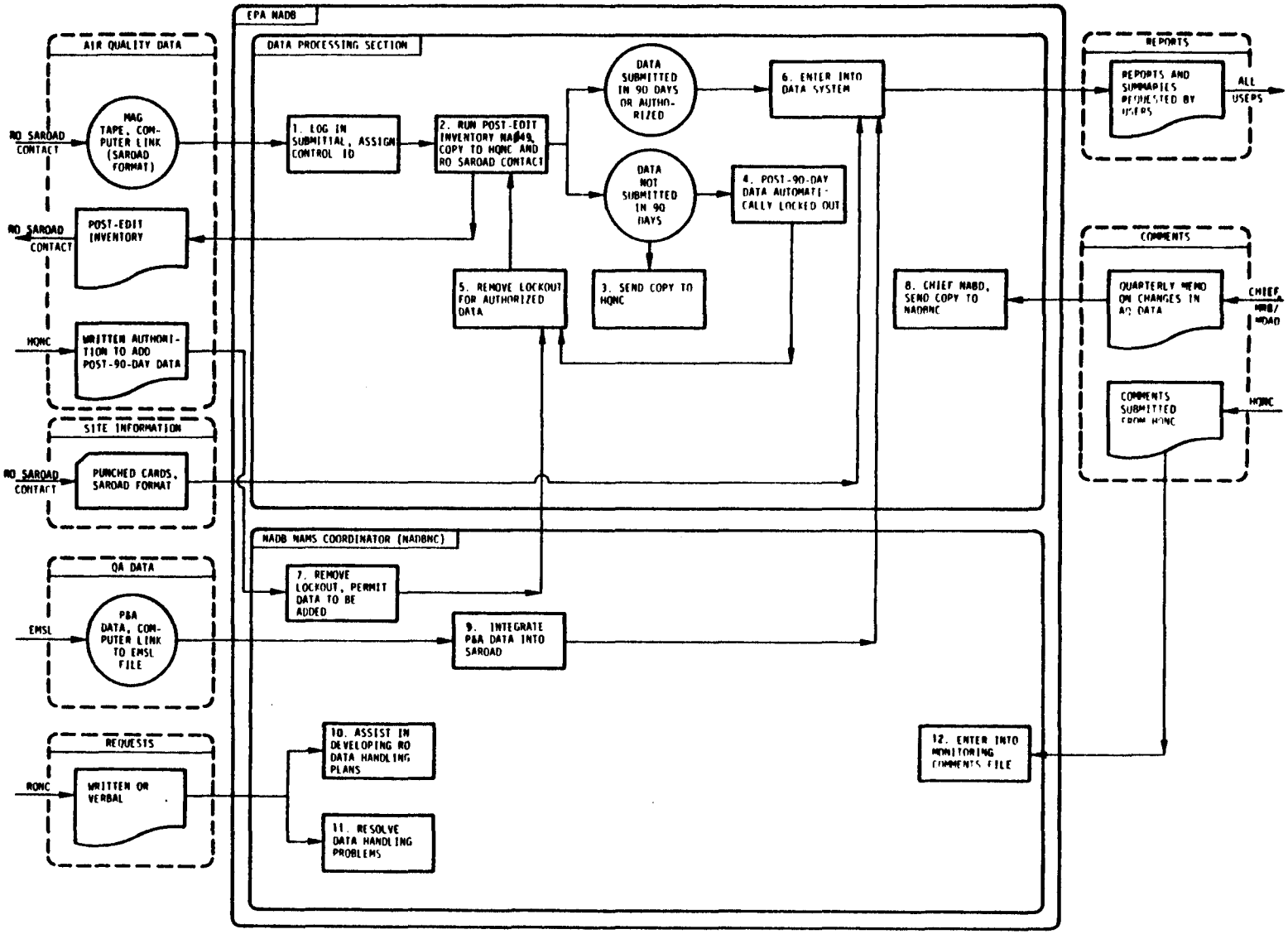


Figure 4-7. Tasks performed by NADB.

contains the name and number of the tape and the number of records contained on the tape. The control ID has five or six digits. The first two are codes for the submitting state or region, the next three indicate the Julian date on which the data were received and the last digit designates (by A, B, C, or some other letter) multiple sets of data if two or more sets are entered.

2. RUN POST-EDIT INVENTORY NAØ49, COPY TO HQNC AND RO SAROAD CONTACT

The NADB data processing section conducts a post-edit inventory (NAØ49) of data from the Regional Office. The post-edit program reads and verifies data on the tape and performs several summary functions. For each site pollutant, the program tallies and prints out the number of observations by month and quarter. It also counts and prints out the number of additions, changes, or deletions in the tape file, as designated by the Regional Office. For all data classified as additions or changes, the program prints out the three maximum observations per month. The program also keeps a running total of the number of observations by state on the tape. This running total must agree with the number submitted according to the Regional Office; if it does not, the difference must be resolved between the NADB data processing section and the RO SAROAD Contact.

The post-edit program flags NAMS data by printing asterisks next to all NAMS site pollutant combinations. This is essential if NAMS and SLAMS data were not separated by the RO/SAROAD Contact.

The printout created by the post-edit program is reviewed by the NADBNC. A copy of the printout out tally is sent to the RONC and the HQNC.

3. SEND COPY TO HQNC

After the post-edit check, all data sets are merged. Then the air quality data is run through a split program that creates four more easily handled files; the GT file for 24-hour monitoring data and the HD and ND files for continuous monitoring data and NAMS data older than 90 days. In these split programs NAMS data older than 90 days are put in a separate file and not processed. A copy of the data more than 90 days old is sent to the HQNC.

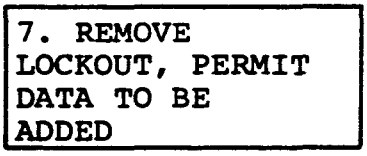
4. POST-90-DAY DATA AUTOMATICALLY LOCKED OUT

In the split programs created after the post-edit check, NAMS data older than 90 days are written out to a separate file and not processed. A copy of locked-out data is sent to the HQNC. The locked-out data will not be added to the data bank until the HQNC authorizes such addition.

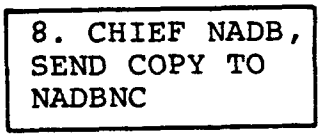
The HQNC reviews the copy of locked-out air quality data and the explanation provided by the RONC. The NADBNC then permits the lockout to be overridden and the NADB data processing group removes the lockout.

All data submitted before 90 days and data approved by the HQNC after 90 days are entered into the SAROAD data bank by the NADB data processing section. Various programs can then access the air quality data and generate reports and summaries for EPA and outside users.

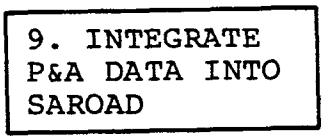
This update involves addition of raw data stored or updated in the raw data file. The HD data file is a low-volume file updated every 6 months; the greater-volume GT and ND files are updated every 3 weeks.



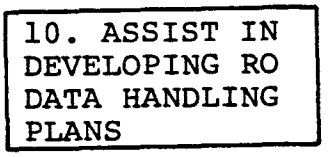
After the HQNC has authorized addition of data more than 90 days old to the system, the NADBNC removes the lockout and allows the data to be added.



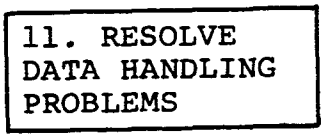
The CMS issues quarterly reports on all major changes in air quality data. A copy of each quarterly report is sent to the Chief of the NADB, who provides a copy to the NADBNC. The purpose is to facilitate notification of data users about changes made to the data base.



The EMSL maintains a P&A file on the same computer as the NADB SAROAD data files. The NADBNC is modifying the computer programs to display air quality data and corresponding P&A data together so that SAROAD users can obtain both files.



The ROQAC must develop a Regional Office data handling plan. The NADBNC assists the ROQAC when necessary and reviews the plan for completeness, clarity, and inclusion of deadlines if the RONC requests such a review.



The NADBNC is responsible for resolving data handling programs such as program errors or modifications. Also the NADBNC is contacted by the RO SAROAD Contact for data handling problems such as a request for a 1-day delay in the current data update so that the RO can finish work on data that should be included in a current update.

12. ENTER INTO MONITORING COMMENTS FILE

The monitoring comments file has been used to document gross errors that may affect all the data from a state file for a pollutant. (As of May 1980, this file contained only two or three comments.) For example, one state that changed the calibration procedure for measuring ozone levels found in 1 to 2 years that data obtained before the change was in error and required a corrective factor. This was done and documented in the monitoring comments file because the change affected a large amount of data. All major comments that affect the use of the air quality data should be sent to the HQNC. The HQNC will screen the comments and decide which comments should be added to the file.

4.3.2 Passive Responsibilities

The NADBNC is responsible for complete knowledge of the AEROS data systems and should keep in contact with the RONC's and the HQNC's. The contacts are generally not initiated by NADB except when data processing problems arise.

REFERENCES

1. U.S. Environmental Protection Agency. Guideline for the Implementation of the Ambient Air Monitoring Regulations. 40 CFR 58. EPA-450/4-79-038, 1979.

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3. U.S. Environmental Protection Agency. Ambient Air Quality Surveillance Regulations. 40 CFR 58, 1980.

4. U.S. Environmental Protection Agency. AEROS Manual Series Volume II: AEROS User's Manual. EPA 450/2-76-029, December 1976.

5. U.S. Environmental Protection Agency. Quality Assurance Handbook for Air Pollution Measurement Systems. Volume I - Principles. EPA-600/9-76-005, 1976.

6. U.S. Environmental Protection Agency. Quality Assurance Handbook for Air Pollution Measurement Systems. Volume II -Ambient Air Specific Methods. EPA-600/4-77-027a, 1977.

7. Farris, A., and K. Eichenbrenner. NAMS Management Information System User's Manual. Prepared for the U.S. Environmental Protection Agency by SDC Integrated Services, Inc., Research Triangle Park, North Carolina. June 11, 1979.

8. U.S. Environmental Protection Agency. Ambient Air Monitoring and Equivalent Methods. 40 CFR 53. 1975 (amended 1976).