# Galveston County
# Air Control Division
# Annual Report
# 1970

THE GALVESTON COUNTY AIR CONTROL DIVISION
104 4TH STREET SOUTH
TEXAS CITY, TEXAS 77590

PHONES: 945-2432
945-2171

May 20, 1971

Dr. Mason Guest
Dept. of Physiology
UTMB
Galveston, Texas 77550

Dear Dr. Guest:

Enclosed is the 1970 Annual Report of the Galveston County Air Control Division. This report encompasses the activities and achievements of the Air Control Division during the past year. If you have any questions that are not answered by this document please address those questions to us.

We would also like to take this opportunity to invite you to visit our office and laboratory facilities in Texas City.

Sincerely,

C. J. Poirier,
Director

CJP/lk

THE GALVESTON COUNTY AIR CONTROL DIVISION
104 4TH STREET SOUTH
TEXAS CITY, TEXAS 77590

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945-2171

May 1, 1971

Honorable Judge Ray Holbrook

We submit the following annual report covering the 1970 activities of the Galveston County Air Control Division. This report will be distributed to local governments, industry and many residents of Galveston County. The report narrative was purposely written to be palatable to its readers. There are certain tables and maps that will aid those desiring a more detailed study of our technical findings. We trust this report will serve to enhance a more knowledgeable public as to their air environment.

Sincerely,

C. J. Poirier, Director
Air Control Division

CJP/lk

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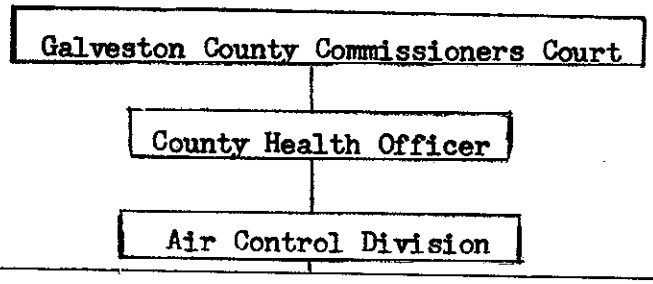



Citizen Complaints

Emission Inventory

Legal Service

Public Information

Statistical Service

Ambient Air Monitoring

General Laboratory

Source Monitoring

Weather Monitoring

## AIR CONTROL DIVISION STAFF

| | | |
|---|---|---|
| Jim Aldridge | 1968 | Inspector |
| Kermet Applewhite | 1970 | Chemist |
| La Vera Kelley | 1970 | Secretary |
| Harold Meyer | 1970 | Chemist |
| Charles Poirier | 1968 | Director |
| John Santarelli | 1970 | Inspector |
| Don Strieber | 1969 | Chief |

CODE of ETHICS
GALVESTON COUNTY AIR CONTROL DIVISION

To serve all the citizens of Galveston County with equal and excellent service on every air pollution complaint.

To provide every citizen of Galveston County with full knowledge of his rights under the State, Federal and Local Law concerning air pollution.

To observe that all industries and other possible pollutors in Galveston County fulfill their obligations under the total law dealing with air pollution control.

To see that every new industry coming into Galveston County does operate from its first minute within the total air pollution control law.

To facilitate the implementation of every new law and regulation concerning air pollution within a minimum amount of time.

To provide technical knowledge wherever possible to every industry or other possible pollutor in Galveston County.

To maintain the latest and most thorough techniques in every aspect of air control technology and administration.

To, wherever necessary, institute both civil and criminal legal action when an Air Pollution Control Law is being violated.

To report all activities of the Air Control Division to the public in a systematic manner.

To maintain an Air Control Division which will serve as an innovator in the professional field of Air Pollution Control.

The Galveston County Air Control Division was formed in 1968. The early days of the division's history were concurrent with the early days of the Texas Air Control Division and the Texas Clean Air Act. Galveston County was one of the first counties in Texas to have a local air pollution agency. A federal grant was applied for by the Galveston County Health Department with the financial support of the Galveston County Commissioners Court. This federal grant awarded Galveston County $78,000.00 in 1970 to establish a workable program for the evaluation and control of air pollution in this county.

The Texas Clean Air Act was revised on September 1969 to better facilitate implementing the state and federal regulations on air pollution. Also of special mention was the passage of a criminal statue concerning air pollution which made air pollution a criminal offense. Since September 1969 air pollution law enforcement has been the mandate of the Galveston County Air Control Division.

Many specific air pollution problems were eliminated during 1970. Most of these problems were handled by the joint action of industry and the Air Control Division. In some cases the Division

had to file criminal, and in one case, civil suits to accomplish the necessary goals over a reasonable span of time. Our experience shows that concern of air pollution is growing rapidly. We trust that this record of our 1970 activities will help the citizen and official alike to better understand the job we are doing to safeguard his air environment. While we are optimistic about the future of the air environment we realize that the main task in controlling air pollution is still before us.

One of the best indications of the Air Control Division's activity is the handling of the public's complaints. There are several indications of progress identifiable with citizen complaints: 1) how many complaints were registered; 2) what range of area are the complaints from; 3) how many different people registered complaints with you; 4) were you able to dispose of the complaints to the citizens' satisfaction and to the satisfaction of the law.

We received 380 citizen complaints during 1970 versus 180 in 1969, 87 in 1968, and as of April 20, 1971, we have received 235 citizen complaints of air pollution. During 1970 we received more

complaints on a three-to-one basis from citizens outside the Texas City/La Marque area. Our 1969 complaints numbered 180, with all of these complaints coming from only 105 different people, while during 1970, 325 different people called upon us for service on specific air pollution complaints. Our record of satisfying the citizen and the law has been growing. This is a reflection of our ability to show industry and other pollutors exactly what the cause of a particular air pollution episode was. The Air Control Division has to maintain credibility with the pollutor as well as the citizen. In 1970 the Air Control Division installed a 24-hour telephone (945-2171) to record citizen complaints. This device has greatly enhanced our ability to give the public more responsive service in complaint handling.

One of the real problems still prevalent in the Texas City/ La Marque area is excessive odors. With the increase in public awareness (described in our complaint records) more and more citizens are demanding and rightfully so an end to excessive industrial odors in this area. Greater effort on the part of industry

in their in-plant maintenance programs and in their waste disposal programs will help to eliminate this problem.

An important progress sign of local air pollution control activity is the attitude of the pollutor to the control agency. Our contact with local industry during 1970 was far more fruitful in respect to air pollution abatement than any previous year.

The Air Control Division is aware that the leadership necessary to effect air pollution control must come from a concerned local air pollution agency backed by concerned local governments.

What about the attitude of local government in regard to air pollution? In 1970 the Galveston County Commissioners Court increased the budget of the Air Control Division for 1971 by over 100 percent. When called upon for support, the County Court went on public record for supporting legal actions where necessary. The city of Texas City loaned the Air Control Division the use of a building to serve as a laboratory and base of operations. The city of La Marque continued to support air pollution control by maintaining the La Marque Control Board. Of special mention is the excellent cooperation of the

Texas City Fire and Police Departments and the La Marque Fire Department. The overall attitude of local government's elected and appointed officals to the activities of the Air Control Division is one of strong support for our work.

The laws that govern air pollution control activity in Texas are as follows: The main law is the Texas Clean Air Act Article 4477-5 V.A.C. S. This law gives the regulations governing air pollution emissions and the desired air pollution ambient air standards. It is based in fact on the Federal Clean Air Act which sets up time schedules for the implementation of air pollution control plans. The federal law makes a positive air pollution control plan mandatory in every state. The Texas Clean Air Act includes the rules for industry, local governments and citizen activity in respect to air pollution. A copy of this law can be attained by writing the Texas Air Control Division in Austin.

Another important air pollution law in Texas is the Penal Code of Texas, 1925 amended by Article 698d which makes air pollution a criminal offense. The venue for the Texas Clean Air Act is State

District Court; the venue for Article 698d is County Court. Civil suits must be brought by a resolution from a local government's governing body. Criminal suits involving air pollution can be brought by citizens or by local governments. This latter type of suit is more along the nuisance line, but is not held to that ideal. One difference in these suits is that the Texas Clean Air Act is far more comprehensive than the criminal code. The Clean Air Act gives government the added leverage of enjoining potential or real pollution sources from operation. The criminal law provides for penalties in air pollution cases after the fact of the air pollution.

Presently the Texas Clean Air Act is being revised to offer further protection to the public from air pollution by requiring tighter controls on industry and other potential pollutors, expecially in regard to the construction and operation of pollution emitting devices.

The total number of suits brought by the Air Control Division during 1970 was 25. Of these suits all but one were criminal suits. A total of $6,250.00 was collected in fines with only 18 of these cases being resolved during 1970. A number of air pollution abatement

programs were carried out by local industry during 1970. An abatement action is that action taken to eliminate air pollution; this activity precludes the need for litigation. The 1971 prognosis for law suits will probably show a slight decrease over 1970. The reason for continuing law suits is that while air pollution is slowly coming under control the reality that air pollution law is equal to other types of law in respect to enforcement has only recently been given full consideration. There is no reward for obeying the law in excess of the knowledge that one is conducting his business by the rules for such activity, while failure to obey the total air pollution law will mean court action by the Air Control Division.

There are many important aspects of air pollution enforcement outside of law suits. The state of Texas with the aid of local governments must provide a plan for the control of air pollution. One of the main parts of an air pollution plan is to collect from industry and other potential pollutors an emission inventory. This inventory gives government an idea of the quantity and quality of pollutants being put into the air. The Texas Clean Air Act states that every

potential pollutor will file an emission inventory with the state. In-plant inspections of process equipment is another important part of air pollution enforcement activity. By inspecting process equipment we can evaluate the control such equipment will have over air pollution emissions. During 1970 the Air Control Division registered 49 grocery-store-type incinerators throughout Galveston County. This registration of incinerators will aid us when involved in citizen complaints concerning incinerators. Registration of all potential pollution sources is being required by the Texas Air Control Board in 1971.

There are two methods generally used in sampling for air pollutants. One method is called ambient air measuring and is conducted at ground level by long term samplers. These samplers are located at permanent sites throughout the county. The Air Control Division maintains seventeen sites for the collection of solid and aerosol pollutants and nine sites for the collection of gaseous pollutants. (The only area in all of Texas that has a larger ambient air monitoring system than Galveston County is the city of Houston.)

Several of these sites are operated seven days a week, but the majority operate on a random schedule which usually includes a minimum of eight 24-hour samples a month for each site. For the gaseous pollutants routine measurements are made for hydrogen sulfide, sulphur dioxide, ammonia, chlorides and mercaptans. Other gases are measured on an as-needed basis. Emission sampling is that sampling made at the pollutor's property line or in the case of stack sampling, on the pollutor's property. This type of sampling is for short time periods, usually several hours. The answers found in this type of measuring gives the level of pollutants actually being emitted from a property. During 1970 the Air Control Division took 44,112 ambient air samples and 425 emission samples. Additional laboratory work was performed on many of these samples. These figures show an increase over the total for 1969, especially in regard to emission sampling. No stack sampling was performed during 1969 while six industrial stacks were sampled during 1970. Our projected schedule for stack sampling in Galveston County will call for a minimum of ten stacks to be sampled each year with additional

sampling being done as found necessary for enforcement purposes.

The first type of pollutant we wish to discuss is suspended particulate matter. Suspended particulate matter is described in the Texas Air Control Division regulations as any airborne, solid or aerosol emitted from a property. The two most important parameters of concern to us in regard to suspended particulate matter are: 1) what is the particulate matter specifically; and 2) what is the size range of the particulate matter. An environment with excessive metals acids or oil spray can very well be harmful if in the right concentrations and for the right duration of time. Particulates in the size range of from 0.01 to 10 microns are considered to be respiratory and therefore can be harmful to health.

Total suspended particulate matter is measured by high volume air samplers. The essence of this sampler is that it filters a metered amount of air across a piece of fibre-glass filter paper. The matter entrained and impacted on this paper is weighed against the same paper without the pollutants on it. During 1969, the first complete year for which we have data, the Texas City/La Marque

area of Galveston County had an annual geometric mean of 91 micrograms per cubic meter. During 1970 Galveston County had an annual geometric mean of 72 ug/$M^3$. The adopted standard for good quality air in Texas is 55 ug/$M^3$ of suspended particulates. Whether this level of clean air can be realized in a highly industrial area such as Texas City/ La Marque is not known; however, the level of clean air in respect to particulate matter is being realized on an annual basis in the remainder of Galveston County.

Generally, industrial suspended particulate matter has specific characteristics. These characteristics can be found through chemical analysis of the filter paper. We normally inspect the captured suspended particulate matter for sulfates, nitrates and total benzene soluble organics. The proportions of these pollutants along with metals and other substances tell us the level of industrial versus natural pollution in the air. Natural pollution is described as that type of pollution which occurs separate of man's activity. The regulations governing air pollution in Texas allow for a certain background of "natural pollution" as well as for a margin of safety in respect to the citizens' health. Suspended particulate matter

is a major pollutant in the Texas City/La Marque area but the levels have been slightly decreasing since 1968, according to our study.

As well as the suspended particulate matter collected at the seventeen sites, we maintain the nine gas sampling sites plus one mobil van equipped for gas sampling. All of the gas sampling sites are located in the Texas City/La Marque area. The results of the gases which we normally sample are as follows: Aldehydes, an organic pollutant associated with the chemical industry and with transportation sources, has an annual arithmetic mean of 30.87 ug/$M^3$ and an annual standard arithmetic deviation of 52.98 ug/$M^3$ in the Texas City/La Marque area. Chlorides have an annual arithmetic mean of 140.55 ug/$M^3$ with an annual standard arithmetic deviation of 234.27 ug/$M^3$. Hydrogen sulfide, a pollutant normally associated with oil refineries, has an annual arithmetic mean of 14.31 ug/$M^3$ and an annual standard arithmetic deviation of 32.91 ug/$M^3$. The Texas Air Control Division recommendations for a 30-minute average concentration of hydrogen sulfide is 14 ug/$M^3$. Mercaptans have an annual arithmetic mean of 153.73 ug/$M^3$ with an annual standard deviation

of 293.72 ug/$M^3$. Sulphur dioxide for the Texas City/La Marque area has an annual arithmetic mean of 51.11 ug/$M^3$ with an annual standard arithmetic deviation of 125.17 ug/$M^3$. The Texas Air Control Division recommendations for the annual arithmetic average for the Houston/ Galveston area for sulphur dioxide is 26 ug/$M^3$, so the sampling results in the Texas City/La Marque area show an excess of this pollutant. Of special note in trying to interpret this gas sampling data is the annual standard arithmetic deviation . Most of these samples do not follow any set statistical pattern. In almost every case the standard deviation is too large to allow us to draw solid conclusions from these values. We shall continue to sample for these gaseous pollutants on the same type of schedule in 1971 as in 1970, and perhaps at some future date we can be more conclusive as to the meaning of these values.

We should mention more about the technical services offered by the Air Control Division. As well as stack sampling and emission sampling and the maintenance of ambient air sampling equipment an air control division has to maintain a chemical laboratory. Our

laboratory located at 104 4th Street South in Texas City has the facilities for running routine wet chemistry analyses as well as running ultra violet spectrophotometer measurements on air pollutants. Work such as analysis of metals and work for analysis on many organic substances is distributed to the Texas Air Control Division laboratories, other local air pollution control agency laboratories in the area that have expanded facilities and the University of Texas Medical Branch. These agencies provide us with a technical back-stop.

Another important aspect of technical services is the maintenance of weather equipment. We maintain two instruments for measuring wind speed and wind direction in Texas City. We make daily measurements for wind speed and wind direction, for humidity, barometric pressure, temperature and rainfall. The place that meteorology has in air pollution is one of the first magnitude. Without proper meteorological information one cannot draw conclusions as to the source of a pollutor in relationship to the recepter of the pollution.

Galveston County has by and large some very reliable weather characteristics with regard to air pollution. The most important

items in reviewing air pollution potential are wind speed, wind direction, stability, and topography. There are other important areas to be considered but as far as we are concerned these parameters tell the story. Our wind is characterized by a southly and easterly flow during most of the year. The wind speed in Galveston County is usually moderately fast except during the summer months when the night sea breeze is usually under six miles per hour.

The annual mixing depth in Galveston County is around 3,200 feet with the greatest height appearing during the summer months. The ideal mixing depth for good air pollution dilution is reported to be 5,000 feet or greater. With our nocturnal temperature inversions during summer months and our nocturnal low summer wind speed, the summer offers Galveston County its most serious long range potential air pollution problems. Stronger frontal action during the winter months along with more constant wind speeds on the mainland of Galveston County keeps our air pollution potential during the winter months below the summer levels, especially in Texas City. The reverse is true for certain parts of West Texas City and La Marque.

The location of industry in Texas City puts the majority of the mainland citizens of Galveston County down wind from the potential pollution sources.

Continuing education of the air pollution control division staff is a very important aspect of our activities especially in relation to total job efficiency. Since the conception of the Air Control Division, its employees have attended a total of 15 separate week-long federal schools sponsored by the Air pollution Control Office of the Environmental Protection Agency. Employees of the Air Control Division have also attended 16 schools sponsored by the Texas Air Control Division. The state schools were for very short periods, one and two days at a time. Other valuable on-the-job training was received by the Air Control Division while working with the Texas Air Control Division locally and in other areas of Texas. In order to continue to maintain a high level of efficiency, employees of the Air Control Division will continue an educational program to keep them up to date in the latest techniques used in air pollution technology and enforcement. In at least two instances, the Air Control Division held its own schools. One held in 1969 jointly

sponsored by the Air Control Division and Texas A&M Extension Service dealt with the effects of air pollution on vegetation. Another school was held to familiarize employees of the Air Control Division with the mathematical equations used in calculating air pollution diffusion equations.

A computer program was written and is maintained by a private consultant for evaluating statistical data from our ambient air sites throughout Galveston County.

During 1970 the Air Control Division worked in conjunction with the Air Pollution Control Office in collaborative testing for standard methods for sulphur dioxide. Our laboratory took part in both phase 1 and phase 2 of this testing.

Enclosed are some isopleth maps showing levels of concentration of various pollutants. Also you will find a reference bibliography to direct you to some important air pollution literature.

Wind roses describing the various wind speeds and directions on an annual and quarterly basis in Galveston County during 1970 can be found in the back part of this booklet. Where additional information

is required, please call upon us to answer your question.

In summation of our activities during 1970, we feel that by and large we have been quite successful in causing a greater consciousness among industry and other potential pollutors that they must obey the law in Texas and the they must proceed with all possible haste to install the necessary control equipment and devices to abate air pollution. The results of our measuring and observations is that generally there has been a reduction in total air pollutants in the Texas City/La Marque area and throughout Galveston County. We are optimistic that this trend will continue. We are further fully aware that the rate with which air pollution abatement proceeds is of utmost importance to the citizens of Galveston County. We hope that all people in Galveston County will call us when they have problems in air pollution.

| SITE # | SITE LOCATIONS |
|---|---|
| 3 | Fire Station, 5th Ave. No. & 9th St., Texas City, Texas. |
| 4 | Fire Station at Logan, Texas City, Texas. |
| 8 | Public Housing, 4th Ave. & 9th St., Texas City, Texas |
| 11 | 16th St. & 1st Ave. No., Texas City, Texas |
| 12 | Hwy. 519, West of Tin Smelter, Texas City, Texas. |
| 24 | Banana & 3rd. St., La Marque, Texas. |
| 25 | Water Filtration Plant Hsy. 146, Kemah, Texas. |
| 26 | Galveston County Park, League City, Texas. |
| 27 | Friendswood City Hall, Friendswood, Texas |
| 29 | 20th St. & 5th Ave., Texas City, Texas. |
| 31 | Texas City Air Control Lab. 4th st. & 1st Ave. S., Texas City |
| 32 | Texas City Barn, 10th St. & 4th Ave. So., Texas City, Texas |
| 33 | Texas City Ice House, 3400 Blk. & 4th Ave. So., Texas City. |
| 35 | Shady Lane & 3rd St., La Marque, Texas. |
| 36 | 14th St. & 4th Ave. So., Texas City, Texas. |
| 37 | Texas City, City Hall 1801 9th Ave. No., Texas City, Texas. |
| 40 | 117 Mackeral Ave., Ferry Road, Galveston, Texas. |
| 41 | Water Station, 31st St. & 3rd Ave. No., Texas City, Texas |
| 42 | Water Well # 2, Magnolia Ave., La Marque, Texas. |
| 43 | Fire Station # 4, Washington St., Texas City, Texas |
| 44 | Water Well, Orchid Drive & 5th Ave. No., Texas City, Texas. |
| 45 | 3408 Magnolia, Texas City, Texas. |
| 46 | Lift Station, Loop 197, East 21 St., Texas City, Texas. |
| 47 | 56 & O's, Galveston, Texas. |

CONSTANT MONITORING SAMPLERS Arithmetic averages in micrograms per cubic meter ($ug/M^3$)

| POLLUTANT | SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hydrogen Sulfide | 20th Street & 5th Ave. South, Texas City | 2.78 | 1.39 | 2.78 | 0 | 0 | 0 | 0 | 0 | 1.39 | 0 | 0 | 0 |
| Hydrogen Sulfide | 4th Ave. South & 14th Street, Texas City | 1.39 | 2.78 | 2.78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hydrogen Sulfide | 1207 Oak Street, La Marque | 0 | 0 | 0 | 0 | | | | | | | | |
| Hydrogen Sulfide | 1831 Texas Ave., Texas City | | | | | 0 | 0 | 0 | 0 | | | | |
| Hydrogen Sulfide | 1801 9th Ave., Texas City | | | | | | | | | 0 | 0 | 0 | 0 |
| Sulfur Dioxide | 1207 Oak Street, La Marque | 79.9 | 2.7 | 53.2 | 2.7 | | | | | | | | |
| Sulfur Dioxide | 1831 Texas Ave., Texas City | | | | | 5.4 | 16.0 | 53.2 | 2.7 | | | | |
| Sulfur Dioxide | 1801 9th Ave., Texas City | | | | | | | | | 2.7 | 10.8 | 0 | 53.2 |
| Total Hydrocarbons | 1207 Oak Street, La Marque | 51.2 | 51.2 | 64.0 | 70.4 | | | | | | | | |
| Total Hydrocarbons | 1831 Texas Ave., Texas City | | | | | 73.6 | 72.0 | 57.6 | 76.8 | | | | |
| Total Hydrocarbons | 1801 9th Ave., Texas City | | | | | | | | | 51.2 | 70.4 | 0 | 20.8 |

SUSPENDED PARTICULATE MATTER 1970 Arithmetic averages in micrograms per cubic meter ($ug/M^3$)

| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 122.75 | 181.28 | 136.42 | 172.25 | 119.87 | 82.28 | 62.57 | 71.37 | 62.57 | 72.37 | 75.85 | 67.62 |
| 4 | 69.62 | 100.33 | 72.42 | 94.33 | 84.00 | 67.00 | 92.66 | 56.00 | 59.00 | 68.87 | 67.28 | 56.00 |
| 11 | 120.50 | 125.42 | 112.00 | 139.87 | 93.87 | 104.42 | 110.00 | 103.85 | 107.85 | 103.87 | 100.00 | 88.75 |
| 12 | 149.25 | 171.14 | 114.66 | 119.00 | 107.62 | 91.57 | 111.71 | 121.25 | 124.28 | 194.62 | 209.00 | 217.12 |
| 24 | 126.37 | 192.71 | 119.42 | 125.00 | 156.62 | 118.00 | 93.14 | 94.50 | 114.71 | 102.37 | 96.71 | 100.12 |
| 25 | 98.00 | 111.14 | 74.42 | 86.75 | 89.62 | 74.28 | 73.14 | 71.25 | 68.85 | 78.87 | 69.71 | 58.87 |
| 26 | 110.71 | 118.14 | 98.85 | 128.50 | 77.12 | 86.14 | 63.28 | 88.75 | 39.42 | 65.87 | 73.28 | 47.50 |
| 27 | 91.83 | 94.14 | 89.42 | 77.75 | 70.75 | 49.50 | 42.50 | 56.75 | 53.85 | 79.42 | 73.28 | 69.00 |
| 31 | 50.12 | 77.42 | 76.71 | 73.75 | 197.87 | 148.57 | 138.14 | 135.87 | 144.42 | 194.62 | 123.85 | 99.50 |
| 40 | 136.75 | 129.57 | 125.85 | 188.12 | 73.50 | 60.00 | 49.85 | 53.25 | 55.14 | 51.50 | 64.28 | 53.75 |
| 41 | 83.87 | 70.85 | 66.14 | 93.00 | 61.75 | 54.42 | 28.00 | 44.12 | 50.85 | 59.00 | 60.71 | 49.00 |
| 42 | 59.62 | 58.57 | 54.57 | 90.50 | 42.66 | 47.71 | 39.28 | 43.75 | 39.57 | 53.87 | 55.42 | 43.12 |
| 43 | 59.62 | 83.71 | 67.14 | 82.62 | 51.75 | 74.14 | 49.42 | 55.42 | 48.14 | 66.12 | 64.28 | 50.87 |
| 44 | 307.37 | 257.14 | 202.16 | 187.50 | 42.00 | 50.57 | 45.50 | 46.50 | 42.28 | 54.25 | 47.57 | 64.62 |
| 45 | 31.00 | 171.00 | 100.71 | 79.66 | 56.00 | 62.28 | 49.57 | 42.87 | 39.71 | 54.75 | 54.28 | 45.87 |
| 46 | 0.00 | 0.00 | 85.00 | 90.33 | 41.00 | 46.57 | 37.00 | 38.87 | 36.71 | 52.50 | 61.42 | 43.00 |
| 47 | 0.00 | 0.00 | 0.00 | 96.66 | 51.20 | 50.28 | 40.71 | 47.12 | 58.28 | 50.71 | 84.14 | 50.50 |

ANNUAL ARITHMETIC MEAN = 86.16 $ug/M^3$ ANNUAL STANDARD DEVIATION = 60.86 $ug/M^3$

## SUSPENDED PARTICULATE 1970 GEOMETRIC MEAN FOR EACH SITE PER MONTH

| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 110.40 | 152.22 | 124.25 | 171.18 | 101.99 | 78.79 | 61.57 | 66.70 | 62.21 | 70.70 | 69.76 | 62.23 |
| 4 | 64.57 | 96.90 | 62.14 | 88.74 | 77.77 | 64.27 | 81.61 | 55.41 | 58.61 | 63.21 | 64.44 | 55.27 |
| 11 | 107.67 | 123.08 | 102.75 | 136.76 | 86.09 | 102.52 | 108.89 | 101.14 | 103.61 | 98.13 | 92.99 | 81.19 |
| 12 | 139.91 | 165.52 | 110.25 | 116.21 | 102.25 | 79.44 | 98.08 | 101.06 | 117.01 | 184.14 | 163.12 | 166.65 |
| 24 | 115.86 | 172.94 | 110.03 | 121.85 | 136.87 | 96.94 | 90.64 | 92.57 | 107.72 | 96.77 | 91.00 | 92.22 |
| 25 | 90.14 | 105.34 | 72.96 | 82.51 | 82.81 | 70.68 | 71.88 | 70.00 | 67.64 | 75.47 | 65.03 | 56.66 |
| 26 | 103.14 | 115.38 | 91.46 | 125.82 | 63.90 | 75.77 | 57.32 | 78.41 | 35.81 | 57.56 | 69.94 | 45.71 |
| 27 | 82.77 | 90.96 | 82.00 | 75.07 | 58.62 | 45.70 | 39.10 | 51.44 | 38.43 | 73.89 | 69.69 | 62.04 |
| 31 | 46.01 | 72.86 | 66.15 | 72.64 | 182.98 | 135.72 | 133.08 | 133.39 | 140.42 | 176.76 | 116.46 | 95.72 |
| 40 | 126.70 | 126.12 | 109.05 | 161.40 | 69.03 | 53.48 | 47.58 | 48.32 | 53.29 | 49.02 | 54.79 | 49.67 |
| 41 | 75.38 | 68.53 | 63.11 | 88.73 | 54.72 | 38.14 | 26.06 | 42.37 | 49.03 | 56.94 | 57.24 | 49.00 |
| 42 | 56.73 | 56.73 | 51.15 | 84.29 | 39.50 | 44.51 | 36.73 | 41.77 | 38.22 | 50.10 | 53.84 | 41.14 |
| 43 | 55.26 | 76.66 | 65.79 | 81.12 | 49.21 | 65.83 | 43.44 | 52.80 | 45.39 | 59.72 | 61.88 | 47.95 |
| 44 | 262.84 | 230.93 | 197.35 | 176.64 | 39.21 | 47.26 | 38.10 | 43.96 | 38.64 | 50.97 | 45.38 | 55.55 |
| 45 | 31.00 | 171.00 | 98.38 | 78.82 | 51.58 | 57.28 | 44.26 | 41.21 | 38.28 | 51.70 | 49.96 | 43.56 |
| 46 | 1.00 | 1.00 | 85.00 | 72.55 | 39.34 | 40.66 | 34.33 | 35.50 | 35.32 | 50.52 | 59.62 | 41.56 |
| 47 | 1.00 | 1.00 | 1.00 | 92.77 | 49.62 | 46.63 | 36.96 | 43.87 | 56.34 | 49.17 | 73.75 | 49.23 |

ANNUAL GEOMETRIC MEAN = 71.84 ug/$M^3$ ANNUAL STANDARD GEOMETRIC DEVIATION = 1.80 ug/$M^3$

PARTICULATE CHEMISTRY 1970 Arithmetic averages in micrograms per cubic meter ($ug/M^3$)

| POLLUTANT | SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Benzene Soluble | 3 | | | | | 4 | 6 | 5 | 4 | 2 | 9 | 1 | 3 |
| | 4 | 4 | | | | 5 | 6 | 3 | 7 | 5 | 9 | 2 | 7 |
| | 11 | 2 | 8 | 4 | 4 | 3 | 6 | 6 | 5 | 7 | 16 | 2 | 10 |
| | 12 | 4 | 9 | 6 | 2 | 5 | 11 | 7 | 29 | 4 | 6 | 3 | 4 |
| | 24 | | 8 | 6 | 4 | 12 | 8 | 6 | 6 | 6 | 7 | 2 | 7 |
| | 25 | 4 | 4 | 5 | 3 | 5 | 7 | 5 | 4 | 4 | 7 | 2 | 2 |
| | 26 | | 3 | 2 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | 2 |
| | 27 | | 5 | 6 | 3 | 4 | 4 | 3 | 3 | 4 | 6 | 3 | 16 |
| | 31 | | | 4 | 11 | 7 | 2 | 7 | 11 | 6 | 8 | 2 | 3 |
| | 40 | | | | 2 | 2 | 2 | 3 | 4 | 3 | 2 | 2 | 3 |
| | 41 | | | | 2 | 3 | 2 | 1 | 4 | 4 | 3 | 2 | 2 |
| | 42 | | | | | 2 | 4 | 8 | 6 | 3 | 5 | 2 | 2 |
| | 43 | | | | 1 | 3 | 3 | 5 | 14 | 5 | 4 | 1 | 5 |
| | 44 | | | | 3 | 1 | 2 | 5 | 5 | 4 | 5 | 5 | 1 |
| | 45 | | | | 2 | 3 | 4 | 3 | 3 | 4 | 7 | 4 | 3 |
| | 46 | | | | 2 | 3 | 5 | 6 | 4 | 3 | 10 | 3 | 1 |
| | 47 | | | | | | 2 | 2 | 6 | 3 | 12 | 3 | 3 |

PARTICULATE CHEMISTRY 1970 Arithmetic averages in micrograms per cubic meter ($ug/M^3$)

| POLLUTANT | SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Nitrates | 3 | 0.4 | | | | 0.1 | 0.0 | 0.5 | 2.2 | 0.6 | 1.6 | 0.1 | 1.0 |
| | 4 | 0.6 | 0.0 | | | 0.3 | 0.0 | 0.0 | 3.3 | 0.4 | 0.3 | 0.2 | 0.5 |
| | 11 | 0.4 | 0.0 | 0.6 | 0.0 | 0.0 | 0.7 | 2.1 | 1.3 | 0.5 | 2.0 | 0.0 | 0.4 |
| | 12 | | | | 0.0 | 0.0 | 0.7 | 1.5 | 2.5 | 1.0 | 0.9 | 0.2 | 0.4 |
| | 24 | 0.8 | | 0.6 | 0.4 | 0.0 | 0.1 | 1.6 | 2.1 | 0.8 | 1.8 | 0.2 | 0.9 |
| | 25 | | | 0.4 | 0.4 | 0.0 | 0.6 | 2.3 | 2.8 | 0.4 | 0.4 | 0.1 | 0.7 |
| | 26 | | 0.0 | 0.4 | 0.7 | 0.0 | 0.3 | 2.1 | 0.0 | 0.4 | 1.5 | 0.4 | 0.5 |
| | 27 | | | | 0.3 | 0.0 | 0.3 | 2.0 | 0.0 | 0.3 | 0.8 | 0.2 | 3.5 |
| | 31 | | | | 0.0 | 0.1 | 0.7 | 2.0 | 0.0 | 0.2 | 1.4 | 0.2 | 0.7 |
| | 40 | | | | | 0.0 | 0.6 | 0.7 | 0.0 | 0.3 | 1.2 | 0.0 | 0.4 |
| | 41 | | | | 0.0 | 0.1 | 0.0 | 1.4 | 0.0 | 1.3 | 1.2 | 0.2 | 0.4 |
| | 42 | | | | | 0.3 | 0.2 | 1.5 | 0.0 | 0.6 | 1.9 | 0.3 | 0.2 |
| | 43 | | | | 0.0 | 0.1 | 0.0 | 1.1 | 3.2 | 1.4 | 0.6 | 0.7 | 1.1 |
| | 44 | | | | 0.0 | 0.0 | 0.1 | 1.3 | 2.6 | 1.7 | 0.7 | 0.3 | 2.3 |
| | 45 | | | | 0.0 | 0.0 | 0.3 | 0.7 | 0.9 | 1.6 | 0.3 | 1.3 | 1.4 |
| | 46 | | | | 0.0 | 0.1 | 0.4 | 0.5 | 1.3 | 0.4 | 1.8 | 0.1 | 2.5 |
| | 47 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 0.4 | 1.0 | 0.1 | 0.4 |

PARTICULATE CHEMISTRY 1970 Arithmetic averages in micrograms per cubic meter ($ug/M^3$)

| POLLUTANT | SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Sulfates | 3 | | | | | 12 | 17 | 34 | | 3 | 2 | 2 | 3 |
| | 4 | 8 | | | | 11 | 8 | 17 | | 7 | 14 | 5 | 1 |
| | 11 | 9 | 11 | 4 | 10 | 8 | 8 | 12 | 31 | 6 | 6 | 14 | 4 |
| | 12 | 25 | 11 | | 8 | 10 | 5 | 24 | 51 | 11 | 31 | 9 | 0 |
| | 24 | | 12 | | 8 | 9 | 10 | 22 | 41 | 13 | 22 | 41 | 1 |
| | 25 | 15 | | 4 | 3 | 7 | 18 | 20 | 30 | 5 | 19 | 47 | 6 |
| | 26 | | | 1 | 6 | 6 | 15 | 22 | 1 | 4 | 14 | 30 | 4 |
| | 27 | | | 6 | 4 | 7 | 7 | 9 | 30 | 4 | 15 | 1 | 6 |
| | 31 | | 2 | | 4 | 0 | 28 | 12 | 27 | 4 | 16 | 8 | 4 |
| | 40 | | | | | 4 | 18 | 13 | 14 | 14 | 10 | 16 | 1 |
| | 41 | | | | 15 | 9 | 25 | 6 | 16 | 21 | 15 | 2 | 8 |
| | 42 | | | | | 1 | 9 | 22 | 17 | 6 | 12 | 4 | 6 |
| | 43 | | | | 4 | 3 | 11 | 6 | 19 | 9 | 14 | 0 | 7 |
| | 44 | | | | 7 | 3 | 5 | 9 | 17 | 5 | 16 | 9 | 12 |
| | 45 | | | | 6 | 7 | 14 | 17 | | 5 | 11 | 8 | 8 |
| | 46 | | | | 7 | 15 | 36 | 28 | | 5 | 13 | 6 | 5 |
| | 47 | | | | | | 33 | 19 | | 4 | 2 | 0 | 6 |

ALDEHYDES 1970 ARITHMETIC MEAN FOR EACH SITE PER MONTH

| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 107.42 | 71.14 | 44.57 | 11.00 | 11.83 | 13.00 | 40.00 | 6.28 | 5.75 | 5.50 | 6.33 | 3.25 |
| 8 | 81.75 | 42.25 | 29.14 | 11.62 | 11.14 | 12.42 | 6.57 | 5.14 | 5.20 | 25.00 | 23.33 | 7.40 |
| 12 | 0.00 | 0.00 | 7.00 | 7.37 | 13.33 | 5.71 | 17.33 | 3.83 | 8.00 | 36.00 | 17.60 | 11.25 |
| 29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 31 | 131.25 | 88.66 | 74.14 | 24.87 | 22.33 | 18.00 | 54.42 | 5.33 | 4.00 | 14.20 | 12.40 | 4.20 |
| 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | 83.16 | 80.66 | 54.14 | 43.16 | 0.00 | 17.00 | 47.85 | 8.42 | 12.16 | 31.33 | 15.28 | 22.42 |
| 35 | 61.00 | 135.50 | 66.14 | 18.50 | 21.60 | 9.42 | 61.20 | 2.20 | 2.60 | 53.66 | 42.14 | 12.75 |
| 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**ANNUAL ARITHMETIC MEAN** = 30.87 ug/$M^3$ ANNUAL STANDARD ARITHMETIC DEVIATION = 52.98 ug/$M^3$

AMMONIA 1970 ARITHMETIC MEAN FOR EACH SITE PER MONTH

| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | | | | | | | 329.00 | 22.83 |
| 8 | | | | | | | | | | | 0.00 | 1.00 |
| 12 | | | | | | | | | | | 279.00 | 13.00 |
| 29 | | | | | | | | | | | 0.00 | 0.00 |
| 31 | | | | | | | | | | | 0.00 | 32.00 |
| 32 | | | | | | | | | | | 0.00 | 0.00 |
| 33 | | | | | | | | | | | 169.00 | 48.50 |
| 35 | | | | | | | | | | | 0.00 | 135.40 |
| 36 | | | | | | | | | | | 0.00 | 0.00 |
| 37 | | | | | | | | | | | 0.00 | 0.00 |
| SPARE | | | | | | | | | | | 0.00 | 0.00 |
| SPARE | | | | | | | | | | | 0.00 | 0.00 |

ANNUAL ARITHMETIC MEAN = 77.91 ug/$M^3$ ANNUAL STANDARD ARITHMETIC DEVIATION = 117.50 ug/$M^3$

## CHLORIDE 1970 ARITHMETIC MEAN FOR EACH SITE PER MONTH

| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | | | | | | | 0.00 | 0.00 |
| 8 | | | | | | | | | | | 47.00 | 86.66 |
| 12 | | | | | | | | | | | 19.00 | 49.00 |
| 29 | | | | | | | | | | | 0.00 | 0.00 |
| 31 | | | | | | | | | | | 641.50 | 240.75 |
| 32 | | | | | | | | | | | 0.00 | 0.00 |
| 33 | | | | | | | | | | | 219.50 | 78.00 |
| 35 | | | | | | | | | | | 90.50 | 69.75 |
| 36 | | | | | | | | | | | 0.00 | 0.00 |
| 37 | | | | | | | | | | | 0.00 | 0.00 |
| SPARE | | | | | | | | | | | 0.00 | 0.00 |
| SPARE | | | | | | | | | | | 0.00 | 0.00 |

ANNUAL ARITHMETIC MEAN = 140.55 ug/$M^3$ ANNUAL STANDARD ARITHMETIC DEVIATION = 234.27 ug/$M^3$

HYDROGEN SULFIDE 1970 ARITHMETIC MEAN FOR EACH SITE PER MONTH

| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 0.00 | 2.50 | 3.00 | 0.00 | 0.00 | 3.50 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | 9.00 | 5.00 | 24.00 | 0.00 | 0.00 | 8.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | 0.00 | 3.00 | 33.00 | 0.00 | 0.00 | 0.00 | 37.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 |
| 29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 31 | 13.00 | 7.25 | 29.00 | 0.00 | 0.00 | 8.50 | 1.00 | 0.00 | 0.00 | 5.00 | 1.00 | 0.00 |
| 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | 17.00 | 7.50 | 35.00 | 0.00 | 0.00 | 17.00 | 1.00 | 0.00 | 0.00 | 1.00 | 2.00 | 0.00 |
| 35 | 0.00 | 5.00 | 115.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

ANNUAL ARITHMETIC MEAN = 14.31 ug/$M^3$ ANNUAL STANDARD ARITHMETIC DEVIATION = 32.91 ug/$M^3$

## MERCAPTAN 1970 ARITHMETIC MEAN FOR EACH SITE PER MONTH

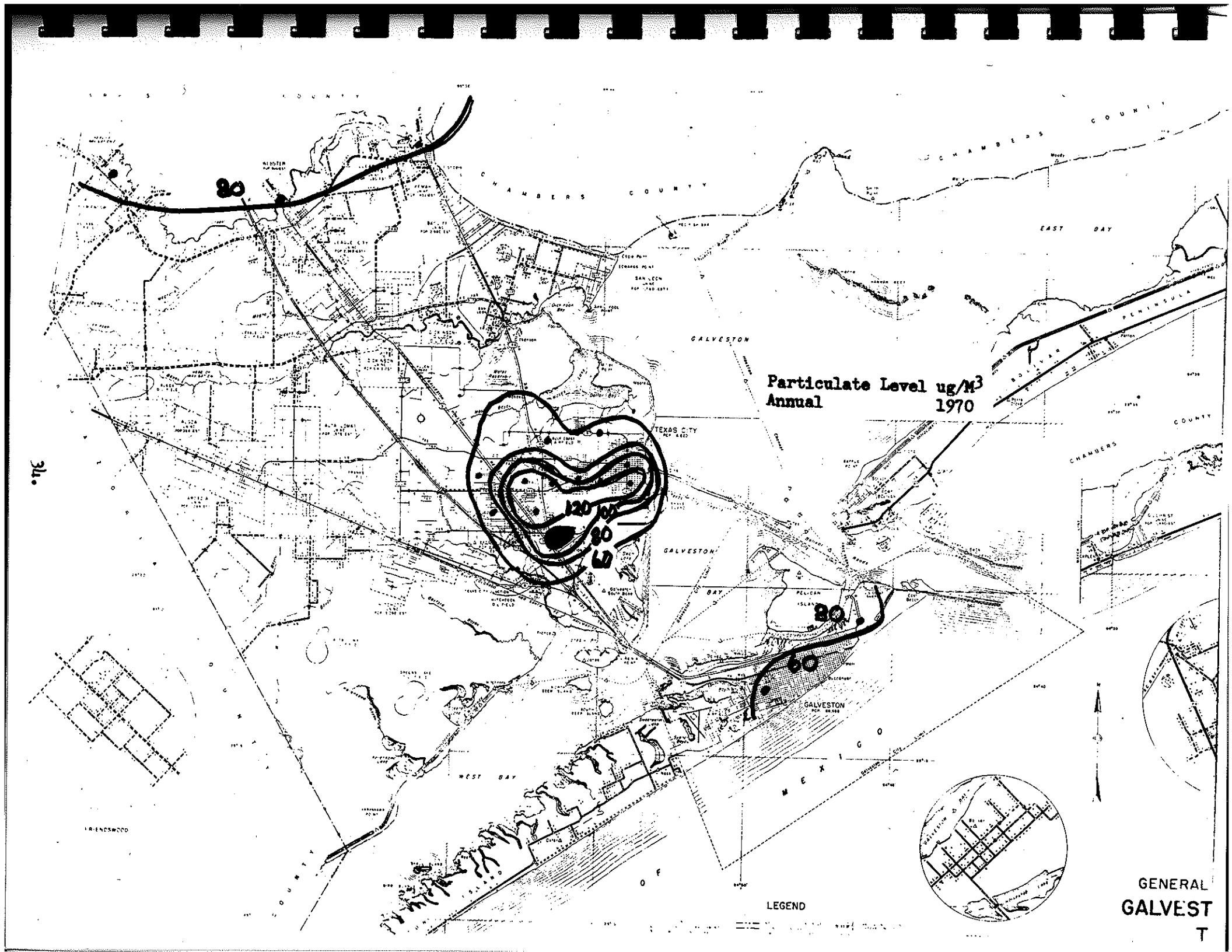
| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | | | | 0.00 | 23.00 | 323.50 | 1409.0 | 86.00 |
| 8 | | | | | | | | 14.00 | 145.00 | 0.00 | 43.00 | 18.66 |
| 12 | | | | | | | | 0.00 | 10.00 | 487.50 | 0.00 | 0.00 |
| 29 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 31 | | | | | | | | 0.00 | 384.00 | 103.00 | 69.00 | 137.20 |
| 32 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | | | | | | | | 0.00 | 16.00 | 35.00 | 0.00 | 25.00 |
| 35 | | | | | | | | 0.00 | 11.00 | 0.00 | 230.00 | 0.00 |
| 36 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

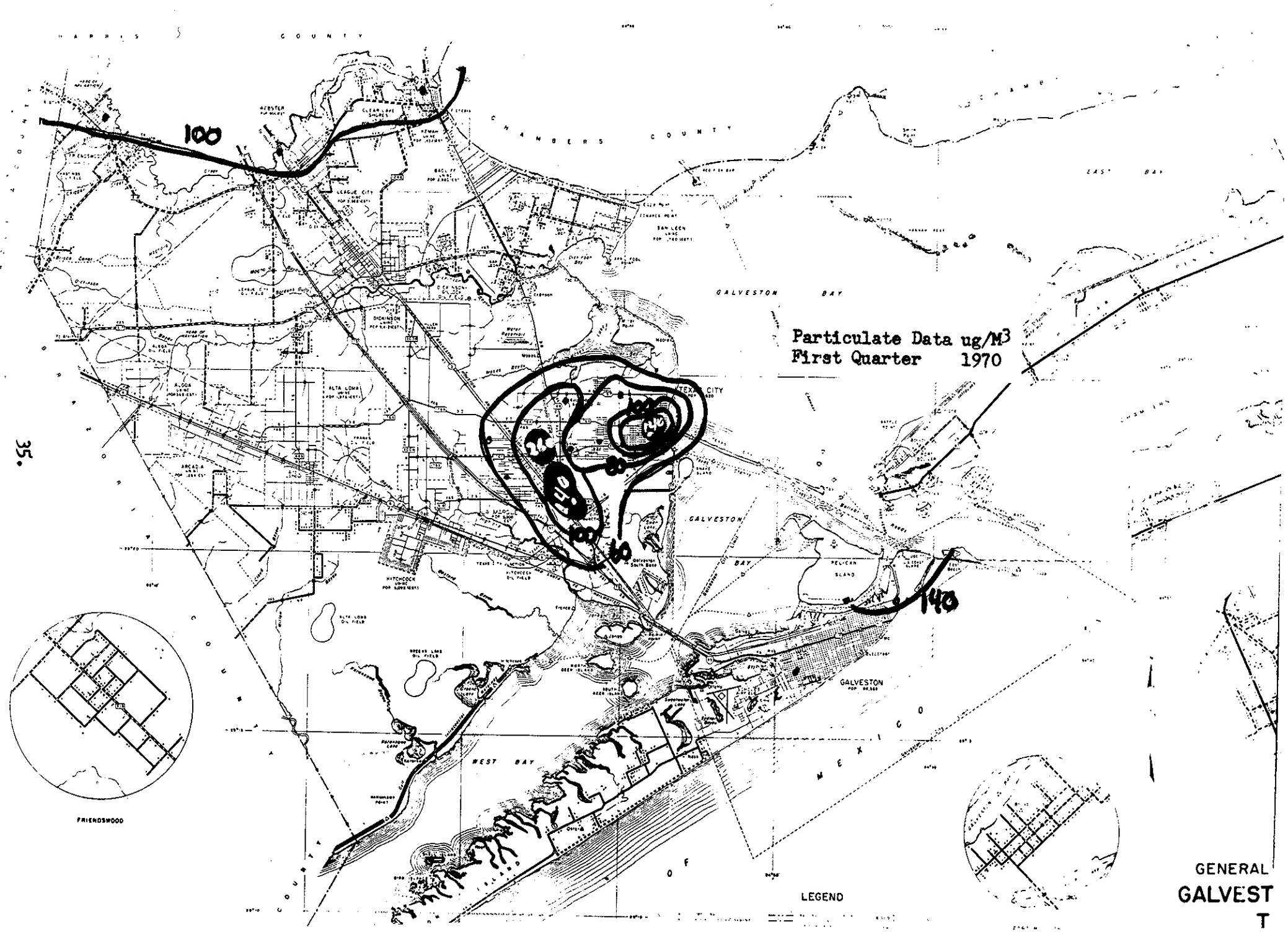
ANNUAL ARITHMETIC MEAN = 153.73 ug/$M^3$ ANNUAL STANDARD ARITHMETIC DEVIATION = 293.72 ug/$M^3$

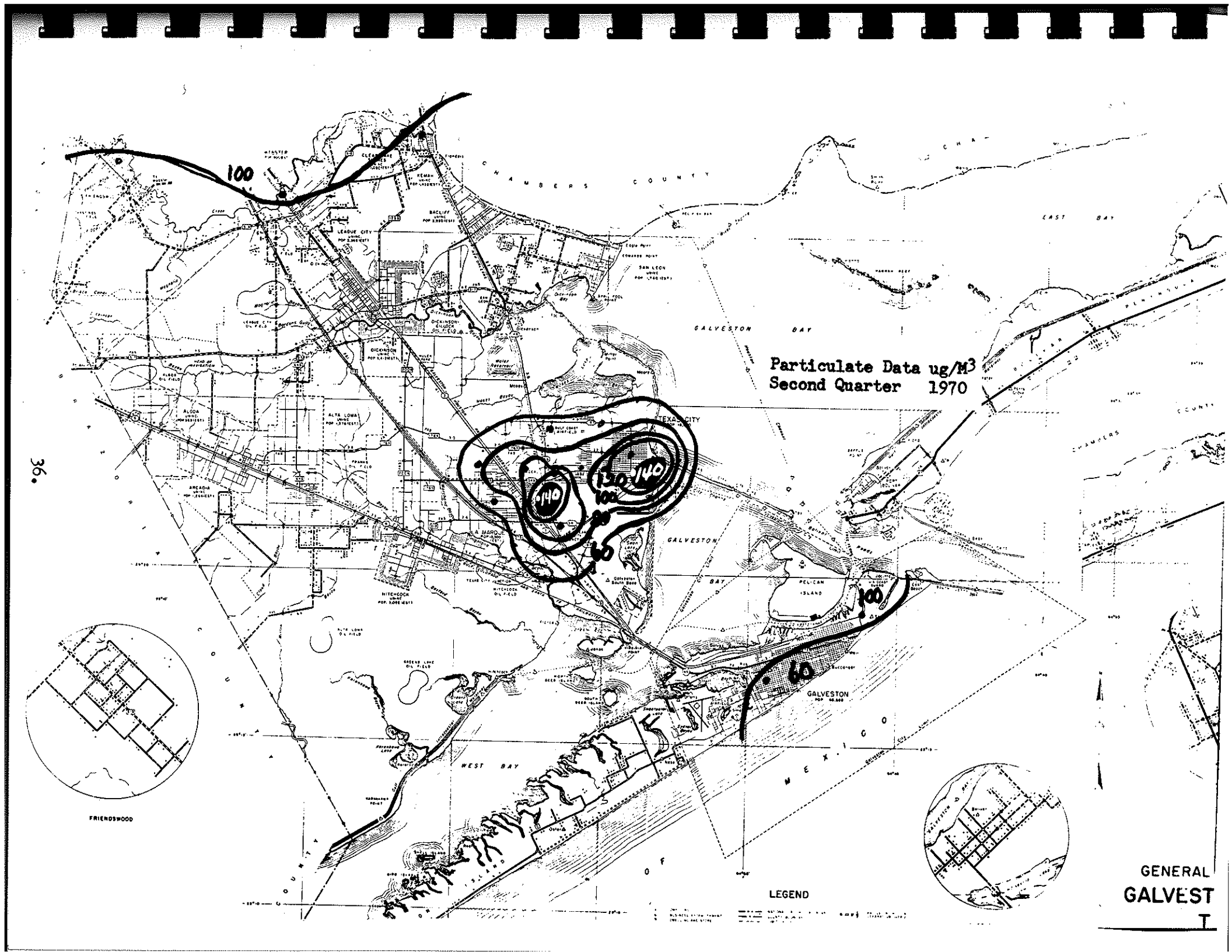
## SULFUR DIOXIDE 1970 ARITHMETIC MEAN FOR EACH SITE PER MONTH

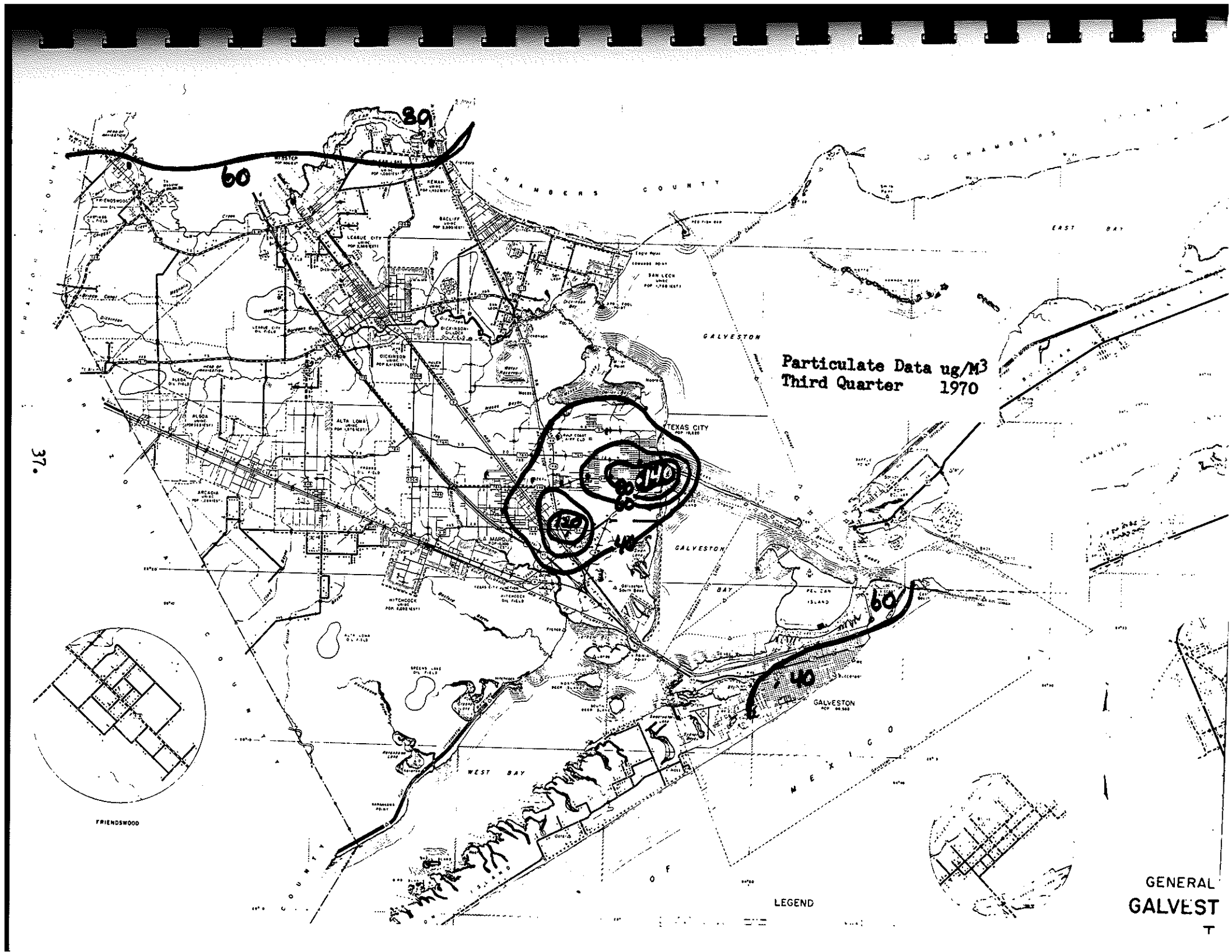
| SITE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 7.28 | 27.42 | 32.50 | 54.00 | 80.66 | 47.40 | 3.25 | 39.83 | 20.50 | 62.00 | 14.50 | 42.75 |
| 8 | 5.80 | 10.40 | 26.50 | 36.66 | 46.33 | 25.66 | 68.71 | 12.83 | 14.50 | 31.66 | 11.25 | 8.71 |
| 12 | 0.00 | 0.00 | 18.50 | 240.42 | 127.42 | 128.40 | 60.57 | 115.14 | 53.16 | 82.50 | 24.40 | 410.66 |
| 29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 31 | 3.25 | 8.00 | 9.00 | 7.50 | 8.00 | 20.00 | 8.50 | 47.75 | 9.50 | 298.50 | 17.00 | 10.50 |
| 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | 10.00 | 43.33 | 68.80 | 185.66 | 0.00 | 98.00 | 8.20 | 13.83 | 79.33 | 8.00 | 11.00 | 50.33 |
| 35 | 5.00 | 8.00 | 16.00 | 7.00 | 8.75 | 2.50 | 12.60 | 7.00 | 4.00 | 18.40 | 21.00 | 13.80 |
| 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPARE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

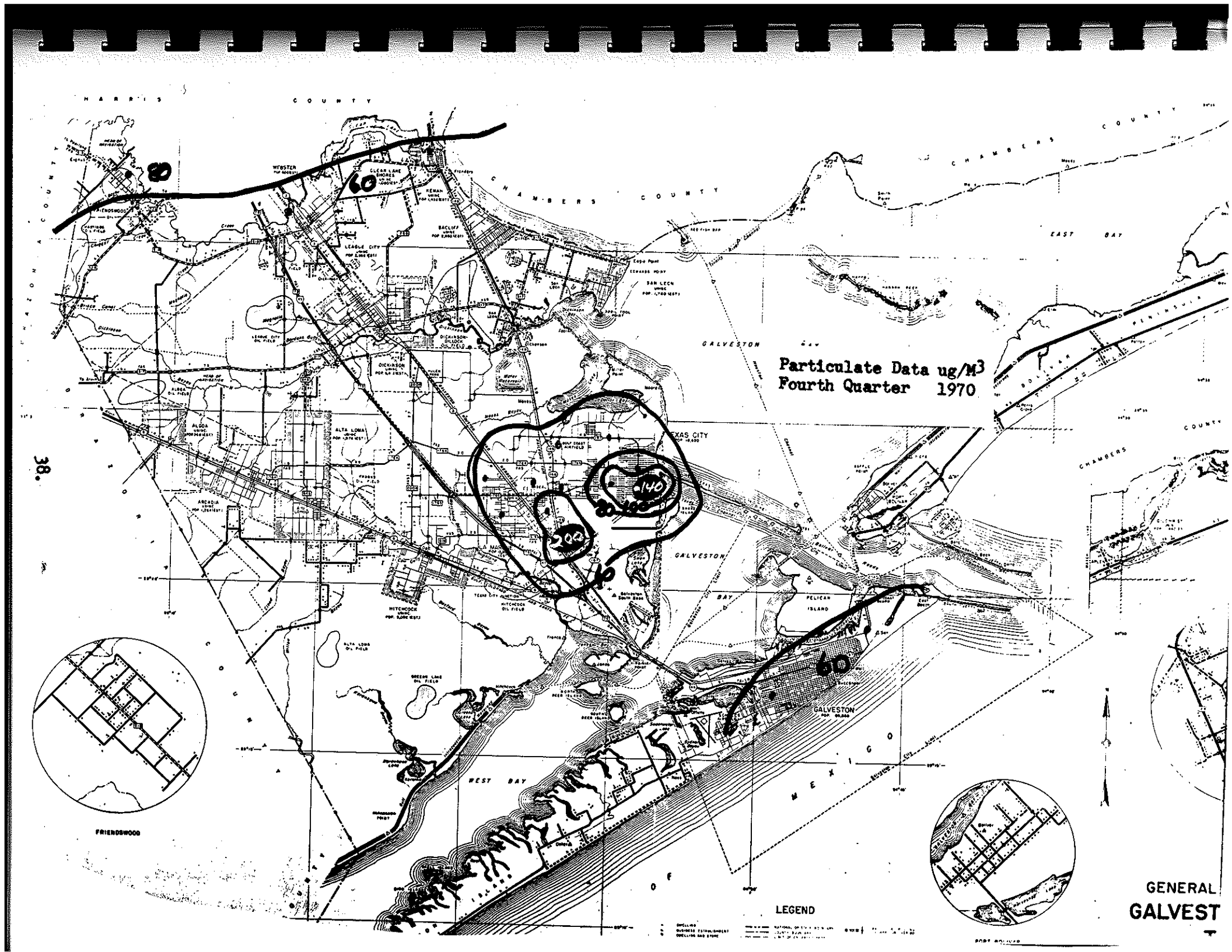
ANNUAL ARITHMETIC MEAN = 51.11 $ug/M^3$ ANNUAL STANDARD ARITHMETIC DEVIATION = 125.17 $ug/M^3$

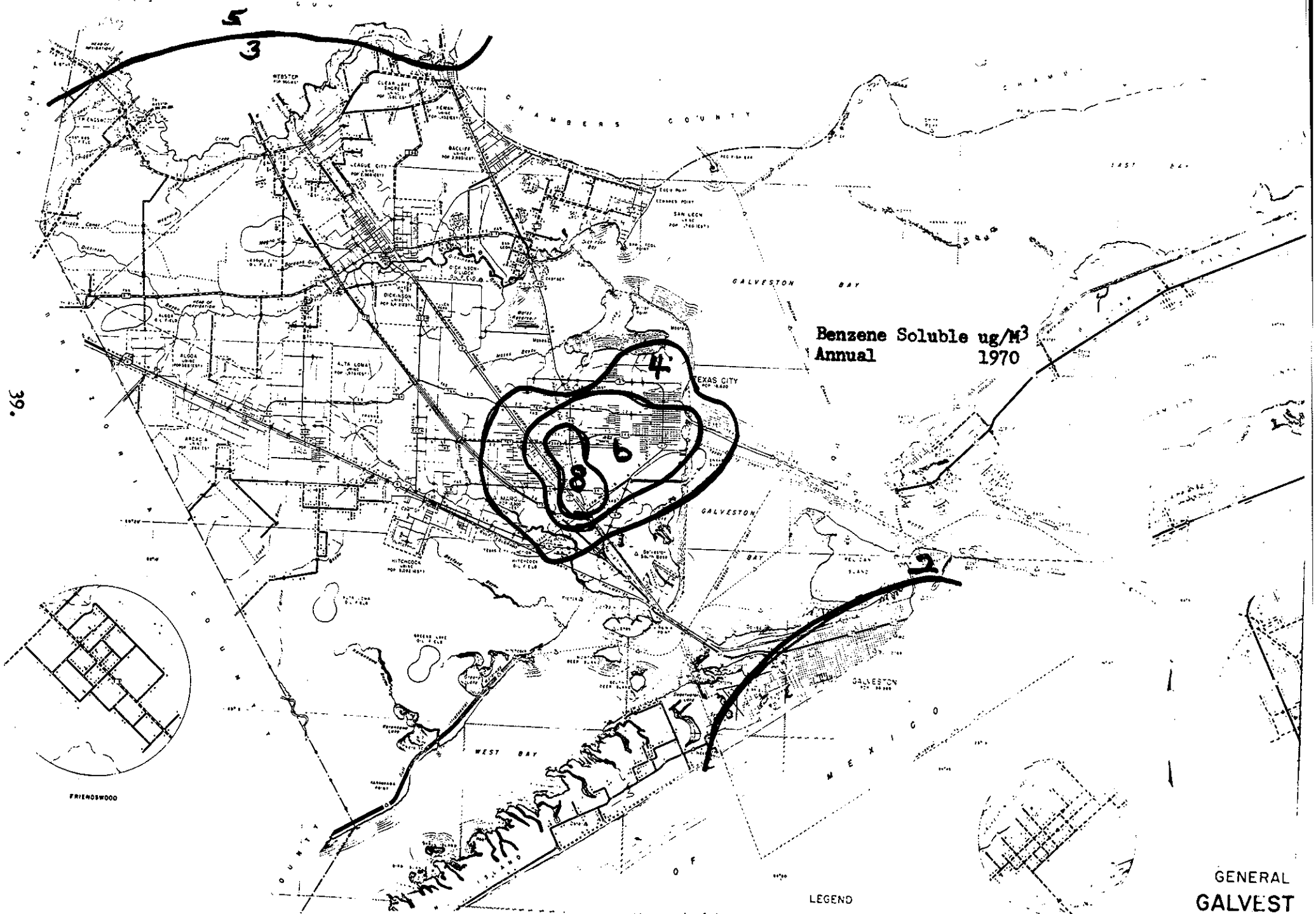

Particulate Level ug/M3
Annual 1970
120
100
80
60
80
60
CHAMBERS COUNTY
GALVESTON
TEXAS CITY
EAST BAY
WEST BAY
GALVESTON BAY
PELICAN ISLAND
BOLIVAR PENINSULA
FRIENDSWOOD
LEGEND
GENERAL
GALVEST
T

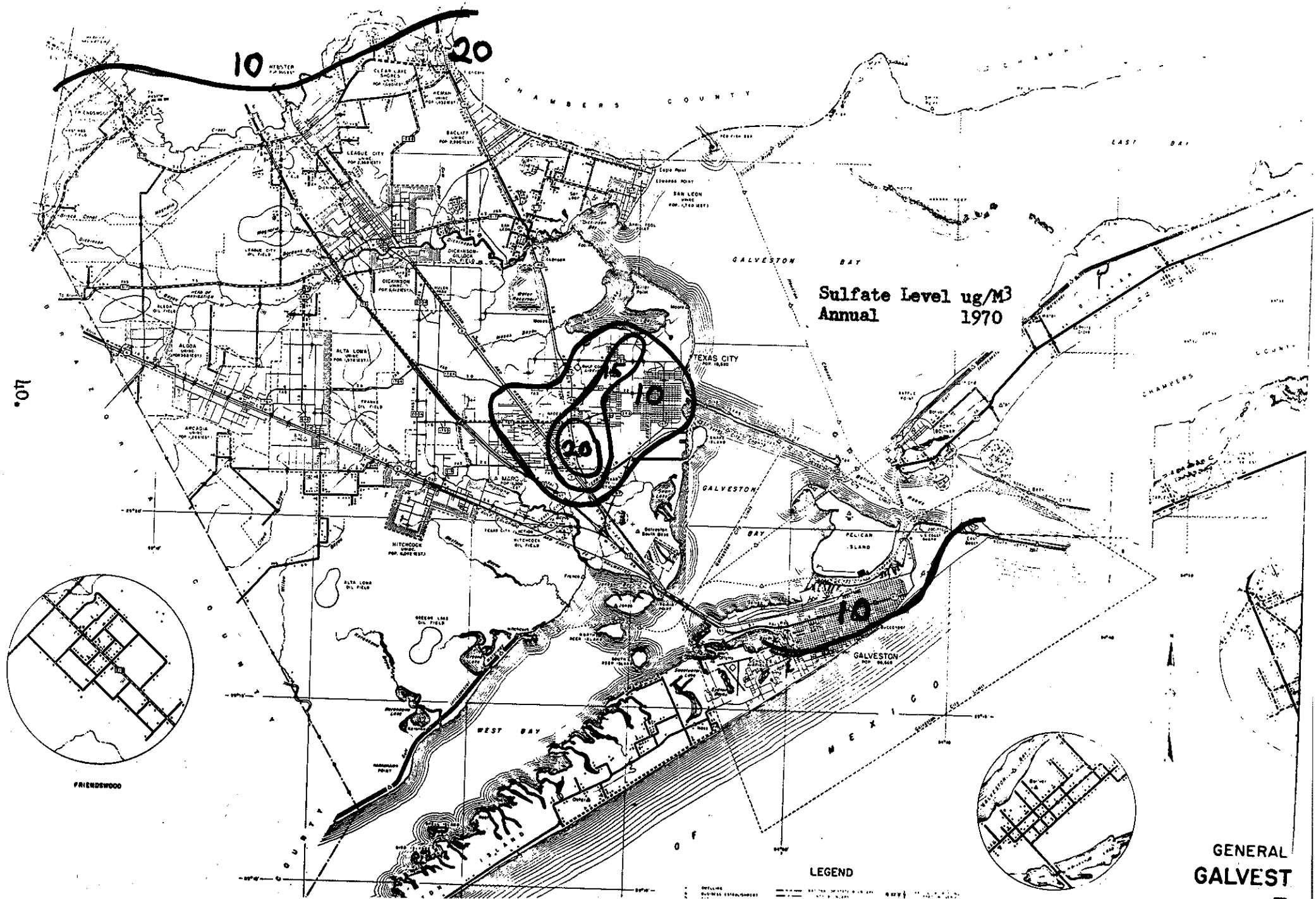

HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON BAY
EAST BAY
Particulate Data ug/M3
First Quarter 1970
100
140
TEXAS CITY
GALVESTON
PELICAN ISLAND
WEST BAY
MEXICO
FRIENDSWOOD
LEGEND
GENERAL
GALVEST
T

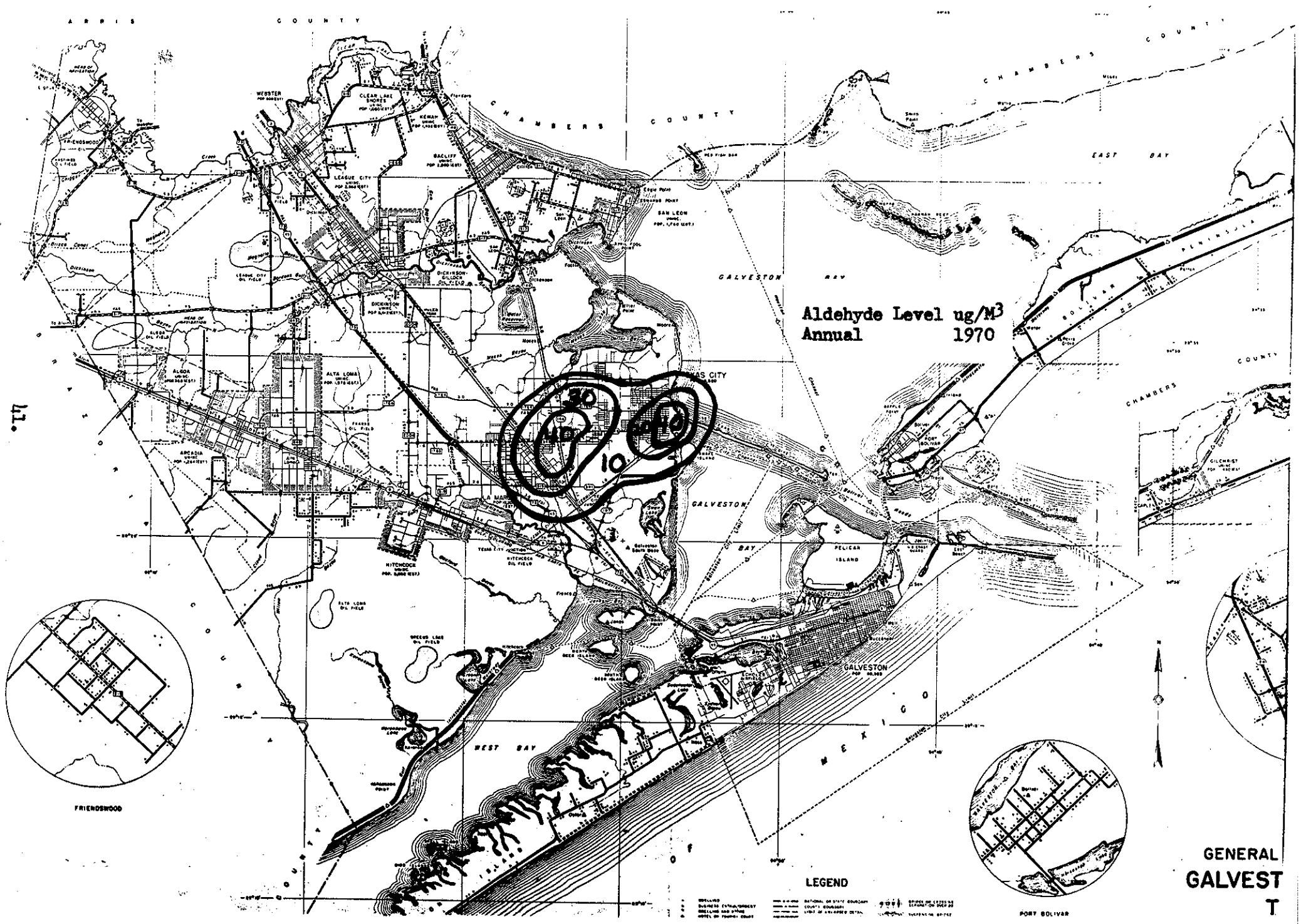

Particulate Data ug/M3
Second Quarter 1970
100
110
120
60
CHAMBERS COUNTY
GALVESTON BAY
EAST BAY
TEXAS CITY
GALVESTON
PELICAN ISLAND
WEST BAY
GULF OF MEXICO
FRIENDSWOOD
LEGEND
GENERAL
GALVEST
T

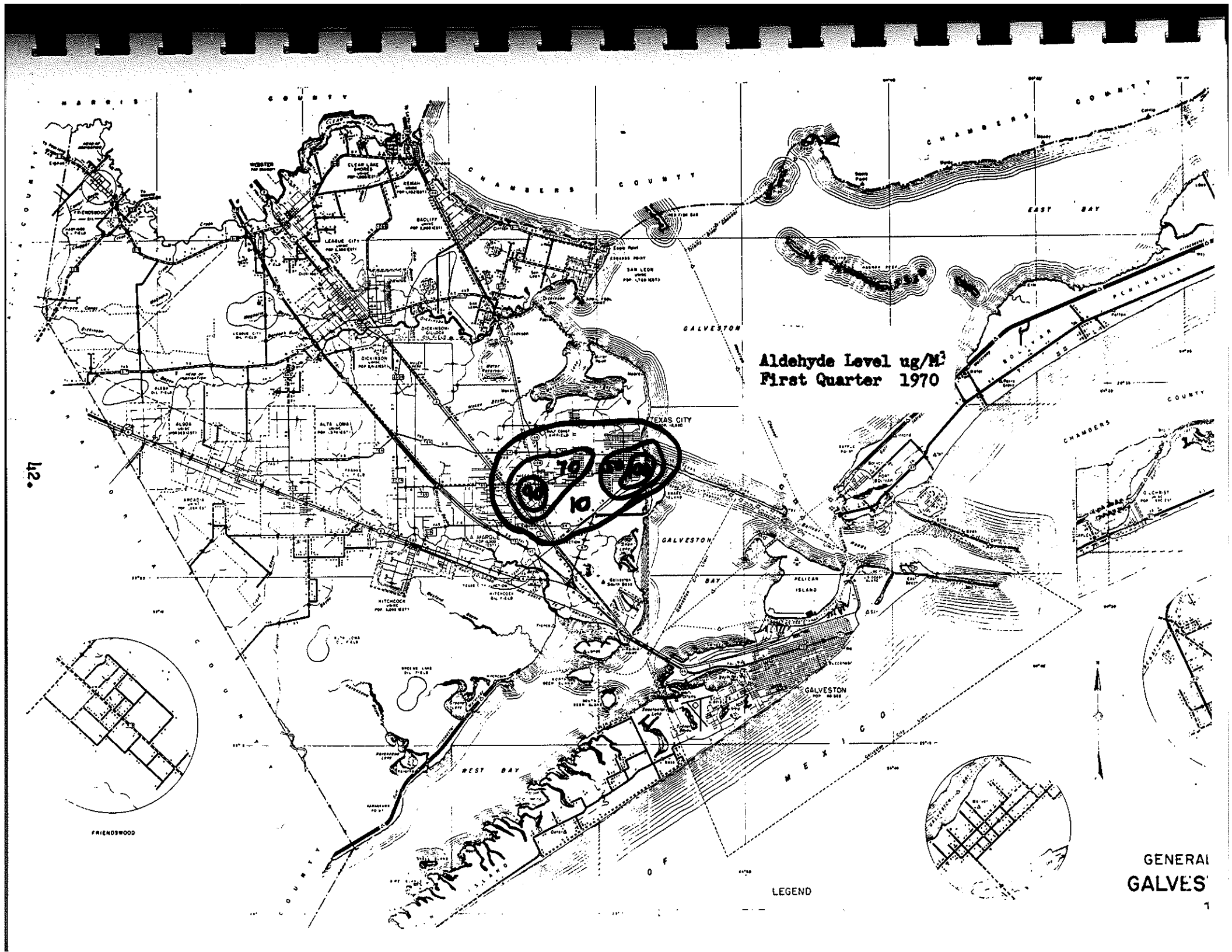

Particulate Data ug/M3
Third Quarter 1970
80
60
140
120
40
60
40
LEGEND
GENERAL
GALVEST
T

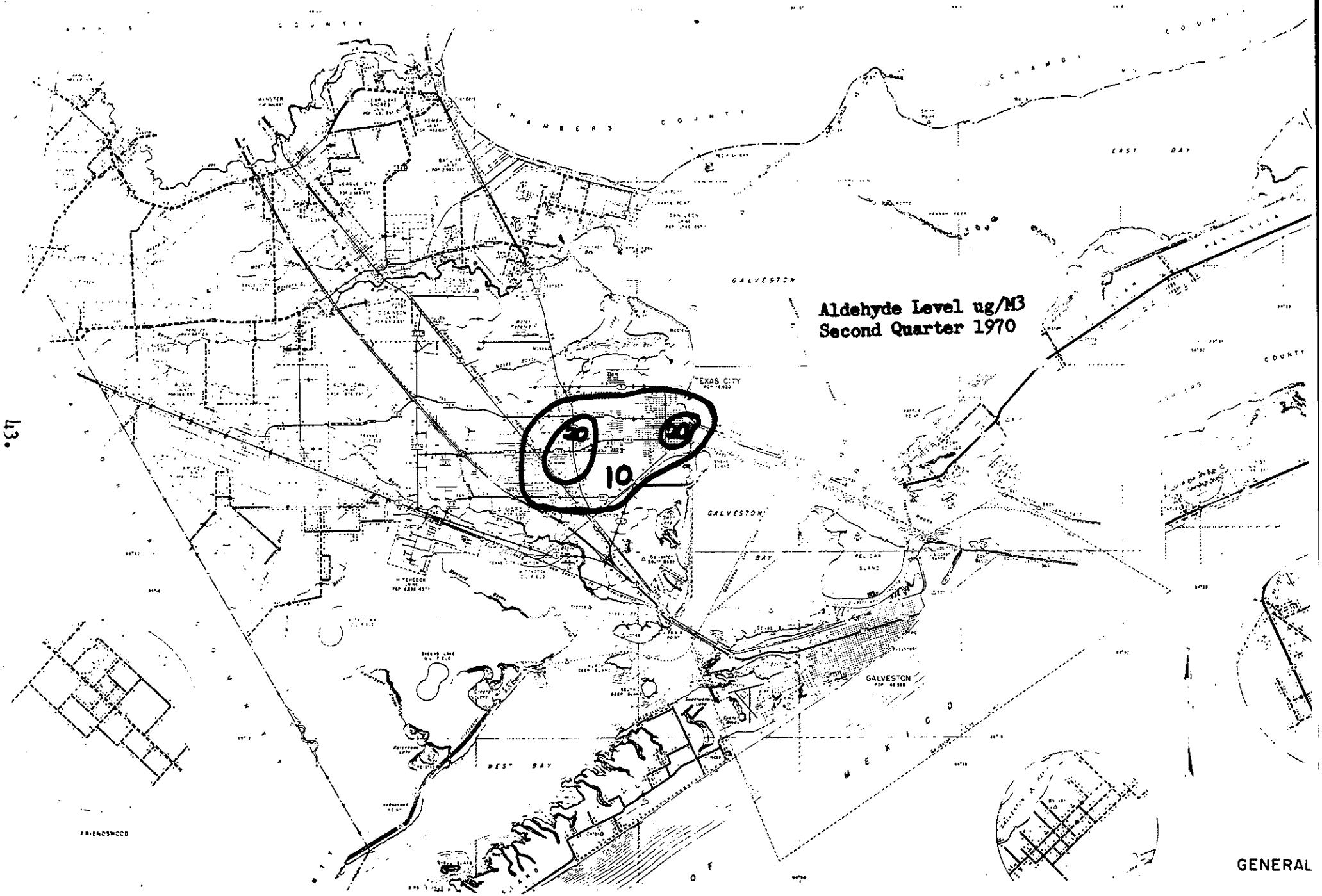

Particulate Data ug/M3
Fourth Quarter 1970
80
60
140
200
60
HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON BAY
EAST BAY
WEST BAY
TEXAS CITY
GALVESTON
PELICAN ISLAND
FRIENDSWOOD
LEGEND
GENERAL
GALVEST

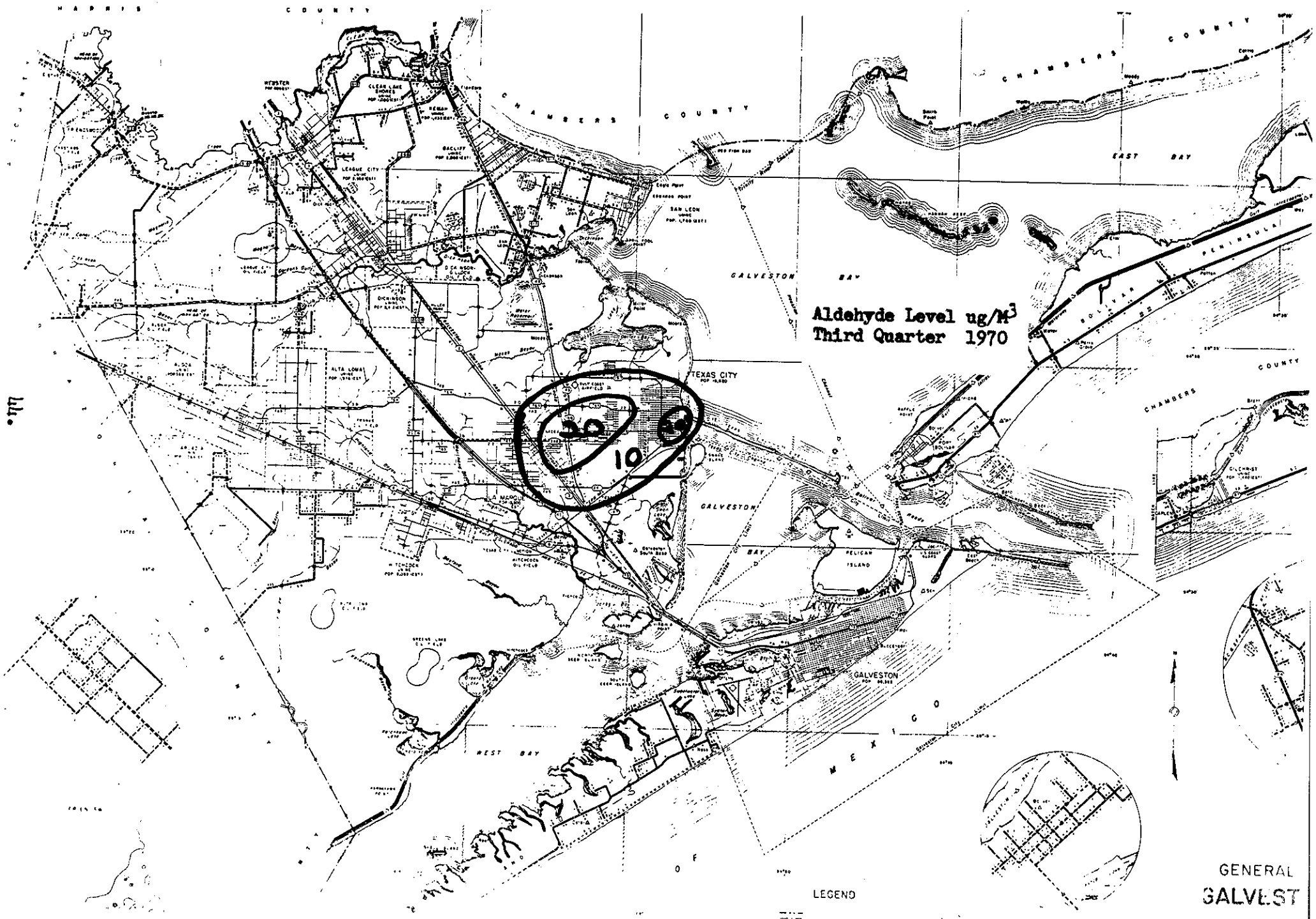

Benzene Soluble ug/M3
Annual 1970
5
3
4
6
8
2
CHAMBERS COUNTY
GALVESTON BAY
TEXAS CITY
GALVESTON
WEST BAY
FRIENDSWOOD
LEGEND
GENERAL
GALVEST

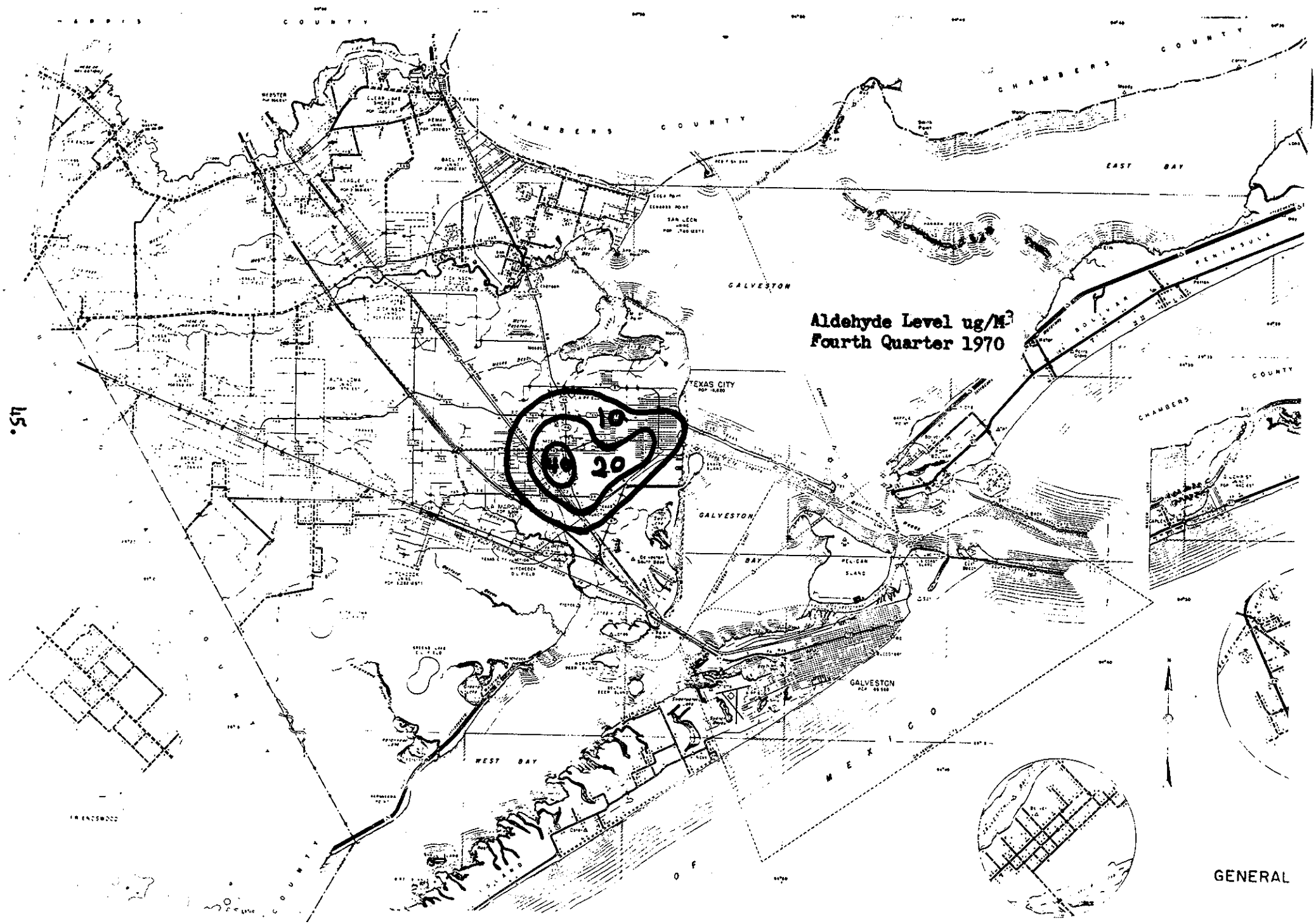

10
20
CHAMBERS COUNTY
GALVESTON BAY
Sulfate Level ug/M3
Annual 1970
TEXAS CITY
GALVESTON
PELICAN ISLAND
WEST BAY
GULF OF MEXICO
FRIENDSWOOD
LEGEND
GENERAL
GALVEST
T


Aldehyde Level ug/M3
Annual 1970
30
20
10
GALVESTON BAY
GALVESTON
WEST BAY
PELICAN ISLAND
FRIENDSWOOD
PORT BOLIVAR
LEGEND
GENERAL
GALVEST
T

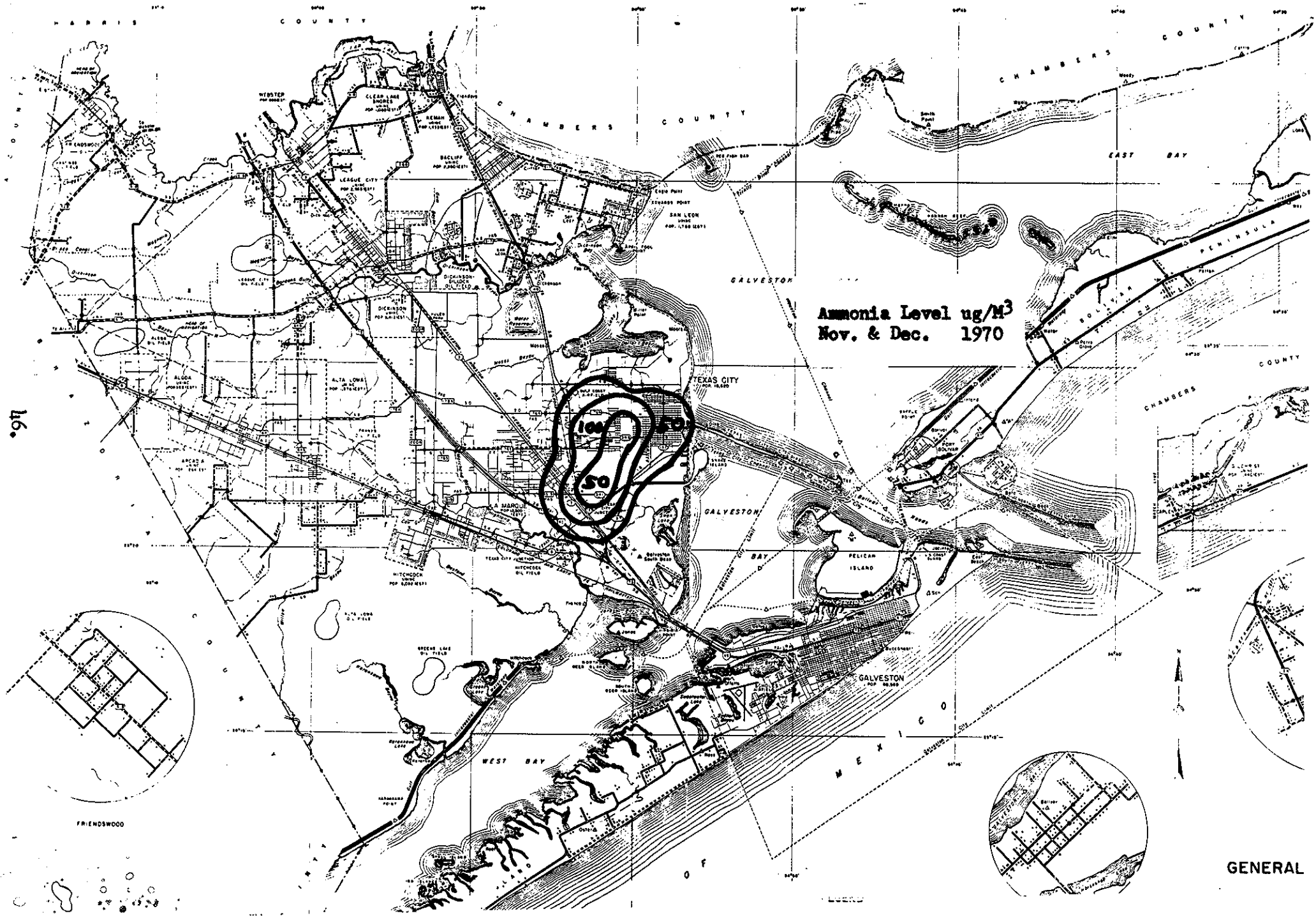

Aldehyde Level ug/M³
First Quarter 1970
10
12
TEXAS CITY
GALVESTON
GALVESTON BAY
EAST BAY
WEST BAY
PELICAN ISLAND
FRIENDSWOOD
LEGEND
GENERAL
GALVES

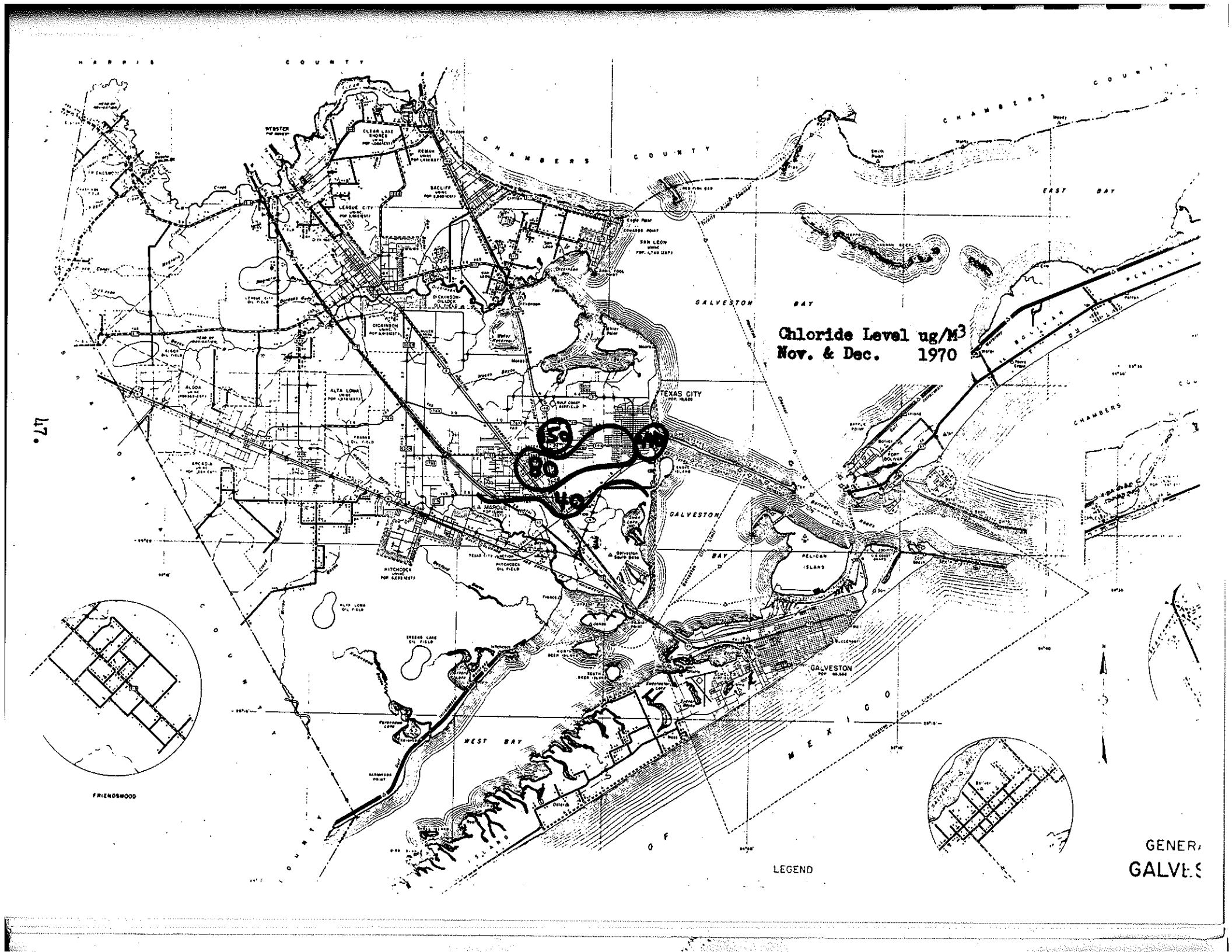

Aldehyde Level ug/M3
Second Quarter 1970
10
GALVESTON
TEXAS CITY
GALVESTON
GALVESTON
CHAMBERS COUNTY
GENERAL

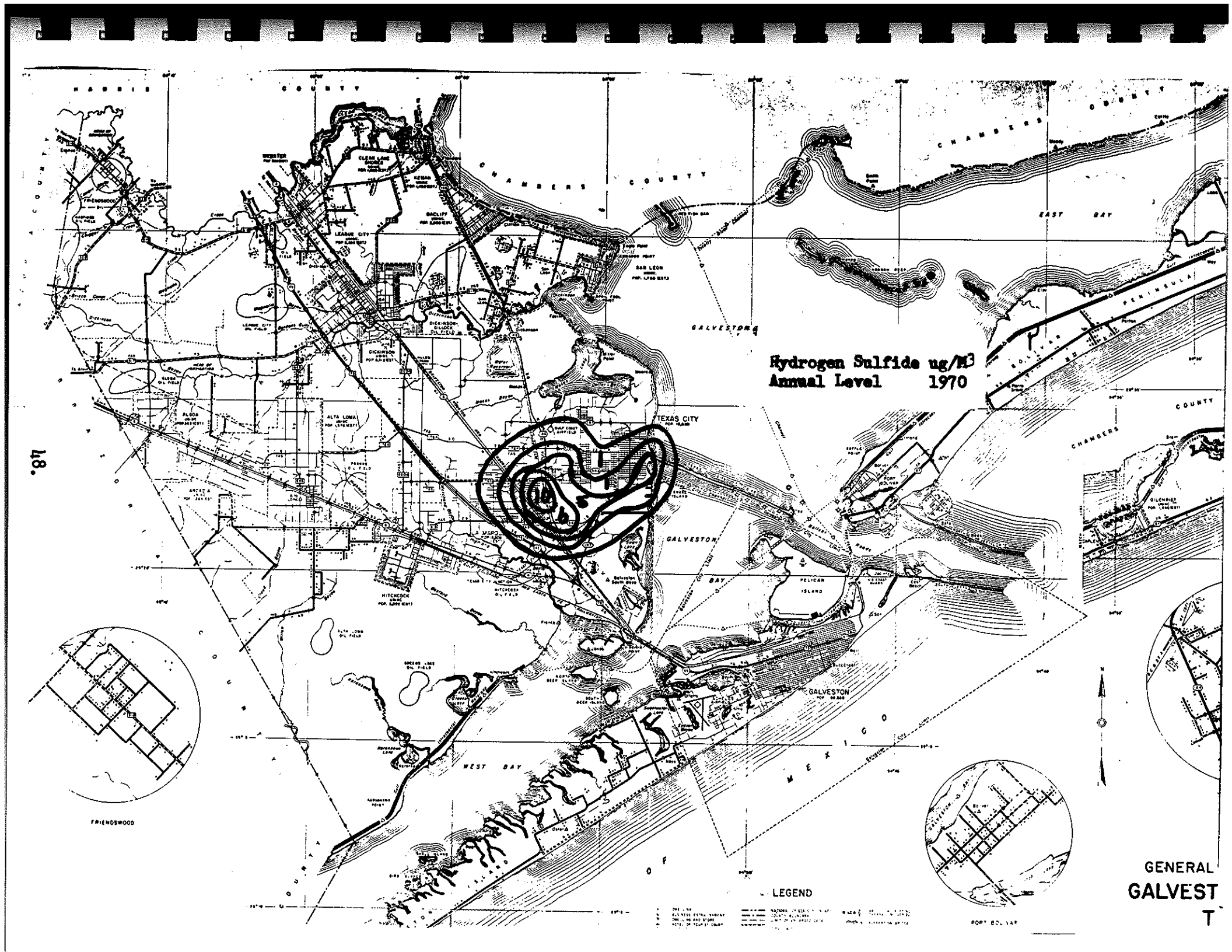

Aldehyde Level ug/M3
Third Quarter 1970
30
10
TEXAS CITY
GALVESTON
GALVESTON BAY
EAST BAY
WEST BAY
CHAMBERS COUNTY
HARRIS COUNTY
BOLIVAR PENINSULA
PELICAN ISLAND
LEGEND
GENERAL
GALVEST

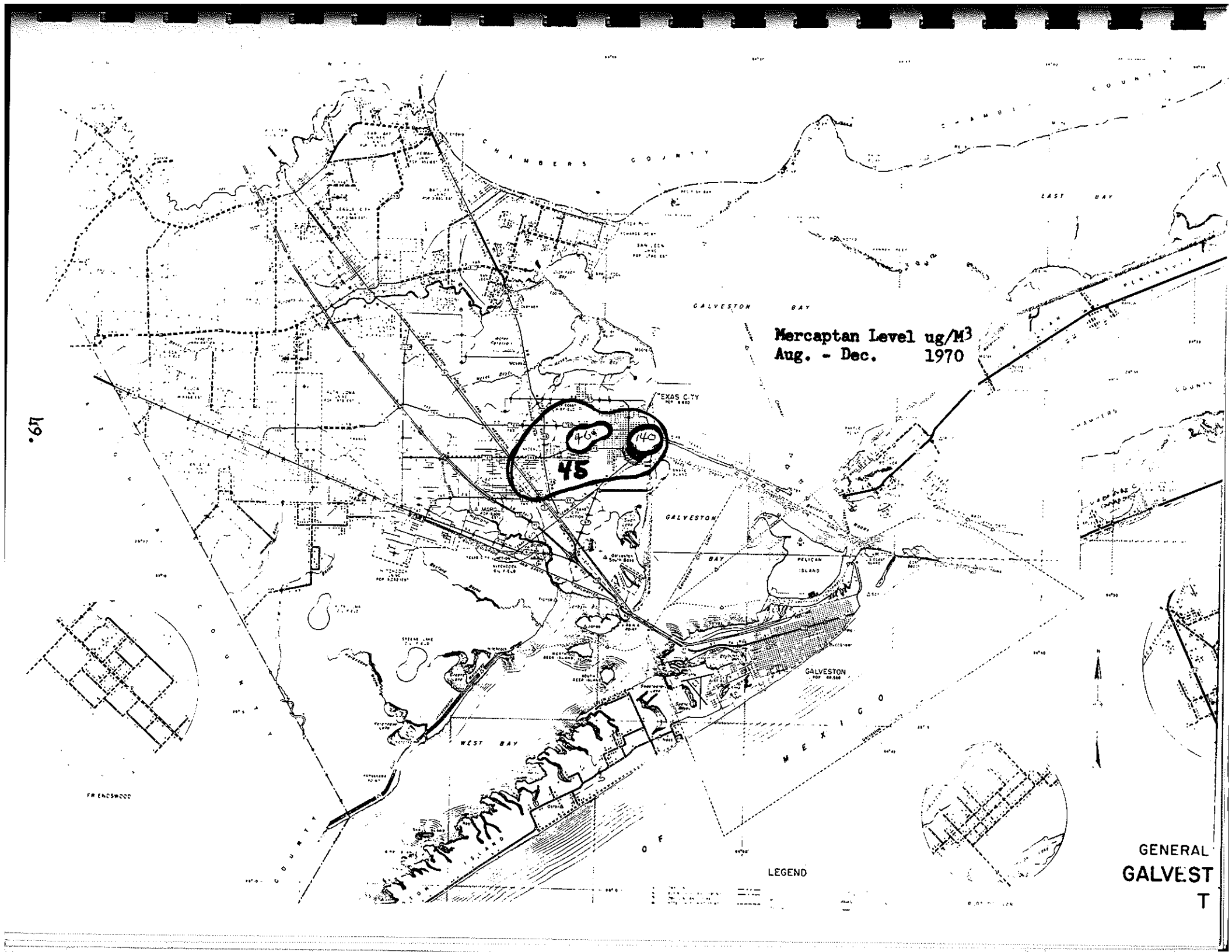

Aldehyde Level ug/M³
Fourth Quarter 1970
10
20
GALVESTON
TEXAS CITY
CHAMBERS COUNTY
EAST BAY
WEST BAY
GALVESTON BAY
GALVESTON
GENERAL

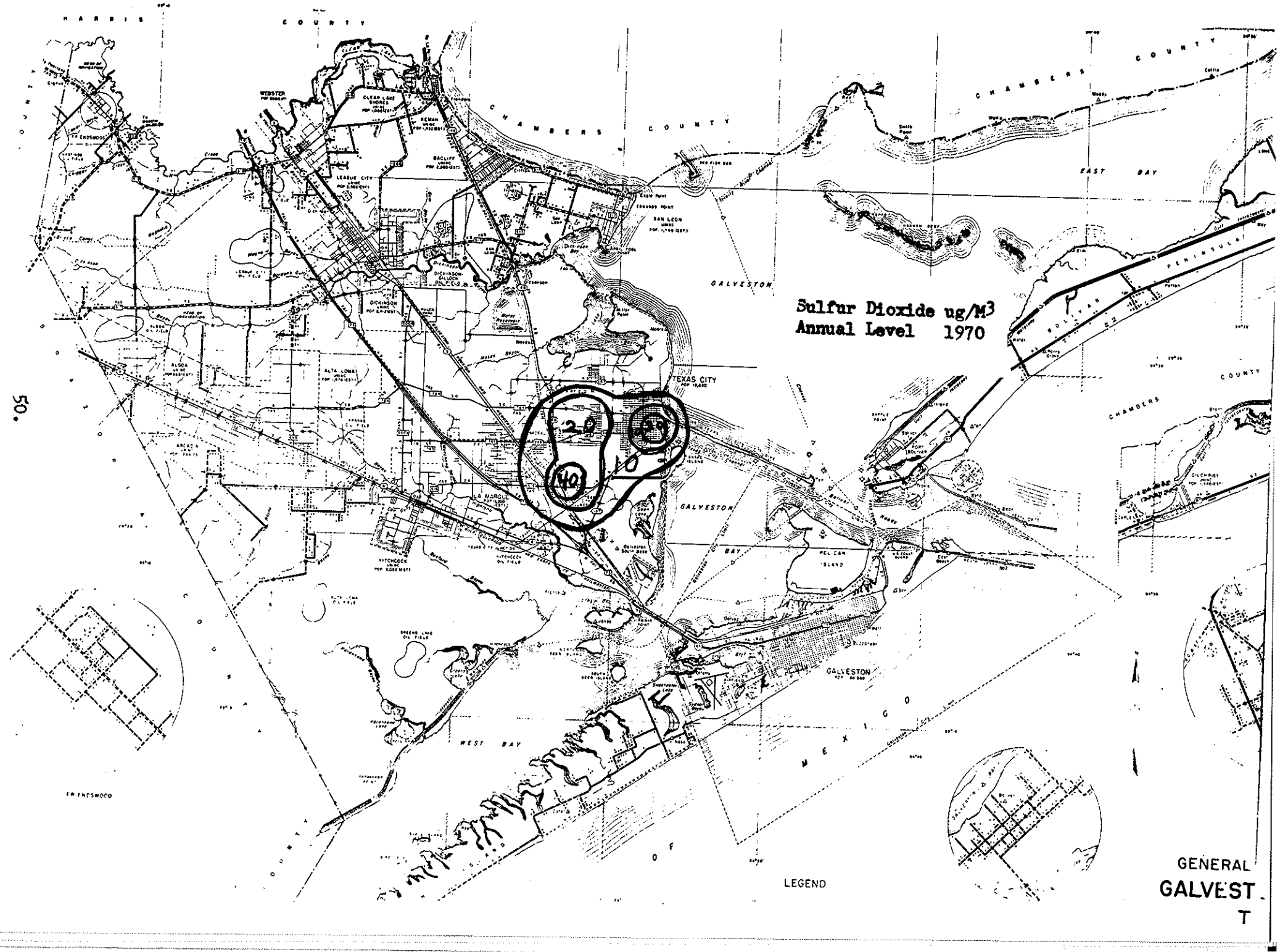
45.

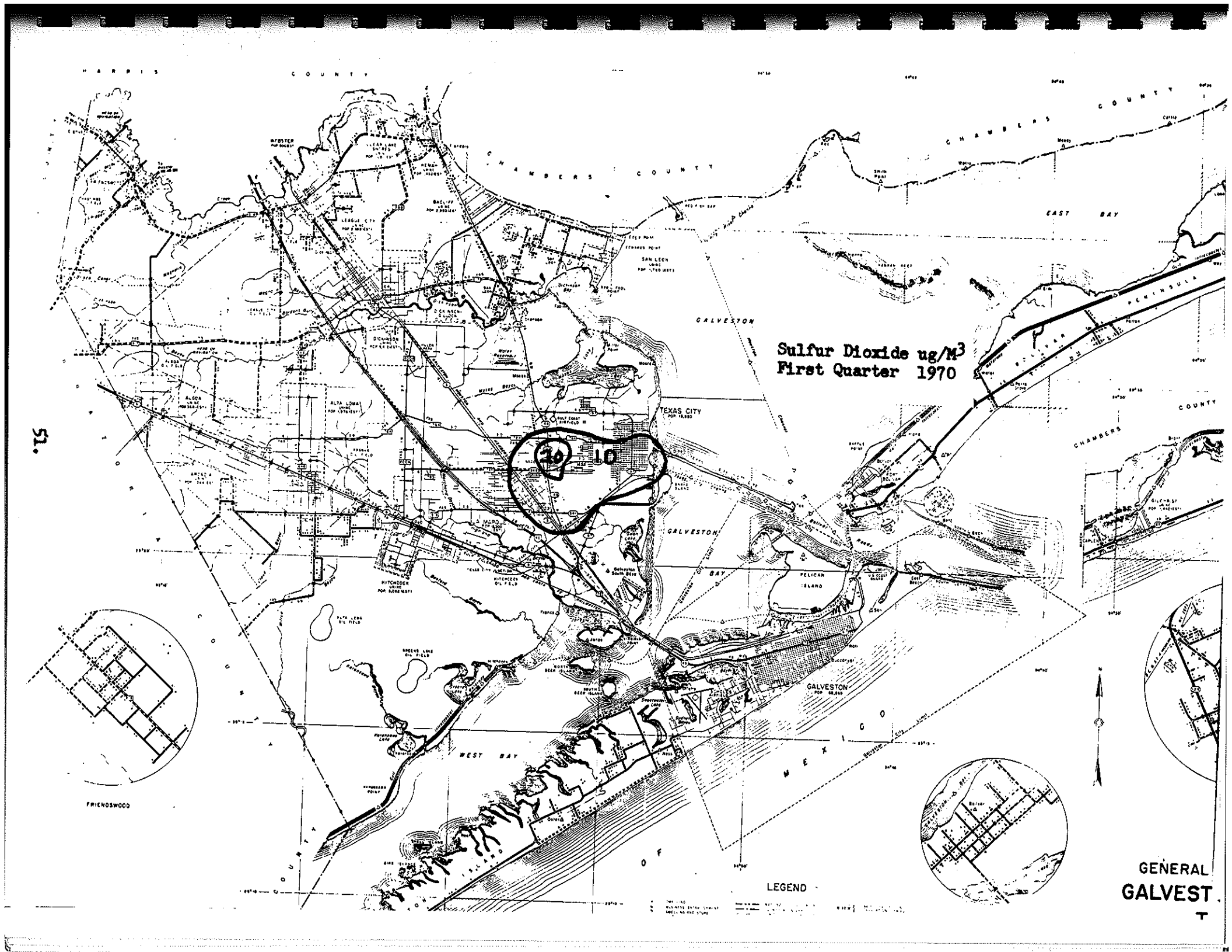

Ammonia Level ug/M3
Nov. & Dec. 1970
100
50
GENERAL

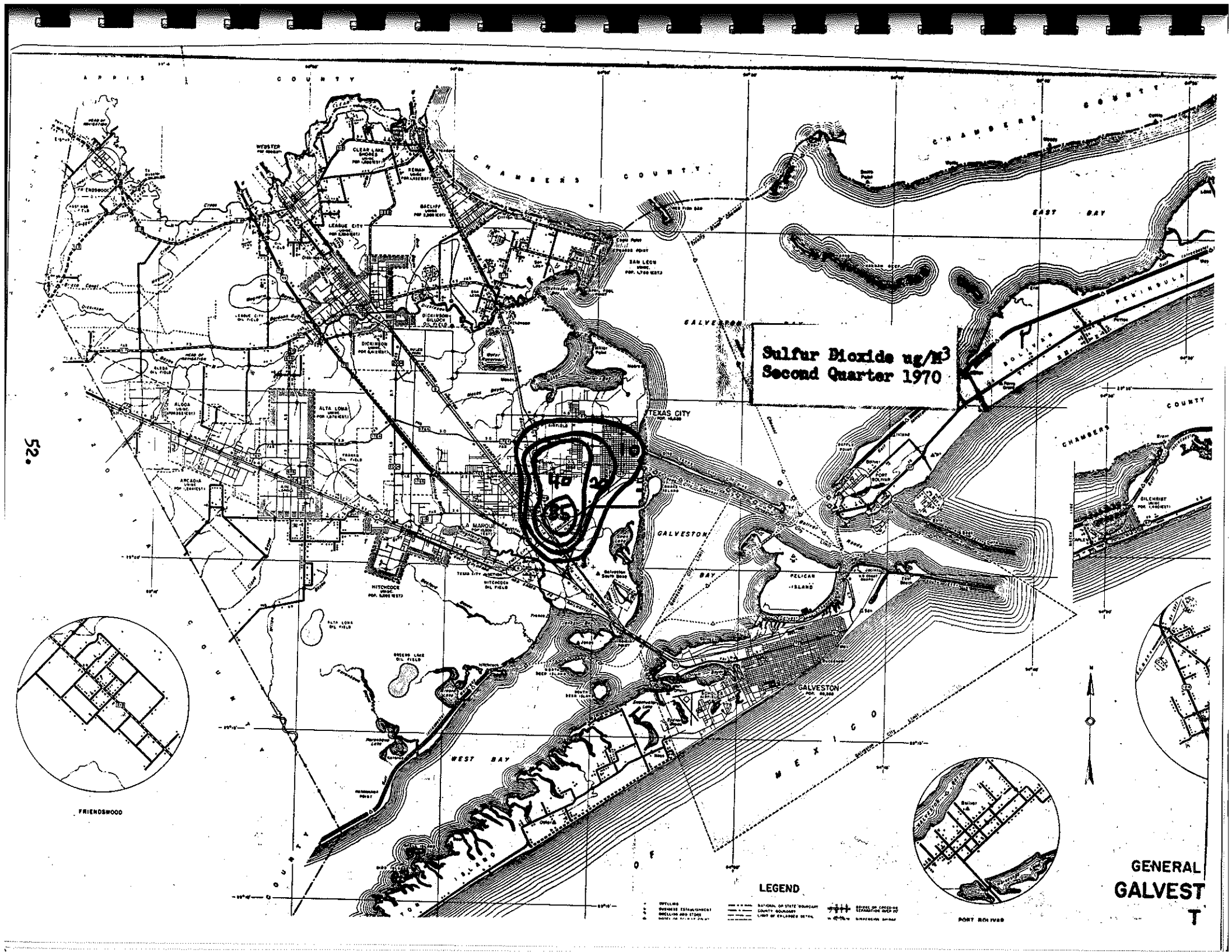

Chloride Level ug/M3
Nov. & Dec. 1970
50
100
80
40
HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON BAY
EAST BAY
WEST BAY
TEXAS CITY
LA MARQUE
GALVESTON
PELICAN ISLAND
FRIENDSWOOD
LEGEND

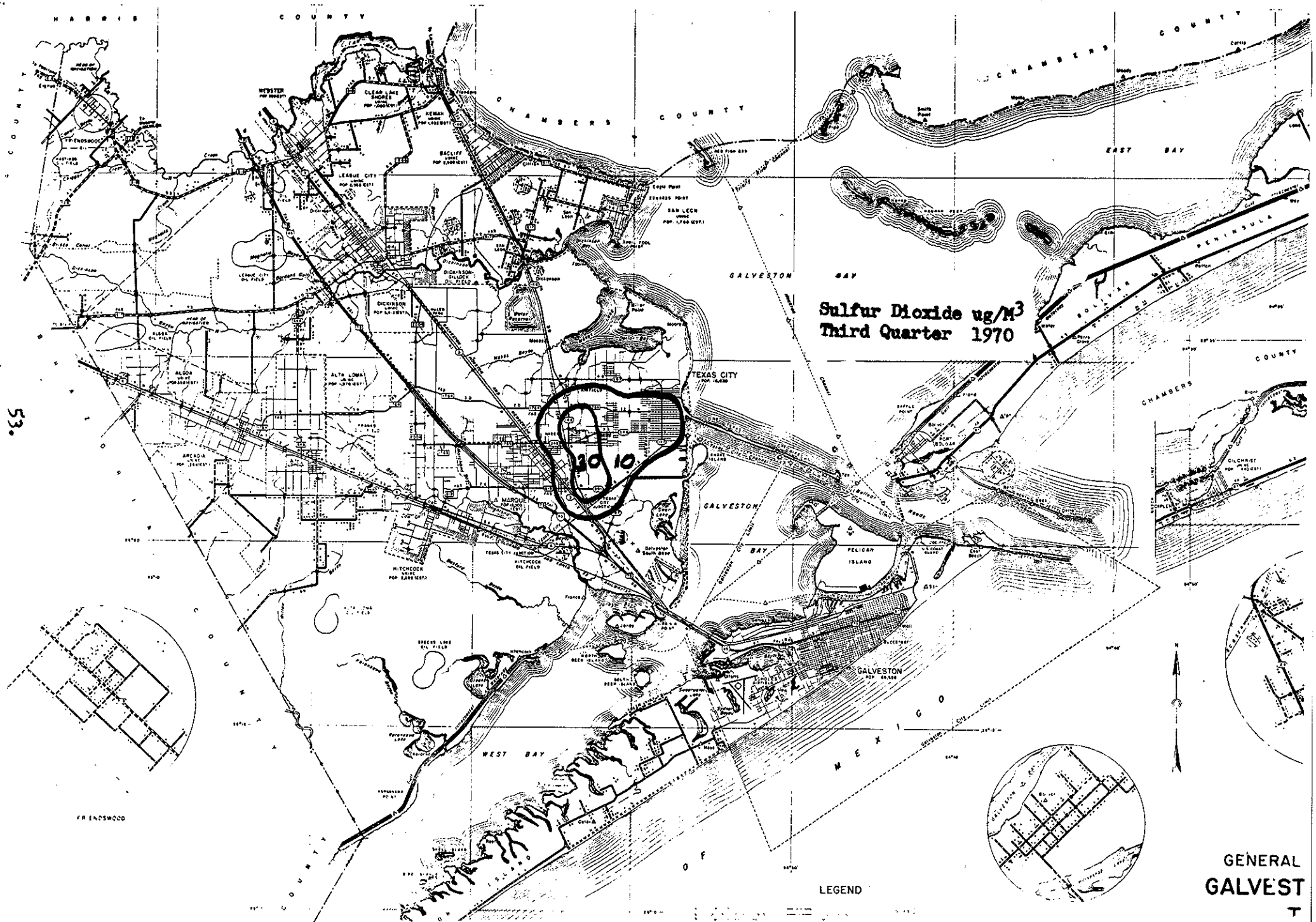

Hydrogen Sulfide ug/M3
Annual Level 1970
HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON COUNTY
GALVESTON BAY
EAST BAY
WEST BAY
GULF OF MEXICO
TEXAS CITY
LEAGUE CITY
GALVESTON
PELICAN ISLAND
BOLIVAR PENINSULA
FRIENDSWOOD
LEGEND
GENERAL
GALVEST
T

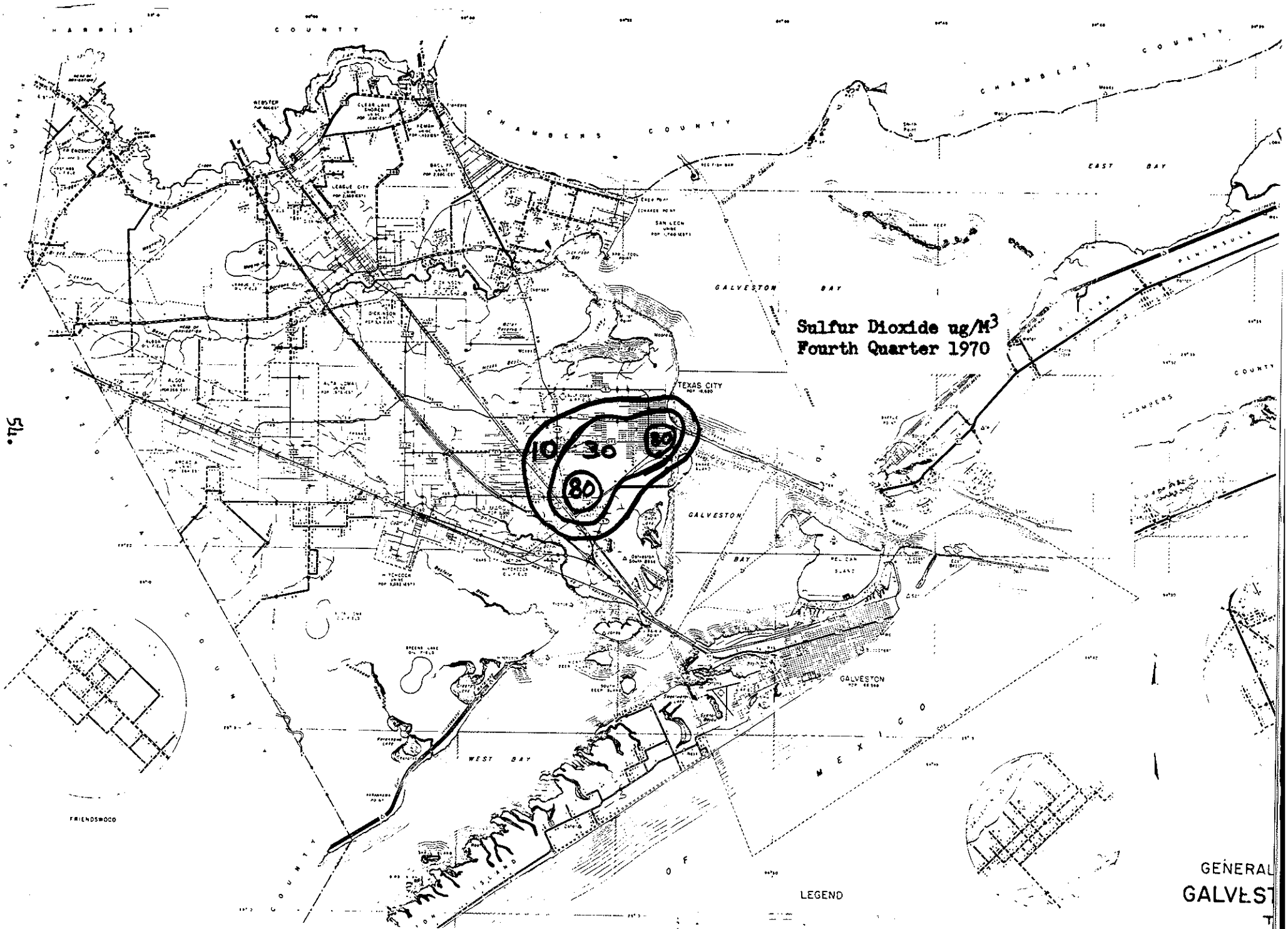

Mercaptan Level ug/M3
Aug. - Dec. 1970
45
64
40
CHAMBERS COUNTY
GALVESTON BAY
EAST BAY
TEXAS CITY
GALVESTON
PELICAN ISLAND
WEST BAY
GALVESTON
MEXICO
FRIENDSWOOD
LEGEND
GENERAL
GALVEST
T

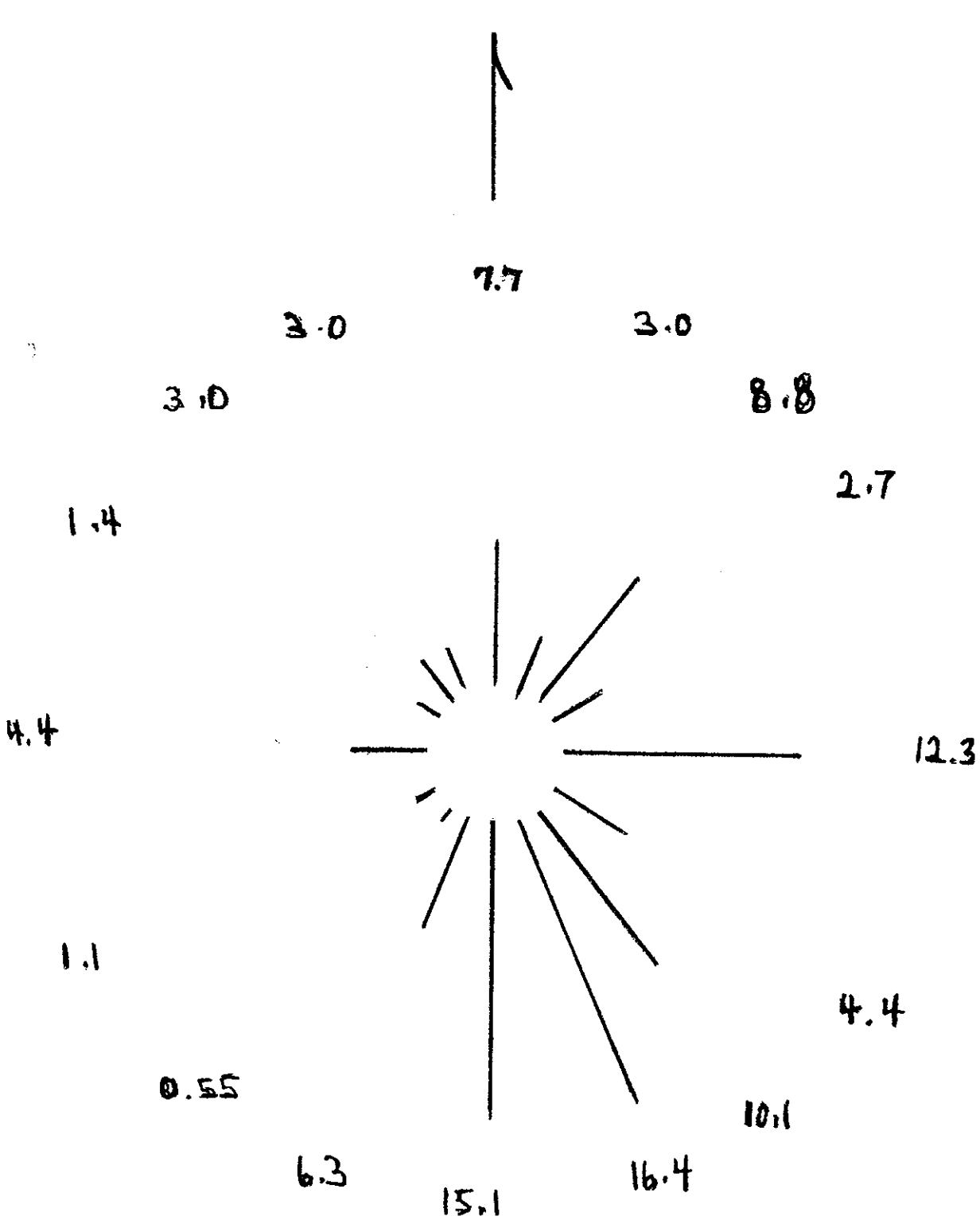

Sulfur Dioxide ug/M3
Annual Level 1970
20
40
10
LEGEND
GENERAL
GALVEST
T


Sulfur Dioxide ug/M3
First Quarter 1970
20
10
HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON
EAST BAY
TEXAS CITY
GALVESTON BAY
PELICAN ISLAND
GALVESTON
WEST BAY
FRIENDSWOOD
LEGEND
GENERAL
GALVEST


Sulfur Dioxide ug/M3
Second Quarter 1970
GALVESTON BAY
WEST BAY
GALVESTON
TEXAS CITY
LEAGUE CITY
FRIENDSWOOD
PORT BOLIVAR
LEGEND
GENERAL
GALVEST
T

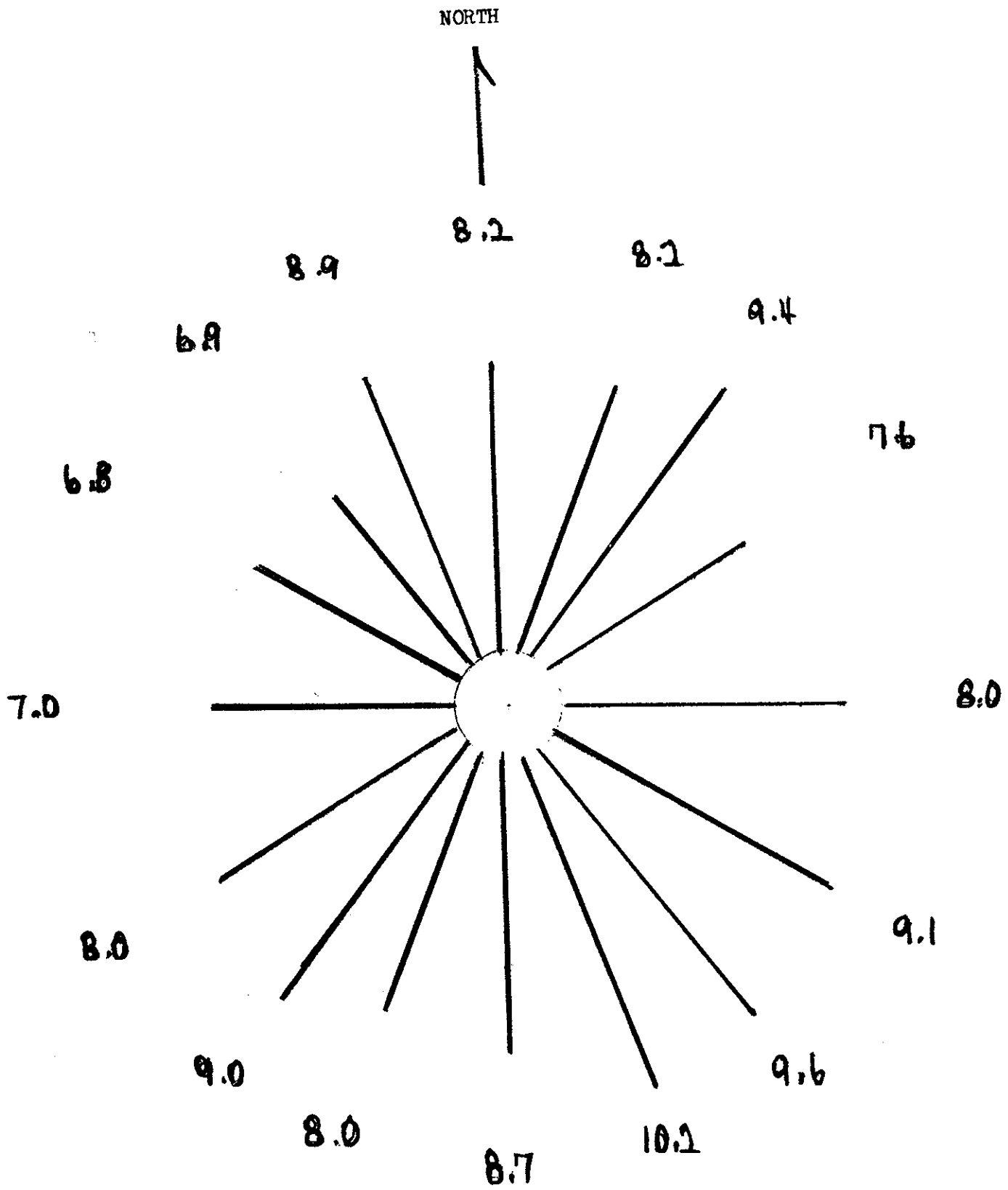

Sulfur Dioxide ug/M3
Third Quarter 1970
10
10
HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON BAY
EAST BAY
BOLIVAR PENINSULA
TEXAS CITY
LA MARQUE
GALVESTON
PELICAN ISLAND
WEST BAY
MEXICO
FRIENDSWOOD
LEGEND
GENERAL
GALVEST


Sulfur Dioxide ug/M3
Fourth Quarter 1970
10
30
80
80
HARRIS COUNTY
CHAMBERS COUNTY
GALVESTON COUNTY
GALVESTON BAY
EAST BAY
WEST BAY
TEXAS CITY
GALVESTON
FRIENDSWOOD
LEGEND
GENERAL
GALVEST



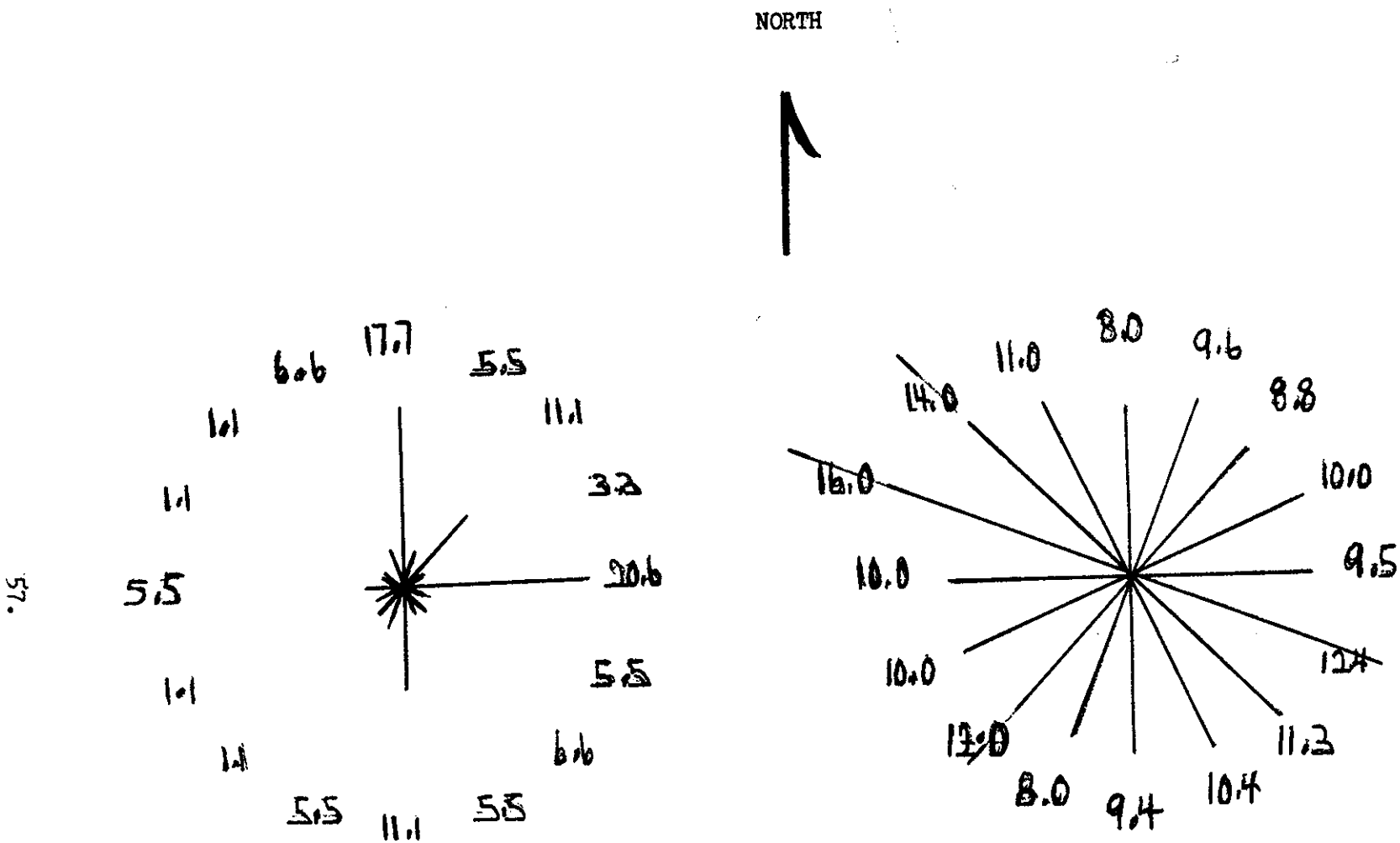

ANNUAL WIND DIRECTION

½ inch = 4%




ANNUAL WIND SPEED

½ inch = 2 mph

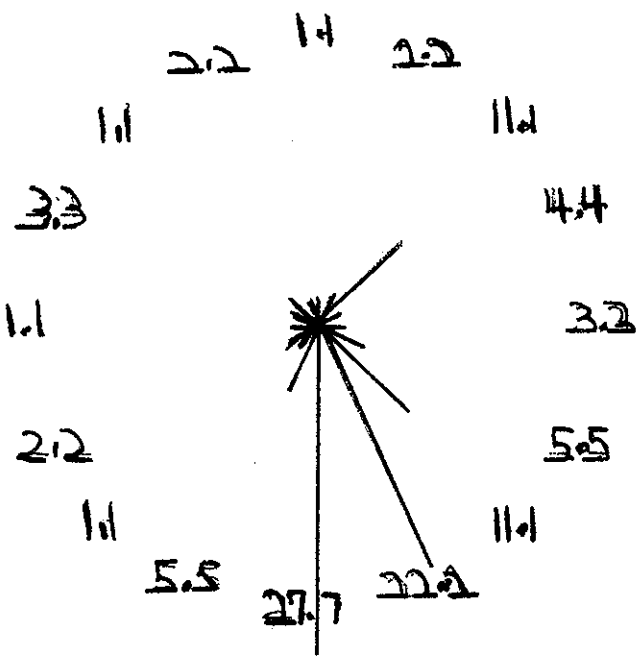



FIRST QUARTER WIND DIRECTION

1/16 inch = 0.1%

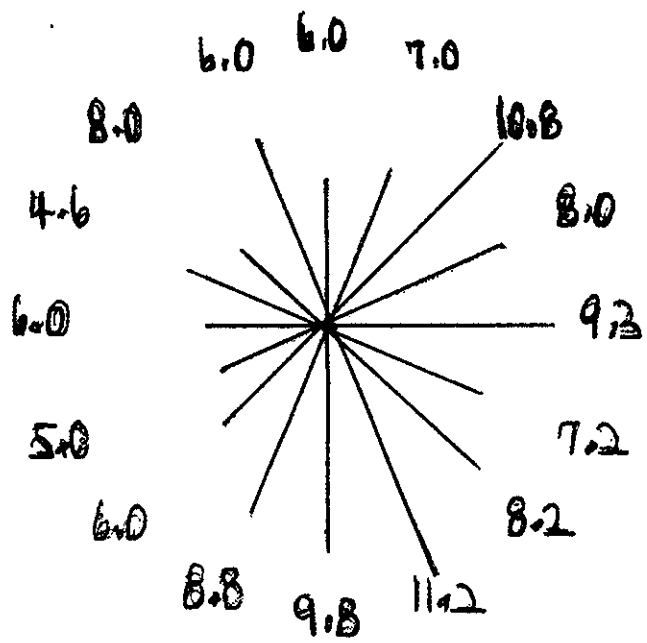
FIRST QUARTER WIND VELOCITY

1/8 inch = 1.0 MPH



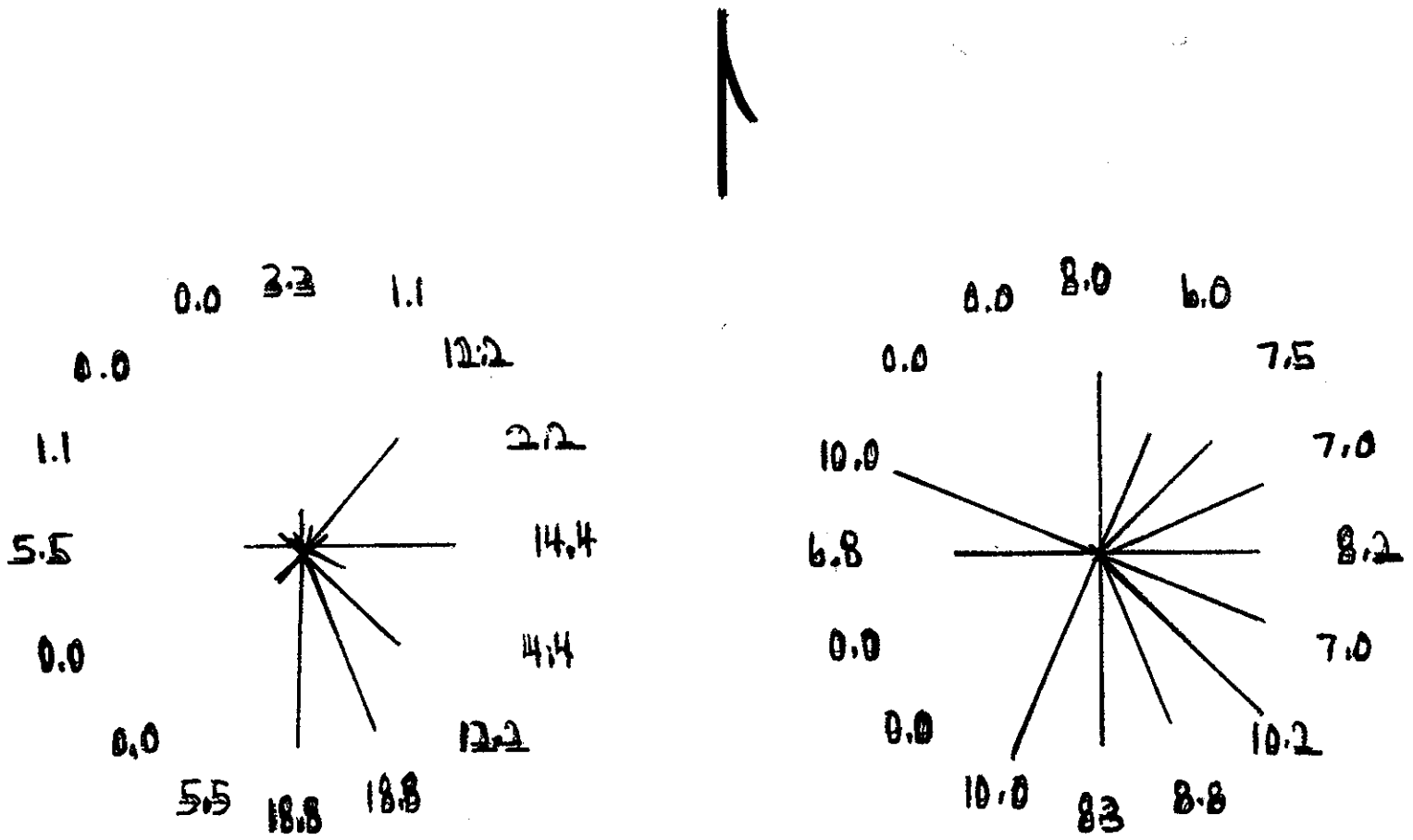

SECOND QUARTER WIND DIRECTION

1/16 inch = 0.1%




SECOND QUARTER WIND VELOCITY

1/8 inch = 1.0 MPH



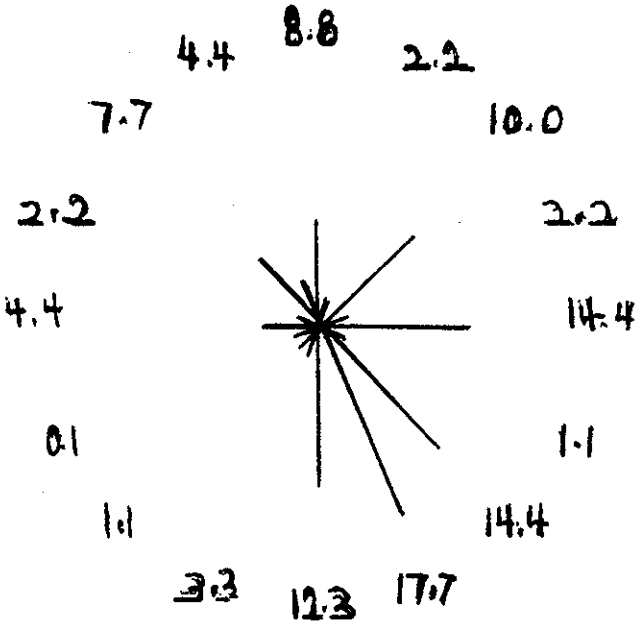

THIRD QUARTER WIND DIRECTION

1/16 inch = 0.1%

THIRD QUARTER WIND VELOCITY

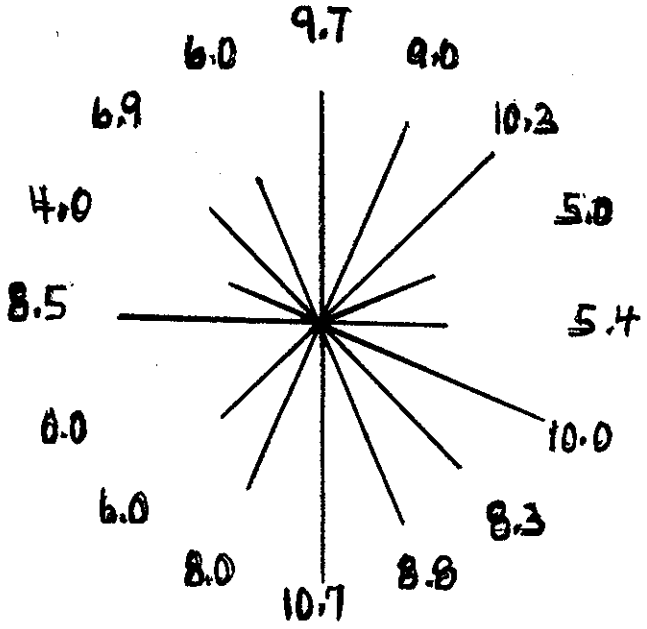
1/8 inch = 1.0 MPH

NORTH




FOURTH QUARTER WIND DIRECTION

1/16 inch = 0.1%




FOURTH QUARTER WIND VELOCITY

1/8 inch = 1.0 MPH

## REFERENCE BIBLIOGRAPHY

This list does not include all the literature available on the subject of air pollution.

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Air Pollution Control Office
Research Triangle Park
Durham, North Carolina 27709

| | |
|---|---|
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| Air Quality Criteria for Particulate Matter | AP-49 |
| Air Quality Criteria for Carbon Monoxide | AP-62 |
| Air Quality Criteria for Photochemical Oxidants | AP-63 |
| Air Quality Criteria for Hydrocarbons | AP-64 |
| Air Quality Criteria for Nitrogen Oxides | AP-84 |
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| Control Technology for Nitrogen Oxide Stationary Sources | AP-67 |
| Control Technology for Carbon Monoxide, Nitrogen Dioxide, & Hydrocarbons from Mobile Sources | AP-66 |
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