

# USE OF WHATMAN-41 FILTERS IN AIR QUALITY SAMPLING NETWORKS (WITH APPLICATIONS TO ELEMENTAL ANALYSIS)

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# USE OF WHATMAN-41 FILTERS IN AIR QUALITY SAMPLING NETWORKS

# (WITH APPLICATIONS TO ELEMENTAL ANALYSIS)

by Harold E. Neustadter, Steven M. Sidik, Robert B. King, J. Stuart Fordyce, and John C. Burr\*

Lewis Research Center

#### SUMMARY

The Air Pollution Control Division (APCD) of Cleveland, Ohio, and the NASA Lewis Research Center jointly operate a 16-site parallel high volume air sampling network. At each site one unit is operated with glass fiber filters to obtain total suspended particulate measurements for APCD, while the other unit is operated with Whatman-41 filters to provide particulate samples suitable for elemental and chemical analyses by Lewis. On the basis of data collected from the parallel network over a 13-month interval and some subsidiary experiments, various aspects of network sampling and filter properties have been studied. It was found that sampler-to-sampler and filter-to-filter variability introduce only small errors. The variability of the total suspended particulate measurements appear to be proportional to their absolute concentrations. The hygroscopic affinity of Whatman-41 filters does not introduce any error provided there is adequate equilibration and use of control blanks. From the paired network observations we find that the total suspended particulate samples collected with glass fiber filters were on the average slightly higher than those collected with Whatman-41 filters. At ten of the fourteen stations there was no statistically significant difference. Of the remaining four stations, there were three where the particulate matter on the glass fiber filters was higher (one much so), while one had the particulate matter on the Whatman-41 filter larger. We conclude that, over the network, there is no statistically significant difference. For environments similar to that of Cleveland, this study demonstrates the validity and practicability of using Whatman-41 filters in routine air quality monitoring programs to obtain samples suitable for elemental and chemical analyses.

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#### INTRODUCTION

In response to a request from the Air Pollution Control Division (APCD) of the City of Cleveland, Ohio, to NASA Lewis Research Center, the latter organization has undertaken a comprehensive investigation of trace elements and compounds in the urban air. The extent of the monitoring program of APCD and the scope of the Lewis effort have been presented elsewhere (refs. 1 and 2). As part of this program, the two agencies operate a 16-site parallel high volume air sampling network. At each site and for each 24-hour sampling period, one unit is operated with glass fiber filters to obtain total suspended particulate (TSP) measurements for APCD. The other unit at each site is operated with Whatman-41 (high purity, analytical, cellulose) filters to provide TSP samples suitable for elemental and chemical analyses by Lewis. This report considers the comparability of TSP data obtained from the two components of this network.

The Federal Environmental Protection Agency (EPA) mandated TSP collection technique for legal monitoring and control purposes requires the use of a high volume air sampler with the collection on 20.3 by 25.4 centimeter sheets (400 sq cm active region) of filter paper with a total air flow rate of 1.18 to 1.53 cubic meters per minute (ref. 3). Thus, high volume sampling is a basic tool in air quality monitoring, even though it is approximate and semi-quantitative (refs. 3 and 4). When operated on a judicious schedule, a high volume air sampler will yield data which can be used to evaluate such things as compliance with established standards, long-term trends, and the efficacy of various control strategies (ref. 5). (The sampling schedule recommended by EPA is a minimum of 61 random samples per year or its equivalent, ref. 6.) In this application, glass fiber filter media produce adequate samples with a minimum of procedural complications and have become the norm (ref. 3). As such, the glass fiber filters have been used by APCD since the inception of their monitoring program in 1967.

Another major application of high volume air sampling is to trap particulates which can then be analyzed for their element and compound content (ref. 6). Without extraction, the glass fiber filters are generally unacceptable for analytical work because of interference from the high concentrations of various elements in the filter itself (e.g., Na, when neutron activation analysis is attempted). Clearly, the inconvenience and, at times, inadequacy of chemical extraction procedures associated with glass fiber filters (refs. 7 and 8) makes a highly pure analytical type desirable for this application.

The major objective of this report is to determine the feasibility of using the Whatman-41 filter media on a routine TSP (high volume air) monitoring network. To this end we will ascertain both the relation between TSP collected on glass fiber filter and TSP collected on Whatman-41 filter measurements and the relative accuracy and precision of such data when accumulated from a sampling network spread out over a geographic region with varying TSP environments.

The first step is to determine the sources and extent of error variability. For example, to determine the differences between measurements due to using different high volume samplers, or the inherent variability of the filters of a given type. It will be shown in the former case that there is a small high volume sampler to high volume sampler variability. In the latter case, the variability within each of the two filter types will be shown to be essentially the same. Analyses were performed first assuming additive errors and then assuming that the errors are multiplicative with the implication that it is preferable to use the logarithms of the TSP values in the analyses.

On the basis of the network data it will be shown that the Whatman-41 filter and glass fiber filter measurements are closely related linearly and that the slope of the best-fitting straight line is very close to 1.0. This indicates that, compared to the other errors and for the Cleveland environment, the Whatman-41 and glass fiber filters are interchangeable.

Finally, it was found that the increase in variability of measurements taken in the network as opposed to measurements taken in close proximity and over a relatively small time interval is moderate.

#### HIGH VOLUME SAMPLING PROCEDURES

The 16-site APCD-Lewis monitoring network is shown in figure 1. At each site there are two high volume samplers spaced 2 to 3 meters apart. The operational procedures for both samplers are essentially equivalent to the EPA mandated procedures (ref. 3) except as now noted. The glass fiber filters used on the APCD samplers were MSA 1106B (Mine Safety Appliance Co., Pittsburgh, Pa.). They were mounted using a sponge rubber faceplate gasket and operated at a flow rate of 1.85 cubic meters per minute (60 ft<sup>3</sup>/min). Upon removal, each filter was folded lengthwise and placed in a manila envelope. The Lewis samplers used Whatman-41 filters mounted in special cassettes as described in reference 9. The airflow was initially set at 1.1 cubic meters per minute (40 ft<sup>3</sup>/min) and dropped to as low as half this rate by the end of the 24-hour sampling period as indicated by continuous flow recording. At these flow rates, the glass fiber filter is better than 99 percent efficient for a 0.3 micrometer aerosol using the dioctyl phthalate (DOP) smoke penetration test (ref. 10).

For larger aerosols ( $\geq 2 \ \mu m$ ), the Whatman-41 filter is also better than 99 percent efficient (ref. 11). There are studies showing that as the aerosol size decreases to submicron size, the Whatman-41 filter collection efficiency is degraded to as low as 70 to 85 percent at the flow rates used in the Lewis samplers (refs. 11 to 14). However, it should be noted that DOP and other similar procedures are severe tests designed to rate absolute filters under laboratory conditions over very limited time intervals. As such,

they are not directly applicable to evaluating a filter collecting a large range of particle sizes in a relatively polluted environment. Of greater significance is the actual 24-hourfield test which compared Whatman-41 filters to very efficient (>99 percent) polystyrene filters (ref. 15). Here, the conclusion was that little or no difference could be seen in collection efficiency. Presumably this is a consequence of the rapid plugging of the Whatman-41 filter air passages by the particles being collected. This phenomenon in one study (ref. 13), for a 0.365-micrometer aerosol collected at a low flow rate of 0.28 cubic meter per minute and a concentration of 500 micrograms per cubic meter, showed collection efficiency rising from an initial value of 75 percent to over 95 percent in less than 30 minutes.

#### **PROCEDURES FOR HANDLING WHATMAN-41 FILTERS**

#### Laboratory Procedures

Since glass fiber filters are essentially unaffected by relative humidities of up to 60 percent and the TSP collected is essentially unaffected by relative humidities of up to 50 percent (ref. 16), the glass fiber filters are equilibrated before weighing at 50 percent or less relative humidity for at least 24 hours and no humidity corrections are made.

Because the Whatman-41 filter has a tendency to sorb water and also because of the analytical work to be performed on samples collected on Whatman-41 filters, proper procedures must be followed or else erroneous TSP measurements will result. Thus, a description and a validation of the laboratory procedures for handling the Whatman-41 filters are in order.

A batch of filters (one for each station and three extra for controls) are removed from one package of Whatman-41 filters. These are all equilibrated at less than 50 percent relative humidity for at least 24 hours and then weighed. All but three of them are placed into cassettes for use in the field. After use in the field, the exposed Whatman-41 filters and the three unexposed Whatman-41 filters are again equilibrated at less than 50 percent relative humidity for more than 24 hours and then reweighed. The average change in weight of the three unexposed filters is algebraically subtracted from the change in weight of each of the exposed filters. The resulting corrected weight changes are herein identified as TSP-W41.

To validate this procedure an experiment was run in a clean room at Lewis. Six Whatman-41 filters were weighed on six different days with the relative humidity varying from 35 to 55 percent and the temperature nearly constant at  $20^{\circ}$  C. Figure 2 shows these weights plotted as a function of relative humidity. The close agreement to a linear weight increase with a uniform vertical shift among filters of different weights is obvious. From this we conclude that the humidity corrections do not vary from filter to filter, and, the use of control blanks is adequate to correct for water sorbtion. Due to the extreme sensitivity of elemental analyses (e.g., neutron activation and X-ray fluorescence), it is essential that the filters not be contaminated by contact with bare hands. Therefore, all handling of the Whatman-41 filters is done with rubber or plastic gloves.

#### Field Handling Procedures

After taring, the numbered Whatman-41 filters are loaded into cassettes which are labeled with a station name. A cover plate, with an attached air flow chart bearing the filter number, is placed on the cassette. Thus, in the field it is the cassette rather than the Whatman-41 filter that is handled. At the designated station the field service man transfers the cover plate and exchanges cassettes and flow charts. The flow rate is set to 1.1 cubic meters per minute  $(40 \text{ ft}^3/\text{min})$  and a timer is activated for the next scheduled 24-hour sampling period. The used cassette with its attached flow chart is returned to the laboratory for analysis.

At the laboratory the cassette is opened and the exposed filter with its TSP-W41 sample is removed, folded longitudinally, and placed in a rack for equilibration. The flow rate is read from the flow chart for each 3-hour interval from startup to shutdown. The air flow rate is determined by averaging these nine readings. The volume of air and the particulate concentration are calculated in the usual manner (ref. 3).

#### FACTORIAL EXPERIMENTS

#### **Experiment Purpose and Description**

If a Whatman-41 filter is a suitable substitute for a glass fiber filter for making TSP measurements, then it must yield approximately the same TSP values and its precision of measurement should be at least as good. Because factorial experiments would permit a comparison of the variability among measurements due to the use of different filter specimens (a measure of precision) within each filter type, two such experiments were performed at Lewis. The results were analyzed by the technique of analysis of variance (ANOVA) which is described in a number of standard texts on experimental design and analysis (refs. 17 and 18).

In the first experiment, five high volume samplers were run simultaneously at one location with glass fiber filters for nine different 24-hour periods. The data from the fifth sampler was discarded from this analysis because of a gasket leak which was de-

tected part way through the experiment. The measurements in micrograms per cubic meter are given in table I. In the second experiment, the same five high volume samplers were operated simultaneously at the same location for four different 24-hour periods using Whatman-41 filters. The resulting TSP measurements in micrograms per cubic meter are presented in table II.

For each of these experiments, the data are tabulated in a two-way table where the column headings are the sampler number and the row headings are the dates of operation. Because of the two-way nature of the data it is possible, using the appropriate statistical model, to separately estimate (1) the variability among measurements due to the use of different samplers, (2) the variability among measurements due to the measurements being taken on different days (i.e., possibly measuring different TSP environments), and (3) the variability among measurements due to all other sources including the use of different filter specimens. The ANOVA technique is dependent on a model equation for the data. Because of the lack of definitive evidence to determine a unique model equation, two plausible forms are presented here.

#### Additive Model

The first model assumes that a value of TSP obtained on day i from sampler j can be written as

$$g_{ij} = \mu_g + d_i + s_j + \epsilon_{ij}$$
$$w_{ij} = \mu_w + d_i + s_j + \delta_{ij}$$

for TSP-GF and TSP-W41, respectively. The term  $\mu$  represents a mean overall TSP level,  $d_i$  a deviation from the overall mean due to day i, and  $s_j$  the deviation from the overall mean due to the observation being taken from sampler j. Thus, it is assumed that each of the sources of variability is completely additive in nature and that there is no interaction between the day effect and sampler effect. For example, if sampler j tends to measure a higher value than average on day i, then it tends to measure the same amount higher than average on day i'.

The  $\epsilon_{ij}$  and  $\delta_{ij}$  represent random errors of observation from all other sources including those due to the random variations among the actual filter specimens. In statistical terminology these might be called the within-filter-type errors for glass fiber and Whatman-41 filters.

#### Multiplicative Model

Since 24-hour averaged TSP sampling is a cumulative procedure, it seems reasonable to assume that errors are also cumulative in nature. Data in favor of multiplicative errors have been noted in two recent studies of high volume sampling reproducibility (refs. 19 and 20).

Because of the preceding considerations, it is reasonable to assume that the random errors  $\epsilon_{ij}$  and  $\delta_{ij}$  may be multiplicative in nature rather than additive. If so, the logarithms of the TSP values are assumed to be normally distributed, in which case it is more appropriate to use the model equations

$$\begin{array}{l} g_{ij}^{*} = \mu_{g} + d_{i} + s_{j} + \epsilon_{ij} \\ w_{ij}^{*} = \mu_{w} + d_{i} + s_{j} + \delta_{ij} \end{array} equivalently \begin{cases} g_{ij} = 10^{\mu} g^{+d_{i} + s_{j} + \epsilon_{ij}} \\ w_{ij} = 10^{\mu} w^{+d_{i} + s_{j} + \delta_{ij}} \end{cases}$$

where

 $g_{ij}^* = \log (g_{ij})$  $w_{ij}^* = \log (w_{ij})$ 

and  $\mu_{g}$ ,  $\mu_{w}$ ,  $d_{i}$ ,  $s_{j}$ ,  $\epsilon_{ij}$ , and  $\delta_{ij}$  are quantities associated with the same sources as they were in the additive model.

#### Analysis

In the previous models it is assumed that

$$\begin{split} \boldsymbol{\epsilon_{ij}} &\sim N\left(0,\sigma_{g}^{2}\right) \\ \boldsymbol{\delta_{ij}} &\sim N\left(0,\sigma_{W}^{2}\right) \\ \boldsymbol{s_{j}} &\sim N\left(0,\sigma_{S}^{2}\right) \end{split}$$

and that all are mutually independent random variables where  $x \sim N(0, \sigma^2)$  denotes that the random variable x follows a normal distribution with mean zero and variance  $\sigma^2$ .

In terms of the notation introduced, we want to do the following. First, we want to estimate the variability attributable to sampler differences  $(\hat{\sigma}_s^2)$  and the within-filter-type variability when using glass fiber filters  $(\hat{\sigma}_g^2)$  and Whatman-41 filters  $(\hat{\sigma}_w^2)$ . (The symbol  $\hat{\phantom{\sigma}}$  indicates an estimate of the quantity.) Next, we want to decide if  $\sigma_s^2$  is significantly larger than either  $\sigma_g^2$  or  $\sigma_w^2$ . This would tell us whether there is evidence of high volume differences or if high volume variability is simply a reflection of error variability. Finally, since  $\sigma_g^2$  and  $\sigma_w^2$  include filter variability, we also want to determine if  $\sigma_w^2 \leq \sigma_g^2$ .

The data of tables I and II were analyzed using ANOVA, and the resulting ANOVA tables are presented in table III. As mentioned previously, the technique of ANOVA permits the total variability of the observations to be partitioned into variability due to different factors. The first column identifies the factor or source of variability. The next three columns give the sums of squares (SSQ), degrees of freedom (df), and the mean squares (MS) for each of these sources. The last column provides in symbols what the expected values of the mean squares are for each source. From table III(a)  $\sigma_W^2$  may be estimated by  $\hat{\sigma}_W^2 = 7.87$ . Also, it may be noted that the ratio of MS(s) over MS( $\hat{o}$ ) can be used to indicate whether MS(s) is significantly larger than the MS( $\hat{o}$ ). Under the previously made assumptions and under the hypothesis that  $\sigma_S^2 = 0$ , this ratio is known to follow an F-distribution with 4 and 12 degrees of freedom. Thus, the computed F = 22.90/7.87 = 2.91 may be compared to the tabulated values (ref. 17) to test if  $\sigma_S^2$  is significantly larger than zero. Similar comments apply to tables III(b) to (d).

Comparing the computed F-ratio for both the glass fiber and Whatman-41 data with tabulated F values (ref. 17) shows that the sampler-to-sampler variability is significantly larger (at significance levels of 0.10 for Whatman-41 and 0.01 for glass fiber) than the error variability. From this it can be concluded that there do exist systematic sampler-to-sampler differences.

The means of the raw TSP values and also the means of the logs of the TSP values for each sampler are listed at the bottoms of the appropriate columns in tables I and II. It is noted that in the glass fiber experiment the order from smallest to largest is exactly opposite to the order in the Whatman-41 experiment. While we know of no reason for this exact reversal, it is possible that it was a chance happening resulting from our operational procedure which set the flow for each sampler at the beginning of each of the experiments and subsequently recorded the flow rates each day without any resetting of flows. If the differences from sampler to sampler are indeed due to flow rate errors, they would presumably be of a multiplicative nature, which lends further credibility to the use of the logarithms of the TSP values.

The error variances  $\sigma_g^2$  and  $\sigma_w^2$  are now considered. It is well known (refs. 17 and 18) that the respective mean square errors (lower right corners of table III) are unbiased estimates of  $\sigma_g^2$  and  $\sigma_w^2$ . Thus, for the data in its original form,

$$\mathbf{F} = \frac{\hat{\sigma}_{\rm w}^2}{\hat{\sigma}_{\rm g}^2} = \frac{7.87}{9.76} = 0.806$$

and for the logarithmically transformed data,

$$\mathbf{F} = \frac{\hat{\sigma}_{w}^{2}}{\hat{\sigma}_{g}^{2}} = \frac{0.000453}{0.000429} = 1.056$$

Neither of these ratios differs significantly from unity. While this does not prove that the two error variances are actually the same, it does lend credence to such an assumption, and we therefore do assume  $\sigma_g^2 = \sigma_w^2$ . As an unbiased estimate of  $\sigma_s^2$  we use

$$\hat{\sigma}_{s}^{2} = \frac{MS(s) - MS(error)}{number of days}$$

Unlike the previous cases  $(\hat{\sigma}_g^2 \text{ and } \hat{\sigma}_w^2)$  the two estimates of  $\sigma_s^2$  cannot be compared by an F-ratio.

If  $\sigma_g^2 = \sigma_w^2$  is assumed and since the estimates from the two experiments are independent, a pooled estimate may be computed as

$$\hat{\sigma}^2 = \frac{\mathrm{SSQ}(\epsilon) + \mathrm{SSQ}(\delta)}{\mathrm{df}(\epsilon) + \mathrm{df}(\delta)}$$

To obtain an estimate of the total variability  $\sigma_t^2$  of a measurement made on a given day on an unspecified sampler we use the following ad hoc equation:

$$\hat{\sigma}_{t}^{2} = \hat{\sigma}^{2} + \frac{\hat{\sigma}_{s}^{2}(GF) + \hat{\sigma}_{s}^{2}(W41)}{2}$$

These respective estimates are all tabulated in table IV for the data in both the original and the log transformed forms.

The interpretation of these estimates is as follows. From the raw TSP values,  $\hat{\sigma}$  = 3.02 is obtained. This is the estimated standard deviation of the errors attributable to within-filter-type differences and hence is an upper bound on filter-to-filter variability. From the assumption of normally distributed errors, it is estimated that approx-

imately 95 percent of these errors are within ±6.04 micrograms per cubic meter. Since the overall TSP values are about 60 micrograms per cubic meter, this corresponds to about a 10 percent error limit. The estimates of  $\hat{\sigma}_s$  are both about 2.0 and imply that about 95 percent of the errors due to high volume variability are within 4.0 micrograms per cubic meter. The estimate  $\hat{\sigma}_t = 3.61$  implies that on any given day about 95 percent of the total error components (includes high volume variability filter, variability, and all other sources) are within ±7.2 micrograms per cubic meter. This is about 12 percent of the mean of the observed TSP values.

The interpretation of the estimates using the log-transformed data is similar. The estimate  $\hat{\sigma} = 0.0209$  implies that 95 percent of the within-filter-type errors, including filter differences, are within ±0.042. This describes the differences in terms of logs. In terms of raw values, this implies that about 95 percent of the errors lead to values within factors of  $10^{-0.042}$  and  $10^{0.042}$ . These values are 0.91 and 1.10. Thus, only about 5 percent of the errors cause values more than 10 percent higher or 9 percent lower than the actual value. Similarly, the values for  $\hat{\sigma}_s$  averaged to 0.0148 and imply 95 percent proportionality factors of 0.93 and 1.07. The estimate  $\hat{\sigma}_t = 0.0256$  implies 95 percent proportionality factors of 0.89 and 1.12.

The percentage limits on variability are seen to be comparable from the analyses using actual TSP values and log-transformed data.

#### Conclusions

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The conclusions drawn from these two experiments are as follows: First, there is a statistically significant variability among the responses from several high volume samplers run at the same location on the same day. The magnitude of this variability is relatively small (95 percent limits of about 7 percent) with a possible contributing factor being variability in the sampler flow rates. Second, the variability among measurements within any particular high volume sample (which is assumed to be mainly attributable to filter differences) is also small (95 percent limits of not more than 10 percent). Third, the error variabilities of the Whatman-41 and glass fiber filter types are found to be almost identical and clearly not statistically significantly different.

#### PARALLEL NETWORK

#### **Experiment Purpose and Description**

The previous section presented an analysis that indicated that both glass fiber and Whatman-41 filters have essentially the same precision of measurement. We next want to determine if the two filter types yield the same TSP measurements and, if not, is there some relation between the two measurements.

At the 16 APCD-Lewis monitoring sites there are two high volume air samplers spaced 2 to 3 meters apart. One sampler operates only with glass fiber filters and collects TSP data for analysis by APCD. The other sampler operates only with Whatman-41 filters and collects TSP data for elemental analysis by Lewis. The Lewis high volume samplers were modified to accept cassette filter holders, which had been designed to minimize handling the Whatman-41 filters. Since this modification was not made to the APCD samplers, an interchange of filter types between the APCD and Lewis samplers was not possible.

The data used in this study are derived from the paired measurements taken at the 16 network sites over a period of 13 months. For a variety of reasons, not related to the filter media, some runs did not yield TSP measurements for both glass fiber and Whatman-41 filters. Only where both a glass fiber and a Whatman-41 value were observed for the same 24-hour period are values recorded in table V. The number of paired values observed varies from 48 at station 13 to 91 at station 3. Preliminary analyses indicated that the data from stations 4, 9, and 13 were suspect. Further investigation confirmed operational irregularities for stations 9 and 13 and these have thus not been included in the analyses. An examination of the data log book showed that the Whatman-41 sampler at station 9 was blown over in a high wind on December 11, 1971. It was then righted and put back into use by the field man without recalibration or other checking. Examination of the raw data shows that prior to this date, the TSP Whatman-41 and TSP glass fiber values are comparable in magnitude. After this date it is seen that the TSP glass fiber values are about twice as large as the TSP Whatman-41 values. Station 13 is the only ground-level high volume sampler site, and it was plagued by intermittent vandalism which rendered the data unreliable. A significant amount of construction took place in the vicinity of station 4. However, we cannot substantiate any conjecture as to what effect this might have had on the high volume sampling.

As with the ANOVA analysis, we proceed with two models assuming in one that the errors of observation are additive and in the other that the errors are multiplicative. Again, both models lead to essentially the same conclusions.

# Additive Model

For this model where the errors are assumed to be additive, we estimate a bestfitting straight line to the data of the form

$$G = \alpha + \beta W \tag{1}$$

where G is the mean TSP glass fiber value and W the mean TSP Whatman-41 value on a given day. Since we assume that when there is a zero TSP level both G and W must be zero, we also estimate a best-fitting straight line where  $\alpha$  is constrained to be zero. Both estimating lines were computed because there are very few observed TSP levels below 40 and none close to zero and we wished to allow for any relation between G and W which might be approximated throughout the range of observations by a linear relation. It will be seen, however, that in almost all cases the two estimating lines are quite close together.

The first calculational procedure used was plotting TSP Whatman-41 values against TSP glass fiber values. We feel that the plotting and line fitting should be done separately for each station. First, there are sampler-to-sampler biases as was established in a previous section. Second, there exists the possibility that the local climatology, particle size distributions, and so forth, will vary from station to station and that these variables may affect the TSP collection process. Therefore, plots of TSP glass fiber against TSP Whatman-41 at each of the 16 reporting stations are presented in figure 3. These plots also include the two best-fitting straight lines.

The appropriate statistical method to derive the best-fitting straight lines is well described in the literature (refs. 18 and 21). This approach differs from that used in earlier studies (refs. 20 and 22) of network monitoring results. The differences between these methods are considered further in the DISCUSSION section.

The details of the development of the statistical model used in this analysis are as follows for any single specified sampling station:

actual mean ambient TSP level over 24-hour sampling period i

 $P_i$   $G_i = p_g(P_i + S_g)$ 

population mean amount of TSP which would be collected on glass fiber filters in sampling period i using glass fiber sampler with bias  $S_{\sigma}$ ;  $p_{\sigma}$ , collection efficiency

 $W_i = p_w(P_i + S_w)$  population mean amount of TSP which would be collected on Whatman-41 filters in sampling period i using Whatman-41 sampler with bias  $S_w$ ;  $p_w$ , collection efficiency

Thus, on ideal unbiased samplers,

$$G_i = p_g P_i$$

$$W_i = P_w P_i$$

It is assumed that the actual measured amounts of TSP collected on glass fiber and Whatman-41 filters, respectively, are given by

$$\begin{cases} g_{i} = G_{i} + \epsilon_{i} \\ \\ w_{i} = W_{i} + \delta_{i} \end{cases}$$

$$(2)$$

where  $\epsilon_i$  and  $\delta_i$  are the random errors of observations. (All symbols are defined in appendix A.) It is assumed that  $\epsilon_i$  and  $\delta_i$  are all independently distributed as  $N(0, \sigma^2)$ . (We assume the same variance for both errors because of the results obtained from the factorial experiments discussed previously.)

From the relation

$$W_i = p_w(P_i + S_w)$$

we get

$$P_i = \frac{W_i}{P_w} - S_w$$

and, hence,

$$G_{i} = p_{g}(P_{i} + S_{g})$$

$$= p_{g}\left(\frac{W_{i}}{p_{w}} - S_{w} + S_{g}\right)$$

$$= \frac{p_{g}}{p_{w}}W_{i} + p_{g}(S_{g} - S_{w})$$

$$= \beta W_{i} + \alpha$$
(3)

We assume the collection efficiencies are unaffected by particle size. This is probably not quite true, but we feel it should not seriously affect the conclusions. In this form it can be seen that the slope of the best-fitting straight line of equation (3) is an estimate of  $p_g/p_w$ , which is the relative collection efficiency of glass fiber as compared to Whatman-41. The quantity  $\alpha$  is a measure of the combined effects of sampler bias and any constant differences between filter types. Since we might assume that when  $P_i = 0$ both  $W_i$  and  $G_i$  equal zero, a best-fitting straight line subject to the constraint  $\alpha = 0$  is also estimated. That is, the estimating line is required to pass through the origin. The model with  $\alpha$  arbitrary is referred to as model I and the model with  $\alpha = 0$  is referred to as model II.

For model I, Kendall and Stuart (ref. 21, chap. 29) describe estimators for  $\alpha$ ,  $\beta$ , and  $\sigma^2$ . These are also given in appendix B. For this model it is also possible to test if the obtained estimate  $\hat{\beta}$  of  $\beta$  is significantly different than some prescribed value. In this problem we hoped that  $\beta = 1$  and are interested in whether or not  $\hat{\beta}$  is much different from 1. The test of  $\beta$  depends on a statistic which follows a student's t-distribution with (n - 2) degrees of freedom. The formula for computing the t-value is also presented in appendix B.

For model II, the estimators for  $\beta$  and  $\sigma^2$  are also described in appendix B. For this model, however, there are no known methods for making significance tests about  $\beta$ .

Figure 3 presents plots of the actual data points and the two best-fitting straight lines for each station. Except for stations 4 and 13, the two lines are almost indistinguishable. The estimated coefficients for each model are given at the bottom of each section of table V. Because the two lines are so close together in most cases, the remaining discussion is restricted to model I since it provides the capability of testing  $\hat{\beta}$ . In table VI the estimates  $\hat{\alpha}$  and  $\hat{\beta}$  and the t-statistic for each station are summarized.

Several facts may be noted from table VI. First, except for stations 4, 9, and 13, all the  $\hat{\beta}$  values are quite close to 1.0 with six of the estimates above 1.0 and seven below. Reasons for rejecting data from stations 9 and 13 were presented previously. Station 4 calls attention to itself because its  $\hat{\beta}$  of 0.534 is so far removed from the other values. There was, however, no independent indication of equipment or procedural malfunction, nor does examination of the original data indicate any suspicious pattern. (During the sampling period some heavy construction took place in the near neighborhood. This is mentioned although it would be unsupported speculation to assume that this might have disturbed the measurements.)

If the previously mentioned three stations are excluded, it is found that the average  $\hat{\alpha}$  value is 5.21 and the average  $\hat{\beta}$  value is 1.023. Of the thirteen stations, four of the  $\beta$  values are significantly different from 1.0 at the 5 percent significance level as indicated by the t-statistics. Three of these are significantly greater than 1.0 while the other is significantly smaller than 1.0. We conclude from these results that the parameter values  $\alpha = 0.0$  and  $\beta = 1.0$  are an adequate overall representation.

#### Multiplicative Model

In this model we also make the simplifying assumption that the respective efficiencies are unaffected by particle size, etc.. This assumption should not seriously affect the conclusions. At any single station let  $P_i$  denote the actual mean of the logarithm of the ambient TSP level on day i. Let  $G_i$  and  $W_i$  denote the population mean amounts of TSP which would be collected on glass fiber and Whatman-41 filters, respectively, on day i where  $s_g$  and  $s_w$  are the logarithms of the sampler biases. The efficiency factors are  $p_g$  and  $p_w$ , respectively. It is assumed

$$W_{i} = \exp_{10} \left[ p_{w}(P_{i}) + s_{w} \right]$$
$$G_{i} = \exp_{10} \left[ p_{g}(P_{i}) + s_{g} \right]$$

Let  $\mathbf{w}_i$  and  $\mathbf{g}_i$  denote the actual sampled Whatman-41 and glass fiber values, respectively, on day i. It is assumed

$$w_i = W_i \ 10^{\delta_i} \tag{4a}$$

$$\mathbf{g}_{\mathbf{i}} = \mathbf{G}_{\mathbf{i}} \mathbf{10}^{\epsilon_{\mathbf{i}}}$$
 (4b)

where  $\epsilon_i$  and  $\delta_i$  are random errors of observation. It is also assumed that  $\epsilon_i \sim N(0,\sigma^2)$  and  $\delta_i \sim N(0,\sigma^2)$  with all the  $\epsilon_i$  and  $\delta_i$  mutually independent. Thus,

$$\mathbf{w}_{i}^{*} = \log \mathbf{w}_{i} = \mathbf{p}_{w} \mathbf{P}_{i} + \mathbf{s}_{w} + \boldsymbol{\delta}_{i}$$
(5a)

$$\mathbf{g}_{i}^{*} = \log \mathbf{g}_{i} = \mathbf{p}_{g} \mathbf{P}_{i} + \mathbf{s}_{g} = \epsilon_{i}$$
 (5b)

Let

$$m_{i} = \log\left(\frac{g_{i}}{w_{i}}\right) = \log g_{i} - \log w_{i}$$
$$= (p_{g} - p_{w})P_{i} + (s_{g} - s_{w}) + (\epsilon_{i} - \delta_{i})$$
(6)

and if there are n pairs of observations, let

$$\overline{m} = \sum \frac{m_i}{n}$$

In terms of this notation, a test of equality of filter efficiencies is a test of equality of  $p_g$  and  $p_w$ . Under the assumptions the expected value of  $\overline{m}$  at a particular station, using the given two samplers, is

$$\mathbf{E}(\mathbf{\overline{m}}) = \mathbf{s}_{\mathbf{g}} - \mathbf{s}_{\mathbf{w}} + (\mathbf{p}_{\mathbf{g}} - \mathbf{p}_{\mathbf{w}})\mathbf{E}(\mathbf{P}_{\mathbf{i}})$$
(7)

where  $E(P_i)$  is the expected pollution level over all days at that station. Thus, when  $p_g = p_w$  this reduces to

$$\mathbf{E}(\mathbf{\overline{m}}) = \mathbf{s}_{g} - \mathbf{s}_{w}$$

The variance of  $\overline{m}$  at this station is

$$\mathbf{V}(\overline{\mathbf{m}}) = \frac{1}{n} \left[ \mathbf{V}(\epsilon) + \mathbf{V}(\delta) \right]$$
$$= \frac{2\sigma^2}{\sigma^2}$$

since  $s_{g}$  and  $s_{w}$  are constant at any specified station.

From the j<sup>th</sup> station it is impossible to determine if  $p_g = p_w$  since the mean difference involves the difference between samplers (eq. (7)). When comparing several stations, however, we can determine if  $p_g - p_w = 0$ . If we assume, as in the factorial experiments, that  $s_{gj}$  and  $s_{wj}$  are independently  $\sim N(0, \sigma_s^2)$ , then we see that taking expectations of  $\overline{m}_j$  over all the possible samplers that could have been used at that station yields

$$E(\overline{m}_{j}) = (p_{g} - p_{w})E(P_{i})_{j}$$

$$V(\overline{m}_{j}) = 2\sigma_{s}^{2} + \frac{2\sigma^{2}}{n_{j}}$$
(8)

and  $\overline{m}_{j}$  is normally distributed. Averaging across stations thus averages the  $s_{g} - s_{w}$  quantity, and the expectation of this average difference is zero. Since not all the stations have the same expected value or the same number of paired observations, the  $\overline{m}_{j}$ 's for each station are not identically distributed. However, the values of  $n_{j}$  obtained range from 48 to 91 and  $2\sigma^{2}/n_{j}$  should be small compared to  $2\sigma_{s}^{2}$ . (See the

estimates for  $\sigma$  and  $\sigma_s$  from the factorial experiments.) Thus, it may be assumed that the  $\overline{m}_j$ 's are approximately normally distributed with the same standard deviation. If the hypothesis  $p_g = p_w$  is true, then the means are zero; if the hypothesis is not true, then the means are not zero (eq. (8)).

Included in tables V to XX are the log  $(g_i)$ , log  $(w_i)$ , log  $(g_i)$  - log  $(w_i)$ , and  $\overline{m}_j$  values for each station. Table VII summarizes the  $\overline{m}_j$  values. The sample cumulative distribution of the 14  $\overline{m}_j$  values (i.e., excluding stations 9 and 13) is presented in table VII and plotted on normal probability paper in figure 4. The probability plot indicates that the  $\overline{m}_j$  values are close enough to a straight line to support saying that they are identically and independently normally distributed. In this case, an approximate t-test is used to determine if the mean of the  $\overline{m}_j$  (denoted  $\overline{m}$ ) is significantly different than zero.

From these 14 stations,

$$\overline{\overline{m}} = \frac{\sum \overline{m}_j}{14} = 0.0204$$

and the sample standard deviation of the  $\overline{m}$ 's is

$$s_{m} = \sqrt{\frac{\sum (\overline{m}_{j} - \overline{\overline{m}})^{2}}{13}} = 0.0511$$

Under the previously stated assumptions the quantity  $s_m^2$  estimates  $V(\overline{m}_j) \approx 2\sigma_s^2$ , and hence  $s_m/\sqrt{2} = 0.036$  is an estimate of  $\sigma_s$ . This compares moderately well with the values of 0.0143 and 0.0153 derived from the factorial experiments. The 0.036 value yields a 95 percent error band of  $\pm 0.072$  in terms of the logs. In terms of the actual TSP values, the error of  $10^{\pm 0.072}$  corresponds to proportionality factors of 0.85 and 1.18. That is, the error band due to sampler variability is about 18 percent high to 15 percent low. This compares with 95 percent error limits of about  $\pm 7$  percent from the factorial experiments.

A 98 percent confidence interval on  $\overline{\overline{m}}$  is given by

$$\overline{\overline{m}} \pm t_{13, 0.99} \frac{s_m}{\sqrt{14}} = -0.0159, 0.0567$$

The mean value  $\overline{m} = 0.0204$  corresponds to a proportionality factor of  $10^{0.0204} = 1.0481$ . That is, data have been observed where the TSP glass fiber values average about 4.81 percent higher than the TSP Whatman-41 values. The confidence limits on  $\overline{m}$  give proportionality factors of 0.9641 and 1.139.

The t-statistic for testing the significance of the difference of  $\overline{\overline{m}}\,$  from zero (i.e., two-sided test) is

$$t = \frac{\overline{m}}{\frac{S_m}{\sqrt{14}}} = 1.50$$

and it is nonsignificant at the 10 percent significance level. Therefore, we conclude that  $p_g = p_w$ , which is to say that the difference between Whatman-41 efficiency and glass fiber efficiency is not statistically significant.

#### **Distribution of Errors**

As an aid to determining the distribution of the errors, the sample cumulative distributions of  $(g_i - w_i)$  as well as those of  $(\log (g_i) - \log (w_i))$  were plotted on a normal probability scale. It was seen by visual examination that the central portion of each plot was generally close to a straight line. It appeared that either the additive or the multiplicative model would be adequate. The full set of these 32 distributional plots is available on microfiche on request from the authors.

#### Conclusion

The previous analyses of the parallel network data show that after more than a full year of operation the evidence is inadequate to support a general claim that Whatman-41 filters are either more or less efficient than glass fiber filters. At any given station there may be a statistically significant difference between the average measurements of the Whatman-41 and glass fiber filters. Although this difference slightly favors higher glass fiber measurements, this difference is just about as likely to have the glass fiber filters yield higher TSP values than the Whatman-41 filters as to have the Whatman-41 filters yield higher TSP values than the glass fiber filters. It is quite likely that such local effects as micrometeorology, particle size distributions, relative placement of the samplers on roof tops, biases due to calibration errors, or other sampler biases may be of importance in explaining the observed differences between Whatman-41 and glass fiber filter types.

#### DISCUSSION

In this section, we first consider in more detail the relation of the work reported herein with pertinent aspects of three studies referenced earlier concerning the reproducibility of high volume sampling. We then consider the implications of these findings for routine ambient air monitoring.

#### **Factorial Experiments**

There have been two recently reported studies comparable to the factorial experiments reported herein. Both of these concerned glass fiber data only. One involved 4 adjacent high volume air samplers operated on 20 sampling days (ref. 20) and the other involved 12 adjacent high volume air samplers operated on 4 sampling days (ref. 19). In general, there is good overall qualitative agreement with our results despite some quantitative differences. The major quantitative difference indicates that there is slightly more variability in glass fiber data reported herein than in either of the other experiments. For instance, what we call within filter type variability with a standard deviation of 5 percent corresponds to the single analyst variation with a 3 percent standard deviation reported by McKee et al. Similarly, Clements et al. report that 50 percent of their paired values differ from the "true" value (i.e., mean of the pair) by less than  $\pm 2.5$  and 90 percent by less than  $\pm 6.5$  percent. The application of their analytic techniques to the data reported herein gives  $\pm 3.0$  and  $\pm 7.5$  percent, respectively.

Despite these differences the work reported herein confirms the earlier findings that the measured TSP values are adequately reproducible. Like Clements et al., we believe that air flow calibration may be a major component of error and that the error term should be expected to enter multiplicatively rather than additively.

As noted previously, both the other studies were restricted to glass fiber filters, whereas the factorial experiment reported herein was performed twice - once with glass fiber filters and once with Whatman-41 filters and obtained similar results in each instance.

There are two recent network studies involving paired high volume samplers. Again, both reports are concerned with glass fiber filters only. One report on 25 sites operated for 10 sampling days (239 paired samples) (ref. 20) and the other reports on 4 sites operated daily over a 5-month period (430 paired samples) (ref. 22). In both of these studies the reported results are for all the data considered as a single set and effectively analyzed under the assumption  $\alpha = 0$ ,  $\beta = 1$  (this is implicit in measuring all deviations relative to the mean of each pair). From the viewpoint of the network operator these are obviously the most desirable values of  $\alpha$  and  $\beta$ . The referenced studies indicate that this model quite adequately represents the data; that is, high volume sampling with a glass fiber media is reproducible.

In the network study reported herein, advantage was taken of the large number of paired results to evaluate the features of the data set for each site separately. For the comparison of glass fiber filters with Whatman-41 filters, a best-fitting line was determined by calculating  $\alpha$  and  $\beta$  for each site.

Just as in our factorial experiments, our network experiments show greater variability in comparison with other network studies. Typical of the difference is the following. When measured from the  $\alpha = 0$ ,  $\beta = 1$  line, Lee et al. found 95 percent of the sample pairs within ±10 percent and Clements et al. found 95 percent within ±16 percent (their fig. 3). Our analysis relative to the differences of the pairs of logarithms of the values gives 95 percent within ±18 to -15 percent (the asymmetry arises from the assumption of log normality). The distribution of best-fitting lines for relating glass fiber and Whatman-41 filters has an average slope,  $\beta = 1.023$ , and an ordinate intercept of  $\alpha = 5.2$  where the overall mean of all the data at the 13 stations considered is 131.0. It is concluded that even though there are station-by-station differences the results presented in the previous section indicate that  $\alpha = 0$ ,  $\beta = 1$  is an adequate overall representation.

Since both factorial experiments showed similarly greater variability than reported by other experimenters, it is not felt that our higher network variability can be attributed to the introduction of a second filtering media. One explanation for which supporting evidence is lacking at present would be to ascribe this variability to the heterogenity of the dispersion of suspended particulates from station to station in the Cleveland area.

In the network study these conclusions not only imply reproducibility of high volume sampling but also carry the further implication that Whatman-41 filters may be used in place of glass fiber filters for high volume monitoring in environments similar to that found in Cleveland.

#### Sampling Objectives

In the introductory remarks we noted two primary motivations for high volume sampling. One is to obtain samples of suspended particulate matter for elemental, chemical, and/or physical analyses. The other is to establish gross TSP concentrations on a weight basis as part of a legal program to identify and abate particulate pollution. For the former, the advantages of using a high purity filter media are evident. The major contribution of this study to such a program would be to give added credibility to absolute measurements taken on the Whatman-41 filter where in the past some researches have felt that only relative measurements were reliable (ref. 23). For the latter, however, despite some known exceptions, there has been a general hesitancy to monitor routinely with Whatman-41 filters presumably as a consequence of the explicit preference given to glass fiber filters by EPA (ref. 3). In this regard some observations will follow.

The Federal requirement for TSP high volume monitoring can be satisfied by taking 61 random samplings per year. From this sample set one has to determine compliance with various standards. The national primary ambient air quality standards for particulate matter require the following:

- (1) 75 micrograms per cubic meter annual geometric mean
- (2) 260 micrograms per cubic meter maximum 24-hour concentration not to be exceeded more than once per year

The national secondary ambient air quality standards for particulate matter require the following:

- (1) 60 micrograms per cubic meter annual geometric mean
- (2) 150 micrograms per cubic meter maximum 24-hour concentration not to be exceeded more than once per year

Such standards in effect require estimating the geometric mean and the next to the largest TSP level for the year. This is conceptually equivalent to evaluating the statistical distribution of the data and applying order statistics to the resulting distribution. In practice, EPA has suggested that the distribution be assumed log normal (ref. 5). Thus, there are three intrinsic sources of error in comparing measured values to legal standards - namely, the assumption of log normality and the two errors when estimating the mean and the next to the largest value for a set of 365 values represented by a sample of 61 values. It has been shown that for log normal distributions with typical standard geometric deviations (i.e., exponential of the standard deviation of the logarithms of the sampled values) of 1.5 to 1.85 (ref. 2) the 0.95 confidence limits for the mean based on 61 samples out of 365 values are  $\pm 10$  and  $\pm 15$  percent, respectively (refs. 24 and 25). The extrapolation to the extreme tail of the distribution to obtain the second highest value will have confidence limits at least as wide (ref. 26). There is no feeling for the

error involved in assuming log normality, but deviations from log normality for TSP data have been reported (ref. 2).

As a consequence of these factors, it is reasonable to conclude that reproducibility in high volume sampling is not the major source of errors in current monitoring practices. In addition, we have just shown that the data distributions obtained from glass fiber and Whatman-41 filters are usually not statistically significantly different. Even in those few cases which are significantly different (see table VI), the differences are generally within the error bounds inherent in evaluating compliance with presently formulated standards as explained previously.

#### CONCLUDING REMARKS

A comparative analysis of Whatman-41 and glass fiber filters based on data derived from three experiments has been presented.

The first experiment shows that if adequate precautions are taken, the hygroscopic affinity of Whatman-41 filters does not introduce any significant error in determining TSP concentrations.

The second was actually a sequence of two factorial experiments. In these, five samplers were run in close proximity over a relatively short interval of time. One experiment had the samplers equipped with glass fiber filters while the other had the samplers equipped with Whatman-41 filters. There are several conclusions drawn from these two experiments. First, there is a statistically significant variability among the responses from several high volume samplers run at the same location on the same day. The magnitude of this variability is relatively small (95 percent limits of about 7 percent), and we speculate that the cause of variability is the difficulty of determining the actual flow rates for all samplers. Second, the variability among measurements attributable to differences within each filter type is also small (95 percent limits of about 10 percent). Third, the error variabilities of the Whatman-41 and glass fiber filter types are found to be almost identical and clearly not statistically significantly different.

The third experiment was the 13 months of operation of a 16-station parallel network. At each of the 16 stations, two high volume air samplers were set up in close proximity where one (APCD sampler) was equipped with glass fiber filters and the other (Lewis sampler) was equipped with Whatman-41. The paired data values obtained over a 13-month interval were analyzed twice. Once with the assumption of additive errors and once with the assumption of multiplicative errors. Both analyses showed that at any given station there may be a significant difference between the two filter types. However, when the entire network is considered, this difference is concluded not to be statistically significant. For environments similar to Cleveland's, this study demonstrates the validity and practicability of using Whatman-41 filters in routine air quality monitoring programs to obtain samples suitable for elemental and chemical analyses.

Lewis Research Center,

National Aeronautics and Space Administration, Cleveland, Ohio, January 31, 1974, 770-18.

# APPENDIX A

# SYMBOLS

d	deviation from $\mu$ due to particular day
$\mathbf{E}(\mathbf{x})$	expected value of x
F	statistic following F-distribution
G	population mean amount of TSP which would be collected on glass fiber filters, see also p. 12
g	TSP measured level collected on glass fiber filters
m	log (g/w)
$N(0, \sigma^2)$	normal distribution with mean zero and variance $\sigma^2$
P	actual mean ambient TSP level
р	collection efficiency
s <sub>m</sub>	sample standard deviation of $\overline{m}$ 's
<sup>s</sup> g, <sup>s</sup> w	sampler biases
V(x)	variance of x
$v_g^2, v_w^2, v_{gw}$	sample variances and covariance of glass fiber and Whatman-41 data
W	population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12
w	population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters
W w x	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x</pre>
W w x x	<pre>population mean amount of TSP which would be collected on Whatman-41   filters, see also p. 12 TSP measured level collected on Whatman-41 filters   mean of x   estimate of x</pre>
W w x x x x*	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x estimate of x logarithm of x</pre>
W w x̄ x̂ x* α	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x estimate of x logarithm of x intercept of best-fit straight line</pre>
W w x̄ x̂ x* α β	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x estimate of x logarithm of x intercept of best-fit straight line slope of best-fit straight line</pre>
W w x x x α β δ	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x estimate of x logarithm of x intercept of best-fit straight line slope of best-fit straight line random error due to Whatman-41 within-filter-type variation</pre>
W w x̄ x̂ α β δ ε	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x estimate of x logarithm of x intercept of best-fit straight line slope of best-fit straight line random error due to Whatman-41 within-filter-type variation random error due to glass fiber within-filter-type variation</pre>
W w x x x* α β δ ε μ	<pre>population mean amount of TSP which would be collected on Whatman-41 filters, see also p. 12 TSP measured level collected on Whatman-41 filters mean of x estimate of x logarithm of x intercept of best-fit straight line slope of best-fit straight line random error due to Whatman-41 within-filter-type variation random error due to glass fiber within-filter-type variation mean TSP level</pre>

Subscripts:

- g glass fiber
- i i<sup>th</sup> day
- j j<sup>th</sup> sampler or j<sup>th</sup> station
- t total
- w Whatman-41
- m distribution of  $\overline{m}$

## APPENDIX B

# ANALYSIS OF FUNCTIONAL RELATIONS

In this appendix some statistical methods for computing best-fitting straight lines to data where both variables have observational errors will be briefly presented. The following mathematical structure was assumed for n observations:

$$g_{i} = G_{i} + \epsilon_{i}$$

$$w_{i} = W_{i} + \delta_{i}$$

$$G_{i} = \alpha + \beta W_{i} \quad (Model I)$$

$$G_{i} = \beta W_{i} \quad (Model II)$$

$$\epsilon_{i} \sim N(0, \lambda \sigma^{2})$$

$$\lambda \text{ assumed known}$$

For our application,  $\lambda$  was concluded to be 1.0 from the factorial experiment analyses.

### Model I Estimation

For model I (eq. (3)) maximum likelihood estimation procedures lead to the following estimators (ref. 18, chapter 9, or ref. 21, sections 29.1 to 29.21):

$$\hat{\alpha} = \overline{g} - \hat{\beta}\overline{w}$$

$$\hat{\beta} = \frac{\left(v_g^2 - \lambda v_w^2\right) + \left[\left(v_g^2 - \lambda v_w^2\right)^2 + 4\lambda v_{wg}^2\right]^{1/2}}{2v_{wg}}$$

where



$$\mathbf{v}_{gw} = \frac{\sum_{i=1}^{n} \frac{(\mathbf{g}_{i} - \mathbf{g})(\mathbf{w}_{i} - \mathbf{w}_{i})}{n}$$

and the consistent estimator for  $\sigma^2$  is

$$\hat{\sigma}^2 = \frac{\lambda}{(n-2)(\lambda + \hat{\beta}^2)} \sum (g_i - \hat{\alpha} - \hat{\beta}w_i)^2$$

#### Model $\Pi$ Estimation

For this model the method of maximum likelihood was applied and the procedure was similar to Kendall and Stuart. The likelihood function is (similar to eq. 9.1 of ref. 18)

$$\mathbf{L} = \frac{1}{(\lambda\sigma^2 2\pi)^{n/2}} e^{-1/2} \sum \frac{\epsilon_i^2}{\lambda\sigma^2} \frac{1}{(\sigma^2 2\pi)^{n/2}} e^{-1/2} \sum \frac{\delta_i^2}{\sigma^2}$$
$$= (\lambda^{1/2} \sigma^2 2\pi)^{-n} \exp -\frac{1}{2} \left[ \frac{\sum (\mathbf{g}_i - \beta \mathbf{W}_i)^2}{\lambda\sigma^2} + \frac{\sum (\mathbf{w}_i - \mathbf{W}_i)^2}{\sigma^2} \right]$$

and the logarithm likelihood is given by

$$\ln L = -n \ln (\lambda^{1/2} 2\pi) - n \ln (\sigma^2) - \frac{1}{2} \left[ \frac{\sum (g_i - \beta W_i)^2}{\lambda \sigma^2} + \frac{\sum (w_i - W_i)^2}{\sigma^2} \right]$$

There are n + 2 parameters to estimate:  $W_i$  for  $i = 1, ..., n, \sigma^2$ , and  $\beta$ . Differentiating ln L with respect to each of these parameters and setting each to zero gives

$$\frac{(\mathbf{g}_{i} - \hat{\boldsymbol{\beta}} \mathbf{W}_{i})\hat{\boldsymbol{\beta}}}{\lambda \hat{\sigma}^{2}} + \frac{\mathbf{w}_{i} - \hat{\mathbf{W}}_{j}}{\hat{\sigma}^{2}} = 0$$
(B1)

$$\frac{-n}{\hat{\sigma}^2} + \frac{1}{2(\hat{\sigma}^2)^2} \left[ \frac{1}{\lambda} \sum_{\alpha} (\mathbf{g}_i - \hat{\mathbf{W}}_i \hat{\boldsymbol{\beta}})^2 + \sum_{\alpha} (\mathbf{w}_i - \hat{\mathbf{W}}_i)^2 \right] = 0$$
(B2)

and

$$\frac{\sum (g_i - \hat{\beta} \hat{W}_i) \hat{W}_i}{\lambda \hat{\sigma}^2} = 0$$
 (B3)

Solving equation (B3) for  $\hat{\beta}$  gives

$$\hat{\beta} = \frac{\sum g_i \hat{w}_i}{\sum \hat{w}_i^2}$$
(B4)

and solving equation (B1) for  $\hat{W}_i$  gives

$$\hat{W}_{j} = \frac{\lambda W_{i} + g_{i}\beta}{\lambda + \hat{\beta}^{2}}$$
(B5)

ī.

Substituting equation (B5) into equation (B4) and simplifying gives

$$\hat{\beta}^{2} \left( \sum g_{i} w_{i} \right) + \hat{\beta} \left( \lambda \sum w_{i}^{2} - \sum g_{i}^{2} \right) - \lambda \left( \sum g_{i} w_{i} \right) = 0$$
(B6)

Solving equation (B6) for  $\hat{\beta}$  and using the positive root for the same reasons as explained in reference 21 (section 29.12) for model I give

$$\hat{\beta} = \frac{\left(\sum g_i^2 - \lambda \sum w_i^2\right) + \left[\left(\sum g_i^2 - \lambda \sum w_i^2\right)^2 + 4\lambda \left(\sum g_i w_i\right)^2\right]^{1/2}}{2\sum g_i w_i}$$

and the consistent estimate for  $\hat{\sigma}^2$  is

$$\hat{\sigma}^2 = \frac{1}{(n-1)(\lambda + \hat{\beta}^2)} \sum (g_i - \hat{\beta} w_i)^2$$

Hypothesis Testing of  $\beta$  in Model I

In the particular model considered herein, it is of interest to test if the estimated value of  $\beta$  is significantly different from 1.0 (we also assume as before that  $\lambda = 1.0$ ).

Note that g and w are uncorrelated if and only if  $\beta = 0.0$  or  $\beta = \infty$ . Because of the normally distributed errors, a test for  $\beta = 0$  can be replaced by a test for zero correlation. To this end, it is well known (ref. 21, sec. 29.20) that

$$t = \left[\frac{(m-2)r^2}{1-r^2}\right]^{1/2}$$
(B7)

where

$$\mathbf{r} = \frac{\mathbf{v}_{gW}}{\mathbf{v}_{g}\mathbf{v}_{W}}$$

is distributed as student's t under the hypothesis that r = 0 ( $\beta = 0$ ).

In order to test for  $\beta$  significantly different from 1.0, make the orthogonal transformation of the data

$$\mathbf{x_i} = \frac{1}{\sqrt{2}} \left( \mathbf{g_i} + \mathbf{w_i} \right)$$

$$y_{i} = \frac{1}{\sqrt{2}} (g_{i} - w_{i})$$

It can then be shown that

$$v_x^2 = \frac{1}{2} \left( v_g^2 + 2v_{gw} + v_w^2 \right)$$
 (B8)

$$v_y^2 = \frac{1}{2} \left( v_g^2 - 2v_{gw} + v_w^2 \right)$$
 (B9)

$$\mathbf{v}_{\mathbf{x}\mathbf{y}} = \frac{1}{2} \left( \mathbf{v}_{\mathbf{g}}^2 - \mathbf{v}_{\mathbf{w}}^2 \right) \tag{B10}$$

Then, if and only if  $\beta = 1.0$ , x and y are uncorrelated. The appropriate test statistic becomes

$$t = \left[\frac{(n-2)(r')^2}{1-(r')^2}\right]^{1/2}$$
(B11)

where

$$\mathbf{r'} = \frac{\mathbf{v}_{\mathbf{X}\mathbf{y}}}{\mathbf{v}_{\mathbf{X}}\mathbf{v}_{\mathbf{y}}} \tag{B12}$$

Upon substituting equations (B8), (B9), and (B10) into equation (B12) and simplifying, we get

$$\frac{(\mathbf{r'})^2}{1 - (\mathbf{r'})^2} = \frac{\left(\mathbf{v}_g^2 - \mathbf{v}_w^2\right)^2}{4\left(\mathbf{v}_g^2 \mathbf{v}_w^2 - \mathbf{v}_{gw}^2\right)}$$
(B13)

and hence

$$t = \left[\frac{(n - 2)(v_g^2 - v_w^2)^2}{4(v_g^2 v_w^2 - v_{gw}^2)}\right]^{1/2}$$

becomes the appropriate test statistic. This procedure may readily be generalized to other values of  $\beta$ .

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# TABLE I. - FACTORIAL EXPERIMENT TOTAL SUSPENDED

# PARTICULATE (TSP) DATA USING

#### GLASS FIBER FILTER

Date	<b>TSP</b> in $\mu$ g/m <sup>3</sup>			log	g (TSP	in µg/n	n <sup>3</sup> )		
			High vo	olume	serial number				
	14	20	68	63	14	20	68	63	
11/8/71	72.0	66.0	64.0	67.0	1.857	1.820	1.806	1.826	
11/9/71	47.0	43.0	43.0	44.0	1.672	1.633	1.633	1.643	
11/10/71	59.0	55.0	55.0	51.0	1.771	1.740	1.740	1.708	
11/11/71	84.0	83.0	81.0	85.0	1.924	1.919	1.908	1.929	
11/15/71	55.0	56.0	57.5	58.6	1.740	1.748	1.760	1.768	
11/16/71	105.0	102.0	101.0	99.0	2.021	2.009	2.004	1.996	
11/17/71	92.0	88.0	82.0	73.0	1.964	1.944	1.914	1.863	
11/18/71	38.6	39.4	36.8	35.2	1.587	1.595	1.566	1.547	
11/22/71	49.0	45.0	47.4	40.0	1.690	1.653	1.676	1.602	
Mean	66.8	64.2	63.1	61.4	1.803	1.785	1.779	1.765	

# TABLE II. - FACTORIAL EXPERIMENTAL TOTAL SUSPENDED

Date	TSP in $\mu g/m^3$				log (TSP in $\mu g/m^3$ )					
	High volum					ne serial number				
	14	14 20 68 63 71					20	68	63	71
1/24/72 1/25/72 1/26/72 1/27/72	61.3 47.7 69.0 45.3	62.7 52.4 71.3 43.5	63.2 60.0 72.0 47.2	66.0 56.5 74.2 50.5	67.0 55.2 64.8 47.2	1.787 1.679 1.839 1.656	1.797 1.719 1.853 1.638	1.826 1.742 1.842 1.674	1.801 1.778 1.857 1.674	1.820 1.752 1.870 1.703
Mean	55.8	57.5	60.6	61.8	58.5	1.740	1.752	1.763	1.777	1.786

PARTICULATE (TSP) DATA USING WHATMAN-41

#### TABLE III. - ANALYSIS OF VARIANCE (ANOVA) TABLES

(a) Raw values for Whatman-41 filter. Mean of all observations, 58.8;  $\hat{\sigma}_w = 2.805$ ;  $F = (mean square due to samplers)/(mean square due to error) = MS(s)/MS(\delta) = 2.91$ 

Source of variability	Sum of squares, SSQ	Degrees of freedom	Mean square, MS	Expected mean square
Days, d	1619.8	3	539.89	$\sigma_{\rm w}^2$ + $5\sigma_{\rm d}^2$
Samplers, s	91.58	4	22.90	$\sigma_{\rm w}^2$ + $4\sigma_{\rm s}^2$
Error, ð	94.48	12	7.87	∞ <sup>2</sup> w

(b) Log transformed data for Whatman-41 filter. Mean of all observations, 1.76;  $\hat{\sigma}_{\rm W} = 0.0213$ ; F = (mean square due to samplers)/(mean square due to error) = MS(s)/MS( $\delta$ ) = 3.07

Source of variability	Sum of squares, SSQ	Degrees of freedom	Mean square, MS	Expected mean square
Days, d	0.092216	3	0.030739	$\sigma_{\rm w}^2$ + $5\sigma_{\rm d}^2$
Samplers, s	. 005559	4	. 001390	$\sigma_w^2 + 4\sigma_s^2$
Error, ð	. 005439	12	.000453	$\sigma_{\rm w}^2$

(c) Raw values for glass fiber filter. Mean of all observations, 63.9;  $\hat{\sigma}_{\rm g}$  = 3.124;

F = (mean square due to samplers)/(mean square due to error) =  $MS(s)/MS(\epsilon)$  = 4.78

Source of variability	Sum of squares,	Degrees of	Mean square,	Expected mean
	SSQ	freedom	MS	square
Days, d	15 077.78	8	1884.72	$\sigma_{g}^{2} + 4\sigma_{d}^{2}$
Samplers, s	139.93	3	46. 64	$\sigma_{\rm f}^2 + 9\sigma_{\rm s}^2$
Error, $\epsilon$	234.30	24	9.76	σ <sup>2</sup> g

(d) Log transformed data for glass fiber filter. Mean of all observations, 1.78;  $\hat{\sigma}_{g} = 0.0207$ ; F = (mean square due to samplers)/(mean square due to error) = MS(s)/MS( $\epsilon$ ) = 5.29

Source of variability	Sum of squares,	Degrees of	Mean square,	Expected mean
	SSQ	freedom	MS	square
Days, d	0.688213	8	0.086027	$\sigma_{\rm g}^2 + 4\sigma_{\rm d}^2$
Samplers, s	. 006807	3	. 002269	$\sigma_{g}^{2} + 9\sigma_{s}^{2}$
Error, $\epsilon$	. 010308	24	. 000429	$\sigma_{g}^{2}$

# TABLE IV. - ESTIMATES OF VARIANCE COMPONENTS

Source of variability	Raw data	Log transformed data
Glass fiber error: $\hat{\sigma}_{g}^{2}$ $\hat{\sigma}_{g}$	9.76 3.12	0.000429 .0207
Whatman-41 error: $\hat{\sigma}_{w}^{2}$ $\hat{\sigma}_{w}$	7.87 2.81	0.000453 .0213
Pooled error: ô <sup>2</sup> ô	9.13 3.02	0.000437 .0209
Sampler variability: $\hat{\sigma}_{s}$ - GF data $\hat{\sigma}_{s}$ - W41 data	2.02 1.94	0.0143 .0153
Total variability: $\hat{\sigma}_t^2$ $\hat{\sigma}_t$	13.06 3.61	0.000656 .0256

# FROM ANALYSIS OF VARIANCE (ANOVA) TABLES

64 T e	1441	Gï	GF-141	LOG (¥41)	L0G (G1)	LOG (GE) - LOG (941	,
8 10 71	279-00	326.00	49.00	2.4456	2.5159	0.70∠70E-01	1
2 16 71	122-00	138.00	16.00	2.0364	2.1399	0.53520E-01	2
0 10 11	130.00	139.00	9_00	2.1139	2.1430	0.23072E-01	3
a 25 71	192.00	215-00	23.00	2.2333	2. 1324	0.491362-01	4
- 25 71	105 00	103.00	-2.00	2.0212	2.0126	-0.93523E-02	5
0 20 31	153 00	134.00	-18-00	2.1818	2, 1271	-0.547396-01	6
	195 00	196 00	-13.00	2.2989	2 2695	-0-293408-01	7
5 6 71	199.00	106 00	-15.00	2 3304	2 2949	-0 115612-01	Å
9 9 71	214.00	199.00	-13.00	5 2022	1 1568	0 575795-01	ā
9 15 71	196.00	229.00	33.00	1 60/15	1 6777	0.01010100	10
9 14 /1	68-00	95.00	21.00	1 0445	2 046	0 10476	11
9 24 71	66.00	112.00	24.00	1 6721	2.0492	0.10414	12
12 11 71	94.00	108.00	14.00	1.2/21	2.003-	0 17974	13
12 14 71	218-00	329.00	111-00	2.3303	2. 3172	0.1/0/4	10
12 20 71	73.00	128.00	55.00	1.0101	1.0161	0.24309	15
12 26 71	83.00	83.00	0.00	1.9191	1.3131	0.00000	14
12 25 71	115.00	161.00	46.00	2.0607	2.2000	V. 14613	10
1 13 72	130.00	186.00	50.00	2.1139	2.2095	0.15557	10
1 16 72	164.00	95.00	-73.00	2.2253	1.9777	-0.24/39	10
1 19 72	146.00	191.00	35.00	2.1044	2.2577	0.93326E-01	19
1 25 72	255.00	285.00	30.00	2.4065	2,4548	0-48305E-01	20
2 12 72	216.40	315.00	98.60	2.3353	4.4983	0.16306	21
2 15 72	109.60	147.00	38.40	2.0358	2.1673	0.13150	- 22
3 22 72	116.90	148.00	31.10	2.0678	2.1703	0.10245	23
4 3 72	186.00	217.00	31.00	2.2695	2.3365	0.66546E-01	24
4 6 7 2	186.90	230.00	43.10	2.2716	2. 36 17	0.901225-01	25
4 9 72	132.80	144_00	11.20	2,1232	2.1584	0.351748-01	26
4 12 72	250.70	270.00	19.30	2.3992	2.4314	0.32210E-01	27
4 15 72	208.30	246.00	39.20	2.3197	2.3945	0.74727E~01	26
4 18 72	214.40	277.00	62.60	2,3312	2.4425	0,11126	29
4 21 72	140.00	148.00	8.00	2.1461	2.1703	0.24134E-01	30
4 27 72	124.50	154.00	29.50	2.0952	2.1675	0.92352E-01	31
5 9 72	65.40	65,00	-0.40	1.8156	1.8129	-0.26541E-02	32
5 1a 72	241.80	306.00	64.20	2.3335	2.4657	0.10227	33
5 21 72	226.70	238.00	11.30	2.3554	2.3766	0.21127E-01	34
5 24 72	270.06	326.00	55,94	2,4315	2.5132	0.81754E-01	35
5 27 72	339.38	353-00	13.63	2.5307	2.5478	0.170951-01	36
6 2 72	162-20	221.00	58.80	2.2100	2.3444	0.13434	37
6 7 72	301.68	321.00	19,13	2.4798	2.5065	0.266782-01	38
7 2 72	147.60	199.00	51.40	2.1691	2.2969	0.12977	39
7 11 72	225.70	264 00	38.30	2.3535	2.4216	0.68073E-01	40
7 14 72	270.69	227.00	-43.69	2.4325	2.3560	-0.76443E-01	41
7 20 72	307.38	268.00	- 39, 38	2.4877	2.4261	-0.59533E-01	42
7 19 72	85.20	113.00	27.80	1.9304	2.0531	0.12264	43
8 1 72	227.50	313.00	85.50	2.3570	2.9955	0.13456	44
8 7 72	136 60	343.00	3.40	2.1449	2, 1553	0.104578+01	45
8 10 72	175 20	231 00	55 40	2 24 35	2 1636	0 12008	46
9 13 72	290 06	324 00	33.64	2 4625	2.5105	0.480546-01	a7
0 13 72 0 33 73	191 30	324.00	45 70	2 2817	2 1747	0 930405-01	ц.Я.
0 ZZ 7Z	199 10	172 00	- 26 10	2 2 6 9	2 2355	-0 613518+01	40
3 31 72	190.10	325.00	-20210	2 6226	2.2333	-0.013312-01	50
0 2 7 2	417-03	323.00	- 11 40	1 7074	1 5911	-0 11135	ŝ
5 1 1 2	30.40	221 00	- 11.40	3 5613	2 5164	-0.11110	57
3 0 72	51 00	221.00	10 40	1 7100	1 2040	0 052205-01	52
3 3 14 0 10 70	31.40	202.00	12.00	1.7107	2 2121	0.332305-01	50
9 12 72	102.20	200.00	43.80	2.2100	2.3101		- 24
9 10 72	173.80	106+00	-/.80	2.2400	2-2201	-U. 19934E-U	22
3 21 72	319,25	205.00	C2.tC~	2-3941	Z.4249	-0.192308-01	20
3 24 12	138* 30	174.00	- 24. 30	2.2713	2.2405	-0.00/0/2-01	21

# TABLE V. - TOTAL SUSPENDED PARTICULATE (TSP) CONCENTRATIONS FOR GLASS FIBER AND WHATMAN-41 FILTERS (a) Station 1

MEAN 184.87 203.96 0.45326 CORRELATION COEFFICIENT 0.667 COEFFICIENTS OF BEST FITTING STRAIGHT LINE --PIRST SZT IS NGT FORCED THROUGH ORIGIN, SACOND SET IS FORCAD

0.45328E-01

INTERCEPT

SLOPE ERFOR SID DEV

 
 16.45
 1.014

 0.00
 1.091

 T VALUE FOR TEST OF BETA
 0.20

 AMALYSIS OF LOGS- 0.45326E-01

 T-STATISTIC
 3.99

 STD JEV
 0.45866E-01

 DEGR&SS OF FREEDOM
 56
 27.80 27.88 Degrzes of Przedom 55

TABLE V (	Continued.	TOTAL SUSPENDED P	ARTICULATE (TSP)	CONCENTRATIONS FOR	GLASS	FIBER AN	D WHATMAN-41 F	ILTERS
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(b) Station 3

STATE         Corrent         Corrent <thcorrent< th=""> <thcorrent< th=""> <thcor< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th></thcor<></thcorrent<></thcorrent<>							
BALE         10         Control         Control <thcontro< th=""> <thcontro< th=""> <thcontrol< th="" th<=""><th>STATION NUMBER</th><th>3</th><th></th><th></th><th></th><th></th><th></th></thcontrol<></thcontro<></thcontro<>	STATION NUMBER	3					
b         c	CATE D. D. D.	841	GZ Du AG	GF-441	LOG (W41)	LOG (G. )	Fre(35) - Fre(841)
6       6       7       10	6 22 71	110.00	121.00	-4.00	2 0/10	1.8092	-0.226635-01
6         6         7         1         17	6 26 21	83.00	107 00	24 00	1 9191	2 0294	0.13031
6         1         211         211.020         223.00         15.00         223.22         21.550         0.23.16.20           10         5         1         140.00         150.00         223.00         14.620         17.770         0.23.16.20           10         5         1         14.620         1.64.20         1.64.20         1.64.20         1.64.20           10         5         1         14.620         1.64.20	9 15 71	137.00	138.00	1.00	2.1367	2. 1399	0. 1156oE-02
$ \begin{array}{c} 5 \ 5 \ 7 \ 1 \ 1 \ 9 \ 0 \ 7 \ 1 \ 1 \ 9 \ 1 \ \mathbf$	9 18 71	210.00	229.00	19.00	2.3222	2.35 x8	0.3701a£+01
10       271       14.0.09       175.00       35.00       2.1333       2.2.240       0.10550         10       271       40.00       75.00       -1.00       1.6652       1.6533       0.0.25000-0         10       1271       40.00       75.00       -1.00       1.6652       1.6533       0.0.25000-0         10       271       142.00       117.00       -7.00       2.0014       2.0053       2.0053       0.2.25000-0         10       271       142.00       117.00       -7.00       2.0014       2.0053       0.22530-0       1.00250       0.2016-0       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       0.2016-0       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       1.00250       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0       0.2016-0	5 30 71	194.00	256.00	62.00	2.2070	2.4002	0. 12044
10         6 7         44. 20         5 7.1         6 7.4         6 7.4         7 7.4         6 7.4         7 7.4         6 7.4         7 7.4         6 7.4         7 7.4         6 7.4         7 7.4          7 7.4         7 7	10 2 71	136.00	175.00	39.00	2.1335	2.2430	0.10950
	10 6 71	46.00	51.00	5.00	1.6628	1.7076	C.44613E-01
	10 9 71	40.00	37.00	-3.00	1.00.1	1.5602	-0.33o5d2-01
10         10         17         140.60         18.00         2.161         2.703         0.24132-01           10         27         14.00         17.00         -2.200         2.200	10 12 71	74.00	73.00	- 1.00	1.8692	1,8633	-u.59090E-02 1
0 = 17 1              1 = 162, 40              1 = 17 1              1 = 162, 40              1 = 17 1              1 = 182, 40              2 = 26, 40              1 = 17 1              1 = 182, 40              2 = 26, 40              1 = 17 1              1 = 182, 40              2 = 26, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40              1 = 17 1              1 = 182, 40	10 15 71	140.00	148.00	8.00	2.1461	2.1703	0.241342-01 1
$ \begin{bmatrix} 0 & 2 & 7 \\ 1 & 2 & 7 \\ 1 & 2 & 7 \\ 1 & 3 & 2 & 2 & 6 \\ 1 & 5 & 7 \\ 1 & 5 & 6 & 6 \\ 1 & 5 & 7 \\ 1 & 5 & 6 & 6 \\ 1 & 7 & 1 & 6 & 6 & 0 \\ 1 & 7 & 7 \\ 1 & 5 & 6 & 0 & 6 & 7 & 0 \\ 1 & 7 & 7 \\ 1 & 5 & 6 & 0 & 6 & 7 & 0 \\ 1 & 7 & 7 \\ 1 & 5 & 6 & 0 & 6 & 7 & 0 \\ 1 & 7 & 7 & 1 & 6 & 6 & 0 \\ 1 & 7 & 7 & 0 & 1 & 6 & 0 \\ 1 & 7 & 7 & 0 & 0 & 1 & 7 & 0 \\ 1 & 7 & 7 & 1 & 6 & 0 & 0 & 7 & 0 \\ 1 & 7 & 7 & 0 & 0 & 1 & 6 & 0 \\ 1 & 7 & 1 & 1 & 0 & 0 & 0 & 7 & 0 \\ 1 & 4 & 7 & 1 & 1 & 0 & 0 & 0 & 7 & 0 \\ 1 & 4 & 7 & 1 & 1 & 0 & 0 & 0 & 1 & 7 & 0 \\ 1 & 4 & 7 & 1 & 1 & 0 & 0 & 0 & 1 & 7 & 0 \\ 1 & 4 & 7 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 4 & 7 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 4 & 7 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 4 & 7 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 4 & 7 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0$	10 21 71	162.00	154.00	-8-00	2.2095	·2. 1a 75	-0.21994E-01 1
$  \begin{array}{ c c c c c c c c c c c c c c c c c c c$	10 27 71	124.00	117.00	-7.00	2.0334	2.0662	-0.252362-01 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	10 30 71	199.00	236,00	37.00	2.2989	2.3729	0.74059E-01 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	11 2 71	99.00	82.00	-6+00	1.9445	1.9138	-0.306692-01 1
11         11         17         25.00         16.00         1.000 </td <td>11 3 (1</td> <td>80.00</td> <td>87.00</td> <td>1.00</td> <td>1.9031</td> <td>1,9170</td> <td>0.364291-01 1</td>	11 3 (1	80.00	87.00	1.00	1.9031	1,9170	0.364291-01 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		126 00	126.00	47.00	1.1709	2.0203	0.23443
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	12 2 21	102 00	52.00	-0.00	2.1004	1 0364	-0 175501+01 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	12 0 71	54.00	91.00	19-00	1.7124	1.9665	0.23604 2
	12 11 71	60 00	79.00	10.00	1. 8125	1.8921	0.595472-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	12 20 71	48.00	60.00	12.00	1.6812	1.7752	0.969102-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	12 25 71	54.DQ	44.00	-10.00	1.7324	1.6435	-0.889416-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1 7 72	50.00	56.00	6,00	1.6990	1.7482	D.49218E-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1 16 72	39.00	54.00	15.00	1,5911	1.7324	0,14133 2
	1 22 72	59.00	74.00	15.00	1.7709	1.8692	0.983792-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1 25 72	131_00	124_00	-7.00	2. 1173	2.0934	-0.238492-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1 20 72	29.00	86-00	57.00	1.4624	1.9345	0.47210 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2 3 72	48.10	52.00	3_90	1.6821	1.7160	0.336788-01 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2 6 72	32.70	47.00	14.30	1.5145	1,6721	0.15756 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2 9 72	99.10	135.00	35.90	1.9961	2.1303	0.13427 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2 12 72	127.40	180.00	52-60	2.1052	2.2553	0.15011 3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2 15 72	46.70	45.00	-1.70	1.6693	1.6532	-0.160976-01 3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2 21 72	123.20	105.00	15.60	2.0906	2.1307	0.463136-01 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2 24 12	07.40	99 44	6 50	1 9561	1 0056	0.050000-01 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 3 73	41.00	91 AD	-2 20	1 0777	1.9906	-0 14236L=01 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 4 72	95.70	107.00	11-30	1.9809	2.0294	0.484765-01 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 7 72	111.40	139.00	27.60	2.0465	2.1430	0.961368-01 3
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 10 22	88.30	118.00	29.70	1,9459	2.0719	0.12594 4
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 16 72	72.00	97.00	24.20	1.8621	1,9868	0.12466 4
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 19 72	100.00	112.00	11.20	2.0034	2.0492	0.457728-01 4
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 22 72	79.00	51.00	-20.00	1.8976	1.7076	-0.19006 4.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 25 72	56.90	76.00	19.10	1.7551	1.8608	0.12571 4
4       3       72       102.10       125.00       22.90       2.0030       2.0569       0.073948-01         4       6       72       101.00       127.00       26.00       2.0031       2.1038       0.073948-01         4       9       72       101.00       127.00       26.00       2.0031       2.1038       0.932762-01         4       12       72       102.00       238.00       46.00       2.1233       2.1566       0.92762-01         4       15       72       102.00       138.00       42.00       2.01962       2.2571       0.13160         2       102.00       136.00       27.80       2.0199       2.1556       0.93152-01         5       72       102.00       136.00       17.40       1.9325       2.0126       0.93352-01         5       72       102.00       136.00       17.40       1.9325       2.0000       0.93552-01         5       72       192.40       176.00       20.30       1.9015       2.0000       0.985452-01         5       16       72       192.90       149.90       19.50       2.1123       2.1732       0.10356         5       21       72<	3 28 72	140.00	217.00	77_00	2.1461	2.3365	0.19033 4
4       6       72       150,40       217,00       26.50       2.0043       2.1038       0.19522         4       12       72       192.00       286.00       46.00       2.2043       2.3766       0.994838-01         4       15       72       192.00       286.00       46.00       2.0170       2.1239       0.10682         4       15       72       124.80       155.00       -2.80       2.1981       2.1831       2.1833       -2.356       0.17565         4       21       72       122.80       193.00       64.20       2.0982       2.2256       0.17565       0.93152-01         5       72       192.00       136.00       17.40       1.9325       2.0120       0.803552-01         5       72       192.00       136.00       17.40       1.9325       2.002       0.803552-01         5       72       192.00       136.00       12.00       1.9325       2.002       0.803552-01         5       72       192.00       136.00       12.302       2.0120       0.803522-01       1.9326       2.002       0.803522-01         5       72       192.00       192.00       192.50       2.1227	4 3 72	102.10	125.00	22.90	2.0090	2.0559	0.078948-01 4
4       9       72       101.00       127.00       26.00       2.003       2.1038       0.994832-01         4       12       72       192.00       236.00       46.00       2.1833       2.3766       0.992762-01         4       15       72       192.00       133.00       29.00       2.10961       2.1235       0.912762-01         4       15       72       192.00       135.00       4.20       2.10961       2.1306       -6.776512-02         4       10       72       106.20       136.00       27.80       2.0199       2.1000       0.933752-01         5       6       72       192.40       176.00       20.30       2.0342       2.255       -0.336590-01         5       6       72       192.40       176.00       20.30       1.9015       2.0000       0.985422-01         5       15       72       79.70       100.00       20.30       1.9015       2.0000       0.985422-01         5       16       72       139.50       111.00       2.1928       2.3032       0.10155         5       21       72       196.00       194.50       2.1127       2.0755       -6.5232032-01	4 6 72	150,40	217.00	66-60	2.1772	2.3365	0.15922 4
411 <th< td=""><td>4 9 72</td><td>101_00</td><td>127.00</td><td>26.00</td><td>2.0043</td><td>2.1038</td><td>0.994836-01 4</td></th<>	4 9 72	101_00	127.00	26.00	2.0043	2.1038	0.994836-01 4
4         16         12         104,00         133,00         23,00         2,0112         2,1233         0,1062           4         16         72         124,80         165,00         4,20         2,0662         2,2273         0,1316d           4         27         12         135,80         -2,80         2,1486         2,1933         -0,776672-02           4         30         72         106,20         136,400         27,80         2,0442         2,133         0,93152-01           5         6         72         192,400         174,00         1,3225         2,0128         2,3060         0,80352-01           5         72         107,10         97,00         -1,00         2,0000         1,8664         -0,13652-01           5         72         107,10         97,00         -3,10         2,0000         0,86542-01           5         72         15,70         100,00         20,300         1,1912         2,1732         0,60372-01           6         72         15,70         100,00         13,50         2,1123         2,1732         0,604172-01           6         72         167,00         136,50         1,124         1,132	4 12 72	192.00	238.00	46.00	2.2833	2.3766	0.91276E-01 4
4 = 172 $124 + 50$ $132 + 50$ $24 + 50$ $24 + 50$ $24 + 50$ $24 + 27 + 24$ $136 + 50$ $136 + 50$ $4 = 27 + 72$ $123 + 50$ $133 + 50$ $44 + 20$ $24 + 168 + 24 + 24$ $24 + 168 + 24 + 24 + 24 + 24 + 24 + 24 + 24 + 2$	4 13 72	170.80	133-04	23-00	2.0170	2.1239	0.10682 5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	4 10 72 4 71 77	157 80	155 00	-2.80	2 1381	2 1903	-0 776671-07 5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	4 27 72	128-80	191-00	54.70	2.1099	2. 2656	0.17565 5
	4 30 72	108.20	136-00	27.80	2 0342	2.1335	0.993158-01 5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5 3 72	85.60	103.00	17.40	1.9325	2.0128	0.803756-01 5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5 6 72	192,40	176-00	-16,40	2.2842	2.2455	-0.386908-01 50
5 15 72 79.70 100.00 20.30 1.9015 2.000 0.965462-01 51672 155.90 201.00 45.10 2.1328 2.3332 0.11035 5172 139.50 149.00 19.50 2.1123 2.132 0.609178-01 527 72 139.50 149.00 19.50 2.1123 2.132 0.609178-01 527 72 139.50 149.00 114.40 1.9425 2.0086 0.661078-01 66 77 2 134.20 119.00 -15.20 2.1277 2.0755 -6.52037-01 61 17.2 42.50 71.00 28.10 1.6124 1.8513 0.21882 1.6124 1.8513 0.21882 1.6124 1.8513 0.21882 1.6124 1.8513 0.21882 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.22482 1.6124 1.8513 0.522182-01 1.622 1.239 0.1571 1.6124 1.865 1.9263 2.0374 0.20612 1.622 1.22 0.50 113.00 40.50 1.9663 2.139 0.15771 1.72 12 7.050 113.00 40.50 1.9663 2.139 0.15771 1.72 17.2 7.050 113.00 40.50 1.9763 2.0334 0.20612 1.625 1.6253 1.9266 0.11625 1.6253 1.9266 0.11625 1.72 12.70 1.30 119.00 46.70 1.6669 2.0755 0.2246 1.0200 1.172 9.520 125.00 2.9260 1.9766 2.055166-01 1.72 9.72 126.10 134.00 7.90 2.1007 2.1271 0.2639 8.60 1.11625 1.9269 1.9668 0.555166-01 1.227 1.226 1.1125 1.926 1.9269 1.9668 0.555166-01 1.225 1.226 1.1125 1.926 1.9269 1.9668 0.555166-01 1.226 1.259 1.9269 1.9668 0.555166-01 1.226 1.259 1.926 1.9269 1.9668 0.555166-01 1.226 1.259 1.926 1.926 1.926 1.9269 1.92769 1.9269 1.9269 1.9269 1.9269 1.9269 1.9269 1.9269 1.9269 1.9	5 9 72	100.10	97.00	-3.10	2.0004	1.9860	-0.13652E-01 5
51672155.90201.0045.102.13282.3320.1103552172139.00399.00111.002.25672.49000.193296672134.20119.00-15.202.12772.0755-0.52237-016672134.20119.00-15.202.12772.0755-0.52237-016111242.5071.0028.101.61241.8130.218826147265.4084.0018.602.0092.05310.52237-016207296.5097.000.501.98451.96640.22498-026267267.50199.0041.501.82332.03740.206126297292.50133.0040.561.96612.1390.1577172770.30190.040.501.97662.0340.20612787.20125.0029.801.97662.0340.206127147234.5097.0012.501.92691.96680.55168-0172770.30119.0040.701.92691.96680.55168-01720125.10132.0010.102.00822.12060.1125197877012.501.92691.96680.55168-0172020.2035.9008.801.97032.23550.2647272052.00<	5 15 72	79.70	100.00	20.30	1.9015	2.0000	0.985462-01 5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5 18 72	155.90	201.00	45.10	2.1928	2.3032	0.11035 5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5 21 72	129.50	149.00	19.50	2.1123	2.1732	0.609171-01 ы
6       2       72       87.60       102.00       14.40       1.9425       2.0086       0.661072-01         6       87.2       139.20       119.00       -15.20       2.1277       2.0755       -0.522032-01         6       1172       42.50       71.00       24.10       1.6124       1.8513       0.21882         6       1772       100.20       113.00       12.80       2.0009       2.0531       0.522142-01         6       20       72       96.50       57.00       0.50       1.9455       1.9465       0.22449E-02         6       20       72       92.50       133.00       40.50       1.9455       2.0374       0.20172         6       20       72       92.50       133.00       40.50       1.9455       2.0374       0.20172         7       2       72       70.30       119.00       40.50       1.9269       2.0755       0.22651         7       4       72       50.00       108.00       50.40       1.9766       2.0374       0.23997-01         7       4       72       70.31       19.00       7.90       2.1007       2.1211       0.23997-01         7	5 24 72	198.00	309.00	111.00	2.2967	2.4900	0.19329 6
0       6       7.2       134.20       134.00       134.20       2.1217       2.035       -0.22012-01         6       11       7.2       104.20       11.5.20       2.1217       2.055       -0.22012-01         6       11       7.2       65.40       84.00       18.60       1.0156       1.9243       0.1071         6       17       72       100.20       113.00       12.400       2.0009       2.0531       0.52142-01         6       20       72       86.50       37.00       0.50       1.9245       1.9464       0.22449E-02         6       26       7.2       92.50       133.00       40.50       1.8253       2.0374       0.20612         7       97.2       92.50       133.00       40.50       1.9263       2.0334       0.22461         7       7       70.10       119.00       40.70       1.669       2.0355       0.22661         7       7       70.00       125.00       2.800       1.9766       2.0369       0.1102         7       14       7.2       84.50       97.00       12.50       1.9269       1.9668       0.55516E-01         7       20       72	6 2 72	120 20	112.00	14.40	1.9425	2.0086	0.661072-01 6
0       1       1.2.3 $42.20$ $1.00$ $24.20$ $1.035$ $1.035$ $1.024$ $0.2482$ 6       17       100.22       113.00       12.80 $2.0009$ $2.0331$ $0.522142-011$ 6       17       100.22       113.00       12.80 $2.0009$ $2.0331$ $0.522142-011$ 6       20       71       96.50       77.00 $0.550$ $1.9945$ $1.9249$ $0.2012$ 6       24       71       92.50       113.00 $40.50$ $1.9243$ $2.0374$ $0.2012$ 6       29       72       92.50       113.00 $40.50$ $1.9243$ $2.0374$ $0.2012$ 7       21.7       72.30       119.00 $40.50$ $1.9734$ $2.0374$ $0.20612$ 7       72       92.20       122.00       29.80 $1.9764$ $2.0359$ $0.1226$ 7       12       92.20       122.00       2.100 $2.1005$ $0.12392$ $0.1241$ 7       22       72       10.10       13.00 $1.300$ $2.1007$ $2.1057$ $0.125192$ <td>6 11 7</td> <td>134-20</td> <td>71 00</td> <td>- 13-20</td> <td>1 6320</td> <td>2.0/00</td> <td>0,322032-01 0.</td>	6 11 7	134-20	71 00	- 13-20	1 6320	2.0/00	0,322032-01 0.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	6 14 72	41.JU 65.UU	84 00	18 60	1.0324	1 0 3 4 3	0.21002 0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	6 17 72	100.20	113.00	12.80	2,0009	2.0511	0.522147-01 6
	6 20 72	96.50	97.00	0.50	1,9845	1.9868	0.224495-02 6
	6 26 72	67.50	109.00	41.50	1_8293	2.0374	0.20812 61
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	6 29 72	92,50	133.00	40,50	1.9661	2.1239	0.15771 65
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7 2 12	70.30	119.00	40.70	1.6469	2.0755	0.22861 71
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7 8 72	50.00	108.00	50.00	1.7634	2,0334	0.27000 7
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7 11 72	95.20	125.00	29.80	1.9785	2.0969	0.11025 7:
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7 14 72	a4.50	97.00	12.50	1.9269	1.9868	0.59516E-01 7.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7 20 72	126.10	134.00	7.90	2.1007	2.1271	0.26399E+01 7
8       1       2       67       70       177.00       29.30       1.9430       2.0662       0.12519         6       10       72       50.20       59.60       8.60       1.7007       1.705       0.12519         6       10       72       35.00       96.00       61.40       1.5441       1.9823       0.43820         6       13       72       93.50       172.00       78.50       1.9763       2.2355       D.26472         6       16       72       94.70       87.00       -7.70       1.9763       1.3395       -0.36272-01         6       16       72       94.70       87.00       -7.70       1.9763       1.3395       -0.36272-01         6       16       72       94.70       87.00       -7.70       1.9763       1.3395       -0.36272-01         6       272       95.10       103.00       7.90       1.9763       2.0128       0.36672-01         8       25       72       95.10       103.00       4.970       1.7656       2.0253       0.25966         31       72       101.60       183.00       d1.40       2.0669       2.2625       0.2557 <t< td=""><td>7 29 72</td><td>101.90</td><td>132.00</td><td>30.10</td><td>2.0082</td><td>2.1206</td><td>0,11241 7</td></t<>	7 29 72	101.90	132.00	30.10	2.0082	2.1206	0,11241 7
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5 1 12	81.10	117.00	29-30	1.9430	2.0662	0.12519 70
0137253.5010.0051.501.54411.983 $0.43820$ 6137253.50172.6078.501.97082.23550.264726167294.7087.00-7.701.97631.3355-0.35272-016167294.7087.00-7.701.97631.335-0.25085712124.1065.60-55.102.05381.6125-0.250858227295.10103.007.901.97822.01280.34667E-018257258.10103.007.701.75662.02530.2596683172101.60183.00d1.402.00692.26250.255575337252.1054.001.7001.7681.7240.155758-01967284.40100.0015.601.92632.00000.73666E-0197245.4033.007.601.65701.72430.67235E-019127245.4033.007.602.18662.30400.151609127237.6060.0022.401.57521.77620.202999217248.6061.0012.401.66681.78530.987156-019247248.6061.0012.401.66681.78530.987156-01	8 10 72	35.00	39.00	61 00	1 5	1 26 3 2	0.701558-01 7
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	- 11 72	03 50	10.00	31.00	1.0300	1.9523	0.43820 //
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8 16 72	94.70	87.00	-7.70	1.0763	1.4345	+0 364277-01 -
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	£ 19 72	124.10	65.00	-59,10	2,0618	1.6176	-0.25085 64
8 25 72         58.30         106.00         \$7,70         1.7556         2.0253         0.25072           4 31 72         101.60         143.00         41.40         2.0069         2.2525         0.25364           5 3 72         52.10         54.00         41.40         2.0069         2.2525         0.25364           5 3 72         52.10         54.00         41.40         1.7168         2.2525         0.25364           5 3 72         52.10         54.00         1.30         1.7168         2.0000         0.15758-01           5 9 72         45.40         53.00         7.60         1.6570         1.7203         0.23268-01           5 9 72         45.40         53.00         7.60         1.6570         1.7203         0.23268-01           5 14 72         37.60         60.00         2.240         1.6570         1.7203         0.20299           5 14 72         37.40         60.00         22.20         1.5752         1.7262         0.20299           9 21 72         63.70         86.00         22.20         1.5753         0.70239         0.20299           9 21 72         48.60         61.00         12.40         1.6864         1.7053         0.987156-01	8 22 72	95, 10	103.00	7.90	1.9782	2.0124	0.346675-01 9
# 31 72       101.60       1#3.00       d1.40       2.0069       2.222       0.2557         9 372       52.10       54.00       1.90       1.7168       1.724       0.155758-01         9 6 72       84.40       100.00       15.60       1.9263       2.0000       0.36662-01         9 72       45.40       33.00       7.60       1.6570       1.7243       0.67235E-01         9 12 72       154.40       33.00       7.60       2.1866       2.1806       0.15160         9 12 72       154.40       32.00       0.40235E-01       2.3040       0.15180         9 12 72       37.60       60.00       22.40       1.5752       1.7762       0.20299         9 21 72       63.70       86.60       22.30       1.8041       1.5345       0.3036         9 24 72       48.60       61.00       12.40       1.6668       1.7853       0.987156-01	8 25 72	58,30	105.00	47.70	1,7656	2.0253	0.25966 8
5         3         72         52.10         54.00         1.30         1.7168         1.7324         0.15575g-01           9         672         84.40         100.00         15.60         1.9263         2.0000         0.736652-01           9         9         7.2         45.40         53.00         7.60         1.6570         1.7203         0.672352-01           9         9         7.2         154.40         219.00         64.60         2.1866         2.300         0.51580           9         12         134.40         219.00         64.60         2.1866         2.300         0.15180           9         12         134.40         60.00         22.40         1.5752         1.7722         0.20299           9         21         72         63.70         86.00         22.40         1.5804         1.5135         0.13016           9         24         72         48.60         61.00         12.40         1.6866         1.7853         0.98715c-01	8 31 72	101.60	183.00	81.40	2.0069	2.2625	0.25557 #
9         6         72         84.40         100.00         15.60         1,9263         2.0000         0,73665-01           9         9         72         45.40         53.00         7.60         1.6570         1,7243         0.67235E-01           9         12         72         154.40         219.00         64.60         2,1806         2.3004         0.15160           9         12         72         37.60         60.00         22.40         1.5752         1.77b2         0.20299           9         21         72         63.70         86.60         22.30         1.8041         1.5345         0.13036           9         24         72         48.60         61.00         12.40         1.6365         1.7853         0.5715c-01	9 3 72	52,10	54.00	1.90	1.7168	1.7324	0.155758-01 8
9         7.2         45.40         53.00         7.60         1.6570         1.723         0.67235E-01           9         12         7.2         154.40         219.00         64.60         2.1896         2.300         0.15180           9         12         7.4         154.40         219.00         64.60         2.1896         2.300         0.15180           9         12         72         15.60         60.00         22.40         1.5752         1.7762         0.20299           9         21         72         63.70         86.00         22.30         1.8041         1.5345         0.13016           9         24         72         48.60         61.00         12.40         1.6866         1.7053         0.987156-01	9 6 7 2	84.40	100.00	15.60	1,9263	2.0000	0.73666E-01 di
9 12 72 154.40 219.00 64.60 2,1886 2,3404 0.15180 9 14 72 37.60 60.00 22.40 1.5752 1.7752 0.20299 9 21 72 63.70 86.60 22.30 1.8041 1.5345 0.13036 9 24 72 48.60 61.00 12.40 1.6865 1.7853 0.987155-01	9 9 72	45.40	53.00	7,60	1.6570	1.7243	0.67235E-01 d
y to 12 37.60 60.00 22.30 1.5752 1.7752 0.20299 9 21 72 63.70 86.60 22.30 1.8041 1.5345 0.13036 9 24 72 48.60 61.00 12.40 1.6368 1.7853 0.987156-01	9 12 72	154.40	219-00	64.60	2,1606	2.3404	0.15160 84
9 21 72 83.40 86.00 22.30 1.8041 1.5345 0.13036 9 24 72 48.60 61.00 12.40 1.6866 1.7853 0.587155-01	9 ld 72	37.60	60.00	22.40	1.5752	1.77-2	0.20299 8
s ≥* +2 45.60 01.00 12.40 1.6666 1.7853 0.987156-01	9 21 72	63.70	86.00	22.30	1.8041	1.5345	0.13036 96
	9 24 72	40.00	01.00	12.40	1,6066	1.7853	0.98/156-01 5

0.850792-01

BLAN 96.33 117.40 0.550792 CORRELATION COBFFICIENT 0.676 COLFFICIENTS OF BLST FITTING STRAIGHT LINE --FIRST SET IS NOT POBCED THROUGH ORIGIN, SECOND SET IS FORCED

INTERCEPT SLOPE ERFOR STD DEV 16.63 16.66 Degrees of }rzedom 09

			(c) Stati	0n <b>4</b>				
LATE	841	GF	GF-141		LOG (141)	LOG (GF)	LOG (GF) - LOG ( 94 ·	1)
12 26 71	66.00	60.00	-6.00		1.8195	1.7782	-0.413932-01	1
1 7 73	157.00	120-00	-37.00		2.1959	2.0792	+0.11672	2
1 16 72	104.00	82.00	= 17 00		1 0056	1.9031	-0.28443	<b>3</b>
1 19 72	109.00	83.00	-26.00		2.0374	1.9141	-0.11835	ŝ
1 22 72	87.00	57.00	- 30,00		1.9395	1.7559	+0. 14364	6
1 25 72	208.00	169.00	-39.00		2.3181	2.2279	-0.901778-01	ž
1 26 72	71.00	69.00	-2.00		1.8513	1.8388	-0.12409E-01	8
2 3 72	85.40	58.00	-27.40		1,9314	1.7634	-0.16802	9
2 12 72	290.75	150.00	-140.75		2.4635	2.1761	-0.28743	10
2 15 72	51.70	52.00	0.30		1.7135	1.7160	0.25187E-02	11
2 21 72	195.40	121.00	-74.40		2.2909	2.0828	-0,20814	12
2 24 72	74.30	76.00	1.70		1,8710	1.8808	0.98429E-02	13
2 21 12	137.70	111.00	-46,70		2.1978	2.0453	-0.15251	14
3 1 72	137.30	131.00	- 24 - 20		2.1383	1.9191	+0.21922	15
3 7 72	171.80	127.00	-30,20		2.1903	2.0828	-0.13121	10
3 10 72	157, 50	122.00	- 35, 50		2.1971	2 0864	-0.11092	10
3 16 72	64.00	88.00	24.00		1.8062	1-9445	0-11830	19
3 19 72	83.50	69.00	-14.50		1.9217	1.8388	-0.42837E-01	20
3 22 72	54.20	43,00	-11.20		1,7340	1.6335	-0.10052	21
4 15 72	105.70	122.00	16.30		2.0241	2.0564	0.622876-01	22
4 18 72	177.80	117.00	-60.80		2.2499	2.0682	-0.18174	23
4 21 72	145-80	85.00	-60.80		2.1637	1.9294	-0.23433	24
4 27 72	61.50	68.00	6.50		1.7889	1.8325	0.43633B-01	25
4 30 72	142.60	118.00	-24.60		2.1541	2.0719	-0.62231E-01	26
5 9 7 2	56 50	64.00	7 60		2.4490	2.2148	-0.23415	27
5 15 72	107-60	91.00	-16 60		2 0318	1 0500	-0 727628-01	20
5 18 72	142.00	147-80	5.00		2.1523	2 1673	0 150308-01	29
5 21 72	166.20	126.00	-40-20		2,2206	2.1004	-0.12026	31
5 24 72	201.50	115.00	-86.50		2.3043	2.0607	-0.24358	32
5 27 72	206.20	133.00	-73.20		2.3143	2.1239	-0-19044	33
6 2 72	237, 10	174.00	-63.10		2,3749	2.2405	-0.13438	34
6 11 72	89.00	64.00	-5.00		1.9494	1.9243	-0.251102-01	35
6 14 72	107.40	106.00	-1_40		2.0310	2.0253	-0.56915E-02	36
6 17 72	83.20	67.00	-16.20		1.9201	1.8261	-0.94045E-01	37
7 11 72	200.00	106.00	-94.00		2.3010	2.0253	-0.27572	38
7 29 72	56 40	48.00	+93.50		2.1508	1.6812	-0.46951	39
8 1 72	147 40	101 00	-11 20		7 1507	1.8421	0.938316-01	40
8 7 72	93.80	85-00	-9.80		1 6772	1 0 2 0 4	-0. (37695-01	41
8 10 72	113.80	116-00	2.20		2.0561	2 0645	0 830752-01	44
8 16 72	149.80	107.00	-42.80		2.1755	2.0294	-0.14612	4.3
8 19 72	76.90	60.00	-16.90		1.8859	1.7782	-0-10777	45
8 22 72	143,70	106.00	- 37.70		2.1575	2.0253	-0.13215	46
8 25 72	121.50	114.00	-7.50		2.0846	2.0569	-0.27671E-01	47
8 31 72	169.80	137.00	-32.80		2.2299	2.1367	-0.93208E-01	48
9 3 72	33.60	24.00	-9.60		1.5263	1.3802	-0.14610	49
9 9 72	43.60	44.00	0.40		1.6395	1.6435	0.39902E-02	50
9 12 72	59 47	114.00	-13,10		2.1041	2.0569	-0.47233E-01	51
9 21 72	112 10	59.00	-0.60		1.//52	1.7709	-0.43764E-02	52
		31.00	-21.10		2.0490	1.9390	-0.903556-01	53
N 77 A.V.	111 07							
CODELLETION CO	120.97	90.30					-0.10234	
CORRECTORIES C	JE BECT SITTIN.	V.041 C CTRITCUT ITND	BTDED COM TO .		Buballey anters			
		o Stearcol rier	FIRST SET IS I	NOT FORCED	THROUGH ORIGIN	, SECOND	SET IS PORCED	
INI	FERCEPT	SLOPE	EBROR STD DEV					
	28.49	0.534	16 34					
	0.00	0.725	10.34					
T VALUE FOR TH	ST OF BETA	7.6 DEGRENS	OF FREEDOM	51				
ANALYSIS OF LO	)GS		5. 185690G					
MEAN DIFFERENC	E +0.10234							
T-STATISTIC	-6.76							
STD DLV	0.11015							
DEGREES OF FRI	EDOM 52							

			(d) Station	5			
DATE	¥4 1	GF	GF- 14 1	LOG (#41)	LOG (GF)	LOG (GP) - LOG (N4	1}
5 18 71	63.00	58.00	-5.00	1.7993	1.7634	-0.35913E-01	1
G 24 71	128.00	139-00	11.00	2.1072	2.1430	0.35806E-01	2
9 30 71	127.00	69.00	-58.00	2.1038	1.8368	-0.260052-01	د
10 2 71	114.00	122.00	4.00	2.0569	2.0864	0.29454E-01	5
10 6 71	111.00	112.00	1.00	2.0453	2.0492	0.389588-02	6
10 9 71	51.00	49.00	-2.00	1.7076	1.6902	-0.17374E+01	7
10 12 71	112.00	98.00	-14.00	2.0492	1.9912	-0.57992E-01	â
10 16 71	152.00	156.00	4.00	2.1818	2.1531	0.11281E-01	9
10 21 71	130.00	108.00	-22.00	2.1139	2.0334	-0.80520E-01	10
10 27 71	145 00	126 00	-19.00	2 3614	2 1004	-0.602052-01	12
10 30 71	177.00	183.00	6.00	2,2460	2.2625	0.14479E-01	13
1 13 72	71.00	65.00	-5.00	1.6513	1. 8 195	-0.31714E-01	14
1 16 72	48.00	45.00	-3.00	1.6812	1.6532	-0,280282-01	15
1 19 72	106.00	125.00	19.00	2.0253	2.0969	0.716048-01	16
1 22 72	74.00	74.00	0.00	1-8692	1.0692	0.00000	17
2 3 72	68.00 68.70	111.00	-2.70	1.9445	2.0453	0.10084	10
2 15 72	80.40	68.00	-17 40	1 9052	1 8325	-0.240385-01	20
2 21 72	116.60	102.00	-14-60	2.0667	2-0086	-0.58090E-01	21
2 24 72	118.40	113.00	-5.40	2.0733	2.0531	-0.20268E-01	22
2 27 72	93.90	a5.00	-8-90	1.9727	1.9294	-0.43240E-01	23
3 1 72	в2.20	71.00	-11,20	1,9149	1.8513	-0.63609E-01	24
3 4 72	122.80	114.00	-8.80	2.0892	2.0569	-0.32282E-01	25
3 7 72	108.50	99.00	-9.50	2.0354	1.9956	-0.39795E-01	26
3 10 72	F19.00	114.00	-5.00	2.0/55	2.0569	-0.38643E-01	27
4 6 72	120-60	139.00	18-40	2.0813	2 14 30	0.616768-01	20
4 12 72	140.80	181.00	40.20	2.1486	2. 2577	0.10909	30
4 15 72	98.20	131.00	32.80	1,9921	2.1173	0.12516	31
4 16 72	108.20	113.00	4.80	2.0342	2,0531	0.18854 <u>2</u> -01	32
4 21 72	109.10	121.00	11.90	2.0378	2.0828	0.44971E-01	33
4 27 72	89.60	115.00	25,40	1.9523	2_0607	0,10840	34
4 30 72	127 10	105.00	3.00	2.0128	2.0253	0.12469E-01	35
5 9 72	71-50	60.00	- 11- 50	1.8543	1,7782	=0.76155¥=01	30
5 15 72	96.30	108.00	11.70	1.9836	2.0334	0.49811E-01	36
5 18 72	218.70	248.00	29.30	2.3396	2.3945	0.54605E-01	39
5 21 72	173.20	182.00	8.80	2.2385	2.2601	0.21526E-01	40
5 24 72	159.00	194.00	35.00	2.2014	2.2878	0.864052-01	41
5 41 12	129.20	140.00	10.80	2.1113	2.1461	0.34868E-01	42
6 11 72	65 20	94 00	28 80	1 8143	2.1072	0.18/2/6-01	43
6 17 72	79.30	74.00	~5.30	1.8993	1.8692	-0.300252-01	44
6 20 72	102.00	93.00	-9.00	2.0086	1.9685	-0.40116E-01	46
6 29 72	100.40	120.00	19.60	2.0017	2.0792	0.77455E+01	47
7 8 72	71.50	108.00	36,50	1.8543	2.0334	0.17912	48
7 11 72	135.50	141.00	5.50	2.1319	2.1492	0.17280E-01	49
7 14 72	100.20	126 00	+0.20	2.0009	2.0000	-0.86403E-03	50
7 24 72	49.00 51.60	68 00	16 40	1 7126	2.1335	0.43634	51
8 1 72	94,90	129.00	34.10	1,9773	2.1106	0.13333	57
8 7 72	24.90	80.00	55.10	1.3962	1,9031	0.50692	54
8 10 72	47.40	96.00	48.60	1.6758	1,9823	0.30651	55
8 13 72	91_80	133.00	41.20	1.9628	2.1239	0.16102	56
8 16 72	101, 20	95.00	-6.20	2.0052	1,9777	-0.27453E-01	57
5 19 72	69.60	79.00	9,40	1.8426	1.8976	0.55033E-01	58
0 22 72 A 25 72	21 20	103.00	22.20	1.9074	2,0128	0.10544	59
6 31 72	75.00	145 00	34.80	1.0323	2.1004	0.24790	60
9 3 72	30.70	31.00	0.30	1,4871	1.4914	0-423348-02	62
9 9 72	41.60	33.00	-8.60	1.6191	1.5185	-0.10055	63
5 12 72	93.80	131.00	37.20	1.9722	2.1173	0.14508	64
9 21 72	76.40	101.00	24-60	1.8831	2,0043	0.12124	65
9 24 72	61.00	71.00	10.00	1.7853	1.8513	0.65928E-01	66

HEAN 97.10 107.58 0.45930E-01 CORRELATION COEPFICIENT 0.812 COEFFICIENTS OF BEST FITTING STBAIGHT LINE --FIEST SET IS NOT FORCED THROUGH OBIGIN, SECOND SET IS FORCED

---- 522 15 60T INTERCEPT SLOPE ERROB STD DEY -0.11 1.109 16.58 0.00 1.108 16.45 T VALUE FOR TEST OF BETA 1.2 DEGREES OF FREEDOM 64 ANALISIS OF LOGS--MEAN DIFFEBRICE 0.459302-D1 T-STATISTIC 3.00 STL DEY 0.12130 DEGREES OF FREEDOM 65

(e) Station 6

DATE	941	GP	G2-¥41			LOG (M4	1)	LOG (GE)		LOG (GF) + LOG (94	11
8 25 71	106.00	111.00	5.00			2-0253		2.0453		0.200178-01	·' 1
9 15 71	128-00	106.00	-22-00			2.1072		2.0253		-0.219030-01	
5 24 71	38 00	46 00	8 00			1 5769		1 66 29		0 020128-01	
12 8 71	143.00	156 00	10.00			2 1622		2 10 21		0.029/36-01	
12 20 71	93.00	00.00	15 00			2. 1323		24 1931		0.408372-01	4
12 20 71	83.00	120 00	15.08			1-9191		1.9912		0.72148E-01	5
12 29 71	92.00	136.00	45.00			1.9638		2.1399		0.17609	- 6
1 4 72	101.00	111.00	10.00			2.0043		2.0453		0.41001E-01	7
1 16 72	66.00	96.00	30.00			1.8195		1.9823		0,16273	8
3 16 72	106.60	90.00	-16.60			2.0277		1.9542		-0.735052-01	9
3 19 72	66.60	62.00	-4.60			1.8235		1.7924		-0.310678-01	10
3 22 72	62.40	54.00	-8-40			1.7952		1.7324		-0.627502-01	11
3 25 72	34.00	37-00	3.00			1.5315		1 5662		0 367228-01	12
3 29 72	102.00	100 00	-2.00			2 0086		2 8000		-0.950038-03	
u 472	141 70	126 00	-15 70			2.0000		2.1000		-0.039936-02	13
0 6 72	107 70	120.00	-13.70			2.1314		2.1004		-0.309978-01	14
4 0 72	107.10	109.00	1.30			2.0322		2.0374		0.52137E-02	15
4 9 72	81.80	12.00	-9.80			1.9127		1,8573		-0.55404E-01	16
4 12 72	202.80	149.00	-53.80			2.3071		2.1732		-0.13387	17
4 15 72	98.00	99.00	1.00			1.9912		1,9956		0.44088E-02	18
4 13 72	14.3+ 20	109,00	- 34, 20			2.1559		2.0374		-0.11852	19
4 21 72	73.00	63.00	-10,00			1.6633		1.7993		-0.63962E-01	20
4 27 72	77.90	86.00	8.10			1.8915		1.9345		0.42970E+01	21
4 30 72	118.20	87.00	- 31.20			2 0726		1 9395		-0.13310	22
5 1 72	97 70	82 00	-15 20			1 0077		1 0120		-0.139467.01	24
5 6 22	202 70	147.00	-54 70			2 3000		2 2 2 2 2 2		-0.738496-01	23
5 0 72	203.70	147.00	-30.70			2.3090		2. 16/3		-0.14167	24
5 15 12	/9.20	00.10	-15.20			1.6987		1.7993		-0.993802-01	25
5 15 72	103.30	100.00	-3.30			2.0141		2.0000		-0.14087 <u>E</u> -01	26
5 16 72	172.80	156.00	-16.80			2.2375		2.1931		-0.44411E-01	27
5 21 72	141_40	121.00	-20.40			2.1504		2.0628		-0.67658E-01	28
5 24 72	182.40	172.00	-10.40			2.2610		2.2355		-0.25493E-01	29
6 2 7 2	164_30	107.00	-57.30			2.2156		2.0294		-0.18624	30
6 8 72	239.30	160.00	-79.30			2.3789		2.2041		-0.17482	31
6 14 72	115.00	89.00	-26.00			2 8607		1 90 66		-0 11131	27
6 17 72	94-30	66.00	- 28 30			1 9745		1 4105		-0 15005	32
6 26 72	136 10	91 00	-45 10			3 4320		1.0133		-0.15495	22
6 29 72	90 70	99 00	-43.10			2.1339		1.9590		-0.17481	34
7 7 77	93 10	00.00	-2.10			1.9576		1.9445		-0.13121E-01	35
7 0 70	83.10	98.00	14.90			1.9196		1,9912		0.716382-01	36
7 41 70	67.50	89.00	21.50			1.8293		1.9494		0.12009	37
2 11 72	167.10	132.00	-35-10			2.2230		2.1206		-0.10240	38
· 7 14 72	165.30	107.00	- 58. 30			2,2183		2.0294		-0.18888	39
7 20 72	173.90	120.00	+53.90			2.2403		2.0792		-0.16111	40
8 1 7 2	162.20	132.00	-30,20			2.2100		2.1206		-0.894752-01	41
6 10 72	154.10	142.00	-12.10			2.1478		2.1523		-0 35508F-01	42
6 13 72	146.80	127-00	- 19, 80			2-1667		2.1034		-0 629138-01	42
8 16 72	168,90	110.00	-58-90			2 2276		2 04 14		-0.19633	4.5
8 19 72	95-40	287.00	191 40			1 0705		A . V . I .		0.10040	
A 22 72	127 10	101 00	-23.10			1 2 1 2 2 2 2 2		2.4379		0.47834	45
6 31 72	100 20	120.00	-23.10			2.1041		2.0170		-0.8/104E-01	46
6 7 72	150.20	120-00	-70.20			2.2192		2.0792		-0.20003	47
9 3 72	10.90	23-00	-12.90			1.5551		1.3617		-0.19335	48
9 6 72	199-00	133.00	-66.00			2.2989		2.1239		-0.17500	49
5 9 72	40.90	36.00	-4,90			1.6117		1.5563		+0.55405E-01	50
9 12 72	136.40	119.00	-17.40			2,1348		2.0755		-0.592628-01	51
9 18 72	57.30	50.00	-7,30			1.7581		1.6990		-0.59161E-01	52
9 21 72	97.00	75.00	-22.00			1.9468		1 8751		-0 11171	5.2
9 24 72	83.40	102.00	18-60			1.9212		2 0086		0.974412-01	55
			19440			1. 32 12		2.0000		0.0744 (2-0)	24
M E AN	117.46	104.69									
COBRELATIO	COEFFICIENT	0.638								-0.440232-01	
COEFFICIEN	S OF BEST FITTING	STRATCHT ITHE		TC 10.0	RODORS	#NDODC"	0.0.7.0.7.**	6 D.00 V.5	<b>e</b>	10	
		STRAIGHT FIRE	rimai agr	10 101	FORCED	TAROUGH	ORIGIN,	SECOND	SET	15 FORCED	
	INTERCEPT	SLOPE	TUDAD CTA	n ev							
				<b>P</b> 51							
	10.67	0.800	27.	12							

 10.67
 0.800
 27.12

 0.00
 0.882
 26.98

 T VALUE FOR TEST OF BETA
 1.3
 DEGREES OF FREEDOM
 52

 AMALYSIS OF LOGS- MEAN DIFFERENCE
 -0.44823E-01
 52

 T-STATISTIC
 -2.80
 53
 53

(f) Station 7

DATE	90 1	C.9	C R - H/r 1				
8 10 71	122 00	130 00	61-141	LOG (N4 I)	LDG (GF)	LOG (GF) - LOG (W	41)
9 16 71	132.00	120-00	-12.00	2.1206	2.0792	-0.413938-01	· 1
0 16 71	65.00	65.00	20.00	1.6129	1.9294	0.11651	
0 19 71	167.00	152.00	-15.00	2. 2777	2 16 19	-0.400737 01	
8 25 71	98_00	95 00	-2.00	1 40.17	2-1010	-0.408/32-01	3
8 31 71	166 00	155 00	-3.00	1*3315	1,9777	-0.13503E-01	4
	188.00	199*00	-11.00	2.2201	2.1903	-0.297772-01	- 5
2 0 /1	124.00	73.00	-51.00	2.0934	1.8633	-0.23010	
9 12 71	54.00	29_00	-25 00	1 7334	1 86 34	-0.25010	0
9 15 71	120 00	100 00	20.00	1.7324	1.4024	-0.27000	7
9 10 11			-20.00	2.0752	2.0000	-0.791812-01	6
16 11	146.00	151.00	5.00	2.1644	2.1790	0.146258-01	
9 24 71	42.00	51.00	9.00	1 6232	1 70.75	0.000000.01	
9 30 71	158.00	195 00	27.00	1+0232	1. 7076	V.64321E-01	10
10 2 11	126 00		21.00	2.1907	2.2672	0.68515E-01	11
10 6 70	120.00	132.00	6,00	2,1004	2.1206	0.202048-01	12
14 6 /1	49.00	51.00	2.00	1_6902	1.7076	0 171708-01	
10 9 71	44.00	37.00	-7-00	1 64 75	1 5640		
10 12 71	88.00	75 00	13.00		. 2002	-0.752528-01	14
10 19 71	160.00	10.00	-13.00	1.9445	1.8751	-0.69422E-01	15
	129-00	145.00	-14.00	2.2014	2.1614	-0.40029F-01	16
10 21 71	164.00	149.00	- 15,00	2.2148	2.1732	-0 416578-01	17
10 24 71	113.00	98-00	-15 00	2 0623	1 0043	-0.410375-01	
10 27 71	179 00	111 80	13400	2-0331	1.9912	-0.618528-01	18
10 10 21	123.00	111.00	- 18-00	2.1106	2.0453	-0.65268£-01	19
10 30 11	192+00	210.00	18.00	2,2833	2.3222	0.389188+01	20
11 2 71	84.00	76.00	-8.00	1 9243	1 6606		
11 5 71	- 79_00	26 00	-3 00	1 007/	1.0008	-0.434002+01	<b>∠</b> ₹
11 11 21	93 00	11( 00	-5.00	.09/0	1-6908	-0.168138-01	22
13 34 34	33.00	110.00	23.00	1.9685	2.0645	0.95975E-01	23
12 20 71	42.00	40.00	-2.00	1.6232	1.6021	-0 211908-01	20
1 22 72	66.00	65.00	- 1, 00	1 8 195	1 0 1 20	-0.463007.00	24
1 25 72	166-00	151 00	-15 00	2 2262	1.0123	-0-001038-05	25
1 24 72	54 00	36.00	-13.00	2.2201	2.1790	+0.41131E-01	26
	30.00	/5.00	19.00	1.7482	1.8751	0.12687	27
2 3 12	62.00	55.00	-7.00	1.7924	1.7404	-0 520308-01	20
2 6 72	41.50	37.00	-4 50	1 (190	1 5(00	-0.320305-01	40
2 9 77	117 80	116 00	1.00	1.0100	1.0082	-0.49847E-01	29
2 12 12		10.00	-1.80	2.0711	2.0645	-0.66757E-02	30
14 12	164.40	176.00	11.60	2.2159	2.2455	Q. 296148-01	31
2 15 72	51.20	47.00	-4.20	1.7093	1 6721	0 333662-04	31
2 21 72	123.10	103.00	- 20 10	2 0000	1.0/21	-0.371668-01	32
2 24 72	71 50	105100	- 20. 10	2.0902	2.0128	-0.774132-01	33
3 37 75	13.30	69.00	-4_50	1.8663	1.8386	-0.27438E-01	34
2 23 72	105.20	90.00	- 15, 20	2.0220	1 9542	-0 677718-01	36
3 1 72	93-20	68.00	-25,20	1 0400	4 0305	-0-01//10-01	33
3 4 72	126.00	112 00	- 14 00	14 5 0 5 4	1-0323	-0.13690	36
3 7 7 7	100 00	12.00	- 14.00	2.1004	2.0492	-0+51152E-01	37
	100.90	33.00	-1.90	2.0039	1.9956	-0-824938-02	38
3 10 72	148.00	90.00	-58.00	2.1703	1.9542	-0 21602	20
3 16 72	88.40	85.00	-3.40	1 0444	1 0 3 9 4 2	-0.21002	19
3 19 72	87 50	86 00	1 50	1. 3484	1.9294	+0.170262-01	40
3 33 93		00.00	-1.50	1.9420	1.9345	-0.75102E-02	41
3 44 14	50.50	46.00	-4.50	1.7033	1.6626	-0.405348-01	40
3 25 72	35.90	41.00	5.10	1.5551	1 6178	6 53300p-04	
3 28 72	77.90	85.00	7 10	1 0015	1.0110	0.311042-01	43
A 372	111 50	106 00	2.10	1-0913	1.9294	0.37690E+01	44
	111.30	100.00	+ 5. 50	2.0473	2.0253	-0.219698-01	45
4 5 72	109.20	105.00	-4.20	2.0382	2.0212	-0.170318-01	44
4 9 7 2	91.60	81.00	-10-60	1 9619	1 0005	0.170312-01	40
4 12 72	179.10	175 00	-4 +0	1, 90 1 9	1-1005	-0.51399E-01	47
6 15 72	101 00	107 00	-4.10	2.2031	2.2430	-0+10052E-01	46
	101.00	107_00	5.20	2.0077	2,0294	0.216498-01	4.9
4 18 72	115.60	114.00	-1.60	2.0629	2-0569	-0 60434E-03	E0
4 21 72	127.40	117.00	-10.40	2 1052	7 0603	-0.004345-02	20
4 27 72	76.70	73.00	-3 70	1 00/0	2.0002	-0.369/8E-01	51
4 30 72	130 17	121 00	-3070	1.0048	1.9011	-0.21468£+01	52
6 3 75	130.10	131.00	0.90	2.1143	2.1173	0.30022E-02	53
3 3 7 2	95.40	92.00	-3.40	1,9795	1.9638	-0.157547-01	6.0
5 24 72	158.10	163.00	4-90	2 1000	2 2422		54
5 27 72	139.70	132.00	-7 70	0 1050	246422	0.132625-01	22
6 2 7 2	121 50	00.00		2.1432	2.1206	-0_24619E-01	56
6 9 73	121, 30	30.00	-23.30	2.0846	1.9912	-0.93349E-01	57
0 0 12	133.20	131.00	-2.20	2.1245	2. 1173	-0 722948-03	c ó
6 11 72	56.80	67.00	10.20	1.7543	1 8741	0 117510 01	50
6 14 72	81.20	61.00	-20 20	1 0006	1 7660	0-11121E-01	28
6 17 72	86, 60	77 00	-0 40	1.9090	1- /853	-U.12422	60
6 20 72	04 70	11 00	- 7+ 60	1.9375	1.8865	-0.51015E-01	61
6 96 99	34,70	71.00	-23.70	1.9763	1.8513	+0.12509	62
0 20 72	10.00	91.00	21.00	1_8451	1 9590	0 11304	
6 29 72	88.70	100_00	11-30	1 9479	2 0000		03
7 2 72	80.80	104 00	72.20	1-34/9	2.0000	0.520808-01	64
7 4 7 7	60.00	1044.00	23.20	1.9074	2.0170	0.10964	65
	80.90	118.00	57.10	1.7846	2.0719	0.28728	66
/ 11 /2	116.00	118.00	2.00	2-0645	2 07 19	0 70 330 8-03	67
7 14 72	103.30	85-00	-18.30	2 0141		0.142345-02	01
7 20 72	111 30	114 00	. 16 30	2.0141	1.9294	+0.8466BE-01	68
7 24 72	110 00	110.00	- 13.30	2.1183	2.0645	-0.53796E-01	69
	110.00	113-00	9.00	2.0414	2.0755	0.341548-01	70
8 1 72	113.00	109.00	-4.00	2,0531	2.0374	-0 156530-04	
8 7 72	60.70	60.00	-0.70	1 7933	1 7760	-0.100326-01	11
8 10 72	48.50	70 00	21 60	1. 18.12	1.7782	-0.50316 <u>E-02</u>	72
0 16 22	133 40	10.00	21.30	1.6857	1.8451	0.15936	73
0 10 72	132.40	101.00	-31.40	2.1219	2.0043	-0-11756	20
6 19 72	108.20	88.00	-20.20	2.0342	1 0005	0 007440 00	11
8 22 72	107,50	100.00	-7.50	3 0 3 4 4	1. 2773	-0.89741E-01	15
8 11 72	120.40	112 00	-1.00	2-0314	∠.0000	-0.31408£+01	76
0 0 10	33 40	12.00	-0.40	2.0806	2.0492	-0.31403R-01	77
3 3 7 4	32.00	24.00	-8_60	1.5132	1-3802	-0.13299	70
9 6 72	107.00	94.00	-13.00	2.0204	1 0 7 7 1	_0 66 56 4 4 4	10
9 9 72	21.60	27.00	5 40	4 3344	1-3/31	-n* 20%208-01	79
9 12 72	152 70	150 00	- 2 70	1.3344	1,4314	0.96957E-01	80
0 10 70	11 EQ	134.00	-2.70	2.1838	2, 1761	-0.77457E-02	81
9 10 72	41-50	53.00	11.50	1,6180	1.7201	0-10623	
9 21 72	90.30	86.00	-4.30	1.9557	1 9 3 4 5	-0 3113-5 55	02
9 24 72	71.10	61.00	-10 10	1 05 10	1.9343	+v. 21174E-01	83
		····	-10.10	1.8519	1.7853	-0.665252-01	84
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HEAN 100.57 96.37 -0.18097E CORRELATION COFFFICIENT 0.914 COFFFICIENTS OF BEST FITTING STRAIGHT LINE --FIRST SET IS NOT FORCED THBOUGH OHIGIN, SECOND SET IS FORCED -0.18097E-01 INTERCEPT SLOPE ERROR STD D.29 -1.74 0-976 11.43 0.00 0.960 11.37 T VALUE FOR TEST 07 BETA 0.51 DEGREES OF FREEDOM 82 NALVSI OF LOGS--REAM DIFFIGENCE -0.18097E-01 T-STATISTIC -2.03 STD DEV 0.81722E-01 DEGREES OF FREEDOM 33

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(g) Station 8

D1 77 V	<b>F</b> A 1	GP	62+941		LOG (941)	LOG (GE)	1.067623-1.067241	1
0 10 71	152 00	179 00	11 00		2.1818	2 1430	-0 386255-01	' 1
6 7 7 7 1	86 00	62.00	- 24.00		1.9345	1.7924	-0.14211	ż
0 22 71	91 00	78 00	-3.00		1 9095	1 6921	-0 163908-01	- î
0 25 71	113 00	70.00	- 33.00		2 6492	1 9976	-0 15150	
9 0 71	107 00	172.00	-25.00		7 7945	2 2355	-0 590398-01	-
9 18 71	197-00	1/2.00	-25.00		2.2945	4.4333	-0.303305-01	2
9 24 71	36.00	00.00	12.00		0.0210	1.0323	0.043205-01	-
9 30 71	270.00	233.00	-37.00		2.4314	2. 3674	-0.640088+01	
10 21 71	166.00	127,00	-39+00		2.2201	2.1038	-0.11630	8
10 27 71	112.00	91.00	-21.00		2.0492	1.9590	-0.90178E-01	9
10 30 71	236.00	205.00	-31.00		2.3729	2.3118	-0.61157E-01	10
11 2 71	72.00	68.00	-4.00		1.8573	1.6325	-0.248248-01	11
11 5 71	69.00	68.00	-1.00		1.8388	1.8325	-0.63410E-02	12
11 11 71	75.00	107.00	32.00		1.8751	2.0294	0.15432	13
11 17 71	128.00	131.00	3.00		2.1072	2.1173	0.10062E-01	14
12 2 71	78.00	113.00	35.00		1.8921	2.0531	0.16098	15
12 . 71	55-00	72.00	17.00		1.7404	1.8573	9, 11697	16
15 11 71	54.00	63.00	9.00		1.7324	1.7993	0.669478-81	17
1 16 73	43.00	39 00	-4.00		1 6115	1 5011	-0 424038-01	10
1 10 72	43.00	100.00	-4.00		1 0065	3 0007	0 11251	10
1 19 72	77.00	100.00	23,00		1.0000	1 7701	0.11331	70
1 22 72	80.00	69.00	-20.00		1-9031	1.//82	-0, 12494	20
1 25 72	123,00	109.00	-14.00		2.0899	2.0374	-0.52479E-01	21
1 28 72	52.00	64.00	12.00		1.7160	1.8062	0.901782-01	22
2 3 72	52.00	44.00	-8.00		1.7160	1,6435	-0.72550E-01	23
2 6 7 2	4 <b>1.</b> 10	126,00	84.90		1.6138	2.1004	0,48655	24
2 9 7 2	161.90	39.00	-122.90		2,2092	1.5911	-0.61818	25
2 12 72	240.50	157.00	-83.50		2.3811	2.1959	-0.18522	26
2 15 72	50.80	35.00	-15.80		1.7058	1.5441	-0.16177	27
2 21 72	93.10	65.00	- 28, 10		1,9689	1.6129	-0-15602	28
2 24 72	103 00	84 00	-19 00		2.0128	1.9243	-0 995572-01	20
2 2 7 7 2	96 30	66 00	- 20 30		1 9360	1 9105	-0 11645	30
2 21 12	60-30	00.00	-20.30		1.3300	1.0193	-0.11043	20
3 1 72	3/.00	84.00	20.20		1.7013	1.9243	0.10238	31
3 4 72	105.70	05-00	-20.70		2.0241	1.9294	-U.94653E-01	32
3 7 72	80.50	79,00	-1.50		1.9058	1.8976	-0.816828-02	33
3 10 72	115.70	95.00	-20.70		2.0633	1.9777	-0.85607E-01	34
3 16 72	94.70	78.00	-16.70		1.9763	1.8921	-0.84251E-01	35
3 19 72	90.00	98.00	8.00		1,9542	1.9912	0.369845-01	36
3 22 72	37.50	31.00	-6,50		1,5740	1.4914	-0.82670E-01	37
3 25 72	35.40	38.00	2,60		1.5490	1.5798	0.308002-01	38
3 28 72	143.40	167.00	23.60		2.1565	2.2227	0.66173E-01	39
4 3 72	112, 90	96.00	- 16, 90		2.0527	1,9823	-0.70416E-01	00
4 6 72	79-30	126-00	46.70		1,8993	2.1004	0.20111	41
4 6 77	138 10	110 00	- 29 10		2 1402	7 04 14	-0 997948-01	u 2
A 12 72	220.20	103 00	- 20, 10		2 2602	2 2625	-0.907946-01	44
4 4 74	123.20	103.00	-40.20		2.3802	2.2023	-0.9//610-01	43
4 13 72	127-00	121.00	-0.00		2.1038	2.0828	-0.210188-01	44
4 16 72	76.40	66.00	-10.40		1.8631	1-8195	-0.63540B-01	45
4 21 72	76.50	58.00	-18,50		1,8837	1.7634	-0.12023	46
4 27 72	158.10	156.00	-2.10		2.1989	2.1931	-0.580025-02	47
4 30 72	147.00	116.00	-31.00		2.1673	2.0645	-0.10286	48
5 3 72	109.70	97.00	-12.70		2,0402	1.9860	-0.53432B-01	49
5 15 72	73.90	68.00	-5.90		1,8686	1.8325	-0.361272-01	50
5 18 72	175.50	144.00	-31.50		2.2443	2.1584	-0.85915g-01	51
5 21 72	169.20	145.00	-24.20		2.2284	2.1614	-0.67030E-01	52
5 24 72	339.50	252.00	-87.50		2.5308	2.4014	-0.12944	53
5 27 72	177.60	133.00	-44.60		2.2494	2. 12 39	-0.12559	54
6 2 72	86-20	78.00	+8.20		1 9355	1 89.21	-0 114062-01	5.5
6 9 72	150 00	106 00	_#9.60		2 1000	2 0252	-0.454005-01	55
6 11 72	33 70	64 00			4 3520	1 8040	-0.104/4	
6 10 72	42.70	54.00	41.50		1.3300	1.0002	0.43017	21
2 17 72	140 20	20.00	- 11.90		1.0440	. /0.34	-0.810392-01	29
0 1/ /2	110.60	A3*C0	-17,60		2.0437	1.9685	-0./5263E-01	59
6 40 72	69.60	113.00	43.40		1.8426	2,0531	0.21048	60
6 26 72	62.60	54.00	-d_60		1.7966	1.7324	-0.641648-01	61
6 29 72	101.00	100.00	-1.00		2.0043	2.0000	-0_43211E-02	62
7 2 72	64.60	33.00	-31,60		1.6102	1,5185	-0.29170	63
7 8 72	64.40	80.00	15.60		1.8089	1.9031	0.94214E-01	64
7 11 72	109.70	103.00	-6.70		2.0402	2.0128	-0.27367E-01	65
7 14 72	87.80	76.00	-11.80		1.9435	1.8508	-0.62665E-01	66
7 20 72	134.60	412.00	277.40		2.1290	2-6149	0_48586	67
7 29 72	96_00	69.00	-7.00		1.9871	1.9556	-0 378878-84	69
8 1 72	106.10	nn 00	-7 10		2 0257	1 0054	-0 300709-01	20
a 25 75	1 1 20	57.0V 6/ 00	10 70		1 0101	1 0721	-0*20010E-01	70
5 23 72	70	73.00	-0.00		1 0507	1.0731	4.0J9345-01	70
0 6 7 7	72.40	32.00	-0.40		1.009/	1.05/3	-0.235068-02	11
9 9 72	31.00	36.00	5.00		1.4914	1.5563	0.64941E-01	72
9 18 72	40.90	53.00	12.10		1.6117	1.7243	0,11257	73
9 21 72	68.70	75.00	6.30		1.8370	1.8751	0.381108-01	74
9 24 72	53.90	48.00	-5.90		1.7316	1.6812	-0.50335g-01	75
MEAN	104.56	99.01					-0.19363E-01	
CORRELATION	COEFFICIENT	0.709						
COEFFICIENT	S OF BEST FITTING	STRAIGHT LINE	FIRST SET	IS NOT FOR	CED THROUGH ONTO	IN, SECOND	SET IS PORCED	
	INTERCEPT	SLOPE	ERROR STD	DEV				
		24462	Denva BID					
	-3 36	0 979		60				
	0.00	0.060	21					

-3.36 0.979 31.60 0.00 0.953 31.41 T VALUE FOR TEST OF BETI 0.16 DEGREES OF FREEDOR 73 ANALVSIS OF LOGS--MEAN DIFFREENCE -0.19363E-01 I-STATISTIC -1.09 STD DEV 0.15410 DEGREES OF FREEDON 74

			(h) Station	. 9			
DA T E	941	GP	GP-#41	LOG (¥41)	LOG (GF)	LOG (GF) - LOG (NH 1)	
8 16 71	122.00	128.00	6.00	2.0864	2.1072	0.208508-01	1
6 28 71	133.00	122.00	-11.00	2.1239	2.0864	-0.374938-01	2
8 31 71	133.00	149.00	16.00	2.1239	2.1732	0.493352-01	Э
5 15 71	156.00	150.00	-6.00	2.1931	2-1761	-0.17034E-01	4
9 1 7 7 1	157.00	356.00	-1.00	2.1959	2.1931	-0.27742z-02	5
5 21 71	33.00	71,00	16.00	1.7404	1.8513	0.11090	6
9 24 71	60 00	109 00	64.00	2.1/32	2.3264	0.15519	7
9 30 71	140.00	190.00	50.00	3 1061	2.0334	0.25527	8
10 2 71	158.00	164 60	26.00	2,1401	2.2/88	0.13263	. 9
10 6 71	221.00	273.00	52-00	2 3 3 4 4 4	2.2040	0.001005-01	10
10 9 71	86.00	75.00	-11.00	1.9345	1. 4751	-0 59437E-01	12
10 12 71	218.00	214,00	-4.00	2.3385	2.3304	+0.800375-01	17
10 18 71	143.00	161.00	18.00	2.1553	2.2068	0_514918-01	14
10 21 71	130.00	134.00	4.00	2.1139	2.1271	0.13162E-01	15
10 27 71	167.00	197.00	30.00	2,2227	2.2945	0.71750E-01	16
10 30 71	170.00	183.00	13.00	2.2304	2.2625	0.32002E-01	17
11 2 71	204.00	366.00	162.00	2.3096	2,5635	0.25385	18
17 2 71	106 00	138.00	45.00	1-9685	2.1399	0.17140	19
12 8 71	99.00	152 00	53.00	2+2923	2.4425	0.15022	20
12 14 71	87.00	115 00	33.00	1.9956	2.1618	0.14621	21
12 20 71	101-00	213 00	112 00	1.9393	2,0607	0.12118	22
12 26 71	75-00	141.00	66.00	1 9751	2.3204	0.32400	23
1 13 72	92.00	129.00	37.00	1,9638	2.1106	0.2/410	24
1 16 72	85.00	145.00	60.00	1,9294	2 16 14	0.23195	25
1 19 72	140.00	260.00	120.00	2.1461	2 4150	0.26885	27
1 22 72	79.00	119.00	40.00	1.8976	2.0755	0.17792	28
1 25 72	239.00	421.00	182.00	2.3784	2.6243	0,24588	29
1 28 72	154.00	258.00	104.00	2.1875	2.4116	0.22410	30
2 12 72	119.20	244.00	124.80	2.0763	2.3874	0.31112	31
2 13 72	182.90	286.00	103, 10	2.2622	2.4564	0.19416	32
2 21 72	154.40	281.00	116.60	2.2159	2_4407	0.23281	33
2 27 72	175 10	224.00	53.40	2.2320	2.3502	0.11627	34
3 1 72	141 50	181.00	43.90	2.0972	2.2279	0.13064	35
3 4 72	105.10	164 00	59 00	2.1508	2.2577	0.10692	36
3 7 72	198.70	346.00	147.30	2.0210	2,2148	0.19325	37
3 10 72	84.40	114.00	29.60	1. 9263	2,0391	0 13057	38
4 6 7 2	99.20	271.00	171.80	1,9965	2.4330	0,13037 1 0 43646 1	39
4 12 72	108.60	237.00	128.40	2.0358	2. 3747	0.11893	щ <b>1</b>
4 15 72	91.00	236.00	147.00	1.9590	2.3766	0.41754	u 2
4 18 72	123.70	276.00	152.30	2.0924	2.4409	0.34854 4	43
4 21 72	81.20	158.00	76.80	1.9096	2.1987	0.28911	44
4 21 12	79.60	183.00	103_40	1.9009	2.2625	0.36155 4	45
4 30 72	10.00	153.00	77.40	1.8785	2.1847	0.3061a	16
5 15 72	134.10	359.00 289 AA	150.00	2.2669	2,5551	0.28816 4	+7
5 18 72	140_80	358.00	217 20	2.1402	2,4609	0.32071 4	∔B
5 21 72	106.70	223-00	116-30	2,1400	2.3339	0.40529	19
5 24 72	110.20	296.00	185-80	2.0422	2.3403	0.43611	20
5 27 72	13.60	268.00	254.40	1, 1335	2. 4281	1.2646	
6 2 7 2	230.20	526.00	297.80	2.3621	2.7226	0.36053	ŝ.
6 11 72	75.50	171.00	95.50	1.8779	2.2330	0.35505	54
6 14 72	113.30	225.00	111.70	2.0542	2.3522	0.29797	55
6 20 72	123.20	208.00	64.60	2.0906	2.3181	0,22746	i6
0 20 72	141.70	248.00	106.30	2.1514	2.3945	0.24308 5	j7
7 2 72	82.10	193.00	110.30	1.9175	2.2856	0.36806 5	58
7 11 72	136 60	199.00	113.50	1.9320	2.2569	0.36689 5	i9
7 14 72	224 10	221 00	151.10	2.1136	2.4487	0.33510 6	0
7 20 72	177.00	273 00	86 00	2.3504	2.5198	0.16939 6	<u>۱</u>
7 29 72	54.50	62-00	7 50	2.2480	2.4362	0.18819 6	γZ.
8 1 72	115.70	250.00	134.30	2 4633	1.7924	0.339968-01 6	
8 10 72	56.10	149.00	92.90	1.7489	2. 17 12	0.33461 0	1
8 16 72	125.80	195.00	69.20	2.0997	2.2900	0.19036 6	6
5 19 72	80.40	98.00	17.60	1.9052	1.9912	0.859798-01 4	7
o 22 72	96.10	157.00	60.90	1.9827	2.1959	0.21319 6	8
8 25 72	107.50	214.00	106.50	2.0314	2.3304	0.29901 6	9
8 31 72	106.30	190.00	83.70	2.0265	2.2788	0.25223 7	0
5 1 /2 0 6 70	35.40	47.00	11.60	1.5490	1.6721	0.12311 7	1
3 0 72	87.90	169.00	68.10	1.9538	2.2504	0.29667 7	2
5 14 72 5 18 72	97.JU 97.JU	152 00	/1.59	1.9890	2.2279	0.23686 7	3
9 21 77	76.30	123.00	46 70	1.3903	2.1987	0.20833 7	4
9 24 72	141.00	210.00	68.20	2 1517	2.0899	0.20740 7	5
				211211	2,3622	0.17035 7	0

NEAN 123.04 205.45 0.22276 COLRELATION COZFFICIENT 0.689 COLFFICIENTS OF BLST FITFING STRAIGHT LINE --FIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED ERROR STD DEV INTERCEPT SLOPE -67.85 2.222 0.00 1.721 T VALUE POH TEST OF BOT 7.2 NALVSIS OF LOGS--MEAN DIFF286NCE 0.22276 T-STATISTIC 11.10 STL DEV 0.17491 DEGREES OF FREEDOM 75 32.02 33.17 Degrees of Freedom 74

(i) Station 10

DA PZ	W 4 1	GÊ	G2-W41	LOG (W4 1)	LOG (GF)	LOG (GP) - LOC (641)	
8 10 71	288.00	279.00	-9.00	2.4594	2.4456	-0.13768E-01	1
a 22 71	150.00	147.00	-3.00	2.1761	2.1673	-ù.877385-0∠	- 2
8 25 71	201.00	211.00	10.00	2.3032	2.3243	0.21687E-01	3
8 26 71	245.00	166.00	-79.00	2.3892	2.2201	-0.16906	4
5 6 7 1	184.00	134.00	-50.00	2.2648	2,1271	-0.13771	5
9 9 71	135.00	106.00	-27.00	2.1303	2.0334	-0.965102-01	6
5 15 71	164.00	160.00	-4.00	2.2148	2.2041	-0.10724E-01	7
S 18 71	109.00	101.00	-8.00	2.0374	2.0043	-0.331056-01	6
9 24 71	64.00	27.00	-37.00	1.4362	1.4314	-0,17462	9
9 30 71	136.00	151.00	15.00	2.1335	2.1790	0.454392-01	10
10 2 71	115.00	127.00	9.00	2.0719	2.1038	0.319225-01	11
10 6 71	434-00	399.00	-35.00	2.0375	2.6010	-0.365172-01	12
10 9 71	89.00	74.00	-15.00	1,9494	1.8692	-0.80158E-01	13
10 12 71	190.00	170.00	-20.00	2.2788	2.2304	-0.48305E-01	14
10 18 71	162.00	129.00	-33.00	2.2095	2.1106	-0.989252-01	15
10 21 71	178.00	169.00	-9.00	2.2504	2.2279	-0.22533E-01	16
10 24 71	71.00	60.00	-11.00	1.8513	1.7782	-0,73106E-01	17
10 27 71	163-00	161.00	- 2.00	2.2122	2.2068	-D.53606£-02	18
10 30 71	197.00	231.00	34.00	2.2945	2.3636	0.69146E-01	19
11 2 71	195.00	152.00	-43.00	2.2900	2.1818	-0.10819	20
11 14 71	B1.00	113.00	32.00	1.9085	2.0531	0.14459	21
11 17 71	161.00	194.00	33.00	2.2068	2.2078	0.80576E-01	22
12 / 71	196.00	186.00	-10.00	2.2923	2.2695	-0.227428-01	23
12 11 71	86.00	89.00	1.00	1.9445	1.5454	0.49067E-02	24
12 20 71	98-00	137.00	39.00	1.9912	2.1367	0.14549	25
12 26 21	87.00	72.00	-15.00	1.9395	1.8573	-0.32187E-01	26
1 7 72	147 00	159.00	17.00	2.1523	2.2014	0.49109E-01	27
1 13 72	74.00	104.00	30.00	1.0692	2.0170	0.14780	28
1 16 72	86.00	68.00	2.00	1.9345	1.9445	0.99850E-02	29
1 10 72	136 00	143.00	7.00	2.1335	2.1553	0.217972-01	30
1 25 72	224 00	211.00	+13.00	2,3502	2, 3243	-0.259652-01	31
2 1 7 2	104.30	93.00	-11.30	2.0163	1,9685	-0,49788 <i>2</i> -01	32
2 15 72	213 00	247 00	34.00	2. 3284	2.3927	0.64317E-01	33
2 10 12	309 19	131.00	21.81	2.4902	2.5198	0.29606E-01	34
2 21 72	94 10	92.00	7.90	1,9248	1.56.38	0.390032-01	35
3 14 72	07 50	102 00	4 50	1.9890	2.0086	0.19595-01	36
2 2 2 7 2 2	80 10	71 00	-9 70	1.9069	1-4513	-0.55611E+01	37
3 22 72	115 00	110 00	15.00	2.0607	2.1139	0.532466-01	38
5 23 72	122 00	140.00	17 00	2 1206	2. 1732	0.526128-01	39
4 3 72	132.00	199.00	21 00	2.2480	2.2967	0.446935-01	40
• 0 JZ	307.00	277 00	20.00	2.3927	2.4425	0.49783E-01	u 1
4 12 72	247.00	217.00	55 30	2 1951	2.3263	0.11127	42
4 15 72	160.00	100 00	33.50	2 2159	2 2967	0.807682-01	u 1
4 10 72	104,40	102.00	-3 70	2.0441	2.0056	-0. 155456-0 1	44
4 2 1 7 2	67 20	100.00	12.80	1.9405	2.0000	0.594848-01	45
4 27 72	146 60	136 00	- 10 - 60	2-1661	2.1335	-0.32569E-01	46
4 30 72	193.90	198.00	W- 10	2,2876	2.2967	0.909148-02	47
5 6 7 2	200 00	192.00	-8.00	2,3010	2.2833	-0.177256-01	48
5 9 72	123 20	106 00	-17-20	2,0906	2.0253	-0.65302E-01	49
5 15 72	147 50	146 00	-1.90	2-1700	2.1644	-0.56105E-02	50
5 14 72	179 60	196.00	16-40	2,2543	2,2923	0.17955E-01	51
5 21 72	174 50	57 00	-117.50	2.2418	1,7559	-0.48592	52
5 20 72	256 06	275.00	16.94	2.4117	2.4393	0.27607E-01	53
5 24 72	171 60	184.00	12.40	2.2345	2.2648	0.30307E-01	54
5 2 7 7 2	163 80	191 00	17 20	2,2143	2.2577	0.43373E-01	55
6 4 72	274 75	286 00	11 25	2.4369	2.4564	0.174288-01	56
6 11 73	107 00	100.00	-27 90	2.1069	2.0000	-0.10686	57
5 10 71	166 30	313 00	26 70	2,2702	2. 1284	0.581748-01	58
6 14 72	100.00	120.00	-21.00	2 2014	2 1399	-0.615188-01	59
6 20 72	133.00	130.00	26.60	2.2019	2 2014	0 11362	60
0 20 72	122.40	139+00	30.00	1 8468	2 1367	0 15175	61
7 2 72	90.00	140 00	57 20	0.169	2 2065	0 18957	6.2
1 4 12	02 20	102.00	55 80	1 9140	2 1 2 9 9	0 22501	61
7 11 72	192.20	107 00	10 70	2 2609	2 2645	0.336875-01	60
7 11 72	102.30	197.00	18 70	2 2246	2 2742	0 455098-01	65
7 14 72	164 90	100.00	1 20	2 2940	2 2967	0 764748-07	66
1 20 12	130.00	303 00	1+ ±0 511 50	2 4 4 2 3	2.2701	0 13070	60
0 1 14	116 00	207.00	34.30	2.1033	2.3100	0.132/0	64
8 IU 72 a 15 75	110.20	108.00	/1.30	2.0002	2.4/44	0 11007	- 00 - 60
B 13 72	124.00	204.00	40.00	2.1987	1 4611	0.11077	70
0 25 72	57.40	113.00	13.00	000%+F	1 9560	1 2247	71
9 10 72	5,40	91.00	53-50	1 0030	1. 2020	0 600908-01	70
5 21 72	58.40	111.00	14.60	1.3330	2.0331	-0 127665-01	72
5 24 12	127.70	124.00	-3.70	2.1002	4+0934	-N- 12 (00£-01	13

MEAN 152.63 158.64 0.24824E-01 CORBELATION COEFFICIENT 0.681 COLFFICIENTS OF BEST FITTING STRAIGHT LINE --FIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS PORCED

.

 INTERCEPT
 SLOP2
 ZAFOR STD DEV

 6.11
 0.359
 22.81

 0.00
 1.034
 22.70

 1
 VALUE PORTEST OF BETA
 0.91E-02
 DEGRESS OF IRELON

 NALVEST OF LOGS- MARY JIF/JRENCE
 0.24824E-01
 71

 T-STATISTIC
 1.18
 371
 JEV
 0.17913

 DEGRESS OF FREEDOM
 72
 72
 72

(j) Station 12

0       0       1	DATE	141	GF	G£-₩41	LOG (#41)	106 (GF)	LOG (GF) - LOG (¥41	)
8       2       71       92.00       85.00       -4.00       1.55.01       1.55.02       -0.1926.01         9       3       71       152.00       15.00       -2.00       2.1038       1.0777       -0.1326         9       1       71       152.00       10.00       -2.00       2.1038       1.0777       -0.1326         9       1       71       152.00       10.00       -1.000       1.7034       1.014       -0.1326         9       1       71       152.00       10.00       1.000       1.0124       1.014       -0.1027       0.10277         9       1       71       10.00       10.00       1.000       1.002       1.0027       0.1771       0.1027       0.1771         10       71       22.00       10.00       1.000       1.002       1.0028       1.0028       0.1028       0.1028       0.1028       0.1773       0.1028       0.1773       0.1028       0.1773       0.1028       0.1773       0.1028       0.1773       0.1028       0.1773       0.1028       0.1773       0.1773       0.1168       0.1168       0.1028       0.1773       0.1168       0.1168       0.1028       0.1773       0.1168	8 10 71	152.00	164.00	12.00	2.1818	2.2148	0.33000E-01	;
B         B         B         B         D <thd< th=""> <thd< th=""> <thd< th=""> <thd< th=""></thd<></thd<></thd<></thd<>	8 25 71	92.00	60.00 B8.00	-2.00	1.9638	1.9445	-0.19304E-01	3
a 3 71         152.00         168.00         -0.00         2.1316         2.1703         -0.11522-01           b 5 71         116.00         37.00         2.0533         1.0356         -0.1532           b 15 71         106.00         110.00         -0.00         2.0233         1.0454         -0.1532           b 15 71         52.00         100.00         4.00         1.5538         2.0000         0.5538           b 15 71         52.00         100.00         1.000         1.0538         1.7027         0.5737           b 2 71         2.000         1.0500         1.0500         1.0533         1.011         0.6333         1.011         0.6333         1.011         0.6333         1.011         0.6333         1.011         0.6333         1.011         0.6333         1.011         0.011	8 28 71	69.00	55.00	26.00	1.8386	1.9777	0.13887	ų
9         9         7         11         16         00         1.000         1.000         1.000         1.000         1.000         0.000         <	a 31 71	152.00	148.00	-4.00	2.1816	2.1703	-0.11582E-01	5
9 1 2 71 38.00 77.00 1.000 1.000 1.000 1.000 1.000 0.0000 0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000	9 6 7 1	116.00	87.00	- 29.00	2.0645	1.9395	-0.12494	6
s = 1         NS.00         110000         4.00         2.005         2.0010         0.000         <	9 12 71	58.00	27.00	-31_00	1.7634	1.4314	-0.33206	7
s 1         2.0.0         10.0.0         1.0.0.0         1.0.0.0         1.0.0.0         1.0.0.0         0.0.0.0.0         0.0.0.0 <th0.0.0< th=""> <th0.0.0< th=""> <th0.0.0.0< <="" td=""><td>9 15 71</td><td>106.00</td><td>110.00</td><td>4.00</td><td>2.0253</td><td>2-0414</td><td>0.160878-01</td><td>ä</td></th0.0.0.0<></th0.0.0<></th0.0.0<>	9 15 71	106.00	110.00	4.00	2.0253	2-0414	0.160878-01	ä
6 30 71         91.00         171.00         74.00         1.9663         2.2227         0.2843           10 2 71         33.00         105.00         12.00         1.6633         2.0112         0.15767           10 171         12.00         15.00         1.603         1.01577         0.15767           10 171         11.00         12.00         1.7076         1.7538         0.15787           10 1871         11.00         12.00         2.005         2.0663         2.1639         0.45784           10 271         35.00         12.00         1.9923         2.0695         2.0697         0.42235-01           10 271         35.00         12.00         15.00         2.200         1.9923         2.0279         0.42355-01           11 271         39.00         05.00         2.000         1.0703         1.3188         0.679377-01           11 171         10.00         15.00         2.200         1.6002         1.602         1.602           12 2071         49.00         05.00         2.000         1.602         1.602         1.602           12 2071         49.00         15.00         12.00         1.602         1.6022         1.7799         0.2339	9 21 71	92.00	100-00	8.00	1.9618	2.0000	0.362136-01	10
10 2 71 72.00 105.00 12.00 1.200 1.4150 1.6122 0.01771 10 3 71 40.00 41.00 12.00 1.4050 1.6021 1.515 0.14050 10 12 71 95.00 12.00 12.00 1.6021 1.6155 0.14050 10 12 71 95.00 12.00 12.00 12.00 1.6021 1.6255 0.14051 10 2 71 95.00 12.00 12.00 12.00 1.6021 1.6255 0.14051 10 2 71 95.00 12.00 12.00 12.00 1.6051 1.6255 0.14057 10 2 71 95.00 10.00 5.00 1.6252 0.200 1.6252 0.01567 11 2 71 15.00 0.00 10.00 3.00 1.6050 1.6252 0.01567 11 2 71 15.00 0.00 10.00 3.00 1.6050 1.6253 0.17567 11 2 71 15.00 0.00 0.00 3.00 1.6653 1.6756 1.5758 0.15767 11 2 71 13.00 95.00 2.600 1.6653 1.5765 1.5758 0.15767 11 2 71 13.00 95.00 2.600 1.6653 1.5765 1.5758 0.15767 11 2 71 13.00 95.00 2.600 1.6661 1.6773 0.02524 0.15767 12 5 71 33.00 95.00 2.600 1.6663 1.5765 1.7709 0.25234 0.15767 12 5 71 33.00 95.00 2.600 1.6663 1.5765 1.7575 0.05373 0.1576 12 17 71 48.00 103.00 3.00 1.600 1.5051 1.585 0.15768 0.15767 12 17 71 48.00 103.00 2.600 1.1661 1.6613 1.7585 0.15768 0.1576 12 17 71 48.00 103.00 1.100 1.100 1.500 1.500 1.5051 1.5585 0.15368 0.1576 13 12 72 2.40.40 7.00 7.100 1.100 1.500 1.500 1.5051 1.5585 0.15368 0.1576 13 12 72 2.40.40 7.00 7.100 1.100 1.500 1.500 1.5051 1.5585 0.15384-01 12 4 77 2.30.60 5.600 11.60 1.5021 1.5585 0.15385 4 3 72 44.60 96.00 11.60 1.5274 1.9823 0.51842 0.11423 12 72 1.60.40 7.00 5.600 11.60 1.9274 1.9823 0.51842 0.11423 13 27 72 3.60 86.00 11.60 1.9274 1.9823 0.51842 0.11423 14 77 7.70 7.100 10.100 2.600 1.6661 1.6571 0.65733-0.11423 14 77 7.70 7.100 10.100 2.600 1.6663 1.6562 2.0033 0.01778 0.11423 15 72 77.50 0.100.00 2.600 1.6663 1.6562 2.0033 0.01778 0.01975 14 17 7.700 10.100 2.600 1.6663 1.6563 0.20640 0.17693 15 0 72 97.50 0.600 1.1400 1.9274 1.9823 0.51845 0.20647 1.6573 15 0 72 97.50 0.600 7.500 1.6663 1.6563 0.20640 0.17693 1.9565 0.20647 1.6573 17 17 2 77.50 0.600 1.2400 1.6663 1.6563 0.20640 0.10657 1.5573 17 17 2 77.50 0.600 1.2400 1.6663 1.6563 1.7769 0.20640 0.20640 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649 0.20649	9 30 71	93.00	167.00	74.00	1.9685	2. 2227	0_25423	11
0         6 71         22.20         11.00         15.00         1.4050         1.4050         1.4051         0.11005           10         12         11         14.00         1.400         1.402         1.402         0.11005           10         12         11         14.00         14.00         1.400         0.1005         0.11005         <	10 2 71	73.00	105.00	32-00	1-8633	2.0212	0, 15787	12
10 9 71 00.00 1.602 1.602 1.602 1.602 1.602 1.602 1.602 1.704 0.5565 0.01065 10 12 71 1 95.00 1.10 0 27.00 1.902 1.204 0.01565 0.01075 1 10 27 71 95.00 0.40.00 5.00 1.8076 1.5256 2.0007 0.922 155-01 11 27 71 95.00 0.40.00 5.00 1.8076 1.5256 2.0007 0.922 155-01 11 27 71 95.00 0.40.00 5.00 1.8076 2.0007 0.922 155-01 11 17 71 01.00 1.36.00 3.00 1.6384 2.0128 0.11395 1 11 77 1 01.00 1.36.00 3.00 1.6384 2.0128 0.11395 1 11 77 1 01.00 1.36.00 3.00 1.6384 2.0128 0.11395 1 11 77 1 01.00 1.36.00 2.21.00 1.6384 2.0128 0.11395 1 11 77 1 01.00 1.36.00 2.21.00 1.6384 2.0128 0.11395 1 12 07 1 05.00 0.50.0 2.2.00 1.6384 2.0133 0.02 1.5386 0.2203 0.11395 1 13 77 1 01.00 1.36.00 2.2.00 1.6384 2.0133 0.02 1.5386 0.11392 0.15381 1 12 17 71 03.00 0.50.0 2.2.00 1.6384 2.0133 0.15381 0.2233 0.01 1.5383 0.15381 1.5388 0.15581 1 12 07 1 05.00 0.50.00 2.2.00 1.6382 1.6383 0.15381 0.2233 0.01 1.6383 0.0233 0.00 0.2233 0.01 1.6383 0.0233 0.00 0.2233 0.01 1.6383 0.01 0.2333 0.01 1.6383 0.00 0.2233 0.00 0.15381 0.00 0.2333 0.01 1.6383 0.00 0.2233 0.01 0.6303 0.000 0.0538 0.00 0.0000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000 0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00	10 6 71	26.00	41.00	15.00	1,4150	1.6128	0.19781	13
10 12 21 11 11.00 150.00 7.00 1.7076 1.7074 0.7074 0.7074 0.40237-01 0.20237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-020237-02	10 9 71	40.00	43.00	3.00	1.6021	1.6335	0.31406E-01	14
10       10 <td< td=""><td>10 12 71</td><td>51.00</td><td>58.00</td><td>7.00</td><td>1.7076</td><td>1.7634</td><td>0.556582-01</td><td>15</td></td<>	10 12 71	51.00	58.00	7.00	1.7076	1.7634	0.556582-01	15
10 4 71 99.00 124.00 25.00 1.9872 2.000 1.9872 2.000 0.9223 0.02235-01 10 27 71 93.00 102.00 57.00 2.0492 2.2279 0.17267 11 271 95.00 60.00 102.00 33.00 1.6739 2.0133 0.072857-01 11 17 71 69.00 102.00 32.00 1.7709 1.6388 2.0133 0.072857-01 12 5 71 99.00 102.00 32.00 1.6731 2.0138 0.73957-01 12 17 11 44.00 55.00 22.00 1.6731 2.0138 0.73957-01 12 17 11 44.00 55.00 22.00 1.6731 2.0138 0.7578-01 12 17 11 44.00 55.00 22.00 1.6731 2.0138 0.7578-01 13 27 73.00 55.00 22.00 1.6731 2.0138 0.7578-01 13 17 72 73.00 55.00 22.00 1.6932 1.6888 0.15761 13 17 72 73.00 55.00 22.00 1.6932 1.6888 0.15761 13 17 72 73.00 55.00 22.00 1.6932 1.6888 0.15651 13 27 10 40.00 47.00 4.600 1.6812 1.6388 1.65733-01 13 15 72 73.00 55.00 22.00 1.100 1.6372 1.6565 0.10465 14 3 72 77.00 55.00 11.40 1.5274 1.8274 1.8274 0.00 55.00 12.00 11.40 1.5274 0.65733-0.1966 14 5 72 77.00 55.00 12.00 11.40 1.5274 0.65733-0.1966 14 5 72 77.00 55.00 12.00 1.6857 1.6368 0.5097 1.6388 0.03918-01 14 12 72 65.53 1.44.00 52.00 11.40 1.5274 1.8274 1.8274 0.28685-0 1.0065 14 3 72 77.20 55.00 12.00 1.400 1.5850 1.5866 0.5000 1.6658 0.10065 14 3 72 77.20 1.60.00 7.40 1.5850 1.5866 0.5000 1.6628 0.7488-01 1.500 1.5866 1.6628 0.7488-0 1.5853 0.012.00 1.5866 1.6628 0.7488-0 1.5975 1.0772 7.00 40.00 7.40 1.5850 1.5866 1.6628 0.7488-0 1.6955-0 1.0040 1.500 1.400 1.5850 1.200 1.5866 1.6628 0.7488-0 1.6955-0 1.500 5.00 1.200 1.5866 1.6628 0.7488-0 1.5955 1.72 5.50 3.600 -5.50 1.7403 1.5565 1.7203 0.2647 1.710 3.1200 1.5806 1.5553 1.7463 0.2748-0 1.5527 1.72 9.00 102.00 7.400 1.5951 1.5866 1.6628 0.74888-0 1.615579 1.527 7.70 95.00 3.00 1.540 1.5855 1.7403 0.2749 1.555 1.72 9.70 9.00 4.400 7.40 1.5951 1.5866 1.6628 0.74888-0 1.5955 1.72 9.70 9.00 13.00 1.540 1.5951 1.5866 1.6628 0.74888-0 1.5553 1.710 9.00 4.00 1.540 1.5555 1.724 1.72 9.70 9.00 13.00 1.540 1.5955 1.724 1.72 9.70 9.00 13.00 1.540 1.5955 1.724 1.710 9.00 4.00 1.540 1.555 1.724 1.710 9.00 4.00 1.540 1.555 1.724 1.710 9.00 4.00 1.540 1.555 1.724 1.72 1.72 9.70 9.00 13.00 1.540 1.555 1.7443 1.555 1.7443 1.555 1.744	10 18 71	114.00	140.00	26,00	2.0569	2.1461	0.89223E-01	16
10 0 27 71 0 21 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 21 71	96.00	123.00	27.00	1.9823	2.0899	0.10763	17
10 0 0 71 12 71 50.00 101.00 12.00 1.00 1.00 1.00 1.00 1.	10 27 71	19.00	115 00	22 48	1.0970	7.0607	0 922152-01	19
11       2 71       55.00       10.00       1.7709       1.8569       0.47597e-01         11       17 71       00.0       136.00       35.00       2.0033       2.0132       0.1739         11       17 71       00.0       136.00       35.00       2.0033       2.0132       0.1739         11       17 71       00.0       0.00       2.003       2.0132       0.17592       0.17399         12       17 71       00.0       0.00       1.6012       1.6389       0.15761         12       20 71       32.00       33.00       1.00       1.5051       1.5165       0.13562-01         12       20 71       32.00       33.00       1.00       1.5051       1.5165       0.13562-01         13       12 7       7.40       5.00       1.100       1.1367       1.3572       0.13595         13       25 72       13.70       25.00       11.400       1.2274       1.9224       0.15956         4       172.00       10.00       2.00       1.8662       2.0104       0.15862         4       172.00       10.00       2.00       1.8662       1.9666       0.457897         4       172.77	10 30 71	112.00	169.00	57.00	2 0492	2.2279	0.17667	20
11       11       71       69.00       103.00       30.00       1.5388       2.0128       0.17395         11       77       10.00       136.00       30.00       1.9711       2.0128       0.13708-01         12       17       34.00       103.00       3.00       1.9711       2.0128       0.13708-01         12       11       34.00       50.00       21.00       1.6711       2.0128       0.13708-01         12       11       34.00       50.00       21.00       1.6701       1.5784       0.1703       0.17574         12       26       71       32.00       33.00       1.00       1.6602       1.6712       0.67332-01         32       72       40.0       50.00       11.40       1.6224       1.7728       0.5395         4       37       27       73.80       53.00       19.20       1.6600       1.6502       0.5995       0.2637         4       37       73.80       53.00       19.20       1.6600       1.6924       0.1783       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080       -9.2080 <td>11 2 71</td> <td>59.00</td> <td>69.00</td> <td>10.00</td> <td>1.7709</td> <td>1.8388</td> <td>0-679976-01</td> <td>21</td>	11 2 71	59.00	69.00	10.00	1.7709	1.8388	0-679976-01	21
11       17       101.00       136.00       35.00       2.0043       2.1335       0.12522         12       57       94.00       10.00       1.5751       2.0138       0.25234         11       11       49.00       70.00       1.5755       1.7709       0.25234         12       10       11.480       0.5700       2.000       1.5051       1.5155       0.13562         12       20       11.200       33.00       1.000       1.5051       1.5155       0.13562         13       12       72       73.40       56.00       2.233       1.6660       1.6221       0.657332-01         13       12       12       1.570       1.570       1.577       0.45122         13       12       2.72       40.40       67.00       1.460       1.6577       1.4366       0.59146-01         14       12       2.6.50       146.00       2.500       1.6557       1.4366       0.5802         4       12       2.6.60       95.00       1.400       1.8657       1.4366       0.26802-01         4       12       2.6.60       95.00       1.400       1.8655       2.0044       0.17874	11 11 71	69.00	103.00	34.00	1.6368	2.0128	0.17399	22
12       5       71       94.00       103.00       9.00       1.9731       2.0128       0.337092-01         12       11       31.00       50.00       22.00       1.5755       1.738       0.42734         12       10       11       94.00       70.00       1.5051       1.5050       0.13642-01         12       10       11       94.00       67.00       1.00       1.5051       1.550       0.13642-01         13       17       73.40       56.00       22.20       1.46630       1.9923       0.51932-01         14       37       2.400       57.00       1.400       1.3974       1.3972       0.53932-01         14       37       2.400       57.00       11.40       1.3974       1.3972       0.53932       0.5393442-01         4       17       72.40       69.00       -1.400       1.6560       1.9665       0.10065         4       18       72       72.40       69.00       1.400       1.3660       1.5660       1.500         4       17       73.60       65.00       12.400       1.3660       1.5060       1.6163       1.9995       0.26677         4       17       <	11 17 71	101.00	136.00	35.00	2,0043	2.1335	0.12522	23
12 8 71 33.00 59.00 26.00 1.5165 1.7709 0.2534 12 10 71 40.00 73.00 1.6012 1.632 1.3366 0.2534 12 10 71 40.00 73.00 21.00 1.5051 1.5555 0.13568=01 13 19 72 73.80 56.00 27.00 1.5051 1.5555 0.13568=01 13 19 72 73.80 56.00 27.00 1.5051 1.5555 0.13588=01 13 25 72 10.70 25.00 11.30 1.1367 1.5779 0.26122 3 22 72 40.40 47.00 66.00 1.6520 1.6573 0.6533.0.11423 3 22 72 40.40 55.00 13.10 1.1367 1.5779 0.26122 3 22 72 42.50 55.0 146.00 15.20 1.5660 1.5653 0.1368 4 5 72 73.20 55.0 146.00 15.20 1.5660 1.5660 1.5665 0.13685 4 5 72 77.00 101.00 24.00 1.5660 1.5660 1.5665 0.13685 4 12 72 55.0 146.00 7.40 1.5660 1.5660 1.5665 0.13685 4 13 72 77.00 101.00 24.00 1.5660 1.5660 1.5665 0.13865 0.13865 4 13 72 77.00 101.00 24.00 1.5660 1.5660 1.5665 0.03885 4 13 72 77.00 101.00 24.00 1.5660 1.5660 0.5865 0.07895 4 13 72 91.60 97.00 5.00 1.5661 1.5666 0.66737 4 13 72 91.60 97.00 5.00 1.5661 1.5668 0.66737 4 30 72 91.60 97.00 5.00 1.5661 1.5668 0.66737 5 3 72 70.02 82.00 10.80 1.5661 1.5668 0.66737 5 3 72 70.02 82.00 10.80 1.6519 1.5866 0.678978 5 3 72 70.02 82.00 10.80 1.6519 1.5866 0.61388=0 1.6628 0.61388=0 1 5 4 72 97.00 124.00 2.610 1.9909 2.0974 0.61388=0 1.8065 5 21 72 97.00 124.00 2.610 1.3090 2.0374 0.27338=0 1 5 14 72 97.00 124.00 2.610 1.3090 2.0374 0.27338=0 1 5 14 72 97.00 124.00 2.610 1.5855 1.7243 0.613862 0.27338=0 1 5 14 72 97.00 124.00 2.610 1.5855 1.7243 0.613862 7 102.40 105.00 6.60 2.0103 2.0374 0.27338=0 1 5 14 72 97.00 124.00 1.5955 1.7243 0.13868 0.27338=0 1 5 14 72 97.00 124.00 1.500 1.5955 1.7243 0.13868 0.27338=0 1 5 14 72 97.00 124.00 1.500 1.5955 1.7243 0.313862 7 107 0.30 52.00 1.5.00 1.5955 1.7243 0.313862 7 107 0.530 53.00 14.500 1.5557 1.2433 0.633862 7 20 72 13.80 132.00 1.5500 1.5577 2.03855 1.7243 0.33862 7 20 72 13.80 132.00 1.5500 1.5578 1.9994 0.0433862 7 20 72 13.80 132.00 1.5500 1.5578 1.9994 0.0433862 7 20 72 13.80 132.00 1.5500 1.5578 1.9994 0.0433862 7 20 72 13.80 112.00 1.5500 1.5578 1.7243 0.53760 0.7443862 7 20 72 13.80 172.00 172.00 13.10 1.5059 1.97	12 5 71	94.00	103.00	9.00	1.9731	2.0128	0.39709E-01	24
12       11       11       14       44.00       21.00       1.00       1.001	12 8 71	33.00	59.00	26.00	1.5185	1.7709	0.25234	25
1       2       71       35.00       71.00       1.000	12 11 71	48.00	69.00	21.09	1.6812	1.8388	0.15761	26
1         1	12 20 71	49.00	76.00	27.00	1.6902	1.8808	0.19062	27
3 22 72       40.40       47.00       4.60       1.6024       1.6721       0.673335-01         3 25 72       42.90       62.00       15.10       1.3877       1.3774       0.26123         3 26 72       42.90       62.00       15.10       1.6324       1.7924       0.5995         4 6 72       71.40       51.00       19.20       1.6659       1.4665       0.10045         4 5 72       72.00       40.00       2.00       1.6597       1.4386       0.17048         4 5 72       77.00       101.00       24.00       1.8657       1.4386       0.200802.01         4 18 72       77.20       101.00       24.00       1.8657       2.0003       0.11783         4 27 72       38.60       46.00       7.400       1.8656       1.6628       0.76178-01         4 30 72       91.60       97.00       5.40       1.9519       1.9668       0.26437         5 72       75.70       72.00       10.80       1.8523       1.3138       0.613382-01         5 72       77.70       12.00       1.950       1.7443       1.5551       0.61782-01         5 72       72.70       72.00       12.00       1.9550       1.7743	3 19 72	32.00	53.00	22 20	1.2021	1.0100	0.13304E+01	20
3 ≥ 7 2       13.70       25.00       11.10       1.1167       1.2577       0.26122         4 3 72       44.60       56.00       11.40       1.9274       1.9223       0.549142-0         4 5 72       71.80       53.00       19.10       1.6560       1.9660       1.9760       1.9760       1.9770       1.9660       1.9770 <td< td=""><td>3 22 72</td><td>40.40</td><td>47.00</td><td>6,60</td><td>1.6060</td><td>1.6721</td><td>0.657138-01</td><td>30</td></td<>	3 22 72	40.40	47.00	6,60	1.6060	1.6721	0.657138-01	30
3 28 72 42.90 62.00 19.10 1.622 1.7224 1.7224 0.15995 4 3 72 84.60 50.00 11.40 1.9274 1.922 0.549182-01 4 6 72 73.80 53.00 19.20 1.6659 1.9665 0.10045 4 12 72 65.56 144.00 82.50 1.8162 2.1703 0.35402 4 12 72 65.56 144.00 82.50 1.8162 2.1703 0.35402 4 15 72 77.00 101.00 24.00 1.8665 2.0043 0.1783 4 17 72 36.60 99.00 7.40 1.5666 1.2964 0.2083 4 17 72 36.60 99.00 7.40 1.5666 1.6628 0.769178-01 4 37 72 36.60 99.00 7.40 1.5666 1.6628 0.769178-01 4 37 72 36.60 99.00 5.40 1.9666 1.6628 0.769178-01 5 3 72 71.20 82.00 10.80 1.9566 1.6628 0.769178-01 5 3 72 71.20 82.00 10.80 1.9566 1.6628 0.769178-01 5 4 72 106.40 13.20 4.60 2.0350 2.0331 0.100552-01 5 6 72 106.40 13.20 4.60 1.9550 1.7443 1.5563 -0.18799 5 13 72 77.20 82.00 10.80 1.9808 2.0331 0.10255 5 5 27 70 77.00 143.00 4.60 1.9308 2.0331 0.10255 5 5 27 72 106.40 13.20 4.60 2.050 2.0533 0.2631 0.100552-01 5 4 72 97.50 142.00 2.610 1.9308 2.0333 0.10255 5 5 27 72 106.80 123.00 16.20 2.0286 2.0859 0.613462-01 6 2 72 08.90 88.00 3.10 1.9308 2.0333 0.10255 5 5 27 72 106.80 123.00 143.00 4.90 1.9395 1.9777 0.382042-01 6 2 72 04.90 88.00 3.10 1.9395 1.9777 0.382042-01 6 2 72 48.90 88.00 3.10 1.9395 1.9777 0.382042-01 6 17 72 60.30 53.00 14.50 1.20286 2.0859 0.613462-01 6 2 72 48.90 88.00 3.10 1.9395 1.9777 0.382042-01 6 17 72 60.30 53.00 14.50 1.20286 2.0859 0.613462-01 6 2 72 48.90 88.00 3.10 1.9395 1.9777 0.382042-01 6 17 72 60.30 53.00 14.50 1.5855 1.7243 0.13882 6 17 72 60.30 53.00 14.50 1.5855 1.7243 0.13882 6 17 72 60.30 53.00 14.50 1.5935 1.9777 0.561382 7 20 72 113.80 112.00 -1.80 1.2051 1.9995 0.23162 7 20 72 113.80 112.00 -1.80 1.2051 1.9995 0.23162 7 20 72 113.80 112.00 -1.80 1.2051 1.9095 0.23162 7 20 72 113.80 112.00 -1.80 1.2055 1.9784 8 13 72 88.40 94.00 9.60 1.9255 1.9784 0.43565 1.77843 0.3882 7 20 72 113.80 112.00 -1.80 1.9055 1.9777 0.58198 7 20 72 113.80 112.00 -1.80 1.9055 1.9784 8 13 72 88.40 94.00 9.60 1.9255 1.9784 8 13 72 88.40 94.00 9.60 1.9255 1.9784 8 13 72 88.40 94.00 9.60 1.9262 1.9995 1.99984 9 24 72 63	3 25 72	13.70	25.00	11.30	1.1367	1-3979	0.26122	31
4       3       72       84.60       96.00       11.40       1.9274       1.9823       0.54914E-01         4       6       72       73.80       53.00       19.201       1.6669       1.9665       0.10045         4       9       72       72.40       69.00       -3.40       1.65697       1.3386       -0.20660E-01         4       12       72       65.50       144.00       1.8665       2.0003       0.11783         4       12       72       66.0       97.00       10.20       1.4862       1.9949       0.61574E-01         4       12       72       38.60       46.00       7.40       1.5866       1.6628       0.76197E-01         5       72       106.40       173.00       4.60       2.0355       1.9138       0.613385-01         5       972       55.50       36.00       -19.50       1.7443       1.5563       -0.18799         5       12       72       104.40       123.00       4.60       2.0355       1.9713       0.27338-01         5       12       72       104.40       130.00       4.90       1.9961       2.0531       0.15657         5       12 <td>3 28 72</td> <td>42.90</td> <td>62.00</td> <td>19.10</td> <td>1.6324</td> <td>1.7924</td> <td>0.15995</td> <td>32</td>	3 28 72	42.90	62.00	19.10	1.6324	1.7924	0.15995	32
4       6       72       73.80       53.00       19.20       1.6680       1.9685       0.10045         4       9       72       72.40       69.00       -3.400       1.6597       1.3560       -0.206080-01         4       15       72       65.50       148.00       82.50       1.8162       2.1703       0.35402         4       172       54.20       99.00       47.80       1.0023       1.9956       0.26637         4       172       54.20       99.00       47.80       1.9956       0.26637       0.26647         4       172       71.20       82.00       10.800       1.9659       1.9956       0.24647         5       72       106.0       97.00       5.40       1.9619       1.9868       0.246882-01         5       972       55.50       36.00       -13.50       1.7443       1.555       -0.18799         5       72       106.40       113.00       4.60       2.0351       0.13652       -0.1353       0.267492-01         5       72       105.40       103.00       4.50       2.0956       2.0553       0.21537       0.267492-01         5       72       72	4 3 72	84.60	96.00	11_40	1.9274	1.9823	0.54914E-01	33
4       9       72       72.40       69.00       -3.40       1.6577       1.3384       -0.20680E-01         4       12       72       65.50       144.00       1.6465       2.1003       0.11783         4       13       72       77.00       101.00       24.00       1.6465       2.0033       0.11783         4       13       72       71.50       101.00       24.00       1.6465       2.0033       0.11783         4       13       72       71.60       89.00       12.40       1.6465       0.0463       0.65174E-01         5       372       71.20       82.00       10.60       1.6519       1.9464       0.65174E-01         5       72       75.70       72.00       4.30       1.4306       1.6573       0.16795E-01         5       72       70.70       72.00       4.30       1.4306       1.6573       0.16795E-01         5       72       77.0       72.00       4.30       1.4306       1.6573       0.16795E-01         5       77       72.00       4.30       1.4306       1.6573       0.16567       0.16795         5       77       77.20       75.00       6.0	4 6 7 2	73.80	93.00	19.20	1.8680	1.9685	0.10045	34
4       12       22       55.50       1.8162       2.1703       0.35402         4       15       72       77.00       101.00       24.00       1.8665       2.0043       0.17783         4       172       51.20       95.00       47.60       1.793       1.9556       0.26637         4       172       38.60       47.00       7.40       1.8665       1.6622       0.61784-01         5       72       71.20       38.60       47.00       7.40       1.8665       1.6228       0.78187-01         5       5       72       106.40       113.00       4.60       2.0550       2.0551       0.16055-01         5       72       55.50       36.00       -19.50       1.7443       1.5563       -0.16799         5       172       57.70       72.00       4.30       1.9906       2.0374       0.7255         5       712       102.40       109.00       6.60       2.0103       2.0374       0.72553       0.15627         5       27       2       84.00       3.00       1.9955       1.977       0.72682-01       6.13682-01         6       72       72       84.80       84.00	4 9 72	72.40	69,00	-3,40	1.8597	1.4388	-0.20880E-01	35
4       19       72       77.00       101.00       24.00       1.865       2.8043       0.11783         4       10       72       51.20       99.00       47.80       1.7093       1.9956       0.26837         4       10       72       51.60       81.00       12.40       1.8484       1.9496       0.65178+01         5       372       71.20       82.00       10.80       1.8525       1.9186       0.45188+01         5       672       100.40       113.00       4.60       2.0350       2.0531       0.10655+01         5       772       55.50       36.00       -19.50       1.7443       1.5553       -0.18799         5       172       97.20       4.30       1.8306       1.6573       0.267492-01         5       172       102.40       109.00       6.60       2.0103       2.0374       0.7133E-01         5       2772       10.40       109.00       1.9906       2.0534       0.10255       1.7273         5       2772       10.40       109.00       1.501       1.9906       2.0374       0.7533         5       772       10.40       105.00       1.5455       1.7724	4 12 72	65.50	148.00	82.50	1.8162	2.1703	0-35402	36
4 10 72       51.20       95.00       17.60       1.995       0.26637         4 21 72       76.60       82.00       7.40       1.8842       1.9494       0.651742-01         4 21 72       36.60       47.00       7.40       1.8845       1.6228       0.781742-01         5 372       71.20       38.60       47.00       7.40       1.8845       1.6228       0.781742-01         5 372       106.40       113.00       4.60       2.0350       2.0531       0.140557-01         5 5 72       57.70       72.00       4.30       1.8306       1.8733       0.267492-01         5 13 72       57.70       72.00       4.30       1.9906       2.0374       0.7255         5 21 72       102.40       109.00       6.60       2.0103       2.0374       0.271332-01         5 22 72       84.00       34.00       1.9906       1.9955       1.7243       0.13862         6 17 72       105.40       123.00       16.20       2.0286       2.0495       0.613862-01         6 17 72       84.00       35.00       1.501       1.5777       0.752692-01         6 17 72       84.50       55.00       1.501       1.7777       0.752692-01 </td <td>4 15 72</td> <td>77.00</td> <td>101_00</td> <td>24.00</td> <td>1.8865</td> <td>2.0043</td> <td>0.11783</td> <td>37</td>	4 15 72	77.00	101_00	24.00	1.8865	2.0043	0.11783	37
4 30 12         12.00         12.40         1.5042         1.423         0.00114420           4 30 12         31.00         5.00         1.5042         1.423         0.0014420           5 3 72         71.20         82.00         10.80         1.5553         1.9136         0.61392-01           5 6 72         106.40         113.00         4.60         2.0350         1.9136         0.61392-01           5 15 72         57.70         72.00         4.30         1.8306         1.6573         0.26792-01           5 14 72         97.90         124.00         26.10         1.9908         2.0374         0.12655           5 2 17         102.40         109.00         6.60         2.0103         2.0374         0.12557           5 2 7 2         95.10         133.00         14.990         1.9961         2.1553         0.15367           6 17 72         60.30         52.00         8.00         1.9355         1.9777         0.32082-01           6 17 72         60.30         52.00         6.30         1.7603         1.7160        642922-01           6 2 72         43.60         75.00         13.20         1.6414         1.8751         0.2362           6 17 72<	4 10 72	76 60	99.00	47.80	1 9043	1.9930	U. 28637	96
4 30 72       91.60       97.00       5.00       1.9519       1.9619       0.260402-01         5 3 72       71.20       82.00       0.80       1.8525       1.9138       0.413852-01         5 72       106.40       113.00       4.60       2.0350       2.0531       0.180552-01         5 17       67.70       72.00       4.30       1.8306       1.6573       0.267492-01         5 17       107.40       109.00       6.60       2.0103       2.0374       0.71332-01         5 21 72       102.40       109.00       6.60       2.0103       2.0374       0.71332-01         5 27 72       106.80       123.00       16.20       2.0286       2.0699       0.613462-0         6 17 72       87.00       55.00       8.00       1.5935       1.57243       0.38620         6 17 72       60.30       52.00       -8.30       1.7703       1.8195       0.3362         6 17 72       60.30       52.00       -8.30       1.7597       1.8195       0.24292-0         6 17 72       54.50       65.00       1.535       1.7243       0.3862       1.9210         7 17       72.50.0       66.00       1.530       1.7977 <td< td=""><td>4 27 72</td><td>38.60</td><td>46 00</td><td>7 40</td><td>1.0042</td><td>1 6628</td><td>0.361928-01</td><td></td></td<>	4 27 72	38.60	46 00	7 40	1.0042	1 6628	0.361928-01	
5       3       72       71.20       82.00       10.80       1.8525       1.9138       0.613382-01         5       9       72       55.50       36.00       -19.50       1.7443       1.5563       -0.18799         5       13       72       05.70       72.00       4.30       1.8306       1.6573       0.267492-01         5       13       72       97.90       124.00       26.10       1.9908       2.0374       0.12255         5       21       72       102.40       109.00       6.60       2.0103       2.0374       0.123527         5       27       71       106.80       123.00       16.20       2.0286       2.0864       2.0939       0.613462-01         6       8       72       84.90       86.00       3.10       1.9385       1.9777       0.320482-01         6       17       72       60.30       52.00       -6.30       1.7603       1.7160       -0.42928-01         6       272       43.60       75.00       31.20       1.6141       1.8751       0.3977       0.320482-01         6       272       43.60       75.00       1.20       1.6141       1.8751       0.	4 30 72	91.60	97.00	5.40	1.9619	1.9868	0.248882-01	41
5       6       72       100.00       13.00       1.60       2.0350       2.0351       0.190552-01         5       9       72       55.50       36.00       -19.50       1.7403       1.5563       -0.8799         5       15       72       67.70       72.00       4.30       1.8306       1.6573       0.267492-01         5       17       102.40       109.00       6.60       2.0103       2.0374       0.27133E-01         5       24       72       90.40       13.00       43.90       1.9961       2.1553       0.15527         5       27       2       106.80       123.00       16.20       2.0286       2.0899       0.613468-01         6       72       87.00       95.00       8.00       1.5855       1.9777       0.342048-01         6       17       2       60.30       52.00       -6.30       1.7693       1.7160       -0.642928-01         6       17       2       64.50       1.7597       1.8195       0.19862       0.9910         7       27       54.50       86.00       31.20       1.7633       1.7163       1.9345       0.9910         7       27	5 3 72	71-20	82.00	10-80	1.8525	1.9138	0.613388-01	42
5       9       72       55.50       36.00       -19.50       1.7443       1.5563       -0.18799         5       15       72       97.90       124.00       26.10       1.9908       2.0914       0.70255         5       16       72       97.90       124.00       26.10       1.9908       2.0914       0.73138-01         5       21       72       106.80       123.00       16.20       2.0246       2.0899       0.613468-01         5       27       7       106.80       123.00       16.20       2.0246       1.9445       0.155818-01         6       8       72       84.90       86.00       3.10       1.9289       1.9445       0.155818-01         6       17       7       0.30       52.00       -8.30       1.7603       1.7160       0.64228-01         6       17       7       0.30       52.00       1.530       1.9434       0.93162       0.93162         7       2       72       54.50       86.00       31.50       1.7434       1.9345       0.948768-01         7       2       72       54.50       86.00       31.50       1.7364       1.9375       0.24928-0	5 6 72	108.40	113.00	4.60	2.0350	2.0531	0.18055E-01	43
5 15 72       67.70       72.00       4.30       1,8306       1,8573       0.267492-01         5 14 72       102.40       109.00       6.60       2.0103       2.0374       0.2713 28-01         5 24 72       102.40       109.00       6.60       2.0286       2.0895       0.613468-01         5 27 72       106.80       123.00       16.20       2.0286       2.0895       0.613468-01         6 27       87.00       95.00       8.00       1.9395       1.9475       0.13862         6 11 72       80.50       53.00       14.50       1.555       1.7243       0.13862         6 17 72       60.30       52.00       8.50       1.7693       1.7160       -0.642928-01         6 20 72       57.50       66.00       31.20       1.6414       1.9751       0.23362         7 27       54.50       86.00       15.30       1.9151       0.9177       0.76259-01         7 10       79.70       95.00       15.30       1.9015       1.9177       0.76259-01         7 20 72       13.80       112.00       -1.80       2.0561       2.0492       0.64928-02         7 20 72       13.80       112.00       32.10       1.9361	5 9 72	55.50	36.00	-19.50	1.7443	1.5563	-0.18799	44
5       13       72       97.90       124.00       26.10       1.9908       2.0314       0.10265         5       21       72       102.40       109.00       6.60       2.0103       2.0374       0.2713E-01         5       21       72       106.80       123.00       16.20       2.0286       2.089       0.61346E-01         6       272       44.90       86.00       3.10       1.9289       1.9445       0.1558         6       8       72       87.00       85.00       8.00       1.5955       1.777       0.3268         6       177       87.00       35.00       14.50       1.5955       1.7743       0.13882         6       177       70       0.3200       52.00       -6.30       1.7503       1.7160       0.598768-01         6       20       72       57.50       66.00       31.50       1.7364       1.9345       0.19810         7       17       72       73.70       95.00       15.30       1.9015       1.9777       0.76269E-01         7       20       72       11.360       112.00       -1.60       2.0561       2.092       0.149368E-02         7	5 15 72	67.70	72.00	4.30	1.8306	1.8573	0.26749E-01	45
5 21 72 102.40 109.00 6.60 2.0103 2.0374 0.27132E-01 5 24 72 95.10 143.00 43.90 1.9961 2.1553 0.15527 5 27 72 106.80 123.00 16.20 2.0286 2.0899 0.61346E-01 6 2 72 84.90 88.00 3.10 1.9289 1.9777 0.3204E-01 6 8 72 87.00 95.00 8.00 1.9395 1.9777 0.3204E-01 6 11 72 80.50 53.00 44.50 1.5455 1.7243 0.13882 6 17 72 60.30 52.00 -6.30 1.7803 1.7160 -0.64392E-01 6 20 72 57.50 66.00 8.50 1.7797 1.8195 0.59876E-01 6 20 72 57.50 66.00 31.20 1.6414 1.8751 0.23362 7 27 54.50 86.00 31.50 1.7364 1.9345 0.19810 7 14 72 89.50 88.00 15.30 1.9015 1.9777 0.76369E-01 7 27 72 54.50 88.00 15.30 1.9015 1.9777 0.76369E-01 7 14 72 89.50 89.00 -0.50 1.9915 1.9777 0.76369E-01 7 14 72 89.50 89.00 -0.50 1.9915 1.9777 0.76369E-01 7 20 72 113.80 112.00 -1.80 2.0561 2.0492 -0.69122E-02 7 20 72 113.80 112.00 -1.80 2.0561 2.0492 -0.69122E-02 7 20 72 13.80 112.00 32.10 1.9025 2.0042 0.14668 8 1 72 84.40 94.00 9.60 1.9025 1.9731 0.46793E-01 8 10 72 34.40 61.00 2.660 1.5565 1.785 0.24872 7 29 7.6 99.00 112.00 32.10 1.9025 2.0042 0.14668 8 1 72 84.40 94.00 9.60 1.9025 1.9731 0.46793E-01 8 10 72 34.40 61.00 2.660 1.5565 1.785 0.24872 7 29 7.60 132.00 1.00 1.9453 1.9731 0.46793E-01 8 10 72 34.40 51.00 2.660 1.5565 1.785 0.24872 7 29 7.60 73.00 53.00 1.00 1.9453 1.9731 0.46793E-01 8 10 72 84.60 89.00 1.00 1.9455 1.9494 0.49067E-02 4 19 72 89.10 68.00 -21.10 1.9495 1.9494 0.49067E-02 4 19 72 89.10 68.00 -21.10 1.9495 1.9494 0.49067E-02 4 19 72 89.10 68.00 -21.10 1.9495 1.9494 0.49367E-02 4 19 72 89.10 68.00 -21.00 1.6274 1.8431 0.757442-01 7 20 72 65.00 75.00 6.00 1.540 1.7752 1.6751 0.36212E-01 9 20 72 65.00 75.00 15.40 1.7752 1.6751 0.36212E-02 1.425 1.0193.0.9433E-01 9 20 72 65.00 75.00 15.40 1.7752 1.6751 0.9933E-01 9 20 72 65.00 75.00 15.40 1.7752 1.6751 0.9933E-01 9 20 72 65.00 75.00 15.40 1.7752 1.6751 0.99433E-01 0.401 1.200 1.306 1.000 1.000 1.000 1.69 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.6274 1.6129 0.14851E-01 0.74434E-01 0.74434E-01 0.74434E-01 1.000 1.000 1.000 1.200 1.000 1.000 1.200	5 18 72	97.90	124.00	26.10	1.9908	2.0934	0.10265	46
5 24 72 99. K0 143.00 44.90 1.9961 2.1533 0.1527 5 27 72 106.80 123.00 16.20 2.0286 2.0895 0.613465-01 6 2 72 84.90 88.00 3.10 1.9289 1.9445 0.15583E-01 6 17 72 60.30 55.00 14.50 1.5855 1.7243 0.1382 6 17 72 60.30 52.00 44.30 1.7803 1.7160 -0.6432E-01 6 20 72 57.50 66.00 8.50 1.7597 1.8155 0.59976E-01 6 20 72 57.50 66.00 31.20 1.6414 1.8751 0.23362 7 2 72 43.60 75.00 31.20 1.6414 1.8751 0.23362 7 2 72 54.50 86.00 31.50 1.7364 1.9355 0.19910 7 11 72 79.70 55.00 15.30 1.9015 1.9777 0.76569E-01 7 14 72 89.50 89.00 -0.50 1.9518 1.9494 -0.2433EE-02 7 20 72 113.80 112.00 -1.80 2.0561 2.0492 -0.6912E-02 7 20 72 13.80 112.00 -5.60 1.9558 1.9731 0.46793E-02 7 20 72 13.80 112.00 32.10 1.9025 2.00492 0.14668 8 1 72 84.40 61.00 2.660 1.9263 1.9731 0.46793E-01 8 10 72 34.40 61.00 2.660 1.9263 1.9731 0.46793E-01 8 10 72 34.40 61.00 2.660 1.9565 1.7853 0.24879 8 13 72 90.60 122.00 35.40 1.9571 2.1004 0.14325 8 16 72 88.00 68.00 -21.10 1.9445 1.9494 -0.14325 8 16 72 88.00 70.00 11.00 1.9445 1.9494 -0.14325 8 16 72 85.00 75.00 15.40 1.9571 2.1004 0.14325 8 16 72 85.00 75.00 1.00 1.9445 1.9494 -0.14325 8 16 72 85.00 75.00 1.00 1.9445 1.9494 -0.14325 8 16 72 85.00 75.00 1.00 1.9445 1.9494 -0.14325 8 16 72 85.00 75.00 1.00 1.9445 1.9495 1.3325 -0.11736 8 12 72 85.10 68.00 -21.10 1.9495 1.3325 -0.11736 8 12 72 85.80 70.00 1.00 1.9445 1.9495 1.3325 -0.11736 9 27 75 75.00 65.00 -22.20 1.6274 1.6129 -0.145510 9 4 72 67.20 65.00 -52.00 1.540 1.5752 1.7243 0.14912 9 6 72 65.00 75.00 1.540 1.5752 1.7243 0.49912 9 24 72 67.20 65.00 -22.20 1.6274 1.6129 -0.14451E-01 1.00 1.44539 1.2766 -0.14551E -0.14451E -0.1 1.200 1.200 1.3.06 7.155E -0.05EE -0.05EE -0.05EE -0.05	5 21 72	102.40	109.00	6.60	2.0103	2.0374	0.27133E-01	47
5 2 7 72       100.00       123.00       123.00       124.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00       125.00	5 24 72	99.10	143.00	43,90	1-9961	2.1553	0.15927	48
b       2.12       01.00       00.00       1.90	5 21 12	00.00	PP 00	3 10	- 1 0200	2.0099	0.013465-01	49
1       1       2       38.50       53.00       14.50       1.5455       1.7243       0.13802       0.1         6       17       2       60.30       52.00       46.30       1.7803       1.7160       -0.64292E-01         6       20       72       57.50       66.00       3.50       1.7597       1.8195       0.13802       0.1064         6       29       72       43.80       75.00       31.20       1.6414       1.8751       0.23362         7       27       54.50       86.00       31.50       1.7364       1.9345       0.19610         7       17       72       74.70       95.00       15.30       1.9015       1.9777       0.76269E-01         7       20       72       13.80       112.00       -1.80       2.0561       2.0492       -0.69122E-02         7       29       72       73.90       112.00       32.10       1.9025       2.0492       -0.69122E-02         7       9       16.00       26.60       1.5365       1.7853       0.24879         8       17       28.40       94.00       1.9571       2.1004       0.49067E-02         8       16	6 8 72	87.00	95-00	8-00	1.9795	1.9777	0.302048=01	51
6 17 72       60.30       52.00       -8.30       1.7103       1.7160       -0.62322-01         6 20 72       57.50       66.00       8.50       1.7597       1.8195       0.598762-01         6 29 72       43.60       75.00       31.20       1.6414       1.8751       0.23362         7 2 72       54.50       86.00       31.50       1.7364       1.9345       0.19816         7 11 72       79.70       95.00       -0.50       1.9518       1.9477       0.752692-01         7 2 72       13.80       112.00       -1.80       2.0561       2.0492       -0.468228-02         7 29 72       79.90       112.00       32.10       1.9025       2.0492       -0.46828-02         7 29 72       79.90       112.00       32.10       1.9025       2.0492       -0.4688         8 1 72       84.40       94.00       9.660       1.5365       1.7731       0.467926-01         8 16 72       86.00       89.00       -1.00       1.94945       1.9494       0.496726-02         8 16 72       86.00       70.00       1.20       1.7574       1.8451       0.757442F-01         9 3 72       29.10       19.00       -10.10       1.46	6 11 72	38.50	53.00	14.50	1.5455	1.7243	0.13682	52
6 20 72 57.50 66.00 8.50 1.7597 1.6195 0.598762-01 6 29 72 43.60 75.00 31.20 1.6444 1.8751 0.23362 7 2 72 54.50 86.00 31.50 1.7364 1.9345 0.19810 7 11 72 79.70 95.00 15.30 1.9015 1.9777 0.762692-01 7 14 72 89.50 89.00 -0.50 1.9518 1.9494 -0.243382-02 7 20 72 113.80 112.00 -1.80 2.0561 2.0492 -0.691222-02 7 20 72 13.80 112.00 32.10 1.9025 2.0492 0.44668 8 1 72 84.40 94.00 9.60 1.5365 1.7853 0.24879 8 13 72 90.60 126.00 35.40 1.9263 1.9731 0.467932-01 8 13 72 90.60 126.00 35.40 1.9445 1.9494 0.44851 8 16 72 88.00 89.00 -21.10 1.9495 1.9494 0.490672-02 8 13 72 99.60 126.00 35.40 1.9445 1.9494 0.490672-02 8 13 72 99.60 126.00 35.40 1.9445 1.9494 0.490672-02 8 13 72 99.60 126.00 35.40 1.9571 2.1004 0.14325 8 16 72 88.00 89.00 -21.10 1.9495 1.9494 0.490672-02 8 17 2 89.10 63.00 -21.10 1.9495 1.9494 0.490672-02 8 17 2 99.10 19.00 -10.10 1.4639 1.2768 -0.18510 9 6 72 69.00 75.00 6.00 13.40 1.5752 1.7243 0.41912 9 21 72 59.60 75.00 15.40 1.5752 1.7243 0.41912 0.744 342-01 0.60 1.200 1.306 7 VALOZ FOR DEST PITITING STRAIGHT LINEPIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED IMTERCEPT SLOPE ERROR STD DEV -5.63 1.271 13.10 0.00 1.200 1.200 1.306 7 VALOZ FOR TEST OF BETA 2.9 DEGREES OF PREEDOM 69 AMALTSIS OF LOSS REAM DIFFEDENCE 0.744342-01 -5.55	6 17 72	60.30	52.00	-8.30	1.7803	1.7160	-0.64292E-01	53
6 29 72       43.60       75.00       31.20       1.6414       1.8751       0.23362         7 2 72       54.50       86.00       31.50       1.7364       1.9345       0.19010         7 11 72       79.70       95.00       15.30       1.9015       1.9777       0.76269E-01         7 11 72       89.50       89.00       -0.50       1.9518       1.9494       -0.243362-02         7 20 72       113.80       112.00       32.10       1.9025       2.0492       0.14668         8 1 72       44.40       94.00       9.60       1.9253       2.0492       0.14668         8 1 72       90.60       126.00       35.40       1.5571       2.1004       0.14325         8 1 72       90.60       126.00       35.40       1.9571       2.1004       0.14325         8 1 72       90.60       126.00       1.000       1.9445       1.9494       0.490672-02         8 1 72       90.60       126.00       1.000       1.9495       1.8325       -0.11736         8 10 72       90.60       126.00       1.000       1.9499       1.8325       -0.11736         9 13 72       91.0       67.00       1.000       1.7694       1	6 20 72	57,50	66.00	8,50	1.7597	1.8195	0.598768-01	54
7 2 72 54.50 86.00 31.50 1.7364 1.9345 0.19810 7 11 72 79.70 95.00 15.30 1.9015 1.9777 0.76269E01 7 14 72 89.50 89.00 -0.50 1.9518 1.9494 -0.24338E-02 7 20 72 13.80 112.00 -1.80 2.0561 2.0492 -0.69122E-02 7 29 72 79.90 112.00 32.10 1.9025 2.0492 -0.69122E-02 8 1 72 84.40 94.00 9.60 1.9263 1.9731 0.46793E-01 8 10 72 34.40 61.00 26.60 1.5365 1.7853 0.24879 8 13 72 90.60 126.00 35.40 1.9571 2.1004 0.14325 8 16 72 88.00 89.00 1.00 1.9445 1.9494 0.49067E-02 8 19 72 83.10 68.00 -21.10 1.9459 1.8325 -0.11736 8 22 72 58.80 70.00 11.20 1.9459 1.8325 -0.11736 8 22 72 58.80 70.00 11.20 1.7694 1.8451 0.75744E-01 9 3 72 29.10 19.00 -10.10 1.4638 1.2786 -0.18510 9 6 72 69.00 75.00 6.00 1.540 1.7752 1.7243 0.14912 9 21 72 59.60 75.00 15.40 1.7752 1.3724 0.14912 9 24 72 67.20 65.00 -2.20 1.6274 1.8129 -0.14451E-01 EEAN 73.50 87.59 0.74434E-01 CORBELATION COEFFICIENT 0.821 COEFFICIENTS OF BEST FITTING STRAIGHT LINEFIRST SET IS NOT FORCEL THROUGH ORIGIN, SECOND SET IS FORCED INTERCEPT SLOPE ERROR STD DEV -5.83 1.271 13.10 0.40 1.200 13.06 T VALUE FOR TEST OF BETA 2.9 DEGREES OF FREEDOM 69 ANALTSIS OF LOGS REAN DIFFERENCE 0.744434E-01 -5.55	6 29 72	43.80	75.00	31_20	1.6414	1.8751	0.23362	55
7       11       72       79.70       0.76269E-01         7       14       72       89.50       -0.50       1.9015       1.977       0.76269E-01         7       20       72       113.80       112.00       -1.80       2.0561       2.0492       -0.69122E-02         7       29       72       79.90       112.00       32.10       1.9025       2.0492       0.14668         8       1       72       34.40       61.00       26.60       1.5365       1.7853       0.24879         8       10       72       34.40       61.00       26.60       1.5365       1.7853       0.24879         8       13       72       99.60       126.00       35.40       1.9571       2.1004       0.49678-02         8       16       72       89.10       68.00       -21.10       1.9494       0.490678-02         8       19       72       93.10       68.00       -21.10       1.9499       1.8325       -0.11736         4       272       58.80       70.00       11.20       1.7694       1.8451       0.757442-01         9       6.72       69.00       75.00       6.00       1.540	7 2 72	54.50	86.00	31.50	1.7.364	1.9345	0.19810	56
7       14       72       05.50       05.00       -0.50       1.5516       1.9494       -0.243362-02         7       20       72       113.80       112.00       32.10       1.9025       2.0492       0.14668         8       1       72       84.40       94.00       9.60       1.9263       1.9731       0.46793E-01         8       10       72       84.40       94.00       9.60       1.9263       1.9731       0.46793E-01         8       10       72       84.40       94.00       9.60       1.9263       1.9731       0.46793E-01         8       16       72       90.60       126.00       35.40       1.5571       2.1004       0.14325         8       16       72       89.10       68.00       -21.10       1.9499       1.4325       -0.11736         4       27       58.60       70.00       11.20       1.7694       1.4351       0.75744E-01         9       372       29.10       19.00       -10.10       1.4639       1.2768       -0.11736         9       172       59.60       75.00       6.00       1.5752       1.3751       0.36212E-01         9       24<	7 11 72	/9./0	95.00	15.30	1.9015	1.9777	0.76269E-01	57
7 29 72       72.90       112.00       112.00       112.00       12.00       22.10       1.9025       2.0492       0.14668         8 1 72       84.40       94.00       9.60       1.9263       1.9731       0.46793E-01         8 10 72       34.40       61.00       26.60       1.5365       1.7853       0.2492       0.14668         8 13 72       90.60       126.00       35.40       1.9571       2.1004       0.14325         8 16 72       86.00       89.00       1.00       1.9495       1.9494       0.490672-02         8 16 72       89.10       68.00       -21.10       1.9499       1.8325       -0.11736         4 19 72       93.10       68.00       -21.10       1.9499       1.8325       -0.15744E-01         9 3 72       29.10       19.00       -10.10       1.4639       1.2768       -0.18510         9 6 72       69.00       75.00       6.00       1.5752       1.7243       0.14912         9 18 72       37.60       55.00       -2.20       1.5274       1.6129       -0.14451E-01         9 24 72       67.20       65.00       -2.20       1.5274       1.6129       -0.14451E-01         COBRELATION	7 7 72	112 80	112 00	-1 90	2 0541	1.9494	-0.243362-02	56
8 1 72       81.40       91.00       92.60       1.9263       1.9731       0.46793E-01         8 10 72       38.40       61.00       26.60       1.5365       1.7853       0.24879         8 13 72       90.60       126.00       35.40       1.9571       2.1004       0.14325         8 16 72       89.00       1.00       1.9445       1.9494       0.49067E-02         8 19 72       93.10       68.00       -21.10       1.9499       1.8325       -0.11736         d 22 72       58.80       70.00       11.20       1.7694       1.8451       0.75744E-01         9 3 72       29.10       19.00       -10.10       1.4639       1.2768       -0.18510         9 6 72       69.00       75.00       6.00       1.5752       1.7243       0.14912         9 21 72       57.60       53.00       15.40       1.5752       1.7243       0.14912         9 21 72       67.20       65.00       -2.20       1.6274       1.8129       -0.14851E-01         0 24 72       67.20       65.00       -2.20       1.6274       1.8129       -0.14451E-01         0 20 HBELATION COEFFICIENT       0.871       0.074434E-01       0.74434E-01       0.74	7 29 72	79.90	112.00	32.10	1 9025	2 0492	A 14669	55
B 10 72       30.400       61.00       26.60       1.5365       1.7853       0.24879         B 13 72       90.60       126.00       35.40       1.9571       2.1004       0.14325         B 16 72       88.00       89.00       1.00       1.9445       1.9494       0.4925         B 16 72       89.10       68.00       -21.10       1.94499       1.4325       -0.11736         8 12 72       58.80       70.00       11.20       1.7694       1.8451       0.75744E-01         9 3 72       29.10       19.00       -10.10       1.4639       1.2768       -0.11736         9 6 72       69.00       75.00       6.00       1.552       1.7243       0.14912         9 18 72       37.60       53.00       15.40       1.5752       1.7243       0.14912         9 21 72       59.60       75.00       15.40       1.7752       1.3751       0.36212E-01         9 24 72       67.20       65.00       -2.20       1.8274       1.8129       -0.14451E-01         CORBELATION COEFFICIENT       0.821       0.821       0.74434E-01       0.74434E-01       0.4931         CORBELATION COEFFICIENT       0.401       1.200       13.06       1.2	8 1 72	84,40	94.00	9,60	1, 9263	1.9731	0-467938-01	61
8 13 72       90.60       126.00       35.40       1.9571       2.1004       0.1025         8 16 72       86.00       89.00       1.00       1.9445       1.9494       0.490672-02         8 19 72       93.10       68.00       -21.10       1.9499       1.8325       -0.11736         8 22 72       58.80       70.00       11.20       1.7694       1.8451       0.75744E-01         9 3 72       29.10       19.00       -10.10       1.4639       1.2768       -0.18510         9 6 72       69.00       75.00       6.00       1.5752       1.7243       0.14912         9 18 72       37.60       53.00       15.40       1.5752       1.7243       0.14912         9 21 72       59.60       75.00       15.40       1.7752       1.8751       0.9933E-01         9 24 72       67.20       65.00       -2.20       1.6274       1.8129       -0.14451E-01         COMBELATION COEFFICIENT       0.821         COMPTICIENT 0.821         COMPTICIENT 0.821         COMPTICIENT 0.821         COMPTICIENT 0.821         COMPTICIENT 0.821         COMPTICIENT 0.821     <	8 10 72	34.40	61.00	26.60	1,5365	1.7853	0.24879	62
8 16 72       88.00       89.00       1.00       1.9445       1.9494       0.49067E-02         8 19 72       89.10       68.00       -21.10       1.9499       1.8325       -0.11736         9 272       58.80       70.00       11.20       1.7694       1.8451       0.75744E-01         9 3 72       29.10       19.00       -10.10       1.4639       1.2768       -0.18510         9 6 72       69.00       75.00       6.00       1.8388       1.3751       0.36212E-01         9 18 72       37.60       53.00       15.40       1.5752       1.7243       0.14912         9 21 72       59.60       75.00       15.40       1.7552       1.6751       0.99833E-01         9 24 72       67.20       65.00       -2.20       1.6274       1.8129       -0.14451E-01         EEAN       73.50       87.59       0.74434E-01         CORRFICIENT       0.821         CORFFICIENT       0.621         CORFFICIENT       0.621         CORFFICIENT       0.621         CORFFICIENT       0.621         CORFFICIENT       0.621         CORFFICIENT <td>8 13 72</td> <td>90.60</td> <td>126.00</td> <td>35.40</td> <td>1.9571</td> <td>2.1004</td> <td>0.14325</td> <td>63</td>	8 13 72	90.60	126.00	35.40	1.9571	2.1004	0.14325	63
8       19       72       89.10       68.00       -21.10       1.9499       1.6325       -0.11736         6       22       72       58.60       70.00       11.20       1.7694       1.8451       0.75744E-01         9       3       72       29.10       19.00       -10.10       1.4639       1.2760       -0.18510         9       6       72       69.00       75.00       6.00       1.8388       1.3751       0.36212E-01         9       12       37.60       53.00       15.40       1.5752       1.7243       0.14912         9       21       72       59.60       75.00       15.40       1.7552       1.3751       0.99833E-01         9       24       72       67.20       65.00       -2.20       1.6274       1.8129       -0.14451E-01         MEAN       73.50       87.59       0.74434E-01       0.74434E-01       0.74434E-01       0.74434E-01         CORRELATION COEFFICIENT       0.821       0.00       1.200       13.06       0.74434E-01         CORPCIENTS OF BEST FITTING STRAIGHT LINEFIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED       1.400       1.200       13.06         T       YALUE FOR TEST OF BETA <td>8 16 72</td> <td>88.00</td> <td>89.00</td> <td>1.00</td> <td>1.9445</td> <td>1.9494</td> <td>0.490672-02</td> <td>64</td>	8 16 72	88.00	89.00	1.00	1.9445	1.9494	0.490672-02	64
0       22       28.80       70.00       11.20       1.7694       1.8451       0.75744E-01         9       3       72       29.10       19.00       -10.10       1.4639       1.2768       -0.18510         9       6       72       69.00       75.00       6.00       1.8388       1.3751       0.36212E-01         9       18       72       37.60       53.00       15.40       1.5752       1.7243       0.14912         9       21       72       67.20       65.00       -2.20       1.6274       1.6129       -0.14451E-01         MEAN       73.50       67.59       0.74434E-01       0.74434E-01       0.74434E-01         CORRELATION COEFFICIENT       0.821       0.74434E-01       0.74434E-01       0.74434E-01         COEFFICIENT SOF DEST FITTING STRAIGHT LINEFIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED       INTERCEPT       SLOPE       ERROR STD DEV         -5.83       1.271       13.10       0.00       1.200       13.06         T VALUE FOR TEST OF BETA       2.9       DEGREES OF PREEDOM       69         ANALTSIS OF LOGS       TH340-01       1.505       -55	8 19 72	89.10	68,00	-21.10	1-9499	1_8325	-0.11736	65
9       5.7.2       27.10       172.00       -102.10       1.4039       1.2760       -0.18510         9       6.72       60.00       75.00       6.00       1.6388       1.3751       0.362122-01         9       8.72       37.60       53.00       15.40       1.5752       1.7243       0.14912         9       21       72       59.60       75.00       15.40       1.7752       1.3751       0.99833E-01         9       24       72       67.20       65.00       -2.20       1.6274       1.8129       -0.14451E-01         COBBELATION COEFFICIENT       0.621       0.74434E-01       0.74434E-01       0.74434E-01         COEFFICIENTS OF BEST FITFING STRAIGHT LINEFIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED       INTERCEPT       SLOPE       ERROR STD DEV         -5.83       1.271       13.10       0.00       1.200       13.06         T VALUE FOR TEST OF BETA       2.9       DECREES OF PREEDON       69         ANALISIS OF LOGS       5.5       55       55	Ø 42 72	58.50 50 10	/0.00	11-20	1,7694	1.8451	0.757448-01	66
9       0       72       33.60       72.00       12.00       12.00       12.00       12.01       0.30212E01         9       18       72       37.60       53.00       15.40       1.5752       1.7243       0.14912         9       21       72       59.60       75.00       15.40       1.7752       1.3751       0.99833E-01         9       24       72       67.20       65.00       -2.20       1.6274       1.8129       -0.14451E-01         MEAN       73.50       87.59       0.74434E-01       0.74434E-01       0.74434E-01         CORPELATION COEFFICIENT       0.821       0.821       0.001       0.821       0.001         CORPELATION COEFFICIENT       0.821       0.001       0.74434E-01       0.74434E-01         CORPELATION COEFFICIENT       0.821       0.001       0.001       0.74434E-01         CORPELATION COEFFICIENT       SIDPE       EREOR STD DEV       -5.83       1.271       13.10         0.00       1.200       13.06       1.200       13.06       1.41515       0.74434E-01         THEAN DIFERSENCE       0.74434E-01       5.55       5.55       5.55       5.55	9 3 72	69.00	75.00	- 10. 10	1.4037	1.2700	+0.10510	60
9 21 72 59.60 75.00 15.40 1.7752 1.8751 0.99833E-01 9 24 72 67.20 65.00 -2.20 1.6274 1.8129 -0.14451E-01 MEAN 73.50 87.59 0.74434E-01 CORPELATION COEFFICIENT 0.821 COEFFICIENTS OF BEST FITTING STRAIGHT LINEFIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED INTERCEPT SLOPE ERROR STD DEV -5.83 1.271 13.10 0.00 1.200 13.06 T VALUE FOR TEST OF BETA 2.9 DEGREES OF FREEDOM 69 ANALISIS OF LOGS REAN DIFFERENCE 0.74434E-01 -STATISTIC 5.55	9 18 72	37.60	53-00	15-40	1-5752	1 7243	0.362125-01	00
9 24 72       67.20       65.00       -2.20       1.6274       1.6129       -0.144512-01         MEAN       73.50       87.59       0.74434E-01       0.74434E-01         CORRELATION COEFFICIENT       0.821       0.74434E-01       0.74434E-01         COEFFICIENTS OF BEST FITFING STRAIGHT LINE      FIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED       INTERCEPT       SLOPE       ERROR STD DEV         -5.83       1.271       13.10       0.00       1.200       13.06         T VALUE FOR TEST OF BETA       2.9       DEGREES OF PREEDON       69         AWALTSIS OF LOGS       TEAM DIFFEBENCE       0.74434E-01         -synatistic (5.55)       5       5	9 21 72	59.60	75.00	15-40	1.7752	1.8751	0.99833E-01	70
MEAN       73.50       87.59       0.74434E-01         CORRELATION COEFFICIENT       0.821       0.821         COEFFICIENTS OF BEST FITFING STRAIGHT LINEFIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED       INTERCEPT         SLOPE       ERROR STD DEV       -5.83       1.271         -5.83       1.271       13.10       0.00       1.200         T VALUE FOR TEST OF BETA       2.9       DEGREES OF FREEDOM       69         ANALTSIS OF LOGS       T4434E-01       -5.55	9 24 72	67.20	65.00	-2.20	1.6274	1-6129	-0.14451E-01	71 1
MEAN       73,50       67.59       0.74434E-01         CORBELATION COEFFICIENT       0.821       0.821       0.74434E-01         COEFFICIENTS OF BEST FITTING STRAIGHT LINEFIRST SET IS NOT FORCED THROUGH ORIGIN, SECOND SET IS FORCED       INTERCEPT       SLOPE       ERROR STD DEV         -5.83       1.271       13.10       0.00       1.200       13.06         T VALUE FOR TEST OF BETA       2.9       DEGREES OF FREEDOM       69         ANALISIS OF LOGS       T434E-01         T-STATISTIC       5.55								
INTERCEPT SLOPE ERROR STD DEV -5.83 1.271 13.10 0.00 1.200 13.06 T VALUE FOR TEST OF BETA 2.9 DEGREES OF PREEDOM 69 ANALTSIS OF LOGS REAN DIFFERENCE 0.74434E-01 T-STATISTIC 5.55	MEAN CORHELATION COEPPICIENTS	73.50 COEFFICIENT S OP BEST FITTING	87.59 0.821 5 STRAIGHT LINE	FIRST SET IS NOT	FORCED THROUGH ORIGI	N, SECOND S	0.74434E-01 Set is forced	
-5.83 1.271 13.10 0.00 1.200 13.06 T VALUE FOR TEST OF BETA 2.9 DEGREES OF PREEDOM 69 ANALYSIS OF LOGS REAN DIFFERENCE 0.74434E-01 T-STATISTIC 5.55	1	INTERCEPT	SLOPE	ERROR STD DEV				
0.00 1.200 13.06 T VALUE FOR TEST OF BETA 2.9 DEGREES OF PREEDOM 69 ANALISIS OF LOGS REAM DIFFREENCE 0.74434E-01 T-STATISTIC 5.55		-5.83	1.271	13.10				
STD DEV 0.11307 DEGREES OF FRBEDOM 70	T VALUE FOR ANALYSIS OF MEAN DIFFERE T-STATISTIC STD DEV DEGREES OF F	0.00 TEST OF BETA 2 LOGS SNCE 0.74434E- 5.55 0.11307 PREEDOM 70	1.200 2.9 DEGREE •01	13.06 S OF PREEDOM 69				

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DATE	841	GF	GF-841	LOG (WH 1)	LOG (GF)	LOG (GP) - LOG ( 94 1	
8 10 71	122 00	206 00	84 00	2 0964	2 21 20	0 10761	' .
	100 00	470.00		2.0004	2.3133	0.22731	1
a 18 / 1	209.00	430.00	221.00	2.3203	2.6335	0.31332	2
8 22 71	82.00	95.00	13,00	1,9138	1.9777	0.635102-01	3
8 25 71	132-00	214.00	82.00	2.1206	2 3364	0.20084	ň
0 20 71	105 00	104 00	-1 00	2 0212	2 0 1 7 0		7
0 20 7	103.00	104.00	-1-00	2.0212	2.0170	+0.415528-02	2
8 31 71	126.00	179.00	53.00	2.1004	2.2529	0.15248	6
9671	78.00	110.00	32.00	1.8921	2_0414	0.14930	7
11 17 71	167 00	307 00	145 00	2 2005	3 4 4 7 1	0.07740	
	102000	307.00		2.2093	2.40/1	V. 21162	ő
12 29 71	72,00	201.00	129.00	1.8573	2.3032	0.44586	9
1 4 72	89.00	12.00	-77.00	1.9494	1.0792	-0.87021	10
1 13 77	475 00	162 00	-212 00	7 6767	3 3004	0.000021	
	473400	102.00	-313.00	2.0707	2.2073	-0.46/10	11
1 19 72	241.00	235.00	-6.00	2.3820	2.3711	-0.109498-01	12
1 25 72	895.00	392.00	-503.00	2,9518	2.5933	-0.35854	11
1 28 72	96.00	18.9 00	92 00	1 6823	2 2702	0 20180	
	50100	100-00	74.00	1.3023	2.2142	0.23183	14
6 3 16	105-00	160.00	-5.00	2.2175	2.2041	-0.133642-01	15
3 1 72	257.88	161.00	-96.88	2.4114	2.2068	+0.2045A	16
3 4 72	94.60	152.00	57 40	1 0759	2 1018	0 30506	17
3 7 73	26 4 20	334 00	27 20	2 5 5 6 6	2.1010	0.20390	
3 / /2	301.30	334.00	-21.38	2.5580	2.5237	-0.34211 <u>B</u> -01	18
3 10 72	135.80	215.00	79.20	2.1329	2.3324	0.19955	19
3 16 72	145.80	132.00	-13-80	2, 16 37	7 1206	-0-431742-01	28
3 19 72	75 20	108 80	33 80	1 6140	2 0 7 7 4	0.451742-01	
0 30 37	105 00	107.00	33-00	1-0/02	2.0374	U. 16 12 1	21
4 30 72	105.20	113.00	7.80	2.0220	2.0531	0.31065E-01	22
5 6 72	171.40	218.00	46.60	2.2340	2.3365	0.10445	23
5 9 72	62.70	116-00	53.30	1 7971	2 0645	0 26720	20
6 16 73	101 20	110400	*** 30	1.7373	2.0043	0.20720	24
5 15 72	104.30	145,00	40.70	2.0183	2.1614	0.14310	25
5 18 72	143.90	348.00	204.10	2.1581	2.5416	0.36352	26
5 21 72	182-10	278.00	95.90	7 2603	2 8440	0 1977/	22
5 24 72	171 20	311 00	120 90	2 2225		0.10314	
5 27 72	111.20	311.00	133-00	2.2333	2.4928	0.25926	<b>28</b>
5 21 12	248.30	341.00	92.70	2.3950	2.5328	0.13778	29
6 2 7 2	187.00	226.00	39.00	2,2718	2.3541	0.822678-01	30
6 4 72	226 50	270 00	57 50	3 3664	2 44 54		
		213200	22.30	2.3331	2.44.26	0-302302-01	31
6 14 72	127.60	1/9.00	51.40	2.1056	2.2529	0. 1470 1	32
6 17 72	63.30	184.00	20.70	1.9206	2.0170	0.964058-01	77
6 29 72	4 16 69	187.00	+229 69	2 6108	2 37 10	-0.30707	3.0
7 2 72	64 30	110 00		2.0130	2. 27 10	-0-34/9/	24
1 1 12	64.20	131.00	00.00	1.8075	2.1173	0.30974	35
7 8 72	79.60	142,00	62.40	1.9009	2.1523	0.25139	36
7 14 72	92.00	147.00	55.00	1.9638	2 1673	0 20252	27
7 20 72	277 70	270 00	-7 70	2 2340		0.20333	
7 20 72	237.770	230.00	- / . / .	2.3760	2.3617	-0.14JOUE-01	38
1 29 12	51.70	110.00	58,30	1.7135	2,0414	0.32791	39
8 1 72	196.00	232.00	36.00	2, 2923	2.3655	0.712338-01	Lл
8 7 72	107 00	125 00	10 00	2 0200	2 00/0		
6 10 75	107 40		10.00	2.0234	2.0969	0.0/5202-01	41
0 10 72	109.10	161.00	51.90	2.037B	2.2068	0.16901	42
9 3 72	49.20	42.00	-7.20	1.6920	1.6232	-0-687088-01	49
9 9 7 2	95.30	86.00	-9.30	1 9791	1 9345	-0 006000-01	
6 12 77	705 70	221 00	- 74 70	1.2721	14 7 3 4 3 0 0 0 0 0 0	-0.443602401	49
	243.70	221,00	-24.70	2.3904	2.3444	-0.46012E-01	45
9 18 72	136.50	126.00	-10,50	2.1351	2.1004	-0.34762B-01	46
9 21 72	262.88	187.00	-95.88	2.4516	2 7718	-0 17675	
5 24 72	100 00	96 00	- 10 00	244210	2.2710	-0.11975	43
	100100	00.00	- 14.00	2.0034	1.9345	-0.689498-01	48
HEAN	170.78	186-85				0 660000 00	
CORRELATION	CORPETCIENS	0 553				A*003345-01	
CORDET IN THE	VALITUIDDI	202					
CORFEECEMENTS	OF BEST FITTING	SIRVIGHT <b>FIRE</b>	FIRST SET IS NOT	FORCED THROUGH ORIG	IN, SECOND S	ET IS FORCED	
					-		
Т	STERCEPT	SLOPE	BREGH STD DRV				
-							
	103 74	A 443					
	107-74	V.403	69.95				
	0.00	0.928	83.51				
T VALUE FOR	TEST OF BETA 3		OF FREEDOM #4				
ANITYSTE OF	1000++						
SCALLJIS UP							
REAN DIFFERE	BCE 0.66994Z-	01					
T-STITISTIC	1.98						
STD DEV	0.23422						
BRCBRZO AT T	1+5-7+6 						
Promoto OL L	A660VB 47						

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(k) Station 13

			(1)				
DATE	941	67	G2-841	LOG (N4 1	LOG (GF)	LOG (GF) - LOG (94	1)
8 16 71	30.00	52-00	22.00	1.4771	1.7160	0.23888	<b>1</b>
8 25 71	108 00	116.00	8.00	2,0334	2.0645	0.31034E-01	2
A 28 71	66.00	75.00	9.00	1.8195	1.6751	0.555172-01	3
9 15 71	157 00	110 00	-47.00	2, 1959	2.0414	-0.15451	4
9 7 71	40 00	\$3.00	13 00	1.6021	1.7243	0.12222	5
0 20 71	10.00	50.00	27 00	1 5051	1.7709	0.26570	6
10 0 71	. 32.00	35.00	27.00	1 0138	1 9294	0 15605E-01	7
	82.00	83.00	15 00	1 0395	1 4573	-0.821871-01	á
	87.00	12.00	-15.00	1,3373	1 0 7 6 1	0 21016	ă
2 3 72	41.30	67.00	25.70	1.0135	1 6007	-0.262267+02	10
2 15 72	49.30	49.00	-0.30	1.6920	1.0902	-0.202205-02	11
2 21 72	77.80	55,00	-22.60	1.8910	1.7404	-0.13060	11
2 24 72	62.50	58.00	-4,50	1. /959	1-7034	-0.324526-01	14
2 27 72	75.00	70.00	-5.00	1.8/51	1.8451	-0,299636-01	13
3 1 72	55.50	42.00	-13.50	1.7443	1.6232	-0.12104	14
3 4 72	81.90	80.00	- 1.90	1.9133	1.9031	-0.101858-01	15
3 7 72	67.20	25.00	-42.20	1,8274	1.3979	-0,42942	16
3 25 72	43.20	45.00	1.80	1.6355	1.6532	0.17737E-01	17
3 28 72	57-00	73.00	16.00	1,7559	1.8633	0.10745	18
4 12 72	127.70	189.00	61.30	2.1062	2.2765	0,17027	19
4 15 72	66-60	120-00	53.40	1.8235	2.0792	0,25572	20
4 18 72	77.50	97.00	19.50	1.8693	1.9868	0.97470E-01	21
4 37 72	58 50	80 00	21.50	1.7672	1,9031	0.13593	22
4 20 72	76 90	91.00	14 20	1,8853	1.9590	0.736978-01	23
4 JU 72	105 00	126 00	20.20	2 0245	2 1004	0.758982-01	24
5 5 72	•U5-8U	120.00	20.20	1 0/76	1 9760	0 12199	25
5 15 72	64.20	85.00	20.80	1.0075	7. 160/	0.538792-01	74
5 18 72	127.20	144.00	16-80	2.1045	2. 1364		20
5 21 72	103.00	107.00	4.00	2.0128	2.0294	0.165475-01	21
5 27 72	108.80	119.00	10.20	2.0366	2.0/55	0.389308-01	20
6 2 7 2	96.40	106.00	9.60	1.9841	2.0253	0.41236E-01	29
6 11 72	55.80	71.00	15,20	1.7466	1.8513	0,10465	30
6 14 72	71.00	68.00	-3.00	1.6513	1.8325	-0.18750E-01	31
6 17 72	73.00	63.00	-10.00	1,6633	1.7993	-0.63982E-01	32
6 20 72	87.80	70.00	-17.80	1.9435	1.8451	-0.983818-01	33
6 26 72	117.00	145.00	26.00	2.0682	2.1614	0.931838-01	34
6 29 72	56-30	76.00	17.70	1.7656	1.8808	0.11517	35
2 2 72	72-60	94.00	21-40	1,8609	1.9731	0.11221	36
2 2 2 2	67 50	87 00	19.50	1.8293	1,9395	0. 11022	37
1 1 1 1 2	177 60	89.00	-38.60	2.2494	1.9494	-0.30005	38
7 11 72	05 00	84 00	-1.80	1,9315	1.9243	+0.919158-02	39
7 14 72	132 10	105 00	-23 10	2 1075	2 0212	-0.863528-01	ш'n
7 20 72	128.10	60.00	12 30	1 7050	1 9/62	0 10118	u 1
1 29 12	50.70	64.00	13.30	1 0960	2 0042	0 103558-01	42
8 1 72	96.60	101.00	4.40	1.9850	1 3443	0.616738-01	
8 7 72	48.60	56.00	7.40	1.0000	1.1402	0 100/0	0.0
8 10 72	41.80	66.00	24.20	1.0211	1.0193	0. 19640	44
8 13 72	84.40	100.00	15.60	1.9203	2.0000	0.736662-01	45
8 16 72	. 92.00	74.00	-18.00	1.9638	1*8035	-0.945565-01	40
8 25 72	58.20	82.00	23.80	1.7649	1.9138	0.14890	47
9672	134.10	110.00	-24.10	2.1274	2.0414	-0.86028E-01	48
9 12 72	98.00	121.00	23.00	1.9912	2.0828	0.915598-01	49
9 18 72	39.60	56.00	16.40	1.5977	1.7482	0.15052	50
9 21 72	70.00	76.00	6.00	1.8451	1.8808	0.357168-01	51
REAN	79.09	84.47				0.35133E-01	
CORRELATION O	ORFFICIENT	0.695					
COFFETCIENTS	OF BEST FITTIN	G STRAIGHT LINE	FIRST SET IS	NOT FORCED THROUGH	ORIGIN, SECOND	SET IS FORCED	
	•• ••••				•		
T	NTERCEPT	SLOPE	EREOR STD DE	T			
-							
	11-19	0.926	17.23				
	0 00	1 055	17 20				
	0.00 9769 NV 18994 A	52 DECOPER	OF FREEDON	<u>и 9</u>			
T VALUE FUR 7	LOSS OF BELL U	DEGREES	AT INTERAC				
ARALISIS OF I	LUUJ"" A 26 19 2	-0.1					
DEAN DIFFERE	101 201						
T-STATISTIC	1.93 7.011						
STO DEV	V=1392/						
DEGREES OF FI	42EDOU 20						

(1) Station 14

DATR	941	62	62-841	100.480	1) 102.025		
9 15 71	96 00	68 00	2 00	1 0001	1 200 [67]	TOP (05) - TOP (84	1)
6 19 71	134 00	293.00	158 00	1.7023	1.9912	0.89550E-02	1
8 77 71	131 00	124 00	-7 00	2.1271	2.4003	U. 33976	2
6 75 71	120 00	124200	-1.00	2.1173	2.0934	-0.23849E-D1	3
6 4 J 7 1	00.00	70.00	0.00	2.2304	2.2455	0. 1506 3E-0 1	4
0 20 71	22.00	70.00	-12.00	1.9138	1,8451	-0.68716E-01	5
0 31 /1	209.00	201.00	-3.00	2.3201	2.3032	-0.16950E-01	6
9 6 71	271.00	217.00	-54.30	2.4330	2.3365	-0.96510E-01	7
9 12 71	72.00	47.00	-25.00	1.8573	1.6721	-0.18524	6
9 15 71	298.00	270.00	~28.00	2.4742	2.4314	-0.42853E-01	9
9 18 71	145.00	161.00	16.00	2.1614	2.2068	D. 45458E-01	10
9 24 71	64.00	96.00	32.00	1,8062	1.9823	0.17609	11
9 30 71	245,00	311.00	66.00	2 1492	2 11626	A 10360	17
10 2 71	214.00	241 00	27 00	2 3304	2 36 10	0.10339	14
10 6 71	46.00	49 00	1 00	1 6633	1 6600	0.516025-01	1.1
10 9 11	00 64	61 00	2.00	1.0028	1.0902	0.274392-01	14
10 12 71	116 00	135 00	10.00	1-7993	1.7653	-0.14010E-01	15
10 12 71	110.00	135.00	19.00	2-0645	2.1303	0.65o75 <u>E</u> -01	16
10 18 71	319.00	346.00	27-00	2.5038	2.5391	0.352858-01	17
10 21 71	301,00	319.00	18.00	2.4786	2.5038	0.25225E-01	18
10 27 71	264.00	265.00	1.00	2.4216	2.4232	0.164222-02	19
10 30 71	385.00	429.00	44.00	2.5355	2.6325	0-464968-01	20
11 2 71	90.00	83.00	-7.00	1.9542	1,9191	-0.351648+01	21
11 5 71	130.00	162.00	52.00	2.1139	2 2601	0 10613	22
11 31 71	98_00	132-00	34.00	1 9912	2 1206	0 12026	22
11 17 71	267.00	372-00	105.00	2 4 265	2 5765	0.12933	23
12 2 71	128 00	95 00	-33.00	2.7403	2.5703	0- 1440 3	24
12 5 71	174 00	161 00	-33.00	2.1072	1.9777	-0.12949	25
10 6 71	170-00	101200	-17.00	2.2504	2.2068	-0.435932-01	26
12 0 71	68.00	83.00	15,00	1.8325	1.9191	0.86570E-01	27
12 11 71	103.00	130,00	21.00	2.0374	2.1139	0.76517z-01	28
12 20 71	51.00	60-00	9.00	1.7076	1_7782	0.70580E-01	29
12 26 71	47.00	38.00	-9.00	1.6721	1.5798	-0.923148-01	30
1 7 72	41.00	53.00	12.00	1.6128	1.7243	0.11149	41
4 15 72	101.60	182.00	80.40	2.0069	2 2601	0 25310	32
4 18 72	190.80	208.00	17.20	2 7806	2 3101	0 370539 04	12
4 21 72	188 - 60	195 00	6 10	2.2000	2.3101	0.374922-01	22
4 27 72	116 40	130 00	13 60	2.2133	2.2900	0.144988-01	34
4 10 72	19/1 20	214 00	21 00	2.0039	2.1139	0.479978-01	35
6 3 73	174.20	216.00	21.80	2.2862	2.3345	0.462D6E-01	36
5 3 72	84.30	91.00	6.70	1,9258	1.9590	0.33230g-01	37
D B 72	192.60	195,00	2.40	2,2347	2.2900	0.53835E-02	38
5 15 72	94.90	100-00	5.10	1.9773	2.0000	0.22741E-01	39
5 18 72	100.10	190.00	89.90	2.0004	2.2766	0.27833	40
5 21 72	156.60	159.00	2.40	2.1948	2.2014	0.661188-02	<b>u</b> 1
5 24 72	220.40	253.00	32.60	2,3432	2.4031	A 59912F-01	u 2
5 27 72	250.70	253.00	2.30	2.3992	2 4631	0 306738-07	
6 2 7 2	112.00	117.00	5-00	2 04.92	2,4031	0.190/02	4.3
6 8 72	123-20	108.00	-15 20	2,0492	2.0002	0.189685-01	44
6 17 72	104.70	101 00	-3 20	2.0300	2.0334	-0.57184E-01	45
7 8 72	84 70	117 00	- 3. 20	2.0179	2.0043	-0.13543E-01	46
7 11 72	127 60	120 00	42.30	1.9279	2, 1038	0.17592	47
7 10 71	100 30	136.00	10.40	2.1058	2. 1399	0.34037E-01	48
6 1 70	100.20	108-00	/_80	2.0009	2.0334	0.32559E-01	49
0 1 72	102.70	62.00	-40.70	2.0116	1.7924	-0.21918	50
	03.10	120.00	56.90	1.6000	2.0792	0.27917	51
0 13 72	1/8.50	213.00	34.50	2.2516	2.3284	0.76742E-01	52
8 16 72	243.30	198.00	-45,30	2.3361	2.2967	-0-89471E-01	53
8 19 72	112,70	135.00	2,30	2.0519	2.0607	0 377678-02	54
8 25 72	87.10	128.00	40.90	1.9400	2 1072	0 16720	66
9 3 7 2	36.30	31.00	-5.30	1.5500	1 46 19	-0 685000-0-	22
9 6 7 2	151.00	153.QÓ	2.00	2 1790	3 10/7	- 0.03503 <u>5</u> -01	20
9 9 72	40, 20	46.00	5 80	1 6000	2.1047	0.571448-02	21
S 12 72	166.00	205 00	29 00	2 2201	1.0020	0.383396-01	28
9 18 72	73 00	96.00	33.00	2.2201	2.3118	0.91646E÷01	59
0 21 72	155 00	150 00	14.00	1.8573	1.9345	0.77166E-01	60
9 24 12	07 00	138.00	1.10	2, 1956	2.1987	0.30394E-02	61
3 24 72	87.40	82.00	-5-40	1,9415	1.9138	-0.27690g-01	62
TEAN	143.10	157.52				0.37459E-01	
CORRELATION (	OFFFICIENT	0.917					
COEFFICIENTS	OF BEST FITTING	G STRAIGHT LINE	FIRST SET IS N	OT FORCED THROUGH	ORIGIN. SECOND	SET IS ZORCED	
11	TERCEPT	S LO PE	ERROR STD DEV				
	-2.94	1.121	24.06				
	0.00	1.105	23 84				
T VALUE FOR 1	EST OF BETA	2.0 DEGROPP	S OF PREFION	60			
ABALTSIS OF I	OGS		V VI INALDUN				
MEAN DIFFEREN	ICE 0. 374597-	-01					
T-STATISTIC	2.40						
STD DEV	0.10201						
DEGREES OF PO	REDON 61						

(n) Station 17

DATE	841	GF	GF-141	LOG (941)	LOG (GE)	106 (GF) - 106 (NA	. 1)
8 10 71	233.00	232.00	-1-00	2.3674	2.3655	=0 18673P=02	Υ,
8 22 71	149.00	139.00	-10.00	2.1732	2. 14 30	-0.301715-01	5
a 25 71	192.00	207.00	15.00	2.2633	2.3160	0 326708-01	1
6 28 71	194.00	187.00	-7-00	2,2878	2. 27 18	-0 159617-01	и
8 31 71	191.00	181.00	-10-00	2,2810	2. 2577	=0.21355E=01	5
9 6 7 1	159.00	125.00	- 34-00	2.2014	2.0969	-0.10449	6
9 9 7 1	148.00	123.00	-25-00	2.1703	2 0999	-0 403578-01	ž
9 15 71	177.00	174.00	- 3, 00	2,2080	2 2405	-0.743305-01	. í
9 18 71	102.00	104_00	2.00	2 0086	2 0170	0.942346-02	a 0
9 24 71	103-00	103.00	0-00	2 6126	2.0170	0.043434-02	10
9 30 71	100.00	124.00	24 00	2.0000	2.0120	0.00000	10
10 2 71	107.00	132.00	25 00	2.0000	2.0934	0.934226-01	11
10 6 71	110.00	106 00		2 04 14	2. 1200	0.911902-01	12
10 9 71	70.00	68,00	-7.00	2.0414	4 0203	+0.100872-01	13
10 12 71	172.05	163 00	-9.00	2 2266	1+0325	-0.125892-01	14
12 11 71	99.00	100 00	1 00	2.2300	2.2122	=0.23341E-01	15
12 14 71	121-00	121 00	0.00	1.990	2.0000	0.436505-02	16
12 26 71	74 50	61 00	-10.00	2.0828	2.0828	0.00000	17
1 7 72	100 00	113.00	11.00	1.8092	1.8062	-0.63051E-01	18
1 16 72	86 00	00 00	2.00	2.0000	2.0531	0.53078E-01	19
1 19 72	108.00	140.00	2.00	1.9345	1.9445	0.99850E-02	20
1 22 72	92.00	140.00	40.00	2.0134	2.1703	0.13684	21
1 28 72	82.00	63.00	1.00	1_9138	1.9191	0.52643E-02	22
2 21 72	96.00	135.00	39.00	1.9823	2.1303	0.14806	23
2 20 72	216.60	145.09	- 11.80	2,3361	2.2672	-0.68381E-01	24
2 24 74	DD-20	106.00	40.80	1.6142	2.0253	0.21106	25
2 21 72	167.90	179.00	11.10	2.2250	2.2529	0.27606E-01	26
2 14 72	154-50	127.00	-27.50	2.1689	2.1038	-0.85125E+01	27
3 10 72	131, 10	764.00	32.90	2,1176	2.2148	0.97249E-01	28
3 19 72	314.10	121.00	6.90	2.0573	2,0826	0.25509E-01	29
3 22 72	69.20	89.00	-0.20	1,9504	1.9494	-0,97179E-03	30
3 25 72	33.60	72.00	38,40	1.5263	1.8573	0.33102	31
3 29 72	84_80	133.00	46.20	1.9284	2,1239	0.19547	32
4 3 72	177.00	155.00	-22,00	2.2480	2.1903	-0.57641E-01	37
4 6 72	157.10	177.00	19.90	2,1962	2.2450	0.516038-01	34
4 9 7 2	144.20	128.00	-16.20	2.1590	2.1072	-0.517548-01	35
4 12 72	232.50	226.00	-4.50	2.3664	2.3579	-0.84877E-02	36
4 15 72	157.10	181.00	23.90	2.1962	2.2577	0.615082-01	37
4 18 72	169.70	174.00	4 30	2.2297	2.2405	0.108705-01	30
4 27 72	113.10	129.00	15.90	2.0535	2.1106	0 571378+01	30
4 30 72	180.20	138.00	-42.20	2,2558	2.1399	-0 11597	22
5 3 72	159.20	153.00	-6.20	2,2019	2.1847	+0.172492-01	41
5672	264.25	241.00	-23.25	2.4220	2.3820	-0.399992-01	4.2
5 15 72	149.60	145.00	-4.60	2.1749	2.1614	-0 135568-01	47
5 18 72	226.10	236.00	7_90	2.3581	2, 1729	0.147912-01	4.5
5 21 72	204.60	169.00	-35.60	2.3109	2.2279	-0 930148-01	15
5 24 72	217.30	234.00	16.70	2,3371	2.3692	0. 321635-01	46
5 27 72	207,80	176.00	-31,80	2.3176	2.2455	-0.72126E-01	40
6 2 7 2	177.60	164.00	-13.60	2.2494	2.2148	-0 345048-01	
6 <b>3</b> 72	279.38	193.00	-86.38	2.4462	2.2556	-0 16063	40
6 11 72	98.10	110.00	11.90	1,9917	2.0414	0.497347-01	50
6 17 72	123.30	111.00	-12-30	2.0910	2.0451	=0 456307-01	6.1
6 20 72	171.80	123.00	-48-80	2,2350	2.0699	-0 14511	50
6 29 72	122.70	160.00	37.30	2-0888	2. 2041	0 11520	52
7 2 72	114.40	166.00	51-69	2.0584	2 2201	0 16160	55
7 11 72	206.20	215.00	8.80	2.3143	2 3324	0 10105	54
7 14 72	153.30	147-00	-6.30	2.1455	2 1673	-0 193152-01	22
7 20 72	209.00	187.00	+22-00	2.3201	2 2719	-0.002135-01	20
7 29 72	90.60	179.00	88-40	1 9571	2 26 20	-0.483056-01	57
8 1 7 2	204.80	243-00	18.20	2 2112	2.2023	0.293/4	58
8 7 72	107.30	116.00	8 70	2.3113	2.3030	0.742832-01	28
B 10 72	92-00	126.00	34 00	1 0420	2.0045	0.338/2E-01	60
8 13 72	161-10	146.00	-15,10	2 2024	2.1604	0.13658	61
6 16 72	143.60	125-00	-18.60	2 1571	2. 1044	-U. 42/36E-01	62
8 25 72	111.80	116.00	4 20	2.1371	5.0303	-0.6023BE-01	63
8 31 72	148-40	136.00	-12 40	2. V904 3 1344	2-0645	0.160282-01	64
9 3 72	57.00	32-00	- 25 00	2-1/14	2-1333	+0.1789DE-01	65
9 9 72	64-10	59 00	15 10	1 80/0	1.3051	-0.25072	66
9 18 72	60. 30	72 00	11 70	1.6068	1.7709	-0.35590E-01	67
9 21 72	103 30	86 00	11.70	1. / 40 3	1.8573	0.77038E-01	66
9 24 72	105.10	55.00	-7.30	2.0141	1+9956	-0.18452E-01	69
	1031 10	30.VV	-7.10	2.0216	1.9912	-0.30367E-01	70

MEAN 141.39 142.61 0.10798E-01 CORRELATION COEFFICIENT 0.866 COEFFICIENTS OF BEST FITTING STRAIGHT LINE --PIEST SET IS NOT PORCED THEOUGH ORIGIN, SECOND SET IS FORCED

	INTERCEPT	SLOPE	EBEOR	STO DEV
T VALUE POP	20.64 0.00 TEST OF BWTA	0.863 0.994 2.1	LICETER OF CE	18.42 18.93
ANALYSIS OF	LUGS FMCZ 0 10739	2. I T_0.1	DEGREES OF FRI	LDON 58
T-STATISTIC STD DLV	0.95 0.950988-(	01		
DEGREES OF	FREEDOM 69			

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TABLE V Cont	inued. TOTAL SU	ISPENDED PART	ICULATE (TSP) CON	CENTRATIONS FOR GI	ASS FIBER AN	ID WHATMAN-41 FI	UTERS
			(o) Station	20			
DATE 8 10 71	₩41 170.00	GF 162-90	GF-141 -8.00	LOG(941) 2.2304	LOG (GF) 2.2095	LOG (GP) - LOG (141 -0. 20934E-01	۱ ۱
8 22 71	85.00	87.00	2.00	1.9294	1. 9395	0.10100E-01	2
8 25 71	101.00	97.00	-4.00	2.0043	1,9868	-0.17550E-01	3
6 28 21	67.00	45.00	-22.00	1.8261	1.6532	-0.17286	4
6 31 71	93.00	73.00	-20.00	1.9685	1.8633	-0.10516	5
5 6 71	124-00	79.00	-45.00	2.0934	1.8976	-0.19580	6
9 9 71	123.00	108.00	+ 15.00	2.0899	2.0334	-0.56481E-01	7
9 15 71	117-00	93.00	-24_00	2.0682	1,9685	-0.997032-01	8
9 18 71	60.00	57.00	-3.00	1.7782	1.7559	-0.22276E-01	9
9 24 71	43.00	52.00	9_00	1.6335	1.7160	0.82535E-01	10
9 30 71	107.00	114.00	7.00	2.0294	2.0569	0.27521E-01	11
10 6 71	48.00	50.00	2.00	1.6812	1.6990	0.17729E-01	12
10 9 71	54.00	50.00	-4.00	1.7324	1.6990	-0.33423E-01	13
10 12 71	103.00	89.00	-14.00	2,0126	1,9494	-0.63447E-01	14
10 18 71	145.00	129.00	-16.00	2.1614	2.1106	-0.50776E-01	15
10 21 71	151.00	119.00	-32,00	2.1790	2,0755	-0.10343	16
10 30 71	182.00	186.00	4.00	2.2601	2.2695	0.94414E-02	17
12 6 71	103.00	109_00	6.00	2.0128	2.0374	0.24590E-01	16
12 14 71	101.00	104.00	3.00	2.0043	2.0170	0.12712E-01	19
12 20 71	13.00	46.00	33.00	1,1139	1.6628	0-54881	20
12 26 71	56.00	56.00	0.00	1.7482	1.7482	0.00000	21
1 4 72	16.00	70.00	54.00	1.2041	1.8451	0.64098	22
1 13 72	32.00	40.00	8.00	1.5051	1.6021	0.969108-01	24
2 12 72	212.90	177.00	-35.90	2.3282	2,2460	-0.801998-01	24
2 15 72	39.10	38.00	-0.10	1.5809	1.3/98	-0.111488-02	20
2 24 72	114-20	57.00	-57.20	2.03//	2 0212	-0.037058-01	20
2 27 72	06.00	105.00	- 25, 30	2.1149	1 3673	0 116297-01	20
5 3 72	70.10	12.00	1.90	1.0457	3 0453	0.110295-01	20
5 6 /2	95.80	111.00	- 23 00	1 0100	1 6232	-0 13966	30
5 9 72	30.40	42.00	-23-00	1 8488	1 8633	0 145328-03	31
5 10 72	175 60	129 00	2.40	2 0950	2.1106	0.116098-01	32
5 16 72	123.00	123.00	26 70	1.9360	2.0531	0.11708	11
5 24 72	125 70	174 00	43 10	2,0993	2.2405	0.14122	34
5 77 72	u7 10	106 00	58 90	1.6730	2.0253	0.35231	35
6 2 72	120 80	110.00	-10-80	2.0421	2.0414	-0.40663E-01	36
6 6 72	106-90	107.00	0,10	2.0290	2.0294	0.412948-03	37
6 11 72	32.90	56.00	23.10	1.5172	1.7482	0.23101	38
6 14 72	29-20	91.00	61.80	1.4654	1,9590	0.49367	39
6 17 72	77-60	65.00	-12.60	1.8898	1.8129	-0,76935E-01	40
6 20 72	45.60	73.00	27.40	1.6589	1,8633	0.20438	41
6 26 72	49.30	71.00	21.70	1.6928	1.8513	0.15844	42
7 2 72	62,50	69,00	26.50	1.7959	1.9494	0, 15351	43
7 14 72	74.50	76.00	1.50	1.8722	1,8808	0.86575E-02	44
7 20 72	76.00	137.00	61.00	1.8608	2.1367	0.25591	45
8 10 72	34.30	94.00	59.70	1.5353	1,9731	0.43787	46
8 13 72	100.20	117.00	16.80	2.0009	2.0682	0.673228-01	47
6 16 72	79.00	96.00	17.00	1.8976	1.9823	0.846442-01	48
8 19 72	82.70	68.00	-14-70	1.9175	1.8325	-0.84992E-01	49
8 22 72	45.80	101.00	55,20	1.6608	2.0043	0.34349	50
9 6 72	154.20	151.00	- 3- 20	2.1861	2.1/90	-0.9104/8-02	51
9 12 72	98.70	131.00	32-30	1.9943	2,1173	V. 12290	52
9 18 72	72.00	45.00	-26.00	1.63/3	1.0028	-V. 19438 A 200315-A1	50
9 21 72	//.00	84.00	D_40 23 70	3.0070 1 7165	1 8609	0 16334	55
¥ 24 J2	54-30	/0.00	23.10	1./100	1.0000	A 10774	22

MEAN 86.32 91.84 0.532382-01 COBRELATION COEPFICIENT 0.771 COLFFICIENTS OF BEST FITTING STRAIGHT LINE ~-PIRST SET IS NOT PORCED THROUGH OBIGIN, SECOND SZT IS FORCED

 INTERCEPT
 SLOPE
 EHROR STD DEV

 21.64
 0.813
 18.84

 0.00
 1.628
 19.65

 1 VALUE FOR FEST OF BETA
 1.0
 DIGREES OF FREEDOM

 ANALYSIS OF LOGS- 1.0
 DIGREES OF FREEDOM

 MEAN DIFFERENCE
 0.53238E-01
 1.53385-01

 F-STATISTIC
 2.13
 351

 STL DEV
 0.18564
 54

52

(p) Station 21							
CATE	841	G7	G2-841	LOG (W4 1)	1.06 (68)	100 (07) - 100 (88	
6 10 71	171.00	171.00	0.00	2,2330	2.2330	0 00000	
8 25 71	277.00	272.00	-5.00	2.4425	2. 4346	+0 701078-02	;
8 28 71	95.00	87.00	-a_00	1,9777	1,9395	-0.3070000-02	2
8 31 71	105.00	89.00	-16.00	2.0212	1.9494	-0 717992-01	<u>,</u>
5 10 71	209.00	259.00	50.00	2.3201	2 4177	0 031547-01	
S 24 71	114-00	129.00	15.00	2.0569	2 1106	0.531342-01	3
9 30 71	163.00	207-00	44.00	2, 2122	2 2160	0.10170	
10 6 71	62.00	73.00	11.00	1.7924	1 86 73	0 100300-01	
1 4 72	86.00	118.00	32-00	1.9345	2 07 19	0.103305-01	
1 7 72	75.00	59.00	-16.00	1,8751	1 7709	-0 10031	
1 13 72	61.00	86.00	25.00	1,7853	1 9345	0. 14017	11
1 16 72	61,00	63.00	2.00	1 7853	1 7907	0 160101.01	12
1 19 72	56.00	83.00	27.00	. 1. 7482	1 0 1 0 1	0 17090	1.5
1 25 72	247.00	238.00	-9.00	2.3927	2 3766	-0 161208-01	10
1 23 72	64.00	103.00	39.00	1.6062	2.0124	0.101206-01	16
2 3 72	115.20	179.00	63.60	2.0614	2 2520	0.20000	15
2 15 72	59.80	73.00	13.20	1.7767	1 96 33	0 056440-09	10
2 21 72	252.90	255.00	2.10	2.4029	7 0035	0.000445-01	1/
2 24 72	81.80	79.00	-2.80	1 6127	1 0076	0.339446-02	18
2 27 72	153.00	144.00	-9-00	2 1817	2 1544	-0 767207.01	19
3 1 72	264.00	272.00	8.00	2 4916	2.1204	-0.263298-01	20
3 4 7 2	145-10	234-00	86 90	2 1617	2.4340	0.129655-01	- 21
4 9 7 2	67.20	112.00	44.80	1 9374	2.3092	V. 20756	22
4 12 72	237.70	320-00	82.30	3 3760	2.0472	0.22185	23
4 18 72	281.19	387.00	105.81	2.3/80	2.3031	0. 2912	24
4 30 72	229.40	308-00	78 60	2 3606	2.30//	0.13871	25
5 3 7 2	93.80	116.00	22.20	1 0733	2.4000	0.12/96	26
5 6 72	249.90	296.00	46 10	2 2026	2.0045	0.922705-01	27
5 9 7 2	102.80	85.00	-17-80	2 0120	2.4/13	0./35282-01	<b>XR</b>
5 15 72	102.10	198.00	95.90	2 0000	3.7234	-0.825618-01	
5 18 72	119.60	164.00	64.40	2.0030	2.290/	0.20/05	30
5 21 72	146.10	201.00	54.90	2 1646	2.2040	0.18709	11
5 24 72	241.70	362.00	120.30	2 3633	2.3032	0.13855	32
5 27 72	212.30	263.00	50.70	2 2240	2.330/		33
6 2 7 2	128,40	220.00	91-60	2 1086	2 34200	0.930128-01	34
6 a 72	145.00	184-00	00 - PE	2 1614	2.3424	0.23385	32
6 11 72	91.80	134.00	42.20	1 6629	2.2040	0.10345	36
6 14 72	114.90	141.00	26-10	2 0603	2.1271	0.10428	3/
6 17 72	112.00	79.00	-33-00	2 0403	1 2076	-0.15150	38
6 20 72	266.06	270.00	3.94	2 4250	2 4314	-0.13139	39
6 29 72	125.30	147.00	21.70	2.0070	2.4314	0.037912-02	40
7 2 7 2	143.90	191.00	47-10	2 1501	2.10/3	0.033788-01	41
7 29 72	78.60	107.00	28-40	3 8954	2.2010	0.12290	42
8 1 72	127.50	184.00	56.50	2 1055	2.0234	0.13397	4.1
8 10 72	116.10	164.00	47.90	2 6649	2.2040	0. 15931	44
8 13 72	281.88	293.00	11.13	2.6501	2. 2140	0.15002	45
8 16 72	264.50	258-00	-26-50	2 8561	2.4009	0.108118-01	46
B 19 72	271.38	72.00	-199.38	2 4336	1 06 23	-0.424025-01	47
6 22 72	416.06	403.00	-13-06	2 6102	2 6063	-0.5/624	48
8 25 72	93.00	111.00	18.00	1.9665	4.0VJJ 2 0453	-0.138538-01	49
9 3 72	41,50	39.00	-2-50	1 6180	4.0433	V. /0839E-01	50
9 6 72	229.80	255.00	25-20	2 3613	1. JY     7 0.045	-U.20983E-01	21
9 9 72	52.60	47.00	-5-60	1 7210	4+4000	0.401968-01	52
9 18 72	233, 10	181.00	- 52, 10	2.1675	1.0/21	-0.400098-01	20
9 21 72	275.00	316.00	41.00	1010	2 4007	-V. 10300	34
9 24 72	116.00	107.00	-9,00	2 0645	2 4331	V.60355E-01	55
				*****	2. V294	-v. JOU/4E-01	56

HEAN 156.18 178.71 0.57707 CORRELATION CORPFICIENT 0.462 COEFFICIENTS OF BEST FITTING STRAIGHT LINE --FIRST SET IS BOT FORCED THROUGH ORIGIN, SECOND SET IS PORCED 

	INTERCEPT	SLOPE	BBROR STD DEV
	3.46 0.00	1.122	33.25 32.97
T VALUE FOR ANALYSIS OF	TEST OF BETA Logs	1.4	DEGREES OF FRZEDOM 54
HEAN DIFPER. T-STATISTIC	ENCE 0.57707 3.32	/E=01 2	
DEGREES OF	U.13005 FREEDOM 55	i	

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0.57707E-01

#### TABLE VI. - SUMMARY OF ESTIMATED OF

BEST-FITTING TONES AT EACH STATION

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Station	Number of observation	α	β	t
1	57	16.45	1.014	0.2
3	91	- 8.46	1.307	<sup>a</sup> 7.5
5	66	11	1.109	1.2
6	54	10.67	. 800	-1.3
7	84	-1.74	. 976	5
8	75	-3.36	.979	2
10	73	6.11	. 999	0
12	71	-5.83	1.271	<sup>a</sup> 2.9
14	51	11.19	. 926	5
15	62	-2.94	1.121	<sup>a</sup> 2.0
17	70	20.64	. 863	<sup>a</sup> -2.1
20	55	21.64	. 813	-1.8
21	56	3.46	1.122	1.4
4	53	28.49	. 534	-7.6
9	76	-67.85	2.222	7.2
13	48	107.74	. 463	-3.8

<sup>a</sup>t-Statistics indicate  $\hat{\beta}$  values significantly different from 1.0 at 95 percent significance level.

# TABLE VII. - SAMPLE DISTRIBUTION OF $\overline{\tilde{m}}_j$

Number of	Station	$\overline{m}_{j}$	Sample distribution
observations,			function,
j			$(i - \frac{1}{4})/14$
			(* 2//
1	4	-0.1023	0.0357
2	· 6	0448	.1071
3	8	0194	. 1786
4	7	0181	. 2500
5	17	. 0108	. 3214
6	10	. 0248	. 3929
1 7	14	. 0351	. 4643
8	15	. 0375	. 5357
9	1	. 0453	. 6071
10	5	. 0459	. 6786
11	20	. 0532	. 7500
12	21	. 0577	. 8214
13	12	. 0744	. 8929
14	3	. 0859	. 9643
15	9	. 2228	
16	13	. 0670	
		m = . 0204	







Figure 2. - Plots of weight in grams of six Whatman-41 filters as function of relative humidity.







Figure 3. - Continued.







Figure 3. - Concluded.





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