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EFFECT OF COAL QUALITY ON MAINTENANCE COSTS AT UTILITY PLANTS

Final Report
Contractor—The Hoffman-Muntner Corporation

June 1980

Contract No. U.S.D.O.E. AC01-75ET12512

U. S. Department of Energy
Assistant Secretary for Fossil Energy
Office of Coal Mining

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**EFFECT OF COAL QUALITY ON
MAINTENANCE COSTS AT
UTILITY PLANTS**

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PITTSBURGH MINING TECHNOLOGY CENTER

COAL PREPARATION DIVISION

FINAL REPORT

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ABSTRACT

In an attempt to determine if correlation exists between coal quality, as measured by its ash and sulfur contents, and the maintenance cost at utility plants, an examination was made of the actual maintenance cost experience of selected portions of five TVA coal-fired power plants as a function of the fuel quality consumed during an extended period of time. The results indicate that according to our decision rules, developed in compliance with accepted statistical practices, correlation does exist in many portions of the coal-fired plants examined for which sufficient maintenance cost records were available. The degree of correlation varies significantly among the individual portions of a particular plant as well as among the various plants. However, the indicators are sufficient to confirm that a change (within the design constraints of the unit) in the ash and/or sulfur content of the coal being consumed by a utility boiler will have a proportionate effect on the maintenance cost at the plant. In the cases examined, each percent variation in ash content could have a monetary effect of from \$0.05 to \$0.10 per ton of coal consumed. Similarly, each percent variation in sulfur content could influence maintenance costs from \$0.30 to \$0.50 per ton of coal. Since these values are based on preliminary analysis of limited data, they must be approached with caution and not removed from the context in which they are presented. However, if borne out by further study, the potential magnitude of such savings may be sufficient to justify the acquisition of superior coal supplies, either by changing the source and/or using preparation to obtain a lower ash and sulfur fuel.

PREFACE

The following report presents the results of a study conducted by the Hoffman-Muntner Corporation of Silver Spring, Maryland for the United States Department of Energy under Contract Number DEAC01-75ET12512 (previously ET-75-C-01-9025). This effort was performed under the technical direction of Mr. Richard E. Hucko and Mr. John T. Wizzard, Pittsburgh Mining Technology Center.

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The author wishes to express sincere appreciation to the competent and dedicated TVA plant superintendents and their staffs who generously gave of their time in support of this program. At these well managed plants, we were made to feel welcome and provided with a substantial amount of information critical to the successful accomplishment of this program. Additionally, the author wishes to thank Messrs. Ray Bowen and Harry E. Tate and their staffs of TVA's Power Accounting Office for their cooperation in providing much of the financial data used in this analysis. Further, the author wishes to express appreciation to Messrs. Richard E. Hucko, Albert W. Deurbrouck, and John T. Wizzard of the Department of Energy, and Mr. Randy M. Cole of TVA's Division of Fossil and Hydro Power for their leadership in establishing the overall program and their valuable counsel and constructive suggestions during the conduct of the program. Also, my utmost appreciation to Mrs. Janet L. Warr and Mrs. J. Joanne Crawford of our staff for their conscientious and dedicated support of every aspect of this project. Finally, special thanks and an expression of admiration to Mr. Richard E. Barrett of Battelle-Columbus with whom I have worked so closely during these past months.

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1.0 INTRODUCTION

For most of the last decade, we heard a lot about the urgency associated with developing an energy strategy to reduce our intolerable dependence on foreign oil supplies. Unfortunately, there has been more "smoke" than "fire" and little, if any, improvement has been made in our less-than-secure domestic energy picture. However, it now appears that the country is finally getting serious and will make substantive progress before it is too late.

Recently, The President's Coal Commission, headed by Governor Jay Rockefeller of West Virginia, came to the conclusion that the direct use of coal is the strategy for the 1980's. Such a conclusion was of little surprise to those who know the weaknesses and difficulties associated with the other options. Fortunately, many utilities have been cognizant of these weaknesses and, in spite of the regulatory labyrinth within which they must function, have continued to increase their coal-fired capabilities. During 1979 the utility industry consumed 529 million tons of coal. If all the new coal-fired capacity planned became a reality, the National Coal Association estimates that the industry would annually consume upwards of 880 million tons by 1988 (1). Even this estimate may be low if incentives to convert existing oil- or gas-fired capability become more appealing. Therefore, barring a major technological breakthrough, the expanded use of coal in an environmentally acceptable fashion will remain the cornerstone of our country's energy plan through this century.

From a national economic perspective, this increased utilization of coal must be accomplished in the most cost-effective manner. This means

that our key resource must not be wasted, but mined, processed, transported, and consumed in the most efficient manner within the constraints of good environmental practices. It is in this regard that we undertook to better define and quantify the benefits associated with coal preparation. Previous works addressing this subject have included among the benefits the increased heat content of the cleaned coal along with lower emission control, transportation, ash disposal, and boiler maintenance costs. It was the objective of this study to give greater definition to this latter benefit by focusing on actual coal-fired power plant operation and maintenance experience as a function of the quality of fuel consumed over time.

In order to do a credible job on this comprehensive subject, the Department of Energy arranged to have this project performed in coordination with a larger program, jointly funded by DOE and the Tennessee Valley Authority (TVA), to examine relationships between coal characteristics and the performance of utility power plants. Also supporting this joint DOE/TVA program was the Battelle-Columbus Laboratories whose major function was to assemble and analyze coal data and plant design considerations. The overall purpose of this program was to define which coal constituents appear to influence which aspects of coal-fired plants and their ability to produce power in a reliable, efficient, and cost-effective manner. This was accomplished by examining the performance of a number of TVA coal-fired plants along with an analysis of the coals burned over time. It was the responsibility of the Hoffman-Muntner Corporation to examine in detail the operation and maintenance cost histories of the coal-related portions of these plants.

2.0 SUMMARY OF STUDY FINDINGS

In summarizing an analysis of this type, it seems particularly fitting to recall a quotation from Shakespeare's "The Tempest" which reads in part "...what's past is prologue..." In the context of the situation of the play, as well as this analysis, there is a reliance upon previous events to predict or foretell those of the future. This proposition is essentially the foundation of this analysis.

Based upon the maintenance cost/coal quality history of power plants in the Tennessee Valley Authority system, estimates were developed of the potential savings to be realized by the utility for each percentage point reduction in ash and sulfur of the coal consumed. These savings ranged from \$0.05 to \$0.10 per ton for each percent reduction in ash and \$0.30 to \$0.50 for each percent reduction in sulfur. Therefore, at the upper limits of these ranges, a 5 percent reduction in ash and a 2 percent reduction in sulfur could mean a savings of \$1.50 per ton.

Obviously, the strength of these results rests upon the degree to which maintenance costs are influenced by coal quality. Since we know that coal quality is not the exclusive controlling factor, cognizance must be taken of the number of variables and tests developed to determine their relative influence. This is not an easy task since a degree of wear, failure, de-rating, slagging, fouling, shutdown, and combinations thereof are inherent and unavoidable in the severe environment of a coal-fired power plant. There remains the inexorable fact that at a power plant, we are dealing with men and machinery, both of which are subject to fatigue and eventual failure. As echoed during many of the discussions with plant personnel, this makes it difficult to relate a particular breakdown, unscheduled outage, or unit

derating exclusively to coal. However, in spite of such influential variables as this inherent aging process and the operator at the controls, we can still establish that a change (within the design constraints of the unit) in the ash and/or sulfur content of the coal being consumed by a utility boiler will have a proportionate effect on the maintenance cost at the plant.

To accomplish this, we selected five TVA coal-fired power plants representing a broad spectrum of unit size, type, manufacturer, age, and configuration. In conjunction with operating and maintenance personnel, we reviewed every area in and around these plants to determine those areas which were perceived to be susceptible to variations in coal quality. Then, using this and our own knowledge and presumptions, we sought out the historical cost records for those areas in and around the plants categorized as coal related. This annual cost information was adjusted to constant 1978 dollars. Next, we computed the actual amounts of ash and sulfur to which the particular coal-fired plants were exposed each year. Correlation and regression analyses were performed on these annual data to confirm or reject the existence of suspected relationships between variations in coal quality and the maintenance costs for various portions of contemporary coal-fired power plants. The results of the analyses indicate that according to our decision rules, developed in compliance with accepted statistical practices, correlation does exist in many portions of the coal-fired plants examined for which sufficient maintenance cost records were available. The validity of inferences or predictions based upon such regression analyses will depend upon the consistency of operating conditions

and maintenance philosophy during subsequent periods.

Of these five plants examined, significant portions of three displayed reasonable correlation as established by the initial analysis of the "raw" data. These plants were Shawnee, Widows Creek, and Paradise. By interpreting these results, the potential savings per ton of coal burned associated with each percent reduction in ash and sulfur can be estimated. At Shawnee, the savings for each percent reduction in ash were \$0.05 per ton and \$0.30 for sulfur. Comparable results for Widows Creek were \$0.10 for ash and \$0.50 for sulfur. Paradise displayed a similar pattern of \$0.06 for ash and \$0.30 for sulfur. Since these values are based on preliminary analysis of limited data, they must be approached with caution and not removed from the context in which they are presented.

At the other TVA plants examined, Bull Run and Cumberland, only a limited number of maintenance cost accounts displayed an acceptable level of correlation with coal quality. In the case of the Cumberland facility, which is TVA's newest coal-fired plant, these results were not totally unexpected since the documented cost history went back only to 1975. Having such limited maintenance and operating histories, coupled with the many modifications at the Cumberland Plant, made it difficult to correlate maintenance cost and performance with coal quality. Although we had twelve years of cost and coal quality data for the Bull Run Plant, our initial correlation results were nearly as weak. However, a more thorough analysis of these data may be warranted to factor out some "abnormal" variables during the course of Bull Run's operating history. For example,

there have been significant additions to the particulate control system, as well as changes in the major maintenance cycles. Particularly at a single unit plant such as Bull Run, it is reasonable to expect that this latter change would cause irregular maintenance cost patterns not related to variations in coal quality. Such "abnormal" variations would have the effect of statistically cancelling normal cost variations with coal quality during other periods.

3.0 DEVELOPMENT OF STATISTICAL APPROACH

3.1 Background

There are many variables which influence the manner in which a particular coal-fired power plant operates at any given time. These variables generally fall into three categories - Operator Related, Design Related, and Fuel Related. Although, from a theoretical perspective, these variables may be discussed separately, they are in practice quite interdependent. Addressing the first category, the proficiency with which the operator executes such functions as soot blowing or varying the amount of excess air will influence the performance of the plant. Even if the plant is in the hands of totally qualified personnel, the ability of the operator to achieve maximum performance from a unit may be limited by design factors outside of his control. Among such design-related factors might be pulverizer capacity and/or furnace volume. Under certain circumstances, the operator may be fully competent and aware of what actions are required to attain full load from the unit, but be unable to execute such steps beyond the design limits of the equipment.

Now, looking at the third category, that of fuel-related factors, affecting performance, the interdependent relationship with the other variables becomes clear. The characteristics of the coal directly influence many of the functions performed by the operator. Additionally, these same characteristics influence the point at which the design of the unit becomes an impediment to meeting the desired output. For example, the amount and frequency of soot blowing are determined by the manner in which ash and slag accumulate on the furnace walls and convection path surfaces. The presence and extent of such accumulations

are a function of percent ash in the coal and its mineral composition. Further, the severity and thus the urgency for prompt removal of this accumulation may further relate to the spacing between adjacent heat transfer surfaces in the convection path or other design features. Similarly, as the thermal content of the coal being fed to a unit is reduced, it will require a greater volume of fuel to achieve the same level of output. If the pulverizer capacity and/or configuration is such that it cannot handle the required increase in throughput to the boiler, the desired output will not be attained. These are just a few examples of the interrelationship of the fuel, the operator, and the boiler design on a plant's ability to respond to the variations in load up to its design capacity.

Having briefly looked at the principal factors which influence power plant operation, we now focus on the maintenance aspects and find that these same mutually related factors are governing. For example, in the case of ash build-up in the convection path, the more often it is necessary to use the soot blowers, the more maintenance they will require. Further, the frequent and/or improper use of the soot blowing equipment will accelerate ash erosion of the heat transfer surfaces on which they are applied. In the case of the pulverizers, as the feed is increased to compensate for a drop in heating value of the coal, the equipment will be working harder with an associated acceleration in wear without any improvement to power output.

There is little difficulty appreciating this interrelationship of fuel, operator, and design on the performance and maintenance of a

coal-fired power plant. The uncertainty comes in trying to determine which of these is the principal controlling item. However, experience tells us that fuel is not inconsequential in this regard. Just as in the expression, "you are what you eat," a power plant appears to be influenced by the "diet" of fuel it receives. Our objective was to confirm the existence of such a relationship and, if possible, measure the extent of such relationship(s) on the cost of operation and maintenance. To accomplish this, we had to develop a rational statistical approach within the limitations of the available data and program budget.

3.2 Statistical Approach

3.2.1 Hypothesis

Based upon previous experience and study, inference, and discussions with senior personnel at coal-fired power plants, we are of the opinion that a quantifiable relationship exists between coal quality and the costs associated with operating and maintaining a utility plant. This program set out to determine the extent of such a relationship and, if significant, the particular areas of a coal-fired plant whose operation and maintenance costs exhibit the most sensitivity to variations in fuel quality. In keeping with accepted statistical practices, our program objective is restated in the form of a motivated hypothesis as follows:

Hypothesis - As the quality of coal consumed by a given power plant decreases, the cost of operating and maintaining the plant will increase.

Under utopian conditions, one would go about testing this hypothesis by selecting several coal-fired power plants of the same age, manufacture,

size, design, unit configuration, etc., which had been functioning at the same level of service for an extended period. Then, an equal number of plants would be selected which would be identical to the first group, except for being between five and ten years older. Next, under these ideal circumstances, both groups of identical plants would have been continually operated by equally competent personnel and maintained under a comparable maintenance program with all costs recorded under a uniform accounting system. Further, the fuel source for each plant would have remained fixed with a plant from each group consuming the same coal and another plant from each group consuming a washed variety of that same coal. Finally, a broad spectrum of coal qualities (ash, sulfur, moisture, hardness, Btu, etc.) would have been used by the plants, fully documented by ultimate analyses and consumption data.

Certainly, under the ideal conditions described above, we would be able to conveniently test our hypothesis since only the variables of interest would remain - namely, coal quality and cost. This would permit us to perform simple statistical operations such as correlation and linear regression. Then, based on an acceptable significance level, we would calculate and apply a decision rule to these statistical values and thus establish the strength of our suspected relationship (hypothesis). Unfortunately, ideal conditions of this type do not exist. However, there are many utilities having a variety of coal-fired units on which they have maintained comprehensive fuel and cost histories.

3.2.2 Source of Data

TVA, being the largest domestic coal purchaser, was a particularly

appropriate source for the data necessary to perform this initial hypothesis testing. Five TVA plants were selected having a total of twenty-four units. Although we could not control the extraneous variables such as age, plant configuration, operator, load demand, maintenance schedule, etc., TVA did offer a reasonably well documented fuel consumption history with costs collected under a uniform accounting system. Eighty-six accounts were identified as being coal related in that they covered areas of a power plant which would be directly exposed to the fuel or the products of combustion. Because of the plant design and/or unit configurations, not all accounts applied to all plants. Specifically, sixty-five applied to Shawnee; forty-eight to Widows Creek; twenty-one to Paradise; sixteen to Bull Run; and twenty-six to Cumberland. Based upon the availability of data, the period from 1962 through 1978 was selected for analysis. Since some units were put into initial service after 1962, not all plants and/or units within certain plants could be analyzed over the same period. As explained in greater detail later, those plants having a shorter data period had to have higher correlation coefficients in order to meet our decision rule for statistical significance.

The eighty-six coal-related accounts were taken from the semiannual TVA report entitled "Comparison of Steam Production Expense." This TVA accounting report summarizes the cost of operating and maintaining each of the coal-fired plants according to a comprehensive series of account classifications. Each of these accounts is a composite of the labor, materials, services, etc., charged to that function or piece of equipment during the period. In consultation with plant personnel, this comprehensive

list of accounts was reviewed to determine those categories which these individuals involved with the operation and maintenance functions perceived as being most sensitive to variations in coal quality. Then, based upon several such interviews and our own experiences, we confirmed that these accounts would be subjected to detailed analysis as covered in Section 4. All of these selected accounts fell within the "Steam Production-Maintenance" classification of the aforementioned TVA report. The selection of only "maintenance" accounts for analysis is not meant to infer that variations of coal quality have no effect on utility plant operations. On the contrary, as implied by many of the account titles (Coal Conveying Facilities, Soot Blowers, etc.), we are very much concerned with operating functions. Certainly, it is reasonable to assume that the level of use, corrosion, and erosion experienced by any given portion of the power plant will vary as a function of the coal. However, under the cost accounting system we are working with, the only measurable indication of these possible effects appears under a maintenance account classification.

3.2.3 Modified Hypothesis

Since all of the areas we have identified as being potentially sensitive to variations in coal quality fall within the "maintenance" classification of TVA's accounting system, we shall drop the term "operating" from our hypothesis. This revises our motivated hypothesis to read:

Hypothesis - As the quality of coal consumed by a given power plant decreases, the cost of maintaining that plant will increase.

Therefore, we have narrowed our analysis to the statistical measurement of the manner in which two variables - coal quality and maintenance cost - correlate with each other.

3.2.4 Coal Quality Variables

Before we can begin the actual statistical measurement of our variables, a consistent presentation format must be developed within the limits of available data. In the case of coal quality, a well documented ultimate analysis prepared from daily bunker samples taken over an extended period of time would have been desirable. However, the normal practice within the TVA system is to collect bunker samples four times each month (each 7 to 8 days within the month). These samples are then analyzed by TVA for ash, sulfur, and Btu content. Then, based upon the amount of coal consumed by a particular unit during each of the four bunker periods that month, a weighted average for each of the coal parameters measured is developed by TVA for the entire month. These monthly weighted averages for ash, sulfur, and heat content on an "as received" basis were obtained from TVA and loaded into the "Computerized Coal Data File" established by the Battelle-Columbus Laboratories. The contents of this computerized file can be manipulated in a variety of ways. Using one standard routine, individual unit monthly totals for a six-month period can be accumulated and weighted in accordance with the actual amount of coal consumed during each of the months to develop weighted values for ash and sulfur. These semiannual values, obtained from Battelle, are the basic coal characteristics against which we have compared maintenance costs throughout this report.

As would be expected, the amount of coal actually consumed by any given unit will vary from month to month. Such variance can be caused by a number of factors. Changes in system load demand or cycling of the unit during one period will cause fluctuations in coal consumption patterns. Scheduled and forced outages will obviously affect the coal consumed by a given unit. Assuming the load demand remains fixed from period to period, consumption patterns may still vary depending upon the heat content (Btu/lb) of the coal. The presence of these and other factors in varying degrees can negate the validity of using changes in the average ash and sulfur contents as bases for correlating comparable changes in the maintenance costs of any given unit.

To compensate for the potentially erroneous use of only the average ash and sulfur contents, we computed the actual amounts of ash and sulfur to which a unit was exposed during each period. This was done by multiplying the actual coal tonnage consumed in the unit during the particular period by the average ash and sulfur contents, respectively. To illustrate the appropriateness of these quantities, the reader is referred to Figures 3-1 and 3-2. Figure 3-1 shows the trend and graphs the movement of average ash content (percent as received) over time at Unit Number 1 of the TVA Paradise Plant. Figure 3-2 gives the trend and a plot of the tons of ash experienced by that same unit. As shown in the figures, the fairly smooth linear increase in average percent ash contrasts sharply with the clearly non-linear pattern of the tons of ash during the same period.

FIGURE 3-1

AVERAGE ASH CONTENT (% AS RECEIVED) OF
COAL CONSUMED BY THE PARADISE PLANT, UNIT #1
DURING THE PERIOD 1964 THROUGH 1977.

FIGURE 3-2
TONS OF ASH EXPERIENCED BY THE
PARADISE PLANT, UNIT #1
DURING THE PERIOD 1964 THROUGH 1977

This need to work with coal quality variables truly representative of the actual amounts of potentially erosive and/or corrosive material passing through the unit is further demonstrated by Figure 3-3. The lower graph in Figure 3-3 represents the percent ash content (weighted average) on an as-received basis of the annual feed to Unit Number 6 at the Widows Creek Plant of TVA. The upper graph, whose units are displayed on the left vertical axis, represents the actual amounts of ash in thousands of tons entering Unit Number 6 each year. As indicated by the arrows in Figure 3-3, there were several years in which the percent ash ran counter to the tons of ash to which the unit was subjected. For example, if we had been using percent ash as a measure of coal quality, we would have assumed conditions were worsening for the unit between 1964 and 1965 and expected a resultant increase in maintenance costs. However, looking at the upper graph indicating the tons of ash, we find that between 1964 and 1965 conditions actually improved as far as the amount of potentially injurious material entering the boiler is concerned.

Although the differences in sulfur on a percent basis versus tonnage fed to the various TVA coal-fired units in our analysis were of less magnitude, they were considered significant. This further established the validity of using the actual tons of sulfur entering the unit as one of the measures of coal quality.

FIGURE 3-3

ANNUAL ASH

WIDOWS CREEK PLANT OF TVA - UNIT #6

3.2.5 Maintenance Cost Variables

Now that we have established a suitable means of measuring the quality of the coal consumed over time, the maintenance cost variable must be addressed. The annual costs recorded for the various maintenance accounts selected for analyses appear on TVA's accounting records in dollars of the year they were incurred. In order to establish a reasonable basis for comparing these costs, they first had to be placed in constant year dollars. The year 1978 was selected for comparison since that was the most recent year for which all cost information and comparable coal data were available. To accomplish this, a large sample of the accounts were examined to determine the relative amounts of labor by category as well as the materials and services by type.

In the case of labor, we obtained from TVA their actual yearly cost experience during the period of 1961 through 1978 for the labor classifications of Salary Policy, Trades and Labor Annual, and Trades and Labor Hourly. From this history, we developed adjustment factors necessary to place prior years' labor cost in terms of 1978 dollars for each of these labor classifications. Then, based upon the typical mix of these classifications, as determined from the sampling of maintenance accounts, a composite set of labor adjustment factors was developed.

In the case of the materials and services, we used the Handy-Whitman Index of Public Utility Construction Costs for those categories applicable to the maintenance cost accounts we had selected for analysis. From the cost index numbers in Handy-Whitman we developed a series of adjustment factors necessary to place prior years materials and service costs in terms of 1978 dollars. Then, using the set of labor adjustment factors for

all classifications and the appropriate set of material and services adjustment factors, a group of four composite adjustment indices were developed. These were titled Boilers and Accessories, Coal and Ash Handling Hardware and Equipment, Fans and Motors, and Steam Piping and Hardware. By selecting the most appropriate one of these composite indices, the stream of multi-years dollars recorded in the TVA maintenance cost accounts were placed in terms of 1978 dollars.

Several examples of the necessity to perform such an adjustment are shown by Figure 3-4 which presents the annual costs experienced at the Widows Creek Plant of TVA in maintaining the pulverizers for Unit Number 6. The lower graph represents the annual maintenance cost in terms of the dollars of the year in which they were incurred. The upper graph represents those same annual costs adjusted to constant 1978 dollars. To illustrate the importance of this conversion, the reader's attention is directed to the lower graph for the years 1963 and 1972. On the basis of actual dollars, there was only slightly less spent on pulverizer maintenance in 1972 than in 1963. However, as shown by the upper graph, there was nearly 50 percent less spent in 1972 than in 1963 in terms of constant 1978 dollars. Another area worthy of note in Figure 3-4 is the 1974 to 1975 period. In terms of actual dollars, pulverizer maintenance costs appear to remain nearly constant. However, when the effects of the relative value (purchasing power) of the dollar are taken into consideration, maintenance costs are actually declining.

Finally, referring back to the latter portion of the preceding section (3.2.4), in the discussion of Figure 3-3 mention was made of the decline in

FIGURE 3-4

ANNUAL COST

WIDOWS CREEK PLANT OF TVA - UNIT #6

ACCT #162.61 - PULVERIZER MILLS

tons of ash through Unit Number 6 at Widows Creek between 1964 and 1965.

It is interesting to observe in Figure 3-4 the decline in adjusted pulverizer maintenance cost for Unit Number 6 during that same period. Another such corresponding movement in adjusted maintenance costs and coal quality is shown in Figures 3-4 and 3-3, respectively, for the period between 1973 and 1974. It is this type of similar movement in maintenance costs and coal quality (here measured as tons of ash) which supports our program hypothesis.

3.2.6 Decision Rules

Having established a consistent manner in which to present our variables, meaningful statistical measurement can now be accomplished. Based upon our preliminary assessment of the data, correlation and linear regression were selected as appropriate statistical analysis techniques. In the application of linear regression, the data are plotted and a best fit straight line is constructed. This line, called a regression line, gives an indication of the overall manner in which one variable (in our case, maintenance cost) moves relative to the other variable (in our case, ash or sulfur). In order to determine how well this line, which is fitted to the data, actually does approximate the data, another statistical indicator is computed. This indicator is the correlation coefficient which has a limit of unity when a perfect linear relationship exists between the two variables. Since few such situations occur in life, and certainly none were encountered during this study, the correlation coefficient becomes more of a relative indicator rather than a precise measure of how well maintenance costs relate to the various coal quality parameters. As the value of the correlation coefficient approaches zero, the two

variables are considered to be statistically independent. For the purpose of this study, results were accepted or rejected if this coefficient passed or failed our decision rules. Two decision rules were applied. One at a significance level of 0.05 and one at 0.01. These "rules" are just restatements of established statistical tests for measuring correlation based upon the number of pairs of data points in an analysis and the degree of confidence (95% or 99%) that the value computed has not occurred randomly. In other words, these tests tell us what the value of the correlation coefficient must be before one can say that there is an acceptable correlation. The following chart of values abstracted from a statistical text puts this in perspective.

NUMBER OF DATA PAIRS	<u>TESTS FOR CORRELATION</u>	
	<u>0.05 SIGNIFICANCE LEVEL</u>	<u>0.01 SIGNIFICANCE LEVEL</u>
4	0.90	0.98
5	0.81	0.93
6	0.73	0.88
7	0.67	0.83
8	0.62	0.79
9	0.58	0.75
10	0.54	0.72
11	0.52	0.69
12	0.50	0.66
13	0.48	0.63
14	0.46	0.61
15	0.44	0.59
16	0.42	0.57
17	0.41	0.56
18	0.40	0.54

Source: Understanding Statistics; Naiman, A., R. Rosenfeld, G. Zikel;
McGraw-Hill, New York, 1977.

If, for example, there are fourteen pairs of data in the analysis, the correlation coefficient (R) must be 0.46 or greater before it passes the decision rule at the 0.05 significance level. In other words, we can be 95 percent certain that the data relationship, and thus the correlation coefficient computed, did not occur randomly. Another criterion for passing our decision rules is that the correlation coefficient (R) must also be positive. Negative values are rejected since they would indicate that maintenance costs go down as ash or sulfur goes up which is contrary to our hypothesis.

This process of subjecting our results to these decision rules is called Hypothesis Testing. If the correlation coefficient from the analysis of any given account passes one or both of our decision rules, it can be said that our hypothesis has been confirmed for that case. Conversely, if the correlation coefficient is less than the critical value in the foregoing chart, then the account fails the decision rule and that rejects the hypothesis for that case. If the correlation coefficients for a significant number of accounts fail our decision rules or were negative, then we would have been unable to prove our hypothesis. If these negative values were of such magnitude to pass the aforementioned decision rules, then we would have to reassess our original hypothesis to determine if, in fact, the reverse may be true for those accounts; i.e., maintenance costs increase as coal quality improves.

Although we have yet to incorporate another important statistical value into our formal plant analysis, it was computed in many cases. This value is called the coefficient of determination (R^2). By mathematical means, it has been proven that this value (R^2) gives an accurate measurement

of what proportion of the movement in the Y variable (in our case, maintenance cost) can be attributed to the linear relationship between the Y's and the X variables (in our case, ash and sulfur) (2). Stating this in a slightly different way in terms of our analysis, the closer R^2 is to unity, the more strongly the values of maintenance cost (Y) depend on the values of ash or sulfur (X's). The practical application of these statistical values is discussed in the following section.

3.2.7 Interpretation of Results

At this point we have established a consistent manner of presenting our data so that they can be subjected to meaningful statistical analysis. Further, we have selected appropriate statistical analysis techniques which provide us with a means of determining the relative degree of correlation between the variables of interest (ash or sulfur and maintenance cost). And, finally, we have established decision rules against which to test our hypothesis. However, this still leaves a gap in our analysis - quantification of results. If the correlation coefficient for a given set of data passes one or both of the decision rules, what does it mean? First of all it means that positive correlation exists between maintenance cost (Y) and another variable such as ash (X). Further, the slope of the regression line gives a measurement of the manner in which Y moves relative to X. Since we have plotted all of the X variables (ash, sulfur, and ash plus sulfur) in terms of thousands of tons, the units of the slope of the regression line are \$ per 1,000 tons of X (\$/K tons X). Dividing this value by 10^3 gives \$ per ton X. Then, multiplying that value by 1 ton of X per 100 tons of coal per % X (1 ton of X/100 tons coal/% X) gives

\$ per ton of coal per % X. Thus, one can compute the potential savings per ton of coal burned from each percent reduction in the X variable by dividing the slope of the regression line by 10^5 .

Now that all of the pieces of our analytical approach have been discussed, it is appropriate to give an example of how it is applied to an actual case.

3.2.8 Example Analysis

To demonstrate the analytical approach and the interpretation of the results, we have selected the Boilers and Accessories Maintenance Account covering Unit Number 5 (Acct. #157.5) at the Widows Creek Plant of TVA. Based upon the six-month weighted average for the ash content of the coal actually consumed by this unit, we computed the amount of ash in thousands of tons to which the unit was subjected each year from 1961 through 1977. These values (X) were plotted against the annual maintenance costs (Y) recorded under Acct. #157.5 during the period 1962 through 1978, adjusted in terms of constant 1978 dollars as shown in Figure 3-5. The reader's attention is directed to the point that the coal data have been assembled on a calendar year basis, whereas the maintenance cost data are presented for a twelve-month period ending 30 June for 1962 through 1975, and ending 30 September for 1976 through 1978 (Federal Government's fiscal years). For example, the ash data which are identified for the year 1961, are based upon the coal actually consumed by Unit Number 5 during the twelve months ending 31 December 1961. These data are compared to the costs accumulated under maintenance account 157.5 during the twelve months ending 30 June 1962. These incongruent time periods were selected to some degree as a matter

FIGURE 3-5

WIDOWS CREEK PLANT OF TVA

ACCT. # 157.5

BOILERS & ACCESSORIES - UNIT # 5

VARIABLE X: # 157.5 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.3271

MEAN OF Y = 85468.7

S.D. OF X = 11.1742

S.D. OF Y = 81129.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .608

COEFFICIENT OF DETERMINATION = .369664

SLOPE (M) OF REGRESSION LINE = 4415.95

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

of convenience, but more because of the practical realities of what our hypothesis assumes. Specifically, the underlying proposition of this study is that wear patterns, corrosion, etc., are influenced by variations in coal quality. Certainly, it is reasonable to assume, and the data seem to bear it out, that the influence of these variations is not instantaneous in most cases, but develops over time. Obviously, this time lag will vary from area to area around the plant and will be affected by other factors, not the least of which is the proficiency of the operator. For example, even with a high-ash coal having severe slagging properties, a skilled operator can avoid excessive build-ups which might rapidly deteriorate into wall tube failures at the hands of a less able operator. Because of such reasons, there is no perfect single time lag between when wear initiates and repair becomes necessary. Therefore, we selected a lag period which was felt to be reasonable and applied it consistently throughout the analysis regardless of the nature of the account.

The results of our plot of the annual ash in thousands of tons versus annual maintenance cost experienced by Unit Number 5 at Widows Creek are presented in Figure 3-6 with the regression line inserted. As can be seen, seventeen pairs of data were used. Therefore, referring to the previous chart of critical values necessary to pass the decision rules, we see that at seventeen pairs, the correlation coefficient must be at least 0.41 and 0.56 at the 0.05 and 0.01 significance levels, respectively. Since the correlation coefficient (R) is 0.608, it passes both tests. Thus, we can say that our hypothesis is confirmed with regard to Acct. #157.5 at Widows Creek. Further, by dividing the slope of the regression line

FIGURE 3-6

WIDOWS CREEK PLANT OF TVA

ACCT.# 157.5

BOILERS AND ACCESSORIES - UNIT # 5

VARIABLE X: # 157.5 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.3271

MEAN OF Y = 85468.7

S.D. OF X = 11.1742

S.D. OF Y = 81129.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .608

COEFFICIENT OF DETERMINATION = .369664

SLOPE (M) OF REGRESSION LINE = 4415.95

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

by 10^5 , we obtain \$0.04415/ton/% of ash. As explained earlier, this is the potential savings to be realized on each ton of coal fed to Unit Number 5 for each percent reduction in ash content. In other words, a reduction of 2 percent ash in the feed coal could save nearly 9 cents per ton in boiler maintenance costs alone. By performing a similar analysis of other maintenance accounts at a given plant, the individual saving can be accumulated to give a plant-wide total of the potential savings to be realized from each percent reduction in ash (or sulfur).

Section 4 presents a summary of the analyses of each of the accounts applicable to the five TVA plants selected.

4.0 MAINTENANCE EXPERIENCE AT SELECTED TVA COAL-FIRED PLANTS

This section presents the analyses of the maintenance cost experience at five TVA coal-fired power plants as a function of the ash and sulfur contents of their fuel. These plants are Shawnee, Widows Creek, Paradise, Bull Run, and Cumberland. For the latter three, the period being assessed (1962-1978) covers the entire operating history of the plant. All plants are comprised of single or multiple pulverized coal units, except Paradise which consists of three cyclone units. These five TVA plants have a total of twenty-four units with a combined rated capacity of over 9,300 megawatts.

Each plant is treated separately for a number of reasons, the most obvious of which is differences in fuel quality. Other differences which preclude common treatment include unit age, configuration, manufacturer, type, load experience, and maintenance philosophy. In spite of this lack of common treatment, general comparisons on the basic theme can still be made.

For each plant, the analysis is based upon the presence or absence of a reasonable degree of correlation between the annual maintenance cost of various areas of the plant and the quality of the coal being consumed during that year. Only those areas of the plant which come in contact with the coal or with the products of combustion were selected for analysis. This permitted us to focus on those areas which could be considered "coal related." A description of the contents of each account selected for analysis appears in Appendix A. Not all of the accounts selected for analysis are applicable to all coal-fired plants in the TVA system. For example, some

accounts are used to collect costs associated with particular types of equipment which are by no means common to all plants. Even at the same plant, units will vary as will their associated emission control hardware. Further, some maintenance costs are collected on an individual basis, while others are collected on a plant-wide basis. Principally, this is determined by the nature of the maintenance item itself. For example, at those facilities having multiple units, items such as pulverizers and boilers will be accounted for on an individual basis whereas conveying facilities common to all units will be treated on a plant-wide basis. Therefore, when assessing the maintenance cost history of a particular plant as a function of coal quality, it was first necessary to determine which accounts appeared to be appropriate candidates for analysis, and also whether or not it was valid to compare such data against individual unit coal characteristics, those for the entire plant, or both. The maintenance accounts selected for analysis and the basis for comparison - unit, composite, or both - are shown in Tables 4-1 through 4-5. The balance of this section is devoted to presenting the analyses of the five TVA plants. To promote a better understanding of the analyses, some background material is provided on these plants.

4.1 Shawnee Plant

4.1.1 Plant Configuration and Location

The Shawnee Plant consists of ten 175 megawatt pulverized coal units for a total plant capacity of 1,750 megawatts. The first of these Babcock and Wilcox units was put into service in 1953, with the tenth unit going on-line in mid-1957. The Shawnee Plant of TVA was selected as one of the

TABLE 4-1
MAINTENANCE ACCOUNTS SELECTED FOR ANALYSIS
AT TVA'S SHAWNEE PLANT

Account Number	Account Title	Basis For Comparison	
		Individual (Each Unit Separately)	Composite (Units 1 thru 10)
152.2	Hammermill-Type Coal Crushers	-	X
153	Coal Conveying Facilities	-	X
154	Coal Handling Power & Control System	-	X
155	Coal Bunkers	-	X
157	Boilers and Accessories	X	X
158.1	Soot Blowers - All Types	-	X
158.2	Soot Blowers - Air Compressors - Reciprocating Types	-	X
160	Coal Transport Piping & Valves	-	X
161	Boiler Room Coal Scales & Feeders	-	X
162	Pulverizer Mills	X	X
162.2	Primary Air Fans or Mill Exhauster Fans	-	X
163.1	Burners & Lighters	-	X
166	Air Preheaters	-	X
168	Induced Draft Fans	-	X
169	Air and Gas Ducts	-	X
170	Smokestacks	-	X
173	Bottom Ash Hoppers	X	X
174.01	Mechanical Fly Ash Collectors	X	X
174.02	Electrostatic Fly Ash Precipitators	X	X
175.2	Ash Crushing, Ejection, and Disposal Pipe System	-	X

TABLE 4-2
MAINTENANCE ACCOUNTS SELECTED FOR ANALYSIS
AT TVA'S WIDOWS CREEK PLANT

Account Number	Account Title	Basis for Comparison	
		Individual (Each Unit Separately)	Composite (Units 1 thru 8)
152.1	Bradford Breaker-Type Coal Crushers	-	X
152.2	Hammermill-Type Coal Crushers	-	X
153	Coal Conveying Facilities	-	X
154	Coal Handling Power & Control System	-	X
155	Coal Bunkers	-	X
157	Boilers & Accessories	X	X
158.1	Soot Blowers - All Types	-	X
158.2	Soot Blowers - Air Compressors - Reciprocating Types	-	X
160	Coal Transport Piping & Valves	-	X
161	Boiler Room Coal Scales & Feeders	-	X
162	Pulverizer Mills	X	X
162.2	Primary Air Fans or Mill Exhauster Fans	-	X
163.1	Burners & Lighters	-	X
166	Air Preheaters	-	X
168	Induced Draft Fans	-	X
169	Air & Gas Ducts	-	X
170	Smokestacks	-	X
173	Bottom Ash Hoppers	X	X
174.01	Mechanical Fly Ash Collectors*	X	X
174.02	Electrostatic Fly Ash Precipitators**	X	X
175.2	Ash Crushing, Ejection, and Disposal System	-	X

* - Applies to Units 1 thru 6

** - Applies to Units 7 & 8

TABLE 4-3
MAINTENANCE ACCOUNTS SELECTED FOR ANALYSIS
AT TVA'S PARADISE PLANT

<u>Account Number</u>	<u>Account Title</u>	<u>Basis for Comparison</u>	
		<u>Individual (Each Unit Separately)</u>	<u>Composite (Units 1 thru 3)</u>
152.1	Bradford Breaker-Type Coal Crushers	-	X
152.31	Coal Conditioners Nos. 1 & 2 - Hammermills, Inc.	-	X
152.32	Coal Conditioners Nos. 3 & 4 - Penn Crushers	-	X
153	Coal Conveying Facilities	-	X
154	Coal Handling Power & Control System	-	X
155	Coal Bunkers	-	X
157	Boilers & Accessories	X	X
158.1	Soot Blowers - All Types	-	X
158.2	Soot Blowers - Air Compressors - Reciprocating Types	-	X
158.3	Soot Blowers - Air Compressors - Centrifugal Types	-	X
160	Coal Transport Piping & Valves	-	X
161	Boiler Room Coal Scales & Feeders	-	X
163.1	Burners & Lighters	-	X
163.2	Cyclones	-	X
165	Gas Recirculating Fans	-	X
166	Air Preheaters	-	X
166.1	Air Preheaters, except Shot Cleaning System, Units 1-3	-	X
169	Air & Gas Ducts	-	X
170	Smokestacks	-	X
173	Bottom Ash Hoppers	X	X
174.02	Electrostatic Fly Ash Precipitators	X	X
175.2	Ash Crushing, Ejection, & Disposal System	-	X
175.7	Ash Handling Conveyor System	-	X

TABLE 4-4
 MAINTENANCE ACCOUNTS SELECTED FOR ANALYSIS
 AT TVA'S BULL RUN PLANT*

<u>Account Number</u>	<u>Account Title</u>
152.1	Bradford Breaker-Type Coal Crushers
153	Coal Conveying Facilities
154	Coal Handling Power & Control System
157.1	Boilers & Accessories
158.1	Soot Blowers - All Types
158.2	Soot Blowers - Air Compressors - Reciprocating Types
160	Coal Transport Piping & Valves
161	Boiler Room Coal Scales & Feeders
162.11	Pulverizer Mills
162.2	Primary Air Fans or Mill Exhauster Fans
163.1	Burners & Lighters
166	Air Preheaters
169	Air & Gas Ducts
173.1	Bottom Ash Hoppers
174.12	Electrostatic Fly Ash Precipitators
175.2	Ash Crushing, Ejection, & Disposal System

*TVA's Bull Run Plant currently has only one unit; therefore, the basis for comparison is always individual.

TABLE 4-5
MAINTENANCE ACCOUNTS SELECTED FOR ANALYSIS
AT TVA'S CUMBERLAND PLANT

<u>Account Number</u>	<u>Account Title</u>	<u>Basis for Comparison</u>	
		<u>Individual (Each Unit Separately)</u>	<u>Composite (Units 1 & 2)</u>
152.1	Bradford Breaker-Type Coal Crushers	-	X
153	Coal Conveying Facilities	-	X
154	Coal Handling Power & Control System	-	X
155	Coal Bunkers	-	X
157	Boilers & Accessories	X	X
158.3	Soot Blowers - Air Compressors - Centrifugal Types	-	X
158.12	Soot Blowers - Lance-Type IK-Long	-	X
158.13	Soot Blowers - Lance-Type IK-Short	-	X
158.14	Slag Blowers - Wall-Type IR	-	X
160	Coal Transport Piping & Valves	-	X
161	Boiler Room Coal Scales & Feeders	-	X
162	Pulverizer Mills	X	X
162.2	Primary Air Fans or Mill Exhauster Fans	-	X
163.1	Burners & Lighters	-	X
165	Gas Recirculating Fans	-	X
166	Air Preheaters	-	X
169	Air & Gas Ducts	-	X
173	Bottom Ash Hoppers	X	X
174.01	Mechanical Fly Ash Collectors	X	X
174.02	Electrostatic Fly Ash Precipitators	X	X
175.2	Ash Crushing, Ejection, & Disposal Pipe System	-	X

initial plants for analysis primarily because of its extended operating history at baseload and the multiple small unit configuration.

The Shawnee Plant is located about ten miles northwest of Paducah, Kentucky in McCracken County on the south bank of the Ohio River. Shawnee was originally designed to have four units whose principal function would be to service the electric power requirements of a nearby Atomic Energy Commission (AEC) uranium enrichment facility. However, when the AEC increased the capacity of its facility, Shawnee was enlarged to ten units. It is interesting to note that although the capacity of the plant was increased by two-and-one-half times, the coal handling facilities were kept about the same.

Although the plant has been called upon for baseload service most of its life, the load at Shawnee is currently being reduced during the night (off peak hours). This drop in electricity demand within the TVA system is consistent with a similar pattern nationwide. It is anticipated that such cycling will continue and eventually be extended to all day as more nuclear capacity comes on-line. However, based upon the well known delays with the nuclear units, it is reasonable to assume that the present demand conditions will exist at Shawnee for some time to come.

4.1.2 Coal Experience

The Shawnee units were designed to burn a Western Kentucky bituminous coal having an ash content of 13 percent, a sulfur content of 3.3 percent, a heat content of 11,530 Btu per pound, and a Hardgrove grindability of 50. During the period from 1961 through 1978, the average ash for six month periods on a plant-wide basis (all ten units) was as low as 10.2 percent

and as high as 16.2 percent. The average sulfur for six-month periods varied between 1.93 percent (last half of 1978) and 3.38 percent. Currently, TVA is procuring washed coal containing less than 1 percent sulfur from mines in West Virginia and Eastern Kentucky. This low-sulfur coal received by barge is being blended with the higher-sulfur Western Kentucky coal received by rail and fed to selected units. By January of 1981, only the low-sulfur coal will be received, via barge, at Shawnee. After that time, the single conveyor belt from the river to the plant will make the plant vulnerable to possible disruption of fuel supply in the event of mechanical breakdown or restriction of barge traffic on the Ohio River due to severe weather conditions.

4.1.3 Observations by Plant Personnel

Extensive interviews were conducted with plant personnel representing various key departments. The primary purpose of these conferences was to obtain a spectrum of candid appraisals, based upon actual experience, of those areas in and around the plant which were perceived to be sensitive to variations in coal quality. Additionally, these visits were essential to understanding the cost and operating histories of the plant. For example, many plants have undergone modifications to major portions of some of their units as well as altered their major maintenance outage schedule. At the Shawnee Plant, it was brought to our attention that Unit Number 10 has had a wet scrubbing system during recent years, and that Unit Number 3 has had an ionizer installed to improve precipitator performance. Additionally, it was important to learn of several changes in the ball mills (pulverizers) over the years, particularly those related to

the size and material composition of the balls. Also, it was expressed that the ball mills' wear patterns may have been influenced by the load conditions under which the units have been operated. In this latter regard, the point has been raised by several plant personnel that the varying load (cycling) in recent years at Shawnee may very well be the principal contributor to the increased wear patterns of the mills rather than a change in coal. The logic behind this point is that as the load is cut on a given unit, the "bed" of coal in the ball mill feeding the lowest burner level becomes very thin. To illustrate, the burner configuration of the units at Shawnee is as shown in Figure 4-1.

FIGURE 4-1

BURNER CONFIGURATION FOR TVA SHAWNEE PLANT UNITS 1 THROUGH 10

The mill feeding the D burner level is the first mill to come off when the load is being cut and the first mill to be started when the unit is being brought on-line. This means that the mill is essentially running dry at times. As mentioned throughout this report, in order for data to be comparable, it must be derived from comparable periods. Obviously, cycling

of a unit will influence many points throughout the pulverized coal-fired unit. By taking cognizance of such variations and the areas affected, it will reduce the probability of including defective data in the analysis.

Information of the type described above was used to focus on particular areas of the plant and particular time periods while discarding others.

4.1.4 Analysis of Maintenance Accounts

A listing of the maintenance accounts selected for analysis at the Shawnee Plant appeared earlier in Table 4-1. Although that table lists only twenty general account titles, it represents a total of at least 210 possible relationships for analysis. Fifteen of these accounts are maintained on a plant-wide basis and can be analyzed three ways each: Ash, Sulfur, and Ash plus Sulfur versus Maintenance Costs. This results in 45 possible correlations. Five of the selected accounts listed in Table 4-1 are maintained on an individual unit basis. Since Shawnee has ten units, this results in 150 ($5 \times 3 \times 10$) potential correlations. The last 15 analyses come from looking at the sum of each of the five accounts maintained on an individual unit basis as a composite account; i.e., Acct. #157.1 through 157.10, Acct. #162.11 through 162.101, etc. Each of these 210 analyses appear in Appendix B hereto. However, we have made a summary (Table 4-6) of those accounts which passed one or both of our decision rules to give a preliminary indication of the cumulative savings that might be realized from each percent reduction in ash and sulfur. Additionally, several individual account analyses are discussed to aid the reader in making the transition from statistical results to practical applications.

TABLE 4-6
CUMULATIVE POTENTIAL SAVINGS
FROM LOWERING THE ASH AND SULFUR CONTENT
IN THE FEED COAL AT TVA'S SHAWNEE PLANT

<u>ACCT. #</u>	<u>TITLE</u>	<u>SAVINGS/TON/% ASH</u>
157	Boilers and Accessories	\$ 0.01130
158.1	Soot Blowers - All Types	0.00381
158.2	Soot Blowers - Reciprocating Types	0.00606
160	Coal Transport Piping & Valves	0.00117
162	Pulverizer Mills	0.01142
162.2	Mill Exhauster Fans	0.00215
169	Air & Gas Ducts	0.00169
173	Bottom Ash Hoppers	0.00134
174.02	Electrostatic Fly Ash Precipitators	0.00384
175.2	Ash Crushing, Ejection, & Disposal Pipe Systems	<u>0.00840</u>
TOTAL ESTIMATED SAVINGS		\$ 0.05118/ton/% ash

<u>ACCT. #</u>	<u>TITLE</u>	<u>SAVINGS/TON/% SULFUR</u>
157	Boilers and Accessories	\$ 0.10996
158.1	Soot Blowers - All Types	0.02015
160	Coal Transport Piping & Valves	0.01087
161	Boiler Room Scales & Feeders	0.00744
162	Pulverizer Mills	0.14073
162.2	Mill Exhauster Fans	0.01674
163.1	Burners & Lighters	<u>0.00475</u>
TOTAL ESTIMATED SAVINGS		\$ 0.31064/ton/% sulfur

As stated previously, Table 4-6 is a listing of those maintenance cost categories whose analyses as a function of ash and sulfur met our tests (decision rules) for reasonable correlation. The potential savings per ton of coal for each percent reduction in ash or sulfur were calculated by dividing the slope of the regression line by 10^5 as explained in Section

3.2.7. For example, Figure 4-2 presents the analysis of the pulverizer maintenance cost experience for all ten Shawnee units as a function of the tons of sulfur entering the units over a seventeen-year period. Since this account (#162 - sulfur) passes at least one of our decision rules, it meets the test for inclusion in our preliminary results. Therefore, the reader will observe that the slope of the regression line is \$14,073 per thousand tons of sulfur. As listed in Table 4-6, this translates to a potential savings of \$0.14073 per ton of coal for each percent reduction in sulfur. The sum of all such accounts displaying reasonable correlation constitutes the potential savings on a plant-wide basis for improving the quality of the feed coal.

As we have cautioned throughout this report, these results are quite preliminary. They can be considered good indicators, but by no means should be construed as axioms applicable to all situations. At this point, we cannot be sure if these initial results are overstatements or understatements of the potential savings. For example, as shown by Figure 4-3, Acct. #157.2 covering Boilers & Accessories Maintenance Cost as a function of ash through Unit Number 2 at Shawnee, passes the least restrictive of the decision rules and displays a potential savings of well over two cents per ton of coal for each percent reduction in ash. However, Figure 4-4 shows that Acct. #157 (covering the Boilers & Accessories for all ten units at Shawnee) has a higher degree of correlation and only a potential savings of a little over one cent per ton of coal for each percent reduction in ash. A similar situation was observed when the maintenance costs for Unit Number 2's boiler were examined as a function of sulfur and then

FIGURE 4-2

SHAWNEE PLANT OF TVA

ACCT. # 162

PULVERIZER MILLS - UNITS #1 - 10

VARIABLE X: # 162 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 910583

S.D. OF X = 9.45207

S.D. OF Y = 245469

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .542

COEFFICIENT OF DETERMINATION = .293764

SLOPE (M) OF REGRESSION LINE = 14073.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

FIGURE 4-3

SHAWNEE PLANT OF TVA

ACCT. # 157.2

BOILERS AND ACCESSORIES - UNIT # 2

VARIABLE X: # 157.2 ASH (K TONS) VARIABLE Y: MAINT COST '78*

MEAN OF X = 59.3259

MEAN OF Y = 56727.3

S.D. OF X = 9.26558

S.D. OF Y = 44875.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .463

COEFFICIENT OF DETERMINATION = .214369

SLOPE (M) OF REGRESSION LINE = 2240.15

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

BOILERS & ACCESSORIES - UNITS #1 - 10

VARIABLE X: # 157 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF Y = 493464

S.D. OF Y = 164356

CORRELATION COEFFICIENT (R) = .658

SLOPE (M) OF REGRESSION LINE = 1130.81

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

compared with the impact of sulfur on all ten units combined. Specifically, as shown by Figure 4-5, Acct. #157.2 (sulfur) passes the less restrictive decision rule and the slope of the regression line converts to a potential savings of nearly twenty-three cents per ton of coal burned by Unit Number 2. However, looking at Figure 4-6 which shows the effects of sulfur on the boiler maintenance cost of all ten Shawnee units (Acct. #157), there is only a savings of less than eleven cents per ton of coal for each percent reduction in the sulfur content of the plant feed. Since this latter correlation analysis of all ten units passes both decision rules, the results should, in theory, have more credence. Notwithstanding, there could have been "non-coal related" factors (equipment modifications, changes in maintenance philosophy, etc.) which influenced the Shawnee units to varying degrees, thus accounting for such differences in the composite versus the individual unit analyses. Such results indicate that this maintenance category (157 series of accounts) should be looked at in more detail.

Another interesting case worthy of note is Acct. #162.11 which demonstrates how an erratic and/or discontinuous cost pattern can greatly influence the results of an analysis. Figure 4-7 shows a rather disappointing regression line having a negative slope. However, with the exception of one data point (arrow), the rest of the points seem to follow a much more consistent pattern. By removing this point from our analysis and recomputing our statistical values, a dramatic change occurs as shown in Figure 4-8. Unfortunately, we have yet to go into that much detail with some of the other accounts suspected of having irregular cost

FIGURE 4-5

SHAWNEE PLANT OF TVA

ACCT. # 157.2

BOILERS & ACCESSORIES - UNIT # 2

VARIABLE X: # 157.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.07

MEAN OF Y = 56727.3

S.D. OF X = 1.07994

S.D. OF Y = 44875.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .548

COEFFICIENT OF DETERMINATION = .300304

SLOPE (M) OF REGRESSION LINE = 22758

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

FIGURE 4-6

SHAWNEE PLANT OF TVA

ACCT. # 157

BOILERS & ACCESSORIES - UNITS #1 - 10

VARIABLE X: # 157 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 493464

S.D. OF X = 9.45207

S.D. OF Y = 164356

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .632

COEFFICIENT OF DETERMINATION = .399424

SLOPE (M) OF REGRESSION LINE = 10996.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

FIGURE 4-7

SHAWNEE PLANT OF TVA

ACCT. # 162.11 PULVERIZER MILLS - UNIT # 1

● CORRELATION COEFFICIENT: -0.125

● SLOPE OF REGRESSION LINE: -4074.86

☆ FAILS DECISION RULES

FIGURE 4-8

SHAWNEE PLANT OF TVA ☆ (ONE YEAR DELETED) ☆
ACCT. # 162.11 PULVERIZER MILLS - UNIT # 1

- CORRELATION COEFFICIENT: 0.609
- SLOPE OF REGRESSION LINE: 20163.2

☆ POTENTIAL SAVINGS:

\$0.20163/TON/% SULFUR

patterns. Erratic points of this type can be caused by such occurrences as an abrupt change in maintenance philosophy or a delayed repair of an item. Certain major portions of a plant may not lend themselves to being partially rebuilt during a forced outage or even an extended scheduled outage. In these situations, maintenance may be deferred over one or more scheduled outage periods. This will be reflected in an irregular annual cost pattern where some years will essentially be zero followed by a significant expenditure during the year in which the actual maintenance/repair was performed. Needless to say, this works counter to the assumptions of this study since annual maintenance costs are not, under those circumstances, reflective of the actual wear that occurred during this period. To compensate for this, we have explored the effects of averaging adjacent years when costs change dramatically without apparent cause. Such an approach may provide a more legitimate basis for comparison by pairing the typical annual cost over the two or three year period concerned with the typical annual amount of corrosive/erosive material experienced by that area of the plant during the same period. If it can be established that the particular maintenance category follows a predictable cycle, then there may be merit in combining the data from all of the years within each cycle and proceeding with the analyses. Although we feel there is value in pursuing such secondary analyses, their performance was beyond the time and budgetary constraints of this program.

4.2 Widows Creek Plant

4.2.1 Plant Configuration and Location

The Widows Creek Plant consists of eight pulverized coal-fired units with a combined rated capacity of 1,675 megawatts. However, according to plant personnel, the units are called upon during certain portions of the day to produce over 1,800 megawatts. Six of these units are of Babcock and Wilcox design, each having a rated capacity of 112.5 megawatts. These units went into service between 1952 and 1954. From a design standpoint, these six units differ only in that Units 5 and 6 have a pendant reheater section between the secondary and primary superheaters.

The other two units at Widows Creek are 500 megawatt Combustion Engineering (CE) units. Unit Number 7 began commercial operation in 1961 with Unit Number 8 following in 1965. These units were originally pressurized, but were converted to negative pressure units in 1974. Because of their age, manufacture, size, and physical location within the Widows Creek complex, these two groups of units (#1 through #6, and #7 and #8) are treated in many respects like separate plants. Although management is common for the entire facility, Units Number 1 through 6 and Units Number 7 and 8 have separate operating and maintenance staffs.

The Widows Creek Plant is located southwest of Chattanooga in Stevenson, Alabama on the west bank of the Tennessee River. Throughout most of their operating life, the various units at Widows Creek have been in a cycling mode. For example, the typical operating schedule during

the fall of 1979 was as follows:

Units 1 through 6

7:00 a.m. to 10:00 a.m.	Baseload (up to 125 MW)
10:00 a.m. to 5:00 p.m.	Minimum Load (50 MW)
5:00 p.m. to 10:00 p.m.	Baseload
10:00 p.m. to 7:00 a.m.	Minimum Load

Units 7 and 8

7:00 a.m. to 10:00 a.m.	Baseload (up to 530 MW)
10:00 a.m. to 5:00 p.m.	Minimum Load (300 MW)
5:00 p.m. to 10:00 p.m.	Baseload
10:00 p.m. to 7:00 a.m.	Minimum Load

Obviously, this schedule varies with the availability of other capacity in the TVA system.

4.2.2 Coal Experience

The first group of B&W units at Widows Creek (Units Number 1 through 4) were designed to burn a Western Kentucky bituminous coal having 13 percent ash, 3.3 percent sulfur, a heat content of 11,530 Btu per pound, and grindability index of 50. It is assumed that Units 5 and 6 had the same design coal specifications. During the period from 1961 through 1977, the average ash content of the coal actually consumed by Units 1 through 6 for six-month periods was as low as 10.3 percent and as high as 22.8 percent. The average sulfur for six-month periods varied between 1.39 percent and 3.49 percent. During the last few years, TVA has been procuring coal of less than one percent sulfur for Widows Creek Units 1 through 6. The purchase specifications states that the sulfur cannot exceed 0.9 percent on an as received basis and 15 percent ash on a dry basis. However, they will accept a 0.1 percent

increase in sulfur for each additional 1,200 Btu above the minimum of 11,000 Btu pound.

The oldest of the CE boilers (Unit Number 7) was designed around the same coal specifications as Units Number 1 through 6. However, there has not been as much variation in the quality of coal fed to the unit. The ash content of the coal fed to Unit Number 7 during the 1961 through 1977 period ranged from 10.6 to 19.1 percent. The sulfur varied from 1.84 to 4.0 percent. Recently, the practice at Unit Number 7 has been to make a 40-60 blend of the low-sulfur coal being procured for Units 1 through 6 and the higher-sulfur coal being fed to Unit Number 8. When the scrubber now being constructed on Unit Number 7 is fully operational, it too will burn only the high-sulfur coal. The other CE boiler (Unit Number 8) has had a limestone scrubber installed since early 1977 and continues to be fed the higher-sulfur coal. During the 1965 through 1977 period of our analysis, Unit Number 8's feed ash varied from 12.1 to 19.8 percent and the sulfur from 1.81 to 3.92 percent.

4.2.3 Observations by Plant Personnel

A wealth of information was obtained during our visit to the Widows Creek Plant. Unfortunately, to cover the material in detail would require a separate volume. However, it is interesting to note that in discussions with various maintenance personnel, they consistently said they did not need to be told when the coal quality had changed because they could see some of the impacts almost immediately. An early sign is the rate at which the ash and pyrite hoppers fill. Also, mill adjustments and clinker grinder maintenance accelerate. Mill exhaustor blades are another good indicator.

It was noted that blade life varies from 3 months to 9 months under approximately the same load conditions when using different coals.

Over the years many of the high erosion areas such as coal feeders, coal pipe, superheater sections, etc., have been modified (shielded) or retrofitted with wear resistant materials to reduce the amount of maintenance. The observation was made that these actions, as well as the recent switch to lower-sulfur coal, were already being reflected in the need for fewer hourly maintenance personnel and the ability to go to a 2-year major maintenance schedule.

4.2.4 Analysis of Maintenance Accounts

In Table 4-2 were listed twenty-one general account titles determined to be appropriate to the Widows Creek Plant. Based upon the number of units, this resulted in 144 analyses which were presented in total as part of Appendix B hereto. However, we have made a summary of those accounts which did not pass one or both of the decision rules to give a preliminary indication of the cumulative savings that might be realized from each percent reduction in ash and sulfur (Table 4-7). These results are based upon our initial analysis of the "raw" data without the benefit of deletions or averaging which might be determined appropriate to eliminate extraneous data. Because of the manner in which costs are accumulated at TVA, this initial analysis has treated the Widows Creek complex as one group of units rather than separating Units Number 1 through Number 6 from Units Number 7 and Number 8. However, because of the difference in design, age, configuration, etc., between these two groups of units, there may be merit to segregating the cost for various portions of the plant and performing a secondary analysis.

TABLE 4-7
CUMULATIVE POTENTIAL SAVINGS
FROM LOWERING THE ASH AND SULFUR CONTENT
IN THE FEED COAL AT TVA'S WIDOWS CREEK PLANT

<u>ACCT. #</u>	<u>TITLE</u>	<u>SAVINGS/TON/% ASH</u>
152.1	Bradford Breaker	\$ 0.00230
157	Boilers and Accessories (Average)	0.03578
158.1	Soot Blowers - All Types	0.00571
160	Coal Transport Piping & Valves	0.00455
161	Boiler Room Scales & Feeders	0.00145
162	Pulverizer Mills (Average)	0.02054
162.2	Mill Exhauster Fans	0.00370
163.1	Burners and Lighters	0.00359
166	Air Preheaters	0.00487
175.2	Ash Crushing, Ejection, & Disposal Pipe Systems	<u>0.01270</u>
	TOTAL ESTIMATED SAVINGS	\$ 0.09519/ton/% ash

<u>ACCT. #</u>	<u>TITLE</u>	<u>SAVINGS/TON/% SULFUR</u>
152.1	Bradford Breaker	\$ 0.01693
157	Boilers and Accessories (Average)	0.17610
158.1	Soot Blowers - All Types	0.03390
160	Coal Transport Piping & Valves	0.03123
161	Boiler Room Scales & Feeders	0.00985
162	Pulverizer Mills (Average)	0.13573
163.1	Burners and Lighters	0.02081
166	Air Preheaters	0.02424
175.2	Ash Crushing, Ejection, & Disposal Pipe Systems	<u>0.08016</u>
	TOTAL ESTIMATED SAVINGS	\$ 0.52895/ton/% sulfur

As stated in the section on Shawnee and in many other places throughout this report, these results should be treated as preliminary due to the limited data on which they are based. However, certain portions of Widows Creek did display some exceptional correlations which reinforced our hypothesis. For example, as shown by Figure 4-9, Acct. #158.1 covering Soot Blowers,

a correlation coefficient of 0.785 was computed in our analysis of ash versus maintenance cost. Although the potential savings were not particularly impressive, high correlation values tend to confirm that certain areas of the power plant are definitely affected by coal quality and thus we may concentrate elsewhere. Nearly as high a correlation coefficient was computed for the Soot Blower Maintenance Costs (Acct. #158.1) as a function of sulfur. As shown by Figure 4-10, Acct. #158.1 (sulfur) displayed a correlation coefficient of 0.766 and a regression line slope which translates to a savings of over three cents per ton of coal for each percent reduction in sulfur.

The account (#160) used to collect the cost of maintaining the coal transport piping and valves at Widows Creek also showed fairly high levels of correlation as a function of both ash and sulfur. For example, as shown by Figure 4-11, Acct. #160 (sulfur) displayed a correlation coefficient of 0.639 and a regression line slope which equates to a savings of over three cents on each ton of coal consumed for each percent reduction in sulfur.

Another strong correlation came from Acct. #162.31 covering the Pulverizer Mills for Unit Number 3 at Widows Creek when compared against sulfur. As shown by Figure 4-12, with few exceptions, these data display a fairly consistent linear pattern. The maintenance costs on the Pulverizer Mills of Unit Number 4 also appeared to correlate well with ash as shown in Figure 4-13. Although the potential savings for this particular unit were less than the average for all pulverizers noted in Table 4-7, the general distribution of data and level of correlation were representative of several other Widows Creek units.

FIGURE 4-10

WIDOWS CREEK PLANT OF TVA

ACCT. # 158.1

SOOT BLOWERS - ALL TYPES

VARIABLE X: # 158.1 SULFUR(K TONS) VARIABLE Y: MAINT COST, '78\$

MEAN OF X = 99.2818

MEAN OF Y = 142903

S.D. OF X = 27.527

S.D. OF Y = 121853

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .766

COEFFICIENT OF DETERMINATION = .586756

SLOPE (M) OF REGRESSION LINE = 3390.01

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

FIGURE 4-11

WIDOWS CREEK PLANT OF TVA

ACCT. # 160

COAL TRANSPORT PIPING & VALVES

VARIABLE X: # 160 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 99.2818

MEAN OF Y = 150680

S.D. OF X = 27.527

S.D. OF Y = 134594

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .639

COEFFICIENT OF DETERMINATION = .408321

SLOPE (M) OF REGRESSION LINE = 3123.1

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

FIGURE 4-12

WIDOWS CREEK PLANT OF TVA

ACCT. # 162.31

PULVERIZER MILLS - UNIT # 3

VARIABLE X: # 162.31 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.43875

MEAN OF Y = 79956.2

S.D. OF X = 2.40367

S.D. OF Y = 51430.6

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .663

COEFFICIENT OF DETERMINATION = .439569

SLOPE (M) OF REGRESSION LINE = 14175.7

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

FIGURE 4-13

WIDOWS CREEK PLANT OF TVA

ACCT. # 162.41

PULVERIZER MILLS - UNIT # 4

VARIABLE X: # 162.41 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 36.2965

MEAN OF Y = 82406.8

S.D. OF X = 15.5827

S.D. OF Y = 47456.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .711

COEFFICIENT OF DETERMINATION = .505521

SLOPE (M) OF REGRESSION LINE = 2164.21

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

A final example of the many maintenance accounts at Widows Creek displaying rather high correlation coefficients is Acct. #175.2, covering the Ash Crushing and Disposal Piping System. As shown by Figure 4-14, an analysis of these adjusted costs as a function of sulfur entering the plant produced a correlation coefficient (R) of 0.773 and a regression line slope equivalent to a savings of over eight cents per ton of coal for each percent reduction in sulfur. Certainly, such a potential savings is not trivial. However, what is of particular interest here is that when one computes the coefficient of determination (R^2) a value of nearly 0.60 is achieved. As covered by Section 3.2.6, this means that nearly 60 percent of the variation in maintenance costs for this category can be attributed to the linear relationship between such costs and the amount of sulfur to which the system is exposed.

FIGURE 4-14

WIDOWS CREEK PLANT OF TVA

ACCT. # 175.2

ASH CRUSHING & DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 99.2818

MEAN OF Y = 536257

S.D. OF X = 27.527

S.D. OF Y = 285453

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .773

COEFFICIENT OF DETERMINATION = .597529

SLOPE (M) OF REGRESSION LINE = 8016.09

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

4.3 Paradise Plant

4.3.1 Plant Configuration and Location

The Paradise Plant consists of three units with rated capacity totalling nearly 2,500 megawatts. Two of the units went into service in 1963 and the third unit in 1969. This is a particularly interesting plant for a number of reasons. One reason is that the units have cyclone furnaces which are found at only two of TVA's plants. Another interesting aspect of the plant is its location. Essentially, the plant is built right on top of its coal supply in Muhlenberg County, Kentucky -- one of the largest coal producing counties in the country. This permits the overwhelming majority (95%) of its fuel to be surface mined and trucked a short distance to the plant. Although this has provided a rather "cheap" source of coal, the quality has left something to be desired. However, beginning in 1981, an 1,800 ton per hour coal preparation plant will be operating adjacent to the power plant to upgrade the fuel. The decision to install the coal cleaning facility was part of TVA's plans for environmental compliance as agreed to with EPA. Also, part of this agreement is the addition of scrubbers on Units 1 and 2 and a substantial increase in precipitator capacity on Unit 3.

4.3.2 Coal Experience

According to information supplied by Babcock and Wilcox, the manufacturer of the cyclone units at Paradise, Units 1 and 2 were designed to burn coal having an ash content of 18.3 percent, sulfur of 3.3 percent, and a heat content of 9,830 Btu per pound. Unit Number 3, which is essentially the same as Units 1 and 2 except bigger, was designed around a coal

of 15.9 percent ash, 4.1 percent sulfur, and 10,870 Btu per pound. During the 1963 through 1977 period, the weighted average ash and sulfur for six-month periods ranged from 12.1 to 20.5 percent and from 3.84 to 4.56 percent, respectively.

4.3.3 Observations by Plant Personnel

According to one of the key operating personnel at Paradise, there is "erosion from the time the coal leaves the hopper." The degree of erosion and other negative effects are perceived by the operating and maintenance personnel to be very much a function of high ash and sulfur coal. Although the cyclone units are designed around relatively high sulfur and ash coals, the observations of personnel at the plant, as well as our results, seem to bear out that the units function better and require less maintenance when the fuel quality exceeds these design values.

Some of the observed effects during periods of burning the "higher" ash coals are:

- 1) More air is required to reach the rated capacity output. This tends to wear out the furnace studs faster.
- 2) Ash handling ability is limited. By the nature of a cyclone furnace, the slag tap opening and the ash handling system must be designed to be compatible with the intended coal characteristics. Because the ash content of the coal exceeded those design parameters for an extended period, the slag tap opening was enlarged to handle the increased volume of molten material leaving the cyclone.

- 3) Fouling of the superheater screen increases.
- 4) Soot blowing must be increased.
- 5) Plugging of ash hoppers and air preheaters occurs.
- 6) Precipitator efficiency drops.

4.3.4 Analysis of Maintenance Accounts

At the beginning of this section, Table 4-3 presented a list of twenty-three general accounts which had been selected for analysis relative to the Paradise Plant. Although there are three separate units at Paradise, most costs are accumulated on a plant-wide basis rather than for each individual unit. This resulted in a total of eighty-seven analyses which are presented in total as part of Appendix B hereto.

However, we have made a summary of those accounts which passed one or both of our decision rules to give a preliminary indication of the cumulative savings that might be realized from each percent reduction in ash and sulfur (Table 4-8).

Due to the limited amount of data upon which these results are based, they must not be interpreted as universally applicable to all power plant situations. The data spanned a fifteen-year period at a single TVA facility with cyclone furnace units. Therefore, although these results may later be proven representative of what occurs at other facilities of similar design, at this point no such generalization can be made. However, as a review of the individual analyses will demonstrate, several of the accounts which passed the decision rules did so with very high correlation coefficients. For example, as shown by Figure 4-15, which gives the analysis of Account 175.2 covering the ash crushing and disposal system at Paradise, maintenance cost as a function of ash had a correlation coefficient (R)

TABLE 4-8

CUMULATIVE POTENTIAL SAVINGS
FROM LOWERING ASH AND SULFUR CONTENT
IN THE FEED COAL AT TVA'S PARADISE PLANT

<u>ACCT. #</u>	<u>TITLE</u>	<u>SAVINGS/TON/% ASH</u>
152.1	Bradford Breakers	\$ 0.00187
152.31	Coal Conditioners 1 & 2	0.00225
152.32	Coal Conditioners 3 & 4	0.00196
153	Coal Conveying Facilities	0.00538
161	Boiler Room Scales & Feeders	0.00255
163.1	Burners and Lighters	0.00044
163.2	Cyclones	0.01409
165	Gas Recirculating Fans	0.00236
169	Air and Gas Ducts	0.00841
170	Smokestacks	0.00162
173	Bottom Ash Hoppers (Average)	0.00300
175.2	Ash Crushing, Ejection, & Disposal Pipe Systems	<u>0.01440</u>
TOTAL ESTIMATED SAVINGS		\$ 0.05833/ton/% ash

<u>ACCT. #</u>	<u>TITLE</u>	<u>SAVINGS/TON/% SULFUR</u>
152.1	Bradford Breakers	\$ 0.00998
152.31	Coal Conditioners 1 & 2	0.01158
152.32	Coal Conditioners 3 & 4	0.01027
153	Coal Conveying Facilities	0.02897
161	Boiler Room Scales & Feeders	0.01360
163.1	Burners and Lighters	0.00241
163.2	Cyclones	0.07462
165	Gas Recirculating Fans	0.01295
169	Air and Gas Ducts	0.04685
170	Smokestacks	0.00826
173	Bottom Ash Hoppers (Average)	0.01458
175.2	Ash Crushing, Ejection, & Disposal Pipe Systems	<u>0.07571</u>
TOTAL ESTIMATED SAVINGS		\$ 0.30978/ton/% sulfur

FIGURE 4-15

PARADISE PLANT OF TVA

ACCT.# 175.2

ASH CRUSHING & DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 807.497

MEAN OF Y = 1.15282E+06

S.D. OF X = 326.477

S.D. OF Y = 539434

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .872

COEFFICIENT OF DETERMINATION = .760384

SLOPE (M) OF REGRESSION LINE = 1440.59

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

of 0.872. Taking this to the next step, R^2 , the coefficient of determination is 0.76. As explained briefly in Section 3.2.6, this means that 76 percent of the movement of annual maintenance costs can be attributed to the linear relationship between maintenance cost and the amount of ash experienced by the unit. Another strong correlation was computed in our analysis of sulfur versus maintenance cost of cyclones (Account 163.2) at Paradise. As shown in Figure 4-16, this portion of the unit is particularly sensitive to variation in the amount of sulfur put through the plant. This high degree of correlation with sulfur, as well as with ash, was consistent with the observations made by the plant personnel. Another good correlation of maintenance cost to coal quality predicted by the staff at Paradise was for Bottom Ash Hoppers, Acct. #173. Figure 4-17 gives the analysis of these costs as they relate to the amount of ash plus sulfur experienced by Unit Number 1 at Paradise over a fifteen-year period. As the reader has probably already observed, the correlation between the two variables in Figure 4-17 is so strong ($R=0.825$) that the regression line actually covers up several of the data points. The relatively small potential savings computed for this cost category of \$0.00256 per ton of coal for each percent reduction in ash plus sulfur is not surprising since Bottom Ash Hoppers are not typically a high maintenance cost area. Further, we have not performed any secondary analysis of the data from this particular plant to determine which coal quality variable or combination of variables has the more dominant influence on maintenance costs.

A final example of one of the maintenance cost categories at the Paradise Plant showing an exceptionally high correlation with coal quality

FIGURE 4-16

PARADISE PLANT OF TVA

ACCT. # 163.2

CYCLONES

VARIABLE X: # 163.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 1.05875E+06

S.D. OF X = 60.2534

S.D. OF Y = 640195

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .702

COEFFICIENT OF DETERMINATION = .492804

SLOPE (M) OF REGRESSION LINE = 7462.17

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

FIGURE 4-17

PARADISE PLANT OF TVA

ACCT.# 173.1

BOTTOM ASH HOPPERS - UNIT # 1

VARIABLE X: # 173.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 348.164

MEAN OF Y = 68511.5

S.D. OF X = 96.2202

S.D. OF Y = 29970

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .825

COEFFICIENT OF DETERMINATION = .680625

SLOPE (M) OF REGRESSION LINE = 256.823

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

is Acct. #165, Gas Recirculating Fans. As shown by Figure 4-18, the adjusted maintenance costs as a function of sulfur displayed a correlation coefficient of 0.837. The regression line was omitted from Figure 4-18 so that the reader could see how the data points are distributed in such a positive linear manner.

Not all portions of the Paradise Plant displayed such high degrees of correlation. As can be observed by the details of our analyses presented in Appendix B, many maintenance cost categories failed the decision rules miserably. Some failures can be attributed to incomplete data or modifications to the units. Others may indicate that the maintenance costs of those particular areas of the plant are more sensitive to factors other than coal quality. Until further analysis is conducted, definitive statements on why all the various accounts passed or failed our decision rules cannot be made.

The complete analyses performed thus far on the Paradise Plant appear as part of Appendix B hereto.

FIGURE 4-18

PARADISE PLANT OF TVA

ACCT. # 165

GAS RECIRCULATING FANS

VARIABLE X: # 165 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 178073

S.D. OF X = 60.2534

S.D. OF Y = 93237.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .837

COEFFICIENT OF DETERMINATION = .700569

SLOPE (M) OF REGRESSION LINE = 1295.06

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

4.4 Bull Run Plant

4.4.1 Plant Configuration and Location

The Bull Run Plant is unique within the TVA system in that it is the only plant comprised of a single unit. TVA's original plans called for two units. As a result, many of the normally common facilities such as conveyors were sized for greater capacity. This is the reverse of the Shawnee situation mentioned earlier.

The 900+ megawatt pulverized coal unit of Combustion Engineering design first went into commercial service during the latter part of 1966. At that time, it was one of the largest units for supercritical pressure in the world. It is rated at a primary steam flow of 6.4 million pounds per hour for steam conditions at the turbine of 3,500 psig and 1,000⁰ F. This unit consists of two identical dry bottom furnaces, each having identical convection surfaces. Both of these furnaces are divided along their entire heights by a division wall which has the effect of creating two combustion chambers. Each combustion chamber, or furnace half, is tangentially fired in such a manner as to create opposite swirl directions of the two firing circles. This cyclonic mixing action is felt to be particularly effective in redistributing the burning fuel into the constantly changing gas and air atmosphere (3).

The Bull Run Plant is located at an attractive site on the Melton Hill Reservoir ten miles west of Knoxville in Anderson County, Tennessee. From a performance standpoint, Bull Run ranks among the top pulverized coal-fired power plants in the country in such areas as availability and heat rate.

4.4.2 Coal Experience

According to information furnished by Combustion Engineering, the Bull Run Plant was designed to burn an Eastern bituminous coal of 13 percent ash, 3.8 percent sulfur, and a heat content of 11,910 Btu per pound. During the period of our analysis, 1966 through 1977, the weighted average percent ash for six-month periods varied from 11.0 to 16.7 percent and the sulfur from 0.78 to 2.74 percent.

4.4.3 Observations by Plant Personnel

At Bull Run, some of the normally troublesome maintenance areas of a coal-fired plant have been mitigated by the plant design. For example, chutes at transfer points in the coal handling system have some built-in redundancy. This excess capacity occurred because the original plans called for another unit. Maintenance can usually be accomplished without shutting down or derating the unit since many parts are in parallel. Another beneficial design feature is the ability to quickly take a coal feeder out of service and replace it with a spare rather than derating the unit for an extended period while repair is performed. Although these areas may be easier to maintain because of design features, they are not trouble-free.

According to the plant staff, they observe a direct, and many times quite rapid, impact on the level of maintenance required by some areas as the ash and sulfur contents of the coal increase. Pulverizers and exhausters have been particularly sensitive to changes in coal quality. Other high wear areas such as coal transport pipe are not as easy to track as a function of ash or sulfur since the maintenance "policy" is "run it until it leaks."

Then the pipe is patched, temporarily, and replaced at the next scheduled outage. The ash sluice lines were also sensitive to changes in coal quality. However, as has been the case at so many plants, the problem became acute to the point that the lines were replaced with high wear resistant pipe. Other areas of the plant perceived by the staff to be affected by variations in coal quality were erosion of the horizontal reheat sections and other surfaces in the convection path, bottom ash system, air preheaters, and electrostatic precipitators.

4.4.4 Analysis of Maintenance Accounts

At first pass, the results of the analyses on the Bull Run Plant data are disappointing in that only four maintenance cost accounts displayed an acceptable level of correlation with coal quality. All of those analyses which passed at least the minimum decision rule were for sulfur versus maintenance cost and had a cumulative potential savings of less than 9 cents per ton for each percent reduction in sulfur. But, before we completely discount the Bull Run results, certain points should be made. The Bull Run Plant has only been operating for twelve years applicable to our analysis. Therefore, under the decision rules for testing our hypothesis, discussed in Section 3.2.6, much higher levels of correlation were necessary. Further, significant changes were made to the particulate control system during a portion of this time. Finally, there has not been a consistent cycle of scheduled outages for major maintenance. This latter point can have the effect of negating the applicability (to our study) of the cost records at a plant such as Bull Run which has only one unit. Our study assumes that annual maintenance costs are reflective

of the wear, corrosion, etc., experienced by a particular portion of the plant during that period. Deferring such maintenance actions, and thus their costs, to subsequent periods makes it difficult to track the actual cause and effect. At plants with multiple units, this understandable shortcoming is mitigated to a large extent by the fact that all units are not typically shut down together and, therefore, major maintenance cycles overlap. In view of these circumstances, a final judgement should be withheld as to the appropriateness of the Bull Run data to confirm or reject our hypothesis until that data can be analyzed further. A good example of this comes from a second look at Account 160, covering the Coal Transport Pipe at Bull Run. As shown by Figure 4-19, a disappointing correlation coefficient of 0.309 is computed when all twelve years are analyzed. However, a look at the graphic distribution of the data tells us that there is better correlation than the computed value indicates. By deleting the twelfth year, in which a major amount was expended for whole-sale replacement of piping, the computed results change considerably as shown by Figure 4-20.

In spite of the inconclusive nature of the analyses of the unadjusted Bull Run data, for completeness, the results are included in their entirety as part of Appendix B hereto. It is our intention to perform additional analysis of these data to determine if they can contribute to a better understanding of the impact of coal quality on large utility boiler maintenance costs.

FIGURE 4-19

BULL RUN PLANT OF TVA

ACCT. # 160

COAL TRANSPORT PIPING & VALVES (12 YRS.)

VARIABLE X: # 160 ASH (K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 101163

S.D. OF X = 78.2003

S.D. OF Y = 70142.2

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .309

COEFFICIENT OF DETERMINATION = .095481

SLOPE (M) OF REGRESSION LINE = 277.152

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

FIGURE 4-20

BULL RUN PLANT OF TVA

ACCT. # 160

COAL TRANSPORT PIPING & VALVES (11 YRS.)

VARIABLE X: # 160 ASH (K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 283.893

MEAN OF Y = 87622.7

S.D. OF X = 80.5793

S.D. OF Y = 56276.5

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = .546

COEFFICIENT OF DETERMINATION = .298116

SLOPE (M) OF REGRESSION LINE = 381.193

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

4.5 Cumberland Plant

4.5.1 Plant Configuration and Location

The Cumberland Plant consists of two pulverized coal units having a rated capacity of 1,300 megawatts each. These units, of Babcock and Wilcox design, are the largest in the TVA coal-fired system. When running at capacity, the combined daily coal consumption of these units is between 24,000 and 27,000 tons. This is a relatively new plant with the first unit going on-line in 1972 and the second unit being put into service the following year. Under the most recent agreements between EPA and TVA concerning environmental compliance at Cumberland, the plant is to use cleaned coal and employ partial scrubbing (600 MW out of the total 2,600 MW) so as not to exceed a 24-hour average SO_x emission level of 4.2 pounds per million Btu. Additionally, as part of these agreements, TVA is adding new precipitators. These are under construction, with completion anticipated in 1981.

The Cumberland Plant is located fifty miles northwest of Nashville on the south shore of Lake Barkley in Stewart County, Tennessee. All coal is currently coming from Western Kentucky and being received by barge.

4.5.2 Coal Experience

The two identical units at Cumberland were designed to consume bituminous coal having 15 percent ash, 4.34 percent sulfur, and a heat content of 11,200 Btu per pound. Through 1977, there had been little deviation from this "prescribed diet." Ash varied from 15.3 to 17.3 percent and sulfur from 3.43 to 3.84 percent on a weighted average basis for six-month periods. The majority of their coal comes from the Kentucky Number 9 seam with the balance from the Kentucky Number 11 seam.

4.5.3 Observations by Plant Personnel

One of the most significant pieces of information offered by the plant staff was the extensive changes which have been made to the plant during its short life. Almost since the plant was commissioned it has been undergoing major modifications. These include:

- a) the addition of wing walls in the furnace -- these are additional heat exchange surfaces (water wall tube sections);
- b) mill (pulverizer) changes; and
- c) replacement of the original coal pipe with high resistance pipe and then replacement of selected portions with ceramic lined pipe.

A significant amount of other valuable information was solicited. However, the combination of the multiple changes and the extremely short operating record were limiting factors at this plant. Specifically, although the units officially went into commercial operation in 1973, the first full calendar year of operation for which coal data is available is 1974. This means that the first comparable year of cost data is for fiscal 1975 (twelve-month period ending 30 June 1975). Therefore, from 1975 through 1978 we have only four years in our analysis.

4.5.4 Analysis of Maintenance Accounts

Unfortunately, the documented maintenance cost history of Cumberland only goes back to 1975. Although there were certainly costs incurred before that time, the "Comparison of Steam Production Expense" for fiscal year 1975 (covering costs from 1 July 1974 through 30 June 1975) was the first year the Cumberland Plant was included. These short maintenance cost

and operating histories, coupled with the many plant modifications make it more difficult to correlate maintenance cost and performance with coal quality. From the standpoint of the study, this is an unfortunate aspect since the Cumberland Plant has been receiving a fairly consistent quality of coal since the plant was opened. If some of the aforementioned design modifications had not been necessary, it would have provided an ideal opportunity to establish anticipated wear patterns (component life expectancy, "normal" slagging, fouling, etc.) as a function of coal quality and basic unit design. Then this could have been used to account for the "normal" wear occurring in a unit of comparable design which had been experiencing variations in coal quality. As we have previously recognized, a degree of wear, failure, derating, slagging, fouling, shut-down, and combinations thereof are inherent and unavoidable in the severe environment of a coal-fired power plant. The best one can hope for is to mitigate the negative impacts of these occurrences. Therefore, as we examine these occurrences over time as a function of coal quality, one must give adequate consideration to this inherent aging process.

The complete analyses performed thus far on the Cumberland Plant appear as Part of Appendix B hereto. However, these analyses were performed on data which spanned such a short period of time that no meaningful conclusions may be drawn.

5.0 SUMMARY AND CONCLUSIONS

In the collection and analysis of data, it is imperative that the researcher never lose sight of reality. There can be a tendency to manipulate the data ad infinitum and never achieve that essential link with the practical objective for which the project was undertaken. Further, the results of any statistical analysis must be approached with caution (and this study is no exception). Many times researchers in their over zealous exuberance will rush to embrace the first semblance of data that supports their hypothesis. We have attempted to avoid these analytical pitfalls by approaching this subject in a practical and statistically sound manner so as to give the results comparable qualities.

Our purpose was to determine if reasonable correlation exists between coal quality, as measured by its ash and sulfur contents, and the maintenance cost at utility plants. We set out to determine if such relationships are present by examining the actual maintenance cost experience of selected portions of five TVA coal-fired power plants as a function of the fuel quality consumed during an extended period of time. Correlation and linear regression analyses were performed on this data. The results indicate that according to our decision rules, developed in compliance with accepted statistical practices, correlation does exist in many portions of the coal-fired plants examined for which sufficient maintenance cost records were available. Although the degree of correlation varies significantly among the individual portions of a particular plant as well as among the various plants, the indicators are sufficient to confirm our

hypothesis. Therefore, we can state without equivocation that a change (within the design constraints of the unit) in the ash and/or sulfur content of the coal being consumed by a utility boiler will have a proportionate effect on the maintenance cost at the plant. In the cases examined, each percent variation in ash content could have a monetary effect of from \$0.05 to \$0.10 per ton of coal consumed. Similarly, each percent variation in sulfur content could influence maintenance costs from \$0.30 to \$0.50 per ton of coal. Since these values are based on preliminary analysis of limited data, they must be approached with caution and not removed from the context in which they are presented. However, if borne out by further study, the potential magnitude of such savings may be sufficient to justify the acquisition of superior coal supplies, either by changing the source and/or using preparation to obtain a lower ash or sulfur fuel. In this latter regard, we are not suggesting that these potential savings in maintenance costs would alone be sufficient to support the entire cost of coal preparation. What we are stating is that when this benefit component is added to some of the other well established benefits of using cleaned coal (lower transportation, ash disposal, and emission control costs, increased heat content, etc.) the "net cost" of coal preparation will, in many situations, become the "net benefit."

Obviously, the specific results obtained from the individual plants and portions thereof are not represented as being economic axioms of coal buying, transferable to all power plant situations. Further, they are not represented as being precise even in the cases of the specific power

plants from which the data were taken. They are, however, valid indicators of which areas of a coal-fired plant (and their associated maintenance costs) are most sensitive to variations in fuel quality and the order of magnitude of such cost sensitivity. Since such diverse operating conditions and maintenance philosophies prevailed at TVA during the periods for which the data were gathered, there are certainly more than one or two measured variables which had an influence on these maintenance costs. However, the data clearly indicate that correlation exists between the coal quality and maintenance costs. And most importantly, our analysis provides a range of cost sensitivity which can serve as a key factor in making a more informed decision concerning the appropriateness of purchasing a coal lower in ash and/or sulfur.

It is our feeling that additional analysis of this data should be performed and further statistical techniques applied. Due to time and budgetary constraints of this program, we were unable to pursue many of the more advanced statistical tools available for secondary analysis. In this regard, the application of a technique such as partial correlation may prove useful in better understanding the relationships between the various coal quality variables and their relative impacts on maintenance costs. In our analyses, we treated ash, sulfur, and ash plus sulfur as three separate independent variables and measured their individual effect upon our dependent variable, maintenance cost. As mentioned earlier, it is unlikely that any one, or a combination, of these few measured variables were exclusively responsible for the fluctuations in maintenance costs. Even for those areas of the plant where strong correlations

were measured between a coal quality variable and maintenance cost, there may be spurious relationships present which tend to conceal the identity of the variable actually influencing cost. For example, pulverizer maintenance costs may vary statistically with the amount of ash in the feed coal. This correlation of ash with cost could be the result of the fact that, in the particular coal, ash varies along with another coal quality variable such as sulfur which may be the true predictor of cost.

Additionally, an attempt should be made to integrate the results obtained thus far with those related to boiler performance and design which are being developed by Battelle. This will permit us to focus on more specific areas of the power plant. We feel that these initial results provide adequate definition of the potential savings to be realized from burning an improved quality of coal. The reader is, again, cautioned that these preliminary results are not axioms, but only very general indicators of the magnitude of potential saving. Any direct application or extrapolation of these results should be made only after a complete appreciation of the limitations of the data base and an understanding of the statistical approach used.

6.0 REFERENCES

1. Bagge, C. Utilities Remain Committed To Coal. Coal Mining & Processing. February 1980, Vol. 17, No. 2.
2. Naiman, A., R. Rosenfeld, G. Zikel. Understanding Statistics. McGraw-Hill, New York, 1977.
3. Tennessee Valley Authority; The Bull Run Steam Plant; Technical Report Number 38; Knoxville, Tennessee, 1967.

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APPENDIX A

SELECTED TVA COST DATA

The Tennessee Valley Authority (TVA) has a comprehensive accounting system for the collection of costs at each of its twelve coal-fired power plants. This accounting system requires that all costs for labor, materials, and services incurred in the operation and maintenance of the particular plant be charged to one or more of 301 accounts which cover every function and/or physical item related to the facility. One of the forms in which this data is summarized and published is a report entitled, "Comparison of Steam Production Expense." This is a semiannual report prepared by the Power Accounting Office of TVA. Prior to the 1977 change in the Federal Government's fiscal year, this report was published through the 31st of December and the 30th of June each year. The December report covered the first six months of the fiscal year and the June report was a cumulative look at each plant for the entire fiscal period. Since fiscal year 1977, this report has been published through the 31st of March and the 30th of September to coincide with the Federal Government's fiscal year.

This TVA accounting report summarizes the cost of operating and maintaining each of the coal-fired plants according to a comprehensive series of account classifications. Each of these accounts is a composite of the labor, materials, services, etc., charged to that function or piece of equipment during the period. In consultation with plant personnel, this comprehensive list of accounts was reviewed to determine those categories perceived as being most sensitive to variations in coal quality.

Then, based upon several such interviews and our own experiences, eighty-six of these accounts were selected for detailed analysis as covered in Section 4. All of these selected accounts fell within the "Steam Production Maintenance" classification of the aforementioned TVA report. The selection of only "maintenance" accounts for analysis is not to infer that variations of coal quality have no effect on utility plant operations. On the contrary, as implied by many of the account titles (Coal Conveying Facilities, Soot Blowers, etc.), we are very much concerned with operating functions. Certainly, it is reasonable to assume that the level of use, corrosion, and erosion experienced by any given portion of the power plant will vary as a function of the coal. However, under the cost accounting system we are working with, the only measurable indication of these possible effects appears under a maintenance account classification.

For the use of the reader, the balance of this Appendix is devoted to a listing of the eighty-six selected maintenance costs accounts in numerical order with a brief description of their scope of coverage. The descriptive words concerning the contents of each account were abstracted from TVA accounting directives. Since all accounts do not apply universally, the plant(s) to which a given account applies appears in parentheses following the title: BR = Bull Run, C = Colbert, CU = Cumberland, G = Gallatin, J = Johnsonville, JS = John Sevier, K = Kingston, P = Paradise, S = Shawnee, and WC = Widows Creek. Because of a combination of their age and uniqueness, two TVA plants (Allen and Watts Bar) were not considered by this program.

MAINTENANCE COST ACCOUNTS SELECTED FOR ANALYSIS

Acct. 152.1, Bradford Breaker-Type Coal Crusher (BR, C, CU, G, JS, P, WC)

Recorded under this account are the costs associated with maintaining the rotary breaker and the related drive belts and motors, local controls, hoppers, chutes, etc. Also, charged to this account are the expenses necessary to maintain the structure in which the breaker is housed and its service facilities.

Acct. 152.2, Hammermill-Type Coal Crushers (J, K, S, WC)

Included in this account are the labor and materials incident to the Hammermill-type (flextooth) crushers with associated drive belts and motors, local controls, hoppers, chutes, and spouts. Additionally, costs are included pertaining to the crusher building and its service facilities.

Acct. 152.31, Coal Conditioners - Numbers 1 and 2 (P)

Collected under the account are the costs associated with maintaining two of the four secondary crushers (coal conditioners) at the Paradise Plant. This equipment is unique to that facility by nature of its cyclone furnace design. Unlike pulverizers, these simple crushers reduce the coal so that about ninety-five percent will pass through a four-mesh screen.

Acct. 152.32, Coal Conditioners - Numbers 3 and 4 (P)

Under this account are recorded the costs associated with the other two conditioners at the Paradise Plant. The age of this equipment is about the same as those covered by Acct. 152.31, only the manufacturer is different.

Acct. 153, Coal Conveying Facilities (All Plants)

Included in this account are the labor and materials associated with

maintaining the equipment used for conveying coal from receiving points through crushing equipment to the powerhouse bunkers or to (and from) the storage yard. Also included are structures for housing and supporting conveyors, transfer structures, and special buildings for conveyor control and switchgear equipment at plants with Bradford breaker-type crushers, unloading, reclaiming, and surge hoppers; and dust collectors located in areas where dust accumulates from coal handling.

Acct. 154, Coal Handling Power and Control System (All Plants)

As the name explicitly states, this account covers the labor and materials associated with maintaining the electrical facilities serving the coal handling system. The costs in this account are recorded on a plant-wide basis. Although the typical electrical components covered by this account do not come into contact with the coal per se, it was included for analysis since the stress and eventual failure of such components might possibly show a relationship with coal quality.

Acct. 155, Coal Bunkers (C, CU, G, J, JS, K, P, S, WC)

Recorded under this account are all the labor and materials used in the maintenance of the coal bunkers which are constructed as an integral part of the powerhouse structural frame. Although it is standard to have a single bunker servicing a separate unit, there are apparently enough common items to prevent individual unit cost accounting.

Acct. 157, Boilers and Accessories

Included in this account are the labor and materials expended in maintaining the integral pressure parts of the steam generating units beginning at the connection of the feed water piping to the economizer inlet header, or to the main steaming drum and ending with the connection of steam piping to the superheater or reheater outlet headers. Also

included are the structural steel frames and steel casing, refractories, and insulation.

This is a major maintenance cost category which, because of its magnitude and scope, warrants individual unit accountability. The individual units are designated by a series of point breakdowns of the 157 account; i.e., 157.1 designates Boiler Number 1; 157.2 is for Boiler Number 2; etc.

Acct. 157.1, Boilers and Accessories, Unit No. 1 (All Plants)

Acct. 157.2, Boilers and Accessories, Unit No. 2 (C, CU, G, J, JS, K, P, S, WC)

Acct. 157.3, Boilers and Accessories, Unit No. 3 (C, G, J, JS, K, P, S, WC)

Acct. 157.4, Boilers and Accessories, Unit No. 4 (C, G, J, JS, K, S, WC)

Acct. 157.5, Boilers and Accessories, Unit No. 5 (C, J, K, S, WC)

Acct. 157.6, Boilers and Accessories, Unit No. 6 (J, K, S, WC)

Acct. 157.7, Boilers and Accessories, Unit No. 7 (J, K, S, WC)

Acct. 157.8, Boilers and Accessories, Unit No. 8 (J, K, S, WC)

Acct. 157.9, Boilers and Accessories, Unit No. 9 (J, K, S)

Acct. 157.10, Boilers and Accessories, Unit No. 10 (J, S)

Acct. 158.1, Soot Blowers - All Types (BR, C, G, J, JS, K, P, S, WC)

This account is used to accumulate the labor and material costs associated with maintaining the soot blowing systems using steam. These systems are installed in the boilers to introduce a high-pressure steam spray for dislodging soot, dust, and slag that collect on boiler furnace walls and the various tube sections. Each system consists of two types: extended-travel retractable units and short-travel wall units installed at various locations about the furnace walls.

Acct. 158.2, Soot Blowers - Air Compressors - Reciprocating Types (BR, C, K, P, S, WC)

Although functionally the same as the other soot blowing equipment, some plants have more elaborate systems which are given separate accounting treatment.

Acct. 158.3, Soot Blowers - Air Compressors - Centrifugal Types (CU, P)

Same as above.

Acct. 158.12, Soot Blowers - Lance - Type IK - Long (CU)

Same as above.

Acct. 158.13, Soot Blowers - Lance - Type IK - Short (CU)

Same as above.

Acct. 158.14, Slag Blowers - Wall - Type IR (CU)

Same as above.

Acct. 160, Coal Transport Piping and Valves (All Plants)

This account is used to collect the costs associated with servicing and replacing the piping and valves through which the coal moves from the bunkers to the burners. Although most of the path traveled is unique to a particular unit, these costs are accumulated on a plant-wide basis.

Acct. 161, Boiler Room Coal Scales and Volumetric Feeders (All Plants)

The scope of this account is obvious by its title. Costs are accumulated on a plant-wide basis. Although it would be easy to account for these costs on an individual basis, it is probably not justified by the level of expenditure.

Acct. 162.01, Pulverizer Mills

As in the case of the 157 account series covering boilers and accessories, this is a major maintenance cost category which is accumulated on an individual basis. Included under this account are all labor and

materials necessary to maintain this critically important equipment which varies in design and manufacture among the plants in the TVA system.

The various types include the Ring-Roll-Bowl Type (C.E. Raymond), Ball-Race Type (Babcock & Wilcox), and the Ball-Type (Foster-Wheeler). Since each burner level is fed by a separate pulverizer, the costs in these accounts actually represent those necessary to maintain multiple pieces of equipment. The individual units are designed by a series of point breakdowns; i.e., 162.11 designates Unit No. 1; 162.21 designates Unit No. 2, etc.

Acct. 162.11, Pulverizer Mills for Unit No. 1 (BR, C, CU, G, J, JS, K, S, WC)

Acct. 162.21, Pulverizer Mills for Unit No. 2 (C, CU, G, J, JS, K, S, WC)

Acct. 162.31, Pulverizer Mills for Unit No. 3 (C, G, J, JS, K, S, WC)

Acct. 162.41, Pulverizer Mills for Unit No. 4 (C, G, J, JS, K, S, WC)

Acct. 162.51, Pulverizer Mills for Unit No. 5 (C, J, K, S, WC)

Acct. 162.61, Pulverizer Mills for Unit No. 6 (J, K, S, WC)

Acct. 162.71, Pulverizer Mills for Unit No. 7 (J, K, S, WC)

Acct. 162.81, Pulverizer Mills for Unit No. 8 (J, K, S, WC)

Acct. 162.91, Pulverizer Mills for Unit No. 9 (J, K, S)

Acct. 162.101, Pulverizer Mills for Unit No. 10 (J, S)

Acct. 162.2, Primary Air Fans or Mill Exhauster Fans (BR, C, CU, G, J, JS, K, S, WC)

This account covers the costs incident to the maintenance of the fans used to force the pulverized coal-air mixture from the pulverizer mills to the burners into the boilers. For units manufactured by Babcock & Wilcox, the equipment is referred to as Primary Air Fans; for those units produced by Combustion Engineering and Foster-Wheeler, the nomenclature is Mill Exhauster Fans.

Although this function is typically configured around an individual unit, these costs are accumulated on a plant-wide basis.

Acct. 163.1, Burners and Lighters (All Plants)

Included in this account are the labor and materials costs associated with servicing and replacing the pulverized coal burners and the oil torches with attendant igniters for lighting off or partially firing the furnace. These costs are accumulated on a plant-wide basis.

Acct. 163.2, Cyclones (P)

Under this account, which is unique to the Paradise Plant, are collected all the costs associated with maintaining the cyclone furnaces, which are the water-cooled horizontal cylinders where the coal is fired. This is a major account since Units No. 1 and 2 at Paradise have fourteen cyclones each and Unit No. 3 has twenty-three.

Acct. 165, Gas Recirculating Fans (C, CU, P)

Collected under this account are the costs incident to maintaining the fans which force the recirculation of the gas taken from the induced draft ducts back through the furnaces. This feature can be used to regulate the steam temperature at the superheater outlet.

Acct. 166, Air Preheaters (All Plants)

Under this account are collected the costs related to maintaining the equipment used to preheat the air for combustion. This is accomplished as cold air is driven by the forced draft fans through the preheater installed in such a position that exhaust gases from the furnace flow through it and transfer heat by a slowly revolving rotor to the incoming cold air. The heated air then passes to the furnace through the pulverizers and burner windboxes. Although there is a separate preheater for each

unit, the costs are accumulated on a plant-wide basis.

Acct. 166.1, Air Preheater, Except Shot Cleaning System (P)

Functionally, this equipment is the same as above. However, a separate account was established in 1972 to record the maintenance expenses associated with the preheater configuration of the three Paradise units.

Acct. 168, Induced Draft Fans (C, G, J, JS, K, S, WC)

This account includes the labor and materials associated with maintaining the fans on the stack side of the furnace which create a sufficient pressure differential to cause the heated gases to pass through the furnace against the draft loss caused by flow over the heating surfaces and through the ducts between the furnaces and these fans. These costs are accumulated on a plant-wide basis.

Acct. 169, Air and Gas Ducts (All Plants)

Under this account are collected the costs incurred in maintaining duct work (including insulation) through which air and gases pass from the cold air intakes through the furnaces to the stacks. Obviously, the areas of most interest to this analysis are those ducts which come in direct contact with coal-air mixtures and the products of combustion. Unfortunately, the account is not that precisely subdivided on a routine basis. Costs under this classification are accumulated on a plant-wide basis.

Acct. 170, Smokestacks (C, G, J, JS, K, P, S, WC)

In addition to the portions of the smokestacks coming in direct contact with the products of combustion, this account also includes the labor and materials necessary to maintain the non-coal related portions such as aeronautical lighting, lightning protection, etc. This rather varied account composition along with a rather irregular cost pattern at many of the plants reduced our ability to draw any particularly meaningful relationships

from an analysis of this account. For such reasons, Bull Run and Cumberland data were not considered under this account.

Acct. 173, Bottom Ash Hoppers

Included under this account classification are all the labor and materials costs associated with maintaining the bottom ash hoppers into which ashes and slag fall from the boiler furnaces and from which disposal is made through piping and handling equipment to the ash disposal field.

These costs are accumulated on an individual basis at all plants. However, due to the irregular cost patterns and sometimes nominal level of expenditure at many plants, there was insufficient data for worthwhile analysis. As in the case of other accounts which collect costs on a unit basis, the point breakdown designates the specific unit; i.e., 173.1, Unit No. 1; 173.2, Unit No. 2; etc.

Acct. 173.1, Bottom Ash Hoppers, Unit No. 1 (All Plants)

Acct. 173.2, Bottom Ash Hoppers, Unit No. 2 (C, CU, G, J, JS, K, P, S, WC)

Acct. 173.3, Bottom Ash Hoppers, Unit No. 3 (C, G, J, JS, K, P, S, WC)

Acct. 173.4, Bottom Ash Hoppers, Unit No. 4 (C, G, J, JS, K, S, WC)

Acct. 173.5, Bottom Ash Hoppers, Unit No. 5 (C, J, K, S, WC)

Acct. 173.6, Bottom Ash Hoppers, Unit No. 6 (J, K, S, WC)

Acct. 173.7, Bottom Ash Hoppers, Unit No. 7 (J, K, S, WC)

Acct. 173.8, Bottom Ash Hoppers, Unit No. 8 (J, K, S, WC)

Acct. 173.9, Bottom Ash Hoppers, Unit No. 9 (J, K, S)

Acct. 173.10, Bottom Ash Hoppers, Unit No. 10 (J, S)

Acct. 174.01, Mechanical Fly Ash Collectors

As the name states, this account is used to record all labor and material costs necessary for maintaining the equipment in which the fly ash

in boiler flue gas is mechanically separated and collected in hoppers. This equipment is installed in the induced draft system between the air pre-heater and induced draft fan.

These costs are accumulated on an individual unit basis. However, as was the case with the preceding series of accounts covering Bottom Ash Hoppers (173.1 through 173.10), irregular cost patterns and, at times, unexplainable levels of expenditure limit our ability to develop a meaningful relationship by individual assessments. Another potentially complicating factor was the installation of electrostatic fly ash precipitators at many plants (beginning around 1970) which deemphasized the role of the mechanical collectors.

Acct. 174.11, Mechanical Fly Ash Collectors, Unit No. 1 (C, CU, G, J, JS, K, S, WC)

Acct. 174.21, Mechanical Fly Ash Collectors, Unit No. 2 (C, CU, G, J, JS, K, S, WC)

Acct. 174.31, Mechanical Fly Ash Collectors, Unit No. 3 (C, G, J, JS, K, S, WC)

Acct. 174.41, Mechanical Fly Ash Collectors, Unit No. 4 (C, G, J, JS, K, S, WC)

Acct. 174.51, Mechanical Fly Ash Collectors, Unit No. 5 (J, K, S, WC)

Acct. 174.61, Mechanical Fly Ash Collectors, Unit No. 6 (J, K, S, WC)

Acct. 174.71, Mechanical Fly Ash Collectors, Unit No. 7 (J, K, S)

Acct. 174.81, Mechanical Fly Ash Collectors, Unit No. 8 (J, K, S)

Acct. 174.91, Mechanical Fly Ash Collectors, Unit No. 9 (J, K, S)

Acct. 174.101, Mechanical Fly Ash Collectors, Unit No. 10 (J, S)

Acct. 174.02, Electrostatic Fly Ash Precipitators

This account includes the labor and materials costs related to maintaining the equipment in which the fly ash in the boiler flue gas is

electrostatically separated and collected in hoppers. These costs are accumulated on an individual unit basis at those plants having this type of fly ash collection equipment.

As mentioned above, these electrostatic precipitators were installed as replacements or to supplement the mechanical collectors at some of the older plants beginning around 1970. Therefore, we have a much shorter maintenance cost experience record to examine for the existence of any sensitivities to changes in coal quality. Additionally, there is somewhat of an irregular pattern of incurred cost. To compensate for this, we have grouped together the maintenance costs for each of the units at some of the plants and compared the totals with the selected measures of coal quality.

Acct. 174.12, Electrostatic Fly Ash Precipitators, Unit No. 1 (BR, C, CU, G, J, JS, K, P, S)

Acct. 174.22, Electrostatic Fly Ash Precipitators, Unit No. 2 (C, CU, G, J, JS, K, P, S)

Acct. 174.32, Electrostatic Fly Ash Precipitators, Unit No. 3 (C, G, J, JS, K, P, S)

Acct. 174.42, Electrostatic Fly Ash Precipitators, Unit No. 4 (C, G, J, JS, K, S)

Acct. 174.52, Electrostatic Fly Ash Precipitators, Unit No. 5 (C, J, K, S)

Acct. 174.62, Electrostatic Fly Ash Precipitators, Unit No. 6 (J, K, S)

Acct. 174.72, Electrostatic Fly Ash Precipitators, Unit No. 7 (J, K, S, WC)

Acct. 174.82, Electrostatic Fly Ash Precipitators, Unit No. 8 (J, K, S, WC)

Acct. 174.92, Electrostatic Fly Ash Precipitators, Unit No. 9 (J, K, S)

Acct. 174.102, Electrostatic Fly Ash Precipitators, Unit No. 10 (J, S)

Acct. 174.03, Electrostatic Fly Ash Precipitator (New)

As the name implies, under this account are recorded all costs incident to maintaining the "New" ESP equipment. These costs are accumulated on an individual unit basis. For the period of our analysis (through 1978), costs were collected only at Kingston for the last several years.

Acct. 174.13, Electrostatic Fly Ash Precipitator (New), Unit No. 1 (K)

Acct. 174.23, Electrostatic Fly Ash Precipitator (New), Unit No. 2 (K)

Acct. 174.33, Electrostatic Fly Ash Precipitator (New), Unit No. 3 (K)

Acct. 174.43, Electrostatic Fly Ash Precipitator (New), Unit No. 4 (K)

Acct. 174.53, Electrostatic Fly Ash Precipitator (New), Unit No. 5 (K)

Acct. 174.63, Electrostatic Fly Ash Precipitator (New), Unit No. 6 (K)

Acct. 174.73, Electrostatic Fly Ash Precipitator (New), Unit No. 7 (K)

Acct. 174.83, Electrostatic Fly Ash Precipitator (New), Unit No. 8 (K)

Acct. 174.93, Electrostatic Fly Ash Precipitator (New), Unit No. 9 (K)

Acct. 175.2, Ash Crushing, Ejection, and Disposal Piping Systems (All Plants)

Under this account are collected all labor and materials costs expended in maintaining the crushing, ejection, and disposal piping systems which carry ash and slag from the boiler ash hoppers, fly ash collected from flue gas, boiler dust and pulverizer pyrite rejects from other collecting hoppers through piping to the ash disposal field. Also included in this account are the hoppers for the minor collecting systems.

Needless to say, this account covers a broad spectrum of components which come in direct contact with the potentially erosive and corrosive constituents of the material fed to the boiler. One of the major wear items

encompassed by this account is the ash sluice lines (pipes) which carry an ash-laden slurry to the disposal field. Because these lines are so critical to the environmentally sound transportation of refuse from the plant, they must be kept in service at all times. To aid in this regard, at a number of plants many portions of pipe have been replaced with sections lined with wear resistant materials. This has significantly modified the wear pattern. Since these changes have taken place during an extended period, it is difficult to pinpoint when such modifications should be reflected in the costs. Another high maintenance item covered by this account is the clinker grinder. According to some plant personnel, the rebuilding of these grinders approaches a full-time job. The costs charged to this account are accumulated on a plant-wide basis.

Acct. 175.4, Fly Ash Recovery and Storage System (C, G, K)

As the name explicitly states, the equipment whose maintenance costs are collected under this account recovers and stores fly ash for possible further application and/or sale. This particular type of system is limited to three TVA plants.

Acct. 175.7, Ash Handling Conveyor System (P)

Under this account, established in 1970, are collected the costs associated with maintaining the ash conveying system which services all three units at the Paradise Plant.

APPENDIX B

COMPLETE ANALYSES OF MAINTENANCE COSTS

This Appendix includes the statistical analyses of the annual maintenance costs experienced at five of TVA's coal-fired plants as a function of the coal quality consumed by the particular unit(s) during multi-year periods beginning as early as 1962 and ending with 1978. The analyses periods vary depending upon when the plant, unit(s) at the plant, or particular piece of ancillary equipment was placed into full commercial operation.

As covered by Section 3, our primary objective was to confirm that coal-fired power plant maintenance costs are influenced to a measurable degree by their fuel quality. Using an accepted statistical approach, we developed and tested such a hypothesis by measuring the degree with which two variables - coal quality and maintenance cost - correlate with each other. For purposes of our analyses, coal quality was expressed as a series of three X variables - the actual amounts of ash, sulfur, and ash plus sulfur to which the plant was exposed annually. This means of expressing the coal quality variables was selected over the percentages of each of these constituents in the feed coal to provide a more accurate measure of the potentially erosive and/or corrosive effects of the material passing through the unit.

Maintenance costs were expressed as a series of Y variables representing the annual expenses for the selected maintenance accounts adjusted to constant 1978 dollars. This indexing of prior years' costs was necessary, as covered by Section 3.2.5, to eliminate the effect of

substantial variations in the purchasing power of the dollar during the period considered by our study.

The following subsections of this Appendix present the complete statistical analyses performed on data from each of the five TVA coal-fired plants discussed in the body of this report. Each maintenance account applicable to the particular plant is addressed on a separate page. The adjusted series of annual costs experienced under an account (variable Y) are compared to three different measures of coal quality (variable X); first to ash, then sulfur, and finally ash plus sulfur, all expressed in thousands of tons entering the unit(s) annually. For a discussion of the rationale and criteria for passing our decision rules at the various significance levels, the reader is referred to Section 3.2.6. Further, Sections 3.2.7 and 3.2.8 provide a discussion and an example of the interpretation of all the elements of the analyses and how the results either prove or disprove our hypothesis that "as the quality of coal consumed by a given power plant decreases (ash and/or sulfur increases) the cost of maintaining that plant will increase." Additionally, the aforementioned sections describe to the reader the methodology with which to make a transition from the statistical results to their practical interpretation of how they relate to a potential monetary savings for each percent reduction in the ash and sulfur content of the feed coal.

APPENDIX B-1

SHAWNEE PLANT

ANALYSES OF

MAINTENANCE COST ACCOUNTS

AS A FUNCTION OF

COAL QUALITY

SHAWNEE PLANT OF TVA
ACCT. # 152.2
HAMMERMILL-TYPE COAL CRUSHER

VARIABLE X: # 152.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 54789.4
S.D. OF X = 95.6385 S.D. OF Y = 28224.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .372
COEFFICIENT OF DETERMINATION = .138384

SLOPE (M) OF REGRESSION LINE = 109.75

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 54789.4
S.D. OF X = 9.45207 S.D. OF Y = 28224.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .034
COEFFICIENT OF DETERMINATION = 1.156E-03

SLOPE (M) OF REGRESSION LINE = 102.978

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 54789.4
S.D. OF X = 100.699 S.D. OF Y = 28224.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .356
COEFFICIENT OF DETERMINATION = .126736

SLOPE (M) OF REGRESSION LINE = 99.9023

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 153
COAL CONVEYING FACILITIES

VARIABLE X: # 153 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 142088
S.D. OF X = 95.6385 S.D. OF Y = 34965.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.256
COEFFICIENT OF DETERMINATION = .065536

SLOPE (M) OF REGRESSION LINE = -93.5893

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 142088
S.D. OF X = 9.45207 S.D. OF Y = 34965.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .106
COEFFICIENT OF DETERMINATION = .011236

SLOPE (M) OF REGRESSION LINE = 390.795

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 142088
S.D. OF X = 100.699 S.D. OF Y = 34965.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.233
COEFFICIENT OF DETERMINATION = .054289

SLOPE (M) OF REGRESSION LINE = -80.9753

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 154

COAL HANDLING POWER AND CONTROL SYSTEM

VARIABLE X: # 154 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.037

MEAN OF Y = 14080.1

S.D. OF X = 95.6385

S.D. OF Y = 26225.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .24

COEFFICIENT OF DETERMINATION = .0576

SLOPE (M) OF REGRESSION LINE = 65.6895

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 14080.1

S.D. OF X = 9.45207

S.D. OF Y = 26225.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = 2E-03

COEFFICIENT OF DETERMINATION = 4E-06

SLOPE (M) OF REGRESSION LINE = 6.27619

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.002

MEAN OF Y = 14080.1

S.D. OF X = 100.699

S.D. OF Y = 26225.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .228

COEFFICIENT OF DETERMINATION = .051984

SLOPE (M) OF REGRESSION LINE = 59.3078

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 155
COAL BUNKERS

VARIABLE X: # 155 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 46638.1
S.D. OF X = 95.6385 S.D. OF Y = 26929.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.01
COEFFICIENT OF DETERMINATION = 1E-04

SLOPE (M) OF REGRESSION LINE = -2.72005

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 46638.1
S.D. OF X = 9.45207 S.D. OF Y = 26929.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.211
COEFFICIENT OF DETERMINATION = .044521

SLOPE (M) OF REGRESSION LINE = -600.182

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 46638.1
S.D. OF X = 100.699 S.D. OF Y = 26929.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.029
COEFFICIENT OF DETERMINATION = 8.41001E-04

SLOPE (M) OF REGRESSION LINE = -7.74143

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 157

BOILERS & ACCESSORIES - UNITS #1 - 10

VARIABLE X: # 157 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.036

MEAN OF Y = 493464

S.D. OF X = 95.638

S.D. OF Y = 164356

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .658

COEFFICIENT OF DETERMINATION = .432964

SLOPE (M) OF REGRESSION LINE = 1130.81

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 157 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 493464

S.D. OF X = 9.45207

S.D. OF Y = 164356

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .632

COEFFICIENT OF DETERMINATION = .399424

SLOPE (M) OF REGRESSION LINE = 10996.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 157 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.001

MEAN OF Y = 493464

S.D. OF X = 100.699

S.D. OF Y = 164356

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .684

COEFFICIENT OF DETERMINATION = .467856

SLOPE (M) OF REGRESSION LINE = 1116.89

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

SHAWNEE PLANT OF TVA
ACCT. # 157.1
BOILERS AND ACCESSORIES - UNIT # 1

VARIABLE X: # 157.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.4224 MEAN OF Y = 52755.8
S.D. OF X = 10.167 S.D. OF Y = 37764.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .08
COEFFICIENT OF DETERMINATION = 6.4E-03

SLOPE (M) OF REGRESSION LINE = 297.849

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.0612 MEAN OF Y = 52755.8
S.D. OF X = 1.4591 S.D. OF Y = 37764.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .061
COEFFICIENT OF DETERMINATION = 3.721E-03

SLOPE (M) OF REGRESSION LINE = 1582.23

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.4835 MEAN OF Y = 52755.8
S.D. OF X = 10.9341 S.D. OF Y = 37764.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .083
COEFFICIENT OF DETERMINATION = 6.889E-03

SLOPE (M) OF REGRESSION LINE = 285.697

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 157.2

BOILERS AND ACCESSORIES - UNIT # 2

VARIABLE X: # 157.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.3259

MEAN OF Y = 56727.3

S.D. OF X = 9.26558

S.D. OF Y = 44875.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .463

COEFFICIENT OF DETERMINATION = .214369

SLOPE (M) OF REGRESSION LINE = 2240.15

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.07

MEAN OF Y = 56727.3

S.D. OF X = 1.07994

S.D. OF Y = 44875.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .548

COEFFICIENT OF DETERMINATION = .300304

SLOPE (M) OF REGRESSION LINE = 22758

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.3959

MEAN OF Y = 56727.3

S.D. OF X = 9.72194

S.D. OF Y = 44875.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .502

COEFFICIENT OF DETERMINATION = .252004

SLOPE (M) OF REGRESSION LINE = 2315.6

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 157.3
BOILERS AND ACCESSORIES - UNIT # 3

VARIABLE X: # 157.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 60.7188 MEAN OF Y = 47248.4
S.D. OF X = 10.8832 S.D. OF Y = 38738.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .359
COEFFICIENT OF DETERMINATION = .128881

SLOPE (M) OF REGRESSION LINE = 1278.18

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.3706 MEAN OF Y = 47248.4
S.D. OF X = 1.40186 S.D. OF Y = 38738.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .442
COEFFICIENT OF DETERMINATION = .195364

SLOPE (M) OF REGRESSION LINE = 12225.1

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 74.0894 MEAN OF Y = 47248.4
S.D. OF X = 11.8608 S.D. OF Y = 38738.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .382
COEFFICIENT OF DETERMINATION = .145924

SLOPE (M) OF REGRESSION LINE = 1246.93

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 157.4

BOILERS AND ACCESSORIES - UNIT # 4

VARIABLE X: # 157.4 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.5418

MEAN OF Y = 52639.8

S.D. OF X = 10.4899

S.D. OF Y = 49649.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .321

COEFFICIENT OF DETERMINATION = .103041

SLOPE (M) OF REGRESSION LINE = 1521.24

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.4 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.1259

MEAN OF Y = 52639.8

S.D. OF X = 1.32452

S.D. OF Y = 49649.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .268

COEFFICIENT OF DETERMINATION = .071824

SLOPE (M) OF REGRESSION LINE = 10057.4

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.4 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.6677

MEAN OF Y = 52639.8

S.D. OF X = 11.2949

S.D. OF Y = 49649.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .33

COEFFICIENT OF DETERMINATION = .1089

SLOPE (M) OF REGRESSION LINE = 1450.42

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 157.5
BOILERS AND ACCESSORIES - UNIT # 5

VARIABLE X: # 157.5 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 60.6782 MEAN OF Y = 43184.1
S.D. OF X = 11.2116 S.D. OF Y = 43075.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .305
COEFFICIENT OF DETERMINATION = .093025

SLOPE (M) OF REGRESSION LINE = 1171.1

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.5 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.4671 MEAN OF Y = 43184.1
S.D. OF X = 1.42645 S.D. OF Y = 43075.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .153
COEFFICIENT OF DETERMINATION = .023409

SLOPE (M) OF REGRESSION LINE = 4611.84

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.5 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 74.1453 MEAN OF Y = 43184.1
S.D. OF X = 12.2159 S.D. OF Y = 43075.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .298
COEFFICIENT OF DETERMINATION = .088804

SLOPE (M) OF REGRESSION LINE = 1049.33

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 157.6
BOILERS AND ACCESSORIES - UNIT # 6

VARIABLE X: # 157.6 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.0541 MEAN OF Y = 47788.4

S.D. OF X = 9.94641 S.D. OF Y = 39041.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .274

COEFFICIENT OF DETERMINATION = .075076

SLOPE (M) OF REGRESSION LINE = 1076.06

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.6 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.1365 MEAN OF Y = 47788.4

S.D. OF X = .994347 S.D. OF Y = 39041.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .125

COEFFICIENT OF DETERMINATION = .015625

SLOPE (M) OF REGRESSION LINE = 4892.83

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.6 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.1906 MEAN OF Y = 47788.4

S.D. OF X = 10.5781 S.D. OF Y = 39041.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .269

COEFFICIENT OF DETERMINATION = .072361

SLOPE (M) OF REGRESSION LINE = 994.614

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 157.7
BOILERS & ACCESSORIES - UNIT # 7

VARIABLE X: # 157.7 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 61.6182 MEAN OF Y = 49252.2
S.D. OF X = 10.525 S.D. OF Y = 38659.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .439
COEFFICIENT OF DETERMINATION = .192721

SLOPE (M) OF REGRESSION LINE = 1611.19

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.7 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.63 MEAN OF Y = 49252.2
S.D. OF X = 1.21484 S.D. OF Y = 38659.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .38
COEFFICIENT OF DETERMINATION = .1444

SLOPE (M) OF REGRESSION LINE = 12080.7

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.7 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 75.2482 MEAN OF Y = 49252.2
S.D. OF X = 11.2725 S.D. OF Y = 38659.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .45
COEFFICIENT OF DETERMINATION = .2025

SLOPE (M) OF REGRESSION LINE = 1544.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 157.8
BOILERS AND ACCESSORIES - UNIT # 8

VARIABLE X: # 157.8 ASH(K TONS) VARIABLE Y: MAINT COST. '78\$

MEAN OF X = 59.3594 MEAN OF Y = 48513.5
S.D. OF X = 9.07449 S.D. OF Y = 34618.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .421
COEFFICIENT OF DETERMINATION = .177241

SLOPE (M) OF REGRESSION LINE = 1607.94

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.8 SULFUR(K TONS) VARIABLE Y: MAINT COST. '78\$

MEAN OF X = 13.24 MEAN OF Y = 48513.5
S.D. OF X = 1.57804 S.D. OF Y = 34618.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .244
COEFFICIENT OF DETERMINATION = .059536

SLOPE (M) OF REGRESSION LINE = 5353.39

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.8 ASH+SUL(K TONS) VARIABLE Y: MAINT COST. '78\$

MEAN OF X = 72.5994 MEAN OF Y = 48513.5
S.D. OF X = 10.0529 S.D. OF Y = 34618.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .419
COEFFICIENT OF DETERMINATION = .175561

SLOPE (M) OF REGRESSION LINE = 1442.1

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 157.9

BOILERS AND ACCESSORIES - UNIT # 9

VARIABLE X: # 157.9 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.6847

MEAN OF Y = 48220.2

S.D. OF X = 12.0818

S.D. OF Y = 37390.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .241

COEFFICIENT OF DETERMINATION = .058081

SLOPE (M) OF REGRESSION LINE = 745.536

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.9 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.2976

MEAN OF Y = 48220.2

S.D. OF X = 1.81631

S.D. OF Y = 37390.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .236

COEFFICIENT OF DETERMINATION = .055696

SLOPE (M) OF REGRESSION LINE = 4856.7

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.9 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.9824

MEAN OF Y = 48220.2

S.D. OF X = 13.5293

S.D. OF Y = 37390.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .247

COEFFICIENT OF DETERMINATION = .061009

SLOPE (M) OF REGRESSION LINE = 682.077

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 157.10
BOILERS AND ACCESSORIES - UNIT # 10

VARIABLE X: #157.10 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 60.6635 MEAN OF Y = 47348.9
S.D. OF X = 11.3157 S.D. OF Y = 44906.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .338
COEFFICIENT OF DETERMINATION = .114244

SLOPE (M) OF REGRESSION LINE = 1339.46

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: #157.10 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.5118 MEAN OF Y = 47348.9
S.D. OF X = 1.59256 S.D. OF Y = 44906.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .473
COEFFICIENT OF DETERMINATION = .223729

SLOPE (M) OF REGRESSION LINE = 13343.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: #157.10 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 74.1753 MEAN OF Y = 47348.9
S.D. OF X = 12.5091 S.D. OF Y = 44906.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .366
COEFFICIENT OF DETERMINATION = .133956

SLOPE (M) OF REGRESSION LINE = 1312.36

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 158.1
SOOT BLOWERS - ALL TYPES

VARIABLE X: # 158.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 110727
S.D. OF X = 95.6385 S.D. OF Y = 46289.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .788
COEFFICIENT OF DETERMINATION = .620944

SLOPE (M) OF REGRESSION LINE = 381.199

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 158.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 110727
S.D. OF X = 9.45207 S.D. OF Y = 46289.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .412
COEFFICIENT OF DETERMINATION = .169744

SLOPE (M) OF REGRESSION LINE = 2015.58

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 158.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 110727
S.D. OF X = 100.699 S.D. OF Y = 46289.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .787
COEFFICIENT OF DETERMINATION = .619369

SLOPE (M) OF REGRESSION LINE = 361.603

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

SHAWNEE PLANT OF TVA
ACCT.# 158.2
SOOT BLOWERS - AIR COMPRESSOR, RECIP.

VARIABLE X: # 158.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 509.125 MEAN OF Y = 82654.4
S.D. OF X = 22.1179 S.D. OF Y = 17349.2

NUMBER OF PAIRS (N) = 8

CORRELATION COEFFICIENT (R) = .773
COEFFICIENT OF DETERMINATION = .597529

SLOPE (M) OF REGRESSION LINE = 606.445

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 129.364 MEAN OF Y = 82654.4
S.D. OF X = 9.5118 S.D. OF Y = 17349.2

NUMBER OF PAIRS (N) = 8

CORRELATION COEFFICIENT (R) = .378
COEFFICIENT OF DETERMINATION = .142884

SLOPE (M) OF REGRESSION LINE = 690.005

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 638.489 MEAN OF Y = 82654.4
S.D. OF X = 29.7333 S.D. OF Y = 17349.2

NUMBER OF PAIRS (N) = 8

CORRELATION COEFFICIENT (R) = .696
COEFFICIENT OF DETERMINATION = .484416

SLOPE (M) OF REGRESSION LINE = 406.19

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 160
COAL TRANSPORT PIPING AND VALVES

VARIABLE X: # 160 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 604.391 MEAN OF Y = 66741.1
S.D. OF X = 96.9333 S.D. OF Y = 22211.1

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .511
COEFFICIENT OF DETERMINATION = .261121

SLOPE (M) OF REGRESSION LINE = 117.146

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 160 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 133.05 MEAN OF Y = 66741.1
S.D. OF X = 9.73666 S.D. OF Y = 22211.1

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .477
COEFFICIENT OF DETERMINATION = .227529

SLOPE (M) OF REGRESSION LINE = 1087.93

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 160 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 737.441 MEAN OF Y = 66741.1
S.D. OF X = 102.172 S.D. OF Y = 22211.1

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .53
COEFFICIENT OF DETERMINATION = .2809

SLOPE (M) OF REGRESSION LINE = 115.321

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT.# 161

BOILER ROOM COAL SCALES - VOLUMETRIC

VARIABLE X: # 161 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.037

MEAN OF Y = 58647.3

S.D. OF X = 95.6385

S.D. OF Y = 14166.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .171

COEFFICIENT OF DETERMINATION = .029241

SLOPE (M) OF REGRESSION LINE = 25.2788

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 161 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 58647.3

S.D. OF X = 9.45207

S.D. OF Y = 14166.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .497

COEFFICIENT OF DETERMINATION = .247009

SLOPE (M) OF REGRESSION LINE = 744.367

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 161 ASH+SUL(KTONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.002

MEAN OF Y = 58647.3

S.D. OF X = 100.699

S.D. OF Y = 14166.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .209

COEFFICIENT OF DETERMINATION = .043681

SLOPE (M) OF REGRESSION LINE = 29.3599

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT.# 162

PULVERIZER MILLS - UNITS #1 - 10

VARIABLE X: # 162 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.036

MEAN OF Y = 910583

S.D. OF X = 95.638

S.D. OF Y = 245469

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .445

COEFFICIENT OF DETERMINATION = .198025

SLOPE (M) OF REGRESSION LINE = 1142.49

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 910583

S.D. OF X = 9.45207

S.D. OF Y = 245469

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .542

COEFFICIENT OF DETERMINATION = .293764

SLOPE (M) OF REGRESSION LINE = 14073.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.001

MEAN OF Y = 910583

S.D. OF X = 100.699

S.D. OF Y = 245469

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .474

COEFFICIENT OF DETERMINATION = .224676

SLOPE (M) OF REGRESSION LINE = 1154.54

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 162.11
PULVERIZER MILLS - UNIT # 1

VARIABLE X: # 162.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.4224 MEAN OF Y = 101865
S.D. OF X = 10.167 S.D. OF Y = 47707.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .241
COEFFICIENT OF DETERMINATION = .058081

SLOPE (M) OF REGRESSION LINE = 1130.69

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.0612 MEAN OF Y = 101865
S.D. OF X = 1.4591 S.D. OF Y = 47707.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.125
COEFFICIENT OF DETERMINATION = .015625

SLOPE (M) OF REGRESSION LINE = -4074.86

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.4835 MEAN OF Y = 101865
S.D. OF X = 10.9341 S.D. OF Y = 47707.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .207
COEFFICIENT OF DETERMINATION = .042849

SLOPE (M) OF REGRESSION LINE = 905.033

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 162.21

PULVERIZER MILLS - UNIT # 2

VARIABLE X: # 162.21 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.62

MEAN OF Y = 92360.5

S.D. OF X = 9.46303

S.D. OF Y = 37207.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .22

COEFFICIENT OF DETERMINATION = .0484

SLOPE (M) OF REGRESSION LINE = 864.978

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.21 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.07

MEAN OF Y = 92360.5

S.D. OF X = 1.07994

S.D. OF Y = 37207.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .119

COEFFICIENT OF DETERMINATION = .014161

SLOPE (M) OF REGRESSION LINE = 4098.45

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.21 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.69

MEAN OF Y = 92360.5

S.D. OF X = 9.8806

S.D. OF Y = 37207.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .224

COEFFICIENT OF DETERMINATION = .050176

SLOPE (M) OF REGRESSION LINE = 842.374

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 162.31

PULVERIZER MILLS - UNIT # 3

VARIABLE X: # 162.31 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 60.7188 MEAN OF Y = 88342.1
S.D. OF X = 10.8832 S.D. OF Y = 35777.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .157
COEFFICIENT OF DETERMINATION = .024649

SLOPE (M) OF REGRESSION LINE = 514.905

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.31 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.3706 MEAN OF Y = 88342.1
S.D. OF X = 1.40186 S.D. OF Y = 35777.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .253
COEFFICIENT OF DETERMINATION = .064009

SLOPE (M) OF REGRESSION LINE = 6451.36

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.31 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 74.0894 MEAN OF Y = 88342.1
S.D. OF X = 11.8608 S.D. OF Y = 35777.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .174
COEFFICIENT OF DETERMINATION = .030276

SLOPE (M) OF REGRESSION LINE = 523.64

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 162.41

PULVERIZER MILLS - UNIT # 4

VARIABLE X: # 162.41 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.5418

MEAN OF Y = 94426.4

S.D. OF X = 10.4899

S.D. OF Y = 28387.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .36

COEFFICIENT OF DETERMINATION = .1296

SLOPE (M) OF REGRESSION LINE = 974.146

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.41 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.1259

MEAN OF Y = 94426.4

S.D. OF X = 1.32452

S.D. OF Y = 28387.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .243

COEFFICIENT OF DETERMINATION = .059049

SLOPE (M) OF REGRESSION LINE = 5202.18

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.41 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.6677

MEAN OF Y = 94426.4

S.D. OF X = 11.2949

S.D. OF Y = 28387.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .363

COEFFICIENT OF DETERMINATION = .131769

SLOPE (M) OF REGRESSION LINE = 911.774

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 162.51
PULVERIZER MILLS - UNIT # 5

VARIABLE X: # 162.51 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 60.6782 MEAN OF Y = 90987
S.D. OF X = 11.2116 S.D. OF Y = 25540.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .543
COEFFICIENT OF DETERMINATION = .294849

SLOPE (M) OF REGRESSION LINE = 1237.74

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.51 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.4671 MEAN OF Y = 90987
S.D. OF X = 1.42645 S.D. OF Y = 25540.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .433
COEFFICIENT OF DETERMINATION = .187489

SLOPE (M) OF REGRESSION LINE = 7760.4

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.51 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 74.1453 MEAN OF Y = 90987
S.D. OF X = 12.2159 S.D. OF Y = 25540.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .549
COEFFICIENT OF DETERMINATION = .301401

SLOPE (M) OF REGRESSION LINE = 1148.39

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 162.61
PULVERIZER MILLS - UNIT # 6

VARIABLE X: # 162.61 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.0541 MEAN OF Y = 81128.8
S.D. OF X = 9.94641 S.D. OF Y = 23044.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .326
COEFFICIENT OF DETERMINATION = .106276

SLOPE (M) OF REGRESSION LINE = 754.267

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.61 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.1365 MEAN OF Y = 81128.8
S.D. OF X = .994347 S.D. OF Y = 23044.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .226
COEFFICIENT OF DETERMINATION = .051076

SLOPE (M) OF REGRESSION LINE = 5238.4

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.61 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.1906 MEAN OF Y = 81128.8
S.D. OF X = 10.5781 S.D. OF Y = 23044.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .327
COEFFICIENT OF DETERMINATION = .106929

SLOPE (M) OF REGRESSION LINE = 713.162

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 162.71

PULVERIZER MILLS - UNIT # 7

VARIABLE X: # 162.71 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 61.6182

MEAN OF Y = 91956.3

S.D. OF X = 10.525

S.D. OF Y = 34779.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .339

COEFFICIENT OF DETERMINATION = .114921

SLOPE (M) OF REGRESSION LINE = 1120.06

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.71 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.63

MEAN OF Y = 91956.3

S.D. OF X = 1.21484

S.D. OF Y = 34779.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .559

COEFFICIENT OF DETERMINATION = .312481

SLOPE (M) OF REGRESSION LINE = 16010.2

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.71 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 75.2482

MEAN OF Y = 91956.3

S.D. OF X = 11.2725

S.D. OF Y = 34779.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .377

COEFFICIENT OF DETERMINATION = .142129

SLOPE (M) OF REGRESSION LINE = 1162.39

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 162.81
PULVERIZER MILLS - UNIT # 8

VARIABLE X: # 162.81 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.3594 MEAN OF Y = 92555.7
S.D. OF X = 9.07449 S.D. OF Y = 37831

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .533
COEFFICIENT OF DETERMINATION = .284089

SLOPE (M) OF REGRESSION LINE = 2221.96

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.81 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.24 MEAN OF Y = 92555.7
S.D. OF X = 1.57804 S.D. OF Y = 37831

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .472
COEFFICIENT OF DETERMINATION = .222784

SLOPE (M) OF REGRESSION LINE = 11309.1

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.81 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.5994 MEAN OF Y = 92555.7
S.D. OF X = 10.0529 S.D. OF Y = 37831

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .555
COEFFICIENT OF DETERMINATION = .308025

SLOPE (M) OF REGRESSION LINE = 2089.18

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 162.91
PULVERIZER MILLS - UNIT # 9

VARIABLE X: # 162.91 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.6847 MEAN OF Y = 88588.1
S.D. OF X = 12.0818 S.D. OF Y = 40014.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .359
COEFFICIENT OF DETERMINATION = .128881

SLOPE (M) OF REGRESSION LINE = 1190.31

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.91 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.2976 MEAN OF Y = 88588.1
S.D. OF X = 1.81631 S.D. OF Y = 40014.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .379
COEFFICIENT OF DETERMINATION = .143641

SLOPE (M) OF REGRESSION LINE = 8340.11

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.91 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.9824 MEAN OF Y = 88588.1
S.D. OF X = 13.5293 S.D. OF Y = 40014.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .372
COEFFICIENT OF DETERMINATION = .138384

SLOPE (M) OF REGRESSION LINE = 1099.55

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 162.101
PULVERIZER MILLS - UNIT # 10

VARIABLE X: # 162.101 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 60.6635 MEAN OF Y = 88373.8

S.D. OF X = 11.3157 S.D. OF Y = 29688.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .175

COEFFICIENT OF DETERMINATION = .030625

SLOPE (M) OF REGRESSION LINE = 459.331

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.101 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.5118 MEAN OF Y = 88373.8

S.D. OF X = 1.59256 S.D. OF Y = 29688.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .373

COEFFICIENT OF DETERMINATION = .139129

SLOPE (M) OF REGRESSION LINE = 6946.59

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.101 ASH+SU(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.1753 MEAN OF Y = 88373.8

S.D. OF X = 12.5091 S.D. OF Y = 29688.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .206

COEFFICIENT OF DETERMINATION = .042436

SLOPE (M) OF REGRESSION LINE = 488.462

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 162.2

PRIMARY AIR FANS / MILL EXHAUSTER FANS

VARIABLE X: # 162.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.037

MEAN OF Y = 118156

S.D. OF X = 95.6385

S.D. OF Y = 39185.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .527

COEFFICIENT OF DETERMINATION = .277729

SLOPE (M) OF REGRESSION LINE = 215.97

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 118156

S.D. OF X = 9.45207

S.D. OF Y = 39185.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .404

COEFFICIENT OF DETERMINATION = .163216

SLOPE (M) OF REGRESSION LINE = 1674.62

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.002

MEAN OF Y = 118156

S.D. OF X = 100.699

S.D. OF Y = 39185.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .539

COEFFICIENT OF DETERMINATION = .290521

SLOPE (M) OF REGRESSION LINE = 209.561

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 163.1
BURNERS AND LIGHTERS

VARIABLE X: # 163.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 63544
S.D. OF X = 95.6385 S.D. OF Y = 11223.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .232
COEFFICIENT OF DETERMINATION = .053824

SLOPE (M) OF REGRESSION LINE = 27.1851

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 63544
S.D. OF X = 9.45207 S.D. OF Y = 11223.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .401
COEFFICIENT OF DETERMINATION = .160801

SLOPE (M) OF REGRESSION LINE = 475.709

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 63544
S.D. OF X = 100.699 S.D. OF Y = 11223.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .258
COEFFICIENT OF DETERMINATION = .066564

SLOPE (M) OF REGRESSION LINE = 28.7125

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 166
AIR PREHEATERS

VARIABLE X: # 166 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 106909
S.D. OF X = 95.6385 S.D. OF Y = 95620

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .087
COEFFICIENT OF DETERMINATION = 7.569E-03

SLOPE (M) OF REGRESSION LINE = 86.74

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 106909
S.D. OF X = 9.45207 S.D. OF Y = 95620

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .397
COEFFICIENT OF DETERMINATION = .157609

SLOPE (M) OF REGRESSION LINE = 4016.17

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 106909
S.D. OF X = 100.699 S.D. OF Y = 95620

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .12
COEFFICIENT OF DETERMINATION = .0144

SLOPE (M) OF REGRESSION LINE = 113.625

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 168
INDUCED DRAFT FANS

VARIABLE X: # 168 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 23785.5
S.D. OF X = 95.6385 S.D. OF Y = 13918.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.382
COEFFICIENT OF DETERMINATION = .145924

SLOPE (M) OF REGRESSION LINE = -55.5286

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 168 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 23785.5
S.D. OF X = 9.45207 S.D. OF Y = 13918.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.343
COEFFICIENT OF DETERMINATION = .117649

SLOPE (M) OF REGRESSION LINE = -505.803

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 168 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 23785.5
S.D. OF X = 100.699 S.D. OF Y = 13918.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.395
COEFFICIENT OF DETERMINATION = .156025

SLOPE (M) OF REGRESSION LINE = -54.5436

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 169
AIR AND GAS DUCTS

VARIABLE X: # 169 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 51799.7
S.D. OF X = 95.6385 S.D. OF Y = 31816

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .509
COEFFICIENT OF DETERMINATION = .259081

SLOPE (M) OF REGRESSION LINE = 169.481

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 169 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 51799.7
S.D. OF X = 9.45207 S.D. OF Y = 31816

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.219
COEFFICIENT OF DETERMINATION = .047961

SLOPE (M) OF REGRESSION LINE = -735.522

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 51799.7
S.D. OF X = 100.699 S.D. OF Y = 31816

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .463
COEFFICIENT OF DETERMINATION = .214369

SLOPE (M) OF REGRESSION LINE = 146.393

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 170
SMOKESTACKS

VARIABLE X: # 170 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 600.037 MEAN OF Y = 6524.65
S.D. OF X = 95.6385 S.D. OF Y = 10082.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .221
COEFFICIENT OF DETERMINATION = .048841

SLOPE (M) OF REGRESSION LINE = 23.3234

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 170 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 132.965 MEAN OF Y = 6524.65
S.D. OF X = 9.45207 S.D. OF Y = 10082.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .218
COEFFICIENT OF DETERMINATION = .047524

SLOPE (M) OF REGRESSION LINE = 232.055

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 170 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 733.002 MEAN OF Y = 6524.65
S.D. OF X = 100.699 S.D. OF Y = 10082.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .231
COEFFICIENT OF DETERMINATION = .053361

SLOPE (M) OF REGRESSION LINE = 23.0825

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT.# 173

BOTTOM ASH HOPPERS - UNITS #1 - 10

VARIABLE X: # 173 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.036

MEAN OF Y = 61328.5

S.D. OF X = 95.638

S.D. OF Y = 21667.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .594

COEFFICIENT OF DETERMINATION = .352836

SLOPE (M) OF REGRESSION LINE = 134.649

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 173 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 61328.5

S.D. OF X = 9.45207

S.D. OF Y = 21667.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .372

COEFFICIENT OF DETERMINATION = .138384

SLOPE (M) OF REGRESSION LINE = 853.107

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.001

MEAN OF Y = 61328.5

S.D. OF X = 100.699

S.D. OF Y = 21667.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .599

COEFFICIENT OF DETERMINATION = .358801

SLOPE (M) OF REGRESSION LINE = 128.971

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

SHAWNEE PLANT OF TVA

ACCT. # 173.1

BOTTOM ASH HOPPERS — UNIT # 1

VARIABLE X: # 173.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.4224

MEAN OF Y = 5025.65

S.D. OF X = 10.167

S.D. OF Y = 4176.73

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .233

COEFFICIENT OF DETERMINATION = .054289

SLOPE (M) OF REGRESSION LINE = 95.588

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.0612

MEAN OF Y = 5025.65

S.D. OF X = 1.4591

S.D. OF Y = 4176.73

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .201

COEFFICIENT OF DETERMINATION = .040401

SLOPE (M) OF REGRESSION LINE = 574.175

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.4835

MEAN OF Y = 5025.65

S.D. OF X = 10.9341

S.D. OF Y = 4176.73

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .243

COEFFICIENT OF DETERMINATION = .059049

SLOPE (M) OF REGRESSION LINE = 92.8703

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 173.2
BOTTOM ASH HOPPERS - UNIT # 2

VARIABLE X: # 173.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.62 MEAN OF Y = 6096.94
S.D. OF X = 9.46303 S.D. OF Y = 4761.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .361
COEFFICIENT OF DETERMINATION = .130321

SLOPE (M) OF REGRESSION LINE = 181.647

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.07 MEAN OF Y = 6096.94
S.D. OF X = 1.07994 S.D. OF Y = 4761.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .179
COEFFICIENT OF DETERMINATION = .032041

SLOPE (M) OF REGRESSION LINE = 789.378

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.69 MEAN OF Y = 6096.94
S.D. OF X = 9.8806 S.D. OF Y = 4761.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .365
COEFFICIENT OF DETERMINATION = .133225

SLOPE (M) OF REGRESSION LINE = 176.049

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 173.3

BOTTOM ASH HOPPERS - UNIT # 3

VARIABLE X: # 173.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 60.7188

MEAN OF Y = 5474.77

S.D. OF X = 10.8832

S.D. OF Y = 3698.37

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .335

COEFFICIENT OF DETERMINATION = .112225

SLOPE (M) OF REGRESSION LINE = 113.931

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.3706

MEAN OF Y = 5474.77

S.D. OF X = 1.40186

S.D. OF Y = 3698.37

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .266

COEFFICIENT OF DETERMINATION = .070756

SLOPE (M) OF REGRESSION LINE = 703.072

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.0894

MEAN OF Y = 5474.77

S.D. OF X = 11.8608

S.D. OF Y = 3698.37

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .339

COEFFICIENT OF DETERMINATION = .114921

SLOPE (M) OF REGRESSION LINE = 105.744

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 173.4
BOTTOM ASH HOPPERS - UNIT # 4

VARIABLE X: # 173.4 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.5418 MEAN OF Y = 7122.53
S.D. OF X = 10.4899 S.D. OF Y = 7337.15

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .368
COEFFICIENT OF DETERMINATION = .135424

SLOPE (M) OF REGRESSION LINE = 257.233

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.4 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.1259 MEAN OF Y = 7122.53
S.D. OF X = 1.32452 S.D. OF Y = 7337.15

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .272
COEFFICIENT OF DETERMINATION = .073984

SLOPE (M) OF REGRESSION LINE = 1505.95

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.4 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.6677 MEAN OF Y = 7122.53
S.D. OF X = 11.2949 S.D. OF Y = 7337.15

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .373
COEFFICIENT OF DETERMINATION = .139129

SLOPE (M) OF REGRESSION LINE = 242.582

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 173.5

BOTTOM ASH HOPPERS - UNIT # 5

VARIABLE X: # 173.5 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 60.6782

MEAN OF Y = 9214.29

S.D. OF X = 11.2116

S.D. OF Y = 11204.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .474

COEFFICIENT OF DETERMINATION = .224676

SLOPE (M) OF REGRESSION LINE = 473.343

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 173.5 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.4671

MEAN OF Y = 9214.29

S.D. OF X = 1.42645

S.D. OF Y = 11204.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .446

COEFFICIENT OF DETERMINATION = .198916

SLOPE (M) OF REGRESSION LINE = 3505.28

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 173.5 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.1453

MEAN OF Y = 9214.29

S.D. OF X = 12.2159

S.D. OF Y = 11204.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .487

COEFFICIENT OF DETERMINATION = .237169

SLOPE (M) OF REGRESSION LINE = 446.504

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 173.6

BOTTOM ASH HOPPERS - UNIT # 6

VARIABLE X: # 173.6 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.0541

MEAN OF Y = 5766

S.D. OF X = 9.94641

S.D. OF Y = 4134.91

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .418

COEFFICIENT OF DETERMINATION = .174724

SLOPE (M) OF REGRESSION LINE = 173.609

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 173.6 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.1365

MEAN OF Y = 5766

S.D. OF X = .994347

S.D. OF Y = 4134.91

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .227

COEFFICIENT OF DETERMINATION = .051529

SLOPE (M) OF REGRESSION LINE = 945.14

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.6 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.1906

MEAN OF Y = 5766

S.D. OF X = 10.5781

S.D. OF Y = 4134.91

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .414

COEFFICIENT OF DETERMINATION = .171396

SLOPE (M) OF REGRESSION LINE = 161.845

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 173.7

BOTTOM ASH HOPPERS - UNIT # 7

VARIABLE X: # 173.7 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 61.6182

MEAN OF Y = 5898.47

S.D. OF X = 10.525

S.D. OF Y = 4014.24

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .194

COEFFICIENT OF DETERMINATION = .037636

SLOPE (M) OF REGRESSION LINE = 74.0499

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.7 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.63

MEAN OF Y = 5898.47

S.D. OF X = 1.21484

S.D. OF Y = 4014.24

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .263

COEFFICIENT OF DETERMINATION = .069169

SLOPE (M) OF REGRESSION LINE = 868.276

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.7 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 75.2482

MEAN OF Y = 5898.47

S.D. OF X = 11.2725

S.D. OF Y = 4014.24

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .21

COEFFICIENT OF DETERMINATION = .0441

SLOPE (M) OF REGRESSION LINE = 74.6393

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 173.8
BOTTOM ASH HOPPERS - UNIT # 8

VARIABLE X: # 173.8 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.3594 MEAN OF Y = 5462.35
S.D. OF X = 9.07449 S.D. OF Y = 3562.26

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .261
COEFFICIENT OF DETERMINATION = .068121

SLOPE (M) OF REGRESSION LINE = 102.322

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.8 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.24 MEAN OF Y = 5462.35
S.D. OF X = 1.57804 S.D. OF Y = 3562.26

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .097
COEFFICIENT OF DETERMINATION = 9.40901E-03

SLOPE (M) OF REGRESSION LINE = 220.05

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.8 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.5994 MEAN OF Y = 5462.35
S.D. OF X = 10.0529 S.D. OF Y = 3562.26

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .251
COEFFICIENT OF DETERMINATION = .063001

SLOPE (M) OF REGRESSION LINE = 88.7969

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 173.9
BOTTOM ASH HOPPERS - UNIT # 9

VARIABLE X: # 173.9 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.6847 MEAN OF Y = 5426
S.D. OF X = 12.0818 S.D. OF Y = 4564.43

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .287
COEFFICIENT OF DETERMINATION = .082369

SLOPE (M) OF REGRESSION LINE = 108.562

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.9 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.2976 MEAN OF Y = 5426
S.D. OF X = 1.81631 S.D. OF Y = 4564.43

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .323
COEFFICIENT OF DETERMINATION = .104329

SLOPE (M) OF REGRESSION LINE = 812.369

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.9 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.9824 MEAN OF Y = 5426
S.D. OF X = 13.5293 S.D. OF Y = 4564.43

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .3
COEFFICIENT OF DETERMINATION = .09

SLOPE (M) OF REGRESSION LINE = 101.217

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 173.10

BOTTOM ASH HOPPERS - UNIT # 10

VARIABLE X: #173.10 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 60.6635

MEAN OF Y = 5841.24

S.D. OF X = 11.3157

S.D. OF Y = 4536.55

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .357

COEFFICIENT OF DETERMINATION = .127449

SLOPE (M) OF REGRESSION LINE = 143.22

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: #173.10 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.5118

MEAN OF Y = 5841.24

S.D. OF X = 1.59256

S.D. OF Y = 4536.55

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .407

COEFFICIENT OF DETERMINATION = .165649

SLOPE (M) OF REGRESSION LINE = 1159.22

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: #173.10 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.1753

MEAN OF Y = 5841.24

S.D. OF X = 12.5091

S.D. OF Y = 4536.55

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .375

COEFFICIENT OF DETERMINATION = .140625

SLOPE (M) OF REGRESSION LINE = 135.985

FAILS DECISION RULE AT 0.25 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.01

MECH. FLY ASH COLLECTORS-UNITS#1-10

VARIABLE X: # 174.01 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.036

MEAN OF Y = 42364.2

S.D. OF X = 95.638

S.D. OF Y = 34795.

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.122

COEFFICIENT OF DETERMINATION = .014884

SLOPE (M) OF REGRESSION LINE = -44.3777

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.01 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 42364.2

S.D. OF X = 9.45207

S.D. OF Y = 34795

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .121

COEFFICIENT OF DETERMINATION = .014641

SLOPE (M) OF REGRESSION LINE = 444.343

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.01 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.001

MEAN OF Y = 42364.2

S.D. OF X = 100.699

S.D. OF Y = 34795

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.105

COEFFICIENT OF DETERMINATION = .011025

SLOPE (M) OF REGRESSION LINE = -36.1142

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 174.11
MECH. FLY ASH COLLECTORS - UNIT # 1

VARIABLE X: # 174.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 59.9019 MEAN OF Y = 4811
S.D. OF X = 10.2917 S.D. OF Y = 4224.3

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.047
COEFFICIENT OF DETERMINATION = 2.209E-03

SLOPE (M) OF REGRESSION LINE = -19.4711

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 12.98 MEAN OF Y = 4811
S.D. OF X = 1.46629 S.D. OF Y = 4224.3

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .119
COEFFICIENT OF DETERMINATION = .014161

SLOPE (M) OF REGRESSION LINE = 342.474

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 72.8819 MEAN OF Y = 4811
S.D. OF X = 11.1503 S.D. OF Y = 4224.3

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.028
COEFFICIENT OF DETERMINATION = 7.84001E-04

SLOPE (M) OF REGRESSION LINE = -10.6655

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.21

MECH. FLY ASH COLLECTORS - UNIT # 2

VARIABLE X: # 174.21 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 61.6192

MEAN OF Y = 4604.77

S.D. OF X = 9.69712

S.D. OF Y = 2671.96

NUMBER OF PAIRS (N) = 13

CORRELATION COEFFICIENT (R) = -.243

COEFFICIENT OF DETERMINATION = .059049

SLOPE (M) OF REGRESSION LINE = -66.8532

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.21 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.0931

MEAN OF Y = 4604.77

S.D. OF X = 1.03404

S.D. OF Y = 2671.96

NUMBER OF PAIRS (N) = 13

CORRELATION COEFFICIENT (R) = .42

COEFFICIENT OF DETERMINATION = .1764

SLOPE (M) OF REGRESSION LINE = 1084.84

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.21 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.7123

MEAN OF Y = 4604.77

S.D. OF X = 10.1901

S.D. OF Y = 2671.96

NUMBER OF PAIRS (N) = 13

CORRELATION COEFFICIENT (R) = -.188

COEFFICIENT OF DETERMINATION = .035344

SLOPE (M) OF REGRESSION LINE = -49.3707

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.31

MECH. FLY ASH COLLECTORS - UNIT # 3

VARIABLE X: # 174.31 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 60.7188

MEAN OF Y = 4728.65

S.D. OF X = 10.8832

S.D. OF Y = 8068.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.037

COEFFICIENT OF DETERMINATION = 1.369E-03

SLOPE (M) OF REGRESSION LINE = -27.5285

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.31 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.3706

MEAN OF Y = 4728.65

S.D. OF X = 1.40186

S.D. OF Y = 8068.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .318

COEFFICIENT OF DETERMINATION = .101124

SLOPE (M) OF REGRESSION LINE = 1828.67

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.31 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.0894

MEAN OF Y = 4728.65

S.D. OF X = 11.8608

S.D. OF Y = 8068.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = 3E-03

COEFFICIENT OF DETERMINATION = 9.00001E-06

SLOPE (M) OF REGRESSION LINE = 2.36799

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.41

MECH. FLY ASH COLLECTORS - UNIT # 4

VARIABLE X: # 174.41 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 58.5944

MEAN OF Y = 3461.13

S.D. OF X = 10.0826

S.D. OF Y = 3520.73

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .045

COEFFICIENT OF DETERMINATION = 2.025E-03

SLOPE (M) OF REGRESSION LINE = 15.7776

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.41 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.0906

MEAN OF Y = 3461.13

S.D. OF X = 1.35752

S.D. OF Y = 3520.73

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .077

COEFFICIENT OF DETERMINATION = 5.929E-03

SLOPE (M) OF REGRESSION LINE = 200.664

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.41 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 71.685

MEAN OF Y = 3461.13

S.D. OF X = 10.9149

S.D. OF Y = 3520.73

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .051

COEFFICIENT OF DETERMINATION = 2.601E-03

SLOPE (M) OF REGRESSION LINE = 16.5672

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.51

MECH. FLY ASH COLLECTORS - UNIT # 5

VARIABLE X: # 174.51 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.8107

MEAN OF Y = 5541.93

S.D. OF X = 11.7071

S.D. OF Y = 6535.46

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .089

COEFFICIENT OF DETERMINATION = 7.921E-03

SLOPE (M) OF REGRESSION LINE = 49.5163

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.51 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.2943

MEAN OF Y = 5541.93

S.D. OF X = 1.37332

S.D. OF Y = 6535.46

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .315

COEFFICIENT OF DETERMINATION = .099225

SLOPE (M) OF REGRESSION LINE = 1500.26

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.51 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 73.105

MEAN OF Y = 5541.93

S.D. OF X = 12.8208

S.D. OF Y = 6535.46

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .115

COEFFICIENT OF DETERMINATION = .013225

SLOPE (M) OF REGRESSION LINE = 58.5007

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.61

MECH. FLY ASH COLLECTORS - UNIT # 6

VARIABLE X: # 174.61 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.3225 MEAN OF Y = 4768.94

S.D. OF X = 10.1926 S.D. OF Y = 5948.72

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.038

COEFFICIENT OF DETERMINATION = 1.444E-03

SLOPE (M) OF REGRESSION LINE = -22.4006

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.61 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.1669 MEAN OF Y = 4768.94

S.D. OF X = 1.01725 S.D. OF Y = 5948.72

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .079

COEFFICIENT OF DETERMINATION = 6.241E-03

SLOPE (M) OF REGRESSION LINE = 463.964

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.61 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.4894 MEAN OF Y = 4768.94

S.D. OF X = 10.8338 S.D. OF Y = 5948.72

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.029

COEFFICIENT OF DETERMINATION = 8.41001E-04

SLOPE (M) OF REGRESSION LINE = -15.7369

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT.# 174.71
MECHANICAL FLY ASH COLLECTORS - UNIT # 7

VARIABLE X: # 174.71 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 61.6182 MEAN OF Y = 5339.94
S.D. OF X = 10.525 S.D. OF Y = 6647.83

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.115
COEFFICIENT OF DETERMINATION = .013225

SLOPE (M) OF REGRESSION LINE = -72.8541

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.71 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.63 MEAN OF Y = 5339.94
S.D. OF X = 1.21484 S.D. OF Y = 6647.83

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .078
COEFFICIENT OF DETERMINATION = 6.084E-03

SLOPE (M) OF REGRESSION LINE = 424.443

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.71 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 75.2482 MEAN OF Y = 5339.94
S.D. OF X = 11.2725 S.D. OF Y = 6647.83

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.099
COEFFICIENT OF DETERMINATION = 9.801E-03

SLOPE (M) OF REGRESSION LINE = -58.5826

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.81

MECH. FLY ASH COLLECTORS - UNIT # 8

VARIABLE X: # 174.81 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 59.3594

MEAN OF Y = 4074.41

S.D. OF X = 9.07449

S.D. OF Y = 3613.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .1

COEFFICIENT OF DETERMINATION = .01

SLOPE (M) OF REGRESSION LINE = 39.7733

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.81 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.24

MEAN OF Y = 4074.41

S.D. OF X = 1.57804

S.D. OF Y = 3613.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .089

COEFFICIENT OF DETERMINATION = 7.921E-03

SLOPE (M) OF REGRESSION LINE = 203.636

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.81 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 72.5994

MEAN OF Y = 4074.41

S.D. OF X = 10.0529

S.D. OF Y = 3613.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .104

COEFFICIENT OF DETERMINATION = .010816

SLOPE (M) OF REGRESSION LINE = 37.4261

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.91

MECH. FLY ASH COLLECTORS - UNIT # 9

VARIABLE X: # 174.91 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 60.6193

MEAN OF Y = 5012.2

S.D. OF X = 11.8422

S.D. OF Y = 8125.63

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = -.176

COEFFICIENT OF DETERMINATION = .030976

SLOPE (M) OF REGRESSION LINE = -120.554

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.91 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.5573

MEAN OF Y = 5012.2

S.D. OF X = 1.77162

S.D. OF Y = 8125.63

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = -.076

COEFFICIENT OF DETERMINATION = 5.776E-03

SLOPE (M) OF REGRESSION LINE = -346.859

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.91 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.1767

MEAN OF Y = 5012.2

S.D. OF X = 13.2717

S.D. OF Y = 8125.63

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = -.167

COEFFICIENT OF DETERMINATION = .027889

SLOPE (M) OF REGRESSION LINE = -102.162

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.101

MECH. FLY ASH COLLECTORS - UNIT # 10

VARIABLE X: # 174.101 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 61.2556

MEAN OF Y = 3654.5

S.D. OF X = 11.4056

S.D. OF Y = 3287.62

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = $-5E-03$

COEFFICIENT OF DETERMINATION = $2.5E-05$

SLOPE (M) OF REGRESSION LINE = -1.38199

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.101 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.625

MEAN OF Y = 3654.5

S.D. OF X = 1.57378

S.D. OF Y = 3287.62

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .142

COEFFICIENT OF DETERMINATION = .020164

SLOPE (M) OF REGRESSION LINE = 297.183

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.101 ASH+SU(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.8806

MEAN OF Y = 3654.5

S.D. OF X = 12.5618

S.D. OF Y = 3287.62

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .013

COEFFICIENT OF DETERMINATION = $1.69E-04$

SLOPE (M) OF REGRESSION LINE = 3.52524

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.02

ELECTROSTAT. PRECIPITATORS-UNITS#1-10

VARIABLE X: # 174.02 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 665.487

MEAN OF Y = 66588.5

S.D. OF X = 69.2241

S.D. OF Y = 45981

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .579

COEFFICIENT OF DETERMINATION = .335241

SLOPE (M) OF REGRESSION LINE = 384.604

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 174.02 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 137.326

MEAN OF Y = 66588.5

S.D. OF X = 8.4868

S.D. OF Y = 45981

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .149

COEFFICIENT OF DETERMINATION = .022201

SLOPE (M) OF REGRESSION LINE = 807.552

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.02 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 802.813

MEAN OF Y = 66588.5

S.D. OF X = 69.6247

S.D. OF Y = 45981

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .594

COEFFICIENT OF DETERMINATION = .352836

SLOPE (M) OF REGRESSION LINE = 392.189

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.12

ELECTROSTATIC PRECIPITATOR - UNIT # 1

VARIABLE X: # 174.12 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 65.8711

MEAN OF Y = 7099.44

S.D. OF X = 9.93027

S.D. OF Y = 5516.22

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .416

COEFFICIENT OF DETERMINATION = .173056

SLOPE (M) OF REGRESSION LINE = 231.277

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 12.9222

MEAN OF Y = 7099.44

S.D. OF X = 1.79065

S.D. OF Y = 5516.22

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .372

COEFFICIENT OF DETERMINATION = .138384

SLOPE (M) OF REGRESSION LINE = 1145.12

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 78.7933

MEAN OF Y = 7099.44

S.D. OF X = 11.3313

S.D. OF Y = 5516.22

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .424

COEFFICIENT OF DETERMINATION = .179776

SLOPE (M) OF REGRESSION LINE = 206.22

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.22

ELECTROSTATIC PRECIPITATOR - UNIT # 2

VARIABLE X: # 174.22 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 67.2233

MEAN OF Y = 9440.78

S.D. OF X = 6.01606

S.D. OF Y = 6859.94

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .264

COEFFICIENT OF DETERMINATION = .069696

SLOPE (M) OF REGRESSION LINE = 300.969

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.22 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.1022

MEAN OF Y = 9440.78

S.D. OF X = 1.01809

S.D. OF Y = 6859.94

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .424

COEFFICIENT OF DETERMINATION = .179776

SLOPE (M) OF REGRESSION LINE = 2853.82

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.22 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 80.3256

MEAN OF Y = 9440.78

S.D. OF X = 6.59914

S.D. OF Y = 6859.94

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .306

COEFFICIENT OF DETERMINATION = .093636

SLOPE (M) OF REGRESSION LINE = 318.058

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA
ACCT. # 174.32
ELECTROSTATIC PRECIPITATOR - UNIT # 3

VARIABLE X: # 174.32 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 67.319 MEAN OF Y = 7916
S.D. OF X = 9.20151 S.D. OF Y = 9105.28

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .361
COEFFICIENT OF DETERMINATION = .130321

SLOPE (M) OF REGRESSION LINE = 357.534

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.32 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 13.77 MEAN OF Y = 7916
S.D. OF X = 1.42168 S.D. OF Y = 9105.28

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .427
COEFFICIENT OF DETERMINATION = .182329

SLOPE (M) OF REGRESSION LINE = 2735.62

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.32 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 81.089 MEAN OF Y = 7916
S.D. OF X = 10.1346 S.D. OF Y = 9105.28

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .388
COEFFICIENT OF DETERMINATION = .150544

SLOPE (M) OF REGRESSION LINE = 348.558

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.42

ELECTROSTATIC PRECIPITATOR - UNIT # 4

VARIABLE X: # 174.42 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 66.044

MEAN OF Y = 6841.9

S.D. OF X = 8.38357

S.D. OF Y = 6774.23

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .367

COEFFICIENT OF DETERMINATION = .134689

SLOPE (M) OF REGRESSION LINE = 296.439

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.42 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.496

MEAN OF Y = 6841.9

S.D. OF X = 1.02693

S.D. OF Y = 6774.23

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = -.185

COEFFICIENT OF DETERMINATION = .034225

SLOPE (M) OF REGRESSION LINE = -1221.31

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.42 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 79.54

MEAN OF Y = 6841.9

S.D. OF X = 8.7961

S.D. OF Y = 6774.23

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .328

COEFFICIENT OF DETERMINATION = .107584

SLOPE (M) OF REGRESSION LINE = 252.639

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.52

ELECTROSTATIC PRECIPITATOR - UNIT # 5

VARIABLE X: # 174.52 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 69.5689

MEAN OF Y = 6966.78

S.D. OF X = 7.43885

S.D. OF Y = 7799.38

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .248

COEFFICIENT OF DETERMINATION = .061504

SLOPE (M) OF REGRESSION LINE = 259.666

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.52 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.9633

MEAN OF Y = 6966.78

S.D. OF X = 1.31869

S.D. OF Y = 7799.38

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .212

COEFFICIENT OF DETERMINATION = .044944

SLOPE (M) OF REGRESSION LINE = 1255.6

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.52 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 83.5322

MEAN OF Y = 6966.78

S.D. OF X = 8.41235

S.D. OF Y = 7799.38

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .252

COEFFICIENT OF DETERMINATION = .063504

SLOPE (M) OF REGRESSION LINE = 233.898

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT.# 174.62

ELECTROSTATIC PRECIPITATOR - UNIT # 6

VARIABLE X: # 174.62 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 63.5911

MEAN OF Y = 7075.44

S.D. OF X = 7.49607

S.D. OF Y = 5948.74

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .74

COEFFICIENT OF DETERMINATION = .5476

SLOPE (M) OF REGRESSION LINE = 587.184

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 174.62 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.43

MEAN OF Y = 7075.44

S.D. OF X = .918841

S.D. OF Y = 5948.74

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .326

COEFFICIENT OF DETERMINATION = .106276

SLOPE (M) OF REGRESSION LINE = 2109.99

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.62 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 77.0211

MEAN OF Y = 7075.44

S.D. OF X = 7.79673

S.D. OF Y = 5948.74

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .75

COEFFICIENT OF DETERMINATION = .5625

SLOPE (M) OF REGRESSION LINE = 572.076

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

SHAWNEE PLANT OF TVA
ACCT. # 174.72
ELECTROSTATIC PRECIPITATORS - UNIT # 7

VARIABLE X: # 174.72 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 70.1556 MEAN OF Y = 7779.89
S.D. OF X = 7.21194 S.D. OF Y = 6275.49

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .157
COEFFICIENT OF DETERMINATION = .024649

SLOPE (M) OF REGRESSION LINE = 136.945

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.72 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 14.0189 MEAN OF Y = 7779.89
S.D. OF X = 1.2634 S.D. OF Y = 6275.49

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .23
COEFFICIENT OF DETERMINATION = .0529

SLOPE (M) OF REGRESSION LINE = 1143.93

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.72 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 84.1744 MEAN OF Y = 7779.89
S.D. OF X = 8.08977 S.D. OF Y = 6275.49

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .176
COEFFICIENT OF DETERMINATION = .030976

SLOPE (M) OF REGRESSION LINE = 136.737

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.82

ELECTROSTATIC PRECIPITATOR - UNIT # 8

VARIABLE X: # 174.82 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 66.1689

MEAN OF Y = 6394.44

S.D. OF X = 6.69308

S.D. OF Y = 5666.98

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .451

COEFFICIENT OF DETERMINATION = .203401

SLOPE (M) OF REGRESSION LINE = 381.658

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.82 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 13.3867

MEAN OF Y = 6394.44

S.D. OF X = 1.81239

S.D. OF Y = 5666.98

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .276

COEFFICIENT OF DETERMINATION = .076176

SLOPE (M) OF REGRESSION LINE = 861.903

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.82 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 79.5556

MEAN OF Y = 6394.44

S.D. OF X = 8.24555

S.D. OF Y = 5666.98

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .426

COEFFICIENT OF DETERMINATION = .181476

SLOPE (M) OF REGRESSION LINE = 293.112

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.92

ELECTROSTATIC PRECIPITATOR - UNIT # 9

VARIABLE X: # 174.92 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 67.383

MEAN OF Y = 5501.4

S.D. OF X = 9.76124

S.D. OF Y = 6145.29

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .298

COEFFICIENT OF DETERMINATION = .088804

SLOPE (M) OF REGRESSION LINE = 187.611

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.92 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 14.103

MEAN OF Y = 5501.4

S.D. OF X = 1.86312

S.D. OF Y = 6145.29

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .126

COEFFICIENT OF DETERMINATION = .015876

SLOPE (M) OF REGRESSION LINE = 414.294

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.92 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 81.486

MEAN OF Y = 5501.4

S.D. OF X = 11.049

S.D. OF Y = 6145.29

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .284

COEFFICIENT OF DETERMINATION = .080656

SLOPE (M) OF REGRESSION LINE = 158.206

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 174.102

ELECTROSTATIC PRECIPITATOR - UNIT # 10

VARIABLE X: # 174.102 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 67.286

MEAN OF Y = 6048.1

S.D. OF X = 10.3162

S.D. OF Y = 5111.67

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .613

COEFFICIENT OF DETERMINATION = .375769

SLOPE (M) OF REGRESSION LINE = 303.678

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 174.102 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 14.094

MEAN OF Y = 6048.1

S.D. OF X = 1.76838

S.D. OF Y = 5111.67

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .351

COEFFICIENT OF DETERMINATION = .123201

SLOPE (M) OF REGRESSION LINE = 1015.19

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.102 ASH+SU(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 81.38

MEAN OF Y = 6048.1

S.D. OF X = 11.5252

S.D. OF Y = 5111.67

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .602

COEFFICIENT OF DETERMINATION = .362404

SLOPE (M) OF REGRESSION LINE = 267.21

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

SHAWNEE PLANT OF TVA

ACCT. # 175.2

ASH CRUSHING & DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 600.037

MEAN OF Y = 294340

S.D. OF X = 95.6385

S.D. OF Y = 106516

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .755

COEFFICIENT OF DETERMINATION = .570025

SLOPE (M) OF REGRESSION LINE = 840.816

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 175.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 132.965

MEAN OF Y = 294340

S.D. OF X = 9.45207

S.D. OF Y = 106516

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .303

COEFFICIENT OF DETERMINATION = .091809

SLOPE (M) OF REGRESSION LINE = 3418.61

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 733.002

MEAN OF Y = 294340

S.D. OF X = 100.699

S.D. OF Y = 106516

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .745

COEFFICIENT OF DETERMINATION = .555025

SLOPE (M) OF REGRESSION LINE = 788.543

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

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APPENDIX B-2

WIDOWS CREEK PLANT

ANALYSES OF

MAINTENANCE COST ACCOUNTS

AS A FUNCTION OF

COAL QUALITY

WIDOWS CREEK PLANT OF TVA

ACCT. # 152.1

BRADFORD BREAKER-TYPE COAL CRUSHER

VARIABLE X: # 152.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 572.559

MEAN OF Y = 57993.3

S.D. OF X = 124.587

S.D. OF Y = 43682.3

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .659

COEFFICIENT OF DETERMINATION = .434281

SLOPE (M) OF REGRESSION LINE = 230.897

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 108.688

MEAN OF Y = 57993.3

S.D. OF X = 18.1084

S.D. OF Y = 43682.3

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .702

COEFFICIENT OF DETERMINATION = .492804

SLOPE (M) OF REGRESSION LINE = 1693.62

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 681.247

MEAN OF Y = 57993.3

S.D. OF X = 140.593

S.D. OF Y = 43682.3

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .674

COEFFICIENT OF DETERMINATION = .454276

SLOPE (M) OF REGRESSION LINE = 209.414

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 152.2
HAMMERMILL-TYPE COAL CRUSHER

VARIABLE X: # 152.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 22045.2
S.D. OF X = 167.335 S.D. OF Y = 17660.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.28
COEFFICIENT OF DETERMINATION = .0784

SLOPE (M) OF REGRESSION LINE = -29.5703

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 22045.2
S.D. OF X = 27.527 S.D. OF Y = 17660.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.296
COEFFICIENT OF DETERMINATION = .087616

SLOPE (M) OF REGRESSION LINE = -189.819

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 22045.2
S.D. OF X = 192.899 S.D. OF Y = 17660.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.285
COEFFICIENT OF DETERMINATION = .081225

SLOPE (M) OF REGRESSION LINE = -26.1173

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 153
COAL CONVEYING FACILITIES

VARIABLE X: # 153 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 188909
S.D. OF X = 167.335 S.D. OF Y = 53280.9

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .118
COEFFICIENT OF DETERMINATION = .013924

SLOPE (M) OF REGRESSION LINE = 37.5485

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 188909
S.D. OF X = 27.527 S.D. OF Y = 53280.9

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .05
COEFFICIENT OF DETERMINATION = 2.5E-03

SLOPE (M) OF REGRESSION LINE = 96.2115

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 188909
S.D. OF X = 192.899 S.D. OF Y = 53280.9

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .109
COEFFICIENT OF DETERMINATION = .011881

SLOPE (M) OF REGRESSION LINE = 30.2148

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT.# 154

COAL HANDLING POWER AND CONTROL SYSTEM

VARIABLE X: # 154 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 515.85

MEAN OF Y = 6630.18

S.D. OF X = 167.335

S.D. OF Y = 3859.35

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .054

COEFFICIENT OF DETERMINATION = 2.916E-03

SLOPE (M) OF REGRESSION LINE = 1.2483

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 99.2818

MEAN OF Y = 6630.18

S.D. OF X = 27.527

S.D. OF Y = 3859.35

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .04

COEFFICIENT OF DETERMINATION = 1.6E-03

SLOPE (M) OF REGRESSION LINE = 5.58193

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 615.132

MEAN OF Y = 6630.18

S.D. OF X = 192.899

S.D. OF Y = 3859.35

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .053

COEFFICIENT OF DETERMINATION = 2.809E-03

SLOPE (M) OF REGRESSION LINE = 1.05302

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 155
COAL BUNKERS

VARIABLE X: # 155 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 515.85 MEAN OF Y = 3885.35
S.D. OF X = 167.335 S.D. OF Y = 3549.78

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .182
COEFFICIENT OF DETERMINATION = .033124

SLOPE (M) OF REGRESSION LINE = 3.8521

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 99.2818 MEAN OF Y = 3885.35
S.D. OF X = 27.527 S.D. OF Y = 3549.78

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .281
COEFFICIENT OF DETERMINATION = .078961

SLOPE (M) OF REGRESSION LINE = 36.2474

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 615.132 MEAN OF Y = 3885.35
S.D. OF X = 192.899 S.D. OF Y = 3549.78

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .198
COEFFICIENT OF DETERMINATION = .039204

SLOPE (M) OF REGRESSION LINE = 3.63686

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 157.1

BOILERS AND ACCESSORIES - UNIT # 1

VARIABLE X: # 157.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 40.3173

MEAN OF Y = 56947.2

S.D. OF X = 18.9164

S.D. OF Y = 65837.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .353

COEFFICIENT OF DETERMINATION = .124609

SLOPE (M) OF REGRESSION LINE = 1229.2

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.32133

MEAN OF Y = 56947.2

S.D. OF X = 2.75047

S.D. OF Y = 65837.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .33

COEFFICIENT OF DETERMINATION = .1089

SLOPE (M) OF REGRESSION LINE = 7897.63

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 46.6387

MEAN OF Y = 56947.2

S.D. OF X = 21.4551

S.D. OF Y = 65837.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .354

COEFFICIENT OF DETERMINATION = .125316

SLOPE (M) OF REGRESSION LINE = 1085.3

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 157.2
BOILERS AND ACCESSORIES - UNIT # 2

VARIABLE X: # 157.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 42.1707 MEAN OF Y = 88236.3
S.D. OF X = 18.9085 S.D. OF Y = 139019

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .309
COEFFICIENT OF DETERMINATION = .095481

SLOPE (M) OF REGRESSION LINE = 2272.37

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.84867 MEAN OF Y = 88236.3
S.D. OF X = 2.68444 S.D. OF Y = 139019

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .442
COEFFICIENT OF DETERMINATION = .195364

SLOPE (M) OF REGRESSION LINE = 22881.7

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 49.0193 MEAN OF Y = 88236.3
S.D. OF X = 21.3909 S.D. OF Y = 139019

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .329
COEFFICIENT OF DETERMINATION = .108241

SLOPE (M) OF REGRESSION LINE = 2135.92

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT.# 157.3

BOILERS AND ACCESSORIES - UNIT # 3

VARIABLE X: # 157.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 39.0606

MEAN OF Y = 61920.7

S.D. OF X = 16.7492

S.D. OF Y = 72327.5

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .437

COEFFICIENT OF DETERMINATION = .190969

SLOPE (M) OF REGRESSION LINE = 1886.16

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.43875

MEAN OF Y = 61920.7

S.D. OF X = 2.40367

S.D. OF Y = 72327.5

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .487

COEFFICIENT OF DETERMINATION = .237169

SLOPE (M) OF REGRESSION LINE = 14639.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 45.4994

MEAN OF Y = 61920.7

S.D. OF X = 18.9818

S.D. OF Y = 72327.5

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .447

COEFFICIENT OF DETERMINATION = .199809

SLOPE (M) OF REGRESSION LINE = 1703.33

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT.# 157.4
BOILERS AND ACCESSORIES - UNIT # 4

VARIABLE X: # 157.4 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 36.2965 MEAN OF Y = 63993.9
S.D. OF X = 15.5827 S.D. OF Y = 74971.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .577
COEFFICIENT OF DETERMINATION = .332929

SLOPE (M) OF REGRESSION LINE = 2776.5

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 157.4 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.23706 MEAN OF Y = 63993.9
S.D. OF X = 2.4618 S.D. OF Y = 74971.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .524
COEFFICIENT OF DETERMINATION = .274576

SLOPE (M) OF REGRESSION LINE = 15950.1

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.4 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 42.5335 MEAN OF Y = 63993.9
S.D. OF X = 17.8275 S.D. OF Y = 74971.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .577
COEFFICIENT OF DETERMINATION = .332929

SLOPE (M) OF REGRESSION LINE = 2425.46

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 157.5
BOILERS AND ACCESSORIES - UNIT # 5

VARIABLE X: # 157.5 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 42.3271 MEAN OF Y = 85468.7
S.D. OF X = 11.1742 S.D. OF Y = 81129.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .608
COEFFICIENT OF DETERMINATION = .369664

SLOPE (M) OF REGRESSION LINE = .4415.95

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 157.5 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 7.46235 MEAN OF Y = 85468.7
S.D. OF X = 1.9321 S.D. OF Y = 81129.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .539
COEFFICIENT OF DETERMINATION = .290521

SLOPE (M) OF REGRESSION LINE = 22648.2

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.5 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 49.7894 MEAN OF Y = 85468.7
S.D. OF X = 12.7255 S.D. OF Y = 81129.4

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .616
COEFFICIENT OF DETERMINATION = .379456

SLOPE (M) OF REGRESSION LINE = .3926.99

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA

ACCT. # 157.6

BOILERS AND ACCESSORIES - UNIT # 6

VARIABLE X: # 157.6 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 44.7477

MEAN OF Y = 77799.4

S.D. OF X = 9.43733

S.D. OF Y = 74064.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .366

COEFFICIENT OF DETERMINATION = .133956

SLOPE (M) OF REGRESSION LINE = 2871.63

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.6 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 8.3253

MEAN OF Y = 77799.4

S.D. OF X = 1.84677

S.D. OF Y = 74064.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .298

COEFFICIENT OF DETERMINATION = .088804

SLOPE (M) OF REGRESSION LINE = 11934.2

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.6 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 53.0729

MEAN OF Y = 77799.4

S.D. OF X = 10.7154

S.D. OF Y = 74064.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .374

COEFFICIENT OF DETERMINATION = .139876

SLOPE (M) OF REGRESSION LINE = 2581.96

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 157.7

BOILERS AND ACCESSORIES - UNIT # 7

VARIABLE X: # 157.7 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 164.855

MEAN OF Y = 471514

S.D. OF X = 36.6365

S.D. OF Y = 484065

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .45

COEFFICIENT OF DETERMINATION = .2025

SLOPE (M) OF REGRESSION LINE = 5942.11

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.7 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 35.7941

MEAN OF Y = 471514

S.D. OF X = 9.42432

S.D. OF Y = 484065

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .13

COEFFICIENT OF DETERMINATION = .0169

SLOPE (M) OF REGRESSION LINE = 6661.02

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.7 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 200.649

MEAN OF Y = 471514

S.D. OF X = 44.4308

S.D. OF Y = 484065

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .398

COEFFICIENT OF DETERMINATION = .158404

SLOPE (M) OF REGRESSION LINE = 4339.87

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 157.8

BOILERS AND ACCESSORIES - UNIT # 8

VARIABLE X: # 157.8 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 142.672

MEAN OF Y = 564783

S.D. OF X = 44.8382

S.D. OF Y = 926946

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .286

COEFFICIENT OF DETERMINATION = .081796

SLOPE (M) OF REGRESSION LINE = 5914.1

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.8 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 28.2164

MEAN OF Y = 564783

S.D. OF X = 8.45374

S.D. OF Y = 926946

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .537

COEFFICIENT OF DETERMINATION = .288369

SLOPE (M) OF REGRESSION LINE = 58912.8

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 157.8 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 170.889

MEAN OF Y = 564783

S.D. OF X = 52.286

S.D. OF Y = 926946

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .332

COEFFICIENT OF DETERMINATION = .110224

SLOPE (M) OF REGRESSION LINE = 5889.29

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 158.1
SOOT BLOWERS - ALL TYPES

VARIABLE X: # 158.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 142903
S.D. OF X = 167.335 S.D. OF Y = 121853

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .785
COEFFICIENT OF DETERMINATION = .616225

SLOPE (M) OF REGRESSION LINE = 571.313

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 158.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 142903
S.D. OF X = 27.527 S.D. OF Y = 121853

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .766
COEFFICIENT OF DETERMINATION = .586756

SLOPE (M) OF REGRESSION LINE = 3390.01

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 158.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 142903
S.D. OF X = 192.899 S.D. OF Y = 121853

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .79
COEFFICIENT OF DETERMINATION = .6241

SLOPE (M) OF REGRESSION LINE = 498.951

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA

ACCT. # 158.2

SOOT BLOWERS - AIR COMPRESSOR, RECIP.

VARIABLE X: # 158.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 480.528

MEAN OF Y = 40520.5

S.D. OF X = 154.574

S.D. OF Y = 45100.9

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.274

COEFFICIENT OF DETERMINATION = .075076

SLOPE (M) OF REGRESSION LINE = -79.9066

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 94.4614

MEAN OF Y = 40520.5

S.D. OF X = 27.384

S.D. OF Y = 45100.9

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.232

COEFFICIENT OF DETERMINATION = .053824

SLOPE (M) OF REGRESSION LINE = -382.112

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 574.989

MEAN OF Y = 40520.5

S.D. OF X = 180.162

S.D. OF Y = 45100.9

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.27

COEFFICIENT OF DETERMINATION = .0729

SLOPE (M) OF REGRESSION LINE = -67.6478

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 160
COAL TRANSPORT PIPING AND VALVES

VARIABLE X: # 160 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 150680
S.D. OF X = 167.335 S.D. OF Y = 134594

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .566
COEFFICIENT OF DETERMINATION = .320356

SLOPE (M) OF REGRESSION LINE = 455.599

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 160 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 150680
S.D. OF X = 27.527 S.D. OF Y = 134594

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .639
COEFFICIENT OF DETERMINATION = .408321

SLOPE (M) OF REGRESSION LINE = 3123.1

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 160 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 150680
S.D. OF X = 192.899 S.D. OF Y = 134594

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .583
COEFFICIENT OF DETERMINATION = .339889

SLOPE (M) OF REGRESSION LINE = 406.44

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 161
BOILER ROOM COAL SCALES - VOLUMETRIC

VARIABLE X: # 161 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 515.85

MEAN OF Y = 71256

S.D. OF X = 167.335

S.D. OF Y = 56618.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .429

COEFFICIENT OF DETERMINATION = .184041

SLOPE (M) OF REGRESSION LINE = 145

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 161 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 99.2818

MEAN OF Y = 71256

S.D. OF X = 27.527

S.D. OF Y = 56618.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .479

COEFFICIENT OF DETERMINATION = .229441

SLOPE (M) OF REGRESSION LINE = 985.303

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 161 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 615.132

MEAN OF Y = 71256

S.D. OF X = 192.899

S.D. OF Y = 56618.6

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .44

COEFFICIENT OF DETERMINATION = .1936

SLOPE (M) OF REGRESSION LINE = 129.178

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 162.11
PULVERIZER MILLS - UNIT # 1

VARIABLE X: # 162.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 40.3173 MEAN OF Y = 81635.3
S.D. OF X = 18.9164 S.D. OF Y = 49040

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .524
COEFFICIENT OF DETERMINATION = .274576

SLOPE (M) OF REGRESSION LINE = 1359.14

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.32133 MEAN OF Y = 81635.3
S.D. OF X = 2.75047 S.D. OF Y = 49040

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .567
COEFFICIENT OF DETERMINATION = .321489

SLOPE (M) OF REGRESSION LINE = 10105.4

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 46.6387 MEAN OF Y = 81635.3
S.D. OF X = 21.4551 S.D. OF Y = 49040

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .535
COEFFICIENT OF DETERMINATION = .286225

SLOPE (M) OF REGRESSION LINE = 1222.6

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 162.21
PULVERIZER MILLS - UNIT # 2

VARIABLE X: # 162.21 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 42.1707 MEAN OF Y = 86494.3
S.D. OF X = 18.9085 S.D. OF Y = 51830.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .622
COEFFICIENT OF DETERMINATION = .386884

SLOPE (M) OF REGRESSION LINE = 1705.19

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.21 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.84867 MEAN OF Y = 86494.3
S.D. OF X = 2.68444 S.D. OF Y = 51830.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .627
COEFFICIENT OF DETERMINATION = .393129

SLOPE (M) OF REGRESSION LINE = 12107.9

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.21 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 49.0193 MEAN OF Y = 86494.3
S.D. OF X = 21.3909 S.D. OF Y = 51830.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .629
COEFFICIENT OF DETERMINATION = .395641

SLOPE (M) OF REGRESSION LINE = 1523.07

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 162.31
PULVERIZER MILLS - UNIT # 3

VARIABLE X: # 162.31 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 39.0606 MEAN OF Y = 79956.2
S.D. OF X = 16.7492 S.D. OF Y = 51430.6

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .712
COEFFICIENT OF DETERMINATION = .506944

SLOPE (M) OF REGRESSION LINE = 2185.11

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.31 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.43875 MEAN OF Y = 79956.2
S.D. OF X = 2.40367 S.D. OF Y = 51430.6

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .663
COEFFICIENT OF DETERMINATION = .439569

SLOPE (M) OF REGRESSION LINE = 14175.7

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.31 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 45.4994 MEAN OF Y = 79956.2
S.D. OF X = 18.9818 S.D. OF Y = 51430.6

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .712
COEFFICIENT OF DETERMINATION = .506944

SLOPE (M) OF REGRESSION LINE = 1928.64

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA

ACCT. # 162.41

PULVERIZER MILLS - UNIT # 4

VARIABLE X: # 162.41 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 36.2965

MEAN OF Y = 82406.8

S.D. OF X = 15.5827

S.D. OF Y = 47456.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .711

COEFFICIENT OF DETERMINATION = .505521

SLOPE (M) OF REGRESSION LINE = 2164.21

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.41 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.23706

MEAN OF Y = 82406.8

S.D. OF X = 2.4618

S.D. OF Y = 47456.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .694

COEFFICIENT OF DETERMINATION = .481636

SLOPE (M) OF REGRESSION LINE = 13386.7

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.41 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.5335

MEAN OF Y = 82406.8

S.D. OF X = 17.8275

S.D. OF Y = 47456.7

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .717

COEFFICIENT OF DETERMINATION = .514089

SLOPE (M) OF REGRESSION LINE = 1908.77

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 162.51
PULVERIZER MILLS - UNIT # 5

VARIABLE X: # 162.51 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 42.3271 MEAN OF Y = 103328
S.D. OF X = 11.1742 S.D. OF Y = 66764.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .549
COEFFICIENT OF DETERMINATION = .301401

SLOPE (M) OF REGRESSION LINE = 3279.48

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.51 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 7.46235 MEAN OF Y = 103328
S.D. OF X = 1.9321 S.D. OF Y = 66764.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .524
COEFFICIENT OF DETERMINATION = .274576

SLOPE (M) OF REGRESSION LINE = 18093.2

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.51 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 49.7894 MEAN OF Y = 103328
S.D. OF X = 12.7255 S.D. OF Y = 66764.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .561
COEFFICIENT OF DETERMINATION = .314721

SLOPE (M) OF REGRESSION LINE = 2945.72

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 162.61
PULVERIZER MILLS - UNIT # 6

VARIABLE X: # 162.61 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 44.7477 MEAN OF Y = 84067.8
S.D. OF X = 9.43733 S.D. OF Y = 33611.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .459
COEFFICIENT OF DETERMINATION = .210681

SLOPE (M) OF REGRESSION LINE = 1634.97

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.61 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 8.3253 MEAN OF Y = 84067.8
S.D. OF X = 1.84677 S.D. OF Y = 33611.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .034
COEFFICIENT OF DETERMINATION = 1.156E-03

SLOPE (M) OF REGRESSION LINE = 620.85

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.61 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 53.0729 MEAN OF Y = 84067.8
S.D. OF X = 10.7154 S.D. OF Y = 33611.8

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .41
COEFFICIENT OF DETERMINATION = .1681

SLOPE (M) OF REGRESSION LINE = 1286.66

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 162.71
PULVERIZER MILLS - UNIT # 7

VARIABLE X: # 162.71 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 164.855

MEAN OF Y = 197824

S.D. OF X = 36.6365

S.D. OF Y = 65807.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .16

COEFFICIENT OF DETERMINATION = .0256

SLOPE (M) OF REGRESSION LINE = 288.133

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.71 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 35.7941

MEAN OF Y = 197824

S.D. OF X = 9.42432

S.D. OF Y = 65807.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .141

COEFFICIENT OF DETERMINATION = .019881

SLOPE (M) OF REGRESSION LINE = 982.855

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.71 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 200.649

MEAN OF Y = 197824

S.D. OF X = 44.4308

S.D. OF Y = 65807.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .162

COEFFICIENT OF DETERMINATION = .026244

SLOPE (M) OF REGRESSION LINE = 240.129

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 162.81

PULVERIZER MILLS - UNIT # 8

VARIABLE X: # 162.81 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 142.672 MEAN OF Y = 229360
S.D. OF X = 44.8382 S.D. OF Y = 137248

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.027
COEFFICIENT OF DETERMINATION = 7.29E-04

SLOPE (M) OF REGRESSION LINE = -82.7839

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.81 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 28.2164 MEAN OF Y = 229360
S.D. OF X = 8.45374 S.D. OF Y = 137248

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .226
COEFFICIENT OF DETERMINATION = .051076

SLOPE (M) OF REGRESSION LINE = 3668.19

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.81 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 170.889 MEAN OF Y = 229360
S.D. OF X = 52.286 S.D. OF Y = 137248

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .013
COEFFICIENT OF DETERMINATION = 1.69E-04

SLOPE (M) OF REGRESSION LINE = 35.0119

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT.# 162.2

PRIMARY AIR FANS / MILL EXHAUSTER FANS

VARIABLE X: # 162.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 515.85

MEAN OF Y = 168284

S.D. OF X = 167.335

S.D. OF Y = 88887.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .697

COEFFICIENT OF DETERMINATION = .485809

SLOPE (M) OF REGRESSION LINE = 370.241

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 99.2818

MEAN OF Y = 168284

S.D. OF X = 27.527

S.D. OF Y = 88887.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .666

COEFFICIENT OF DETERMINATION = .443556

SLOPE (M) OF REGRESSION LINE = 2150.22

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 615.132

MEAN OF Y = 168284

S.D. OF X = 192.899

S.D. OF Y = 88887.2

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .7

COEFFICIENT OF DETERMINATION = .49

SLOPE (M) OF REGRESSION LINE = 322.395

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT.# 163.1
BURNERS AND LIGHTERS

VARIABLE X: # 163.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 213243
S.D. OF X = 167.335 S.D. OF Y = 119655

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .503
COEFFICIENT OF DETERMINATION = .253009

SLOPE (M) OF REGRESSION LINE = 359.742

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 213243
S.D. OF X = 27.527 S.D. OF Y = 119655

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .479
COEFFICIENT OF DETERMINATION = .229441

SLOPE (M) OF REGRESSION LINE = 2081.43

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 213243
S.D. OF X = 192.899 S.D. OF Y = 119655

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .505
COEFFICIENT OF DETERMINATION = .255025

SLOPE (M) OF REGRESSION LINE = 313.095

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 166
AIR PREHEATERS

VARIABLE X: # 166 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 137090
S.D. OF X = 167.335 S.D. OF Y = 133115

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .613
COEFFICIENT OF DETERMINATION = .375769

SLOPE (M) OF REGRESSION LINE = 487.3

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 166 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 137090
S.D. OF X = 27.527 S.D. OF Y = 133115

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .501
COEFFICIENT OF DETERMINATION = .251001

SLOPE (M) OF REGRESSION LINE = 2424.28

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 166 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 137090
S.D. OF X = 192.899 S.D. OF Y = 133115

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .603
COEFFICIENT OF DETERMINATION = .363609

SLOPE (M) OF REGRESSION LINE = 416.064

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

WIDOWS CREEK PLANT OF TVA
ACCT. # 168
INDUCED DRAFT FANS

VARIABLE X: # 168 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 325654
S.D. OF X = 167.335 S.D. OF Y = 478429

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .277
COEFFICIENT OF DETERMINATION = .076729

SLOPE (M) OF REGRESSION LINE = 792.576

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 168 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 325654
S.D. OF X = 27.527 S.D. OF Y = 478429

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .231
COEFFICIENT OF DETERMINATION = .053361

SLOPE (M) OF REGRESSION LINE = 4009.07

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 168 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 325654
S.D. OF X = 192.899 S.D. OF Y = 478429

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .273
COEFFICIENT OF DETERMINATION = .074529

SLOPE (M) OF REGRESSION LINE = 678.059

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT.# 169
AIR AND GAS DUCTS

VARIABLE X: # 169 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 88492.4
S.D. OF X = 167.335 S.D. OF Y = 52650.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .234
COEFFICIENT OF DETERMINATION = .054756

SLOPE (M) OF REGRESSION LINE = 73.7098

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 88492.4
S.D. OF X = 27.527 S.D. OF Y = 52650.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .196
COEFFICIENT OF DETERMINATION = .038416

SLOPE (M) OF REGRESSION LINE = 375.134

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 88492.4
S.D. OF X = 192.899 S.D. OF Y = 52650.5

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .231
COEFFICIENT OF DETERMINATION = .053361

SLOPE (M) OF REGRESSION LINE = 63.1063

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 170
SMOKESTACKS

VARIABLE X: # 170 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 18322.1
S.D. OF X = 167.335 S.D. OF Y = 25231.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .147
COEFFICIENT OF DETERMINATION = .021609

SLOPE (M) OF REGRESSION LINE = 22.1155

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 170 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 18322.1
S.D. OF X = 27.527 S.D. OF Y = 25231.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .108
COEFFICIENT OF DETERMINATION = .011664

SLOPE (M) OF REGRESSION LINE = 99.3463

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 170 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 18322.1
S.D. OF X = 192.899 S.D. OF Y = 25231.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .143
COEFFICIENT OF DETERMINATION = .020449

SLOPE (M) OF REGRESSION LINE = 18.6651

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.1
BOTTOM ASH HOPPERS - UNIT # 1

VARIABLE X: # 173.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 40.3173 MEAN OF Y = 6001.07
S.D. OF X = 18.9164 S.D. OF Y = 8310.34

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .348
COEFFICIENT OF DETERMINATION = .121104

SLOPE (M) OF REGRESSION LINE = 152.9

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.32133 MEAN OF Y = 6001.07
S.D. OF X = 2.75047 S.D. OF Y = 8310.34

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .289
COEFFICIENT OF DETERMINATION = .083521

SLOPE (M) OF REGRESSION LINE = 873.562

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 46.6387 MEAN OF Y = 6001.07
S.D. OF X = 21.4551 S.D. OF Y = 8310.34

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .344
COEFFICIENT OF DETERMINATION = .118336

SLOPE (M) OF REGRESSION LINE = 133.212

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.2
BOTTOM ASH HOPPERS - UNIT # 2

VARIABLE X: # 173.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.1707 MEAN OF Y = 12847.1
S.D. OF X = 18.9085 S.D. OF Y = 26094.3

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .078
COEFFICIENT OF DETERMINATION = 6.084E-03

SLOPE (M) OF REGRESSION LINE = 107.779

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.84867 MEAN OF Y = 12847.1
S.D. OF X = 2.68444 S.D. OF Y = 26094.3

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = -.061
COEFFICIENT OF DETERMINATION = 3.721E-03

SLOPE (M) OF REGRESSION LINE = -588.116

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 49.0193 MEAN OF Y = 12847.1
S.D. OF X = 21.3909 S.D. OF Y = 26094.3

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .061
COEFFICIENT OF DETERMINATION = 3.721E-03

SLOPE (M) OF REGRESSION LINE = 74.9524

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.3
BOTTOM ASH HOPPERS - UNIT # 3

VARIABLE X: # 173.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 39.0606 MEAN OF Y = 4621.25
S.D. OF X = 16.7492 S.D. OF Y = 4133.64

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .015
COEFFICIENT OF DETERMINATION = 2.25E-04

SLOPE (M) OF REGRESSION LINE = 3.65191

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.43875 MEAN OF Y = 4621.25
S.D. OF X = 2.40367 S.D. OF Y = 4133.64

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.106
COEFFICIENT OF DETERMINATION = .011236

SLOPE (M) OF REGRESSION LINE = -181.687

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 45.4994 MEAN OF Y = 4621.25
S.D. OF X = 18.9818 S.D. OF Y = 4133.64

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = 0
COEFFICIENT OF DETERMINATION = 0

SLOPE (M) OF REGRESSION LINE = -.0700096

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.4
BOTTOM ASH HOPPERS - UNIT # 4

VARIABLE X: # 173.4 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 36.2965 MEAN OF Y = 4243.06

S.D. OF X = 15.5827 S.D. OF Y = 3382.85

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .415

COEFFICIENT OF DETERMINATION = .172225

SLOPE (M) OF REGRESSION LINE = 89.9864

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 173.4 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.23706 MEAN OF Y = 4243.06

S.D. OF X = 2.4618 S.D. OF Y = 3382.85

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .339

COEFFICIENT OF DETERMINATION = .114921

SLOPE (M) OF REGRESSION LINE = 466.043

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.4 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.5335 MEAN OF Y = 4243.06

S.D. OF X = 17.8275 S.D. OF Y = 3382.85

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .409

COEFFICIENT OF DETERMINATION = .167281

SLOPE (M) OF REGRESSION LINE = 77.6385

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.5
BOTTOM ASH HOPPERS - UNIT # 5

VARIABLE X: # 173.5 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.3271

MEAN OF Y = 5337.71

S.D. OF X = 11.1742

S.D. OF Y = 4305.96

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .104

COEFFICIENT OF DETERMINATION = .010816

SLOPE (M) OF REGRESSION LINE = 40.1971

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.5 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 7.46235

MEAN OF Y = 5337.71

S.D. OF X = 1.9321

S.D. OF Y = 4305.96

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .014

COEFFICIENT OF DETERMINATION = 1.96E-04

SLOPE (M) OF REGRESSION LINE = 30.333

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.5 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 49.7894

MEAN OF Y = 5337.71

S.D. OF X = 12.7255

S.D. OF Y = 4305.96

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .094

COEFFICIENT OF DETERMINATION = 8.836E-03

SLOPE (M) OF REGRESSION LINE = 31.6931

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.6
BOTTOM ASH HOPPERS - UNIT # 6

VARIABLE X: # 173.6 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 44.7477 MEAN OF Y = 6619
S.D. OF X = 9.43733 S.D. OF Y = 5033.47

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.095
COEFFICIENT OF DETERMINATION = 9.025E-03

SLOPE (M) OF REGRESSION LINE = -50.6147

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.6 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 8.3253 MEAN OF Y = 6619
S.D. OF X = 1.84677 S.D. OF Y = 5033.47

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.04
COEFFICIENT OF DETERMINATION = 1.6E-03

SLOPE (M) OF REGRESSION LINE = -109.19

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.6 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 53.0729 MEAN OF Y = 6619
S.D. OF X = 10.7154 S.D. OF Y = 5033.47

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.09
COEFFICIENT OF DETERMINATION = 8.1E-03

SLOPE (M) OF REGRESSION LINE = -42.5044

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.7
BOTTOM ASH HOPPERS — UNIT # 7

VARIABLE X: # 173.7 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 164.855 MEAN OF Y = 22468.8
S.D. OF X = 36.6365 S.D. OF Y = 17634.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .123
COEFFICIENT OF DETERMINATION = .015129

SLOPE (M) OF REGRESSION LINE = 59.1489

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.7 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 35.7941 MEAN OF Y = 22468.8
S.D. OF X = 9.42432 S.D. OF Y = 17634.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .112
COEFFICIENT OF DETERMINATION = .012544

SLOPE (M) OF REGRESSION LINE = 209.115

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.7 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 200.649 MEAN OF Y = 22468.8
S.D. OF X = 44.4308 S.D. OF Y = 17634.3

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .125
COEFFICIENT OF DETERMINATION = .015625

SLOPE (M) OF REGRESSION LINE = 49.6252

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 173.8
BOTTOM ASH HOPPERS - UNIT # 8

VARIABLE X: # 173.8 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 142.672

MEAN OF Y = 44837.4

S.D. OF X = 44.8382

S.D. OF Y = 61281.3

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .209

COEFFICIENT OF DETERMINATION = .043681

SLOPE (M) OF REGRESSION LINE = 285.788

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.8 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 28.2164

MEAN OF Y = 44837.4

S.D. OF X = 8.45374

S.D. OF Y = 61281.3

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .456

COEFFICIENT OF DETERMINATION = .207936

SLOPE (M) OF REGRESSION LINE = 3309.01

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.8 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 170.889

MEAN OF Y = 44837.4

S.D. OF X = 52.286

S.D. OF Y = 61281.3

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = .253

COEFFICIENT OF DETERMINATION = .064009

SLOPE (M) OF REGRESSION LINE = 296.67

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 174.11
MECH. FLY ASH COLLECTORS - UNIT # 1

VARIABLE X: # 174.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 40.3173 MEAN OF Y = 5109.87
S.D. OF X = 18.9164 S.D. OF Y = 6015.87

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .211
COEFFICIENT OF DETERMINATION = .044521

SLOPE (M) OF REGRESSION LINE = 67.1882

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.32133 MEAN OF Y = 5109.87
S.D. OF X = 2.75047 S.D. OF Y = 6015.87

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .027
COEFFICIENT OF DETERMINATION = 7.29E-04

SLOPE (M) OF REGRESSION LINE = 59.6779

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 46.6387 MEAN OF Y = 5109.87
S.D. OF X = 21.4551 S.D. OF Y = 6015.87

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .19
COEFFICIENT OF DETERMINATION = .0361

SLOPE (M) OF REGRESSION LINE = 53.2091

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 174.21
MECH. FLY ASH COLLECTORS - UNIT # 2

VARIABLE X: # 174.21 ASH(K TONS) VARIABLE Y: MAINT-COST '78\$
MEAN OF X = 42.1707 MEAN OF Y = 3902.87
S.D. OF X = 18.9085 S.D. OF Y = 4521.78

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .129
COEFFICIENT OF DETERMINATION = .016641

SLOPE (M) OF REGRESSION LINE = 30.9313

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.21 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.84867 MEAN OF Y = 3902.87
S.D. OF X = 2.68444 S.D. OF Y = 4521.78

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .222
COEFFICIENT OF DETERMINATION = .049284

SLOPE (M) OF REGRESSION LINE = 374.718

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.21 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 49.0193 MEAN OF Y = 3902.87
S.D. OF X = 21.3909 S.D. OF Y = 4521.78

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .142
COEFFICIENT OF DETERMINATION = .020164

SLOPE (M) OF REGRESSION LINE = 30.0701

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 174.31
MECH. FLY ASH COLLECTORS - UNIT # 3

VARIABLE X: # 174.31 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 39.0606 MEAN OF Y = 4201.56
S.D. OF X = 16.7492 S.D. OF Y = 5630.08

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .019
COEFFICIENT OF DETERMINATION = 3.61E-04

SLOPE (M) OF REGRESSION LINE = 6.41003

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.31 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 6.43875 MEAN OF Y = 4201.56
S.D. OF X = 2.40367 S.D. OF Y = 5630.08

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.15
COEFFICIENT OF DETERMINATION = .0225

SLOPE (M) OF REGRESSION LINE = -350.933

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.31 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 45.4994 MEAN OF Y = 4201.56
S.D. OF X = 18.9818 S.D. OF Y = 5630.08

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -2E-03
COEFFICIENT OF DETERMINATION = 4E-06

SLOPE (M) OF REGRESSION LINE = -.636445

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 174.41

MECH. FLY ASH COLLECTORS - UNIT # 4

VARIABLE X: # 174.41 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 35.4388

MEAN OF Y = 4294.06

S.D. OF X = 15.6681

S.D. OF Y = 5339.65

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .2

COEFFICIENT OF DETERMINATION = .04

SLOPE (M) OF REGRESSION LINE = 68.055

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.41 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 6.01875

MEAN OF Y = 4294.06

S.D. OF X = 2.37255

S.D. OF Y = 5339.65

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .181

COEFFICIENT OF DETERMINATION = .032761

SLOPE (M) OF REGRESSION LINE = 407.846

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.41 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 41.4575

MEAN OF Y = 4294.06

S.D. OF X = 17.8326

S.D. OF Y = 5339.65

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = .2

COEFFICIENT OF DETERMINATION = .04

SLOPE (M) OF REGRESSION LINE = 59.7568

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 174.51

MECH: FLY ASH COLLECTORS - UNIT # 5

VARIABLE X: # 174.51 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 42.3271

MEAN OF Y = 4654.71

S.D. OF X = 11.1742

S.D. OF Y = 4590.07

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .032

COEFFICIENT OF DETERMINATION = 1.024E-03

SLOPE (M) OF REGRESSION LINE = 13.232

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.51 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 7.46235

MEAN OF Y = 4654.71

S.D. OF X = 1.9321

S.D. OF Y = 4590.07

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.102

COEFFICIENT OF DETERMINATION = .010404

SLOPE (M) OF REGRESSION LINE = -242.037

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.51 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 49.7894

MEAN OF Y = 4654.71

S.D. OF X = 12.7255

S.D. OF Y = 4590.07

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .013

COEFFICIENT OF DETERMINATION = 1.69E-04

SLOPE (M) OF REGRESSION LINE = 4.62312

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT. # 174.61

MECH. FLY ASH COLLECTORS - UNIT # 6

VARIABLE X: # 174.61 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 44.4438 MEAN OF Y = 4768.88

S.D. OF X = 9.64674 S.D. OF Y = 5948.52

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.118

COEFFICIENT OF DETERMINATION = .013924

SLOPE (M) OF REGRESSION LINE = -72.855

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.61 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 8.3 MEAN OF Y = 4768.88

S.D. OF X = 1.90075 S.D. OF Y = 5948.52

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.237

COEFFICIENT OF DETERMINATION = .056169

SLOPE (M) OF REGRESSION LINE = -740.888

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.61 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 52.7438 MEAN OF Y = 4768.88

S.D. OF X = 10.9614 S.D. OF Y = 5948.52

NUMBER OF PAIRS (N) = 16

CORRELATION COEFFICIENT (R) = -.145

COEFFICIENT OF DETERMINATION = .021025

SLOPE (M) OF REGRESSION LINE = -78.7046

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA

ACCT.# 174.72

ELECTROSTATIC PRECIPITATOR - UNIT # 7

VARIABLE X: # 174.72 ASH(K TONS) VARIABLE Y: MAINT. COST '78\$

MEAN OF X = 164.855

MEAN OF Y = 43168.7

S.D. OF X = 36.6365

S.D. OF Y = 41771.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.1

COEFFICIENT OF DETERMINATION = .01

SLOPE (M) OF REGRESSION LINE = -114.558

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.72 SULFUR(K TONS) VARIABLE Y: MAINT. COST '78\$

MEAN OF X = 35.7941

MEAN OF Y = 43168.7

S.D. OF X = 9.42432

S.D. OF Y = 41771.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.193

COEFFICIENT OF DETERMINATION = .037249

SLOPE (M) OF REGRESSION LINE = -853.359

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.72 ASH+SUL(K TONS) VARIABLE Y: MAINT. COST '78\$

MEAN OF X = 200.649

MEAN OF Y = 43168.7

S.D. OF X = 44.4308

S.D. OF Y = 41771.1

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = -.124

COEFFICIENT OF DETERMINATION = .015376

SLOPE (M) OF REGRESSION LINE = -116.285

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 174.82
ELECTROSTATIC PRECIPITATOR - UNIT # 8

VARIABLE X: # 174.82 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 142.672 MEAN OF Y = 57284.3

S.D. OF X = 44.8382 S.D. OF Y = 74769.6

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.03

COEFFICIENT OF DETERMINATION = 9E-04

SLOPE (M) OF REGRESSION LINE = -50.4387

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.82 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 28.2164 MEAN OF Y = 57284.3

S.D. OF X = 8.45374 S.D. OF Y = 74769.6

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.111

COEFFICIENT OF DETERMINATION = .012321

SLOPE (M) OF REGRESSION LINE = -982.13

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.82 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 170.889 MEAN OF Y = 57284.3

S.D. OF X = 52.286 S.D. OF Y = 74769.6

NUMBER OF PAIRS (N) = 14

CORRELATION COEFFICIENT (R) = -.044

COEFFICIENT OF DETERMINATION = 1.936E-03

SLOPE (M) OF REGRESSION LINE = -62.7668

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

WIDOWS CREEK PLANT OF TVA
ACCT. # 175.2
ASH CRUSHING & DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 515.85 MEAN OF Y = 536257
S.D. OF X = 167.335 S.D. OF Y = 285453

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .745
COEFFICIENT OF DETERMINATION = .555025

SLOPE (M) OF REGRESSION LINE = .1270.58

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 175.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 99.2818 MEAN OF Y = 536257
S.D. OF X = 27.527 S.D. OF Y = 285453

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .773
COEFFICIENT OF DETERMINATION = .597529

SLOPE (M) OF REGRESSION LINE = 8016.09

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 175.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 615.132 MEAN OF Y = 536257
S.D. OF X = 192.899 S.D. OF Y = 285453

NUMBER OF PAIRS (N) = 17

CORRELATION COEFFICIENT (R) = .756
COEFFICIENT OF DETERMINATION = .571536

SLOPE (M) OF REGRESSION LINE = 1119.36

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

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APPENDIX B-3

PARADISE PLANT

**ANALYSES OF
MAINTENANCE COST ACCOUNTS
AS A FUNCTION OF
COAL QUALITY**

PARADISE PLANT OF TVA

ACCT.# 152.1

BRADFORD BREAKER-TYPE COAL CRUSHER

VARIABLE X: # 152.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 807.497

MEAN OF Y = 132132

S.D. OF X = 326.477

S.D. OF Y = 92423.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .661

COEFFICIENT OF DETERMINATION = .436921

SLOPE (M) OF REGRESSION LINE = 187.058

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 132132

S.D. OF X = 60.2534

S.D. OF Y = 92423.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .651

COEFFICIENT OF DETERMINATION = .423801

SLOPE (M) OF REGRESSION LINE = 998.409

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1000.21

MEAN OF Y = 132132

S.D. OF X = 385.99

S.D. OF Y = 92423.7

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .66

COEFFICIENT OF DETERMINATION = .4356

SLOPE (M) OF REGRESSION LINE = 158.151

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA

ACCT.# 152.31

COAL CONDITIONERS—NUMBERS 1 AND 2

VARIABLE X: # 152.31 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 807.497

MEAN OF Y = 255432

S.D. OF X = 326.477

S.D. OF Y = 90868.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .809

COEFFICIENT OF DETERMINATION = .654481

SLOPE (M) OF REGRESSION LINE = 225.078

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.31 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 255432

S.D. OF X = 60.2534

S.D. OF Y = 90868.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .768

COEFFICIENT OF DETERMINATION = .589824

SLOPE (M) OF REGRESSION LINE = 1158.58

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.31 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1000.21

MEAN OF Y = 255432

S.D. OF X = 385.99

S.D. OF Y = 90868.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .804

COEFFICIENT OF DETERMINATION = .646416

SLOPE (M) OF REGRESSION LINE = 189.254

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA

ACCT.# 152.32

COAL CONDITIONERS-NUMBERS 3 AND 4

VARIABLE X: # 152.32 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 807.497

MEAN OF Y = 225830

S.D. OF X = 326.477

S.D. OF Y = 80073.1

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .8

COEFFICIENT OF DETERMINATION = .64

SLOPE (M) OF REGRESSION LINE = 196.132

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.32 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 225830

S.D. OF X = 60.2534

S.D. OF Y = 80073.1

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .773

COEFFICIENT OF DETERMINATION = .597529

SLOPE (M) OF REGRESSION LINE = 1027.3

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 152.32 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1000.21

MEAN OF Y = 225830

S.D. OF X = 385.99

S.D. OF Y = 80073.1

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .797

COEFFICIENT OF DETERMINATION = .635209

SLOPE (M) OF REGRESSION LINE = 165.347

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA
ACCT.# 153
COAL CONVEYING FACILITIES

VARIABLE X: # 153 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 444781
S.D. OF X = 326.477 S.D. OF Y = 264123

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .666
COEFFICIENT OF DETERMINATION = .443556

SLOPE (M) OF REGRESSION LINE = 538.654

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 153 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 444781
S.D. OF X = 60.2534 S.D. OF Y = 264123

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .661
COEFFICIENT OF DETERMINATION = .436921

SLOPE (M) OF REGRESSION LINE = 2897.76

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 153 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 444781
S.D. OF X = 385.99 S.D. OF Y = 264123

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .666
COEFFICIENT OF DETERMINATION = .443556

SLOPE (M) OF REGRESSION LINE = 455.969

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA

ACCT.# 154

COAL HANDLING POWER AND CONTROL SYSTEM

VARIABLE X: # 154 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 807.497

MEAN OF Y = 14563.7

S.D. OF X = 326.477

S.D. OF Y = 9655.69

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .224

COEFFICIENT OF DETERMINATION = .050176

SLOPE (M) OF REGRESSION LINE = 6.62361

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 14563.7

S.D. OF X = 60.2534

S.D. OF Y = 9655.69

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .226

COEFFICIENT OF DETERMINATION = .051076

SLOPE (M) OF REGRESSION LINE = 36.2748

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1000.21

MEAN OF Y = 14563.7

S.D. OF X = 385.99

S.D. OF Y = 9655.69

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .225

COEFFICIENT OF DETERMINATION = .050625

SLOPE (M) OF REGRESSION LINE = 5.62251

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 155
COAL BUNKERS

VARIABLE X: # 155 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 16626.3
S.D. OF X = 326.477 S.D. OF Y = 17698.8

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .371
COEFFICIENT OF DETERMINATION = .137641

SLOPE (M) OF REGRESSION LINE = 20.1323

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 16626.3
S.D. OF X = 60.2534 S.D. OF Y = 17698.8

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .365
COEFFICIENT OF DETERMINATION = .133225

SLOPE (M) OF REGRESSION LINE = 107.172

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 16626.3
S.D. OF X = 385.99 S.D. OF Y = 17698.8

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .371
COEFFICIENT OF DETERMINATION = .137641

SLOPE (M) OF REGRESSION LINE = 17.0143

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 157.1
BOILERS AND ACCESSORIES - UNIT # 1

VARIABLE X: # 157.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 279.647 MEAN OF Y = 422054
S.D. OF X = 80.8789 S.D. OF Y = 436364

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = $6E-03$
COEFFICIENT OF DETERMINATION = $3.6E-05$

SLOPE (M) OF REGRESSION LINE = 35.0021

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 68.5173 MEAN OF Y = 422054
S.D. OF X = 17.0119 S.D. OF Y = 436364

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = $-.139$
COEFFICIENT OF DETERMINATION = $.019321$

SLOPE (M) OF REGRESSION LINE = -3572.31

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 348.164 MEAN OF Y = 422054
S.D. OF X = 96.2202 S.D. OF Y = 436364

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = $-.019$
COEFFICIENT OF DETERMINATION = $3.61E-04$

SLOPE (M) OF REGRESSION LINE = -86.9359

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 157.2

BOILERS AND ACCESSORIES - UNIT # 2

VARIABLE X: # 157.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 289.3

MEAN OF Y = 481402

S.D. OF X = 79.4921

S.D. OF Y = 370133

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .202

COEFFICIENT OF DETERMINATION = .040804

SLOPE (M) OF REGRESSION LINE = 939.669

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 70.36

MEAN OF Y = 481402

S.D. OF X = 13.6465

S.D. OF Y = 370133

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .053

COEFFICIENT OF DETERMINATION = 2.809E-03

SLOPE (M) OF REGRESSION LINE = 1446.93

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 359.66

MEAN OF Y = 481402

S.D. OF X = 91.9661

S.D. OF Y = 370133

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .182

COEFFICIENT OF DETERMINATION = .033124

SLOPE (M) OF REGRESSION LINE = 733.909

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 157.3
BOILERS AND ACCESSORIES - UNIT # 3

VARIABLE X: # 157.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 397.237 MEAN OF Y = 547948
S.D. OF X = 126.37 S.D. OF Y = 346386

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.11
COEFFICIENT OF DETERMINATION = .0121

SLOPE (M) OF REGRESSION LINE = -300.536

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 89.4578 MEAN OF Y = 547948
S.D. OF X = 27.1463 S.D. OF Y = 346386

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.026
COEFFICIENT OF DETERMINATION = 6.76E-04

SLOPE (M) OF REGRESSION LINE = -331.016

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 486.695 MEAN OF Y = 547948
S.D. OF X = 153.349 S.D. OF Y = 346386

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.095
COEFFICIENT OF DETERMINATION = 9.025E-03

SLOPE (M) OF REGRESSION LINE = -214.465

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 158.1
SOOT BLOWERS - ALL TYPES

VARIABLE X: # 158.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1032.42 MEAN OF Y = 282799
S.D. OF X = 178.366 S.D. OF Y = 85719.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.502
COEFFICIENT OF DETERMINATION = .252004

SLOPE (M) OF REGRESSION LINE = -241.202

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 232.323 MEAN OF Y = 282799
S.D. OF X = 33.6559 S.D. OF Y = 85719.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.457
COEFFICIENT OF DETERMINATION = .208849

SLOPE (M) OF REGRESSION LINE = -1164.23

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1264.75 MEAN OF Y = 282799
S.D. OF X = 211.543 S.D. OF Y = 85719.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.496
COEFFICIENT OF DETERMINATION = .246016

SLOPE (M) OF REGRESSION LINE = -200.946

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 158.2

SOOT BLOWERS - AIR COMPRESSORS - RECIPRO.

VARIABLE X: # 158.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 785.195

MEAN OF Y = 150402

S.D. OF X = 340.185

S.D. OF Y = 60730.1

NUMBER OF PAIRS (N) = 13

CORRELATION COEFFICIENT (R) = .201

COEFFICIENT OF DETERMINATION = .040401

SLOPE (M) OF REGRESSION LINE = 35.9063

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 189.261

MEAN OF Y = 150402

S.D. OF X = 63.0961

S.D. OF Y = 60730.1

NUMBER OF PAIRS (N) = 13

CORRELATION COEFFICIENT (R) = .246

COEFFICIENT OF DETERMINATION = .060516

SLOPE (M) OF REGRESSION LINE = 236.841

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 974.455

MEAN OF Y = 150402

S.D. OF X = 402.484

S.D. OF Y = 60730.1

NUMBER OF PAIRS (N) = 13

CORRELATION COEFFICIENT (R) = .209

COEFFICIENT OF DETERMINATION = .043681

SLOPE (M) OF REGRESSION LINE = 31.4715

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 158.3

SOOT BLOWERS - AIR COMPRESSORS - CENTRIFU.

VARIABLE X: # 158.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1055.27 MEAN OF Y = 82397.7
S.D. OF X = 178.89 S.D. OF Y = 64514.1

NUMBER OF PAIRS (N) = 7

CORRELATION COEFFICIENT (R) = -.754
COEFFICIENT OF DETERMINATION = .568516

SLOPE (M) OF REGRESSION LINE = -271.879

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 237.237 MEAN OF Y = 82397.7
S.D. OF X = 33.575 S.D. OF Y = 64514.1

NUMBER OF PAIRS (N) = 7

CORRELATION COEFFICIENT (R) = -.752
COEFFICIENT OF DETERMINATION = .565504

SLOPE (M) OF REGRESSION LINE = -1444.14

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1292.51 MEAN OF Y = 82397.7
S.D. OF X = 211.873 S.D. OF Y = 64514.1

NUMBER OF PAIRS (N) = 7

CORRELATION COEFFICIENT (R) = -.756
COEFFICIENT OF DETERMINATION = .571536

SLOPE (M) OF REGRESSION LINE = -230.085

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 160
COAL TRANSPORT PIPING AND VALVES

VARIABLE X: # 160 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 927.278 MEAN OF Y = 83467.8
S.D. OF X = 240.791 S.D. OF Y = 51655.9

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .11
COEFFICIENT OF DETERMINATION = .0121

SLOPE (M) OF REGRESSION LINE = 23.6743

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 160 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 213.741 MEAN OF Y = 83467.8
S.D. OF X = 43.7828 S.D. OF Y = 51655.9

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .171
COEFFICIENT OF DETERMINATION = .029241

SLOPE (M) OF REGRESSION LINE = 202.152

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 160 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1141.02 MEAN OF Y = 83467.8
S.D. OF X = 284.212 S.D. OF Y = 51655.9

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .12
COEFFICIENT OF DETERMINATION = .0144

SLOPE (M) OF REGRESSION LINE = 21.7904

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 161

BOILER ROOM COAL SCALES - VOLUMETRIC FEED.

VARIABLE X: # 161 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 807.497

MEAN OF Y = 204816

S.D. OF X = 326.477

S.D. OF Y = 141449

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .591

COEFFICIENT OF DETERMINATION = .349281

SLOPE (M) OF REGRESSION LINE = 255.982

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 161 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 192.709

MEAN OF Y = 204816

S.D. OF X = 60.2534

S.D. OF Y = 141449

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .58

COEFFICIENT OF DETERMINATION = .3364

SLOPE (M) OF REGRESSION LINE = 1360.95

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 161 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1000.21

MEAN OF Y = 204816

S.D. OF X = 385.99

S.D. OF Y = 141449

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .59

COEFFICIENT OF DETERMINATION = .3481

SLOPE (M) OF REGRESSION LINE = 216.294

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 163.1
BURNERS AND LIGHTERS

VARIABLE X: # 163.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 36304.5
S.D. OF X = 326.477 S.D. OF Y = 24946.9

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .583
COEFFICIENT OF DETERMINATION = .339889

SLOPE (M) OF REGRESSION LINE = 44.5694

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 36304.5
S.D. OF X = 60.2534 S.D. OF Y = 24946.9

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .584
COEFFICIENT OF DETERMINATION = .341056

SLOPE (M) OF REGRESSION LINE = 241.714

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 36304.5
S.D. OF X = 385.99 S.D. OF Y = 24946.9

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .584
COEFFICIENT OF DETERMINATION = .341056

SLOPE (M) OF REGRESSION LINE = 37.7752

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 163.2
CYCLONES

VARIABLE X: # 163.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 1.05875E+06
S.D. OF X = 326.477 S.D. OF Y = 640195

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .719
COEFFICIENT OF DETERMINATION = .516961

SLOPE (M) OF REGRESSION LINE = 1409.23

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 163.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 1.05875E+06
S.D. OF X = 60.2534 S.D. OF Y = 640195

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .702
COEFFICIENT OF DETERMINATION = .492804

SLOPE (M) OF REGRESSION LINE = 7462.17

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 163.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 1.05875E+06
S.D. OF X = 385.99 S.D. OF Y = 640195

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .717
COEFFICIENT OF DETERMINATION = .514089

SLOPE (M) OF REGRESSION LINE = 1190.01

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA
ACCT.# 165
GAS RECIRCULATING FANS

VARIABLE X: #165 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 178073
S.D. OF X = 326.477 S.D. OF Y = 93237.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .828
COEFFICIENT OF DETERMINATION = .685584

SLOPE (M) OF REGRESSION LINE = 236.576

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 165 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 178073
S.D. OF X = 60.2534 S.D. OF Y = 93237.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .837
COEFFICIENT OF DETERMINATION = .700569

SLOPE (M) OF REGRESSION LINE = 1295.06

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 165 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 178073
S.D. OF X = 385.99 S.D. OF Y = 93237.5

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .831
COEFFICIENT OF DETERMINATION = .690561

SLOPE (M) OF REGRESSION LINE = 200.806

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA
ACCT.# 166
AIR PREHEATERS

VARIABLE X: # 166 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 470.107 MEAN OF Y = 122639
S.D. OF X = 170.37 S.D. OF Y = 37548.6

NUMBER OF PAIRS (N) = 6

CORRELATION COEFFICIENT (R) = -.452
COEFFICIENT OF DETERMINATION = .204304

SLOPE (M) OF REGRESSION LINE = -99.6935

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 133.288 MEAN OF Y = 122639
S.D. OF X = 38.6308 S.D. OF Y = 37548.6

NUMBER OF PAIRS (N) = 6

CORRELATION COEFFICIENT (R) = -.539
COEFFICIENT OF DETERMINATION = .290521

SLOPE (M) OF REGRESSION LINE = -524.039

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 603.395 MEAN OF Y = 122639
S.D. OF X = 207.152 S.D. OF Y = 37548.6

NUMBER OF PAIRS (N) = 6

CORRELATION COEFFICIENT (R) = -.473
COEFFICIENT OF DETERMINATION = .223729

SLOPE (M) OF REGRESSION LINE = -85.6571

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 166.1

AIR PREHEATERS - EXCEPT SHOT CLEANING SYS.

VARIABLE X: # 166.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1055.27

MEAN OF Y = 904584

S.D. OF X = 178.89

S.D. OF Y = 883407

NUMBER OF PAIRS (N) = 7

CORRELATION COEFFICIENT (R) = -.022

COEFFICIENT OF DETERMINATION = 4.84E-04

SLOPE (M) OF REGRESSION LINE = -111.107

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 237.237

MEAN OF Y = 904584

S.D. OF X = 33.575

S.D. OF Y = 883407

NUMBER OF PAIRS (N) = 7

CORRELATION COEFFICIENT (R) = -.126

COEFFICIENT OF DETERMINATION = .015876

SLOPE (M) OF REGRESSION LINE = -3316.08

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1292.51

MEAN OF Y = 904584

S.D. OF X = 211.873

S.D. OF Y = 883407

NUMBER OF PAIRS (N) = 7

CORRELATION COEFFICIENT (R) = -.039

COEFFICIENT OF DETERMINATION = 1.521E-03

SLOPE (M) OF REGRESSION LINE = -162.48

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 169
AIR AND GAS DUCTS

VARIABLE X: # 169 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 592363
S.D. OF X = 326.477 S.D. OF Y = 494948

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .555
COEFFICIENT OF DETERMINATION = .308025

SLOPE (M) OF REGRESSION LINE = 841.333

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 169 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 592363
S.D. OF X = 60.2534 S.D. OF Y = 494948

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .57
COEFFICIENT OF DETERMINATION = .3249

SLOPE (M) OF REGRESSION LINE = 4685.12

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 169 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 592363
S.D. OF X = 385.99 S.D. OF Y = 494948

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .558
COEFFICIENT OF DETERMINATION = .311364

SLOPE (M) OF REGRESSION LINE = 716.061

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA
ACCT.# 170
SMOKESTACKS

VARIABLE X: # 170 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 81587.2
S.D. OF X = 326.477 S.D. OF Y = 111766

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .475
COEFFICIENT OF DETERMINATION = .225625

SLOPE (M) OF REGRESSION LINE = 162.483

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 170 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 81587.2
S.D. OF X = 60.2534 S.D. OF Y = 111766

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .446
COEFFICIENT OF DETERMINATION = .198916

SLOPE (M) OF REGRESSION LINE = 826.554

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 170 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 81587.2
S.D. OF X = 385.99 S.D. OF Y = 111766

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .471
COEFFICIENT OF DETERMINATION = .221841

SLOPE (M) OF REGRESSION LINE = 136.383

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 173.1

BOTTOM ASH HOPPERS - UNIT # 1

VARIABLE X: # 173.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 279.647

MEAN OF Y = 68511.5

S.D. OF X = 80.8789

S.D. OF Y = 29970

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .831

COEFFICIENT OF DETERMINATION = .690561

SLOPE (M) OF REGRESSION LINE = 307.973

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 173.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 66.5173

MEAN OF Y = 68511.5

S.D. OF X = 17.0119

S.D. OF Y = 29970

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .712

COEFFICIENT OF DETERMINATION = .506944

SLOPE (M) OF REGRESSION LINE = 1254.89

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 173.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 348.164

MEAN OF Y = 68511.5

S.D. OF X = 96.2202

S.D. OF Y = 29970

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .825

COEFFICIENT OF DETERMINATION = .680625

SLOPE (M) OF REGRESSION LINE = 256.823

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA

ACCT.# 173.2

BOTTOM ASH HOPPERS - UNIT #2

VARIABLE X: # 173.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 289.3 MEAN OF Y = 74588.3
S.D. OF X = 79.4921 S.D. OF Y = 33783.2

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .688
COEFFICIENT OF DETERMINATION = .473344

SLOPE (M) OF REGRESSION LINE = 292.262

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 173.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 70.36 MEAN OF Y = 74588.3
S.D. OF X = 13.6465 S.D. OF Y = 33783.2

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .672
COEFFICIENT OF DETERMINATION = .451584

SLOPE (M) OF REGRESSION LINE = 1662.7

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 173.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 359.66 MEAN OF Y = 74588.3
S.D. OF X = 91.9661 S.D. OF Y = 33783.2

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .694
COEFFICIENT OF DETERMINATION = .481636

SLOPE (M) OF REGRESSION LINE = 254.966

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA

ACCT.# 173.3

BOTTOM ASH HOPPERS - UNIT # 3

VARIABLE X: # 173.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 397.237

MEAN OF Y = 98524.3

S.D. OF X = 126.37

S.D. OF Y = 16003.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .076

COEFFICIENT OF DETERMINATION = 5.776E-03

SLOPE (M) OF REGRESSION LINE = 9.65802

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 89.4578

MEAN OF Y = 98524.3

S.D. OF X = 27.1463

S.D. OF Y = 16003.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .065

COEFFICIENT OF DETERMINATION = 4.225E-03

SLOPE (M) OF REGRESSION LINE = 38.4577

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 486.695

MEAN OF Y = 98524.3

S.D. OF X = 153.349

S.D. OF Y = 16003.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .074

COEFFICIENT OF DETERMINATION = 5.476E-03

SLOPE (M) OF REGRESSION LINE = 7.76386

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 174.12

ELECTROSTATIC PRECIPITATORS - UNIT # 1

VARIABLE X: # 174.12 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 310.836

MEAN OF Y = 67537.6

S.D. OF X = 51.6893

S.D. OF Y = 55738.1

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = -.289

COEFFICIENT OF DETERMINATION = .083521

SLOPE (M) OF REGRESSION LINE = -311.868

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 71.4055

MEAN OF Y = 67537.6

S.D. OF X = 11.5961

S.D. OF Y = 55738.1

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = -.315

COEFFICIENT OF DETERMINATION = .099225

SLOPE (M) OF REGRESSION LINE = -1511.81

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 382.242

MEAN OF Y = 67537.6

S.D. OF X = 62.6637

S.D. OF Y = 55738.1

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = -.297

COEFFICIENT OF DETERMINATION = .0882091

SLOPE (M) OF REGRESSION LINE = -263.969

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 174.22

ELECTROSTATIC PRECIPITATORS - UNIT # 2

VARIABLE X: # 174.22 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 326.467

MEAN OF Y = 83001

S.D. OF X = 48.8732

S.D. OF Y = 73395.5

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = .013

COEFFICIENT OF DETERMINATION = 1.69E-04

SLOPE (M) OF REGRESSION LINE = 18.868

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.22 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 74.6764

MEAN OF Y = 83001

S.D. OF X = 10.2611

S.D. OF Y = 73395.5

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = 6E-03

COEFFICIENT OF DETERMINATION = 3.6E-05

SLOPE (M) OF REGRESSION LINE = 41.22

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.22 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 401.144

MEAN OF Y = 83001

S.D. OF X = 58.4524

S.D. OF Y = 73395.5

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = .012

COEFFICIENT OF DETERMINATION = 1.44E-04

SLOPE (M) OF REGRESSION LINE = 14.4609

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 174.32

ELECTROSTATIC PRECIPITATORS - UNIT # 3

VARIABLE X: \$ 174.32 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 397.237

MEAN OF Y = 113376

S.D. OF X = 126.37

S.D. OF Y = 69419.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .218

COEFFICIENT OF DETERMINATION = .047524

SLOPE (M) OF REGRESSION LINE = 120.012

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: \$ 174.32 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 89.4578

MEAN OF Y = 113376

S.D. OF X = 27.1463

S.D. OF Y = 69419.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .239

COEFFICIENT OF DETERMINATION = .057121

SLOPE (M) OF REGRESSION LINE = 612.446

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: \$ 174.32 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 486.695

MEAN OF Y = 113376

S.D. OF X = 153.349

S.D. OF Y = 69419.1

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .222

COEFFICIENT OF DETERMINATION = .049284

SLOPE (M) OF REGRESSION LINE = 100.692

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

PARADISE PLANT OF TVA

ACCT.# 175.2

ASH CRUSHING AND DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 807.497 MEAN OF Y = 1.15282E+06
S.D. OF X = 326.477 S.D. OF Y = 539434

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .872
COEFFICIENT OF DETERMINATION = .760384

SLOPE (M) OF REGRESSION LINE = 1440.59

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 175.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 192.709 MEAN OF Y = 1.15282E+06
S.D. OF X = 60.2534 S.D. OF Y = 539434

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .846
COEFFICIENT OF DETERMINATION = .715716

SLOPE (M) OF REGRESSION LINE = 7571.58

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 175.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 1000.21 MEAN OF Y = 1.15282E+06
S.D. OF X = 385.99 S.D. OF Y = 539434

NUMBER OF PAIRS (N) = 15

CORRELATION COEFFICIENT (R) = .869
COEFFICIENT OF DETERMINATION = .755161

SLOPE (M) OF REGRESSION LINE = 1215.11

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

PARADISE PLANT OF TVA
ACCT.# 175.7
ASH HANDLING CONVEYOR SYSTEM

VARIABLE X: # 175.7 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1032.42

MEAN OF Y = 127221

S.D. OF X = 178.366

S.D. OF Y = 50032.3

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .34

COEFFICIENT OF DETERMINATION = .1156

SLOPE (M) OF REGRESSION LINE = 95.2717

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.7 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 232.323

MEAN OF Y = 127221

S.D. OF X = 33.6559

S.D. OF Y = 50032.3

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .362

COEFFICIENT OF DETERMINATION = .131044

SLOPE (M) OF REGRESSION LINE = 537.975

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.7 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 1264.75

MEAN OF Y = 127221

S.D. OF X = 211.543

S.D. OF Y = 50032.3

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .344

COEFFICIENT OF DETERMINATION = .118336

SLOPE (M) OF REGRESSION LINE = 81.3484

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

APPENDIX B-4

BULL RUN PLANT

ANALYSES OF

MAINTENANCE COST ACCOUNTS

AS A FUNCTION OF

COAL QUALITY

BULL RUN PLANT OF TVA

ACCT. # 152.1

BRADFORD BREAKER-TYPE COAL CRUSHER

VARIABLE X: # 152.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 18550.5

S.D. OF X = 78.2003

S.D. OF Y = 8636.33

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.101

COEFFICIENT OF DETERMINATION = .010201

SLOPE (M) OF REGRESSION LINE = -11.183

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042

MEAN OF Y = 18550.5

S.D. OF X = 12.0578

S.D. OF Y = 8636.33

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.018

COEFFICIENT OF DETERMINATION = 3.24E-04

SLOPE (M) OF REGRESSION LINE = -12.7838

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243

MEAN OF Y = 18550.5

S.D. OF X = 78.7263

S.D. OF Y = 8636.33

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.103

COEFFICIENT OF DETERMINATION = .010609

SLOPE (M) OF REGRESSION LINE = -11.3339

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 153
COAL CONVEYING FACILITIES

VARIABLE X: # 153 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 95896.8

S.D. OF X = 78.2003

S.D. OF Y = 60044.1

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .038

COEFFICIENT OF DETERMINATION = 1.444E-03

SLOPE (M) OF REGRESSION LINE = 28.9659

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042

MEAN OF Y = 95896.8

S.D. OF X = 12.0578

S.D. OF Y = 60044.1

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .502

COEFFICIENT OF DETERMINATION = .252004

SLOPE (M) OF REGRESSION LINE = 2501.93

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 153 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243

MEAN OF Y = 95896.8

S.D. OF X = 78.7263

S.D. OF Y = 60044.1

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .114

COEFFICIENT OF DETERMINATION = .012996

SLOPE (M) OF REGRESSION LINE = 87.2711

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA

ACCT. # 154

COAL HANDLING POWER AND CONTROL SYSTEM

VARIABLE X: # 154 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 13731.1

S.D. OF X = 78.2003

S.D. OF Y = 5299.57

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.245

COEFFICIENT OF DETERMINATION = .060025

SLOPE (M) OF REGRESSION LINE = -16.6023

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042

MEAN OF Y = 13731.1

S.D. OF X = 12.0578

S.D. OF Y = 5299.57

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .133

COEFFICIENT OF DETERMINATION = .017689

SLOPE (M) OF REGRESSION LINE = 58.6573

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243

MEAN OF Y = 13731.1

S.D. OF X = 78.7263

S.D. OF Y = 5299.57

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.223

COEFFICIENT OF DETERMINATION = .049729

SLOPE (M) OF REGRESSION LINE = -15.0052

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA

ACCT. # 157.1

BOILERS AND ACCESSORIES — UNIT # 1

VARIABLE X: # 157.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 440083

S.D. OF X = 78.2003

S.D. OF Y = 494212

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.089

COEFFICIENT OF DETERMINATION = 7.921E-03

SLOPE (M) OF REGRESSION LINE = -559.541

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042

MEAN OF Y = 440083

S.D. OF X = 12.0578

S.D. OF Y = 494212

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .278

COEFFICIENT OF DETERMINATION = .077284

SLOPE (M) OF REGRESSION LINE = 11384

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243

MEAN OF Y = 440083

S.D. OF X = 78.7263

S.D. OF Y = 494212

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.045

COEFFICIENT OF DETERMINATION = 2.025E-03

SLOPE (M) OF REGRESSION LINE = -285.039

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA

ACCT. # 158.1

SOOT BLOWERS - ALL TYPES

VARIABLE X: # 158.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.783

MEAN OF Y = 59139.9

S.D. OF X = 44.2411

S.D. OF Y = 36630.7

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.36

COEFFICIENT OF DETERMINATION = .1296

SLOPE (M) OF REGRESSION LINE = -298.18

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.0433

MEAN OF Y = 59139.9

S.D. OF X = 12.3405

S.D. OF Y = 36630.7

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = .417

COEFFICIENT OF DETERMINATION = .173889

SLOPE (M) OF REGRESSION LINE = 1237.15

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 346.827

MEAN OF Y = 59139.9

S.D. OF X = 39.3537

S.D. OF Y = 36630.7

NUMBER OF PAIRS (N) = 9

CORRELATION COEFFICIENT (R) = -.274

COEFFICIENT OF DETERMINATION = .075076

SLOPE (M) OF REGRESSION LINE = -255.193

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 158.2
SOOT BLOWERS - AIR COMPRESSOR, RECIP.

VARIABLE X: # 158.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 281.71 MEAN OF Y = 26220.3
S.D. OF X = 85.4006 S.D. OF Y = 21221.1

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = -.429
COEFFICIENT OF DETERMINATION = .184041

SLOPE (M) OF REGRESSION LINE = -106.566

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 31.72 MEAN OF Y = 26220.3
S.D. OF X = 12.6962 S.D. OF Y = 21221.1

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = .247
COEFFICIENT OF DETERMINATION = .061009

SLOPE (M) OF REGRESSION LINE = 413.314

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.43 MEAN OF Y = 26220.3
S.D. OF X = 86.0891 S.D. OF Y = 21221.1

NUMBER OF PAIRS (N) = 10

CORRELATION COEFFICIENT (R) = -.389
COEFFICIENT OF DETERMINATION = .151321

SLOPE (M) OF REGRESSION LINE = -95.8789

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA

ACCT. # 160

COAL TRANSPORT PIPING AND VALVES

VARIABLE X: # 160 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 101163

S.D. OF X = 78.2003

S.D. OF Y = 70142.2

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .309

COEFFICIENT OF DETERMINATION = .095481

SLOPE (M) OF REGRESSION LINE = 277.152

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 160 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042

MEAN OF Y = 101163

S.D. OF X = 12.0578

S.D. OF Y = 70142.2

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .082

COEFFICIENT OF DETERMINATION = 6.724E-03

SLOPE (M) OF REGRESSION LINE = 478.85

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 160 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243

MEAN OF Y = 101163

S.D. OF X = 78.7263

S.D. OF Y = 70142.2

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .32

COEFFICIENT OF DETERMINATION = .1024

SLOPE (M) OF REGRESSION LINE = 284.694

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 161
BOILER ROOM COAL SCALES --VOLUMETRIC

VARIABLE X: # 161 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 280.039 MEAN OF Y = 10858.5
S.D. OF X = 78.2003 S.D. OF Y = 6714.63

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .462
COEFFICIENT OF DETERMINATION = .213444

SLOPE (M) OF REGRESSION LINE = 39.6723

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 161 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 33.2042 MEAN OF Y = 10858.5
S.D. OF X = 12.0578 S.D. OF Y = 6714.63

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .016
COEFFICIENT OF DETERMINATION = 2.56E-04

SLOPE (M) OF REGRESSION LINE = 8.73807

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 161 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.243 MEAN OF Y = 10858.5
S.D. OF X = 78.7263 S.D. OF Y = 6714.63

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .461
COEFFICIENT OF DETERMINATION = .212521

SLOPE (M) OF REGRESSION LINE = 39.349

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 162.11
PULVERIZER MILLS - UNIT # 1

VARIABLE X: # 162.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 280.039 MEAN OF Y = 133652
S.D. OF X = 78.2003 S.D. OF Y = 57355.9

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.203
COEFFICIENT OF DETERMINATION = .041209

SLOPE (M) OF REGRESSION LINE = -149.055

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 33.2042 MEAN OF Y = 133652
S.D. OF X = 12.0578 S.D. OF Y = 57355.9

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .587
COEFFICIENT OF DETERMINATION = .344569

SLOPE (M) OF REGRESSION LINE = 2791.62

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.243 MEAN OF Y = 133652
S.D. OF X = 78.7263 S.D. OF Y = 57355.9

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.112
COEFFICIENT OF DETERMINATION = .012544

SLOPE (M) OF REGRESSION LINE = -81.5831

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA

ACCT. # 162.2

PRIMARY AIR FANS / MILL EXHAUSTER FANS

VARIABLE X: # 162.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039

MEAN OF Y = 74989.4

S.D. OF X = 78.2003

S.D. OF Y = 19389.1

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .234

COEFFICIENT OF DETERMINATION = .054756

SLOPE (M) OF REGRESSION LINE = 57.9539

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042

MEAN OF Y = 74989.4

S.D. OF X = 12.0578

S.D. OF Y = 19389.1

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .665

COEFFICIENT OF DETERMINATION = .442225

SLOPE (M) OF REGRESSION LINE = 1070.11

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

PASSES DECISION RULE AT 0.01 SIGNIFICANCE LEVEL!!!

VARIABLE X: # 162.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243

MEAN OF Y = 74989.4

S.D. OF X = 78.7263

S.D. OF Y = 19389.1

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .334

COEFFICIENT OF DETERMINATION = .111556

SLOPE (M) OF REGRESSION LINE = 82.285

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 163.1
BURNERS AND LIGHTERS

VARIABLE X: # 163.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 280.039 MEAN OF Y = 56770.5
S.D. OF X = 78.2003 S.D. OF Y = 49927.3

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.171
COEFFICIENT OF DETERMINATION = .029241

SLOPE (M) OF REGRESSION LINE = -109.372

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 33.2042 MEAN OF Y = 56770.5
S.D. OF X = 12.0578 S.D. OF Y = 49927.3

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .418
COEFFICIENT OF DETERMINATION = .174724

SLOPE (M) OF REGRESSION LINE = 1731.57

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.243 MEAN OF Y = 56770.5
S.D. OF X = 78.7263 S.D. OF Y = 49927.3

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.106
COEFFICIENT OF DETERMINATION = .011236

SLOPE (M) OF REGRESSION LINE = -67.296

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 166
AIR PREHEATERS

VARIABLE X: # 166 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 280.039 MEAN OF Y = 60782.9
S.D. OF X = 78.2003 S.D. OF Y = 57689.7

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .119
COEFFICIENT OF DETERMINATION = .014161

SLOPE (M) OF REGRESSION LINE = 87.7829

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 33.2042 MEAN OF Y = 60782.9
S.D. OF X = 12.0578 S.D. OF Y = 57689.7

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .506
COEFFICIENT OF DETERMINATION = .256036

SLOPE (M) OF REGRESSION LINE = 2419.45

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!
FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 166 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.243 MEAN OF Y = 60782.9
S.D. OF X = 78.7263 S.D. OF Y = 57689.7

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .196
COEFFICIENT OF DETERMINATION = .038416

SLOPE (M) OF REGRESSION LINE = 143.37

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 169
AIR AND GAS DUCTS

VARIABLE X: # 169 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 280.039 MEAN OF Y = 77411.3
S.D. OF X = 78.2003 S.D. OF Y = 56524.3

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .042
COEFFICIENT OF DETERMINATION = 1.764E-03

SLOPE (M) OF REGRESSION LINE = 30.2139

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 33.2042 MEAN OF Y = 77411.3
S.D. OF X = 12.0578 S.D. OF Y = 56524.3

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .156
COEFFICIENT OF DETERMINATION = .024336

SLOPE (M) OF REGRESSION LINE = 730.083

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.243 MEAN OF Y = 77411.3
S.D. OF X = 78.7263 S.D. OF Y = 56524.3

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .065
COEFFICIENT OF DETERMINATION = 4.225E-03

SLOPE (M) OF REGRESSION LINE = 46.9379

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 173.1
BOTTOM ASH HOPPERS - UNIT # 1

VARIABLE X: # 173.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 297.719 MEAN OF Y = 63470.6
S.D. OF X = 54.0395 S.D. OF Y = 59282.4

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = -.268
COEFFICIENT OF DETERMINATION = .071824

SLOPE (M) OF REGRESSION LINE = -293.817

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 34.5391 MEAN OF Y = 63470.6
S.D. OF X = 11.7142 S.D. OF Y = 59282.4

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = .46
COEFFICIENT OF DETERMINATION = .2116

SLOPE (M) OF REGRESSION LINE = 2330.33

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 332.258 MEAN OF Y = 63470.6
S.D. OF X = 49.2189 S.D. OF Y = 59282.4

NUMBER OF PAIRS (N) = 11

CORRELATION COEFFICIENT (R) = -.184
COEFFICIENT OF DETERMINATION = .033856

SLOPE (M) OF REGRESSION LINE = -222.188

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 174.12
ELECTROSTATIC PRECIPITATOR - UNIT # 1

VARIABLE X: # 174.12 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 280.039 MEAN OF Y = 91795.4
S.D. OF X = 78.2003 S.D. OF Y = 138387

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .261
COEFFICIENT OF DETERMINATION = .068121

SLOPE (M) OF REGRESSION LINE = 462.362

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 33.2042 MEAN OF Y = 91795.4
S.D. OF X = 12.0578 S.D. OF Y = 138387

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = -.404
COEFFICIENT OF DETERMINATION = .163216

SLOPE (M) OF REGRESSION LINE = -4641.74

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 313.243 MEAN OF Y = 91795.4
S.D. OF X = 78.7263 S.D. OF Y = 138387

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .198
COEFFICIENT OF DETERMINATION = .039204

SLOPE (M) OF REGRESSION LINE = 347.317

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

BULL RUN PLANT OF TVA
ACCT. # 175.2
ASH CRUSHING & DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 280.039 MEAN OF Y = 273143
S.D. OF X = 78.2003 S.D. OF Y = 179919

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .386
COEFFICIENT OF DETERMINATION = .148996

SLOPE (M) OF REGRESSION LINE = 888.163

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 33.2042 MEAN OF Y = 273143
S.D. OF X = 12.0578 S.D. OF Y = 179919

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .47
COEFFICIENT OF DETERMINATION = .2209

SLOPE (M) OF REGRESSION LINE = 7009.67

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 313.243 MEAN OF Y = 273143
S.D. OF X = 78.7263 S.D. OF Y = 179919

NUMBER OF PAIRS (N) = 12

CORRELATION COEFFICIENT (R) = .455
COEFFICIENT OF DETERMINATION = .207025

SLOPE (M) OF REGRESSION LINE = 1040.77

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

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APPENDIX B-5

CUMBERLAND PLANT

ANALYSES OF

MAINTENANCE COST ACCOUNTS

AS A FUNCTION OF

COAL QUALITY

CUMBERLAND PLANT OF TVA

ACCT. # 152.1

BRADFORD BREAKER-TYPE COAL CRUSHER

VARIABLE X: # 152.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 812.48

MEAN OF Y = 62622.5

S.D. OF X = 95.1376

S.D. OF Y = 28049.3

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.629

COEFFICIENT OF DETERMINATION = .395641

SLOPE (M) OF REGRESSION LINE = -185.375

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 179.295

MEAN OF Y = 62622.5

S.D. OF X = 19.2385

S.D. OF Y = 28049.3

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.706

COEFFICIENT OF DETERMINATION = .498436

SLOPE (M) OF REGRESSION LINE = -1029.61

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 152.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 991.775

MEAN OF Y = 62622.5

S.D. OF X = 114.264

S.D. OF Y = 28049.3

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.642

COEFFICIENT OF DETERMINATION = .412164

SLOPE (M) OF REGRESSION LINE = -157.697

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 153
COAL CONVEYING FACILITIES

VARIABLE X: # 153 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 284346
S.D. OF X = 95.1376 S.D. OF Y = 80767.4

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .124
COEFFICIENT OF DETERMINATION = .015376

SLOPE (M) OF REGRESSION LINE = 105.02

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 284346
S.D. OF X = 19.2385 S.D. OF Y = 80767.4

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .044
COEFFICIENT OF DETERMINATION = 1.936E-03

SLOPE (M) OF REGRESSION LINE = 183.051

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 153 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 284346
S.D. OF X = 114.264 S.D. OF Y = 80767.4

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .11
COEFFICIENT OF DETERMINATION = .0121

SLOPE (M) OF REGRESSION LINE = 77.9932

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 154
COAL HANDLING POWER AND CONTROL SYSTEM

VARIABLE X: # 154 ASH(K TONS) VARIABLE Y: MAINT. COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 16928
S.D. OF X = 95.1376 S.D. OF Y = 15147.3

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .274
COEFFICIENT OF DETERMINATION = .075076

SLOPE (M) OF REGRESSION LINE = 43.6787

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 SULFUR(K TONS) VARIABLE Y: MAINT. COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 16928
S.D. OF X = 19.2385 S.D. OF Y = 15147.3

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .162
COEFFICIENT OF DETERMINATION = .026244

SLOPE (M) OF REGRESSION LINE = 127.817

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 154 ASH+SUL(K TONS) VARIABLE Y: MAINT. COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 16928
S.D. OF X = 114.264 S.D. OF Y = 15147.3

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .256
COEFFICIENT OF DETERMINATION = .065536

SLOPE (M) OF REGRESSION LINE = 33.9033

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 155
COAL BUNKERS

VARIABLE X: # 155 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 812.48 MEAN OF Y = 1681.25

S.D. OF X = 95.1376 S.D. OF Y = 1106.91

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .32

COEFFICIENT OF DETERMINATION = .1024

SLOPE (M) OF REGRESSION LINE = 3.72755

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 179.295 MEAN OF Y = 1681.25

S.D. OF X = 19.2385 S.D. OF Y = 1106.91

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .282

COEFFICIENT OF DETERMINATION = .079524

SLOPE (M) OF REGRESSION LINE = 16.2409

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 155 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 991.775 MEAN OF Y = 1681.25

S.D. OF X = 114.264 S.D. OF Y = 1106.91

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .314

COEFFICIENT OF DETERMINATION = .098596

SLOPE (M) OF REGRESSION LINE = 3.04449

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND - PLANT OF TVA

ACCT. # 157.1

BOILERS AND ACCESSORIES - UNIT # 1

VARIABLE X: # 157.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 394.18

MEAN OF Y = 628234

S.D. OF X = 110.206

S.D. OF Y = 275079

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .234

COEFFICIENT OF DETERMINATION = .054756

SLOPE (M) OF REGRESSION LINE = 584.497

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 86.81

MEAN OF Y = 628234

S.D. OF X = 24.1715

S.D. OF Y = 275079

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .198

COEFFICIENT OF DETERMINATION = .039204

SLOPE (M) OF REGRESSION LINE = 2257.06

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 480.99

MEAN OF Y = 628234

S.D. OF X = 134.353

S.D. OF Y = 275079

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .228

COEFFICIENT OF DETERMINATION = .051984

SLOPE (M) OF REGRESSION LINE = 466.339

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT. # 157.2

BOILERS AND ACCESSORIES - UNIT # 2

VARIABLE X: # 157.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 418.703

MEAN OF Y = 630010

S.D. OF X = 76.4055

S.D. OF Y = 311956

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.797

COEFFICIENT OF DETERMINATION = .635209

SLOPE (M) OF REGRESSION LINE = -3172.18

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 92.4825

MEAN OF Y = 630010

S.D. OF X = 15.8207

S.D. OF Y = 311956

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.815

COEFFICIENT OF DETERMINATION = .664225

SLOPE (M) OF REGRESSION LINE = -16061.8

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 157.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 511.185

MEAN OF Y = 630010

S.D. OF X = 94.2041

S.D. OF Y = 311956

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.8

COEFFICIENT OF DETERMINATION = .64

SLOPE (M) OF REGRESSION LINE = -2650.42

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT.# 158.3
SOOT BLOWERS - AIR COMPRESS., CENTRI.

VARIABLE X: # 158.3 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 152558
S.D. OF X = 95.1376 S.D. OF Y = 21662.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.747
COEFFICIENT OF DETERMINATION = .558009

SLOPE (M) OF REGRESSION LINE = -170.107

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.3 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 152558
S.D. OF X = 19.2385 S.D. OF Y = 21662.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.665
COEFFICIENT OF DETERMINATION = .442225

SLOPE (M) OF REGRESSION LINE = -748.303

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.3 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 152558
S.D. OF X = 114.264 S.D. OF Y = 21662.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.734
COEFFICIENT OF DETERMINATION = .538756

SLOPE (M) OF REGRESSION LINE = -139.138

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 158.12
SOOT BLOWERS - LANCE, TYPE IK, LONG

VARIABLE X: # 158.12 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 360847
S.D. OF X = 95.1376 S.D. OF Y = 158652

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .259
COEFFICIENT OF DETERMINATION = .067081

SLOPE (M) OF REGRESSION LINE = 431.705

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.12 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 360847
S.D. OF X = 19.2385 S.D. OF Y = 158652

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .28
COEFFICIENT OF DETERMINATION = .0784

SLOPE (M) OF REGRESSION LINE = 2307.81

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.12 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 360847
S.D. OF X = 114.264 S.D. OF Y = 158652

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .263
COEFFICIENT OF DETERMINATION = .069169

SLOPE (M) OF REGRESSION LINE = 364.697

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT. # 158.13

SOOT BLOWERS - LANCE, TYPE IK, SHORT

VARIABLE X: # 158.13 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 812.48

MEAN OF Y = 85534.3

S.D. OF X = 95.1376

S.D. OF Y = 26781.4

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .248

COEFFICIENT OF DETERMINATION = .061504

SLOPE (M) OF REGRESSION LINE = 69.8734

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.13 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 179.295

MEAN OF Y = 85534.3

S.D. OF X = 19.2365

S.D. OF Y = 26781.4

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .276

COEFFICIENT OF DETERMINATION = .076176

SLOPE (M) OF REGRESSION LINE = 384.694

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.13 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 991.775

MEAN OF Y = 85534.3

S.D. OF X = 114.264

S.D. OF Y = 26781.4

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .253

COEFFICIENT OF DETERMINATION = .064009

SLOPE (M) OF REGRESSION LINE = 59.3444

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT.# 158.14

SLAG BLOWERS — WALL — TYPE IR

VARIABLE X: # 158.14 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 812.48

MEAN OF Y = 41257.5

S.D. OF X = 95.1376

S.D. OF Y = 23713.7

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.787

COEFFICIENT OF DETERMINATION = .619369

SLOPE (M) OF REGRESSION LINE = -196.132

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.14 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 179.295

MEAN OF Y = 41257.5

S.D. OF X = 19.2385

S.D. OF Y = 23713.7

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.836

COEFFICIENT OF DETERMINATION = .698896

SLOPE (M) OF REGRESSION LINE = -1030.39

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 158.14 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 991.775

MEAN OF Y = 41257.5

S.D. OF X = 114.264

S.D. OF Y = 23713.7

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.796

COEFFICIENT OF DETERMINATION = .633616

SLOPE (M) OF REGRESSION LINE = -165.176

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 160
COAL TRANSPORT PIPING AND VALVES

VARIABLE X: # 160 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 812.48

MEAN OF Y = 412591

S.D. OF X = 95.1376

S.D. OF Y = 114091

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.596

COEFFICIENT OF DETERMINATION = .355216

SLOPE (M) OF REGRESSION LINE = -714.91

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 160 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 179.295

MEAN OF Y = 412591

S.D. OF X = 19.2385

S.D. OF Y = 114091

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.524

COEFFICIENT OF DETERMINATION = .274576

SLOPE (M) OF REGRESSION LINE = -3109.21

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 160 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 991.775

MEAN OF Y = 412591

S.D. OF X = 114.264

S.D. OF Y = 114091

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.585

COEFFICIENT OF DETERMINATION = .342225

SLOPE (M) OF REGRESSION LINE = -583.745

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 161
BOILER ROOM COAL SCALES - VOLUMETRIC

VARIABLE X: # 161 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 167435
S.D. OF X = 95.1376 S.D. OF Y = 95609.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .664
COEFFICIENT OF DETERMINATION = .440896

SLOPE (M) OF REGRESSION LINE = 666.859

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 161 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 167435
S.D. OF X = 19.2385 S.D. OF Y = 95609.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .705
COEFFICIENT OF DETERMINATION = .497025

SLOPE (M) OF REGRESSION LINE = 3504.42

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 161 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 167435
S.D. OF X = 114.264 S.D. OF Y = 95609.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .671
COEFFICIENT OF DETERMINATION = .450241

SLOPE (M) OF REGRESSION LINE = 561.638

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 162.11
PULVERIZER MILLS - UNIT # 1

VARIABLE X: # 162.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 394.18

MEAN OF Y = 834870

S.D. OF X = 110.206

S.D. OF Y = 255330

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.314

COEFFICIENT OF DETERMINATION = .098596

SLOPE (M) OF REGRESSION LINE = -726.962

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 86.81

MEAN OF Y = 834870

S.D. OF X = 24.1715

S.D. OF Y = 255330

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.361

COEFFICIENT OF DETERMINATION = .130321

SLOPE (M) OF REGRESSION LINE = -3809.06

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 480.99

MEAN OF Y = 834870

S.D. OF X = 134.353

S.D. OF Y = 255330

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.322

COEFFICIENT OF DETERMINATION = .103684

SLOPE (M) OF REGRESSION LINE = -612.432

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 162.21
PULVERIZER MILLS - UNIT # 2

VARIABLE X: # 162.21 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 418.703 MEAN OF Y = 831662
S.D. OF X = 78.4055 S.D. OF Y = 249305

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.898
COEFFICIENT OF DETERMINATION = .806404

SLOPE (M) OF REGRESSION LINE = -2856.27

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.21 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 92.4825 MEAN OF Y = 831662
S.D. OF X = 15.8207 S.D. OF Y = 249305

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.889
COEFFICIENT OF DETERMINATION = .790321

SLOPE (M) OF REGRESSION LINE = -14007.6

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.21 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 511.185 MEAN OF Y = 831662
S.D. OF X = 94.2041 S.D. OF Y = 249305

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.897
COEFFICIENT OF DETERMINATION = .804609

SLOPE (M) OF REGRESSION LINE = -2373.65

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 162.2
PRIMARY AIR FANS / MILL EXHAUSTER FANS

VARIABLE X: # 162.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 78639.5
S.D. OF X = 95.1376 S.D. OF Y = 59630.2

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.944
COEFFICIENT OF DETERMINATION = .891137

SLOPE (M) OF REGRESSION LINE = -591.672

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 78639.5
S.D. OF X = 19.2385 S.D. OF Y = 59630.2

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.942
COEFFICIENT OF DETERMINATION = .887364

SLOPE (M) OF REGRESSION LINE = -2918.48

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 162.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 78639.5
S.D. OF X = 114.264 S.D. OF Y = 59630.2

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.945
COEFFICIENT OF DETERMINATION = .893025

SLOPE (M) OF REGRESSION LINE = -492.905

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 163.1
BURNERS AND LIGHTERS

VARIABLE X: # 163.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 600791
S.D. OF X = 95.1376 S.D. OF Y = 154465

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .317
COEFFICIENT OF DETERMINATION = .100489

SLOPE (M) OF REGRESSION LINE = 514.856

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 600791
S.D. OF X = 19.2385 S.D. OF Y = 154465

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .333
COEFFICIENT OF DETERMINATION = .110889

SLOPE (M) OF REGRESSION LINE = 2673.12

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 163.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 600791
S.D. OF X = 114.264 S.D. OF Y = 154465

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .32
COEFFICIENT OF DETERMINATION = .1024

SLOPE (M) OF REGRESSION LINE = 432.697

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 165
GAS RECIRCULATING FANS

VARIABLE X: # 165 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 269615
S.D. OF X = 95.1376 S.D. OF Y = 168889

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .463
COEFFICIENT OF DETERMINATION = .214369

SLOPE (M) OF REGRESSION LINE = 822.622

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 165 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 269615
S.D. OF X = 19.2385 S.D. OF Y = 168889

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .48
COEFFICIENT OF DETERMINATION = .2304

SLOPE (M) OF REGRESSION LINE = 4213.09

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 165 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 269615
S.D. OF X = 114.264 S.D. OF Y = 168889

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .467
COEFFICIENT OF DETERMINATION = .218069

SLOPE (M) OF REGRESSION LINE = 689.708

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 166
AIR PREHEATERS

VARIABLE X: # 166 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 1.39606E+06
S.D. OF X = 95.1376 S.D. OF Y = 1.0437E+06

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.08
COEFFICIENT OF DETERMINATION = 6.4E-03

SLOPE (M) OF REGRESSION LINE = -874.707

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 1.39606E+06
S.D. OF X = 19.2385 S.D. OF Y = 1.0437E+06

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.011
COEFFICIENT OF DETERMINATION = 1.21E-04

SLOPE (M) OF REGRESSION LINE = -585.027

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 166 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 1.39606E+06
S.D. OF X = 114.264 S.D. OF Y = 1.0437E+06

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.068
COEFFICIENT OF DETERMINATION = 4.624E-03

SLOPE (M) OF REGRESSION LINE = -622.971

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 169
AIR AND GAS DUCTS

VARIABLE X: # 169 ASH(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 812.48 MEAN OF Y = 753916
S.D. OF X = 95.1376 S.D. OF Y = 587134

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .364
COEFFICIENT OF DETERMINATION = .132496

SLOPE (M) OF REGRESSION LINE = 2249.29

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 179.295 MEAN OF Y = 753916
S.D. OF X = 19.2385 S.D. OF Y = 587134

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .309
COEFFICIENT OF DETERMINATION = .095481

SLOPE (M) OF REGRESSION LINE = 9438.38

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 169 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$
MEAN OF X = 991.775 MEAN OF Y = 753916
S.D. OF X = 114.264 S.D. OF Y = 587134

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .356
COEFFICIENT OF DETERMINATION = .126736

SLOPE (M) OF REGRESSION LINE = 1826.86

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA
ACCT. # 173.1
BOTTOM ASH HOPPERS - UNIT # 1

VARIABLE X: # 173.1 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 394.18 MEAN OF Y = 379671
S.D. OF X = 110.206 S.D. OF Y = 251192

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .527
COEFFICIENT OF DETERMINATION = .277729

SLOPE (M) OF REGRESSION LINE = 1202.14

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 86.81 MEAN OF Y = 379671
S.D. OF X = 24.1715 S.D. OF Y = 251192

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .491
COEFFICIENT OF DETERMINATION = .241081

SLOPE (M) OF REGRESSION LINE = 5104.77

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.1 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 480.99 MEAN OF Y = 379671
S.D. OF X = 134.353 S.D. OF Y = 251192

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .521
COEFFICIENT OF DETERMINATION = .271441

SLOPE (M) OF REGRESSION LINE = 974.1

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT.# 173.2

BOTTOM ASH HOPPERS - UNIT # 2

VARIABLE X: # 173.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 418.703

MEAN OF Y = 158500

S.D. OF X = 78.4055

S.D. OF Y = 58790.1

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .209

COEFFICIENT OF DETERMINATION = .043681

SLOPE (M) OF REGRESSION LINE = 156.945

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 92.4825

MEAN OF Y = 158500

S.D. OF X = 15.8207

S.D. OF Y = 58790.1

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .216

COEFFICIENT OF DETERMINATION = .046656

SLOPE (M) OF REGRESSION LINE = 800.876

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 173.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 511.185

MEAN OF Y = 158500

S.D. OF X = 94.2041

S.D. OF Y = 58790.1

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .21

COEFFICIENT OF DETERMINATION = .0441

SLOPE (M) OF REGRESSION LINE = 131.305

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT. # 174.11

MECH. FLY ASH COLLECTORS - UNIT # 1

VARIABLE X: # 174.11 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 394.18

MEAN OF Y = 30600.8

S.D. OF X = 110.206

S.D. OF Y = 43794

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .855

COEFFICIENT OF DETERMINATION = .731025

SLOPE (M) OF REGRESSION LINE = 339.743

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.11 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 86.81

MEAN OF Y = 30600.8

S.D. OF X = 24.1715

S.D. OF Y = 43794

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .852

COEFFICIENT OF DETERMINATION = .725904

SLOPE (M) OF REGRESSION LINE = 1543.61

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.11 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 480.99

MEAN OF Y = 30600.8

S.D. OF X = 134.353

S.D. OF Y = 43794

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .855

COEFFICIENT OF DETERMINATION = .731025

SLOPE (M) OF REGRESSION LINE = 278.562

FAILS DECISION RULE AT 0.25 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT. # 174.21

MECH. FLY ASH COLLECTORS UNIT # 2

VARIABLE X: # 174.21 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 343.765 MEAN OF Y = 2608.5

S.D. OF X = 17.5337 S.D. OF Y = 2507.5

NUMBER OF PAIRS (N) = 2

CORRELATION COEFFICIENT (R) = -1

COEFFICIENT OF DETERMINATION = 1

SLOPE (M) OF REGRESSION LINE = -143.021

INSUFFICIENT DATA FOR MEANINGFUL ANALYSIS!

VARIABLE X: # 174.21 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 77.47 MEAN OF Y = 2608.5

S.D. OF X = 4.78 S.D. OF Y = 2507.5

NUMBER OF PAIRS (N) = 2

CORRELATION COEFFICIENT (R) = -1

COEFFICIENT OF DETERMINATION = 1

SLOPE (M) OF REGRESSION LINE = -524.582

INSUFFICIENT DATA FOR MEANINGFUL ANALYSIS!

VARIABLE X: # 174.21 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 421.235 MEAN OF Y = 2608.5

S.D. OF X = 22.3173 S.D. OF Y = 2507.5

NUMBER OF PAIRS (N) = 2

CORRELATION COEFFICIENT (R) = -1

COEFFICIENT OF DETERMINATION = 1

SLOPE (M) OF REGRESSION LINE = -112.345

INSUFFICIENT DATA FOR MEANINGFUL ANALYSIS!

CUMBERLAND PLANT OF TVA

ACCT. # 174.12

ELECTROSTATIC PRECIPITATOR - UNIT # 1

VARIABLE X: # 174.12 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 394.18

MEAN OF Y = 208795

S.D. OF X = 110.206

S.D. OF Y = 106070

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .907

COEFFICIENT OF DETERMINATION = .822649

SLOPE (M) OF REGRESSION LINE = 872.981

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 86.81

MEAN OF Y = 208795

S.D. OF X = 24.1715

S.D. OF Y = 106070

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .892

COEFFICIENT OF DETERMINATION = .795664

SLOPE (M) OF REGRESSION LINE = 3914.56

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.12 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 480.99

MEAN OF Y = 208795

S.D. OF X = 134.353

S.D. OF Y = 106070

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = .905

COEFFICIENT OF DETERMINATION = .819025

SLOPE (M) OF REGRESSION LINE = 714.097

PASSES DECISION RULE AT 0.05 SIGNIFICANCE LEVEL!!!

FAILS DECISION RULE AT 0.01 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT. # 174.22

ELECTROSTATIC PRECIPITATOR - UNIT # 2

VARIABLE X: # 174.22 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 418.703

MEAN OF Y = 223863

S.D. OF X = 78.4055

S.D. OF Y = 82136.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.492

COEFFICIENT OF DETERMINATION = .242064

SLOPE (M) OF REGRESSION LINE = -515.668

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.22 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 92.4825

MEAN OF Y = 223863

S.D. OF X = 15.8207

S.D. OF Y = 82136.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.525

COEFFICIENT OF DETERMINATION = .275625

SLOPE (M) OF REGRESSION LINE = -2723.6

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 174.22 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 511.185

MEAN OF Y = 223863

S.D. OF X = 94.2041

S.D. OF Y = 82136.5

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.498

COEFFICIENT OF DETERMINATION = .248004

SLOPE (M) OF REGRESSION LINE = -434.027

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

CUMBERLAND PLANT OF TVA

ACCT.# 175.2

ASH CRUSHING & DISPOSAL PIPING SYSTEM

VARIABLE X: # 175.2 ASH(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 812.48

MEAN OF Y = 1.55568E+06

S.D. OF X = 95.1376

S.D. OF Y = 342771

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.496

COEFFICIENT OF DETERMINATION = .246016

SLOPE (M) OF REGRESSION LINE = -1785.24

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.2 SULFUR(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 179.295

MEAN OF Y = 1.55568E+06

S.D. OF X = 19.2385

S.D. OF Y = 342771

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.523

COEFFICIENT OF DETERMINATION = .273529

SLOPE (M) OF REGRESSION LINE = -9321.1

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

VARIABLE X: # 175.2 ASH+SUL(K TONS) VARIABLE Y: MAINT COST '78\$

MEAN OF X = 991.775

MEAN OF Y = 1.55568E+06

S.D. OF X = 114.264

S.D. OF Y = 342771

NUMBER OF PAIRS (N) = 4

CORRELATION COEFFICIENT (R) = -.501

COEFFICIENT OF DETERMINATION = .251001

SLOPE (M) OF REGRESSION LINE = -1501.84

FAILS DECISION RULE AT 0.05 SIGNIFICANCE LEVEL

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4. TITLE AND SUBTITLE Effect of Coal Quality on Maintenance Costs at Utility Plants	5. REPORT DATE June 1980	6.
7. AUTHOR(S) Elmer C. Holt, Jr.	8. PERFORMING ORGANIZATION REPORT NO. 5004-3FR	
9. PERFORMING ORGANIZATION-NAME AND ADDRESS The Hoffman-Muntner Corporation 8750 Georgia Avenue, Suite E134 Silver Spring, Maryland 20910	10. PROJECT/TASK/WORK UNIT NO.	11. CONTRACT OR GRANT NO. DEAC01-75-ET-12512
12. SPONSORING ORGANIZATION NAME AND ADDRESS United States Department of Energy Pittsburgh Mining Technology Center Pittsburgh, Pennsylvania 15236	13. TYPE OF REPORT FINAL	14.
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16. ABSTRACT - In an attempt to determine if correlation exists between coal quality, as measured by its ash and sulfur contents, and the maintenance cost at utility plants, an examination was made of the actual maintenance cost experience of selected portions of five TVA coal-fired power plants as a function of fuel quality consumed during an extended period of time. The results indicate that according to established decision rules, developed in compliance with accepted statistical practices, correlation does exist in many portions of the coal-fired plants examined for which sufficient maintenance cost records were available. The degree of correlation varies significantly among the individual portions of a particular plant as well as among the various plants. However, the indicators are sufficient to confirm that a change (within the design constraints of the unit) in the ash and/or sulfur content of the coal being consumed by a utility boiler will have a proportionate effect on the maintenance cost at the plant. In the cases examined, each percent variation in ash content could have a monetary effect of from \$0.05 to \$0.10 per ton of coal consumed. Similarly, each percent variation in sulfur content could influence maintenance costs from \$0.30 to \$0.50 per ton of coal. Since these values are based on preliminary analysis of limited data, they must be approached with caution and not removed from the context in which they are presented. However, if borne out by further study, the potential magnitude of such savings may be sufficient to justify the acquisition of superior coal supplies, either by changing the source and/or using preparation to obtain a lower ash or sulfur fuel.		
17. DESCRIPTORS Coal Coal Preparation Electric Utilities Electric Power Plants Economic Analysis Furnaces Benefit/Cost Analysis Cost Effectiveness	18. AVAILABILITY STATEMENT	
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