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DATA SUMMARIES OF LICENSEE EVENT REPORTS OF DIESEL GENERATORS AT U.S. COMMERCIAL NUCLEAR POWER PLANTS FROM JANUARY 1, 1976 TO DECEMBER 31, 1978

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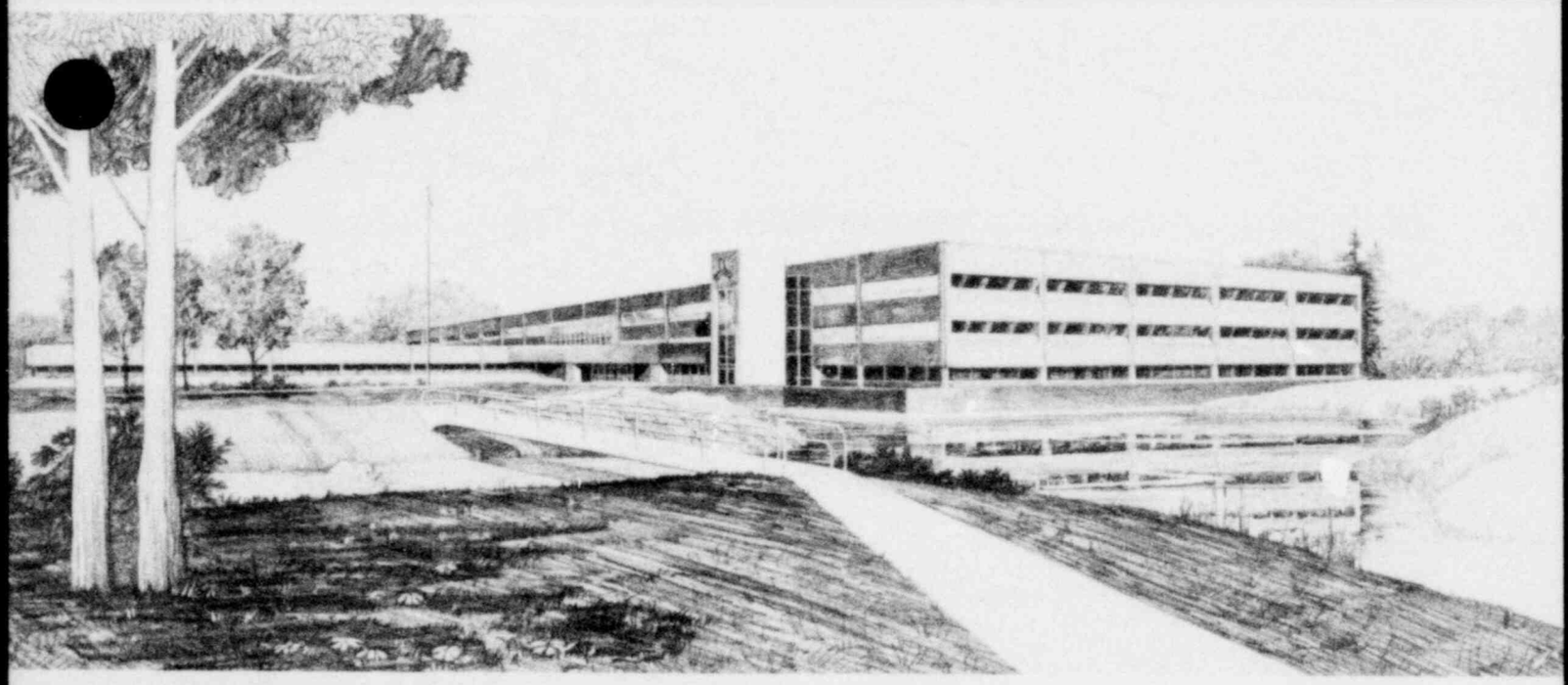

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ABSTRACT

We present data summaries of Licensee Event Reports (LERs) of diesel generators at U.S. commercial nuclear power plants, from January 1, 1976 to December 31, 1978. We classified the events contained in the LERs as failures and nonfailures. We further classified the events according to failure mode, failure mechanism, common cause, recurring, and various other classifications useful in risk assessment. The events reported in the LERs that we classified as failures, were used to estimate gross standby, operating, and demand failure rates, in units of failures per hour and failures per demand, for the diesel generators. Explanation and summary tables of all classifications and estimations are provided.

FOREWORD

This report is one in a series summarizing the statistics of Licensee Event Reports (LERs) as recorded by the U.S. Nuclear Regulatory Commission. The goal of the report is twofold: (a) to summarize the data for risk and statistical analyses, and (b) to obtain gross constant failure rate estimations and gross categorizations of the failures.

Because subjective judgments had to be made regarding population sizes and pertinence of recorded events, and because some component failures may not be recorded in the LERs, the component failure rates estimated in this report should be interpreted as being only tentative gross indicators of the true failure rates. The analyst himself must validate the applicability of the LER-derived failure rates for his own particular use. Furthermore, because LER reporting requirements can differ from plant to plant, comparisons of plant-to-plant failure rates should be interpreted with care: a higher failure rate may simply be due to stricter reporting requirements. As more data are collected and more analyses are performed in the future, improved failure rate estimations will be produced.

The failure rates given in the report are only one of many kinds of information presented. The tables and discussions give important information on failure classifications, according to failure modes, failure causes, and systems affected. Gross time trends are examined. Human errors are identified as are common-cause failures and recurring failures. Each LER analyzed is presented in a useful, summarized form, and all evaluations are presented such that you can modify the authors' calculations or perform your own evaluations if you so desire.

William E. Vesely
Project Manager
November 16, 1979

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INTRODUCTION

In support of the Nuclear Regulatory Commission's (NRC's) data gathering and analysis effort, we selectively analyzed Licensee Event Reports (LERs) of various diesel-generator events that were submitted to the NRC between January 1, 1976 and December 31, 1978. Initially, we obtained all reports in the NRC file with the component code, ENGINES, INTERNAL COMBUSTION, submitted during this period. Subsequently, however, to ensure that all LERs pertaining to diesel generator events were retrieved from the NRC file, a text search for the word "diesel" was conducted on the remaining, unretrieved LERs. We believe that these sorts yielded all of the LERs pertaining to diesel-generator events for the period of January 1,1976 through December 31, 1978.

We qualitatively evaluated the data reported in these Licensee Event Reports, and coded the pertinent information contained in each LER that described a diesel-generator event (for example, failure mode, failure mechanism, event date) into a one-line description of the event. Each one-line description was then stored in a computer-based data file for future use. The computer has the capability to search, collate, retrieve, update, and display the coded one-line LERs of the file by almost any item of data contained in the original LER, for example, plant, Nuclear Steam Supply System (NSSS) vendor, event date, failure mode, failure mechanism. This capability makes the LER data file a useful tool for obtaining various LER summary statistics for use in further analyses of diesel-generator events.

One type of summarization used for this report was to estimate from the LER data file, LER-based standby, demand, and operating failure rates (or "standby LER rates," "demand LER rates," and "operating LER rates," for short). Specifically, we estimated various standby, demand, and operating LER rates for the diesel generators used by all operating U.S. commercial

nuclear power plants, with the exceptions of Fort St. Vrain, Humboldt Bay, and LaCrosse, which were considered atypical, and Indian Point Unit 1, which has been shut down and defueled for a significant period. We then averaged these estimates to obtain various LER rates for the four NSSS vendors considered. Finally, we averaged specific plant failure data to obtain various rates for Pressurized Water Reactors (PWRs), Boiling Water Reactors (BWRs), and for the aggregate population.

LER rates, as well as the one-line LERs, are useful for probabilistic assessment, such as gross risk and reliability evaluations. However, when using the LER rates, the analyst must apply them with caution. Our LER rates are estimates based on information contained in the LERs, and may not represent actual failure rates of nuclear plant, emergency diesel generators. A difference between the actual failure rate and the LER rate may be due to the averaging performed, but also to the various interpretations of the criteria used for LER reporting. In Appendix A, we give a brief explanation of the causes of these variations.

The body of our report has two major parts. First, we describe our LER analysis. Included are the definitions, ground rules, coding schemes, and assumptions we used in carrying out the analysis. Next, we evaluate the data provided by our analysis and summarize the results of the data evaluation. In Appendix A, we explain the causes for the variations in LER reporting. In Appendix B, we describe the LER coding scheme used to encode the original LERs into the data file. In Appendix C, we discuss our methods to estimate the LER failure rates. In Appendix D, we list those plants to which operating licenses with standard technical specifications were issued.

DESCRIPTION OF THE LER ANALYSIS AND EVALUATION METHODOLOGY

In order to analyze and evaluate the data contained in the LERs, we found it was first necessary to define the diesel-generator component in a way that was generally applicable for our use in this evaluation. Once we accomplished this task, we made various assumptions and definitions that were necessary for encoding the applicable LER data. When the data were encoded, we collected pertinent component information and applied the statistical methods necessary for estimating the diesel-generator LER rates.

Component Definition

After considering several references[1,2,3] and performing a cursory evaluation of the information contained in the available LERs, we decided to define the diesel-generator unit in terms that would generally parallel the accepted industry definitions, as well as encompass the scope of the diesel-generator LERs. For the context of this report, we defined the diesel-generator unit as the diesel engine(s) and attached generator, and their corresponding support systems, up to and including the generator output breaker.

Assumptions and Definitions

In light of this definition, we encoded the appropriate LERs into one-line data records, and stored them in a computer-based file. A detailed explanation of the coding scheme is given in Appendix B. Specific descriptions of the assumptions and definitions used to encode these data are provided below.

Failure Mode

For this report, we identified two diesel-generator failure modes, Does Not Start and Does Not Continue to Run. There are three kinds of diesel-generator failures represented in the Does Not Start failure mode: in the first, a "start" command was given to the standby diesel generator and the unit failed to respond, that is, roll over and "fire"; in the

second, the "start" command was met and the diesel generator "started," that is, began running under its own power, but failed to reach rated speed and voltage in the required time; and in the third, the diesel-generator unit "started" successfully, that is, reached rated speed and voltage in the required time, but failed to achieve the expected load. As you can see, only after the unit had "started"--achieved rated speed and voltage in the required time, and had been loaded to the expected value--did we consider the unit to be running, that is, a successful "start." Due to the limited information available in most of the LERs, we did not differentiate between the automatic and manual start of the diesel-generator sets. When either of these types of start commands resulted in a diesel-generator starting failure, the failure was classified under the general failure mode, Does Not Start. Any diesel-generator failure that occurred after the unit had completed a successful start, as we have here defined, was classified under the general failure mode, Does Not Continue to Run.

When an LER reported an event that involved placing the diesel in an inoperable status, or reported problems with units that were already in an inoperable status, we put these events in the Unavailable/Nonfailure, failure mode category. We do not consider this category as a true diesel-generator failure mode, because no demand was placed on the unit. Only if the demand was made and the unit failed to respond to the demand could a definite failure be counted. No "implied" failures were considered in this report. We also used the Unavailable/Nonfailure category to record other events of interest that were not considered to be diesel-generator failures, such as technical specification violations.

Failure Mechanisms

The failure mechanisms (causes of failure) used in our report are generally the mechanisms reported in the respective LERs, and should be self-explanatory. However, a mechanism reported may or may not be the true, root cause of a failure. The quality of the LERs vary, and an intermediate mechanism may be reported as the cause. A study conducted by Boner and Hanners of the University of Dayton further discusses this problem.[4]

Type of Event

Five types of events were classified: common cause, recurring, recurring common cause, command faults, and recurring command faults. All other events were considered to be random events.

We define common cause failures as the failure of two or more diesel generators resulting from a single causal event (for example, fire, flooding, human error). If an event was recorded as a single diesel-generator failure, and yet we felt that there was potential for a common cause failure, we assumed the event was a common cause candidate and we coded it as a common cause failure.

When we determined that the same diesel generator was reported to have failed two or more times, each of these events was coded as a recurring failure.

If the same common cause failure or the same common cause candidate was reported more than one time as a result of the same cause, we coded this event as a recurring common cause event.

We classified events as command faults when there was not an actual physical failure of the diesel-generator unit, but, due to inputs (or lack of inputs) from other components external to the unit, the diesel generators failed to function as expected. This failure could be the result of some other failed component, human error, or, as in some cases, an environmental condition. A command fault does not involve actual diesel-generator failure. For instance, if a diesel generator were commanded to start but failed to do so because the fuel day tank was empty as a result of an improper valve lineup, we did not consider this a diesel-generator failure in itself, because, barring other unforeseen circumstances, the diesel would have operated satisfactorily if fuel had been available. However, since the diesel generator does fail to function, given a demand and the existance of a command fault, these events were included in our failure rate estimations, and were encoded under the appropriate failure mode.

Recurring command faults, of course, are command faults that involve the same diesel-generator unit, and occur two or more times.

Event Date

Our data field, FAIL DATE, corresponds to the event date reported in the LER. But the event date is not necessarily the date of occurrence. Though this is ostensibly the date of occurrence--and in most cases it probably is--there could be instances when the component had been in a failed state for some time before discovery, and the event date will actually correspond to the date of failure discovery, not occurrence. For our purposes, we assumed that the event date always corresponds to the date of component failure.

Manufacturer/kW Rating

The diesel-generator manufacturer and kW rating were usually not available in the LERs. However, we felt that this information would be useful for comparison to the AEC study[5] and the University of Dayton study[6], among others. So, we consulted the respective plant Final Safety Analysis Reports (FSARs), the AEC study, and the questionnaires used in the University of Dayton study. The information from these sources was combined to form our list of manufacturers and kW ratings.

Subsystems

The diesel-generator-unit support systems, or subsystems, were chosen to encompass the scope of the diesel-generator LERs, and to parallel the industry's definitions of diesel-generator support systems.[2,3,7,8]

Failure Classification

In our attempt to extract as much additional, significant information as possible from an original LER, we analyzed each diesel-generator failure to determine if the failure was related to the exposure time or to the actual demand. As the standby time or running time increases, the chance

of a time-related failure increases. The chance of a demand-related failure increases as the demands or cycling of the component increases, not directly as the time increases. For example, a diesel generator that failed by reason of the failure mechanism, Corrosion/Erosion, would be classified as a "time related" failure. But a diesel-generator failure that resulted from a jammed air-start motor pinion gear, would be considered a "demand related" failure. We used the classification, Unknown, for any failure that could not be specifically classified.

For the most part, we subjectively analyzed each event to determine its Failure Classification. Specific Failure Classification information was seldom available in the LERs. Consequently, an analyst may find it difficult to arrive at the same classifications as we did for some events. Again, we emphasize that our classifications are largely subjective and care should be exercised in their use.

Method of Discovery

We also attempted to classify the failures according to the activity taking place when the event occurred or was discovered. Unlike the Failure Classification discussed above, this information was usually available in the LERs and very few subjective decisions about the appropriate discovery category were necessary.

Repair Time

Finally, we attempted to classify each event by the duration necessary to repair the unit and restore it to standby status. Some of the more recent LERs provided this information. Unfortunately, the majority of the LERs did not provide this information, and, again, we were required to make subjective decisions, based on our experience, about the length of time necessary to effect the appropriate repairs.

We put the repair times into intervals to simplify the estimating technique and to increase the accuracy of our decisions. We assumed that maintenance practices varied from plant to plant. Consequently, we were

more likely to put the repair time in a correct interval than to provide a correct, "discrete" repair time for each event.

The 8-24 hour interval is probably the only interval that needs some explanation. We chose this longer interval rather than breaking it into several smaller intervals (that is, 8-12, 12-16, 16-20, 20-24) because we assumed that if the repair was going to take longer than one shift, it would take until the following day shift to have the qualified maintenance personnel available to continue repairs--no qualified maintenance personnel would be available on backshifts.

Again, we must emphasize that our repair time classifications are largely subjective and care should be exercised in their use.

Data Collection

For our analysis, the data necessary to estimate diesel-generator LER rates were collected from a variety of sources. It was necessary to determine standby time, operating time, demands, populations, and the number of failures for the diesel generators in each plant in our study. The discussion below gives a summary of each of these data gathering efforts and the assumptions and sources used to arrive at values for each of the data needs mentioned above.

Time

In order to estimate standby hourly LER rates and operating hourly LER rates, it was necessary to know the time the diesel generator was in a standby and an operating condition.

Standby Time. The emergency diesel-generator units are primarily used as the emergency power source in the event of a loss of site power. Consequently, we inferred, the diesel generators would ideally be in a standby condition at all times, regardless of the status of the reactor plant. And we assumed, therefore, that the total calendar time in hours for the time interval in question, that is, 1976, 1977, 1976-1978, etc., would adequately

represent the standby time for the diesel generators. However, in order to eliminate "initial" failures, that is, failures due to initial testing and running of a new unit, standby time was calculated from the date of a plant's initial criticality. So, all plants that went critical before the time interval in question would have the same number of standby hours. All plants that went critical subsequent to the beginning of the time interval in question, would have their standby hours calculated from their corresponding date of initial criticality. Due to the limited scope of this report, we made no attempt to determine individual diesel-generator outages, nor long periods of operation, nor to correct the corresponding standby hours accordingly. We assumed these periods to be insignificant compared to the usual total standby time of the diesel generator. Consequently, we made no attempt to adjust standby time for these periods.

Calendar hours were determined to the 8760-hour year. This is based on a 24-hour day and a 365-day year. Initial criticality dates for all plants were obtained from the NRC "Gray Book."[9]

Operating Time. In order to estimate an operating LER rate, the diesel-generator operating hours should be known. Since it was impractical for us to gather all operating data for each diesel generator unit, we consulted a number of sources[10-14] and assumed that the diesel generators are run for one hour, as part of the test to demonstrate operability. Generally, the requirements for demonstrating diesel-generator operability are as follows:

At least once per 31 days, on a STAGGERED TEST BASIS,[a]

1. Verify the fuel level in the day and engine-mounted fuel tanks

2. Verify the fuel level in the fuel storage tank

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a. STAGGERED TEST BASIS is defined by dividing the 31-day period by the number of diesel generators at the particular plant.[15]

3. Verify that the fuel transfer pump starts and transfers fuel from the storage system to the day and engine-mounted tank

4. Verify that the diesel generator starts from ambient conditions and accelerates satisfactorily.

5. Verify that the diesel generator is synchronized and loaded, and operates for at least 60 minutes

6. Verify that the diesel generator is aligned to provide standby power to the associated emergency buses.

However, some of the same sources also imply that the test interval may be as short as every three days. Boner and Hanners also state that testing frequency for diesel generators varies from weekly to monthly.[16] Due to these variations, we based our total number of operating hours for each diesel generator on both weekly and monthly testing.

Since there was usually no mention of how long a unit operated before tripping or being shut down, the one-hour-run test requirement was assumed for estimating the operating hourly LER rates for the diesel generators. We assumed that the diesel-generator operating failures were experienced before one hour of run time had expired.

We also assumed that there would be 12 operating hours per year for each diesel generator, based on monthly testing, and 52 operating hours per year, based on weekly testing. Again, any plant whose date of criticality falls after the initial date of the time interval in question, had its operating time (hours) adjusted accordingly.

Demands

In order to estimate a demand LER rate, one should know the number of demands placed on the diesel generator during a specific time interval. We

assumed that the diesel-generator demands corresponded to the testing frequency (weekly or monthly) outlined in the above mentioned sources (see References 10-14). Therefore, each diesel generator would be subject to 12 demands per year, based on monthly testing, and 52 demands per year, based on weekly testing. Again, the demands were adjusted according to the initial criticality date of the plant.

We know that the actual number of demands may vary from the assumed number of demands, due to unexpected transients that require the use of the diesel generators (for example, a loss of offsite power), and due to special tests (for example, refueling or an annual) that may be run in addition to the periodic operability tests. We assume that the additional number of demands are relatively small, however, compared to the number resulting from the weekly or monthly tests. And, due to the limited scope of this analysis, we made no further attempt to account for these additional demands.

Populations

Diesel-generator populations for our failure rate estimations were generally unavailable. The Crooks and Vissing[17] and Boner and Hanners (see Reference 6) studies provided some information. However, we determined most of our population information from the individual plant FSARs. A number of different diesel-generator-to-plant configurations exist in the plants considered in this study. For some configurations, where diesel generators are shared between plants, we found it was necessary to make some assumptions about individual plant diesel-generator populations. We identified the following configurations:

No Diesel Generator Units: Of all of the operating U.S. nuclear power plants considered in this study, Oconee Units 1, 2, and 3 are the only plants that do not have emergency diesel generators as their standby source of onsite A.C. power. This station has its own onsite hydroelectric plant, which is its standby source of emergency power; and, consequently, has no need for onsite emergency diesel generators. Therefore, these three plants are not included in our study.

One Plant, One Diesel Generator Unit. Three plants included in our study have this configuration. They are Big Rock Point, Dresden Unit 1, and Millstone Unit 1.

One Plant, Two Diesel Generator Units. The majority of plants included in our study have this configuration.

One Plant, Three Diesel Generator Units. Four plants included in our study have this configuration. They are Indian Point Units 2 and 3, Salem Unit 1, and Yankee Rowe.

One Plant, Four Diesel Generator Units. James A. Fitzpatrick is the only plant with this configuration.

Two Plants, Two Diesel Generator Units. Point Beach Units 1 and 2 are the only units equipped with this configuration. We assume that each plant has a diesel-generator population of two.

Two Plants, Three Diesel Generator Units. Eight plants have this configuration. They are Dresden Units 2 and 3, North Anna Units 1 and 2 (Unit 2 is not used in our study), Quad-Cities Units 1 and 2, and Surry Units 1 and 2. In this configuration, each plant has one diesel generator unit. The remaining diesel generator is shared between plants. Since we could not determine which plant had the responsibility for reporting the LER for the shared diesel generator, we included the shared diesel generator in the population count for each plant.

Two Plants, Four Diesel Generator Units. Brunswick Units 1 and 2, and Peach Bottom Units 2 and 3, have this configuration. All four diesel generators are shared between the two plants. In this case, the oldest units, Brunswick 2 and Peach Bottom 2, were assigned the total population (4) and all plant-specific LER rates were estimated for these plants only. The newer plants, Brunswick Unit 1 and Peach Bottom Unit 3, were then assigned the LER rate estimated for the older plant.

Three Plants, Four Diesel Generator Units. Browns Ferry Units 1, 2, and 3 are the only plants with this configuration. All four diesel generators are shared among three plants. Again, the oldest plant, Browns Ferry Unit 1, was assigned the total population (4) and all plant-specific LER rates were estimated for this plant only. Browns Ferry Units 2 and 3 were then given the LER rate estimated for Browns Ferry Unit 1.

Three other unusual arrangements were found in Joseph M. Farley Unit 1, St. Lucie, and Trojan. Joseph M. Farley Units 1 and 2 (Unit 2 is not included in this study) have a total of five diesel generators between them. As far as we could determine, all five diesel generators can be shared between either plant. Consequently, we gave Farley Unit 1 a population of five diesel generators. St. Lucie and Trojan each have two diesel-generator units. However, each diesel-generator unit is driven by tandem diesels. So, in actuality, St. Lucie has four diesels and two generators and Trojan has four diesels and two generators. However, for the purpose of this report, these plants are given a diesel-generator population of two.

Failures

We extracted the number of failures used for estimating the LER rates from the coded one-line LERs stored in the computer-based data file. Not all coded one-line LERs were considered as failures for this study. Only those one-liners categorized as Does Not Start or Does Not Continue to Run events were considered to be failures.

LER Rate Estimations

We estimated diesel-generator failure rates for all operating U.S. nuclear power plants, with the exceptions discussed above (pp. 1-2). Our method for estimating these rates is discussed in Appendix C. We grouped our estimations for each failure mode, or combination of failure modes, as follows:

1. An LER rate for each licensed operating plant

2. An LER rate for each NSSS

3. An LER rate for PWRs and BWRs

4. An overall LER rate based on aggregating the failure data of each licensed operating plant.

All LER rates given in this report are either standby failure rates calculated in units of failures per hour, demand failure rates calculated in units of failures per demand, or operating failure rates calculated in units of failures per hour. The analyst must decide, according to the particular problem being analyzed, which rates are applicable when he uses these LER rates in risk or reliability assessments.

In addition to our LER rate estimations, we also obtained associated chi-square confidence bounds. These confidence bounds apply strictly only when all the components combined have exactly the same failure rate. When components have different failure rates--which is due to individual component variations, different plant environments, and so forth--the confidence bounds will tend to bound only the average of the failure rates combined, and not individual component variations.

SUMMARY OF RESULTS

We received from the NRC, 627 LERs identified as diesel-generator events of the period, January 1, 1976 through December 31, 1978. These LERs were obtained by making two searches of the NRC LER file for diesel-generator events. The first search yielded events that were coded, ENGINES, INTERNAL COMBUSTION. This search resulted in 253 LERs. The second search of the NRC LER file was based on the same period as the first search, January 1, 1976 through December 31, 1978, but a text search of the LER narrative was made for the word "diesel," or any word in the narrative that contained "diesel" as part of the word. This search netted an additional 374 LERs for our study. The second search did not include any LERs that were coded as ENGINES, INTERNAL COMBUSTION. These two searches obtained a total of 627 LERs to be screened for diesel-generator failures. We believe these 627 LERs are all the LERs pertaining to diesel-generator events that have been reported by the U.S. commercial nuclear power plants during the period covered in this study.

These 627 LERs were then screened, and those that were not directly applicable to this analysis were excluded. Examples of inapplicable LERs are those reported prior to a plant's initial criticality date, reports of component failures other than the diesel-generator component (that is, diesel-driven fire pumps, diesel-driven auxiliary feed pumps, etc.), and reports received from atypical plants. For this report, we considered six plants to be atypical. They were Fort St. Vrain (gas-cooled), Humboldt Bay (BWR/1, only 63 MW), LaCrosse (NSSS is Allis-Chalmers), and Oconee 1, 2, and 3 (supplied with a standby source of electrical power from a hydroelectric plant located onsite). Indian Point 1 was also not considered because it had been shut down and defueled for a significant time.

After our screening of the 627 LERs, there were 408 L[illegible] available for analysis. We found LERs in our analysis that reported information describing more than one diesel-generator event. For example, at Salem 1, the 1A and 1B diesel generators were reported as inoperable (LER Control No. 018799) because they failed to reach rated speed on start. In this situation, we made two one-line description entries into the data base, 018799A and

0187998, for the respective diesel-generator, 1A and 1B, failures. Such multiple events resulted in an additional 17 one-line descriptions being inserted into the data base. Thus, after having analyzed the 408 LERs, we had 425 one-line events available for coding. We then coded these into one-line descriptions of the original LER and input them to the computer-based data file for use in our data summarizations. Appendix E is a complete listing of the 425 diesel-generator-event one-liners contained in our data file.

As stated earlier, not all of these one-line descriptions pertained to an actual hardware failure of the diesel-generator unit, but were events that occurred outside the boundaries of the diesel-generator unit, as defined by this report, and prevented the diesel-generator unit from achieving its intended function to supply power to emergency buses. We classified only 18% (53) of these one-line descriptions as command faults or recurring command faults. A significant number of the one-line LER , 30% (127), were neither failures nor command faults but rather technical specification violations (for example, not completing a test of the diesel-generator unit on time) or events indicating that the diesel generator was declared inoperable because preventive maintenance was to be performed on the unit, or events indicating that the diesel-generator unit was found to be in an inoperable state and no demand was placed on the diesel generator (for example, a person tagged out the wrong starting air pilot valves for a diesel generator at D. C. Cook Unit 1, LER Control No. 021634). One-line descriptions of this type were considered nonfailures for this report. These nonfailures were not used in any of the LER rate estimates, but we will discuss them later because the diesel was placed in an inoperable state by personnel error. Table 1 provides an accounting of the LERs analyzed for this report.

All of the LER rate estimations and data summaries include data for the period January 1, 1976 through December 31, 1978. We chose the starting date of January 1, 1976 for several reasons: more plants began operating with standard technical specifications in 1976, studies were conducted of diesel generators prior to this time by other organizations, and better LER reporting requirements were implemented during this time.

TABLE 1. ACCOUNTING OF LERS ANALYZED

NRC ENGINE, INTERNAL COMBUSTION events	253
NRC events not coded as ENGINE, INTERNAL COMBUSTION but containing the word "diesel"	374
Total LERs available for screening	627
Minus LERs not applicable	-219
Total LERs available for analysis	408
Multiple events contained in a single LER	17
Total one-Line descriptions in data file	425
Minus one-line descriptions of nonfailures	-127
Total one-liners used for LER rate estimations	298

The closing date was chosen in order to cover three full years. To have extended the period into 1979, we believe, would not have allowed us to obtain all of the LERs submitted by the utilities in the additional 1979 period. We base this on the fact that facilities do not have to immediately fill out an LER for a particular event; there exists a "grace" period. Also, when the LER is recieved by the NRC, it takes some time to be filed. For these reasons, then, only data from January 1, 1976 through December 31, 1978 were used.

We included command faults in all of our LER failure rate estimations. We felt that since the LERs apply to safety system degradation, the LER rates should reflect this by including all events that degrade a diesel generator to a state where it no longer functions properly. All LER rates stated in this report include command faults.

Failure Modes

Table 2 summarizes the 425 one-liners used in this report by mode and year.

TABLE 2. SUMMARY OF DIESEL-GENERATOR EVENTS BY FAILURE MODE AND YEAR

Failure Mode	1976	Percent of Total	1977	Percent of Total	1978	Percent of Total	1976-1978	Percent of 1976-1978 Total
Does Not Start	56	44	71	45	59	42	186	44
Does Not Continue to Run	39	30	39	25	34	24	112	26
Unavailable/Nonfailure	33	26	47	30	47	34	127	30
Total	128		157		140		425	

Does Not Start

Appendix F lists all of the diesel-generator events that were classified as Does Not Start failures.

Remember that the failure mode, Does Not Start, encompasses diesel-generator failures that resulted from the diesel failing to start (physically "rolling over"), failing to reach rated speed and voltage once a start sequence was initiated, and failing to achieve expected loading (kW).

The Does Not Start events, 186 in all, accounted for 44% of the 425 one-liners used in this report. When strictly considering the 298 events used for estimating LER rates, this failure mode accounted for 62% of the events.

Of the 186 Does Not Start failures, four plants, Big Rock Point, Dresden 2, Beaver Valley, and Joseph M. Farley 1, accounted for 32% (59) of these failures. The diesel generator at Big Rock Point was credited with 19 of these 59 failures. A majority of these 19 failures classified as Does Not Start were the failure of the diesel generator to meet its required starting time. These events, as recorded in our 1976-1978 data file, started appearing on 8/5/76 and continued through 2/2/78. During this period, 13 LERs were submitted by Big Rock Point relating to the failure of the diesel generator to meet the required starting time. Causes for these failures, as specified in the LERs, ranged from possible water jacket failure, to possible fuel system failure, possible governor control failure, and possible voltage drop on the starting cables and unknown reasons. In an attempt to correct this problem, the governor was replaced (2/19/76), governor lube oil supply modified (1/10/77), and fuel control valve modified (5/27/77). After all these modifications, the last LER (No. 020575), relating to the starting time not being met, reported the cause as unknown.

The Does Not Start failures (16) submitted by Dresden 2 resulted from low air receiver pressure, overspeed trips, air-start motor mechanical problems, etc. The low air receiver pressure prevented the diesel generator from starting on two different occasions. One reason reported for this low

air pressure was a loose wire at terminal 25A5, while the other occurrence had a ruptured regulator diaphragm reported as the cause. The reported causes for the various overspeed trips at Dresden 2 were possible out-of-adjustment governor compensation (6/30/77), probable out-of-adjustment governor compensation (7/12/77 and 3/8/78), and governor setting found set too high (5/22/78). The air-start motor events described problems such as the air-start motor pinion gear jammed (3/22/77), pinion gear not engaged (8/24/78), and finally, air-start motors engaging for only a few seconds as compared with the normal 15-second air start (12/16/78).

Of the 13 Does Not Start failures reported by Beaver Valley, 9 failures pertained to either the No. 1 or the No. 2 diesel generator output breaker failing to close onto the emergency bus. The remaining failures resulted from moisture in the starting air (5/20/76 and 4/29/77) and the generator failing to flash (7/17/77 and 7/28/78). The generator failing to flash on 7/28/78 was not detected during a test but later, when an actual demand was placed on the unit. The sequence of events that created the demand for the diesel generator was a fault in the station main transformer, resulting in a generator trip, turbine trip, reactor trip, and safety injection, followed in four minutes by a loss of offsite power.

The remaining plant, Joseph M. Farley 1, had 11 failures in the Does Not Start failure mode. Two failures indicate the diesel tripped on overspeed, due to the main air-start valve failing to close completely (8/17/77 and 8/28/77). Corrosion products clogging air-start valves contributed to two more failures at Joseph M. Farley 1 (3/2/78 and 3/8/78). Blown fuses in the motor-operated potentiometer (MOP) and motor-operated transformer (MOT) also resulted in two failures (8/27/78 and 9/5/78) at Joseph M. Farley 1. The remaining five failures had the following reported causes: speed switch failure due to wrong voltage rating (120 volt versus 130 volt), main air-start valve pusher assembly missing, loose coupling, out-of-alignment auxiliary switches in the output breaker, and incorrect installation of a jumper for Unit 1/Unit 2 separation.

Does Not Continue to Run

Appendix G lists the Does Not Continue to Run events.

We define the Does Not Continue to Run failure mode as any failure of an operating diesel generator to supply power to the emergency bus, given that the diesel generator had undergone a successful start (that is, starting, coming up to rated speed and voltage in the required time, closing of the output breaker to electrically connect the diesel generator to the emergency bus, and assuming the expected load).

The 112 Does Not Continue to Run events comprised 26% of the 425 one-liners in our data file. Compared to all of the events that were classified as failures (298 total failures), the Does Not Continue to Run events accounted for 38% of the failure events.

Millstone Unit 2 accounted for 14% (16) of the 112 Does Not Continue to Run failures. Five failures described by this failure mode at Millstone Unit 2 indicated that the 12U diesel generator was shut down because a low-flow, cooling water alarm sounded due to excessive mussel fouling of the diesel-generator heat exchanger (9/22/76, 8/17/77, 9/20/77, 5/8/78, and 12/5/78). The causes of the remaining Does Not Continue to Run failures at Millstone Unit 2 ranged from dirty fuel oil filters, to carbon in the crankcase vent, lack of lubrication, dried leather washers, failed bearings, leakage of lube/fuel oil, and dry starts of the diesel generator.

Unavailable/Nonfailure

Appendix H lists the diesel-generator events in our data file that were classified as Unavailable/Nonfailure.

The failure mode, Unavailable/Nonfailure, is defined as the mode for those events where the diesel generator was in an inoperable state, given that no demand (test or actual) was placed on the diesel generator to detect this state. Had a test or actual demand been experienced by the diesel generator while in this state, an appropriate failure mode, Does Not Start,

or Does Not Continue to Run, would have been assigned to this event mode. But, since no demand was made, no diesel-generator failure could be assumed. Also, the Unavailable/Nonfailure failure mode classifies LERs that indicate surveillance tests that were not performed, and diesel-generator design deficiencies. Even though the Unavailable/Nonfailure events are not considered as failures in the estimation process, we feel that they are important, since problems with the diesel generator existed and are described in these events.

We classified 30% (127) of the 425 diesel-generator one-liners as Unavailable/Nonfailure. Among the 47 plants that reported LERs classified under this failure mode, no plant dominated the 127 one-liners. At Surry 1, three LERs reported the discovery of flooded cylinders in the No. 1 diesel generator (No. 1 cylinder on 5/8/76, No. 19 cylinder on 7/2/76, and No. 7 cylinder on 7/23/76). D. C. Cook Unit 2 submitted an LER (6/15/78) which stated that, due to human error, both diesel generators were placed in a condition of not being capable of auto starting (an operator tagged out the wrong starting air pilot valves, when he was supposed to have tagged out the pilot valves for the diesel generators serving Unit 1). At Browns Ferry Unit 1, the 1C diesel-generator field breaker tripped, rendering the diesel generator inoperable. The field breaker tripped due to overheating caused by an inoperable fan. These are only some of the many events that are classified by the Unavailable/Nonfailure failure mode.

Table 3 summarizes the Unavailable/Nonfailure events by failure mechanism. Human error (personnel operation, personnel maintenance, and personnel testing) was the major mechanism for these events. Thirty-two percent (41 events) were attributed to human error. When design error, fabrication/construction/quality control, and procedural discrepancy are added to human error, these failure mechanisms accounted for 51% (65) of the 127 events classified by this failure mode.

TABLE 3. SUMMARY OF THE UNAVAILABLE/NONFAILURE DIESEL-GENERATOR EVENTS BY FAILURE MECHANISM AND YEAR

Failure Mechanism	1976	1977	1978	Total	Percent of Total
Personnel Operation	3	7	5	15	12
Personnel Maintenance	6	1	5	12	9
Personnel Testing	3	4	7	14	11
Design Errors	1	3	8	12	9
Fabrication/Construction/ Quality Control	--	1	2	3	2
Procedural Discrepancy	5	1	3	9	7
Corrosion/Erosion	1	1	--	2	2
Foreign Material Contamination	1	3	1	5	4
Mechanical/Electrical Control	4	7	8	19	15
Hi/Low Ambient Temperature	3	3	3	9	7
Lube/Fuel/Water/Air Leakage	5	9	5	19	15
Vibration	--	5	--	5	4
Out of Adjustment/Calibration	1	2	--	3	2
Total	33	47	47	127	

Failure Mechanisms

Table 4 summarizes the diesel-generator failure mechansims by failure mode and time.

In general, the failure mechanisms given in Table 4 are self-explantory. However, we will discuss the failure mechanisms Unknown, Human Error, Procedural Discrepancy, and Foreign Material Contamination in more detail.

TABLE 4. SUMMARY OF DIESEL-GENERATOR FAILURES BY FAILURE MECHANISM, FAILURE MODE, AND YEAR

Failure Mechanism	Failure Modes: Does Not Start 1976	1977	1978	1976-1978	Does Not Continue to Run 1976	1977	1978	1976-1978	Total	Percent of Total
Unknown	14	17	12	43	3	2	4	9	52	17
Personnel Operation	2	4	1	7	--	--	2	2	9	3
Personnel Maintenance	5	1	5	11	5	5	1	11	22	7
Personnel Testing	2	--	--	2	--	--	--	--	2	1
Design Error	2	8	1	11	4	3	--	7	18	6
Fabrication/Construction/ Quality Control	1	--	1	2	--	2	1	3	5	2
Procedural Discrepancy	3	2	3	8	1	3	--	4	12	4
Defective Fuel Injector(s)	--	--	--	--	1	1	3	5	5	2
Corrosion/Erosion	1	1	--	2	1	--	--	1	3	1
Foreign Material Contamination	6	9	7	22	10	4	4	18	40	13
Mechanical/Electrical Control	15	18	23	56	6	7	12	25	81	27

TABLE 4. (continued)

Failure Mechanism	Failure Modes: Does Not Start 1976	1977	1978	1976-1978	Does Not Continue to Run 1976	1977	1978	1976-1978	Total	Percent of Total
Hi/Low Ambient Temperature	--	--	2	2	--	--	1	1	3	1
Lube/Fuel/Water/Air Lea age	1	4	--	5	5	2	3	10	15	5
Vibration	2	4	2	8	3	6	1	10	18	6
Out of Adjustment/Calibration	2	3	2	7	--	4	2	6	13	4
Total	56	71	59	186	39	39	34	112	298	

Appendix I contains a sorted listing of the diesel-generator failures by failure mechanism.

Unknown

The failure mechanism, Unknown, accounted for 17% (52) of the 298 diesel-generator failures. Of these 52 failures, 83% (43) were reported with the diesel-generator failure mode Does Not Start, and 60% (31) were classified as recurring failures.

Human Error

We define human error as any failure resulting from personnel operation, personnel maintenance, or personnel testing. Human error accounted for 11% of the 298 failures. When classifying the failures caused by human error, either as an act of comission or omission, there was approximately a 50% split for each act. Looking at a yearly summary of the diesel-generator failures (14 in 1976, 10 in 1977, and 9 in 1978), it appears that the number of LERs indicating human error as the cause of failure, are declining. It is not known whether this gradual reduction is the result of better administrative practices, better training/maintenance programs, or some other function (such as recording anomalies in LERs).

Procedural Discrepancy

Even though Table 4 indicates that a small percentage of the diesel-generator failures were attributed to procedural discrepancies, we feel that it is important to cite several incidents where inadequate procedures resulted in failures of the diesel generator. The first incident occurred at Millstone 2 on 12/18/76 (LER No. 016755). During a surveillance test on the 13U diesel generator, the bearing-cap capscrews in the No. 3 upper piston connecting rod, sheared. This resulted in ejection of the rod through the upper crankcase cover. The cause description for this failure stated that "the diesel generator probably failed from a series of unlubricated or dry starts. Emergency starting of the diesels under non-emergency conditions have been eliminated." The second incident occurred on 9/20/77

at Kewaunee (LER No. 019171). The LER stated, "While conducting a monthly test run of diesel generator 1A, smoke and a lazy orange flame was observed coming from the turbocharger." The cause description for this event stated that the fire was caused by carbon buildup in the exhaust path through the turbocharger, which was the result of intermittent, short-duration operation of the diesel generator. The diesel generator was eventually run at high load for four hours, at the advice of the manufacturer, to reduce the exhaust residue buildup. As pointed out by Boner and Hanners,[18] excessively long periods of no-load and light-load operation tend to be practiced in nearly all plants. The diesel manufacturers oppose this practice, and in the industry it is considered bad practice.

Foreign Material Contamination

Based on the 298 failures, a summary of this mechanism by failure mode indicates that it was the third most numerous mechanism (13%) contributing to Does Not Start failures, and the second largest mechanism contributing to the Does Not Continue to Run failures. A majority of the Does Not Start failures (25%) were attributed to corrosion deposits in the starting air system. The Does Not Continue to Run failures that were attributed to this failure mechanism referred to sludge, scale, or mussel fouling as the specific cause for the diesel failure. Thirty percent of the Foriegn Material Contamination failures occurred in the diesel-generator cooling system.

Subsystem

Appendix J provides a sorted list of the diesel-generator failures by subsystem; Table 5 summarizes those subsystem events by failure mode. Fuel oil, starting, and governor systems comprised 44% of the 298 diesel generator failures. Over half of the diesel-generator failures, attributed to the governor, 28 of 52, were coded as recurring events. Table 6 summarizes the subsystem events by failure mechanism.

TABLE 5. SUMMARY OF DIESEL-GENERATOR FAILURES BY SUBSYSTEM, FAILURE MODE, AND YEAR

Subsystem	Failure Modes: Does Not Start 1976	1977	1978	1976-1978	Does Not Continue to Run 1976	1977	1978	1976-1978	Total	Percent of Total
Fuel Oil	5	9	6	20	9	1	6	16	36	12
Lube Oil	1	4	4	9	5	2	2	9	18	6
Starting	15	12	12	39	--	4	1	5	44	15
Cooling	3	6	--	9	4	8	6	18	27	9
Scavenging Air	--	--	--	--	--	5	3	8	8	3
Engine Frame/Internals	3	--	4	7	4	5	2	11	18	6
Governor	10	10	13	33	8	7	4	19	52	17
Exhaust	--	--	--	--	3	--	--	3	3	1
Shutdown	2	6	--	8	--	3	--	3	11	4
Output Breaker	5	9	8	22	--	1	2	3	25	8
Exciter/Voltage Regulator	3	7	5	15	2	2	6	10	25	8
Generator	--	2	1	3	1	1	--	2	5	2
Other/Unknown	9	6	6	21	3	--	2	5	26	9
Total	56	71	59	186	39	39	34	112	298	

TABLE 6. SUMMARY OF DIESEL-GENERATO

Failure Mechanism	Fuel Oil	Lube Oil	Starting	Cooling	Scavenging Air	Engi Frame/In
Unknown	5	--	7	2	2	2
Personnel Operation	1	--	--	1	--	1
Personnel Maintenance	3	4	2	3	--	2
Personnel Testing	--	--	--	--	--	--
Design Error	2	2	--	--	3	1
Fabrication/Construction/ Quality Control	--	--	--	--	1	2
Procedural Discrepancy	2	--	--	--	2	2
Defective Fuel Injector(s)	5	--	--	--	--	--
Corrosion/Erosion	--	--	1	--	--	--
Foreign Material Contamination	6	1	10	12	--	5
Mechanical/Electrical Control	5	5	18	1	--	--
Hi/Low Ambient Temperature	--	--	--	--	--	--
Lube/Fuel/Water/Air Leakage	4	5	1	3	--	--
Vibration	3	--	3	1	--	3
Out of Adjustment/Calibration	--	1	2	4	--	--
Total	36	18	44	27	8	18

)R FAILURES BY SUBSYSTEM AND FAILURE MECHANISM

Subsystem								
ıe ternals	Governor	Exhaust	Shutdown	Output Breaker	Exciter/Voltage Regulator	Generator	Other/Unknown	Total
	8	--	1	5	--	2	18	52
	1	--	1	--	3	--	1	9
	5	--	--	2	1	--	--	22
	--	--	--	1	--	--	1	2
	1	2	--	7	--	--	--	18
	1	--	--	--	--	1	--	5
	1	--	2	1	1	--	1	12
	--	--	--	--	--	--	--	5
	1	--	--	--	1	--	--	3
	4	--	--	--	1	--	1	40
	24	--	2	9	16	1	--	81
	--	--	--	--	--	--	3	3
	1	1	--	--	--	--	--	15
	3	--	2	--	1	1	1	18
	2	--	3	--	1	--	--	13
	52	3	11	25	25	5	26	298

Types of Event

Appendix K provides a sorted list of the diesel-generator events by event type, that is, common cause, recurring, recurring common cause, command faults, and recurring command faults. All other diesel-generator events were considered to be random. Table 7 is a summary of the diesel-generator events by type of event and failure mode. Table 8 is a summary of diesel events by type of event and failure mechanism.

Common Cause and Recurring Common Cause

Diesel-generator events coded as common cause and recurring common cause, accounted for 16% of the 298 events that were considered as failures for this report. Some of the reasons for the common cause events were winter weather, corrosion products clogging air start valves (Foreign Material Contamination), lack of lubrication resulting in binding fuel racks, a rag found in an oil strainer (Personnel Maintenance), water grounding out a cooling-water motor, and leaks in the air-line supply to a master shutdown valve.

Recurring Common Cause events were the result of such things as dirty fuel oil, dirty filters, carbon in crankcase vents (Foreign Material Contamination), lack of lubrication, dried leather washers in booster servomotors, mussel fouling of diesel generator cooling heat exhangers (Foreign Material Contamination), dirty relay contacts (Design Error), and failure of a main air-start valve to fully shut. Of the 26 events classified as recurring common cause, 15 occurred at Millstone Unit 2. And all but two of these failures referred to the 12U diesel generator at Millstone 2. Beaver Valley 1 reported dirty relay contact failures, which we classified as a design error, since a request for a design change for sealed relays was indicated by Beaver Valley in the LERs submitted. Joseph M. Farley Unit 1 reported that failure of the main air-start valve to shut fully, caused the diesel generator to trip on overspeed. Air leaking through the partially-open valve maintained the mechanical booster in the high-rack position, which overrode the governor and caused an overspeed trip of the diesel generator. This occured four times at Joseph M. Farley 1.

TABLE 7. SUMMARY OF DIESEL-GENERATOR FAILURES BY TYPE OF EVENT AND FAILURE MODE

	Does Not Start		Does Not Continue to Run		Total	
Type of Event	Failures	Percent	Failures	Percent	Failures	Percent
Common Cause	11	6	11	10	22	7
Recurring	69	37	25	22	94	32
Command Fault	30	16	13	12	43	14
Recurring Common Cause	9	5	17	15	26	9
Recurring Command Fault	3	2	7	6	10	3
Other (i.e., Random)	64	34	39	35	103	35
Total	186		112		298	

TABLE 8. SUMMARY OF DIESEL-GENERATOR FAILURES BY TYPE OF EVENT AND FAILURE MECHANISM

Failure Mechanism	Random Failure	Recurring Common Cause	Common Cause	Recurring	Command Faults	Recurring Command Faults	Total	Percent of Total
Unknown	21	--	--	29	2	--	52	17
Personnel Operation	1	--	--	1	7	--	9	3
Personnel Mainenance	5	--	3	--	11	3	22	7
Personnel Testing	--	--	--	1	1	--	2	1
Design Error	2	6	2	7	1	--	18	6
Fabrication/Construction/ Quality Control	4	--	1	--	--	--	5	2
Procedural Discrepancy	4	--	1	--	7	--	12	4
Defective Fuel Injector(s)	3	--	--	2	--	--	5	2
Corrosion/Erosion	3	--	--	--	--	--	3	1
Foreign Material Contamination	11	10	6	13	--	--	40	13
Mechanical/Electrical Control	36	7	2	31	5	--	81	27
Hi/Low Ambient Temperature	--	--	2	--	1	--	3	1
Lube/Fuel/Water/Air Leakage	6	2	3	4	--	--	15	5
Vibration	7	1	2	6	2	--	18	6
Out of Adjustment/Calibration	--	--	--	--	6	7	13	4
Total	103	26	22	94	43	10	298	

In the Unavailable/Nonfailure listing of Appendix H, you will also find diesel-generator events classified as common cause. At Peach Bottom 3 (LER No. 018059), an air leak caused the starting air banks to depressurize, making three of the four diesel generators inoperable. Further compounding this situation, the depressurization finally resulted in overloading of the start air compressors. This caused a thermal overload trip of the air compressors, which prevented the air banks from being repressurized to their normal operating pressure.

Recurring

Recurring diesel-generator failures accounted for 44% of the 298 failures (32% for recurring, 9% for recurring common cause, and 3% for recurring command faults). A sequence of recurring events, other than those at Big Rock Point, which we discussed in our Does Not Start, failure mode section, occurred at Surry 1. This sequence of events started on 4/16/76 and ended 7/23/76, three and one-half months later. The first LER (No. 014869) stated that the engine was started with No. 17 piston cylinder flooded with water. The cause description on the LER stated, "Personnel Error: Engine had a crack in No. 17 cylinder head which extended between two exhaust valve seats and into the water jacket. This area of high heat stress probably [our emphasis] caused the crack." Nowhere in the LER was there any indication that the operator was at fault. On 5/8/76, the next LER (No. 014840) reports, "While preparing to start No. 1 DG, water was observed coming out of the air box drain. The cause was a crack in No. 1 cylinder head which extended from the exhaust valve seat to the injector well and through to the water jacket." The next occurrence (LER No. 015521), on 7/2/76, stated that No. 9 cylinder head had a crack. On 7/23/76 (LER No. 015523), No. 7 cylinder head had a crack in it. For all of these events, no cause was listed except the "probable high heat stress area." In an investigation into the "root" causes for diesel generator failures, Boner and Hanners learned that a water temperature control switch mounted on the engine skid assembly failed. Vibration caused the switch to fail, which, in turn, caused the radiator shutters to fall closed, resulting in overheating of the engine.[19]

Command Faults and Recurring Command Faults

Again, command faults are events that did not result in an actual physical failure of the diesel-generator unit, but, due to inputs, or the lack of inputs, from other components external to the unit, the diesel generator failed to function as expected. Command faults and recurring command faults accounted for 18% (53) of the 298 failures. Human error accounted for 42% (22) of the command fault and recurring command fault classification. Examples of command faults due to human error were as follows: incorrect valve lineups, failure to reset trips, improper voltage settings prior to paralleling, airbound cooling systems (not vented), and improper adjustment of the governor and various electrical components (for example, pressure switches, and overspeed relays).

Failure Classification

Table 9 is a summary of the failures by failure classification and failure mode. Appendix L is a sorted list of the diesel-generator failures by the three failure classifications: Demand, Time, and Unknown.

TABLE 9. SUMMARY OF DIESEL-GENERATOR FAILURES BY FAILURE CLASSIFICATION AND FAILURE MODE

Failure Classification	Does Not Start		Does Not Continue to Run		Total	
	Failures	Percent	Failures	Percent	Failures	Percent
Demand	95	51	43	38	138	46
Time	53	28	62	55	115	39
Unknown	38	20	7	6	45	15
Total	186		112		298	

As mentioned, we attempted to classify all diesel-generator failures as either "time related" or "demand related"; that is, we asked if the failure was related to exposure time (age) or to the frequency of demand.

As the stand-by time or running time increases, the chance of a time-related failure increases. The chance for a demand-related failure increases as the demands on the component increase, not directly as time increases. Failures due to human errors that occurred during testing or maintenance of the diesel generator were considered to be demand related, since the probability of this kind of failure increases as the frequency of test or maintenance acts increases, and not directly as time increases.

Due to the limited information contained in the LER, our classification method is highly subjective. Therefore, care should be exercised in drawing conclusions from these data.

Repair Time

Table 10 is a summary of diesel-generator failures by failure mode and repair times. Appendix M is a listing of diesel-generator failures sorted by the repair-time intervals.

We created this classification to provide information for risk modeling. That is, given an accident that requires the diesel generators to supply power to the emergency buses, and the diesel generator(s) fails to function as expected, how long would the emergency buses be without power before a diesel generator would become available (be repaired) to supply power to these buses? Again, we note that this classification is mostly determined subjectively and is based on our experience with diesel generators. However, there were LERs that stated exactly how long it took to repair the diesel generator. But the number of these LERs is small, approximately 19% of the 425 one-liners, compared to the number of LERs that did not state how long the repair took.

To provide additional insight into the repair-time classifications, we provide various summaries. Table 11 summarizes the diesel-generator failures by subsystem and repair times. Table 12 summarizes the diesel-generator failures by failure mechanism and repair times.

TABLE 10. SUMMARY OF DIESEL-GENERATOR FAILURES BY REPAIR TIME, FAILURE MODE, AND YEAR

Repair Times	Does Not Start			Total 1976-1978	Percent of Total	Does Not Continue to Run			Total 1976-1978	Percent of Total	Grand Total	Percent Grand Total
	1976	1977	1978			1976	1977	1978				
0 to 1 Hour	14	19	18	51	27	7	4	7	18	16	69	23
1 to 4 Hours	13	21	11	45	24	7	14	10	31	28	76	26
4 to 8 Hours	9	13	18	40	22	11	7	9	27	24	67	22
8 to 24 Hours	7	2	5	14	8	9	5	2	16	14	30	10
Greater Than 24 Hours	3	4	6	13	7	4	9	6	19	17	32	11
Unknown/Not Applicable	10	12	1	23	12	1	--	--	1	1	24	8
Total	56	71	59	186		39	39	34	112		298	

TABLE 11. SUMMARY OF DIESEL-GENERATOR FAILURES BY SUBSYSTEM AND REPAIR TIME

Subsystem	Repair Time						
	0 to 1 Hour	1 to 4 Hours	4 to 8 Hours	8 to 24 Hours	Greater Than 24 Hours	Unknown/ Not Applicable	Total
Fuel Oil	13	7	6	5	1	4	36
Lube Oil	4	7	4	2	1	--	18
Starting	5	16	12	7	1	3	44
Cooling	3	9	3	4	8	--	27
Scavenging Air	--	1	--	--	7	--	8
Engine Frame/Internals	?	5	1	1	8	--	18
Governor	12	14	19	--	1	6	52
Exhaust	--	--	--	3	--	--	3
Shutdown	3	4	3	1	--	--	11
Output Breaker	8	6	6	2	2	1	25
Exciter/Voltage Regulator	7	3	10	3	2	--	25
Generator	1	2	1	--	--	1	5
Other/Unknown	10	2	2	2	1	9	26
Total	69	76	67	30	32	24	298

TABLE 12. SUMMARY OF DIESEL-GENERATOR FAILURES BY FAILURE MECHANISM AND REPAIR TIME

Failure Mechanisms	Repair Time						
	0 to 1 Hour	1 to 4 Hours	4 to 8 Hours	8 to 24 Hours	Greater Than 24 Hours	Unknown/ Not Applicable	Total
Unknown	21	2	5	3	3	18	52
Personnel Operation	6	1	1	--	1	--	9
Personnel Maintenance	7	8	3	3	1	--	22
Personnel Testing	--	--	1	--	--	1	2
Design Error	1	7	--	3	5	2	18
Fabrication/Construction/ Quality Control	--	1	1	1	2	--	5
Procedural Discrepancy	7	2	--	--	3	--	12
Defective Fuel Injector(s)	--	1	4	--	--	--	5
Corrosion/Erosion	--	--	1	2	--	--	3
Foreign Material Contamination	6	11	9	6	8	--	40
Mechanical/Electrical Control	16	21	33	5	4	2	81
Hi/Low Ambient Temperature	1	1	--	--	1	--	3
Lube/Fuel/Water/Air Leakage	2	4	1	6	1	1	15
Vibration	2	12	3	--	1	--	18
Out of Adjustment/Calibration	--	5	5	1	2	--	13
Total	69	76	67	30	32	24	298

Method of Discovery

This is a classification of the diesel-generator events by the activity taking place when the failure was detected. Note that the diesel generator could have been in a failed state prior to this activity. Table 13 summarizes the diesel-generator failures by failure mode and Method of Discovery. As Table 13 indicates, 83% of the diesel-generator failures were detected by testing.

TABLE 13. SUMMARY OF DIESEL-GENERATOR FAILURES BY METHOD OF DISCOVERY AND FAILURE MODE

	Does Not Start		Does Not Continue to Run		Total	
Method of Discovery	Failures	Percent	Failures	Percent	Failures	Percent
During Maintenance	5	3	2	2	7	2
During Normal Operation	25	13	16	14	41	14
During Testing	154	83	94	84	248	83
Unknown	2	1	0	--	2	1
Total	186		112		298	

Manufacturer/kW Rating

We also provide data summaries of failures by manufacturer/kW rating. The data are provided so that further analyses of the failures can be done to determine if there exists a correlation between the manufacturer/kW rating and the diesel-generator failures. Note that the manufacturers listed are those that manufacture or package the diesel. The generator is usually built by another manufacturer. Note also that though these are the manufacturers of the diesel, they do not necessarily package the complete diesel-generator unit.

Appendix N is a list of the diesel-generator failures sorted by manufactuer/kW rating. Table 14 summarizes the diesel-generator failures by failure mode, year, and manufacturer/kW rating. Table 15 is a yearly summarization of the diesel-generator population by manufacturer/kW rating. Table 16 is a summarization of the diesel-generator failures by manufacturer/kW rating and failure mechanism. Table 17 summarizes the diesel-generator failures by manufacturer/kW rating and subsystem. Table 18 summarizes the diesel generator failures by repair time and manufacturer/kW rating. And Table 19 provides a summary of all the failure data (demands, operating hours, plant, etc.) by manufacturer/kW rating and subsystem.

TABLE 14. SUMMARY OF DIESEL-GENERATOR FAILURES BY MANU

Manufacturer/kW Rating	Does Not Start				Percent of Total	Does Not Continue to R	
	1976	1977	1978	Total		1976	1977
Alco							
1750 to 1950	--	--	1	1	1	3	--
2500 to 2850	--	2	--	2	1	2	2
Caterpillar							
200 to 400	11	7	1	19	10	2	--
Cooper-Bessemer							
4000 to 4418	2	--	5	7	4	3	4
De Laval							
500 to 1000	--	--	2	2	1	--	--
Fairbanks Morse							
2500 to 2850	15	10	8	33	18	18	15
3000 to 3500	2	9	9	20	11	2	3
4000 to 4418	--	3	5	8	4	--	2
General Motors							
200 to 400	--	1	--	1	1	--	2
500 to 1000	--	--	5	5	3	--	--
2500 to 2850	20	31	19	70	38	6	6
3000 to 3500	2	4	1	7	4	1	2
4000 to 4418	--	1	--	1	1	--	1
Nordberg Manufacturing							
3000 to 3500	3	3	1	7	4	2	2
Worthington							
3000 to 3500	1	--	2	3	2	--	--
Total	56	71	59	186		39	39

FACTURER/kW RATING, FAILURE MODE, AND YEAR

un 1978	Total	Percent of Total	Grand Total	Population	Percent of Grand Total	Percent of Total Population
--	3	3	4	8	1	6
1	5	4	7	7	2	5
1	3	3	22	1	7	1
5	12	11	19	7	6	5
--	--	--	2	2	1	2
7	40	36	73	21	24	16
4	9	8	29	16	10	13
--	2	2	10	3	3	2
--	2	2	3	3	1	2
--	--	--	5	1	2	1
12	24	21	94	43	32	34
--	3	3	10	6	3	5
--	1	1	2	2	1	2
1	5	4	12	4	4	3
3	3	3	6	4	2	3
34	112		298	128		

TABLE 15. SUMMARY OF DIESEL-GENERATOR POPULATIONS BY MANUFACTURER/kW RATING AND YEAR

Manufacturer/kW Rating	Diesel Generator Population 1976	1977	1978	Percent of Total
Alco				
1750 to 1950	8	8	8	6
2500 to 2850	7	7	7	5
Caterpillar				
200 to 400	1	1	1	1
Cooper-Bessemer				
4000 to 4418	7	7	7	5
De Laval				
500 to 1000	2	2	2	2
Fairbanks Morse				
2500 to 2850	13	15	21	16
3000 to 3500	12	14	16	13
4000 to 4418	--	3	3	2
General Motors				
200 to 400	3	3	3	2
500 to 1000	1	1	1	1
2500 to 2850	41	43	43	34
3000 to 3500	6	6	6	5
4000 to 4418	2	2	2	2
Nordberg Manufacturing				
3000 to 3500	4	4	4	3
Worthington				
3000 to 3500	2	2	4	3
Total	109	118	128	

TABLE 16. SUMMARY OF DIESEL-GENERATOR FAILURES BY MAN

Manufacturer/ kW Rating	Unknown	Personnel Operation	Personnel Maintenance	Personnel Testing	Design Error	Fabrication/ Construction/ Quality Control	Procedural Discrepancy	Defective Fuel Injector(s)	Corrosion/Erosion
Alco									
1750 to 1950	--	--	2	--	--	--	--	--	--
2500 to 2850	--	1	--	--	3	--	--	--	--
Caterpillar									
200 to 400	12	--	--	1	3	--	--	--	--
Cooper-Bessemer									
4000 to 4418	3	--	1	1	--	--	--	--	1
De Laval									
500 to 1000	--	--	--	--	--	--	1	--	--
Fairbanks Morse									
2500 to 2850	13	2	8	--	2	1	4	3	1
3000 to 3500	4	1	2	--	--	1	3	--	--
4000 to 4418	--	--	1	--	--	--	--	--	--
General Motors									
200 to 400	--	--	--	--	--	--	--	--	--
500 to 1000	--	--	--	--	--	--	--	--	--
2500 to 2850	17	2	7	--	6	2	4	--	--
3000 to 3500	--	2	--	--	2	--	--	--	--
4000 to 4418	1	--	--	--	--	--	--	--	--
Nordberg Manufacturing									
3000 to 3500	1	1	1	--	2	1	--	1	1
Worthington									
3000 to 3500	1	--	--	--	--	--	--	1	--
Total	52	9	22	2	18	5	12	5	3

UFACTURER/kW RATING AND FAILURE MECHANISM

Foreign Material Contamination	Mechanical/ Electrical Control	Hi/Low Ambient Temperature	Lube/Fuel/Water/ Air Leakage	Vibration	Out of Adjustment/ Calibration	Total Failures	DG Population	Percent of Total Failures	Percent of DG Population
--	2	--	--	--	--	4	8	1	6
--	2	--	--	1	--	7	7	2	5
2	3	--	1	--	--	22	1	7	1
1	7	--	1	3	1	19	7	6	5
--	1	--	--		--	2	2	1	2
14	12	--	5	4	4	73	21	24	16
7	5	--	1	4	1	29	16	10	13
1	8	--	--	--	--	10	3	3	2
2	1	--	--	--	--	3	3	1	2
--	3	2	--	--	--	5	1	2	1
9	29	1	5	5	7	94	43	32	34
3	2	--	1	--	--	10	6	3	5
--	1	--	--	--	--	2	2	1	2
1	2	--	1	--	--	12	4	4	3
--	3	--	--	1	--	6	4	2	3
40	81	3	15	18	13	298	128		

TABLE 17. SUMMARY OF DIESEL-GENERATOR FA

Manufacturer/ kW Rating	Fuel Oil	Lube Oil	Starting	Cooling	Scavenging Air	Engine Frame/ Internals	Governor	Exhaust
Alco								
1750 to 1950	--	--	--	--	--	--	2	--
2500 to 2850	2	--	--	1	1	--	--	2
Caterpillar								
200 to 400	4	--	4	5	--	--	6	--
Cooper-Bessemer								
4000 to 4418	2	2	2	--	--	1	3	--
De Laval								
500 to 1000	2	--	--	--	--	--	--	--
Fairbanks Morse								
2500 to 2850	7	5	4	14	--	8	11	1
3000 to 3500	3	4	1	3	--	7	6	--
4000 to 4418	--	--	6	--	--	--	3	--
General Motors								
200 to 400	--	--	1	2	--	--	--	--
500 to 1000	1	1	1	--	--	--	--	--
2500 to 2850	8	4	21	2	5	2	15	--
3000 to 3500	2	--	--	--	2	--	2	--
4000 to 4418	--	--	--	--	--	--	1	--
Nordberg Manufacturing								
3000 to 3500	3	2	2	--	--	--	2	--
Worthington								
3000 to 3500	2	--	2	--	--	--	1	--
Total	36	18	44	27	8	18	52	3

ILURES BY MANUFACTURER/kW RATING AND SUBSYSTEM

Subsystem								
Shutdown	Output Breaker	Exciter/ Voltage Regulator	Generator	Other/ Unknown	Total Failures	DG Population	Percent of Total Failures	Percent of DG Population
--	1	--	1	--	4	8	1	6
--	--	1	--	--	7	7	2	5
--	1	--	--	2	22	1	7	1
2	1	4	--	2	19	7	6	5
--	--	--	--	--	2	2	1	2
1	4	5	1	12	73	21	24	16
2	1	--	1	1	29	16	10	13
--	1	--	--	--	10	3	3	2
--	--	--	--	--	3	3	1	2
--	--	--	--	2	5	1	2	1
5	13	12	2	5	94	43	32	34
1	1	1	--	1	10	6	3	5
--	--	--	--	1	2	2	1	2
--	2	1	--	--	12	4	4	3
--	--	1	--	--	6	4	2	3
11	25	25	5	26	298	128		

TABLE 18. SUMMARY OF DIESEL-GENERATOR FAILURES BY MANUFACTURER/kW RATING AND REPAIR TIME

Manufacturer/ kW Rating	0 to 1 Hour	1 to 4 Hours	4 to 8 Hours	8 to 24 Hours	Greater Than 24 Hours	Unknown/ Not Applicable	Total	Population	Percent of Total	Percent of Population
Alco										
1750 to 1950	1	1	2	--	--	--	4	8	1	6
2500 to 2850	--	3	1	2	1	--	7	7	2	5
Caterpillar										
200 to 400	1	4	3	--	2	12	22	1	7	1
Cooper-Bessemer										
4000 to 4418	3	6	4	3	2	1	19	7	6	5
De Laval										
500 to 1000	2	--	--	--	--	--	2	2	1	2
Fairbanks Morse										
2500 to 2850	21	13	17	6	12	4	73	21	24	16
3000 to 3500	10	9	8	--	1	1	29	16	10	13
4000 to 4418	--	1	4	3	--	2	10	3	3	2

TABLE 18. (continued)

Manufacturer kW Rating	0 to 1 Hour	1 to 4 Hours	4 to 8 Hours	8 to 24 Hours	Greater Than 24 Hours	Unknown/ Not Applicable	Total	Population	Percent of Total	Percent of Population
General Motors										
200 to 400	--	1	--	2	--	--	3	3	1	2
500 to 1000	1	--	--	1	3	--	5	1	2	1
2500 to 2850	22	28	24	8	9	3	94	43	32	34
3000 to 3500	5	2	1	--	2	--	10	6	3	5
4000 to 4418	--	1	--	--	--	1	2	2	1	2
Nordberg Manufacturing										
3000 to 3500	1	4	2	5	--	--	12	4	4	3
Worthington										
3000 to 3500	2	3	1	--	--	--	6	4	2	3
Total	69	76	67	30	32	24	298	128		

TABLE 19. SUMMARY OF FAILURE DATA BY MANUF

Diesel Generator Manufacturer and Plant Name	Plant Code	Generator kW Rating	Population	Minimum Number of Demands per Component		Minimum Number of Operating Hours per Component		Standby Hours per Component	Fuel Oil System	Lube Oil System	Starting System	
				Weekly	Monthly	Weekly	Monthly					
Alco											N 0	
Indian Point 2	IP2	1750	3	156	36	156	36	26280				
Indian Point 3	IP3	1750	3	142	33	142	33	23925	--	--	--	
Robert E. Ginna	RG1	1950	2	156	36	156	36	26280	--	--	--	
Palisades	PA1	2500	2	156	36	156	36	26280			N 0	
Pilgrim 1	PI1	2600	2	156	36	156	36	26280	--	--	--	
Salem 1	SA1	2600	3	107	25	107	25	17976	2A	--	--	
(Subtotal)			(15)	(873)	(202)	(873)	(202)	(147021)	(2A)	--	--	
Caterpillar												
Big Rock Point	BP1	200	1	156	36	156	36	26280	4A	--	4A	
Cooper-Bessemer												
Cooper Station	CO1	4000	2	156	36	156	36	26280	1B	--	--	
Zion 1	ZI1	4000	5[b]	156	36	156	36	26280	1B	1A	2A	
Zion 2	ZI2	4000		156	36	156	36	26280	--	1B		
(Subtotal)			(7)	(468)	(108)	(468)	(108)	(78840)	(2B)	(1A,1B)	(2A)	
De Laval												
San Onofre 1	SO1	600	2	156	36	156	36	26280	2A	--	--	
Fairbanks Morse												
Calvert Cliffs 1	CC1	2500	3[b]	156	36	156	36	26280	--	1B	--	
Calvert Cliffs 2	CC2	2500		108	25	108	25	18264	--	--	2A	
H. B. Robinson 2	RO2	2500	2	156	36	156	36	26280	2B	--	--	
Joseph M. Farley 1[c]	JF1	2600	2	72	17	72	17	12192	--	--	1A	
Millstone 1	MI1	2664	1	156	36	156	36	26280			N 0	
Millstone 2	MI2	2750	2	156	36	156	36	26280	1A,3B	2B	--	
North Anna 1	NA1	2750	2	38	9	38	9	6456			N 0	
Arkansas Nuclear One 2	AR2	2850	2	4	1	4	1	600			N 0	
Duane Arnold	DA1	2850	2	156	36	156	36	26280	1B	1B	--	
Edwin I. Hatch 1	EN1	2850	5[b]	155	36	156	36	26280	--	1B	1A	
Edwin I. Hatch 2	EN2	2850		26	6	26	6	4296	--	--	--	
Crystal River 3	CR3	3000	2	102	24	102	24	17184	1A	1A	--	
Prairie Island 1	PR1	3000	2	156	36	156	36	26280	--	--	--	
Prairie Island 2	PR2	3000	2	156	36	156	36	26280	--	--	--	
Three Mile Island 1	TI1	3000	2	156	36	156	36	26280	--	2A	--	
Three Mile Island 2	TI2	3000	2	40	9	40	9	6648	1A	--	--	
Vermont Yankee	VY1	3000	2	156	36	156	36	26280	1B	--	1A	
Peach Bottom 2	PB2	3250	4[b]	156	36	156	36	26280	--	1B	--	
Peach Bottom 3	PB3	3250		156	36	156	36	26280			N 0	
Joseph M. Farley 1[c]	JF1	4000	3	72	17	72	17	12192	--	--	4A,2B	
(Subtotal)			(40)	(2334)	(540)	(2334)	(540)	(393192)	(3A,7B)	(3A,6B)	(9A,2B)	
General Motors												
Yankee Rowe	YR1	400	3	156	36	156	36	26280	--	--	1A	
Dresden 1	DR1	500	1	156	36	156	36	26280	1A	1A	1A	
Fort Calhoun	FC1	2500	2	156	36	156	36	26280	--	--	4A	

ACTURER/kW RATING AND SUBSYSTEM

Number and Mode of Failures[a]										
Cooling System	Scavenging Air System	Engine Frame/ Internals	Governor	Exhaust System	Shutdown System	Output Breaker	Exciter/ Voltage Regulator	Generator	Other/ Unknown	Totals
AILURES REPORTED						NO FAILURES REPORTED				
--	--	--	2B	--	--	--	--	1B	--	3B
--	--	--	--	--	--	1A	--	--	--	1A
AILURES REPORTED						NO FAILURES REPORTED				
--	--	--	--	2B	--	--	1B	--	--	3B
1B	1B	--	--	--	--	--	--	--	--	2A,2B
(1B)	(1B)	--	(2B)	(2B)	--	(1A)	(1B)	(1B)	--	(3A,8B)
2A,3B	--	--	6A	--	--	1A	--	--	2A	19A,3B
--	--	1A	--	--	--	1A	1B	--	--	2A,2B
--	--	--	1B	--	--	--	1B	--	2A	5A,3B
--	--	--	2B	--	2B	--	2B	--	--	7B
--	--	(1A)	(3B)	--	(2B)	(1A)	(4B)	--	(2A)	(7A,12B)
1A,1B	--	1B	--	--	--	--	--	--	--	2A
1A,1B	--	--	--	--	--	1A	1A	1A	3A,2B	7A,5B
--	--	--	1B	--	--	1B	--	--	1A	4A,2B
--	--	--	1A	--	--	--	--	--	--	3B
AILURES REPORTED						NO FAILURES REPORTED				
1A,5B	--	4B	3A,1B	--	1B	--	1A	--	--	6A,16B
AILURES REPORTED						NO FAILURES REPORTED				
AILURES REPORTED						NO FAILURES REPORTED				
1B	--	2A	1B	1B	--	1A	--	--	--	3A,5B
3B	--	1B	2A	--	--	--	1A,2B	--	4A,2B	8A,9B
--	--	--	2A	--	--	--	--	--	--	2A
--	--	--	2A	--	1A	--	--	--	1A	6A
--	--	--	1B	--	--	--	--	--	--	1B
--	--	1B	--	--	--	--	--	--	--	1B
--	--	--	--	--	--	--	--	--	--	3A
--	--	1A,2B	--	--	--	1A	--	--	--	2A,2B
1B	--	1A,2B	--	--	--	--	--	--	--	2A,4B
2A	--	--	3A	--	1A	--	--	--	--	7A,1B
ILURES REPORTED						NO FAILURES REPORTED				
--	--	--	3A	--	--	1A	--	--	--	8A,2B
A,12B)	--	(4A,11B)	(16A,4B)	(1B)	(2A,1B)	(5A,1B)	(3A,2B)	(2A)	(9A,4B)	(61A,51B)
2B	--	--	--	--	--	--	--	--	--	1A,2B
--	--	--	--	--	--	--	--	--	2A	5A
--	--	--	1B	--	--	--	1A,2B	--	1A	6A,3B

Diesel Generator Manufacturer and Plant Name	Plant Code	Generator kW Rating	Population	Minimum Number of Demands per Component		Minimum Number of Operating Hours per Component		Standby Hours per Component	Fuel Oil System	S
				Weekly	Monthly	Weekly	Monthly			
General Motors (continued)										
Monticello	MO1	2500	2	156	36	156	36	26280	--	
Maine Yankee	MY1	2500	2	156	36	156	36	26280	1A	
Oyster Creek 1	OC1	2500	2	156	36	156	36	26280	--	
Turkey Point 3	TU3	2500	2	156	36	156	36	26280	2A,1B	
Turkey Point 4	TU4	2500	2	156	36	156	36	26280		
Nine Mile Point 1	NM1	2560	2	156	36	156	36	26280		
Beaver Valley 1	BV1	2600	2	137	32	137	32	23136	1B	
Davis-Besse 1	DB1	2600	2	68	16	68	16	11424	--	
James A. Fitzpatrick	FP1	2600	4	156	36	156	36	26280	--	
Arkansas Nuclear One 1	AR1	2750	2	156	36	156	36	26280	--	
Rancho Seco	RS1	2750	2	156	36	156	36	26280	1B	
Surry 1	SU1	2750	3[b]	156	36	156	36	26280	--	
Surry 2	SU2	2750		156	36	156	36	26280		
Dresden 2	DR2	2850	3[b]	156	36	156	36	26280	1B	
Dresden 3	DR3	2850		156	36	156	36	26280	--	
Haddam Neck	HN1	2850	2	156	36	156	36	26280	1A	
Kewaunee	KE1	2850	2	156	36	156	36	26280	--	
Point Beach 1	PT1	2850	2	156	36	156	36	26280	--	
Point Beach 2	PT2	2850	2	156	36	156	36	26280		
Quad-Cities 1	QC1	2850	3[b]	156	36	156	36	26280	--	
Quad-Cities 2	QC2	2850		156	36	156	36	26280		
Browns Ferry 1	BF1	3500		156	36	156	36	26280	--	
Browns Ferry 2	BF2	3500	4[b]	156	36	156	36	26280		
Browns Ferry 3	BF3	3500		125	28	125	28	20976	--	
St. Lucie	SL1	3500	2	140	32	140	32	23592	2A	
Trojan	TR1	4418	2	156	36	156	36	26280	--	
(Subtotal)			(55)	(4370)	(1008)	(4370)	(1008)	(736128)	(7A,4B)	(
Nordberg Manufacturing										
Brunswick 1	BR1	3500	4[b]	116	27	116	27	19512	1B	
Brunswick 2	BR2	3500		156	36	156	36	26280	1A,1B	
(Subtotal)			(4)	(272)	(63)	(272)	(63)	(45792)	(1A,2B)	(
Worthington										
Donald C. Cook 1	DC1	3500	2	156	36	156	36	26280	--	
Donald C. Cook 2	DC2	3500	2	42	10	42	10	7080	1A,1B	
(Subtotal)			(4)	(198)	(46)	(198)	(46)	(33360)	(1A,1B)	
(Total)	(63)[c]		(128)	(8827)	(2039)	(8827)	(2039)	(1486893)	(20A,16B)	(

a. A and B are failure modes. A is Does Not Start; B is Does Not Continue to Run.

b. See Table 23 for explanation.

c. The diesel generators at Joseph M. Farley have two ratings, hence two entries, but the plant is only counted once

19. (continued)

Number and Mode of Failures[a]												
ube il stem	Starting System	Cooling System	Scavenging Air System	Engine Frame/ Internals	Governor	Exhaust System	Shutdown System	Output Breaker	Exciter/ Voltage Regulator	Generator	Other/ Unknown	Totals
--	1A	--	--	--	--	--	--	--	--	--	--	1A
--	--	--	--	--	1A	--	--	--	--	--	--	2A
--	1A	--	--	--	--	--	--	--	2A	--	--	3A
--	--	--	--	--	--	--	--	--	--	--	--	2A,1B
	NO FAILURES REPORTED						NO FAILURES REPORTED					
	NO FAILURES REPORTED						NO FAILURES REPORTED					
1B	2A	--	--	--	--	--	--	9A	2A	1B	--	13A,3B
--	--	--	2B	1A	1A	--	--	--	1A	--	1B	3A,3B
2A	--	--	--	--	1A	--	2A	1B	--	--	--	5A,1B
--	2A	--	1B	--	--	--	--	--	--	--	--	2A,1B
--	1A	--	--	--	1B	--	--	--	--	--	2A	3A,2B
--	--	--	--	1A	--	--	--	--	--	--	--	1A
	NO FAILURES REPORTED						NO FAILURES REPORTED					
--	9A	2B	1B	--	4A	--	2A	1A	1B	--	--	16A,5B
1B	--	--	--	--	3A,2B	--	--	--	1A	--	--	4A,3B
--	--	--	--	--	--	--	--	--	--	--	--	1A
--	--	--	1B	--	1B	--	--	--	--	--	1A	1A,2B
--	--	--	--	--	--	--	1A	2A	--	--	--	3A
	NO FAILURES REPORTED						NO FAILURES REPORTED					
--	1A	--	--	--	--	--	--	--	2A	1A	--	4A
	NO FAILURES REPORTED						NO FAILURES REPORTED					
--	--	--	--	--	1A,1B	--	--	--	--	--	--	1A,1B
	NO FAILURES REPORTED						NO FAILURES REPORTED					
--	--	--	--	--	--	--	--	--	1A	--	--	1A
--	--	--	2B	--	--	--	1A	1A	--	--	1A	5A,2B
--	--	--	--	--	1B	--	--	--	--	--	1A	1A,1B
A,2B)	(23A)	(4B)	(7B)	(2A)	(11A,7B)	--	(6A)	(13A,1B)	(10A,3B)	(1A,1B)	(8A,1B)	(84A,30B)
2A	1A	--	--	--	1B	--	--	1B	--	--	--	3A,3B
--	1A	--	--	--	1B	--	--	1A	1A	--	--	4A,2B
2A)	(2A)	--	--	--	(2B)	--	--	(1A,1B)	(1A)	--	--	(7A,5B)
--	--	--	--	--	--	--	--	--	1A	--	--	1A
--	1A,1B	--	--	--	1B	--	--	--	--	--	--	2A,3B
--	(1A,1B)	--	--	--	(1B)	--	--	--	(1A)	--	--	(3A,3B)
A,9B)	(41A,3B)	(7A,20B)	(8B)	(7A,11B)	(33A,19B)	(3B)	(8A,3B)	(22A,3B)	(15A,10B)	(3A,2B)	(21A,5B)	(186A,112B)

LER Rates

LER rates in this report are based on LER information and classified either as standby failure rates, calculated in units of failures per standby hour; demand failure rates, calculated in units of failures per demand; or as operating failure rates, calculated in units of failures per operating hour. The LER rates are estimated for selected failure modes. The LER rates include both failures and command faults. Command faults were included in the estimation process because LERs generally report safety system degradation; the LER rates should reflect this by including all events that would prevent the diesel generator from supplying emergency power on demand. Again, all LER rates found in this analysis include command faults. Table 20 summarizes the diesel-generator LER rates estimated in this report. WASH-1400[20] failure rates for diesel generators (complete plant) were included in this table for comparison purposes only.

Since the diesel-generator operability testing schedules vary throughout the industry, we estimated LER rates based on different test-interval assumptions. Our monthly test-interval assumption is based on technical specification guidelines discussed earlier. The monthly test interval is usually the minimum requirement if a diesel generator demonstrates high reliability. We also estimated the LER rates based on a weekly test interval. This assumption was based on the information contained in Reference 18, which stated that testing frequency varied from weekly to monthly.

The results of all the LER estimations are contained in Appendices O, P, and Q. The plants are grouped by NSSS vendor. The "Final Statistics" section for each estimation contains the averaged NSSS vendor LER rates, averaged PWR (pressurized water reactors) LER rates, and an overall LER rate. Along with the LER rates contained in this "Final Statistics" section, the upper 95% confidence limit and lower 5% confidence limit are given and expressed as a multiple of the LER rate estimate. To obtain the upper 95% chi-square confidence limit, multiply the given LER rate estimate by the upper multiple associated with this estimate. To get the corresponding lower 5% chi-square confidence limit, divide the LER rate estimate by the lower multiple associated with this estimate.

TABLE 20. SUMMARY OF DIESEL-GENERATOR FAILURE RATES BY FAIURE MODE AND TESTING INTERVAL

	LER Rates								
	Weekly Testing				Monthly Testing				
Failure Mode	1976	1977	1978	1976-1978	1976	1977	1978	1976-1978	WASH-1400[a]
Does Not Start[b]	1E-2/d	1E-2/d	9E-3/d	1E-2/d	4E-2/d	5E-2/d	4E-2/d	4E-2/d	3E-2/d
Does Not Continue to Run[c]	7E-3/hr	6E-3/hr	5E-3/hr	6E-3/hr	3E-2/hr	3E-2/hr	2E-2/hr	3E-2/hr	3E-3/hr
Does Not Start Combined with Does Not Continue to Run				2E-2/d[b] 1E-4/hr[d]				7E-2/d[b] 1E-4/hr[d]	

a. Computation median for diesels (complete plant); see Reference 23.

b. Demand failure rate.

c. Operating, hourly failure rate.

d. Standby, hourly failure rate.

For example:

X.X upper 95% confidence multiple

Y.YE-YY LER rate estimate

Z.Z lower 5% confidence multiple

Multiply X.X times Y.YE-YY to obtain upper 95% confidence limit.

Divide Z.Z into Y.YE-YY for lower 5% confidence limit.

Does Not Start

LER rates for the failure mode Does Not Start were estimated for each year (1976, 1977, and 1978) and for the total period covered in this report (1976 through 1978). The LER rates are estimated in both units of failures per demand and failures per standby hour. Each of the estimations were done with the monthly test interval assumption and then with the weekly test interval assumption. The yearly LER rates were estimated in order to determine if the LER rate was increasing, decreasing, or remaining constant. As shown in Table 20, the Does Not Start LER rate appears to be constant with time in this gross classification. Appendix O lists the results of all the Does Not Start estimations.

Does Not Continue to Run

The Does Not Continue to Run LER rates were also estimated yearly and collectively for the total time period 1976 through 1978. Again, we point out that only diesel-generator failures that resulted after the diesel generator had completed a successful start, that is, starting, coming up to rated speed and voltage, closing of the output breaker to the emergency bus, and assuming expected load, were classified as Does Not Continue to Run failures. Operating LER rates calculated in units of failures per diesel-generator operating time (hours) were estimated, based on the weekly and monthly test assumption. Again, we point out that the diesel-generator operating time was based on the requirement that the diesel should be run for a minimum of one hour when the test to demonstrate operability is

conducted. Therefore, the LER rate for Does Not Continue to Run is based only on the one-hour-run period, and may not be representative of the operating failure rate for long-term operation. Comparing the LER rate with the WASH-1400 rate for this failure mode, shows that the LER rate to be an order of magnitude higher than the WASH-1400 rate (3E-2/hr versus 3E-3/hr). Appendix P lists the results of all the Does Not Continue to Run estimations.

Does Not Operate

We combined the Does Not Start failures and the Does Not Continue to Run failures for the time period 1976 through 1978 and estimated an LER rate for these aggregate failures. The results of these estimations are listed as Does Not Operate LER rates. The LER rates for Does Not Operate were estimated in units of failures per demand and failures per standby time (hours). We felt that this estimation would allow an analyst to have an additional representation of the diesel-generator LER rates. If the one-hour run assumption for the Does Not Continue to Run failures was too restrictive, the one-hour interval being an insufficient time to estimate a diesel-generator operating failure rate, these failures could be considered as start failures, since the one-hour-run could be considered an extention of the start-test interval. Therefore, the Does Not Operate estimates can be thought of as hybrid Does Not Start estimates if one feels the one-hour interval is too short, and failures occurring in this period are considered as part of the starting sequence (that is, start and stabilize). Appendix Q lists the results of the Does Not Operate estimations.

Scatter Plots

We incorporate scatter plots of the specific plant LER rates to illustrate the plant-to-plant variability associated with these estimates. Figures 1 through 6 reproduce these plots.

For each failure mode and for each test interval assumption (weekly or monthly), a plot of the specific plant LER rate is grouped according to the NSSS vendor. This grouping provides four plots for each failure mode and test assumption, one for each NSSS vendor and its corresponding plants. A

pound sign (#) immediately following the coded plant name, indicates that there were no failures reported for that plant. The LER rate plotted for a plant that reported no failures is the averaged LER rate of the NSSS vendor of which the plant is a member. All the LER rates plotted are for the period 1976 through 1978.

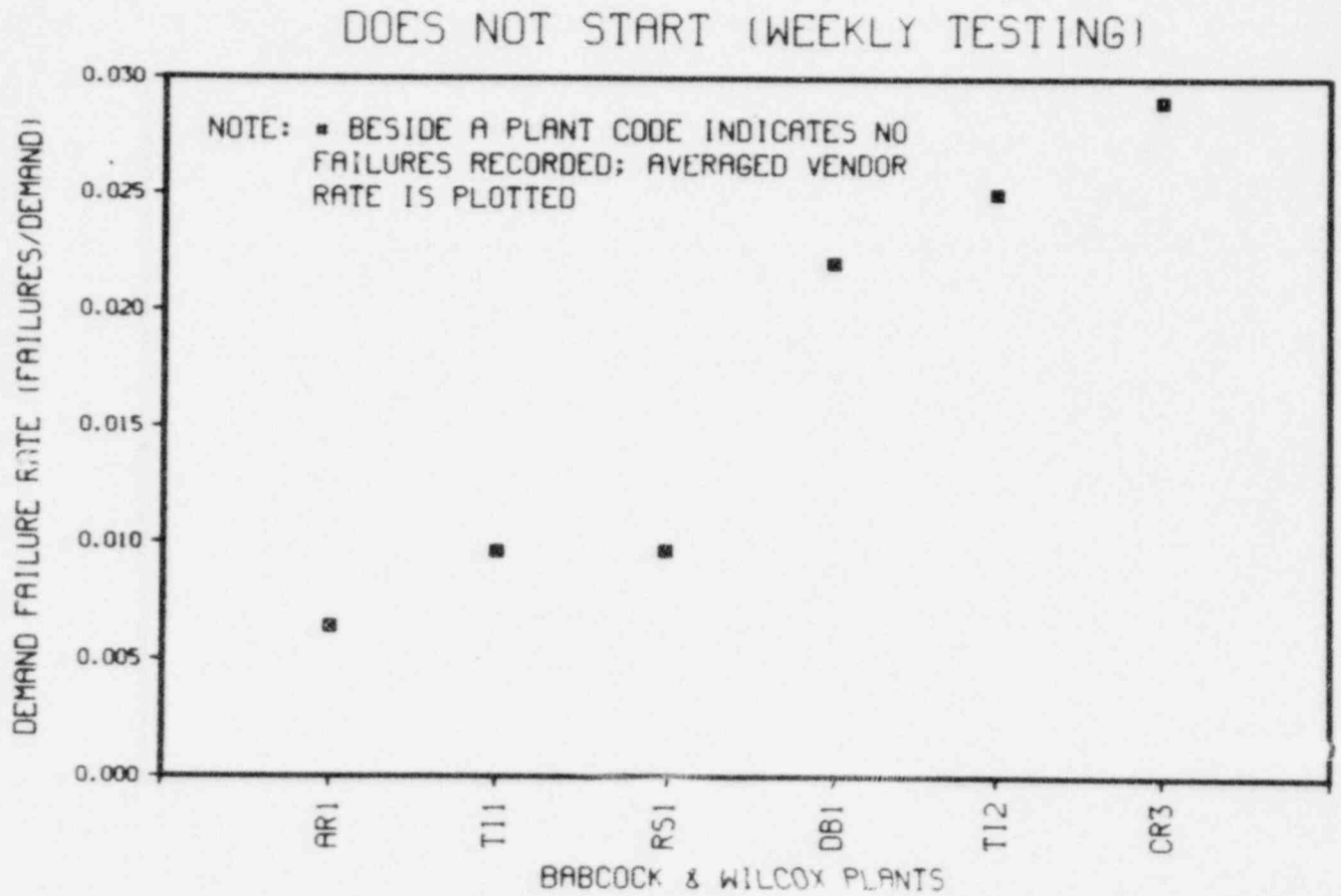

Figure 1a. Demand failure rate estimates (failures per demand) of diesel generators of Babcock & Wilcox plants for the failure mode, Does Not Start, assuming weekly testing.

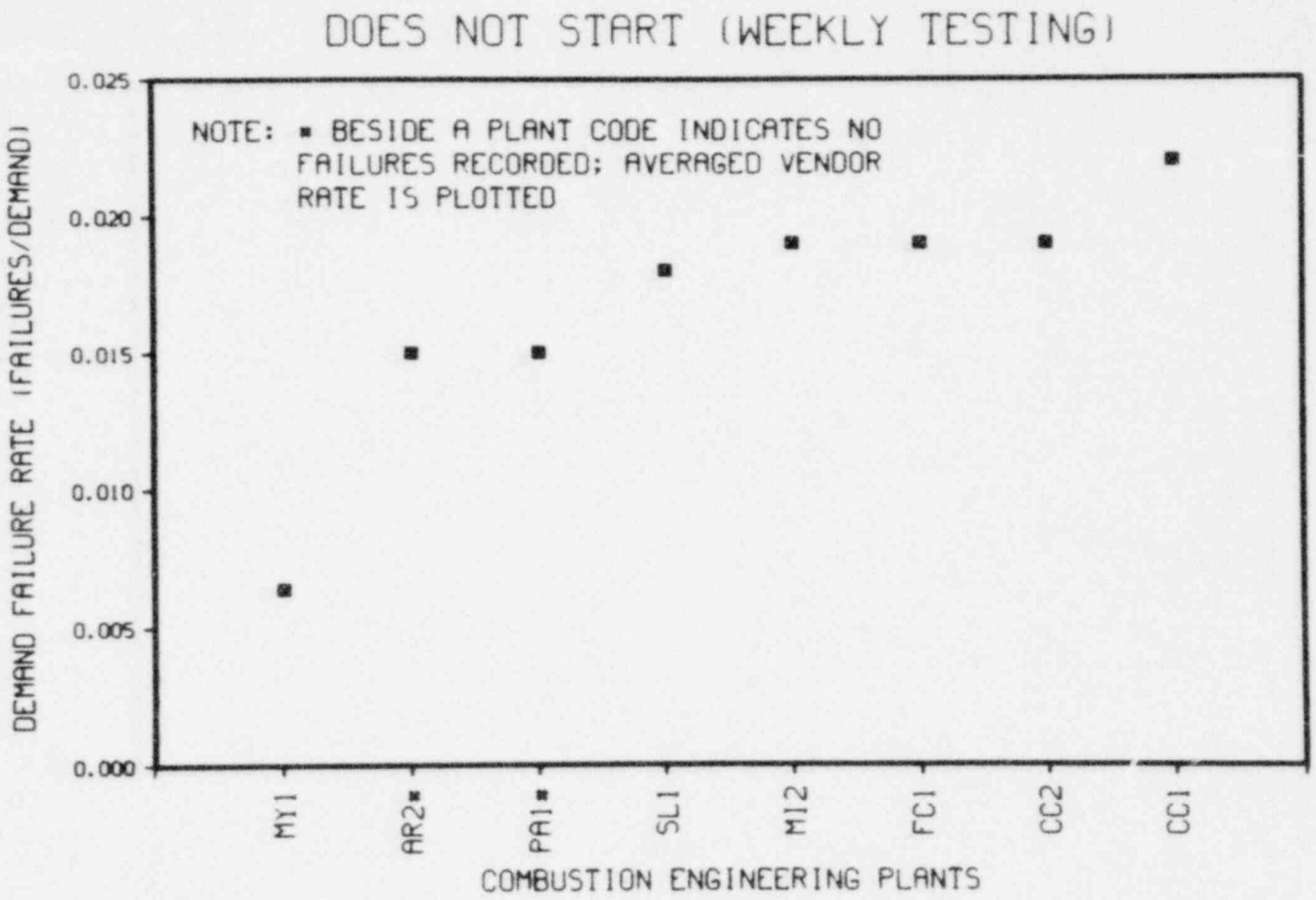

Figure 1b. Demand failure rate estimates (failures per demand) of diesel generators of Combustion Engineering plants for the failure mode, Does Not Start, assuming weekly testing.

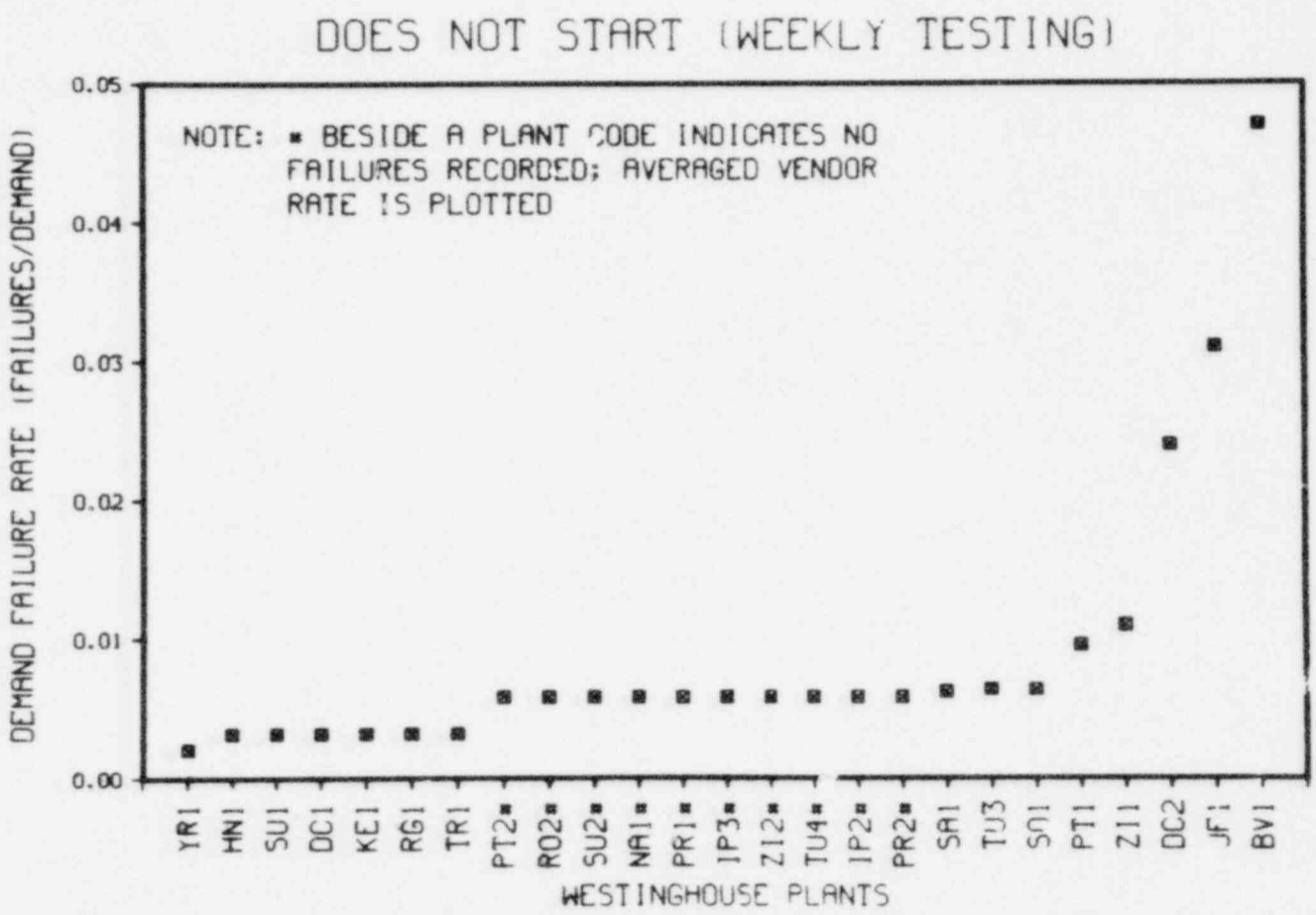

Figure 1c. Demand failure rate estimates (failures per demand) of diesel generators of Westinghouse plants for the failure mode, Does Not Start, assuming weekly testing.

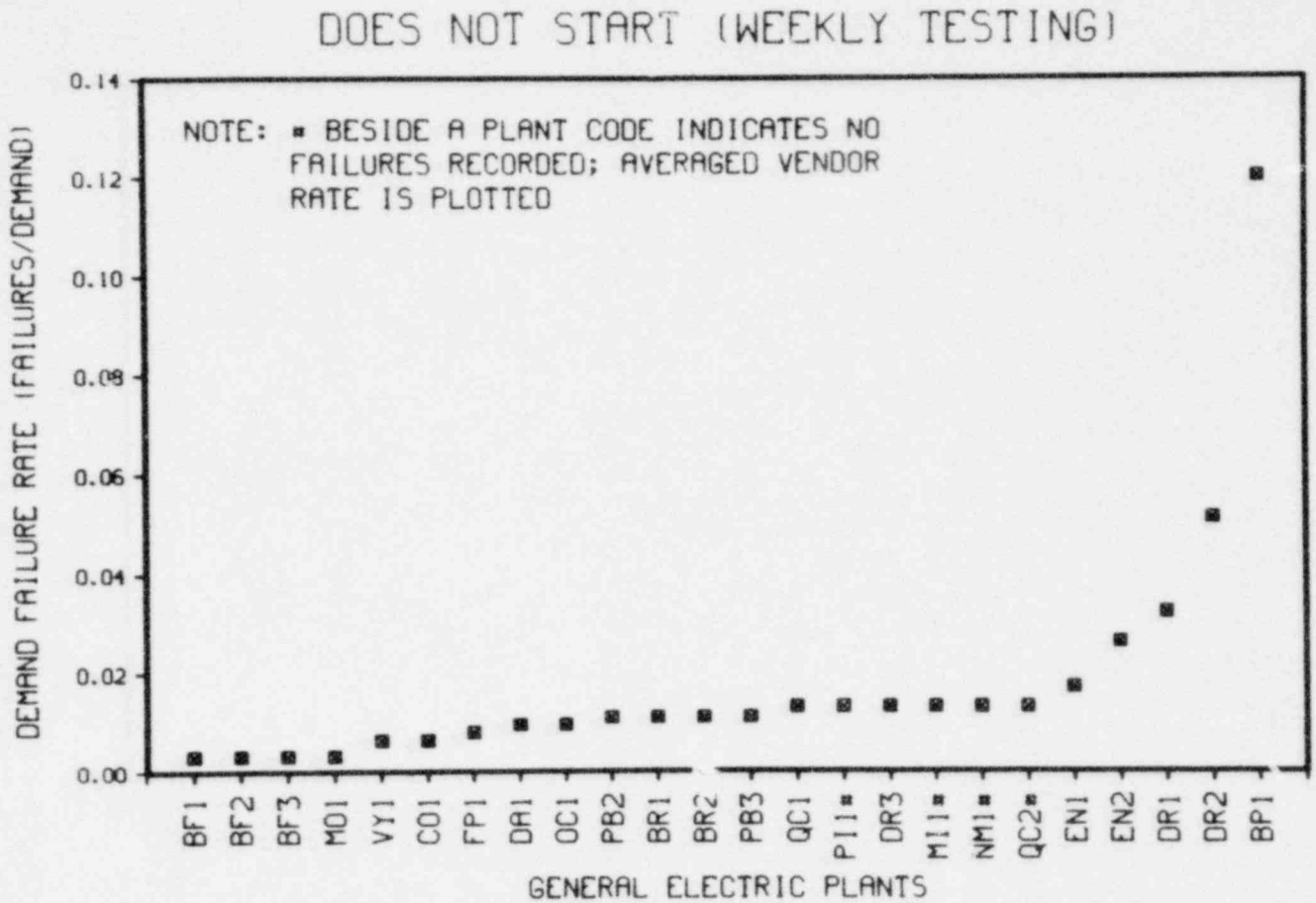

Figure 1d. Demand failure rate estimates (failures per demand) of diesel generators of General Electric plants for the failure mode, Does Not Start, assuming weekly testing.

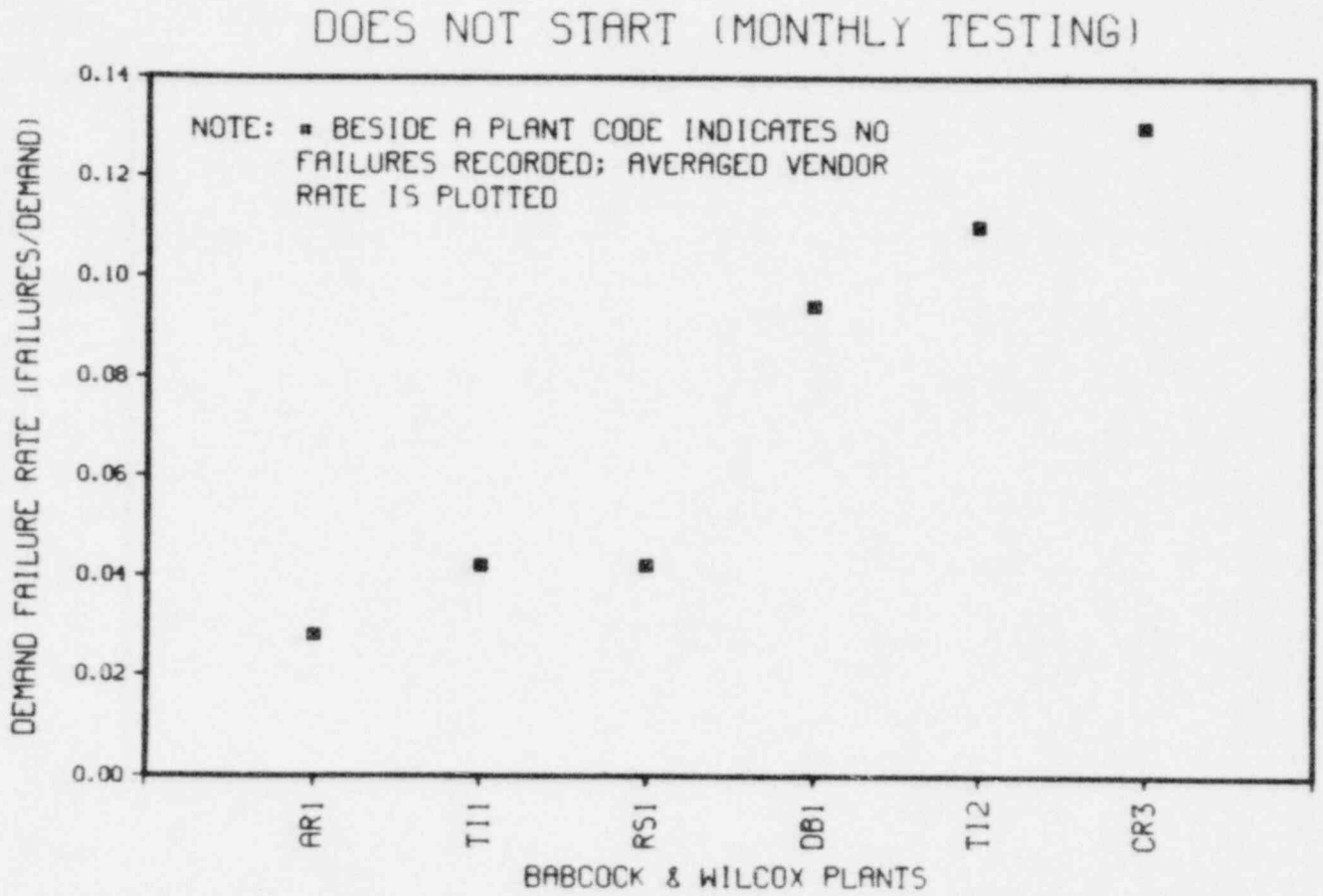

Figure 2a. Demand failure rate estimates (failures per demand) of diesel generators of Babcock & Wilcox plants for the failure mode, Does Not Start, assuming monthly testing.

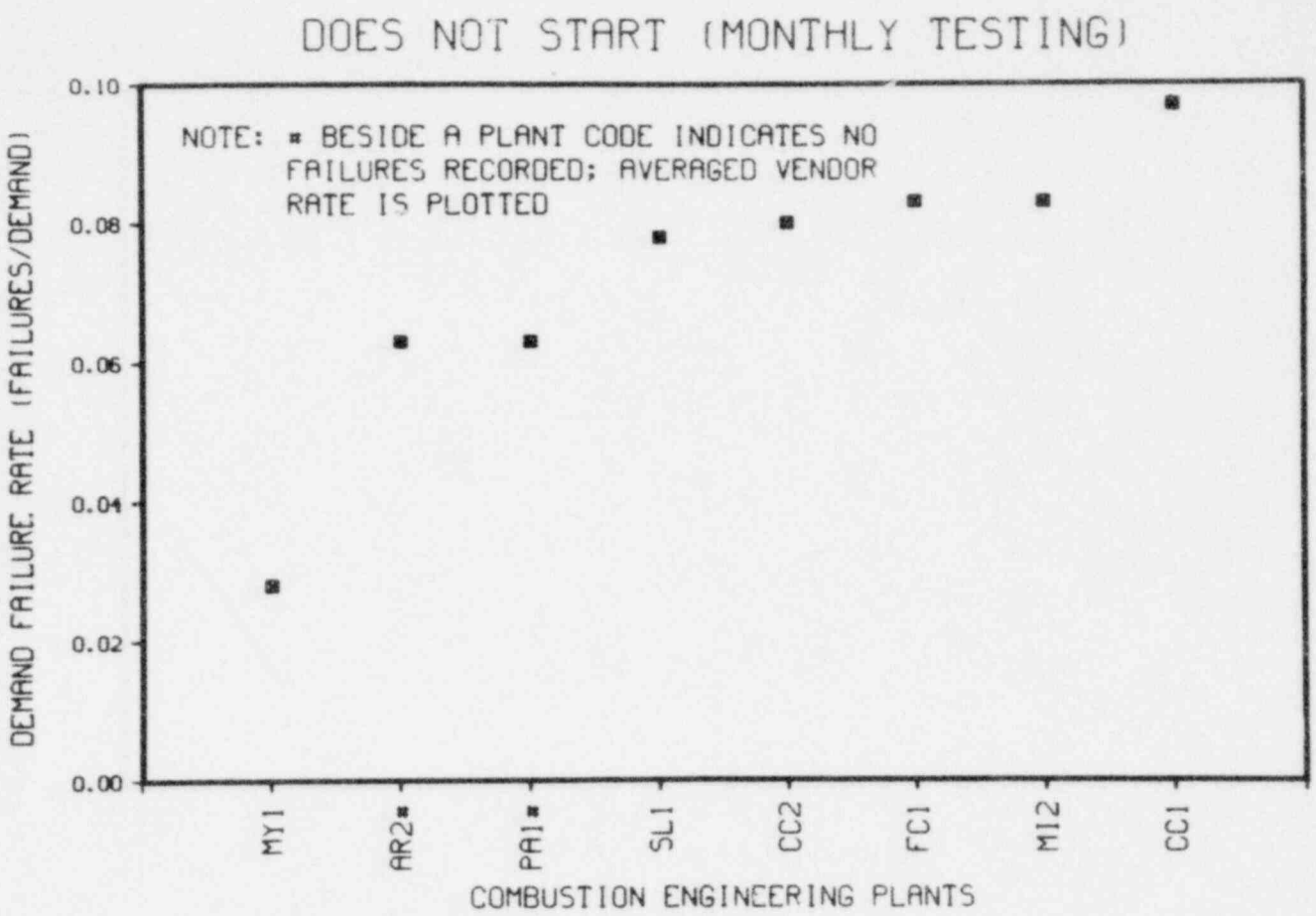

Figure 2b. Demand failure rate estimates (failures per demand) of diesel generators of Combustion Engineering plants for the failure mode, Does Not Start, assuming monthly testing.

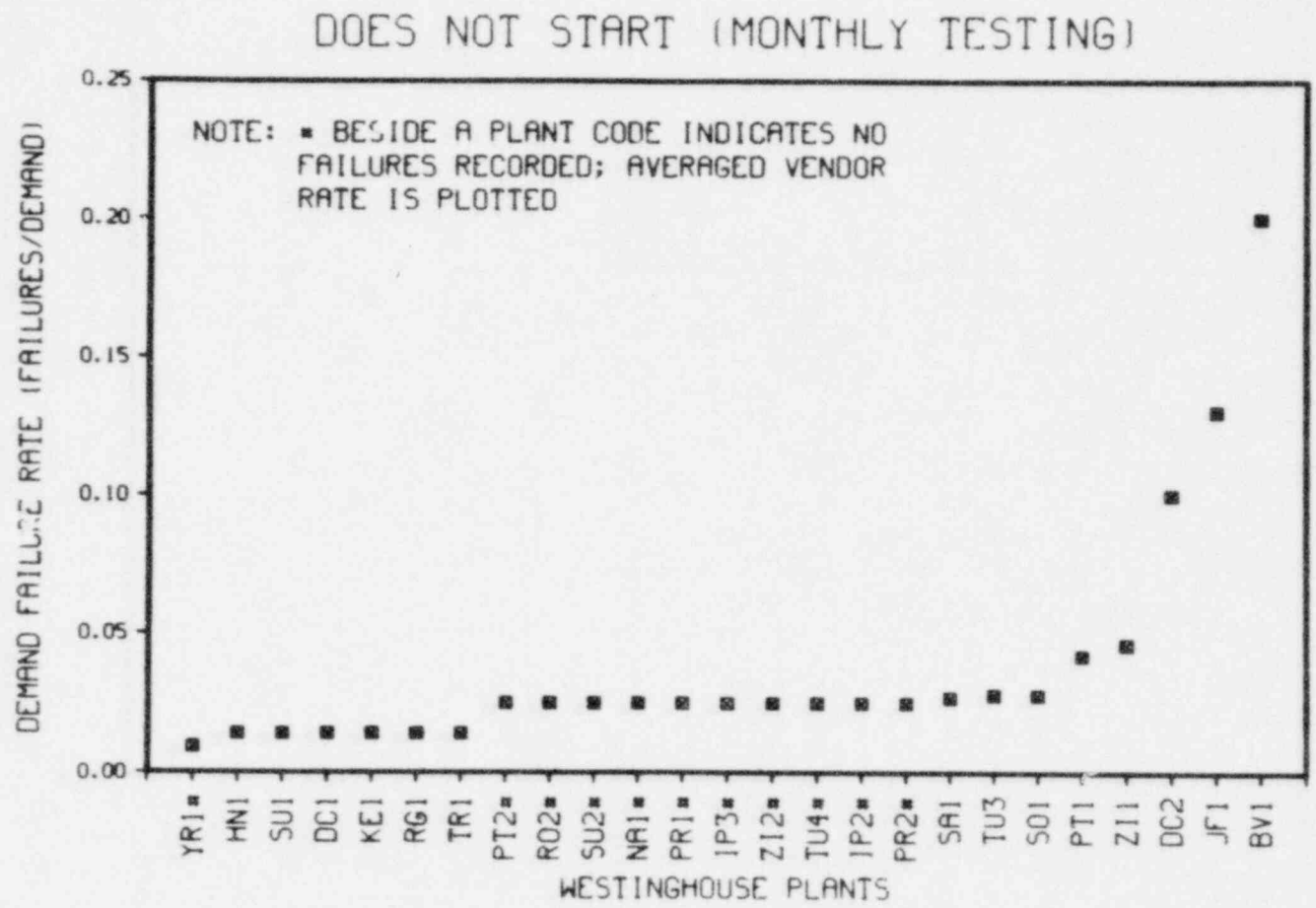

Figure 2c. Demand failure rate estimates (failures per demand) of diesel generators of Westinghouse plants for the failure mode, Does Not Start, assuming monthly testing.

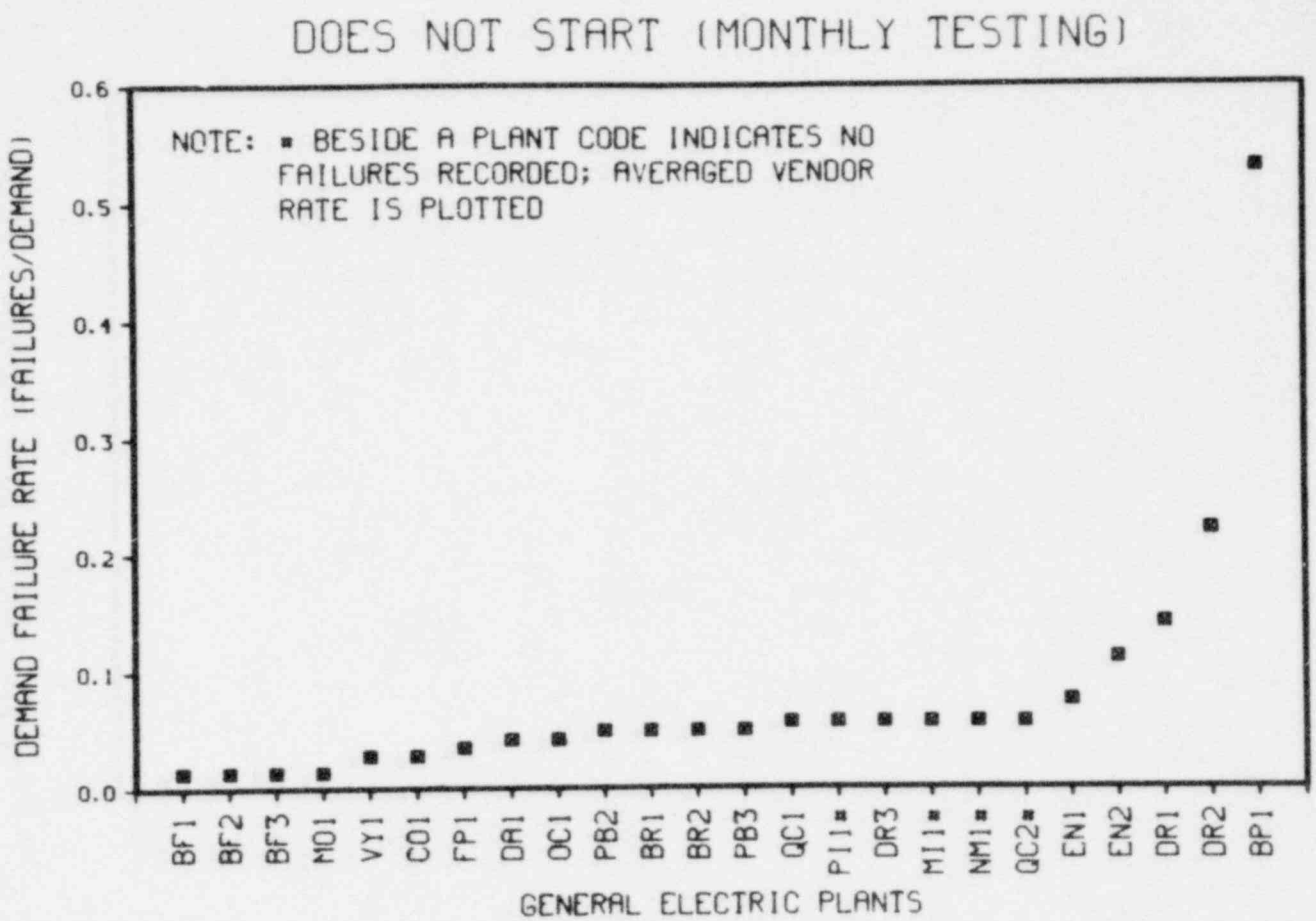

Figure 2d. Demand failure rate estimates (failures per demand) of diesel generators of General Electric plants for the failure mode, Does Not Start, assuming monthly testing.

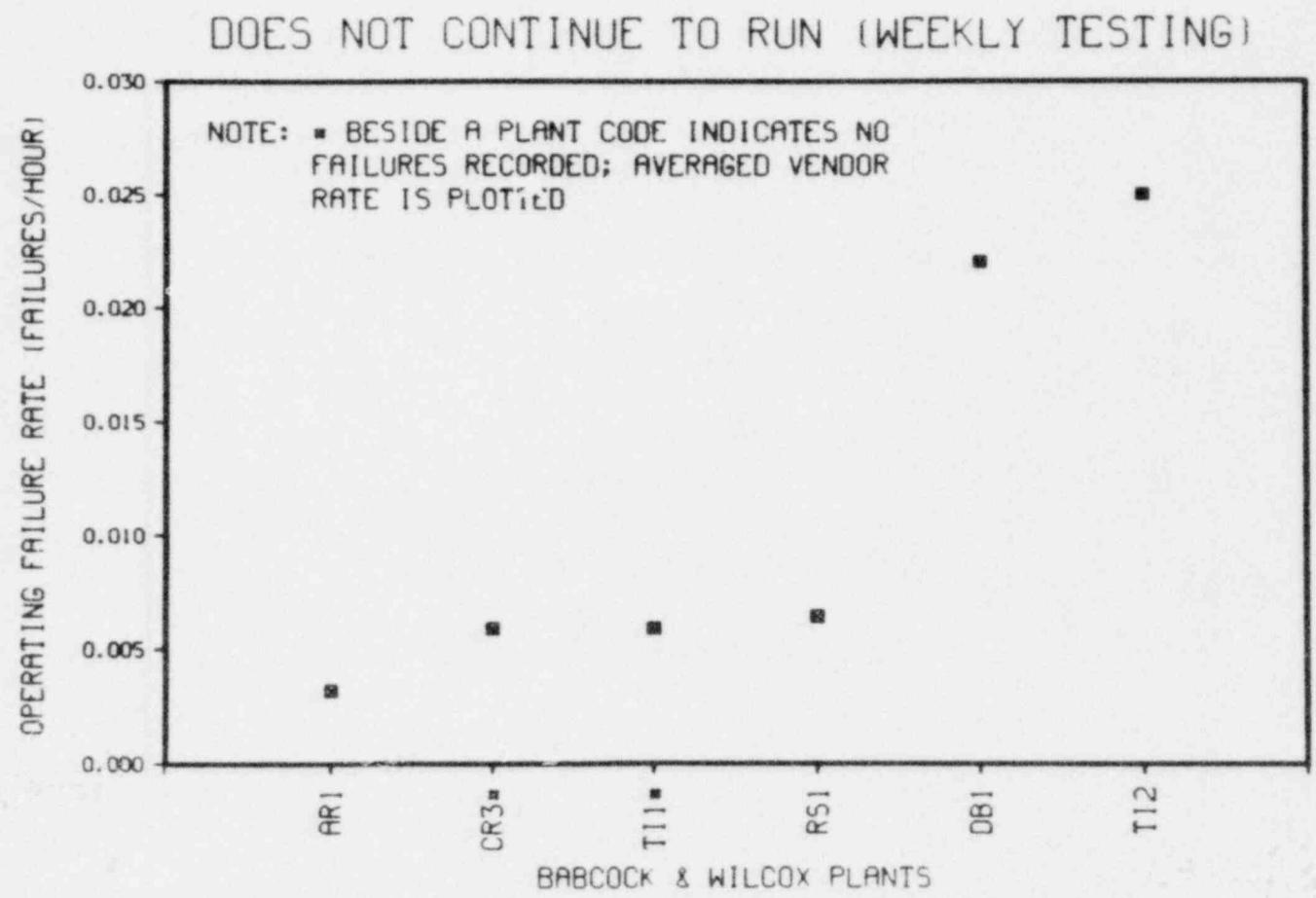

Figure 3a. Operating failure rate estimates (failures per hour) of diesel generators of Babcock & Wilcox plants for the failure mode, Does Not Continue to Run, assuming weekly testing.

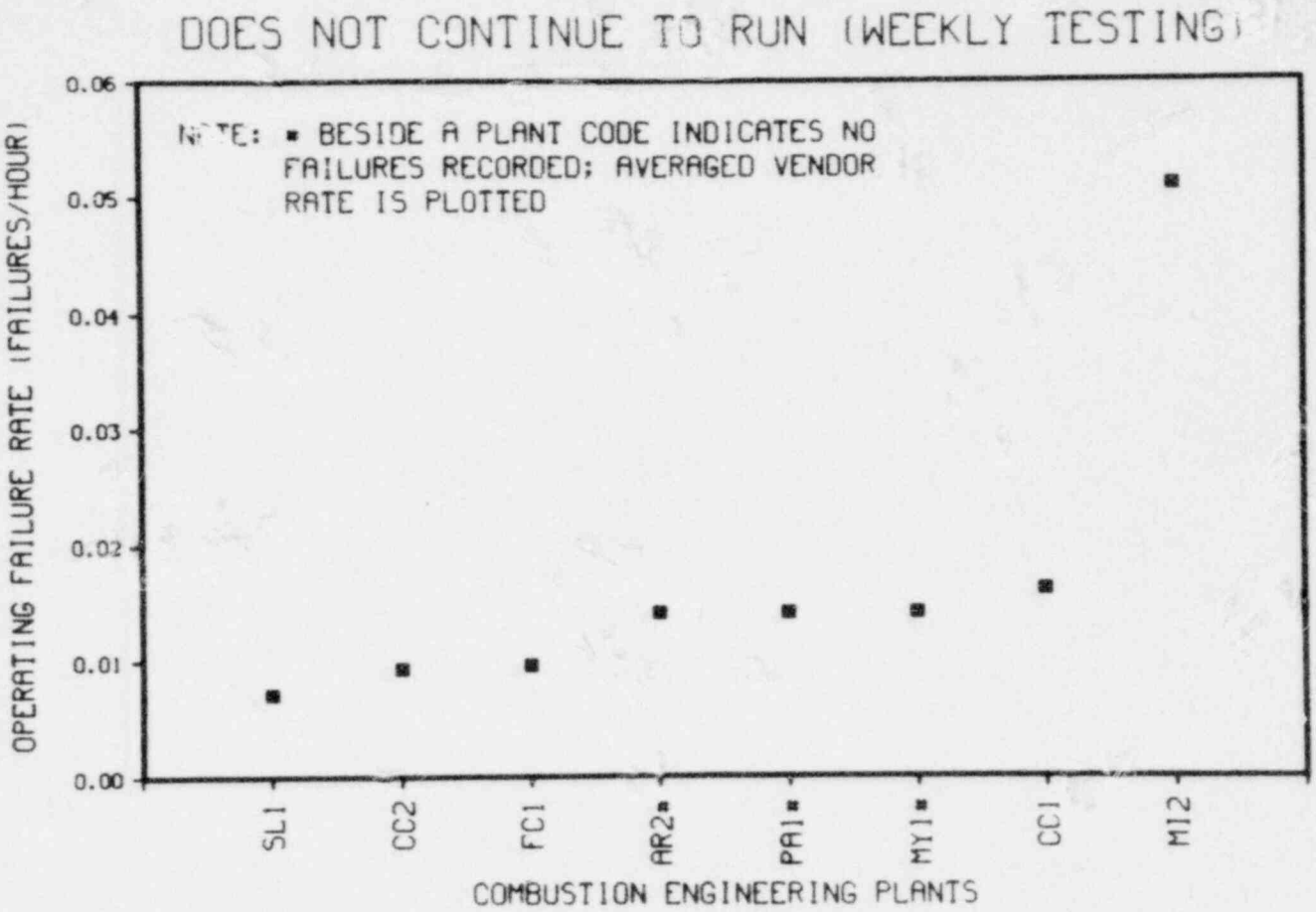

Figure 3b. Operating failure rate estimates (failures per hour) of diesel generators of Combustion Engineering plants for the failure mode, Does Not Continue to Run, assuming weekly testing.

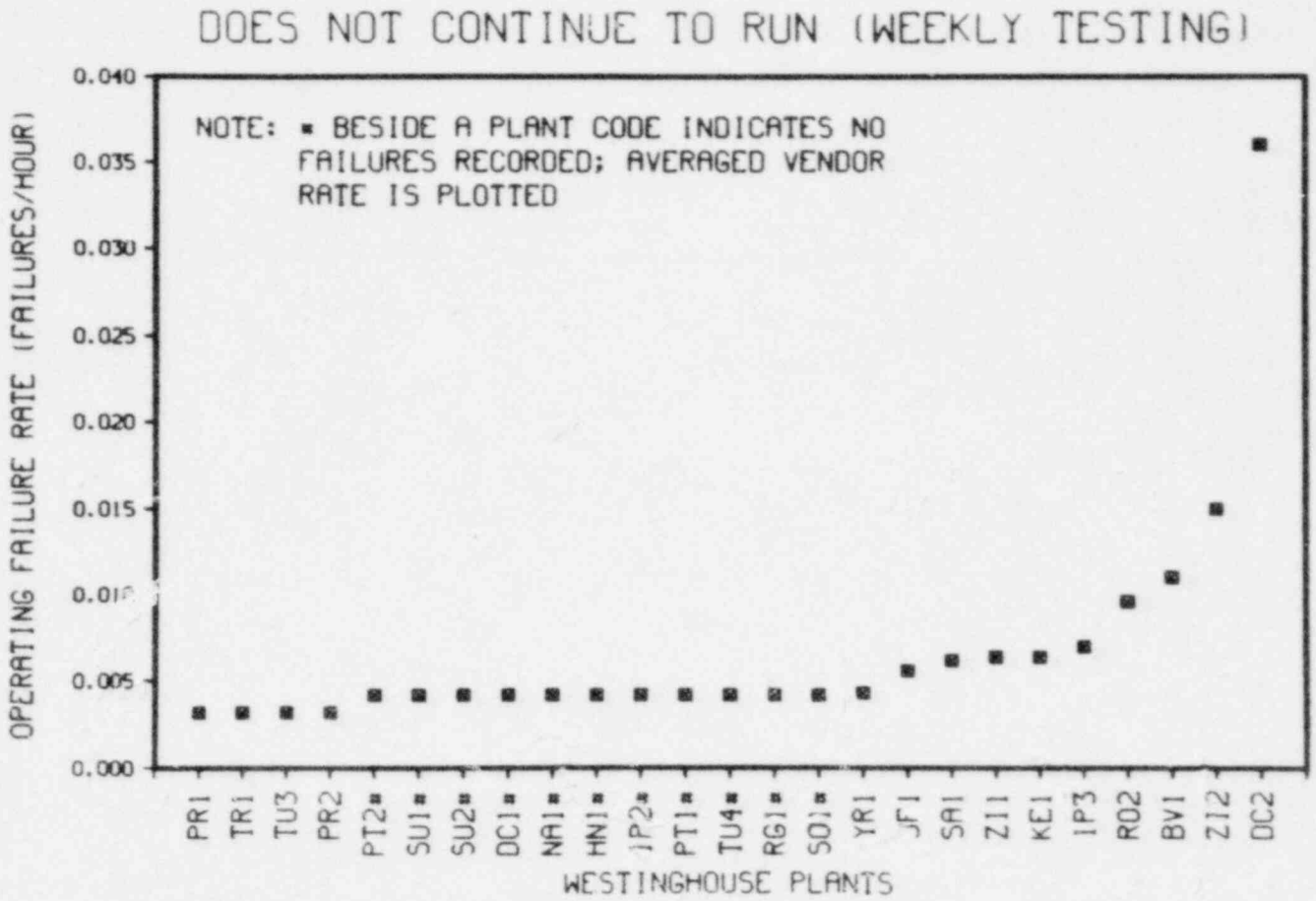

Figure 3c. Operating failure rate estimates (failures per hour) of diesel generators of Westinghouse plants for the failure mode, Does Not Continue to Run, assuming weekly testing.

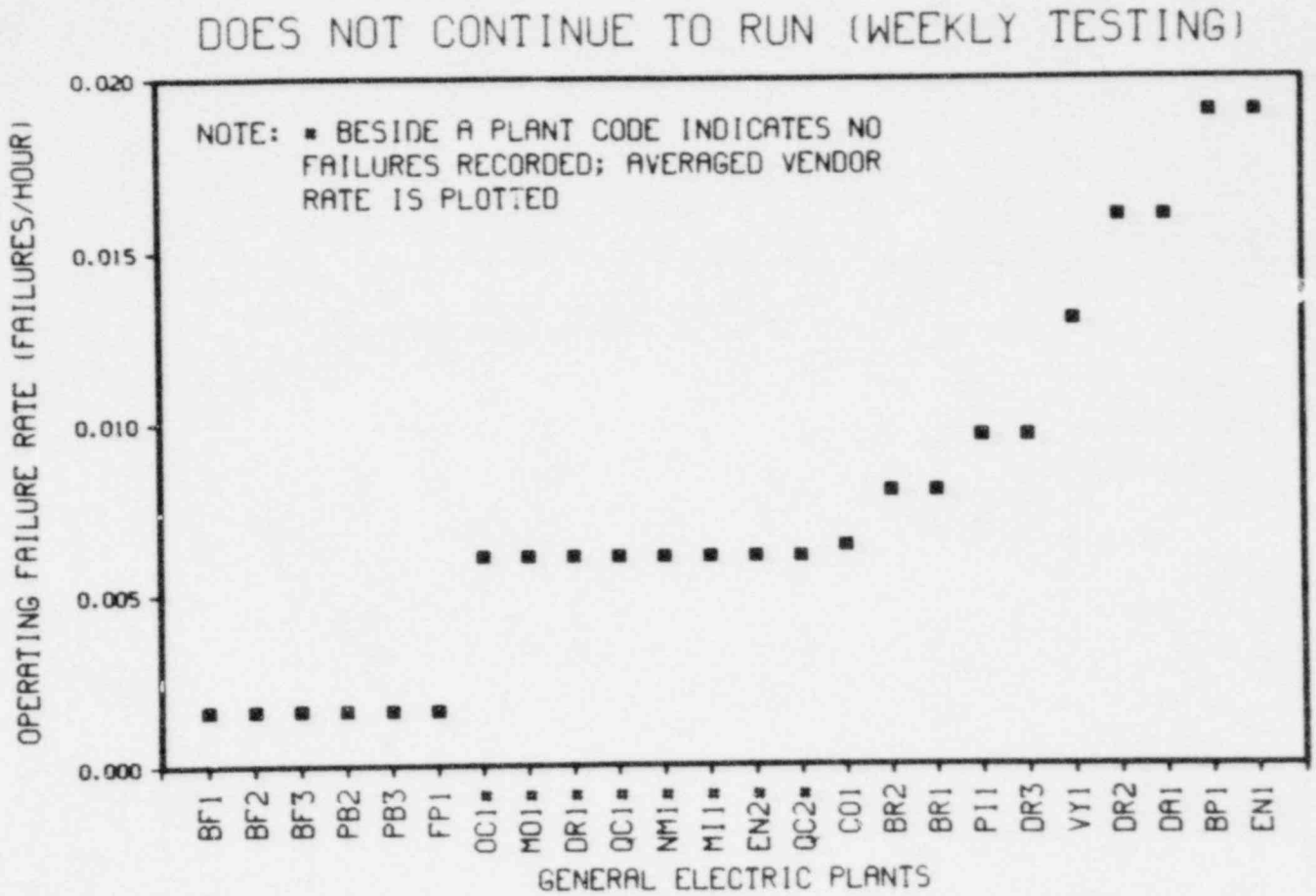

Figure 3d. Operating failure rate estimates (failures per hour) of diesel generators of General Electric plants for the failure mode, Does Not Continue to Run, assuming weekly testing.

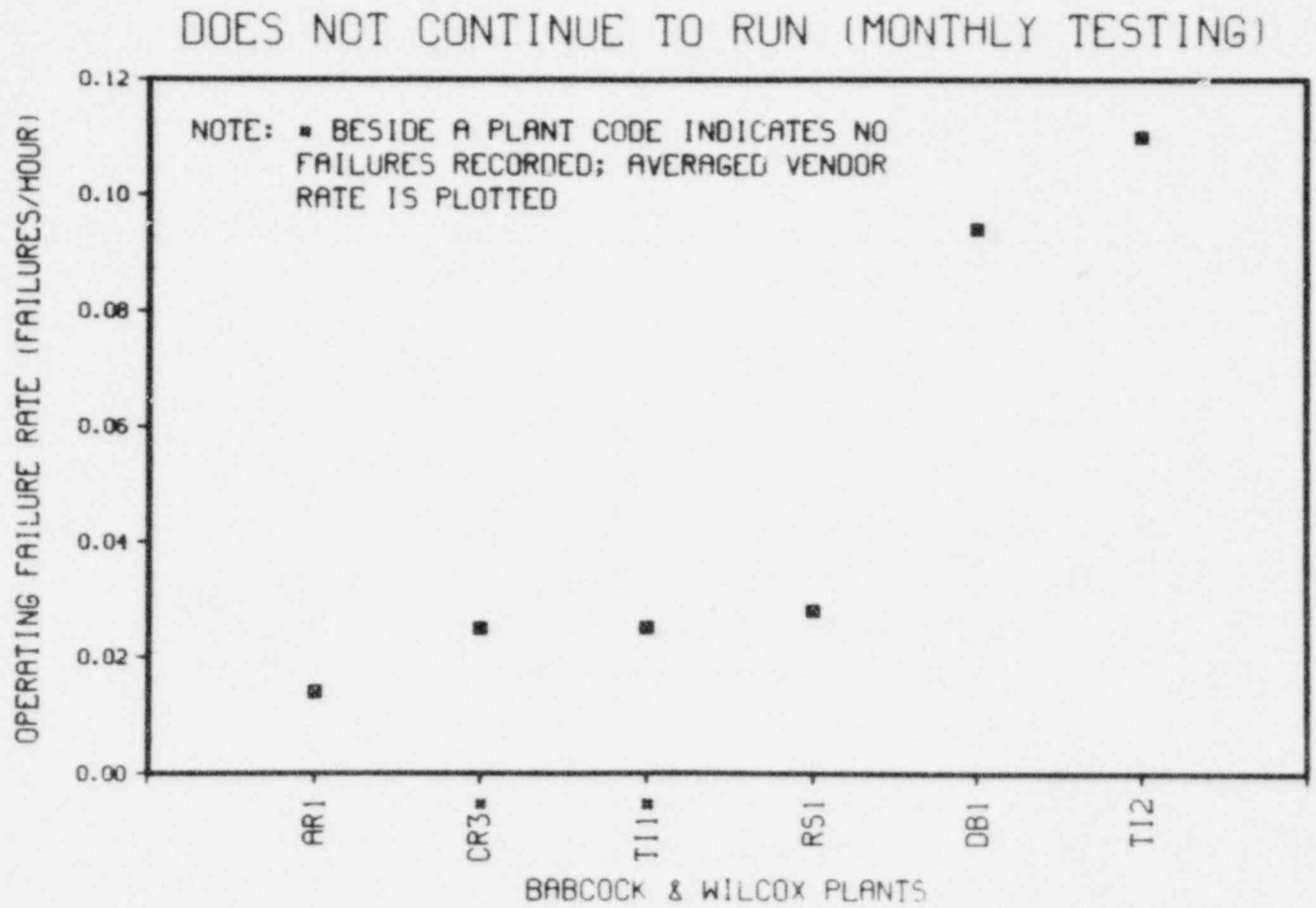

Figure 4a. Operating failure rate estimates (failures per hour) of diesel generators of Babcock & Wilcox plants for the failure mode, Does Not Continue to Run, assuming monthly testing.

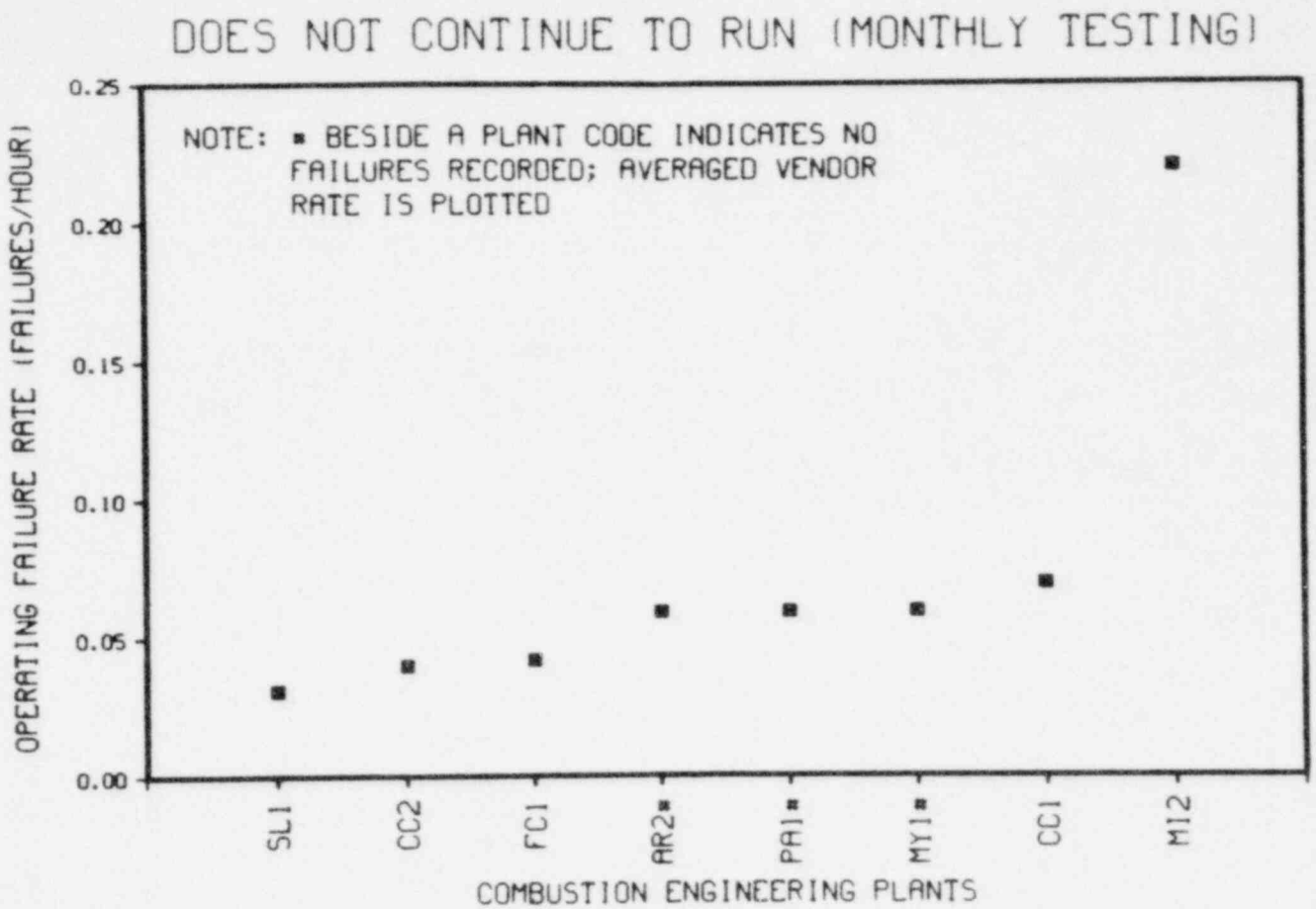

Figure 4b. Operating failure rate estimates (failures per hour) of diesel generators of Combustion Engineering plants for the failure mode, Does Not Continue to Run, assuming monthly testing.

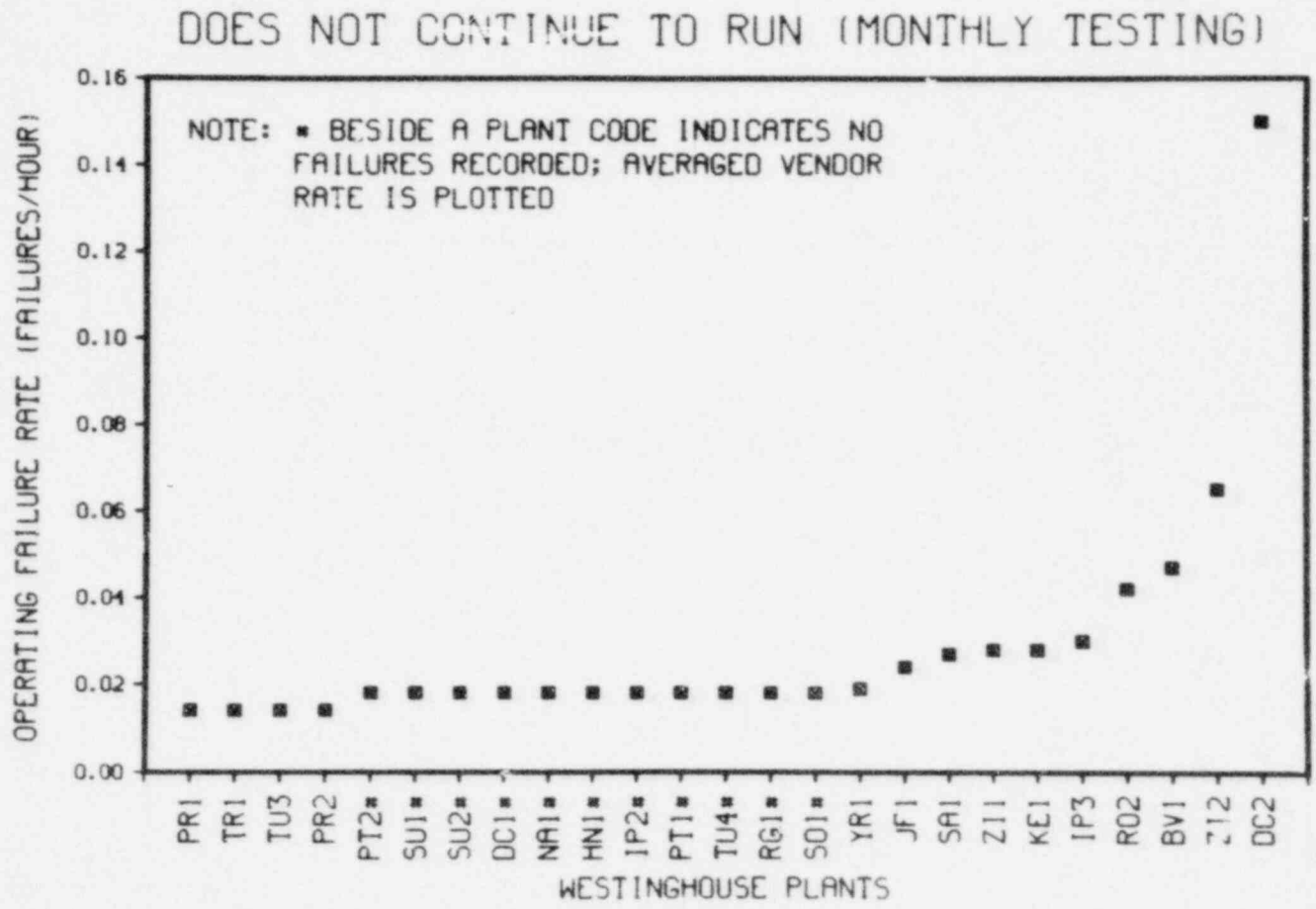

Figure 4c. Operating failure rate estimates (failures per hour) of diesel generators of westinghouse plants for the failure mode, Does Not Continue to Run, assuming monthly testing.

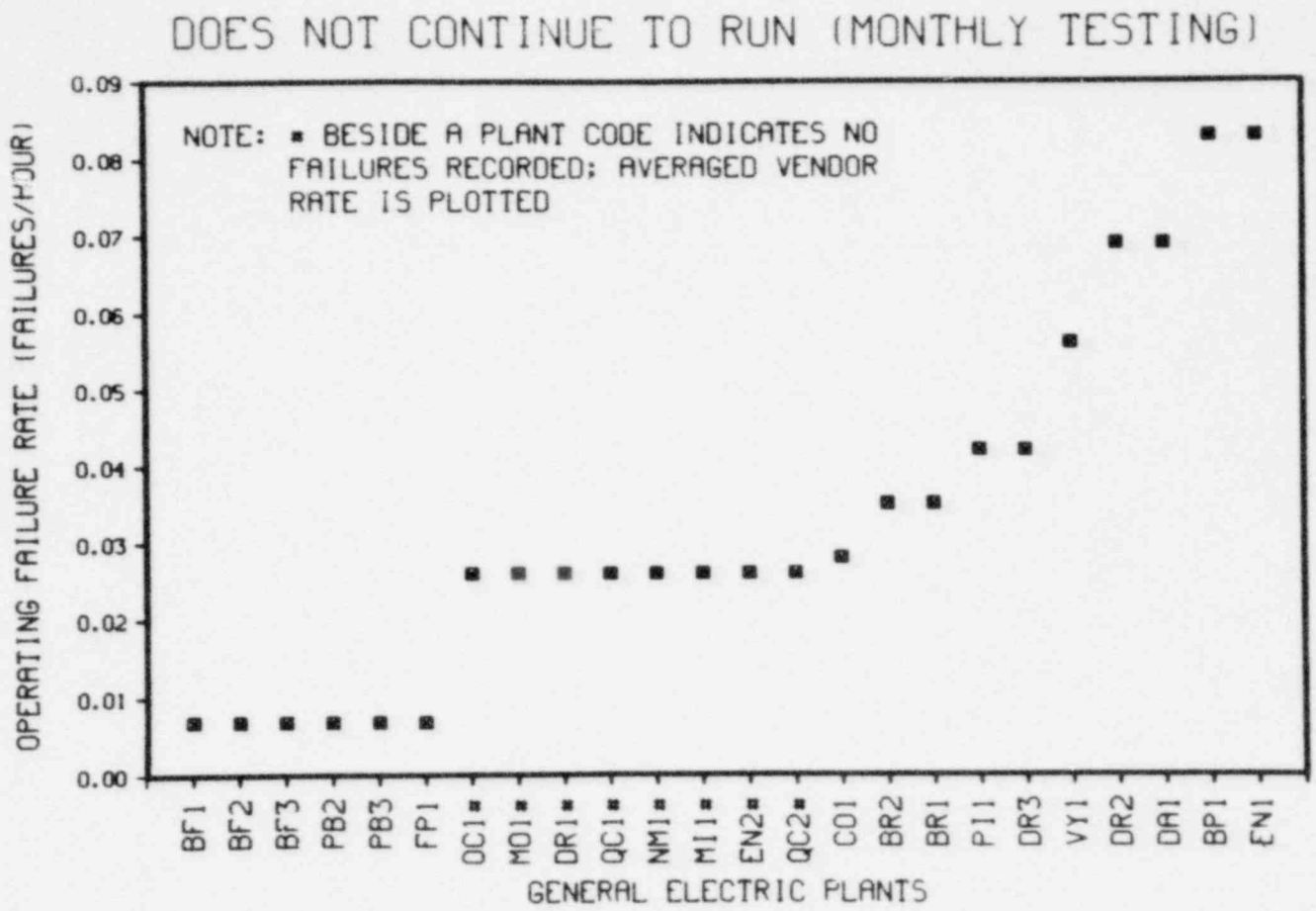

Figure 4d. Operating failure rate estimates (failures per hour) of diesel generators of General Electric plants for the failure mode, Does Not Continue to Run, assuming monthly testing.

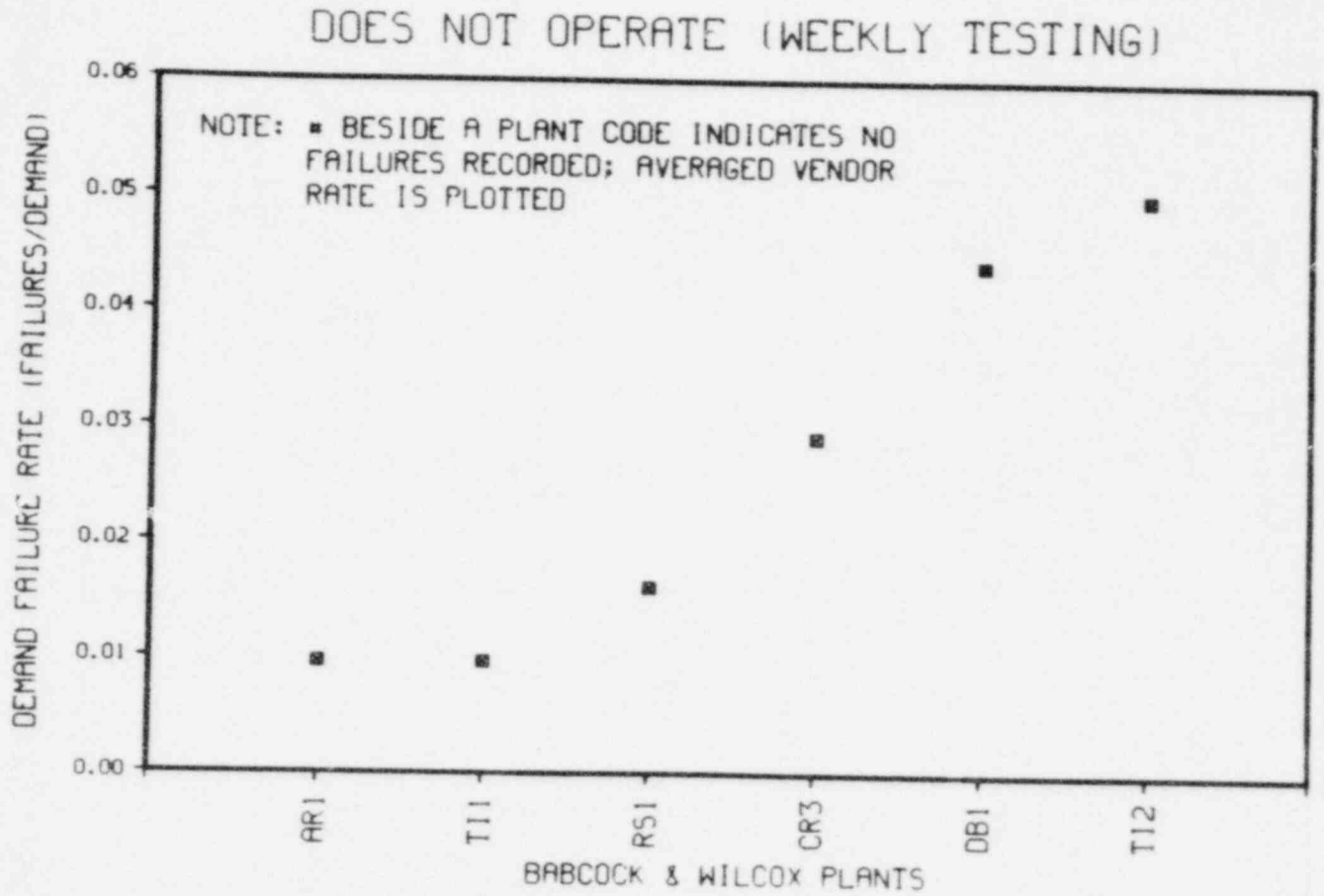

Figure 5a. Demand failure rate estimates (failures per demand) of diesel generators of Babcock & Wilcox plants for the failure mode, Does Not Operate, assuming weekly testing.

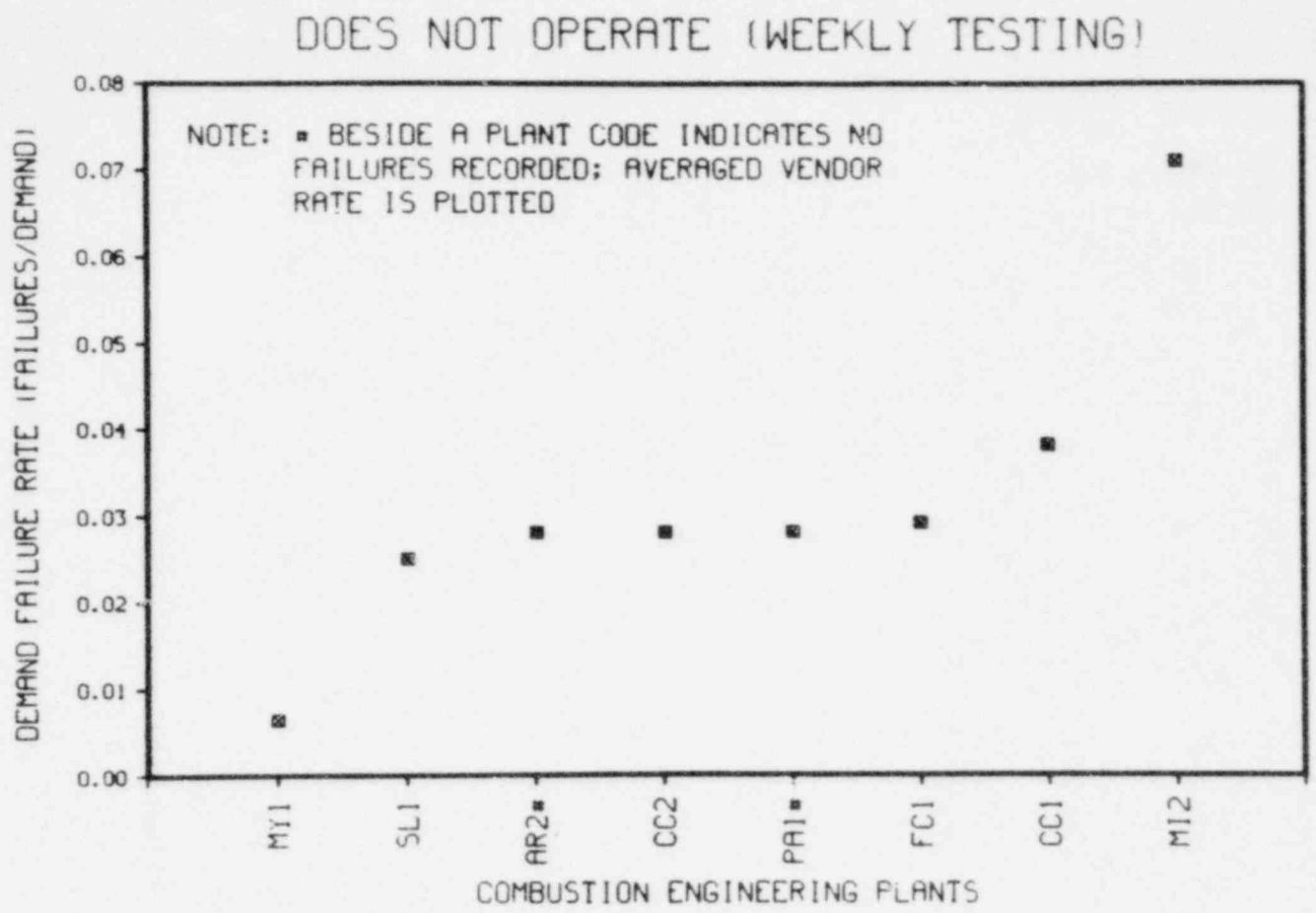

Figure 5b. Demand failure rate estimates (failures per demand) of diesel generators of Combustion Engineering plants for the failure mode, Does Not Operate, assuming weekly testing.

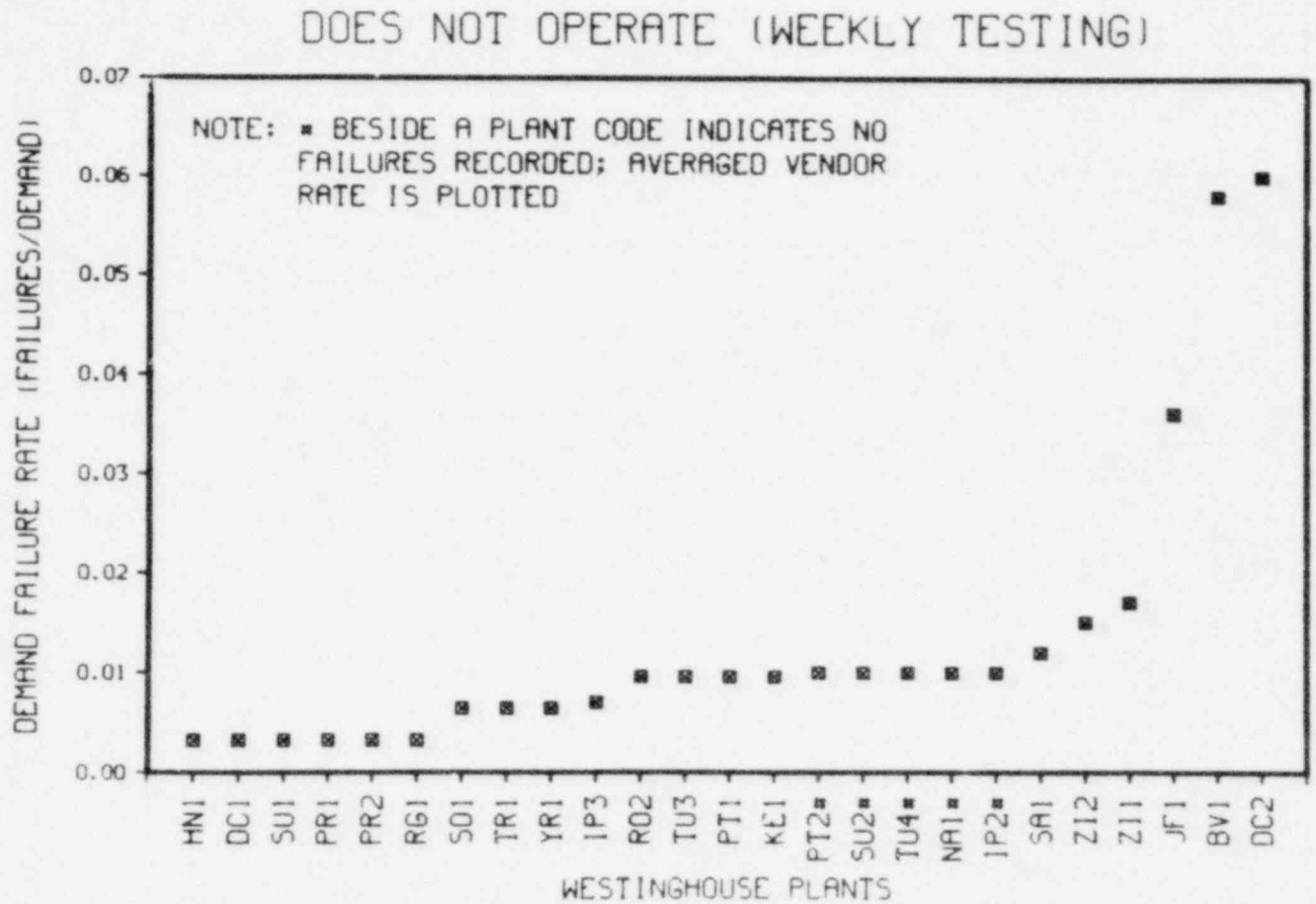

Figure 5c. Demand failure rate estimates (failures per demand) of diesel generators of Westinghouse plants for the failure mode, Does Not Operate, assuming weekly testing.

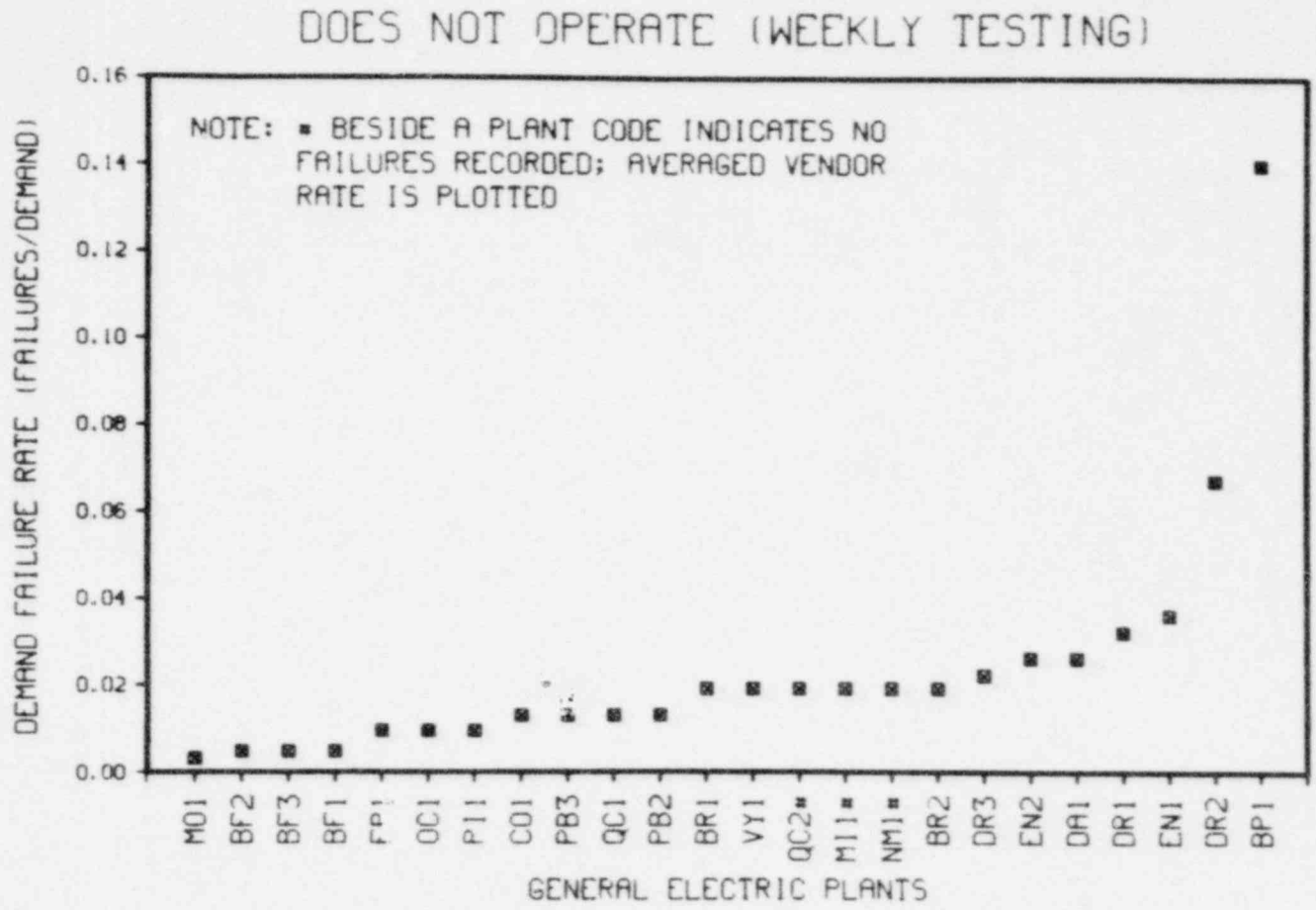

Figure 5d. Demand failure rate estimates (failures per demand) of diesel generators of General Electric plants for the failure mode, Does Not Operate, assuming weekly testing.

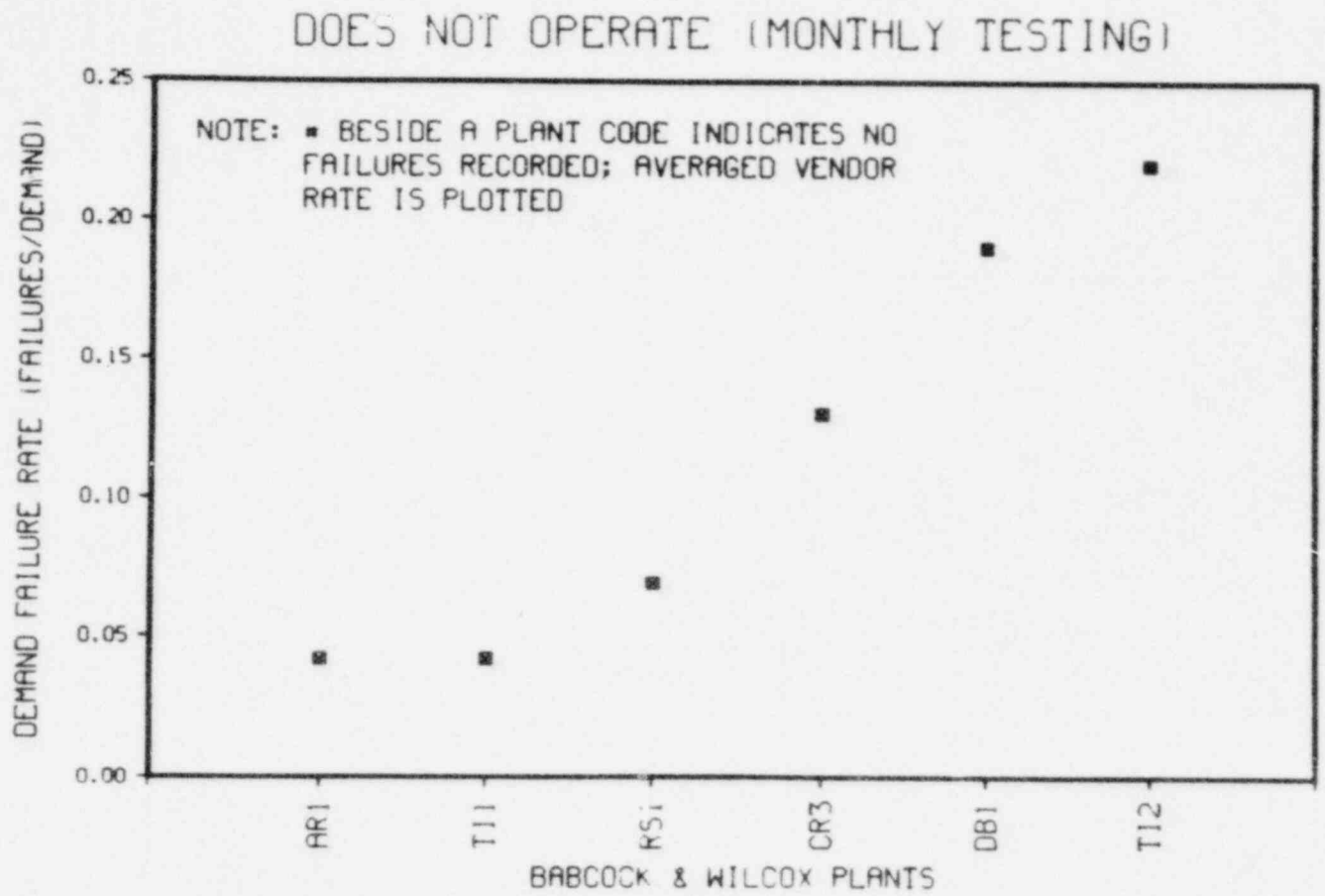

Figure 6a. Demand failure rate estimates (failures per demand) of diesel generators of Babcock & Wilcox plants for the failure mode, Does Not Operate, assuming monthly testing.

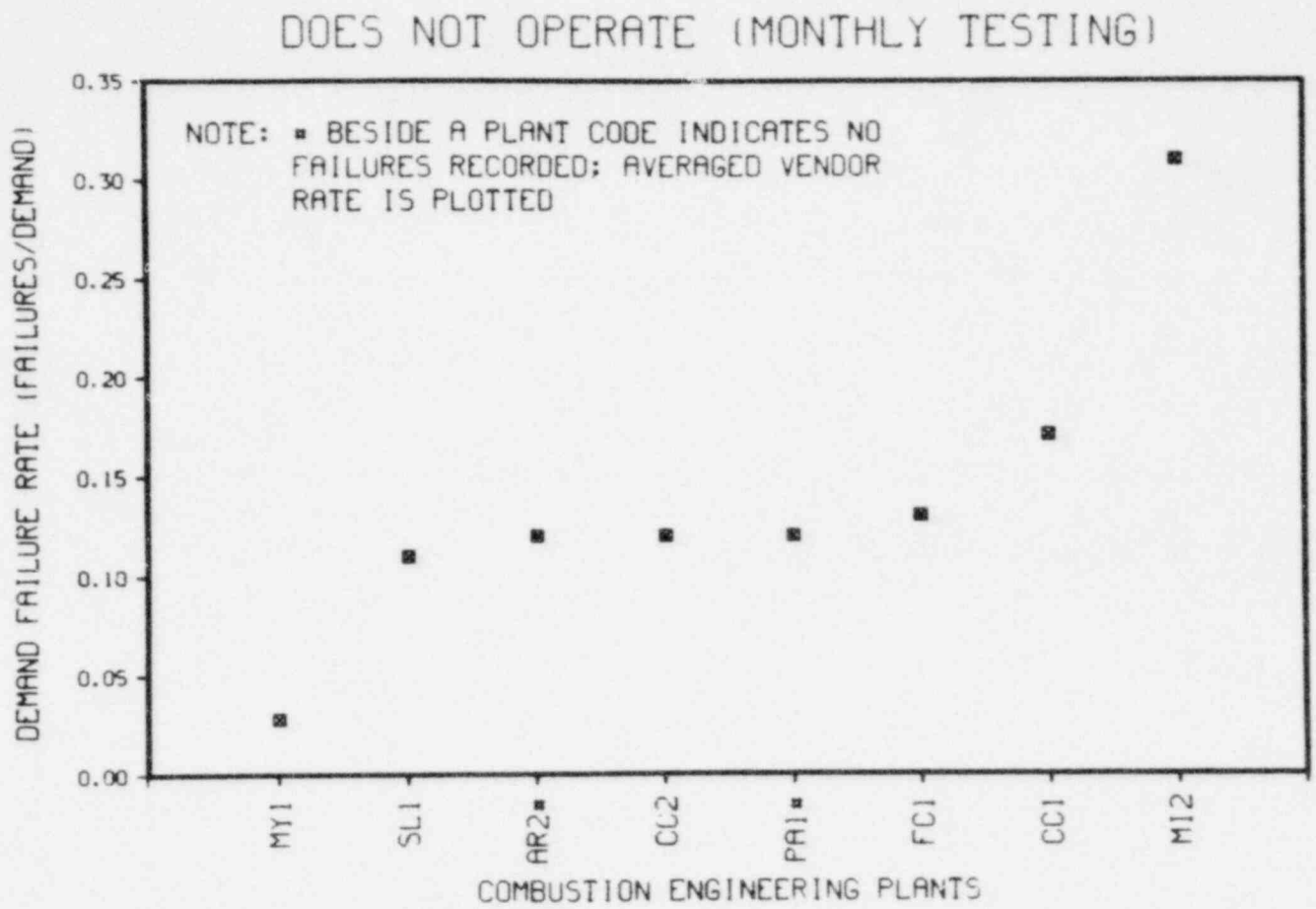

Figure 6b. Demand failure rate estimates (failures per demand) of diesel generators of Combustion Engineering plants for the failure mode, Does Not Operate, assuming monthly testing.

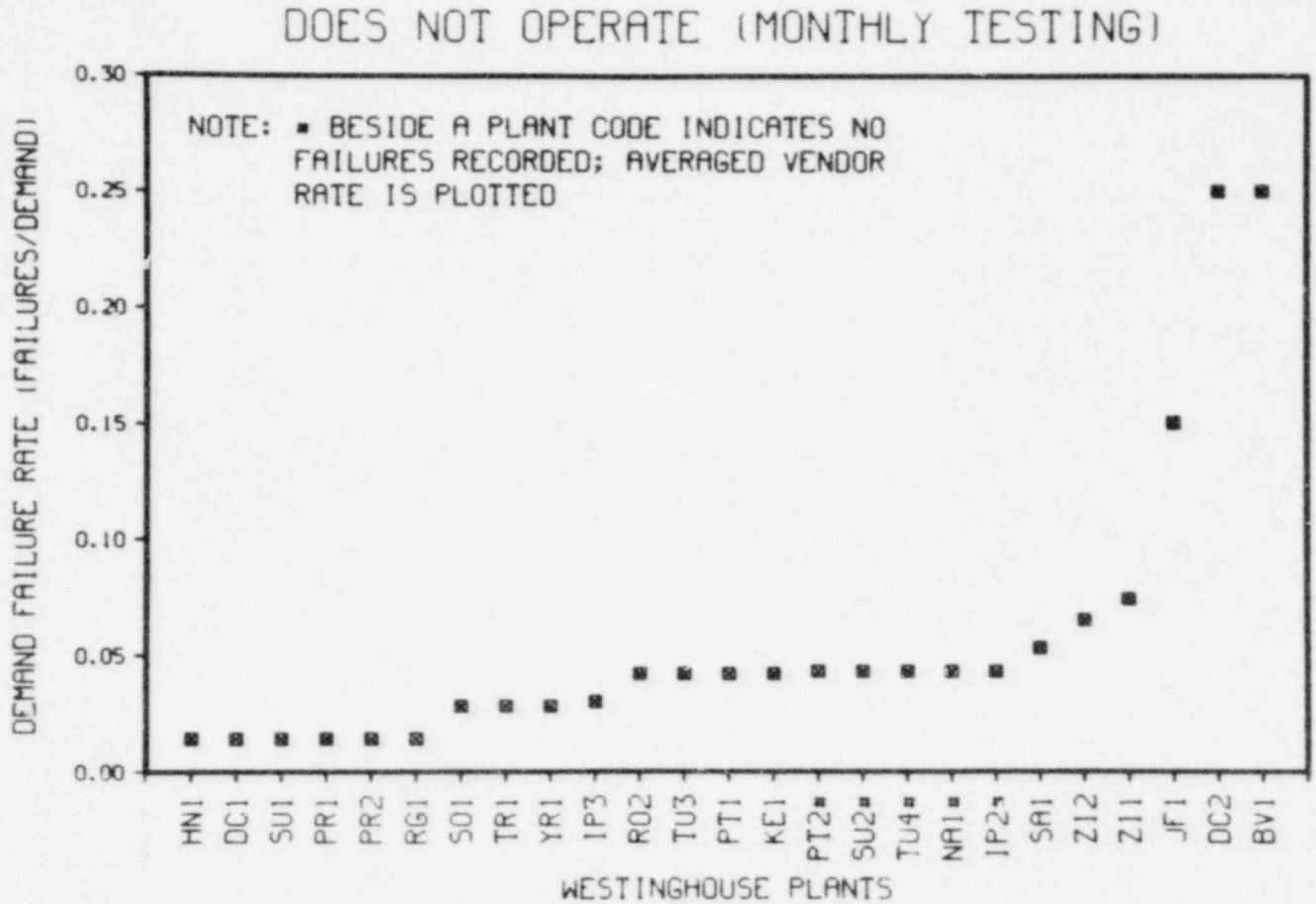

Figure 6c. Demand failure rate estimates (failures per demand) of diesel generators of Westinghouse plants for the failure mode, Does Not Operate, assuming monthly testing.

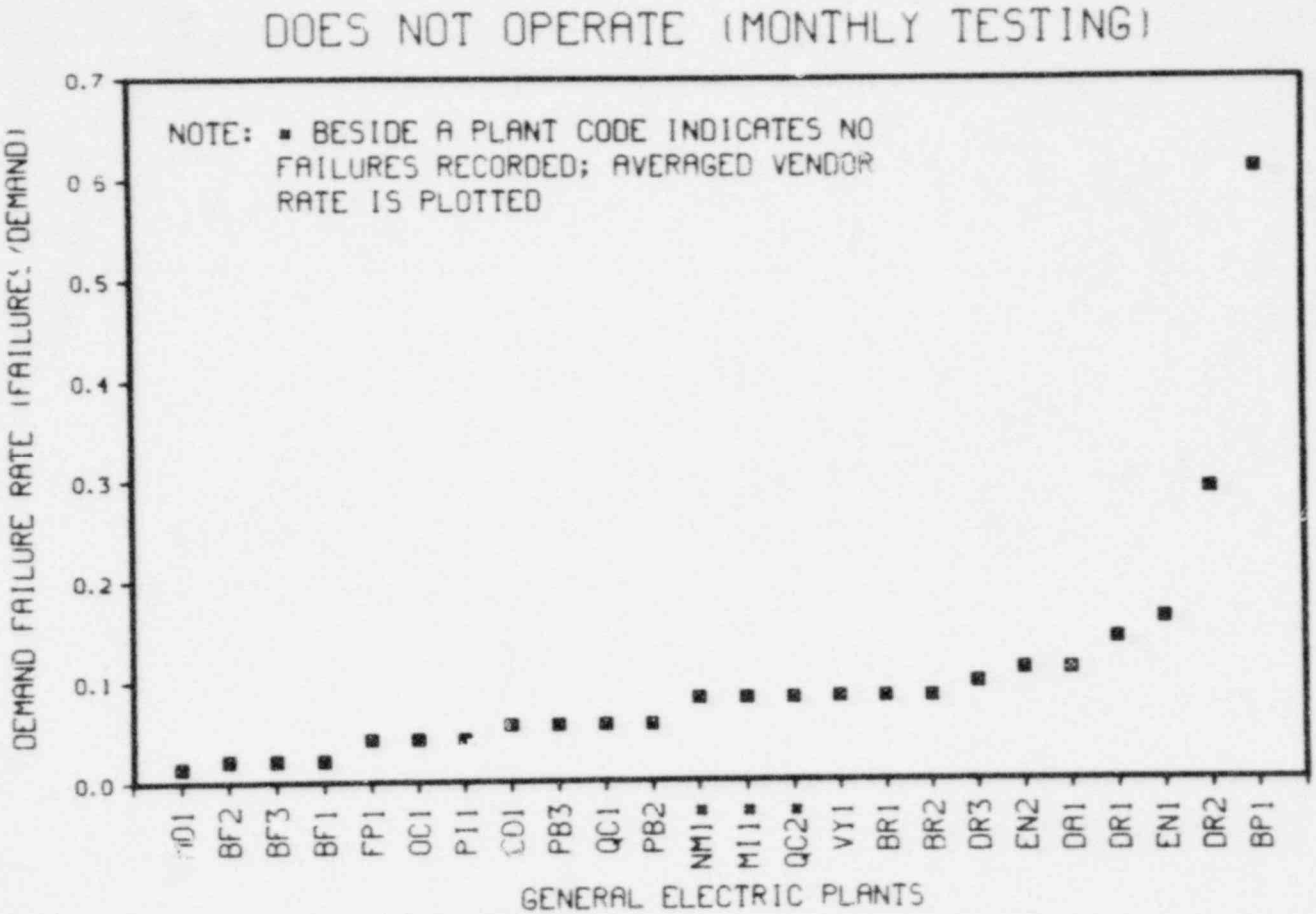

Figure 6d. Demand failure rate estimates (failures per demand) of diesel generators of General Electric plants for the failure mode, Does Not Operate, assuming monthly testing.

NSSS Vendor Rates

Table 21 summarizes the NSSS vendors' diesel-generator LER rates by weekly and monthly testing. These rates were taken from the "Final Statistics" sections of the appendices used to display the results of the LER rate estimations.

TABLE 21. SUMMARY OF DIESEL-GENERATOR FAILURE RATES BY N

NSSS	Standby Hours	Minimum Number of Starts		Does Not Start Q_d			Minimum Number Operating Hours	
		Weekly	Monthly	Weekly	Monthly	Total Failures	Weekly	Monthly
Babcock & Wilcox	228,192	1,356	314	1E-2/d	6E-2/d	19	1,356	314
Combustion Engineering	347,712	2,064	476	2E-2/d	6E-2/d	30	2,064	476
Westinghouse	1,363,848	8,093	1,873	6E-3/d	3E-2/d	[illegible]	8,093	1,873
General Electric	1,169,208	6,942	1,602	1E-2/d	6E-2/d	[illegible]	6,942	1,602
Overall	3,108,960	18,455	4,265	1E-2/d	4E-2/d	186	18,455	4,265

NOTES:

1. Q_d = demand failure rate

   λ_o = operating, hourly failure rate

   λ_s = standby, hourly failure rate.

2. WASH-1400 failure rates:

   Does Not Start Q_d = 3E-2/d

   Does Not Continue to Run λ_o = 3E-3/hr

SSS VENDOR, FAILURE MODE, AND TESTING INTERVAL

Does Not Continue to Run			Does Not Start Combined with Does Not Continue to Run					
λ_o			Q_d			λ_s		
Weekly	Monthly	Total Failures	Weekly	Monthly	Total Failures	Weekly	Monthly	Total Failures
6E-3/hr	3E-2/hr	8	2E-2/d	9E-2/d	27	1E-4/hr	1E-4/hr	27
1E-2/hr	6E-2/hr	28	3E-2/d	1E-1/d	58	2E-4/hr	2E-4/hr	58
4E-3/hr	2E-2/hr	34	1E-2/d	4E-2/d	81	6E-5/hr	6E-5/hr	81
6E-3/hr	3E-2/hr	42	2E-2/d	8E-2/d	132	1E-4/hr	1E-4/hr	132
6E-3/hr	3E-2/hr	112	2E-2/d	7E-2/d	298	1E-4/hr	1E-4/hr	298

Yearly Failure Summarizations

Table 22 summarizes the diesel-generator failures identified in our report. The failures are listed by reporting plant and year of the event. The plants are grouped by vendor, with yearly vendor totals given.

TABLE 22. SUMMARY OF DIESEL-GENERATOR FAILURES BY PLANT AND YEAR

Plant	1976	1977	1978	Total
BABCOCK & WILCOX				
Arkansas 1	1	1	1	3
Crystal River 3	--	4	2	6
Davis-Besse 1	--	1	5	6
Rancho Seco	3	1	1	5
Three Mile Island 1	1	--	2	3
Three Mile Island 2	--	--	4	4
Total	5	7	15	27
COMBUSTION ENGINEERING				
Arkansas 2	--	--	--	--
Calvert Cliffs 1	4	5	3	12
Calvert Cliffs 2	1	3	2	6
Fort Calhoun	4	2	3	9
Millstone 2	13	6	3	22
Maine Yankee	--	--	2	2
Palisades	--	--	--	--
St. Lucie 1	1	5	1	7
Total	23	21	14	58

TABLE 22. (continued)

Plant	19 6	1977	1978	Total
WESTINGHOUSE				
Beaver Valley	2	8	6	16
Cook 1	1	--	--	1
Cook 2	--	--	5	5
Farley 1	--	5	8	13
Ginna	--	--	1	1
Haddam Neck	1	--	--	1
Indian Point 2	--	--	--	--
Indian Point 3	3	--	--	3
Kewaunee	--	3	--	3
North Anna 1	--	--	--	--
Prairie Island 1	--	1	--	1
Prairie Island 2	1	--	--	1
Point Beach 1	--	2	1	3
Point Beach 2	--	--	--	--
Robinson 2	1	1	1	3
Salem 1	--	4	--	4
San Onofre 1	--	--	2	2
Surry 1	1	--	--	1
Surry 2	--	--	--	--
Trojan	--	2	--	2
Turkey Point 3	--	2	1	3
Turkey Point 4	--	--	--	--
Yankee Rowe	--	3	--	3
Zion 1	2	--	6	8
Zion 2	--	4	3	7
Total	12	35	34	81

TABLE 22. (continued)

Plant	1976	1977	1978	Total
GENERAL ELECTRIC				
Big Rock Point 1	13	7	2	22
Browns Ferry 1	2	--	--	2
Browns Ferry 2	--	--	--	--
Browns Ferry 3	--	1	--	1
Brunswick 1	--	5	1	6
Brunswick 2	5	--	1	6
Cooper Station	3	--	1	4
Duane Arnold	5	2	1	8
Dresden 1	--	--	5	5
Dresden 2	4	9	8	21
Dresden 3	4	3	--	7
Duane Arnold	5	2	1	8
Fitzpatrick	2	2	2	6
Hatch 1	9	8	--	17
Hatch 2	--	--	2	2
Millstone 1	--	--	--	--
Monticello	1	--	--	1
Nine Mile Point 1	--	--	--	--
Oyster Creek	2	--	1	3
Peach Bottom 2	--	4	4	8
Peach Bottom 3	--	--	--	--
Pilgrim 1	2	--	1	3
Quad-Cities 1	1	3	--	4
Quad-Cities 2	--	--	--	--
Vermont Yankee	2	3	1	6
Total	55	47	30	132
Grand Total	95	110	93	298

Plant Data

Table 23 summarizes all events, failures and nonfailures, by plant and diesel-generator subsystem. We included this table so that you may conveniently identify our data and perform your own estimations, if you so desire.

TABLE 23. PLA

BABCOCK & WILCOX

Plant Code	Plant Name	Diesel Generator Population	Minimum Number of Demands per Component		Minimum Operating Hours per Component		Standby Hours per Component	Fuel Oil	Lube Oil	Starting	Cooling
			Weekly	Monthly	Weekly	Monthly					
AR1	Arkansas Nuclear One 1	2	156	36	156	36	26280	--	--	2A	--
CR3	Crystal River 3	2	102	24	102	24	17184	1A	1A	--	--
DB1	Davis-Besse 1	2	68	16	68	16	11424	--	--	--	--
RS1	Rancho Seco	2	156	36	156	36	26280	1B	--	1A	--
TI1	Three Mile Island 1	2	156	36	156	36	26280	--	2A,1U	--	--
TI2	Three Mile Island 2	2	40	9	40	9	6648	1A	--	--	--
	(Subtotal)							(2A,1B)	(3A,1U)	(3A)	--
COMBUSTION ENGINEERING											
AR2	Arkansas Nuclear One 2	2	4	1	4	1	600			N O F A I L U R E S	R
CC1	Calvert Cliffs 1	1 ded., 1 shared	156	36	156	36	26280	--	1B,3U	--	1A,1B
CC2	Calvert Cliffs 2	1 ded., 1 shared	108	25	108	25	18264	--	2U	2A	1A,1B,1U
FC1	Fort Calhoun	2	156	36	156	36	26280	1U	--	4A	--
MI2	Millstone 2	2	156	36	156	36	26280	1A,3B,1U	2B,2U	--	1A,5B,1U
MY1	Maine Yankee	2	156	36	156	36	26280	1A	--	--	--
PA1	Palisades	2	156	36	156	36	26280	1U	--	1U	--
SL1	St. Lucie	2	140	32	140	32	23592	2A	--	1U	--
	(Subtotal)							(4A,3B,3U)	(3B,7U)	(6A,2U)	(3A,7B,2U)

a. A and B are failure modes. A is Does Not Start. B is Does Not Continue to Run. U indicates events that were not classified as diesel-ge

NT DATA

Number and Mode of Events[a]									
Scavenging Air	Engine Frame/ Internals	Governor	Exhaust	Shutdown	Output Breaker	Exciter/ Voltage Regulator	Generator	Other Unknown	Total
1B	--	--	--	--	--	--	--	2U	2A,1B,2U
--	--	2A	--	1A	--	--	--	1A	6A
2B	1A	1A	--	--	--	1A	--	1B,2U	3A,3B,2U
--	--	1B	--	--	--	1U	--	2A	3A,2B,1U
--	--	--	--	--	1A	--	--	--	3A,1U
--	1A,2B	--	--	--	--	--	--	--	2A,2B
(3B)	(2A,2B)	(3A,1B)	--	(1A)	(1A)	(1A,1U)	--	(3A,1B,4U)	(19A,8B,6U)
E P O R T E D					N O F A I L U R E S R E P O R T E D				
--	1B	--	--	--	1A	1A	1A	3A,2B	7A,5B,3U
--	--	--	--	--	1B	--	--	1A	4A,2B,3U
--	--	1B	--	--	--	1A,2B	--	1A	6A,3B,1U
--	4B	3A,1B	--	1B	--	1A	--	3U	6A,16B,7U
--	--	1A	-	--	--	--	--	--	2A
--	--	--	--	--	--	--	--	--	2U
2B	--	--	--	1A	1A	--	--	1A	5A,2B,1U
(2B)	(5B)	(4A,2B)	--	(1A,1B)	(2A,1B)	(3A,2B)	(1A)	(6A,2B,3U)	(30A,28B,17U)

nerator failures.

TABLE

WESTINGHOUSE

Plant Code	Plant Name	Diesel Generator Population	Minimum Number of Demands per Component: Weekly	Minimum Number of Demands per Component: Monthly	Minimum Operating Hours per Component: Weekly	Minimum Operating Hours per Component: Monthly	Standby Hours per Component	Fuel Oil	Lube Oil	Starting
BV1	Beaver Valley 1	2	137	32	137	32	23136	1B	1B	2A
DC1	Donald C. Cook 1	2	156	36	156	36	26280	--	--	--
DC2	Donald C. Cook 2	2	42	10	42	10	7080	1A,1B,1U	--	1A,1B
HN1	Haddam Neck	2	156	36	156	36	26280	1A	--	--
IP2	Indian Point 2	3	156	36	156	36	26280	--	3U	1U
IP3	Indian Point 3	3	142	33	142	33	23952	1U	--	--
JF1	Joseph M. Farley 1	5	72	17	72	17	12192	--	--	5A,2B,2U
KE1	Kewaunee	2	156	36	156	36	26280	--	--	--
NA1	North Anna 1	2	38	9	38	9	6456			N O F A I L
PR1	Prairie Island 1	2	156	36	156	36	26280	1U	--	--
PR2	Prairie Island 2	2	156	36	156	36	26280	--	--	--
PT1	Point Beach 1	2	156	36	156	36	26280	--	--	--
PT2	Point Beach 2	2	156	36	156	36	26280			N O F A I L
RG1	Robert E. Ginna	2	156	36	156	36	26280	1U	--	--
RO2	H. B. Robinson 2	2	156	36	156	36	26280	2B	--	--
SA1	Salem 1	3	107	25	107	25	17976	2A	1U	--
SO1	San Onofre 1	2	156	36	156	36	26280	2A,1U	--	--
SU1	Surry 1	1 ded., 1 shared	156	36	156	36	26280	--	--	--
SU2	Surry 2	1 ded., 1 shared	156	36	156	36	26280			N O F A I L
TR1	Trojan	2	156	36	156	36	26280	3U	--	--
TU3	Turkey Point 3	2	156	36	156	36	26280	2A,1B	--	--
TU4	Turkey Point 4	2	156	36	156	36	26280			N O F A I L
YR1	Yankee Rowe	3	156	36	156	36	26280	--	--	1A,2B
ZI1	Zion 1	2 ded., 1 shared	156	36	156	36	26280	1B	1A,2U	2A
ZI2	Zion 2	2 ded., 1 shared	156	36	156	36	26280	--	1B	--
	(Subtotal)							(8/,6B,8U)	(1A,2B,6U)	(11A,5B,3U)

a. A and B are failure modes. A is Does Not Start. B is Does Not Continue to Run. U indicates events that were not classifie

23. (continued)

Number and Mode of Events[a]										
Cooling	Scavenging Air	Engine Frame/ Internals	Governor	Exhaust	Shutdown	Output Breaker	Exciter/ Voltage Regulator	Generator	Other Unknown	Total
--	--	--	--	--	--	9A	2A	1B	3U	13A,3B,3U
--	--	--	--	--	--	--	1A,1U	--	3U	1A,4U
1U	--	--	1B	--	--	--	--	--	3U	2A,3B,5U
--	--	--	--	--	--	--	--	--	1U	1A,1U
1U	--	--	--	1U	--	--	--	--	--	6U
--	--	--	2B	--	--	--	--	1B	1U	3B,2U
--	--	--	4A	--	--	2A	--	--	--	11A,2B,2U
--	1B	--	1B	--	1U	--	--	--	1A	1A,2B.1U
URES	REPORTED					NO	FAILURES	REPORTED		
--	--	--	1B	--	--	--	--	--	1U	1B,2U
1U	--	1B	--	--	--	--	--	--	2U	1B, 3U
--	--	--	--	--	1A	2A	--	--	--	3A
URES	REPORTED					NO	FAILURES	REPORTED		
--	--	--	--	--	--	1A,1U	--	--	--	1A,2U
--	--	--	1B	--	--	--	--	--	--	3B
1B	1B	--	--	--	--	--	--	--	--	2A,2B,1U
--	--	--	--	--	--	--	--	--	--	2A,1U
--	--	1A,3U	--	--	--	--	--	--	1U	1A,4U
URES	REPORTED					NO	FAILURES	REPORTED		
--	--	--	1B	--	--	--	--	1U	1A	1A,1B,4U
2U	--	--	--	--	--	2U	--	--	--	2A,1B,4U
URES	REPORTED					NO	FAILURES	REPORTED		
1U	--	--	--	--	--	--	--	--	--	1A,2B,1U
--	--	--	1B	--	--	--	1B	--	2A	5A,3B,2U
--	--	--	2B	--	2B	--	2B	--	--	7B
(1B,6U)	(2B)	(1A,1B,3U)	(4A,10B)	(1U)	(1A,2B,1U)	(14A,3U)	(3A,3B,1U)	(2B,1U)	(4A,15U)	(47A,34B,48U)

d as diesel generator failures.

GENERAL ELECTRIC

Plant Code	Plant Name	Diesel Generator Population	Minimum Number of Demands per Component		Minimum Operating Hours per Component		Standby Hours per Component	Fuel Oil	Lube Oil	Starting	Cooling
			weekly	Monthly	weekly	Monthly					
BF1	Browns Ferry 1	4	156	36	156	36	26280	--	--	1U	--
BF2	Browns Ferry 2		156	36	156	36	26280	NO FAILURES R			
BF3	Browns Ferry 3		125	28	125	28	20976	--	--	1U	--
BP1	Big Rock Point	1	156	36	156	36	26280	4A	--	4A	2A,3B
BR1	Brunswick 1	4	116	27	116	27	19512	1B	2A	1A	--
BR2	Brunswick 2		156	36	156	36	26280	1A,1B	--	1A	--
CO1	Cooper Station	2	156	36	156	36	26280	1B,1U	--	--	--
DA1	Duane Arnold	2	156	36	156	36	26280	1B,1U	1B	--	1B
DR1	Dresden 1	1	156	36	156	36	26280	1A,2U	1A	1A,1U	--
DR2	Dresden 2	1 ded., 1 shared	156	36	156	36	26280	1B	--	9A	2B,1U
DR3	Dresden 3	1 ded., 1 shared	156	36	156	36	26280	2U	1B	--	3U
EN1	Edwin I. Hatch 1	2 ded., 1 shared	156	36	156	36	26280	1U	1B	1A	3B
EN2	Edwin I. Hatch 2	2 ded., 1 shared	26	6	26	6	4296	--	--	--	--
FP1	James A. Fitzpatrick	4	156	36	156	36	26280	--	2A,2U	--	--
MI1	Millstone 1	1	156	36	156	36	26280	2U	--	--	--
MO1	Monticello	2	156	36	156	36	26280	--	--	1A	--
NM1	Nine Mile Point 1	2	156	36	156	36	26280	NO FAILURES R			
OC1	Oyster Creek	2	156	36	156	36	26280	--	--	1A	--
PB2	Peach Bottom 2	4	156	36	156	36	26280	1U	1B,3U	1U	2A
PB3	Peach Bottom 3		156	36	156	36	26280	--	--	1U	--
PI1	Pilgrim 1	2	156	36	156	36	26280	--	--	--	--
QC1	Quad-Cities 1	1 ded., 1 shared	156	36	156	36	26280	2U	--	1A	1U
QC2	Quad-Cities 2	1 ded., 1 shared	156	36	156	36	26280	--	--	--	2U
VY1	Vermont Yankee	2	156	36	156	36	26280	1B	--	1A	1B
	(Subtotal)							(6A,6B,12U)	(5A,4B,5U)	(2[illegible],5U)	(4A,10B,7U)
	(Overall Total)							(20A,16B,23U)	(9A,9B,19U)	(41A,5B,10U)	(7A,18B,15U)

a. A and B are failure modes. A is Does Not Start. B is Does Not Continue to Run. U indicates events that were not classified as diesel-ge

nued)

Number and Mode of Events[a]									
avenging Air	Engine Frame/ Internals	Governor	Exhaust	Shutdown	Output Breaker	Exciter/ Voltage Regulator	Generator	Other Unknown	Total
--	--	1A,1B	--	--	--	1U	--	--	1A,1B,2U
ORTED					NO FAILURES REPORTED				
--	--	--	--	--	1U	1A	--	--	1A,2U
--	--	6A,1U	--	--	1A	--	--	2A	19A,3B,1U
--	--	1B	--	1U	1B	--	--	2U	3A,3B,3U
--	--	1B	--	--	1A	1A	--	2U	4A,2B,2U
--	1A	--	--	--	1A,2U	1B	--	--	2A,2B,3U
--	2A	1B	1B	--	1A	--	--	2U	3A,5B,3U
--	--	--	--	--	--	--	--	2K	5A,3U
1B	--	4A	--	2A	1A	1B	--	1U	16A,5B,2U
--	--	3A,2B	--	--	--	1A,1U	--	1U	4A,3B,7U
--	1B	2A	--	--	--	1A,2B	--	4A,2B,5U	8A,9B,6U
--	--	2A	--	--	--	--	--	3U	2A,3U
--	--	1A	--	2A	1B	1U	--	--	5A,1B,3U
--	--	--	--	1U	--	--	--	--	3U
--	--	--	--	--	--	--	--	--	1A
ORTED					NO FAILURES REPORTED				
--	--	--	--	--	--	2A	--	--	3A
--	--	3A	--	1A	--	--	1A	--	7A,1B,5U
--	--	--	--	--		--	--	--	1U
--	--	--	2B	--	--	1B	--	--	3B
--	--	--	--	--	--	2A	1A	2U	4A,5U
--	--	--	--	--	--	--	--	--	2U
--	1A,2B	--	--	--	--	--	--	--	2A,4B
(1B)	(4A,3B)	(22A,6B,1U)	(3B)	(5A,2U)	(5A,2B,3U)	(8A,5B,3U)	(2A)	(8A,2B,18U)	(90A,42B,56U)
(8B)	(7A,11B,3U)	(33A,19B,1U)	(3B,1U)	(8A,3B,3U)	(22A,3B,6U)	(15A,10B,5U)	(3A,3B,1U)	(21A,5B,40U)	(186A,112B,127U)

itor failures.

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3. Periodic Testing of Diesel-Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants, U.S. Nuclear Regulatory Commission Regulatory Guide 1.108, Revision 1, August 1977, p. 1.108-2.

4. G. L. Boner and H. W. Hanners, Enhancement of On-site Emergency Diesel Generator Reliability, NUREG-CR-0660, UDR-TR-79-07, February 1979, pp. I-3, I-5 through I-7, IV-5, V-12.

5. Crooks and Vissing (see Ref. 1) pp. A-1 through A-4.

6. Boner and Hanners (see Ref. 4) pp. I-10 and I-11.

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9. Operating Units Status Report, 3, 1, NUREG-0020, January 1979.

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11. IEEE Standard 387-1977 (see Ref. 2), p. 16.

12. Standard Technical Specifications for Combustion Engineering Pressurized Water Reactors, Revision of March 15, 1977, NUREG-0212, March 1977, pp. 3/4 8-2 and 8-3.

13. Standard Technical Specifications for General Electric Boiling Water Reactors, Revision of April 1, 1978, NUREG-0123, Revision 1, April 1, 1978, p. 3/4 8-3.

14. Standard Technical Specifications for Westinghouse Pressurized Water Reactors, Revision of July 1979, NUREG-0452, Revision 2, July 1979, pp. 3/4 8-2 and 8-3.

15. Standard Technical Specifications for Westinghouse Pressurized Water Reactors, Revision of July 1979, (see Ref. 16), p. 1-4.

16. Boner and Hanners (see Ref. 4,) p. IV-5.

17. Crooks and Vissing (see Ref. 1), pp. 3, 4, A-1 through A-4.

18. Boner and Hanners (see Ref. 4), pp. I-25 and I-26.

19. Boner and Hanners (see Ref. 4), pp. I-6 and I-7.

20. Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Reactor Plants, Apendices III and IV, WASH-1400, NUREG-75/014, October 1975, Table III 4-2, p. III-47/48.

APPENDIX A

DISCUSSION OF THE CAUSES OF LER VARIATIONS

APPENDIX A

DISCUSSION OF THE CAUSES OF VARIATIONS IN LER REPORTING

There are generally two criteria used by the utilities to determine reporting requirements for failures. These are (a) technical specifications for each individual plant and (b) Regulatory Guide 1.16[A-1]. Variation exists in the reporting requirements for individual plants. For example, generally, the technical specifications for plants licensed prior to January 1, 1976 were independently written by each specific plant without any planned uniformity between plants. All plants licensed after this date used standardized technical specifications, which helped create more uniform reporting. Also, there have been changes in the rules that govern LER reporting, to ensure greater uniformity. These changed reporting rules, and the standardized technical specifications, are expected to result in more uniform LER reporting after January 1, 1976.

The above "mechanical" causes for LER reporting variations are explainable and expected. However, there are further reporting variations. Differences in interpretation of the rules for submitting incident reports cause these variations. Also, variation is caused by the difficulty of determining the extent of safety and non-safety systems, and therefore, by the questions of what failures are, or are not, required to be reported. Finally, variation can be caused by the degree of importance assigned to the LER reports by the management of each utility. We have seen variation in both the quantity and quality of LERs between similar plants, where one would expect a more uniform reporting. We have attributed these variations to the reasons mentioned above.

The one thing that seems to have most hindered the development of uniform reporting is the lack of agreement of what is intended by an LER. Many persons feel that LERs are intended to highlight problem areas within the safety systems. Some feel that the LERs ought to be used to highlight generic problem areas. And, many of these same people do not feel that

these uses are compatible with the need to determine failure rate information.

All of these points may serve to confuse the individual responsible for reporting events. Hence the variations in the quality and quantity of LERs received by the Nuclear Regulatory Commission may be explained, in part, by these points. For further discussion of the causes of variations in LER reporting, see Reference A-2.

Reference

A-1. Reporting of Operating Information--Appendix A Technical Specifications, U.S. Nuclear Regulatory Commission Regulatory Guide 1.16, Revision 4, August 1975.

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APPENDIX B

ONE-LINE LER CODING SCHEME

APPENDIX B

ONE-LINE LER CODING SCHEME

In order to extract as much pertinent information as possible from the information provided in the original LER, and, at the same time, to restrict the information to one line of computer output per LER, we developed the following code scheme.

In general, the order of discussion follows the order in which the various fields appear in the one-line descriptions of the diesel-generator events. The acronyms used for the corresponding fields in the one-line descriptions are contained in parentheses following the topic headings used below.

Vendor (VEN)

The VEN field indicates the NSSS vendor associated with the plant submitting the LER report. A single-character field is used to store and display the vendor code. This field can be used as a sort key. The following list gives the code and corresponding NSSS vendor.

Code	NSSS Vendor
B	Babcock & Wilcox
C	Combustion Engineering
G	General Electric
W	Westinghouse

Plant (PLANT)

We used a three-character field to identify the commercial power plant responsible for the submission of each LER. Due to the relatively large number of plants used in our report, a list of the plants and codes will

not be given here. Table B-1 provides this information. The PLANT field can be used as a sort key.

Control Number (CONTROL NO.)

To identify each one-line LER within the data file, and to provide a cross-reference with the actual LER submitted to NRC, we entered the unique six-digit control number assigned to the report by the NRC into the CONTROL NO. field. There were some instances of several different reports being listed in the narrative summary of a single LER. To accomodate this situation, we added an alphabetic character to the six-digit number in order to separately identify each report, and we encoded each report separately. Thus, traceability back to the original LER number was maintained, yet each report remained unique. When a single report contained more than one instance of the same event in the summary description, we placed an asterisk (*) after the control number to flag the coded one-line LER in the data file. The corresponding number of events was then entered in the FAIL NUM field so that each event could be accounted for. The CONTROL NO. field can be used as a sort field, but it is intended for data record identification within the data file and not for use as a sorting key.

Number of Failures (FAIL NUM)

The FAIL NUM field, mentioned above, was used to store a count of the number of events per one-line LER description. Due to the limited space available on a line of computer output, and to the fact that only diesel-generator unavailabilities/nonfailures contained multiple events, this field is not displayed in the one-line LER descriptions. A blank in this field implies that the value of the field is one. Should there be more than one event per report, the corresponding number of events is entered in this field. A list of those one-line LER descriptions that contain multiple events is given below.

TABLE B-1. G

BAB

Plant Code	Plant Name (Docket Number)	Design Electrical Rating (MWe)	Criticality Date	Date of Commercial Operation	Location (State)	Arch
AR1	Arkansas Nuclear One 1 (50-313)	850	8/6/74	12/19/74	AR	Bechte
CR3	Crystal River 3 (50-302)	825	1/14/77	3/13/77	FL	Gilber
DB1	Davis-Besse 1 (50-346)	906	9/10/77	11/20/77	OH	Bechte
OE1	Oconee 1 (50-269)	887	4/19/73	7/15/73	SC	Duke P Bechte
OE2	Oconee 2 (50-270)	887	11/11/73	9/9/74	SC	Duke P Bechte
OE3	Oconee 3 (50-287)	887	9/5/74	12/16/74	SC	Duke P Bechte
RS1	Rancho Seco (50-312)	918	9/16/74	4/17/75	CA	Bechte
TI1	Three Mile Island 1 (50-289)	819	6/5/74	9/2/74	PA	Gilber
TI2	Three Mile Island 2 (50-320)	906	3/28/78	12/30/78	PA	Burns

ENERAL PLANT INFORMATION

COCK & WILCOX

itect/Engineer	Constructor	DG Manufacturer	kW Rating	Population	Remarks
l	Bechtel	General Motors	2750	2	
t Associates	J.A. Jones Const.	Fairbanks Morse	3000	2	
l	Bechtel	General Motors	2600	2	
ower Co. and l	Duke Power Co.				Emergency power for Oconee 1, 2, and 3 is supplied by an on-site hydroelectric plant
ower Co. and l	Duke Power Co.				
ower Co. and l	Duke Power Co.				
l	Bechtel	General Motors	2750	2	
t Associates	United Engineers & Constructors	Fairbanks Morse	3000	2	
& Roe	United Engineers & Constructors	Fairbanks Morse	3000	2	

TABLE B-1. (cc

COMBUSTION ENGI

Plant Code	Plant Name (Docket Number)	Design Electrical Rating (MWe)	Criticality Date	Date of Commercial Operation	Location (State)	Architect/Eng
AR2	Arkansas Nuclear One 2 (50-368)	912	12/5/78	N/A	AR	Bechtel
CC1	Calvert Cliffs 1 (50-317)	845	10/7/74	5/8/75	MD	Bechtel
CC2	Calvert Cliffs 2 (50-318)	845	11/30/76	4/1/77	MD	Bechtel
FC1	Fort Calhoun (50-285)	457	8/6/73	9/26/73	NB	Gibbs & Hill, I
MI2	Millstone 2 (50-336)	830	10/17/75	12/16/75	CT	Bechtel
MY1	Maine Yankee (50-309)	825	10/23/72	12/28/72	ME	Stone & Webster
PA1	Palisades (50-255)	805	5/24/71	12/31/71	MI	Bechtel
SL1	St. Lucie (50-335)	802	4/22/76	12/21/76	FL	Ebasco

inued)

ERING

eer	Constructor	DG Manufacturer	kW Rating	Population	Remarks
	Bechtel	Fairbanks Morse	2850	2	
	Bechtel	Fairbanks Morse	2500	3	1 dedicated to Unit 1 1 shared between Units 1 and 2
	Bechtel	Fairbanks Morse	2500		1 dedicated to Unit 2
.	Gibbs & Hill, Inc. and Durham & Richardson, Inc.	General Motors	2500	2	
	Bechtel	Fairbanks Morse	2750	2	
	Stone & Webster	General Motors	2500	2	
	Bechtel	Alco	2500	2	
	Ebasco	General Motors	3500	2	Both generators are driven by tandem diesels

TABLE B

WE

Plant Code	Plant Name (Docket Number)	Design Electrical Rating (MWe)	Criticality Date	Date of Commercial Operation	Location (State)	Archi
BV1	Beaver Valley 1 (50-334)	852	5/10/76	10/1/76	PA	Stone &
DC1	Donald C. Cook 1 (50-315)	1054	1/18/75	8/27/75	MI	America Service
DC2	Donald C. Cook 2 (50-316)	1100	3/10/78	7/1/78	MI	America Service
HN1	Haddam Neck (50-213)	575	7/24/67	1/1/68	CT	Stone &
IP2	Indian Point 2 (50-247)	873	5/22/73	8/73	NY	United & Const
IP3	Indian Point 3 (50-286)	965	4/6/76	8/30/76	NY	United & Const
JF1	Joseph M. Farley 1 (50-348)	829	8/9/77	12/1/77	AL	Bechtel Service
KE1	Kewaunee (50-305)	535	3/7/74	6/74	WI	Pioneer & Eng.
NA1	North Anna 1 (50-338)	907	4/5/78	N/A	VA	Stone &
PR1	Prairie Island 1 (50-282)	530	12/1/73	12/16/73	MN	Pioneer & Eng.
PR2	Prairie Island 2 (50-306)	530	12/17/74	12/21/74	MN	Pioneer & Eng.
PT1	Point Beach 1 (50-266)	497	11/2/70	12/21/70	WI	Bechtel
PT2	Point Beach 2 (50-301)	497	5/30/72	10/1/72	WI	Bechtel
RG1	Robert E. Ginna (50-244)	490	11/8/69	7/70	NY	Gilbert

-1. (continued)

STINGHOUSE

tect/Engineer	Constructor	DG Manufacturer	kW Rating	Population	Remarks
Webster	Stone & Webster	General Motors	2600	2	
n Electric Power Corporation	Indiana & Michigan Power Company	Worthington	3500	2	
n Electric Power Corporation	Indiana & Michigan Power Company	Worthington	3500	2	
Webster	Stone & Webster	General Motors	2850	2	
Engineers ructors	J.A. Jones/U.E.&C.	Alco	1750	3	
Engineers ructors	WEDCO	Alco	1750	3	
/Southern s, Inc.	Daniel	Fairbanks Morse	4000	3	All five units have the capability to be shared between Units 1 and 2
		Fairbanks Morse	2600	2	
Services Co.	Pioneer Services & Eng. Co.	General Motors	2850	2	
Webster	Stone & Webster	Fairbanks Morse	2750	2	1 dedicated to Unit 1 1 shared between Unit 1 and 2
Services Co.	Northern States Power Company	Fairbanks Morse	3000	2	
Services Co.	Northern States Power Company	Fairbanks Morse	3000	2	
	Bechtel	General Motors	2850	2	Both shared with Unit 2
	Bechtel	General Motors	2850	2	Both shared with Unit 1
	Bechtel	Alco	1950	2	

TABLE B-1. (co

WESTINGHOUSE (co

Plant Code	Plant Name (Docket Number)	Design Electrical Rating (MWe)	Criticality Date	Date of Commercial Operation	Location (State)	Architect/En
RO2	H. B. Robinson 2 (50-261)	700	9/20/70	3/7/71	SC	Ebasco
SA1	Salem 1 (50-272)	1090	12/11/76	6/30/77	NJ	PSE&G
SO1	San Onofre 1 (50-206)	436	6/14/67	1/1/68	CA	Bechtel
SU1	Surry 1 (50-280)	822	7/1/72	12/22/72	VA	Stone & Webste
SU2	Surry 2 (50-281)	822	3/7/73	5/1/73	VA	Stone & Webste
TR1	Trojan (50-344)	1130	12/15/75	5/20/76	OR	Bechtel
TU3	Turkey Point 3 (50-250)	693	10/20/72	12/14/72	FL	Bechtel
TU4	Turkey Point 4 (50-251)	693	6/11/73	9/7/73	FL	Bechtel
YR1	Yankee Rowe (50-029)	175	8/19/60	7/61	MA	Stone & Webste
ZI1	Zion 1 (50-295)	1040	6/19/73	12/31/73	IL	Sargent & Lund
ZI2	Zion 2 (50-304)	1040	12/24/73	9/17/74	IL	Sargent & Lund

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eer	Constructor	DG Manufacturer	kW Rating	Population	Remarks
	Ebasco	Fairbanks Morse	2500	2	
	United Engineers & Constructors	Alco	2600	3	
	Bechtel	De Laval	600	2	
	Stone & Webster	General Motors	2750	3	1 dedicated to Unit 1 1 shared between Units 1 and 2
	Stone & Webster	General Motors	2750		1 dedicated to Unit 2
	Various	General Motors	4418	2	Both generators are driven by tandem diesels
	Bechtel	General Motors	2500	2	
	Bechtel	General Motors	2500	2	
	Stone & Webster	General Motors	400	3	
	Various	Cooper-Bessemer	4000	5	2 dedicated to Unit 1 1 shared between Units 1 and 2
	Various	Cooper-Bessemer	4000		2 dedicated to Unit 2

GENE

Plant Code	Plant Name (Docket Number)	Design Electrical Rating (MWe)	Criticality Date	Date of Commercial Operation	Location (State)	Arch
BF1	Browns Ferry 1 (50-259)	1065	8/17/73	8/1/74	AL	Tennes Author
BF2	Browns Ferry 2 (50-260)	1065	7/20/74	3/1/75	AL	Tennes Author
BF3	Browns Ferry 3 (50-261)	1065	8/8/76	3/1/77	AL	Tennes Author
BP1	Big Rock Point (50-155)	72	9/27/62	3/29/63	MI	Bechte
BR1	Brunswick 1 (50-325)	821	10/8/76	3/18/77	NC	United & Cons
BR2	Brunswick 2 (50-324)	821	3/20/75	11/3/75	NC	United & Cons
CO1	Cooper Station (50-298)	778	2/21/74	7/1/74	NB	Burns
DA1	Duane Arnold (50-331)	538	3/23/74	2/1/75	IA	Bechte
DR1	Dresden 1 (50-010)	200	10/15/59	7/4/60	IL	Bechte
DR2	Dresden 2 (50-237)	794	1/7/70	6/9/72	IL	Sargen
DR3	Dresden 3 (50-249)	794	1/31/71	11/16/71	IL	Sargen
EN1	Edwin I. Hatch 1 (50-321)	786	9/12/74	12/31/74	GA	Southe Inc.
EN2	Edwin I. Hatch 2 (50-366)	790	7/4/78	N/A	GA	Southe Inc./B
FP1	James A. Fitzpatrick (50-333)	821	11/17/74	7/28/75	NY	Stone
MI1	Millstone 1 (50-245)	660	10/26/70	3/71	CT	Ebasco

-1. (continued)

RAL ELECTRIC

itect/Engineer	Constructor	DG Manufacturer	kW Rating	Population	Remarks
see Valley ity	Tennessee Valley Authority				
see Valley ity	Tennessee Valley Authority	General Motors	3500	4	4 available for use by Units 1, 2, or 3
see Valley ity	Tennessee Valley Authority				
	Bechtel	Caterpillar	200	1	
Engineers tructors	Brown & Root	Nordberg Manufacturing	3500	4	4 available for use by either Unit 1 or 2
Engineers tructors	Brown & Root				
& Roe	Burns & Roe	Cooper-Bessemer	4000	2	
	Bechtel	Fairbanks Morse	2850	2	
	Bechtel	General Motors	500	1	
& Lundy	United Engineers & Constructors	General Motors	2850	3	1 dedicated to Unit 2 1 shared between Units 2 and 3
& Lundy	United Engineers & Constructors	General Motors	2850		1 dedicated to Unit 3
rn Services,	Georgia Power Company	Fairbanks Morse	2850	5	2 dedicated to Unit 1 1 shared between Units 1 and 2
rn Services, echtel	Georgia Power Company	Fairbanks Morse	2850		2 dedticated to Unit 2
Webster	Stone & Webster	General Motors	2600	4	
	Ebasco	Fairbanks Morse	2664	1	

TABLE B-1. (co

GENERAL ELECTRIC (

Plant Code	Plant Name (Docket Number)	Design Electrical Rating (MWe)	Criticality Date	Date of Commercial Operation	Location (State)	Architect/En
MO1	Monticello (50-263)	545	12/10/70	6/30/71	MN	Bechtel
NM1	Nine Mile Point 1 (50-220)	620	9/5/69	12/69	NY	Utility
OC1	Oyster Creek 1 (50-219)	650	5/3/69	12/69	NJ	Burns & Roe
PB2	Peach Bottom 2 (50-277)	1065	9/16/73	7/5/74	PA	Bechtel
PB3	Peach Bottom 3 (50-278)	1065	8/7/74	12/13/74	PA	Bechtel
PI1	Pilgrim 1 (50-293)	655	6/16/72	12/72	MA	Bechtel
QC1	Quad-Cities 1 (50-254)	789	10/18/71	2/18/73	IL	Sargent & Lund
QC2	Quad-Cities 2 (50-265)	789	4/26/72	3/10/73	IL	Sargent & Lund
VY1	Vermont Yankee (50-271)	514	3/24/72	11/30/72	VT	Ebasco

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neer	Constructor	DG Manufacturer	kW Rating	Population	Remarks
	Bechtel	General Motors	2500	2	
	Stone & Webster	General Motors	2560	2	
	J. A. Jones	General Motors	2500	2	
	Bechtel	Fairbanks Morse	3250	4	4 available for use by either Unit 2 or 3
	Bechtel	Fairbanks Morse	3250		
	Bechtel	Alco	2600	2	
	United Engineers & Constructors, Inc.	General Motors	2850	3	1 dedicated to Unit 1 1 shared between Units 1 and 2
	United Engineers & Constructors, Inc.	General Motors	2850		1 dedicated to Unit 2
	Ebasco	Fairbanks Morse	3000	2	

VEN	PLANT	CONTROL NO.	FAIL NUM
C	MI2	014164*	2
C	MI2	017837*	2
G	FP1	015050*	4
G	PB3	018059*	3
W	DC2	021634*	2
W	SO1	017760*	2
W	SU1	022919*	2

This field is normally used for counting events rather than sorting them.

Component Type

The Component Type field distinguishes different components within the data file. We used the code, DG, to identify diesel generators. Since the code is the same for all diesel-generator events, it is not displayed on the computer printout of the diesel-generator one-line LER descriptions. This field can be used as a sort key.

Event Date (FAIL DATE)

We used a six-digit field to record the date of the event: two digits each, for the month, day, and year. The event date corresponds to the EVENT DATE listed in the LER for each event. The month, day, and year can be used as sort keys.

Manufacturer (MFG, KW)

A four-character field identifies the diesel-generator manufacturer and the size or kW output rating of the unit. This is accomplished by dividing the four-character field into two, subordinate, two-character fields. One of the two-character fields (MFG) is used to identify the

manufacturer, the other (KW) is used to identify the continuous generator output rating. The four-character field or either of the two-character fields can be used as sort keys. A list of the manufacturer and kW rating codes is given below.

Code	Manufacturer
AL	Alco
CA	Caterpillar
CB	Cooper-Bessemer
DL	De Laval
FM	Fairbanks Morse
GM	General Motors
NM	Nordberg Manufacturing
WO	Worthington

Code	kW Rating
02	200-400 kW
10	500-1000 kW
18	1750-1950 kW
25	2500-2850 kW
30	3000-3500 kW
40	4000-4418 kW

Subsystem (SUB/SYS)

The diesel-generator unit support systems (subsystems) discussed in the "Component Definition" in the text, were identified and coded according to the following scheme. We used a single-character field to indicate the subsystem in which the event occurred. This field can be used as a sort key.

Code	Subsystem
A	Fuel Oil System
B	Lube Oil System
C	Starting System
D	Cooling System
E	Scavenging Air System
F	Engine Frame/Internals
G	Governor
H	Exhaust System
I	Shutdown System
J	Output Breaker
K	Exciter/Voltage Regulator
L	Generator
M	Other/Unknown

Failure Code (FAIL MODE, FAIL MECH)

A three-character field indicates the failure code. A single-character subordinate field indicates the failure mode. And a two-character subordinate field indicates the failure mechanism. We used the following scheme to encode the various failure modes and mechanisms identified in the LERs. These fields can be used as sort keys.

Code	Failure Mode
A	Does Not Start
B	Does Not Continue to Run
U	Unavailable/Nonfailure
Code	**Failure Mechanism**
00	Unknown

Code	Failure Mechanism
01	Personnel Operation
02	Personnel Maintenance
03	Personnel Testing
04	Design Error
05	Fabrication/Construction/Quality Control
06	Procedural Discrepancy
07	Defective Fuel Injector(s)
08	Corrosion/Erosion
09	Foreign Material Contamination
10	Mechanical/Electrical Control
11	High/Low Ambient Temperature
12	Lube/Fuel/Water/Air Leakage
13	Vibration
14	Out of Adjustment/Calibration

Type of Event (TYPE)

A single-character field indicates the type of event identified in the LER, that is, random, recurring, common cause, etc. A blank in this field implies a random event. Otherwise, we used the following scheme to identify the event types. This field can be used as a sort key.

Code	Type of Event
B	Recurring Common Cause
C	Common Cause
R	Recurring
S	Command Fault
T	Recurring Command Fault

Failure Classification (CLASS)

We used a single-character field to classify the events as "time related" or "demand related." A "D" in this field was used for demand related events, and a "T" was used for time-related events. If no identification could be made, a "U" was inserted in this field. This field can be used as a sort key.

Repair Time (REPAIR)

The REPAIR field indicates the approximate time interval necessary to return the diesel generator back to service (i.e. operable condition). This is a single-character field with the following coding scheme. This field can be used as a sort key.

Code	Repair Time
1	All times greater than 0, but less than or equal 1 hour
4	All times greater than 1 hour, but less than or equal to 4 hours
8	All times greater than 4 hours, but less than or equal to 8 hours
D	All times greater than 8 hours, but less than or equal to 24 hours
G	All times greater than 24 hours
U	Unknown/Not Applicable

Method of Discovery (DISCOVERY)

We used a single-character code to indicate the activity taking place when the event occurred or was discovered. The coding scheme for this field is as follows.

Code	Method Of Discovery
M	During Maintenance
N	During Normal Operations
R	During Records Review
T	During Tr ing
U	Unknown

Failure Mode Description (FAILURE MODE)

We condensed the LER narrative summary of the failure mode into a 50-character alphanumeric field. This field provides a short, concise description of the failure mode. It is not a sort field.

Failure Mechanism Description (FAILURE MECHANISM)

We used a 41-character alphanumeric field for a narrative description of the failure mechanism. If no mechanism was reported, this field provided an additional description of the LER. It is not a sort field.

For convenience, these codes are summarized on a single page and included at the beginning of each listing of one-line LER sorts given in the appendices of this report.

APPENDIX C

LER RATE ESTIMATIONS

APPENDIX C

LER RATE ESTIMATIONS

To estimate the LER failure rates for components, we used the following well-known statistical methods for Type-I censored data with replacement (for example, see Reference C-1).

The general methods for estimating rates on an hourly basis and on a demand basis are

$$\hat{\lambda}(\text{hourly}) = \frac{N}{T} \qquad \text{(C-1)}$$

$$\hat{\lambda}(\text{demand}) = \frac{N}{D} \qquad \text{(C-2)}$$

where

$\hat{\lambda}$ = estimated failure rate

N = number of reported component failures

T = total time accrued by all components

D = total number of demands on all components.

The general computational formulas, Equations (C-1) and (C-2), may be applied to particular situations. The failure rate for a component in a particular plant is estimated by setting

$$N = N_i$$

$$T = T_i$$

$$D = D_i$$

where

N_i = the number of component failures in plant i

T_i = the total accrued hours of all like components in plant i

D_i = total accrued number of demands on all like components in plant i.

In a similar manner, failure rates may be estimated for components manufactured by a particular vendor, for components in a particular plant type (for example, PWR or BWR), or for components present in all plants.

We based confidence limits for hourly failure rates on the assumption that the underlying component failure distributions are exponential, so, the resulting LER data are representable by a Poisson process. In demand evaluations, N is binomially distributed. However, when the probability of failure is small and the number of demands is large, the Poisson distribution may be used to approximate this variable. The generalized formulas for estimating 90% confidence limits on the failure rates are

$$\frac{\chi^2_{0.05}(2N)}{2T} \leq \hat{\lambda}(\text{hourly}) \leq \frac{\chi^2_{0.95}(2N+2)}{2T} \qquad \text{(C-3)}$$

and

$$\frac{\chi^2_{0.05}(2N)}{2D} \leq \hat{\lambda}(\text{demand}) \leq \frac{\chi^2_{0.95}(2N+2)}{2D} \qquad \text{(C-4)}$$

where

$\chi^2_{0.05}(2N)$ = the chi-square variate at 0.05 cumulative probability with 2N degrees of freedom

$\chi^2_{0.95}(2N+2)$ = the chi-square variate at 0.95 cumulative probability with (2N+2) degrees of freedom.

In this work, when we observed no failures, we estimated an upper 95% confidence limit for the failure rate by

$$\hat{\lambda}(\text{hourly}) = \frac{\chi^2_{0.95}(2)}{2T} \qquad \text{(C-5)}$$

or by

$$\hat{\lambda}(\text{demand}) = \frac{\chi^2_{0.95}(2)}{2D} \qquad \text{(C-6)}$$

depending on whether temporal data or demand data are involved.

In estimating the above confidence limits, we assumed that all components in the sample had exactly the same true failure rate. No effort was made to account for possible variations arising from the mixture of populations having different true failure rates. For further discussion of the assumptions and limitations of these confidence limits, see Reference C-1.

Reference

C-1. L. J. Bain, Statistical Analysis of Reliability and Life-Testing Models, New York: Marcall Dekker, Inc., 1978, p. 157.

APPENDIX D

FACILITY OPERATING LICENSES ISSUED WITH STANDARD TECHNICAL SPECIFICATIONS

APPENDIX D

FACILITY OPERATING LICENSES ISSUED WITH
STANDARD TECHNICAL SPECIFICATIONS

Facility	Vendor	Issue Date
Crystal River Unit 3	B	December 3, 1976
Davis-Besse Unit 1	B	April 22, 1977
Three Mile Island Unit 2	B	February 8, 1978
Arkansas Unit 2	C	July 18, 1978
Calvert Cliffs Unit 1 (STS Conversion)	C	February 11, 1977
Calvert Cliffs Unit 2	C	August 13, 1976
Millstone Unit 2	C	August 1, 1975
St. Lucie Unit 1	C	March 1, 1976
Brunswick Unit 1	G	September 8, 1976
Brunswick Unit 2 (STS Conversion)	G	November 23, 1977
Hatch Unit 2	G	June 13, 1978
Beaver Valley Unit 1	W	January 30, 1976
D. C. Cook Unit 1	W	October 25, 1974
D. C. Cook Unit 2	W	December 23, 1977
Joseph M. Farley Unit 1	W	June 25, 1977
North Anna Unit 1	W	November 21, 1977
Salem Unit 1	W	August 13, 1976
Trojan	W	November 21, 1975
Yankee Rowe (STS Retrofit)	W	January 1, 1977

APPENDIX E

DIESEL-GENERATOR EVENT DATA FILE

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATION
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
10	500-1000 KW
18	1750-1950 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

WCN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAILURE MODE	FAILURE MECHANISM	TYPE	CLASS	REPAIRED	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
8	AR1	014658	051176	GM25	C	A10				D	8	T	DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT
8	AR1	016465	112276	GM25	M	U04	C	D	B	N			#1 DG INOPERABLE DUE TO WET CIRCUITRY	INADVRTNT OPER OF FIRE DELUGE SYSTEM
8	AR1	016847	080577	GM25	M	U03	R	U	U	R			MONTHLY SURVEILLANCE TEST NOT PERFORMED ON TIME	THIS IS A REPETITIVE OCCURRENCE
8	AR1	019578	102377	GM25	C	A14	T	I	8	T			#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
8	AR1	021663	032078	GM25	E	B00		I	G	T			DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
8	CR3	018231	060777	FM30	A	A13		I	4	I			"A" DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS
8	CR3	018565	072677	FM30	I	A06	S	D	1	T			"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
8	CR3	019302	092877	FM30	B	A10	S	D	8	T			3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
8	CR3	020221	122777	FM30	G	A09	R	D	8	I			3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
8	CR3	020276	010378	FM30	G	A09	R	D	8	I			3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
8	CR3	023166	111778	FM30	M	A00	R	U	1	T			EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWICE AFTER ANOMALY
8	D81	019816	122977	GM25	G	A14	S	D	G	N			DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
8	D81	020273	010978	GM25	F	A09		I	4	I			DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR
8	D81	020768	020878	GM25	E	B05		D	G	T			1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
8	D81	021580	050978	GM25	E	B00		U	G	T			GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
8	D81	021852	060478	GM25	K	A10		D	4	T			1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE FOR DG 1-1
8	D81	022046	071978	GM25	M	U06		D	U	I			DISEL START TIME NOT CHECKED	PROCEDURES MODIFIED
8	D81	022692	091478	GM25	M	U03		U	D	R			DG 1-1 OOS FOR PMFS SURVEILLANCE TEST NOT PERFORMD	PERSONNEL ERROR
8	D81	023067	103178	GM25	M	B11	S	D	4	T			1-2 DG S/D DUE TO ROOM TEMP RISE TO 116 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
8	M51	013659	071576	GM25	M	A00		U	D	T			SEVERAL ATTEMPTS TO START "B" DG WERE UNSUCCESSFUL	NO DEFINITE CAUSE COULD BE FOUND

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	RS1	015622	080676	GM25		C	A10			D	4	T	"A" DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR STRT MTR DOC
B	RS1	016656	120676	GM25	G	B10				D	8	T	DG "A" TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED-SPD DECR TO TRIP
B	RS1	018853	082477	GM25	M	A00	R	U	1	T			DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED
B	RS1	022613	100478	GM25	A	B01	S	D	1	N			"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
B	RS1	022827	110278	GM25	K	U10		D	8	T			"A" DG LOST FOR 7HOURS;"B"DG INOP. PLANT WAS S/D	BLOWN CONT. POWER FUSE IN VOLT. REGULATOR
B	TI1	014298	022176	FM30	J	A06	S	D	1	T			"1B" DG OUTPUT BREAKER FAILED TO CLOSE	FRCCED ERROR-IMP GOV SETTING-FREQ TOO LOW
B	TI1	017050	020377	FM30	B	U10		D	8	N			DETERMINED THAT "A" DG WOULD NOT START ON LOSP W/O	AN ES SIGNAL-FAULTY PRESSURE SWITCH
B	TI1	020295	011278	FM30	B	A14	S	T	4	T			EDG 1B FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
B	TI1	020997	031878	FM30	B	A10		F	8	T			EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH
B	TI2	021609	042578	FM30	F	B00	R	U	1	T			"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
B	TI2	021607	052078	FM30	F	A05	C	D	G	T			DG B FAILED TO START	VERT SHFT BTW UP E LWR CRANKS FLD-IMP MTL
B	TI2	021605	052378	FM30	F	B09	R	T	6	M			DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
B	TI2	023430	122878	FM30	A	A09		I	8	T			DF-A-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER
C	CC1	015587	072976	FM25	D	A02	S	D	4	N			#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	015584	080776	FM25	J	A02	S	D	G	T			11 DG FAILD TO SENSE "AT VOLTAGE"COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	CC1	016405	102576	FM25	M	B00	R	U	1	T			#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C	CC1	017023	111876	FM25	M	A00	R	U	1	T			#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	017022	051577	FM25	M	A09	R	F	8	T			#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC1	018041	060377	FM25	B	U13	R	T	4	N			#12 DG PLACED OOS TO REPAIR 2 MINOR FUEL OIL LEAKS	FITTINGS VIBRATED LOOSE --TIGHTENED THEM
C	CC1	018306	061777	FM25	F	B02		D	1	T			#11 DG STARTD;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOOSE AND FELL OFF DG

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	CC1	018468	071177	FM25	B	B02	C	D	4	M	#11 DG ON FIRE DUE TO L.O. HITTING HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY
C	CC1	018487	071377	FM25	D	B02	S	D	1	T	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;DP SWITCH ISOLATED
C	CC1	019592	101077	FM25	K	A13		T	8	T	#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	CC1	019695	111577	FM25	B	U13	R	T	D	T	#12 DG OOS DUE TO MINOR FUEL LUBE COOLING H2O LEAK	LOOSE FITTINGS OLD GASKETS LOOSE FLANGES
C	CC1	019738	111677	FM25	B	U13	R	T	4	N	#12 DG OOS TO REPAIR MINOR LEAKS FUEL & LUBE OIL	TIGHTENED FITTINGS,FLANGES
C	CC1	021000	041078	FM25	L	A00		U	1	T	#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEXT TIM
C	CC1	021055	041378	FM25	M	A00		U	1	N	#11 DG FAILD TO START ON LOSS OF OFFSITE POWER	START/FAILURE ALARM DISPLAYD NO ABNORMALS
C	CC1	023380	121878	FM25	M	B00	R	D	1	T	#11 DG SHUTDOWN DUE TO ROOM VENT,FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS
C	CC2	016722	121576	FM25	C	A09		T	4	T	#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	CC2	018422	022277	FM25	C	A00		U	8	T	#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	CC2	017457	031777	FM25	M	A00	R	U	1	T	#12 DG VENT FAN FAILD TO START ON SIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
C	CC2	017986	060177	FM25	D	A12		T	D	T	#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESVL
C	CC2	018428	062177	FM25	B	U13		T	4	N	#21 DG OOS DUE TO MINOR OIL LEAKS	FUEL OIL LEAKS FROM LOOSE FITTINGS
C	CC2	018469	071877	FM25	B	U12		F	8	N	#21 DG OOS TO REPAIR CRACKED BULLSEYE(GLASS)	REPLACED GLASS WITH PLEXIGLASS WINDOW
C	CC2	019481	110177	FM25	D	U13		T	D	N	#21 S/D FOR 7 HRS. FOR PM'S LEAKS ON H2O JACKT REL	1/4" FUEL OIL TUBN TO INJ TIGHTENED
C	CC2	020226	011078	FM25	J	B10		F	1	T	#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
C	CC2	021491	080178	FM25	D	B10	S	D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C	FC1	014559	040776	GM25	M	A06	S	U	1	T	START ON SECONDRY AIR REQUD 10.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE
C	FC1	014596	042776	GM25	C	A02	F	D	8	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPROPR SETNG FOR MAG PKUP ON SWTCHG TACH
C	FC1	015614	081576	GM25	G	B10		T	8	N	SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLNT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	ETPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	FC1	015722	081576	GM25		C	A14	T		D	B	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWTCHG EACH DRIFTED
C	FC1	017662B	040677	GM25		C	A09	R	T	4	T		DG-1 FAILD TO STRT WTHN 10 SEC, STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017661	040777	GM25		A	U01		D	G	R		FUEL OIL STORAGE READINGS SLIGHTLY BELOW TECH.SP.	DISCOVRD FOUR DAYS LATER, TANKS WERE FILLED
C	FC1	017662A	041477	GM25		C	A09	R	T	4	T		DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
C	FC1	021892	061978	GM25		K	A10	R	D	1	T		DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	FC1	021799	071278	GM25		K	B10	R	D	8	T		DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDT)
C	FC1	022249	080978	GM25		K	B10	R	D	8	T		DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	KEFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C	MI2	0142664	012876	FM25		M	U03		D	8	T		DG 12U & 13U DOS W/O PERFORMANCE OF SURV TESTING	OPER THOUGHT SURV TEST UNNEC IF DGS - PMS
C	MI2	0142664A	021776	FM25		A	A09	B	T	1	N		DG 12U FAILED TO START - SIMILAR OCCUR, LER (75-23)	DIRTY FUEL OIL FLTR, CARBON IN CRKCSE VENT
C	MI2	0142608	021876	FM25		A	B09	B	T	1	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR, (75-23)	DIRTY FUEL OIL FLTR, CARBON IN CRKCSE VENT
C	MI2	0142660C	022076	FM25		A	B09	B	T	1	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR, (75-23)	DIRTY FUEL OIL FLTR, CARBON IN CRKCSE VENT
C	MI2	0142660D	022376	FM25		F	B04	B	T	G	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR, (75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	MI2	0144452	032476	FM25		M	U03		D	G	N		DG 13U NOT TESTED AFTER DG 12U DECLARED INOPERABLE	OPER UNAWARE OF REQMT TO TEST ALT DIESEL
C	MI2	0151106	060276	FM25		F	B09	B	T	1	T		DG 13U TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	MI2	0151216	061776	FM25		B	U11	S	T	4	N		13U DG STBY LO PMP TRIPPED, LO TEMP DECREASED	NO CAUSE FOR TRIP, TEMP WOULD PREV DG STRT
C	MI2	0155838A	081676	FM25		G	A10	B	T	4	T		DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	0155838B	081776	FM25		G	A10	B	T	4	T		DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	0155838C	082376	FM25		G	B10	B	T	4	T		DG 12U TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	0159966	090176	FM25		B	B12	C	T	1	N		DG 13U SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	0160386	091976	FM25		B	B12	B	D	4	N		12U DG HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	MI2	016631	092276	FM25	D	B09	B	T	G	T	12U DG RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016626	120176	FM25	D	A09	B	T	G	T	13U DG STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016755	121876	FM25	F	B06		D	G	T	DG 13U #3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS
C	MI2	017620	011077	FM25	F	B13	S	D	G	T	DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN
C	MI2	021371	020977	FM25	B	G14		D	B	U	13U DG REMOVED FROM SERVICE	REMOVE & RECALB LUBE OIL TEMP SWITCH
C	MI2	017837*	051577	FM25	A	U02	S	D	U	N	BOTH DG'S FUEL SUPPLY VLVS FOUND SHUT-BOTH DG INOP	REASON FOR SHUT VALVES WAS UNKNOWN
C	MI2	016923	081077	FM25	G	A01	S	D	1	N	DG 12U FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN "NO FUEL" FROM PREV S/D
C	MI2	018972	081777	FM25	D	B09	B	T	G	T	12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	018974	082377	FM25	M	U03		D	U	N	12U DG RETURNED TO SERVICE WITHOUT OPERABILITY TST	OPER DIDNT KNOW TEST REQRD AFTER PREV MIN
C	MI2	018976A	082677	FM25	D	U09	B	T	G	T	DISCOVERED 13U DG SW HX MUSSEL FOULED	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	018976B	092077	FM25	D	B09	B	T	G	N	COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	019255	092477	FM25	I	B14	S	T	B	T	12U DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW OUT OF ADJ ON DG OVSPD TRIP MECH
C	MI2	019929	110977	FM25	K	A01	S	D	1	T	DG 13U TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
C	MI2	021386	050878	FM25	D	B09	B	T	G	T	12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	022131	080378	FM25	A	B07		T	B	T	DG 13U SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
C	MI2	023213	120578	FM25	D	B09	B	T	G	T	12U DG S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
C	MY1	020733	021678	GM25	G	A09		T	B	T	DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD
C	MY1	022719	092578	GM25	A	A06	S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
C	PA1	017219	021177	AL25	C	U12	C	T	4	T	DG 1-2 HAD 1 OF ITS AIR START MOTORS CYCLE	DEPLETED AIR SUPPLY, WATER LKG ONTO MOTOR
C	PA1	019409	082377	AL25	A	U06	C	T	4	N	LEVEL IN DIESEL FUEL OIL STG TANK DECRSD TO 53 PCT	SUPPLIER FAILED TO DELIVER PER SCHEDULE

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG MW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	SL1	019003	051876	GM30	C	U09			F	6	T	"A" DG PLACED OUT OF SERVICE	AIR START SYS VALVES & LINES CLOGD W DIRT
C	SL1	016881	110276	GM30	M	A01	S	D	4	T		1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP
C	SL1	017134	011877	GM30	E	B04	R	I	G	T		1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	017135A	011977	GM30	A	A09	R	I	1	T		THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017135B	011977	GM30	A	A09	R	I	1	T		THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017441	030177	GM30	I	A01	S	D	1	T		1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
C	SL1	019511	092677	GM30	E	B04	R	I	G	T		1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
C	SL1	022532	090578	GM30	J	A10		F	8	T		"A" DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BF1	014102	011476	GM30	G	A12		T	1	T		FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRALLIC ACTUATOR
G	BF1	016261	110376	GM30	G	B09	C	I	4	T		D DG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BF1	016396	112276	GM30	C	U02		U	4	M		ONE START CIRCUIT ON B DG INOP; 2ND START CKT. OK	BROKEN SOLD HOLDER ON BREAKER, REPLACED
G	BF1	022084	070978	GM30	K	U11	S	D	4	T		1C DG FIELD BKR TRIPPD ;DG INOPERABLE	OVERHEATING OF BKR DUE TO INOPRBLE FAN
G	BF3	016817	112676	GM30	C	U02		U	8	M		START CKT. 1 OF DG 3D INOP DUE TO RELAY FAILURE	NOT ABLE TO SENSE SPEED IN START CKT.
G	BF3	019133	091977	GM30	K	A10		D	1	T		3D DG TRIPPD ON OVERSPEED ;GOVERNOR INOPERABLE	TO FUSE OPEN DISENABLING FIELD CIRCUIT
G	BF3	021760	070678	GM30	J	U10		U	8	M		4-KV SEANDBY POWER CKT BKR DEFECTIVE; DG INOPERABL	SHORT IN WINDING OF A SPRING CHARGN MOTOR
G	BP1	014417	032476	CA02	D	B09	R	I	8	T		DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	014694	051676	CA02	D	B09	R	I	G	N		DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	015446	080576	CA02	M	A03	R	U	U	I		DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BP1	015449	080576	CA02	D	A09	R	U	8	N		DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	015464	081276	CA02	C	A10	R	I	8	T		WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC

ONe-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	0156?2	090276	CA02		A	A00		R	U	U	T	FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016364	102876	CA02		G	A00		R	U	U	T	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02		G	A00		R	U	U	T	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016587	111876	CA02		C	A10		R	D	4	T	FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016597	120276	CA02		G	A00		R	U	U	T	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122076	CA02		G	A04		R	U	U	T	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN
G	BP1	016912	122776	CA02		A	A04		R	U	U	T	START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	016911	122876	CA02		C	A10		R	D	4	M	DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945487
G	BP1	016910	010377	CA02		G	A00		R	U	U	T	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?
G	BP1	017022	011677	CA02		G	004		R	U	6	N	REMOVED FROM SERVICE FOR CORRECTIVE MODIFICATION	LUBE OIL SUPPLY TO GOV. MODIFIED
G	BP1	020296	032477	CA02		G	A00		R	U	U	T	EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BP1	018102	051877	CA02		D	A00		R	I	4	T	H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	T TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	018203	052677	CA02		A	A00		R	U	U	T	START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	018742	080577	CA02		J	A04	3	D	G	7	T	TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR
G	BP1	019541	102077	CA02		C	A00		R	U	U	T	START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	019993	112477	CA02		A	A00		R	U	1	T	START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BP1	020375	020278	CA02		M	A00		R	U	U	T	START TIME 28.5 SECS VS 13.9 SECS	CAUSE UNKNOWN
G	BP1	020580	020978	CA02		D	B12		F	4	7	T	DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT
G	BR1	0168549	010477	NM30		B	A04		C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER &JACKE
G	BR1	0168548	010477	NM30		B	A04		C	D	4	T	#4 DG TRIPPD R/X AT POWER, TO SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BR1	019275A	091277	NM30	M	U01	R		R	D	U	N	R/X AT PWR #1 DG REMOVED FROM SERVICE FOR ANN.INSP	T.S.4.5.F NOT PERFORMED ON 9/15/77
G	BR1	0192758	092877	NM30	M	U01	R		R	D	U	N	#3 DG OUT FOR ANN. INSP. T.S.4.F NOT PERFORMD #4DG	OPERATOR ERROR
G	BR1	019391	101177	NM30	G	B05			D	B	T	T	#2 DG UNABLE TO MAINTAIN LOAD CYCLING 500KW	SHORTED LEADS TO GOVERNOR; INCORRECT ASMB
G	BR1	020068	120977	NM30	C	A09			T	D	T	T	#3 DG START TIME 10.2 SEC VS 10	CARBON BLILDUP ON AIR VALVE STUCK SHUT
G	BR1	019948	121077	NM30	J	B00			D	D	T	T	SMOKE COMING FROM 320 RELAY AND 86DB RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	BR1	020246	010678	NM30	I	U01	S	D	4	N			#2 DG SECURED OPERATOR FAILD TO RESET LOCKOUT	#2 DG INOPRBLE FOR 1.5 HOURS
G	BR1	022454	091178	NM30	A	B07			T	4	T	T	#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
G	BR2	014136	010976	NM30	J	A10			D	4	N	T	#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	BR2	014614	031476	NM30	A	B12			T	D	T	T	AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANUL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	BR2	014609	032576	NM30	M	U01			D	G	N		REFUEL MODE, 3DG BEING PM'D; FAILD TO TEST SBGT B	"B" TRAIN NOT TESTED TILL 3/29/76
G	BR2	015461	061176	NM30	A	A02	C		D	D	T	T	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL H2O IN SADDLE & 4 DAY TANK
G	BR2	016399	111176	NM30	C	A08			T	D	T	T	DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	BR2	016823	122976	NM30	G	B10			T	B	T	T	#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC
G	BR2	018177	060777	NM30	M	U03			D	U	T	T	WHILE SECURING DG1 OPERATOR REDUCED LOAD TOO FAST	BKR TRIPPD ON REVERSE POWER AND DG LOCOUT
G	BR2	020612	021378	NM30	K	A01	S	D	1	N			FOLLOWING SCRAM ON UNIT 1 ;#1 DG LO RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET
G	CO1	015872	082376	CB40	A	B00			U	B	T	T	FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	CO1	016580	110776	CB40	K	B08			E	D	T	T	DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	POT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	CO1	016712	111076	CB40	J	A03	S	D	B	T			EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 59RELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	CO1	017064	121576	CB40	J	U10	B	D	U	I			COMPLETD DG TEST; BKR. 1FS WOULD NOT CLOSE AUTO IF	BKR 1AF CR 1FA TRIPPD--AUX CONTACTS POOR
G	CO1	019117	091277	CB46	A	B04			D	G	N		FUEL OIL RETURN LINE SHEARD AT INLET TO DAY STORAG	RIGID HANGER WORKED LOOSE CAUSN EX MOVEM

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	CO1	020803	011778	CB40	J	010			B	D	G	I	AUX SWITCHES FAILD TO CLOSE ON DG OUTPUT BKR THIS	WOULD PREVENT SHUTTING BKRS. 1FS AND 1G3
G	CO1	023044	091278	CB40	F	A09			I	G	I		#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL
G	DA1	014334	022776	FM25	B	B12	R	T	D	I			SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DA1	014337	031776	FM25	H	B12	R	T	D	I			SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	DA1	014953	062276	FM25	D	B09	C	T	B	T			1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DA1	015993	100776	FM25	F	A05			D	D	T		1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL
G	DA1	016449	110276	FM25	M	G06			D	G	R		1G-21 & 1G-31 ANNUAL INSPECT NOT PERFORM ON TIME	COMPLETED 10/21/76 VS 9/15/76
G	DA1	016452	110476	FM25	A	B04			D	D	T		DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	DA1	017796	051077	FM25	J	A16	S		D	B	I		1G-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DA1	017963	051277	FM25	G	B06	S		D	I	T		1G-31 DG WOULD NOT REACH FULL LOADING ONLY 2500 KW	SPEED SETTING ADJUSTMNT NOT RESET
G	DA1	019448	100677	FM25	A	G04			D	G	N		STNDBY DG FUEL STRGE TANK INDICATOR INCORRCTLY CAL	ACTUALLY 2000 GAL LESS THAN INDICATED
G	DA1	021171	040578	FM25	F	A06			D	G	M		BEARING WIPED ON 9/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	DA1	023503	122778	FM25	M	G01			D	G	N		CORE LOADING 1G-21 INOP; T.S.3.7.8 VIOLATED	1G-31 NOT TESTD DAILY--12/25 TO 12/31
G	DR1	016167	093076	GM10	A	U02	C		D	B	N		BACK-HOE SEVERED FUEL OIL TRANSFR LINE TO UNIT1 DG	AND FIRE PUMP; PRUMPTLY REPAIRED
G	DR1	0204088	012778	GM10	M	A11	C		D	I	N		U-1 B/U DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER
G	DR1	0204088A	012978	GM10	M	A11	C		D	G	N		U-1 FAILD TO START DUE TO COLD WEATHR 6 HEATRS	INSTALLED & ROOM WINTERIZED
G	DR1	020852	030478	GM10	C	A10			D	G	I		D-1 B/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR1	021518	050378	GM10	C	U02	S		D	D	N		LOW STARTN AIR PRESS DUE TO LEAKING PILOT AIR REG.	IMPROPERLY POSITIONED O-RING
G	DR1	021517	050778	GM10	B	A10			T	D	N		TEMORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR1	021516	051178	GM10	A	A10	K		D	G	I		TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR1	021537	060678	GM10	A	U01	S			D	G	N	BACKUP DG DAY TANK EMPTY AND TRANSFER PUMP WAS OFF	PUMP STARTER FAILD AND PERSONEL ERROR
G	DR2	014913	052376	GM25	C	A00			U	1	T	T	UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYST
G	DR2	015242	071076	GM25	D	U11			D	6	N		U-2 DG COOLING H2O PUMP BKR FOUND TRIPPD	EXCESSV TEMP IN BKR CUBICLE
G	DR2	016018	090576	GM25	M	U08	C	T	G	N			H2O LEAKAGE INTO U 2/3 DG ROOM; SMALL HOLE IN HPCI	TEST RETURN LINE; CHLORIDE STRESS CORROSN
G	DR2	016168	093076	GM25	K	B09			T	D	T		2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR2	016443	102976	GM25	I	A14	S	T	D	T			UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLEND	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	016654	121876	GM25	A	B02	S	D	D	T			UNIT 2 DG FAILD TO CARRY REQD LOAD ;2000Kw MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATON
G	DR2	017397	032277	GM25	C	A10	R	D	1	T			UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	018283	063077	GM25	G	A00	R	D	1	T			2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE CUT-OF-AD .ST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25	G	A00	R	D	1	T			U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE CUT-OF ADJUST GOVENOR COMPENSATIN
G	DR2	019651	103077	GM25	E	B06			T	G	T		UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTART	TURBO-CHARGR CLUCTHESHAFT BEARING
G	DR2	019732	111677	GM25	I	A00	S	D	1	T			AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	DR2	019728	112977	GM25	D	B12	C	D	D	T			2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GROUNDED PUMP STATOR
G	DR2	019723	120277	GM25	C	A13	R	T	1	T			UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	019816	120377	GM25	C	A12			D	4	T		2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM
G	DR2	019905	120477	GM25	J	A00			U	6	T	T	U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	DR2	020242	010378	GM25	C	A13	R	T	6	T			UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR2	021048	030778	GM25	C	A00	S	D	8	T			OPERATN SHOOK AIR START SOLENOID &UNIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC
G	DR2	020855	030878	GM25	G	A14	S	D	8	T			ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021538	052278	GM25	G	A02			D	8	T		U-2 DG TRIPPD 4 TIMES ON OVERSPEED;R/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR2	021982	063078	GM25	D	B14			T	D	G	T	2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	DR2	022262	082478	GM25	C	A10	R	U	4	T			2/3 UNIT OOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR2	022589	092278	GM25	C	A0C	R	U	6	T			UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	DR2	023337	121678	GM25	C	A00	R	U	4	T			2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TD2 RELAY CLEANED;TD2 AND AIR VALVE ?
G	DR3	014439	030376	GM25	G	A13	R	T	4	I			DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016615	092176	GM25	B	B09		T	4	T			DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	DR3	016687	100976	GM25	G	A13	R	T	4	I			LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	DR3	016855	110576	GM25	G	B10	R	T	8	T			LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	017509	032277	GM25	K	A10		D	G	M			GEN FIELD FAILD TO FLASH	INTERMITINT CAPACITOR SHORT IN FLASH CIRC
G	DR3	018449	070177	GM25	K	U10		I	8	T			DAY TANK FOR DIESL NOT AT NORMAL LEVEL	LOOSE WIRE IN LEVEL SWITCH PREVENT PMPRUN
G	DR3	015379	071277	GM25	D	U09	B	D	6	N			U3 DG COOLING H2O PUMP CKT.BKR. FOUND TRIPPD;RESET	TRIPPD AGAIN--WORN PMP BEARINGS;REPLACED
G	DR3	018370	071277	GM25	D	U11	B	D	6	N			DG COOLING WTR PMP BKR. FOUND TRIPPD ;RESET OK	ABNORMALLY HI AMB TEMP FROM CURRENT DEMND
G	DR3	018986	091477	GM25	D	U09	B	D	D	N			DG COOLN WTR PMP BKR. FOUND TRIPPD; WORN OUT BRNGS	DUE TO DETERIATION OF IN-LINE FILTER
G	DR3	019318	100477	GM25	A	U01	R	D	4	N	U	3	DIESL OIL STORAGE LEVEL 8700 VS.10000 GALLONS	LO LEVEL ALARM INOP--OPERATOR NOT INFORMD
G	DR3	019722	112277	GM25	G	A10	R	U	8	T	3		DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	DR3	019727	112977	GM25	G	B10	R	D	8	N	3		DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	DR3	019655	122877	GM25	M	U03	S	D	4	M			2/3 DG OOS-OPERATOR PULLD 3D/G TO BUS 34-1 SWITCH	TO LOCK-PLACED OOS CARD-3HOURS UNDETECTD
G	DR3	021461	060178	GM25	A	U09	R	D	1	N	U	3	DIESL STORAGE LEVEL 9000 GALS.--STUCK VALVE	2/3 FIRE PMP DAY TNK LEVEL CONTRL VALV
G	EN1	014778	032576	FM25	C	A10		D	D	T			1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	EN1	014795	050176	FM25	M	B13	S	I	8	T			NORMAL SURV. TEST DG 1C TRIPPD; LOOSE WIRE	NUT VIBRATED OFF WIRE-PANEL R43-P001C

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	ENI	014796	051576	FM25	M	AUG			U	U	T		1B DG FAILD TO START ON FIRST ATTEMPT	UNKNOWN WILL DO WEEKLY START TO DETERMINE
G	ENI	015557	062676	FM25	B	B02	S	D	B	T			DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH
G	ENI	015568	080576	FM25	K	A06	S	D	1	T			DG 1A TRIPPED DUE TO LOSS OF EXCITATION DRNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	ENI	015947	081476	FM25	H	A00	R	D	U	T			1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	ENI	016065	091176	FM25	G	A10	R	D	1	T			1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	ENI	016842	122576	FM25	M	B00	R	U	U	T			DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITVE	CHECKNG OUT LOGIC ON 1C DG
G	ENI	016943	123176	FM25	M	A00	R	U	1	T			MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY
G	ENI	018141	052877	FM25	M	A00		U	U	T			1A DG FAILD TO COME UP TO RATED VOLT IN REQD. TIME	TOOK 16 SEC VS 12 SEC RETESTED SATISFAC
G	ENI	018644	061377	FM25	D	B14	T	D	4	T			1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	ENI	018646	061877	FM25	D	B14	T	D	4	T			1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS
G	ENI	018647	062577	FM25	D	B14	T	D	4	N			1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
G	ENI	018839	081277	FM25	K	B10		D	B	T			1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG MTR OPER XFMR PWR SUP DIODES FAIL
G	ENI	020031	081877	FM25	F	B00	R	U	G	T			DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	ENI	020213	111977	FM25	K	B02	S	D	4	T			1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	ENI	020214	112577	FM25	G	A08		T	B	T			1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED
G	ENI	020491	120877	FM25	A	U01	S	D	U	N			1A DG FUEL OIL XFER PUMP DISCH VLVS FOUND SHUT	PERSONNEL ERROR - IMPROPER VALVE LINEUP
G	ENI	021249	033078	FM25	M	U04	C	D	U	T			BUS 2F FOR BREAKER CONT PWR DESIGN COULD CAUSE A	LOSS OF 2 DSLS IF BATT LOST COINCT W LOSP
G	ENI	021250	033078	FM25	M	U04	C	D	U	T			DSL LOAD SEQ TIMER DESIGN COULD RESULT IN OVLD OF	DG 1B IF LOCA FOLLWS LOSP OR VICE VERSA
G	ENI	021476	060278	FM25	M	U04	C	D	U	T			VLTG LOGIC ON DGS 1A,1B,1C SUCH THAT WIBREN OF THE	BRKR DOOR WLD CAUSE BRKR TO CLOSE
G	ENI	021714	062778	FM25	M	U02	C	U	U	U			1C DG BATTERY PLT CELL SURV NOT COMPLETED IN INTVL	SPECIF IN TECH SPEC-PERSONNEL OVERSIGHT

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MK #	SUBSYST	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	022476	092078	FM25	M	U04	C	D	U	R	DGS THAT FAIL TO START OR ARE S/D DURING LOCA OR	LOSP MAY NOT RESTART FROM CONTROL ROOM
G	EN2	022213	080978	FM25	M	U03		D	U	R	SURVEILL ON DG "B" NOT PERFORMED	PERSONNEL OVERSIGHT
G	EN2	022493	092078	FM25	M	U04	C	D	U	R	DGS THAT FAIL TO START OR ARE S/D DURING A LOCA OR	LOSP MAY NOT RESTART FROM THE CONTROL RM
G	EN2	022751A	102878	FM25	G	A10	R	D	6	I	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	022751B	103178	FM25	G	A10	R	T	6	N	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	EN2	023035	111378	FM25	M	U03		D	6	N	POWER AT 1464 MW, TESTING ZC DG, TS.4.8.1.1.1.A	SURV TIME LIMIT ON OTHERS RAN OUT--8 HOUR
G	FP1	015656*	061676	GM25	K	U14	C	D	U	T	A,B,C,ED DGS WERE UNSTABLE DURING TESTING	DRIFT IN DROOP CKT-NOT NECSRY FOR EMERGCY
G	FP1	016496	111776	GM25	I	A10	R	D	6	T	"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	016600	121576	GM25	B	A10	R	D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016671	011977	GM25	B	A10	R	D	1	T	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL
G	FP1	017725	042077	GM25	I	A10	R	D	6	T	DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	FP1	020518	021578	GM25	J	B10		T	1	T	"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH C/T FOR OUTPUT BRKR
G	FP1	022115	073178	GM25	B	U03		D	G	T	L.O. SAMPLES NOT TAKEN IN REQD TIME INTERVAL	SAMPLE EQUIPMENT FAILED
G	FP1	022276	082878	GM25	B	U05		D	G	N	EDG INOPERABLE BECAUSE OF NOISY LUBE OIL PUMP	PUMP - MOTOR MISALIGNMENT
G	FP1	023101	120578	GM25	G	A02	S	D	4	T	"A"DGTRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR
G	MI1	018499	020177	FM25	A	U12	R	T	4	U	DG DECLARED INOPER IN ORDER TO REPAIR FUEL OIL LK	SMALL CRK IN PIPE NIPPLE TO NO. 12 INJ
G	MI1	019089	092777	FM25	A	U12	R	T	1	U	DG DECLARED INOPER IN ORDER TO REPAIR FUEL OIL LK	SMALL CRK IN PIPE NIPPLE TO NO. 12 INJ
G	MI1	019820	121077	FM25	I	U10		U	8	N	DIESEL GENERATOR BECAME INOPERABLE	GOV SHUTDOWN SOLONOID MALFUNCTION
G	MO1	016166	101676	GM25	C	A09		T	U	T	#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 START SYS AIR CONT COMP FOULED W RUST
G	OC1	014447	030376	GM25	K	A10		D	6	T	DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	RESTHSE FFCD RELAY FLD TO ENRGZ FLD FLASH

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DC1	015042	060876	GM25		C	A00			U	1	T	DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	DC1	023119	113078	GM25	K	A10				D	8	T	#1DG STARTED BUT GEN FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	PB2	013491	011176	FM30	C	U01	S			D	1	N	E-3 DG DC FEED BKR FOUND OPEN - PREVENTS STARTING	OPER LEFT OPEN AFTER DC GRND ISOL PROCED
G	PB2	018686	082677	FM30	D	A01	S			D	1	T	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP, BUT NOT DIESEL TRP
G	PB2	018687	082677	FM30	I	A06	S			D	4	T	E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
G	PB2	019414	101877	FM30	D	A02	S			D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	PB2	019560	110177	FM30	B	U12				T	8	N	E-4 DG DECLARED INOPERABLE	CLEANUP ACCUM OIL UNDER MACHINE-FIRE HZD
G	PB2	019830	112277	FM30	A	U12				T	4	N	E2 DG DECLARED INOPERABLE	REPAIR FUEL OIL LEAK IN PLUG ON CUNO FLTR
G	PB2	020490	121977	FM30	L	A00				U	0	T	E1 DG TRIPPED ON "A" PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXTV TST
G	PB2	020167	010378	FM30	B	U11	K			D	4	N	E-4 DG DECLARED INOPERABLE	LO LUBE OIL TEMP-REPLC LUBE OIL HTR ELEMT
G	PB2	020161	011878	FM30	B	U11	K			D	8	N	E2 DG DECLARED INOPERABLE	LO LUBE OIL TEMP-REPLC 2 COILS IN HTR ELE
G	PB2	020665	022878	FM30	B	B12	C			D	8	T	E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
G	PB2	022462	083078	FM30	G	A10				T	1	T	E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD SY
G	PB2	023349A	122178	FM30	G	A10				D	1	T	E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/28/78
G	PB2	0233498	122178	FM30	G	A00				U	1	T	E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
G	PB3	018659*	061377	FM30	C	U10	C			T	0	N	3 OF 4 DIESEL GENERATORS INOPERABLE	START AIR COMPRESSORS TRPD - AIR TANKS MI
G	P11	015466	092276	AL25	H	B04	B			T	0	T	"A" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	P11	016388	111776	AL25	H	B04	B			T	0	T	"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	P11	022128	080278	AL25	K	B01				D	8	T	B DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
G	DC1	014120	011276	GM25	C	A10				D	8	T	UNIT 1 DG FAILED TO START WHEN MODE SW IN START PO	AIR START SOL VLV DIRTY-NOT OPEN FULLY

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	QC1	019426	031776	GM25	M	G02			C	D	4	M	1/2 DG OOS TOO LONG FOR PREVENTATIVE MAINTENANCE	COMMUNICATIONS PROBLEM BETWEEN OPER-MAINT
G	QC1	015765	072776	GM25	M	G06				D	1	M	UNIT 1/2 DG OOS FOR LONGER THAN TS ALLOWANCE	MAINT MAN UNAWARE OF TIME LIMIT-PROCED ER
G	QC1	016904	120276	GM25	D	G02			C	D	8	M	COOLING WTR HDR FOR DG 1 CW PUMP - AIRBOUND	AIR LINE ATTACHD TO RHR PUMP-COMMON HEADR
G	QC1	018112	042577	GM25	K	A10				D	G	T	WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
G	QC1	018114	050677	GM25	A	G12				I	8	U	LEAK DISVD IN TAP OFF FUEL LINE TO FUEL PRESS GAGE	FOR 1/2 DG - CRACKS ATTRBTD TO NRML STRSS
G	QC1	019100	082477	GM25	L	A13				T	4	T	UNIT 1 DG STARTED AND RAN, BUT NO VLTG, SYNCH, FREQ	FREQ GEN TACH SET SCREWS VIBRATED LOOSE
G	QC1	019994	112877	GM25	K	A10				D	4	M	1/2 DG WOULD NOT START SUCCESSFLY, FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT
G	QC1	022666	092878	GM25	A	G04				D	D	M	UNIT 1 FUEL AFER LINES REMOVED-TS DECLARES DG INOP	750 GAL DAY TANK FULL-DIESEL WOULD RUN
G	QC2	018745	081077	GM25	D	G12				T	G	N	"A" DG REMVD FRM SERV DUE TO DECRS IN ENG WTR LVL	EAST CW HT EXCHGR HAD A TUBE LEAK
G	QC2	020595	012478	GM25	D	G12	J		E	D	8	I	UNIT 2 DG CW PUMP DRAINS FAILED TO SHUT	AIR SUPPLY SOLENOID VALVES FAILED
G	VY1	014740	050676	FM30	F	A09		R	T	4	N	"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VY1	015739	082576	FM30	A	B13			T	1	T	"B" DG OOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
G	VY1	018323	062377	FM30	F	B13		R	T	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VY1	019858	072677	FM30	C	A09			T	4	T	"A" DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
G	VY1	020194	121977	FM30	F	B13		R	T	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
G	VY1	020464	012478	FM30	D	B09			T	4	T	DIESEL GENERATOR "A" TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNT &RND HX
W	BV1	014963	052076	GM25	C	A09		R	T	4	N	DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEM
W	BV1	015913	090376	GM25	J	A00			G	1	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
W	BV1	017883	022477	GM25	L	B05			D	4	T	DG OUTPUT BREAKER TRIPPED:INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST
W	BV1	017348	031477	GM25	J	A04	B		D	4	T	#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
*	BV1	017621	041177	GM25	J	A04	B	U	4	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
*	BV1	017693	042677	GM25	J	A04	B	D	4	T	#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
*	BV1	017696	042977	GM25	C	A09	R	I	4	N	DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
*	BV1	017827	050977	GM25	J	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
*	BV1	018068	060377	GM25	J	A04	R	D	1	T	#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
*	BV1	018069	062277	GM25	M	U01		D	U	N	MODE 3 (HOT STNDBY) TO MODE 1(PWR OPS) 1DG OOS	REG GUIDE 1.16-C.2.8.(2) MISINTERPRETED
*	BV1	018628	071777	GM25	K	A10	R	I	8	T	#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
*	BV1	022437	011178	GM25	J	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
*	BV1	021335	041878	GM25	A	B12		I	D	N	#1 DG WAS S/D AND DECLARED INOPERABLE--OIL LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL
*	BV1	021647	060178	GM25	B	B02		D	1	T	#2 DG LUBE OIL LEAK AT ENGINE CONTROL PANEL GAUGE	GAUGE WAS CALIBRATED ON 5/21;LOOSE CONN.
*	BV1	022137	072878	GM25	K	A10	R	D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
*	BV1	022395A	090578	GM25	M	U03	R	D	U	T	2 DG OOS FOR TESTN DIESL AIR AND OIL RELIEFS	#1 DG BRKR FAILD TO CLOSE AUTO DURN TEST
*	BV1	022395B	090578	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY,1 HOUR RUN AT FULL LD
*	BV1	022394A	091278	GM25	M	U03	R	D	U	T	#2 DG OOS FOR TESTN AIR AND RELIEFS,TESTD #1 DG	1 DG BRKR FAILD TO CLOSE USIN CONTROL SW.
*	BV1	022394B	091278	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWITCH	CLOSED LATER NEGATING TROUBLESHOOTING
*	DC1	014415A	040176	WD30	M	U12	R	I	G	N	1CD DG REAR BANK AIR AFTERCOOLR HAD TUBE LEAK	COOLER REPLACED ON 4-6-76
*	DC1	014415B	040176	WD30	M	U12	R	I	G	N	1AB DG REAR BANK AIR AFTERCOOLER HAD TUBE LEAK	REPLACED ON 4-24-76
*	DC1	016647	120976	WD30	K	A10		D	1	T	C-D DG TRIPPD ON OVERSPEED--BLOWN FUSE ON INVERTER	FAILD SILICONE RECTIFIER IN DG INVERTER
*	DC1	020320	120977	WD30	M	U11	C	D	8	N	WITHIN 3HRS. 3 SPURIOUS OS TRIP SIGNALS ON 1AB,1CD	DG OPERABLE CHECKD TRIP POINTS DG COLD
*	DC1	022446	110778	WD30	K	U04		D	1	N	A8 DG INOPERABLE DUE TO INADV.REMOVAL OF CKT.BOARD	CKT.BOARD SNAGGD ON CLOTHING;DESIGN CHANG

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	DC2	020981	031978	WD30	C	B10			U	4	T		2CD DG GASKETS ON AIR LINE TO #5 CYL BLEW OUT	FRACTURED AIR START CHECK VALVE
W	DC2	021217	041578	WD30	M	U03			D	G	N		SURVEILLANCE TESTING OF CD DG NOT PERFORMED	OPERATOR THOUGHT TEST SCHEDULE IN ERROR
W	DC2	022280	061378	WD30	M	U01			D	G	N		MODE1 #A8 DG INOP. FROM 2100 HR. 6-13 TC 1030 HRS.	6-14 --- INVERTER BEING REPAIRED
W	DC2	021634	061578	WD30	M	U02	C		U	4	N		BOTH EDG'S PLACED IN A COND. OF NOT AUTO STARTING	TAGGED OUT WRONG STARTING AIR PILOT VALVE
W	DC2	021675	061778	WD30	D	U05			I	G	N		NORMAL OPNS. WELD CRACK ON ESW OUTLET ON 2A8 L.O	COOLR, TOOK 2A8 DG OOS TO REPAIR
W	DC2	021681	061778	WD30	A	B07			I	8	T		2CD DG WIDELY VARYING CYLNDR TEMP TAGGED OUT	FUEL INJECT. PUMP FAILD
W	DC2	022026	072878	WD30	G	B10	R		T	4	T		#2 A8 DG OVERSPED WHL UNLOADG PREVIOUS OCCURRENCE?	WORN LINKAGE CAP SCREW BROKE IN GOVENOR
W	DC2	022330	090178	WD30	A	U12			D	8	T		#2CD DECLARED INOPERABLE DUE TO L.O. VISCOSTY VIOL	REPLACED 4 INJ. PMPS E1 INJ AS THE ANSWER
W	DC2	022563	091178	WD30	C	A13			T	4	T		2A8 STARTED FOR LOAD TEST WAS TRIPPED OFF MANUALLY	PISTON BOLT FOR AIR CHECK VALV LOOSE
W	DC2	022839	101978	WD30	A	A00			U	1	T		2A8 FAILD TO START DUE TO LACK OF FUEL TO INJECTRS	UNKNOWN BUT REPLACED FUEL FILTER ELEMENT
W	HN1	014162	020376	GM25	A	A02	S	D	1	F			EDG-28 TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	HN1	021376	050878	GM25	M	U04	C	D	U	R			IF ONE DG FAILS TO START DURING COINCDT LOCA/LOSP	LOADING ON RMNG DG MAY EXCEED SPECS
W	IP2	016041	121276	AL18	B	U11	R	T	4	I			LUBE OIL TEMP FOR 22 EDG BELOW MINIMUM FOR OPERATN	CHROMALOX HTR MTD-330A FOUND SHORTED
W	IP2	016913	022677	AL18	B	U14	S	D	4	N			23 EDG REMOVED FROM SERVICE - DEFECTIVE PRESS SWCH	PRESS SW SETTING WAS FOUND TO BE INCORRCT
W	IP2	018914	082977	AL18	D	U12			T	G	N		23 EDG REMVD FROM SERV TO REPAIR JACKET WTR COOLER	AMER STD HA, MOD 1205-6CP, DEVLPD TUBE LKS
W	IP2	019244	091677	AL18	H	U10			I	G	N		22 EDG DEVLPD PHASE-TO-PHASE SHORT IN EXH HOOD MTR	DEFCTVE DSL EXH BLWR MTR, GE 5K449HG01A
W	IP2	019598	101977	AL18	B	U11	R	T	.	N			22 EDG FOUND TO HAVE LOW LUBE OIL TEMPERATURE	DEF TERMINAL BLK SHORTED CHROMALOX HTRS
W	IP2	020379	121978	AL18	C	U16			I	4	N		21 EDG INOP DUE TO AIR START MOTOR PROBLEMS	MOTORS CLEANED, DG TESTED SAT
W	IP3	015120	061576	AL18	M	U03	S	D	1	F			LOST AC AUX FOR EDG 31 FOR 19 MINUTES	MECHANIC CAUSED A SUCCESSION OF BKR TRIPS
W	IP3	015733	083076	AL18	G	B02	T	D	1	F			EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	IP3	016635	092476	AL	18	G	B02	T	D	4	T		EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONT ELE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	IP3	016286	102176	AL	18	L	B10	S	D	8	T		UNABLE TO CONTROL SPEED OF NO 31 DG	UNIT/PARA RELAY OPER INTRMIT-DEFECTV CONN
W	IP3	022410	082978	AL	18	A	U10	S	T	U	N		VALVE FAILURE CAUSED AN INBALANCED DIST OF FUEL	AMONG THE 3 GEN TRS-DG 33 LT PERMIT BY IS
W	JF1	019055	081777	FM	40	C	A10	B	D	U	T		DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM	40	C	A10	B	D	U	T		DG 1B TRIPPED ON OVSPD DURING MANUAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
W	JF1	019359	091377	FM	40	C	B10	B	D	D	N		DSL GEN 1B EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019360	091677	FM	40	C	B10	B	D	8	N		DSL GEN 1-2A EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019368	100277	FM	40	G	A10		D	6	T		DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 130V RATING
W	JF1	020291	010378	FM	40	C	U10	S	D	D	N		DG 1B DECLARED INOPERABLE	BOTH AIR COMPRESSORS ASSOC W 1B WERE OOS
W	JF1	020992	030278	FM	40	C	A09	C	T	D	T		DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	020996	030678	FM	25	C	A09	C	T	8	T		DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	021185	032378	FM	40	C	A02		D	D	N		DSL GEN 1B FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING
W	JF1	022235	081278	FM	40	J	A10	S	D	8	N		OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWTCHS OUT OF ALIGNMT
W	JF1	022374	082778	FM	25	G	A10	R	D	8	N		2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022373	090578	FM	40	G	A10	R	D	8	M		1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP,CAUSED BY FAIL DIODES
W	JF1	023152	091478	FM	40	C	U10		D	4	N		1B DG DECLARED INOPERABLE	1A&1B AIR RESVRS WERE BLED DOWN-RLF VLV
W	JF1	022630	091778	FM	40	G	A10		D	4	T		1B DG FREQ COULD NOT BE INCR ABOVE 58.5 HZ	CPLNG BET DC MTR AND GOV POS POT WAS LOOS
W	JF1	022987	100378	FM	25	J	A02	S	D	1	T		1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR,INCRCTLY POS
W	KE1	016941	082477	GM	25	I	U10	S	D	U	M		PUSH-BUTTON TIMER IN CARBON FIRE PROT SYS FAILED	IN INTER POSIT-CONT S/O SIGNAL TO DG 1B
W	KE1	019171	092077	GM	25	E	B06	C	D	4	T		DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBCHG	CARBON BUILDUP DUE TO SHORT DURATION OPER

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	KE1	019519	102577	GM25	M	A00				U	U	T	D/G 1A STARTED & WAS AT 70 RPM WHEN IT STOPPED	COULD NOT DETERMINE CAUSE OF FAILURE
W	KE1	020695	122177	GM25	G	B02	S	D	4	T			D/G 1B WOULD NOT PICK UP MORE THAN 1500 KW LOAD	SYNCHRO MOTOR LIMIT SWCHS ADJUSTED IMPROP
W	PR1	018342	061777	FM30	G	B10		I	8	T			D2 DG FAILED TO RESPOND TO LOAD CHANGE SIGNALS	LINK LEVER KEY MISSING, CAPSCREWS LOOSE
W	PR1	019919	120977	FM30	M	U01	C	D	1	U			BOTH DGS INOPER FOR APPROXIMATELY 10 MINUTES	OPERATOR ERROR IN RESETTING MCA RELAYS
W	PR1	021704	062278	FM30	A	U02	C	D	G	N			ROOT VLV ON [illegible] DSL OIL DAY TK INST LVL COLMN-SHUT	IMPROPER VLV L/U DURING TEST ON JUNE 9TH
W	PR2	014706	040276	FM30	M	U02	C	D	1	M			D1 DIESEL GENERATOR MOMENTARILY LOCKED OUT	DURING MAINT, TECH ACTUATED WRONG RELAY
W	PR2	015735	091076	FM30	F	B02		D	4	T			D1 DG TRIPPED ON HIGH CRANKCASE PRESSURE	HOSE CLAMPS ON PIPE NOT CONN AFTER MAINT
W	PR2	017618	041277	FM30	M	U10	C	D	4	U			LIGHT SOCKET FOR DG D2 GOV READY LITE SHORTED CAUS	ING 2 HOUR LOSS OF CONTROL POWER
W	PR2	021358	032978	FM30	D	U02	C	D	1	M			NO. 12 DIESEL CW PUMP LOCKED OUT APPROX 1 MINUTE	MAINT MAN PLACED JUMPER BEFORE SUPPSD TO
W	PI1	017146	020977	GM25	J	A10	R	D	8	T			3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
W	PI1	018417	062977	GM25	I	A14	S	I	4	T			3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	PI1	021445	051778	GM25	J	A10	R	D	D	T			4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	BEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
W	RG1	015126	070976	AL18	J	U10		D	U	T			1B EG OUTPUT BREAKER COULD NOT BE CLSD RMTLY AFTER	TEST; SWITCH WEAR PREVENTED BRKR ELEC RST
W	RG1	021625	030478	AL18	A	U10		I	4	N			"A" DG FUEL XFER PUMP LOST-DG STILL HAD 3HR FUEL	POOR ELEC CONN CAUSED THRML DEVICE TRIP
W	RG1	022450	081678	AL18	J	A10		I	8	T			B EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS
W	RU2	014823	030176	FM25	A	B07	R	T	8	T			"B" EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	RU2	019354	091377	FM25	A	B07	R	T	8	I			"A" DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING
W	RU2	021313	041078	FM25	G	B13		I	4	T			EDG LOAD FAILED TO INCREASE ABOVE 900KW	COMM BRUSH VIBRATED OUT OF GOV SPD CHGR
W	SA1	018799A	073077	AL25	A	A10	C	T	4	N			1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	018799B	073077	AL25	A	A10	C	T	4	N			1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	RECOVERY	FAILURE MODE	FAILURE MECHANISM
*	SA1	019920	111777	AL25		D	B13	B		T	4	T	1C DIESEL DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
*	SA1	019924	120277	AL25		E	B04			T	G	T	1B DIESEL DECLARED INOP-TURBOCHGR & EXH EXP JT FLD	CAUSE DETERMINED TO BE TURB BLADE FAILURE
*	SA1	022870	101178	AL25		B	U12			D	G	N	1B DIESEL DECLARED INOPERABLE-PRE-LUBE MTR FAILED	WATER JKT CLR LKNG ONTO PRELUBE PUMP MTR
*	SO1	017760*	051077	DL10		A	U05			D	U	R	2 DIESELS HAD FUEL OIL BYPASS LINE SUPPORTS MISSNG	INADV OMITTED DURING ASSY OF BYPASS PIPNG
*	SO1	021310	032878	DL10		A	A00	R	T	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
*	SO1	022100	071878	DL10		A	A06			D	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCORP PROC TO EXERCISE
*	SO1	014869	041676	GM25	F	A01	R	D	G	T	#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
*	SO1	014840	050876	GM25	F	U12	R	D	G	N	#1 CYLINDER IN #1 DG WAS FOUND FLOODED	CRACK IN #1 CYL HD THRU TO WATER JACKET
*	SO1	015521	070276	GM25	F	U12	R	D	G	N	#19 CYLINDER IN #1 DG WAS FOUND FLOODED	CRACK IN #19 CYL HD THRU TO WATER JACKET
*	SO1	015523	072376	GM25	F	U12	R	D	G	N	#7 CYLINDER IN #1 DG WAS FOUND FLOODED	CRACK IN #7 CYL HD THRU TO WATER JACKET
*	SO1	022919*	103178	GM25	M	U06		D	U	R	PT TO INSPECT DGS DURING OUTAGE NOT PERF FOR 163	ADMINISTRATIVE SCHEDULING ERROR
*	IR1	014668	042076	GM40	A	U06	C	I	G	U	BOTH DSL FUEL OIL TANKS LT TS LIMIT OF 33000 GAL	PROCEDURE NOT REVISED TO INDIC CORRCT LIM
*	IR1	014929	051276	GM40	A	U06		D	U	R	PERIOD SURVEIL TO SAMPLE & VER DSL FUEL NOT PERFMD	PROC FOR PROPER SCHED & RECORDKPG INADEQ
*	IR1	014930	052176	GM40	A	U06		D	1	N	EMER DIESEL FO DAY TANK LVL WAS LESS THAN TS REQMT	AUTO M/U SETPOINT WAS SET LOW
*	IR1	018007	042977	GM40	M	A00		D	U	N	EDG FAILD TO START ON LOSP (PARTIAL) THE 2ND TIME	NO LER FOR DG FAILURE JUST THE LOSP
*	IR1	018447	062277	GM40	G	B10		F	4	N	WEST DG FAILED TO ASSUME MIN REQUIRED LOAD	BRUSH FALLEN OUT OF DC GOV DRIVE MOTOR
*	IR1	020462	021778	GM40	L	U06		D	U	R	DG PHASE DIFFNTL TRIP NOT VERIFIED BYPASSED ON STA	DEFECTIVE PROCEDURES
*	TO3	014879	030676	GM25	J	U10	B	D	6	N	DISCOVD THAT 3B EDG OUTPUT BRKR INDIC NOT CHARGED	CHG MTR DRIVE PAWL MISALGND W CHG SPRING
*	TO3	015963	090976	GM25	J	U10	B	D	6	U	3A DG OUTPUT BRKR WAS NOT IN CHARGED POSITION	WORN NYLON BUSHING-DRV MTR ECC/RATCHT WHL
*	TO3	016136	100276	GM25	D	U01		D	1	N	DG "A" COOLING WTR SURGE TNK LO LVL ALARM	PARTIALLY OPEN SAMPLE VALVE-OPERTR ERROR

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
*	TU3	017591	020377	GM25		A	A12		R	F	U	T	DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
*	TU3	018147	033177	GM25		A	A12		R	F	S	T	DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
*	TU3	019423	061077	GM25		D	U08			I	U	M	FOUND PINHOLE LEAK IN "B" DG RADIATOR	EXT ENVIRON COND - INCOMPLETE CHEM MIXING
*	TU3	021919	060178	GM25		A	B10			T	S	T	B DG HI LEVEL IN FUEL TANK (ENG.MOUNTED) DG S/D	LEVEL SWITCH MALFUNCTION--REPLACED SWITC
*	YR1	017316	030177	GM02	C	A	A10			D	S	T	#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
*	YR1	018653	080277	GM02	D	B	B09	C	T	F	U	T	#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
*	YR1	018654	080277	GM02	D	B	B09	C	T	D	U	T	#3 DG OVERHEATD AFTR 2 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL
*	YR1	020476	012878	GM02	D	U	U01			D	S	N	MODE 3;#1DG TAKEN O/S TO REPAIR WTR HEATER	HEATR COIL FAILURE--T.S.VIOLATD (2 DG'S)
*	ZI1	015188	062176	CB40	A	B	B13			I	S	N	14 DG HAD FO LEAKAGE AT THE 8L FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ
*	ZI1	016179	092476	CB40	M	A	A00			U	U	T	"0" DIESEL GENERATOR FAILED TO START	NO CAUSE COULD BE DETERMINED
*	ZI1	020255	010378	CB40	K	B	B10	R	T	D	S	T	18 DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
*	ZI1	020348A	011678	CB40	B	U	U12	B	D	G	S	T	1A DG INOPERABLE - HI DELTA-P ACROSS LUBE OIL CLR	OIL CLR TUBE LK CONTAMINATED OIL W WATER
*	ZI1	020348B	011678	CB40	G	B	B10			F	S	T	DG "0" STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTROL AIR PRESS-TRIP VLV "0" RING LK
*	ZI1	021968	071778	CB40	B	U	U12	B	D	G	S	T	1A DG INOPERABLE - HI DELTA-P ACROSS LUBE OIL CLR	OIL CLR TUBE LK CONTAMINATED OIL W WATER
*	ZI1	022110	080178	CB40	C	A	A10			T	S	T	18 DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
*	ZI1	022515	090278	CB40	C	A	A10			D	S	T	18 DIESEL GENERATOR FAILED TO START	STARTING AIR DIST BUSHING ROTATED IMPROP
*	ZI1	022846	091478	CB40	B	A	A02	C	D	S	S	N	1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T
*	ZI1	023368	122078	CB40	M	A	A00			U	U	N	18 DG FAILD TO START DURN AN INADVRTNT SAFTY INJEC	EXTENSIVE TESTING REVEALD NO CAUSE
*	ZI2	017808	042777	CB40	G	B	B10	R	D	I	S	T	GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
*	ZI2	017809	050677	CB40	I	B	B13	C	T	S	S	T	DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE

ONE-LINE DESCRIPTION OF DIESEL GENERATOR EVENTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	Z12	019714	111077	C840	B	812	6	D	G	T	"D" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL
W	Z12	019780	111777	C840	I	813	C	T	4	T	"D" DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	Z12	020258	010678	C840	K	810	R	T	8	T	2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	Z12	020280	010978	C840	G	810	R	D	1	T	2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP
W	Z12	021544	051778	C840	K	814	7	T	8	T	2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUI

APPENDIX F

DIESEL-GENERATOR EVENTS CLASSIFIED AS DOES NOT START FAILURES

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
10	500-1000 KW
20	1750-1950 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	014838	051176	GM25	C	A10			D	B	I	DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT	
B	AR1	019578	102377	GM25	C	A14	I	T	B	I		#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED	
B	CR3	018231	060277	FM30	A	A13		T	4	I		"A" DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS	
B	CR3	018265	072677	FM30	I	A06	S	D	1	T		"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS	
B	CR3	019302	092877	FM30	B	A10	S	D	B	T		3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR	
B	CR3	020221	122777	FM30	G	A09	R	D	8	T		3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR	
B	CR3	020278	010378	FM30	G	A09	R	D	8	T		3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR	
B	CR3	023166	111778	FM30	M	A00	R	U	1	T		EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWI[illegible] AFTER ANOMALY	
B	DB1	019816	122977	GM25	G	A14	S	D	G	N		DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD	
B	DB1	020273	010978	GM25	F	A09		T	4	I		DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR	
B	DB1	021852	060478	GM25	K	A10		D	4	T		1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE [illegible] DG 1-1	
B	RS1	015359	071576	GM25	M	A00		U	D	T		SEVERAL ATTEMPTS TO START "B" DG WERE UNSUCCESSFUL	NO DEFINITE CAUSE COULD BE [illegible]UND	
B	RS1	015622	080676	GM25	C	A10		D	4	T		"A" DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR START MTR DOC	
B	RS1	018053	082477	GM25	M	A00	R	U	1	T		DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED	
B	TI1	014298	022176	FM30	J	A06	S	D	1	T		"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW	
B	TI1	020295	011278	FM30	B	A14	S	T	4	T		EDG 1B FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED	
B	TI1	02099[illegible]	031878	FM30	B	A10		T	B	T		EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH	
B	TI2	021E07	052078	FM30	F	A05	C	D	G	T		DG B FAILED TO START	VERT SHFT BTW UP & LWR CRANKS FLD-IMP MTL	
B	TI2	023430	122878	FM30	A	A09		T	B	T		DF-X-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER	
C	CC1	015567	072976	FM25	D	A02	S	D	4	N		#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD	

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	CC1	015584	080776	FM25		J	A02		S	D	G	T	11 DG FAILD TO SENSE RAT VOLTAGE*COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	CC1	017213	111876	FM25		M	A00	R	U	1	T		#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	017622	051577	FM25		M	A09	R	T	6	T		#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC1	019592	101077	FM25		K	A13		T	8	T		#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	CC1	021666	041078	FM25		L	A00		U	1	T		#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEXT TIM
C	CC1	021655	041378	FM25		M	A00		U	1	N		#11 DG FAILD TO START ON LOSS OF OFFSITE POWER	START/FAILURE ALARM DISPLAYD NO ABNORMALS
C	CC2	016722	121576	FM25		C	A09		T	4	T		#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	CC2	018422	022277	FM25		C	A0C		U	6	T		#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	CC2	017457	031777	FM25		M	A00	R	U	1	T		#12 DG VENT FAN FAILD TO START ON BIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
C	CC2	017986	060177	FM25		D	A12		T	D	I		#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESVL
C	FC1	014559	040776	GM25		M	A06	S	D	1	T		START ON SECONDRY AIR REQUD 10.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE
C	FC1	014596	042776	GM25		C	A02	I	D	8	U		DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPROPR SETNG FOR MAG PKUP ON SWTCHG TACH
C	FC1	015722	081576	GM25		C	A14	I	D	8	U		DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWTCHG EACH DRIFTED
C	FC1	017662B	040677	GM25		C	A09	R	T	4	T		DG-1 FAILD TO STRT WTHN 10 SEC,STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017662A	041477	GM25		C	A09	R	T	4	T		DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
C	FC1	021692	061978	GM25		K	A10	R	U	1	T		DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	MI2	014260A	021776	FM25		A	A09	B	T	1	N		DG 12U FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	015563A	081676	FM25		G	A10	B	T	4	T		DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015563B	081776	FM25		G	A10	B	T	4	T		DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	016626	120176	FM25		D	A09	B	T	G	T		13U DG STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	MI2	018923	081077	FM25	G	A01	S	D	1	N	DG 12B FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN "NO FUEL" FROM PREV S/D
C	MI2	019929	110977	FM25	K	A01	S	D	1	T	DG 13U TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
C	MY1	020733	021878	GM25	G	A09		T	8	T	DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD
C	MY1	022715	092578	GM25	A	A06	S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
C	SL1	016861	110276	GM30	M	A01	S	D	4	T	1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP
C	SL1	017135A	011977	GM30	A	A09	R	T	1	T	THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017135B	011977	GM30	A	A09	R	T	1	T	THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017441	030177	GM30	I	A01	S	D	1	T	1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
C	SL1	022532	090578	GM30	J	A16		T	8	T	MAN DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BF1	019102	011476	GM30	G	A12		T	1	T	FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRAULIC ACTUATOR
G	BF3	019133	091977	GM30	K	A10		D	1	T	3D DG TRIPPD ON OVERSPEED ;GOVERNOR INOPERABLE	TO FUSE OPEN DISENABLING FIELD CIRCUIT
G	BP1	015448	080576	CA02	M	A03	R	U	U	T	DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BP1	015449	080576	CA02	D	A00	R	U	8	N	DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	015454	081276	CA02	C	A16	R	T	8	T	WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BP1	016072	090276	CA02	A	A00	R	U	U	T	FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016304	102876	CA02	G	A00	R	U	U	T	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02	G	A00	R	U	U	T	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016587	111876	CA02	C	A16	R	D	4	T	FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016597	120276	CA02	G	A00	R	U	U	T	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122C76	CA02	G	A04	R	U	U	T	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN

DOES NOT START

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	016912	122776	CA02	A	A04	R	U	U	T	START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	016911	122876	CA02	C	A10	R	D	4	M	DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1943487
G	BP1	016916	010377	CA02	G	A00	R	U	U	T	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?
G	BP1	020298	032477	CA02	G	A00	R	U	U	T	EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BP1	018102	051877	CA02	D	A00	R	T	4	T	HZO JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	I TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	018103	052677	CA02	A	A00	R	U	U	T	START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	018742	080577	CA02	J	A04	S	D	6	T	TESTED EDG WITH 2A-28 BKR RACKD OUT; AUTO TRAN.FR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR
G	BP1	019541	102077	CA02	C	A00	R	U	U	T	START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	019993	112477	CA02	A	A00	R	U	1	T	START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BP1	020575	020278	CA02	M	A00	R	U	U	T	START TIME 28.5 SECS VS 13.9 SECS	CAUSE UNKNOWN
G	BR1	0166548	010477	NM30	B	A04	C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER ,JACKT
G	BR1	0166548	010477	NM30	B	A04	C	D	4	T	#4 DG TRIPPD R/X AT POWER, TD SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT
G	BR1	020068	120977	NM30	C	A09		T	D	T	#3 DG START TIME 10.2 SEC VS 10	CARBON BUILDUP ON AIR VALVE STUCK SHUT
G	BR2	014136	010976	NM30	J	A10		D	4	N	#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	BR2	015461	061176	NM30	A	A02	C	D	D	T	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	46 GAL HZO IN SADDLE & 4 DAY TANK
G	BR2	016399	111176	NM30	C	A08		T	D	T	DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	BR2	020612	021378	NM30	K	A01	S	D	1	N	FOLLOWING SCRAM ON UNIT 1 ;#1 DG LG RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET
G	CD1	016712	111076	CB40	J	A03	5	D	B	T	EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 59RELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	CD1	023644	091278	CB40	F	A09		T	G	T	#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL
G	DA1	015993	100776	FM25	F	A05		D	D	T	1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DA1	017756	051077	FM25	J	A10			S	D	8	T	1G-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DA1	021171	040578	FM25	F	A06			D	G	M		BEARING WIPED ON 4/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	DR1	0204088	012778	GM10	M	A11		C	D	1	N		U-1 B/U DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER
G	DR1	020408A	012978	GM10	M	A11		C	D	G	N		U-1 FAILD TO START DUE TO COLD WEATHR 6 HEATRS	INSTALLED & ROOM WINTERIZED
G	DR1	020852	030478	GM10	C	A10			D	G	T		D-1 B/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR1	021517	050778	GM10	B	A10			T	D	N		TEMORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR1	021516	051178	GM10	A	A10		R	D	G	T		TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP
G	DR2	014913	052376	GM25	C	A00			U	1	T		UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYST
G	DR2	016443	102976	GM25	I	A14		S	T	D	T		UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLEND	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	017397	032277	GM25	C	A10		R	D	1	T		UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	018283	063077	GM25	G	A00		R	D	1	T		2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE OUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25	G	A00		R	D	1	T		U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE OUT-OF ADJUST GOVENOR COMPENSTIN
G	DR2	019732	111677	GM25	I	A06		S	D	1	T		AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	DR2	019723	120277	GM25	C	A13		R	T	1	T		UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	019810	120377	GM25	C	A12			D	4	T		2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM
G	DR2	019905	120477	GM25	J	A00			U	U	T		U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	DR2	020242	010378	GM25	C	A13		R	T	8	T		UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR2	021648	030778	GM25	C	A00		S	D	8	T		OPERATR SHOOK AIR START SOLENOID &UNIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC
G	DR2	020855	030878	GM25	G	A14		S	D	8	T		ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021538	052278	GM25	G	A02			D	8	T		U-2 DG TRIPPD 4 TIMES ON OVERSPEED;R/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR2	022262	082478	GM25	C	A10	R	U	4	T	2/3 UNIT DOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR2	022589	092278	GM25	C	A06	R	U	8	T	UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	DR2	023337	121678	GM25	C	A00	R	D	4	T	2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TD2 RELAY CLEANED;TD2 AND AIR VALVE ?
G	DR3	014439	030376	GM25	G	A13	R	T	4	T	DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016187	100976	GM25	G	A13	R	E	4	T	LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	DR3	017509	032277	GM25	K	A10		D	G	M	GEN FIELD FAILD TO FLASH	INTERMITINT CAPACITOR SHORT IN FLASH CIRC
G	DR3	017722	112277	GM25	G	A10	R	D	8	T	3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	EN1	014778	031576	FM25	C	A10		D	D	T	1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	EN1	014796	051576	FM25	M	A00		U	U	T	1B DG FAILD TO START ON FIRST ATTEMPT	UNKNOWN WILL DO WEEKLY START TO DETERMINE
G	EN1	015568	080576	FM25	K	A06	S	D	1	T	DG 1A TRIPPED DUE TO LOSS OF EXCITATION DRNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	EN1	015947	081476	FM25	M	A00	R	D	U	T	1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	EN1	016665	091176	FM25	G	A10	R	D	1	T	1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	016893	123176	FM25	M	A00	R	U	1	T	MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY
G	EN1	018141	052877	FM25	M	A00		U	U	T	1A DG FAILD TO COME UP TO RATED VOLT IN REQD. TIME	TOOK 16 SEC VS 12 SEC RETESTED SATISFAC
G	EN1	020214	112577	FM25	G	A08		T	8	T	1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED
G	EN2	022751A	102878	FM25	G	A10	R	D	8	T	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	022751B	103178	FM25	G	A10	R	T	8	N	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	FP1	016496	111776	GM25	I	A10	R	D	8	T	"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	015600	121576	GM25	B	A10	R	D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016971	011977	GM25	B	A10	R	D	1	T	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	FP1	017725	042077	GM25		I	A10		R	D	8	T	DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	FP1	023161	120578	GM25		G	A02	S		D	4	T	"A"DG TRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR
G	MO1	016186	101076	GM25		C	A09			T	D	T	#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 START SYS AIR CONT COMP FOULED W RUST
G	OC1	014447	030376	GM25		K	A10			D	8	T	DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	WESTHSE FFCU RELAY FLD TO ENRGZ FLD FLASH
G	OC1	015642	060876	GM25		C	A00			U	1	T	DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	OC1	023129	113078	GM25		K	A10			D	8	T	#1DG STARTED BUT GEN FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	PB2	016866	082677	FM30		D	A01	S		D	1	T	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP, BUT NOT DIESEL TRP
G	PB2	018887	082677	FM30		I	A06	S		D	4	T	E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
G	PB2	019414	101877	FM30		D	A02	S		D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	PB2	020090	121977	FM30		L	A00			U	0	I	E1 DG TRIPPED ON "A" PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXTV TST
G	PB2	022462	083078	FM30		G	A10			T	1	T	E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD BY
G	PB2	023349A	122178	FM30		G	A10			D	1	T	E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/26/78
G	PB2	0233498	122178	FM30		G	A00			U	1	T	E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
G	QC1	014120	011276	GM25		C	A10			D	8	T	UNIT 1 DG FAILED TO START WHEN MODE SW IN START MO	AIR START SOL VLV DIRTY-NOT OPEN FULLY
G	QC1	018112	042577	GM25		K	A10			D	6	T	WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
G	QC1	019100	082477	GM25		L	A13			T	4	T	UNIT 1 DG STARTED AND RAN, BUT NO VLTG, SYNCH, FREQ	FREQ GEN TACH SET SCREWS VIBRATED LOOSE
G	QC1	019994	112877	GM25		K	A10			D	4	M	1/2 DG WOULD NOT START SUCCESSFLY, FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT
G	VY1	014740	050676	FM30		F	A09	R	T	4	N		"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VY1	019658	072677	FM30		C	A09			T	4	T	"A" DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
*	BV1	014903	052076	GM25		C	A04	R	T	4	N		DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEMS

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYST	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	BV1	015913	090376	GM25	J	A00			U	1	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
W	BV1	017348	031477	GM25	J	A04	B	D	4	T	#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH
W	BV1	017621	041177	GM25	J	A04	B	D	4	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
W	BV1	017693	042677	GM25	J	A04	B	D	4	T	#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
W	BV1	017696	042977	GM25	C	A09	R	T	4	N	DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	BV1	017827	050977	GM25	J	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
W	BV1	018068	060377	GM25	J	A04	R	D	1	T	#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
W	BV1	018828	071777	GM25	K	A10	R	T	8	T	#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
W	BV1	020437	011178	GM25	J	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
W	BV1	022137	072878	GM25	K	A10	R	D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
W	BV1	0223958	090573	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY,1 HOUR RUN AT FULL LO
W	BV1	0223948	091278	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWITCH	CLOSED LATER NEGATING TROUBLESHOOTING
W	DC1	016647	120976	WD30	K	A10		D	1	T	C-D DG TRIPPD ON OVERSPEED--BLOWN FUSE ON INVERTER	FAILD SILICONE RECTIFIER IN DG INVERTER
W	DC2	022503	091178	WD30	C	A13		T	4	T	2A8 STARTED FOR LOAD TEST WAS TRIPPED OFF MANUALLY	PISTON BOLT FOR AIR CHECK VALV LOOSE
W	DC2	022839	101978	WD30	A	A00		U	1	T	2A8 FAILD TO START DUE TO LACK OF FUEL TO INJECTRS	UNKNOWN BUT REPLACED FUEL FILTER ELEMENT
W	HN1	014162	020376	GM25	A	A02	S	D	1	T	EDG-2B TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	JF1	019055	081777	FM40	C	A10	B	D	U	T	DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM40	C	A10	B	D	U	T	DG 1B TRIPPED ON OVSPD DURING MANUAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
W	JF1	019368	101477	FM40	G	A10		D	8	T	DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 130V RATING
W	JF1	020992	030278	FM40	C	A09	C	F	D	T	DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS

DOES NOT START

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	020996	030878	FM25	C	A09	C	T	B	T	DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	021185	032378	FM40	C	A02		D	D	N	DSL GEN 1B FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING
W	JF1	022235	061278	FM40	J	A10	S	D	B	N	OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWTCHS OUT OF ALIGNMT
W	JF1	022374	082778	FM25	G	A10	R	D	B	N	2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022373	090578	FM40	G	A10	R	D	B	M	1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP.CAUSED BY FAIL DIODES
W	JF1	022030	091778	FM40	G	A10		D	4	I	1B DG FREQ COULD NOT BE INCR ABOVE 58.5 HZ	CPLNG BET DC MTR AND GOV POS POT WAS LOOS
W	JF1	022987	100378	FM25	J	A02	S	D	1	T	1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR,INCRCTLY POS
W	KE1	019519	102577	GM25	M	A00		U	U	T	D/G 1A STARTED & WAS AT 70 RPM WHEN IT STOPPED	COULD NOT DETERMINE CAUSE OF FAILURE
W	PT1	017146	020977	GM25	J	A10	R	D	B	F	3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
W	PT1	018417	062977	GM25	I	A14	S	T	4	T	3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	PT1	021445	051778	GM25	J	A10	R	D	D	T	4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	WEST 662A143HC1 LATCH-CHKNG SW DEFECTIVE
W	RG1	022456	081678	AL16	J	A10		T	B	T	B EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS
W	SA1	0187994	073077	AL25	A	A10	C	T	4	N	1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	0187998	073077	AL25	A	A10	C	T	4	N	1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA
W	SU1	021310	032878	DL10	A	A10	R	T	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
W	SU1	022100	071878	DL10	A	A06		U	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCORP PROC TO EXERCISE
W	SU1	014869	041675	GM20	F	A01	R	D	G	T	#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
W	TR1	018067	042977	GM40	M	A00		U	U	N	EDG FAILD TO START ON LOSP (PARTIAL) THE 2ND TIME	NO CER FOR DG FAILURE JUST THE LOSP
W	WO3	017591	020377	GM25	A	A12	R	T	4	T	DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	WO3	018147	033177	GM25	A	A12	R	T	4	T	DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING

DOES NOT START

VEN	PLANT	CONTROL NUM	FAIL DATE	MFG	MK	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
*	YK1	017[illegible]6	036[illegible]	[illegible]M02	C	A16			D	4	T		#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
W	ZI1	[illegible]	0[illegible]	CB40	M	A00			U	U	T		MOM DIESEL GENERATOR FAILED TO START	NO CAUSE COULD BE DETERMINED
*	ZI1	0[illegible]	090178	CB40	C	A10			T	1	T		1B DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
*	ZI1	022515	040278	CB40	C	A10			U	4	T		1B DIESEL GENERATOR FAILED TO START	STARTING AIR DIST BUSHING ROTATED IMPROP
W	ZI1	022846	091478	CB40	B	A02	C		D	4	N		1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS
*	ZI1	023308	122078	CB40	M	A00			U	D	N		1B DG FAILD TO START DURN AN INADVRTNT SAFTY INJEC	EXTENSIVE TESTING REVEALD NO CAUSE

APPENDIX G

DIESEL-GENERATOR EVENTS CLASSIFIED AS DOES NOT CONTINUE TO RUN FAILURES

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
16	500-1666 KW
18	1750-1850 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

DOES NOT CONTINUE TO RUN

PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B AR1	021663	032078	GM25	E	800		T	G	I	DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
B D81	020706	020878	GM25	E	805		D	G	T	1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
B D81	021580	050978	GM25	E	800		U	G	T	GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
B D81	023007	103178	GM25	M	811	S	D	4	T	1-2 DG S/D DUE TO ROOM TEMP ROSE TO 110 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
B R31	010656	120676	GM25	G	810		D	8	T	DG "A" TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED,SPD DECR TO TRIP
B R31	022613	100478	GM25	A	801	S	D	1	N	"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
B T12	021609	042578	FM36	F	806	R	U	1	T	"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
B T12	021665	052378	FM36	F	809	R	T	8	M	DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
C CC1	016405	102576	FM25	M	800	R	U	1	T	#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C CC1	018306	061777	FM25	F	802		D	1	I	#11 DG STARTD;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOOSE AND FELL OFF DG
C CC1	018488	071177	FM25	B	802	C	D	4	M	#11 DG ON FIRE DUE TO L.O. HITTNG HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY
C CC1	018487	071377	FM25	D	802	S	D	1	T	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;DP SWITCH ISOLATED
C CC1	023386	121878	FM25	M	800	R	D	1	I	#11 DG SHUTDOWN DUE TO ROOM VENT,FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS
C CC2	020226	011078	FM25	J	810		I	1	T	#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
C CC2	021961	080178	FM25	D	810	S	D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C FC1	015614	081576	GM25	G	810		T	8	N	SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING
C FC1	021799	071278	GM25	K	810	R	D	8	T	DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDT)
C FC1	022249	080978	GM25	K	810	R	D	8	T	DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C MI2	0142608	021876	FM25	A	809	B	T	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C MI2	0142600	022676	FM25	A	809	B	T	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT

DOES NOT CONTINUE TO RUN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	ITEM	CLASS	REPAIR	RECOVERY	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	MI2	014260D	022376	FM25	F	804			B	T	G	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	MI2	015166	060276	FM25	F	809			B	T	1	T		DG 13U TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	MI2	015563C	082376	FM25	G	810			B	T	4	T		DG 12U TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015906	090176	FM25	B	812			C	T	1	N		DG 13U SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	016036	091976	FM25	B	812			B	D	4	N		12U DG HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET
C	MI2	016031	092276	FM25	D	809			B	T	G	T		12U DG RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016755	121876	FM25	F	806				D	G	T		DG 13U #3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS
C	MI2	017020	011077	FM25	F	813			S	D	G	T		DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN
C	MI2	018972	081777	FM25	D	809			B	T	G	T		12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	0189768	092077	FM25	D	809			B	T	G	N		COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	019255	092477	FM25	I	814			S	I	8	T		12U DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW OUT OF ADJ ON DG OVSPD TRIP MECH
C	MI2	021386	050878	FM25	D	809			B	T	G	T		12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	022131	080378	FM25	A	807				I	8	T		DG 13U SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
C	MI2	023213	120578	FM25	D	809			B	T	G	T		12U DG S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
C	SL1	017134	011877	GM30	E	804			R	T	G	T		1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	019511	092677	GM30	E	804			R	T	G	T		1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
G	BP1	016261	110376	GM30	G	809			C	T	4	T		D DG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BP1	014417	032476	CA02	U	809			R	T	8	T		DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	014894	051676	CA02	D	809			R	T	G	N		DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	020586	020978	CA02	D	812				T	4	T		DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT

DOES NOT CONTINUE TO RUN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BR1	019391	101177	NM30	G	805			D	B	T	#2 DG UNABLE TO MAINTAIN LOAD CYCLING 500KW	SHORTED LEADS TO GOVERNOR; INCORRECT ASMB
G	BR1	019948	121077	NM30	J	800			D	D	T	SMOKE COMING FROM 320 RELAY AND 8608 RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	BR1	022454	091178	NM30	A	807			T	4	T	#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
G	BR2	014614	031476	NM30	A	812			T	D	T	AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANUL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	BR2	016623	122976	NM30	G	810			T	B	T	#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC
G	CO1	015872	082376	CB40	A	800			U	B	T	FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	CO1	016560	110776	CB40	K	808			T	D	T	DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	POT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	DA1	014334	022776	FM25	B	812	R	T	D	D	T	SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DA1	014337	031776	FM25	H	812	K	T	D	D	T	SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	DA1	014953	062276	FM25	D	809	C	T	B	B	T	1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DA1	016452	110476	FM25	A	804			D	D	T	DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	DA1	017963	051277	FM25	G	806	S	D	1	T	T	1G-31 DG WOULD NOT REACH FULL LOADING ONLY 2500 KW	SPEED SETTING ADJUSTMNT NOT RESET
G	DR2	016168	093076	GM25	K	809		T	D	T	T	2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR2	016554	121876	GM25	A	802	S	D	D	T	T	UNIT 2 DG FAILD TO CARRY REQD LOAD ;2600KW MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATON
G	DR2	019651	103077	GM25	E	806		T	G	T	T	UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTART	TURBO-CHARGR CLUCTHESHAFT BEARING
G	DR2	019728	112977	GM25	D	812	C	D	D	T	T	2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GROUNDED PUMP STATOR
G	DR2	021682	063078	GM25	D	814	T	D	G	T	T	2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	DR3	016015	092176	GM25	B	809		T	4	T	T	DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	DR3	016455	110576	GM25	G	810	R	T	B	T	T	LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	019727	112977	GM25	G	810	R	D	B	N	3	DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD

DOES NOT CONTINUE TO RUN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUBSYST	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	014795	050176	FM25	M	813		S	T	6	T	NORMAL SURV. TEST DG 1C TRIPPD; LOOSE WIRE	NUT VIBRATED OFF WIRE-PANEL R43-P.01C
G	EN1	015557	062676	FM25	B	802		S	D	8	T	DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH
G	EN1	016842	122576	FM25	M	806	R	U	U	T		DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITVE	CHECKNG OUT LOGIC ON 1C DG
G	EN1	018644	061377	FM25	D	814	T	D	4	T		1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25	D	814	T	D	4	T		1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS
G	EN1	018647	062577	FM25	D	814	T	D	4	N		1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
G	EN1	018839	081277	FM25	K	810		D	8	T		1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG PTR OPER XFMR PWR SUP DIODES FAIL
G	EN1	020031	081677	FM25	F	800	R	U	G	T		DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	EN1	020013	111977	FM25	K	802	S	D	4	T		1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	FP1	020518	021578	GM25	J	810		T	1	T		"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH CKT FOR OUTPUT BRKR
G	PB2	020685	022878	FM30	B	812	C	D	8	T		E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
G	PI1	015966	092276	AL25	H	804	B	T	D	T		"A" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	016368	111776	AL25	H	804	B	T	D	T		"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	022128	080278	AL25	K	801		D	8	T		B DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
G	VY1	015739	082576	FM30	A	813		T	1	T		"B" DG OOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
G	VY1	018323	062377	FM30	F	813	R	T	4	T		"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VY1	020194	121977	FM30	F	813	R	T	4	T		"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
G	VY1	020464	012478	FM30	D	809		T	4	T		DIESEL GENERATOR "A" TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNT ARND HA
W	BV1	017883	022477	GM25	L	805		D	4	T		DG OUTPUT BREAKER TRIPPED;INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST
W	BV1	021355	041878	GM25	A	812		T	D	N		#1 DG WAS S/D AND DECLARED INOPERABLE--OIL LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL

DOES NOT CONTINUE TO RUN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	YR1	018653	080277	GM02	D	B09	C	T	D	T	#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
W	YR1	018654	080277	GM02	D	B09	C	T	D	T	#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL
W	ZI1	015188	062176	C840	A	813		I	4	N	1A DG HAD FO LEAKAGE AT THE 8L FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ
W	ZI1	020255	010378	C840	K	810	R	T	D	T	1B DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
W	ZI1	020348B	011678	C840	G	810		T	4	T	DG "D" STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTROL AIR PRESS-TRIP VLV "D" RING LK
W	ZI2	017808	042777	C840	G	810	R	D	1	T	GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
W	ZI2	017809	050677	C840	I	813	C	T	4	T	DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	ZI2	019714	111077	C840	B	812	B	D	G	T	"D" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL
W	ZI2	019780	111777	C840	I	813	C	T	4	T	"C" DIESEL GENERATLR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	ZI2	020258	010678	C840	K	810	R	T	8	T	2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	ZI2	020266	010978	C840	G	810	R	D	1	T	2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP
W	ZI2	021544	051778	C840	K	814	T	T	8	T	2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUI

APPENDIX H

DIESEL-GENERATOR EVENTS CLASSIFIED AS UNAVAILABLE/NONFAILURE

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
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SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
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F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
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K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
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02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
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06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
10	500-1000 KW
18	1750-1950 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

VSN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	018465	112276	GM25	M	U04	C	D	B	N	#1 DG INOPERABLE DUE TO WET CIRCUITRY	INADVRTNT OPER OF FIRE DELUGE SYSTEM
B	AR1	018847	080577	GM25	M	U03	K	D	U	R	MONTHLY SURVEILLANCE TEST NOT PERFORMED ON TIME	THIS IS A REPETITIVE OCCURRENCE
B	D81	022046	071978	GM25	M	U06		D	U	T	DISEL START TIME NOT CHECKED	PROCEDURES MODIFIED
B	D81	022692	091478	GM25	M	U03		D	D	R	DG 1-1 OOS FOR PM'S SURVEILLANCE TEST NOT PERFORMD	PERSONNEL ERROR
B	KS1	022827	110278	GM25	K	U10		D	B	T	"A" DG LOST FOR 7HOURS;"B"DG INOP. PLANT WAS S/D	BLOWN CONT. POWER FUSE IN VOLT. REGULATOR
B	TI1	017050	020377	FM30	B	U10		D	B	N	DETERMINED THAT "A" DG WOULD NOT START ON LOSP W/O	AN ES SIGNAL-FAULTY PRESSURE SWITCH
C	CC1	018041	060377	FM25	B	U13	R	T	4	N	#12 DG PLACED OOS TO REPAIR 2 MINOR FUEL OIL LEAKS	FITTINGS VIBRATED LOOSE --TIGHTENED THEM
C	CC1	019695	111577	FM25	B	U13	R	T	D	T	#12 DG OOS DUE TO MINOR FUEL LUBE COOLING H2O LEAK	LOOSE FITTINGS OLD GASKETS LOOSE FLANGES
C	CC1	019738	111677	FM25	B	U13	R	T	4	N	#12 DG OOS TO REPAIR MINOR LEAKS FUEL & LUBE OIL	TIGHTENED FITTINGS,FLANGES
C	CC2	018428	062177	FM25	B	U13		T	4	N	#21 DG OOS DUE TO MINOR OIL LEAKS	FUEL OIL LEAKS FROM LOOSE FITTINGS
C	CC2	018489	071877	FM25	B	U12		T	B	N	#21 DG OOS TO REPAIR CRACKED BULLSEYE(GLASS)	REPLACED GLASS WITH PLEXIGLASS WINDOW
C	CC2	019481	110177	FM25	D	U13		T	D	N	#21 S/D FOR 7 HRS. FOR PM'S LEAKS ON H2O JACKT REL	1/4" FUEL OIL TUBN TO INJ TIGHTENED
C	FC1	017661	040777	GM25	A	U01		D	G	R	FUEL OIL STORAGE READINGS SLIGHTLY BELOW TECH.SP.	DISCOVRD FOUR DAYS LATER,TANKS WERE FILLD
C	MI2	014164*	012876	FM25	M	U03		D	B	T	DG 12U & 13U OOS W/O PERFORMANCE OF SURV TESTING	OPER THOUGHT SURV TEST UNNEC IF OOS - PMS
C	MI2	014452	032476	FM25	M	U03		D	U	N	DG 13U NOT TESTED AFTER DG 12U DECLARED INOPERABLE	OPER UNAWARE OF REQMT TO TEST ALT DIESEL
C	MI2	015116	061776	FM25	B	U11	S	T	4	N	13U DG STBY LO PMP TRIPPED, LO TEMP DECREASED	NO CAUSE FOR TRIP,TEMP WOULD PREV DG STRT
C	MI2	021371	020977	FM25	B	U14		D	B	U	13U DG REMOVED FROM SERVICE	REMOVE & RECALB LUBE OIL TEMP SWITCH
C	MI2	017837*	051577	FM25	A	U02	S	D	U	N	BOTH DG'S FUEL SUPPLY VLVS FOUND SHUT-BOTH DG INOP	REASON FOR SHUT VALVES WAS UNKNOWN
C	MI2	018974	082377	FM25	M	U03		D	U	N	12U DG RETURNED TO SERVICE WITHOUT OPERABILITY TST	OPER DIDNT KNOW TEST REQRD AFTER PREV MTN
C	MI2	018976A	082677	FM25	D	U09	B	T	G	T	DISCOVERED 13U DG SW HX MUSSEL FOULED	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL

UNAVAILABLE / NONFAILURE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	PA1	017219	021177	AL25		C	U12		C	T	4	T	DG 1-2 HAD 1 OF ITS AIR START MOTORS CYCLE	DEPLETED AIR SUPPLY, WATER LKG ONTO MOTOR
C	PA1	019409	082377	AL25		A	U06		C	F	4	N	LEVEL IN DIESEL FUEL OIL STG TANK DECRSD TO 53 PCT	SUPPLIER FAILED TO DELIVER PER SCHEDULE
C	SL1	015603	051876	GM30		C	U09			T	6	I	MAM DG PLACED OUT OF SERVICE	AIR START SYS VALVES & LINES CLOGD W DIRT
G	BF1	016396	112276	GM30		C	U02			U	4	M	ONE START CIRCUIT ON B DG INOP; 2ND START CKT. OK	BROKEN STUD HOLDER ON BREAKER, REPLACED
G	BF1	022084	070978	GM30		K	U11	S		D	4	T	1C DG FIELD BKR TRIPPD ;DG INOPERABLE	OVERHEATING OF BKR DUE TO INOPRBLE FAN
G	BF3	016817	112676	GM30		C	U02			U	8	M	START CKT. 1 OF DG 3D INOP DUE TO RELAY FAILURE	NOT ABLE TO SENSE SPEED IN START CKT.
G	BF3	021780	070678	GM30		J	U10			U	8	N	4-KV STANDBY POWER CKT BKR DEFECTIVE; DG INOPERABL	SHORT IN WINDING OF A SPRING CHARGN MOTOR
G	BP1	017622	011077	CA02		G	U04	R	U	S	4	N	REMOVED FROM SERVICE FOR CORRECTIVE MODIFICATION	LUBE OIL SUPPLY TO GOV. MODIFIED
G	BR1	019475A	091277	NM30		M	U01	R	D	L	4	N	R/X AT PWR #1 DG REMOVED FROM SERVICE FOR ANN.INSP	T.S.4.5.F NOT PERFORMED ON 9/15/77
G	BR1	0192758	092877	NM30		M	U01	R	D	U	4	N	#3 DG OUT FOR ANN. INSP. T.S.4.F NOT PERFORMD #4DG	OPERATOR ERROR
G	BR1	020246	010678	NM30		I	U01	S	D	4	4	M	#2 DG SECURED OPERATOR FAILD TO RESET LOCKOUT	#2 DG INOPRBLE FOR 1.5 HOURS
G	BR2	014609	032576	NM30		M	U01		D	G	4	N	REFUEL MODE, 3DG BEING PM'D; FAILD TO TEST SBGT B	"B" TRAIN NOT TESTED TILL 3/29/76
G	BR2	018177	060777	NM30		M	U03		D	U	4	T	WHILE SECURING DG1 OPERATOR REDUCED LOAD TOO FAST	BKR TRIPPD ON REVERSE POWER AND DG LOCOUT
G	CO1	017064	121576	CB40		J	U10	B	D	U	4	T	COMPLETD DG TEST; BKR. IFS WOULD NOT CLOSE AUTO IF	BKR IAF ER IFA TRIPPD--AUX CONTACTS POOR
G	CO1	019117	091277	CB40		A	U04		D	G	4	N	FUEL OIL RETURN LINE SHEARD AT INLET TO DAY STORAG	RIGID HANGER WORKED LOOSE CAUSN EX MOVEM
G	CO1	020803	011778	CB40		J	U10	B	D	L	4	T	AUX SWITCHES FAILD TO CLOSE ON DG OUTPUT BKR THIS	WOULD PREVENT SHUTTING BKRS. IFS AND 1GS
G	DA1	016449	110276	FM25		M	U06		D	G	4	R	1G-21 & 1G-31 ANNUAL INSPECT NOT PERFORM ON TIME	COMPLETED 10/21/76 VS 9/15/76
G	DA1	019446	100677	FM25		A	U04		D	U	4	N	STNDBY DG FUEL STRGE TANK INDICATOR INCORRCTLY CAL	ACTUALLY 2000 GAL LESS THAN INDICATED
G	DA1	023563	122778	FM25		M	U01		D	G	4	N	CORE LOADING 1G-21 INOP; T.S.3.7.8 VIOLATED	1G-31 NOT TESTD DAILY--12/25 TO 12/31
G	DK1	016167	093076	GM10		A	U02	C	D	B	4	N	BACK-HOE SEVERED FUEL OIL TRANSFR LINE TO UNIT1 DG	AND FIRE PUMP; PROMPTLY REPAIRED

VEN	PLNT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR1	021518	050378	GM10		C	U02		S	D	D	N	LOW STARTN AIR PRESS DUE TO LEAKING PILOT AIR REG.	IMPROPERLY POSITIONED O-RING
G	DR1	021537	060678	GM10		A	U01		S	D	G	N	BACKUP DG DAY TANK EMPTY AND TRANSFER PUMP WAS OFF	PUMP STARTER FAILD AND PERSONEL ERROR
G	DR2	015242	071076	GM25		D	U11			D	U	N	U-2 DG COOLING H2O PUMP BKR FOUND TRIPPD	EXCESSV TEMP IN BKR CUBICLE
G	DR2	016018	090576	GM25		M	U08	C	T	G		N	H2O LEAKAGE INTO U 2/3 DG ROOM; SMALL HOLE IN HPCI	TEST RETURN LINE; CHLORIDE STRESS CORRO,N
G	DR3	018449	070177	GM25		K	U10		T	B	T		DAY TANK FOR DIESL NOT AT NORMAL LEVEL	LOOSE WIRE IN LEVEL SWITCH PREVENT PMPRUN
G	DR3	015379	071277	GM25		D	U09	B	D	B		N	U3 DG COOLING H2O PUMP CKT.BKR. FOUND TRIPPD;RESET	TRIPPD AGAIN--WORN PMP BEARINGS;REPLACED
G	DR3	018370	071277	GM25		D	U11	B	D	U		N	DG COOLING WTR PMP BKR. FOUND TRIPPD ;RESET OK	ABNORMALLY HI AMB TEMP FROM CURRENT DEMND
G	DR3	018986	091477	GM25		D	U09	B	D	D		N	DG COOLN WTR PMP BKR. FOUND TRIPPD; WORN OUT BRNGS	DUE TO DETERIATION OF IN-LINE FILTER
G	DR3	019318	100477	GM25		A	U01	R	D	4		N	U 3 DIESL OIL STORAGE LEVEL 8700 VS.10000 GALLONS	LO LEVEL ALARM INOP--OPERATOR NOT INFORMD
G	DR3	019655	122877	GM25		M	U03	S	D	4		M	2/3 DG OOS-OPERATOR PULLD 3D/G TO BUS 34-1 SWITCH	TO LOCK-PLACED OOS CARD-3HOURS UNDETECTD
G	DR3	021461	060178	GM25		A	U09	R	D	1		N	U 3 DIESL STORAGE LEVEL 9000 GALS.--STUCK VALVE	2/3 FIRE PMP DAY TNK LEVEL CONTRL VALV
G	EN1	020191	120877	FM25		A	U01	S	D	U		N	1A DG FUEL OIL XFER PUMP DISCH VLVS FOUND SHUT	PERSONNEL ERROR - IMPROPER VALVE LINEUP
G	EN1	021249	033078	FM25		M	U04	C	D	U		T	BUS 2F FDR BREAKER CONT PWR DESIGN COULD CAUSE A	LOSS OF 2 DSLS IF BATT LOST COINCT W LOSP
G	EN1	021250	033078	FM25		M	U04	C	D	U		T	DSL LOAD SEQ TIMER DESIGN COULD RESULT IN OVLD OF	DG 1B IF LOCA FOLLWS LOSP OR VICE VERSA
G	EN1	021476	060278	FM25		M	U04	C	D	U		T	VLTG LOGIC ON DGS 1A,1B,1C SUCH THAT VIBRTN OF TIE	BRKR DOOR WLD CAUSE BRKR TO CLOSE
G	EN1	021719	062778	FM25		M	U02	C	U	U	U		1C DG BATTERY PLT CELL SURV NOT COMPLETED IN INTVL	SPECIF IN TECH SPEC-PERSONNEL OVERSIGHT
G	EN1	022476	092078	FM25		M	U04	C	D	U		R	DGS THAT FAIL TO START OR ARE S/D DURING LOCA OR	LOSP MAY NOT RESTART FROM CONTROL ROOM
G	EN2	022213	080978	FM25		M	U03		D	U		R	SURVEILL ON DG MBM NOT PERFORMED	PERSONNEL OVERSIGHT
G	EN2	022493	092078	FM25		M	U04	C	D	U		R	DGS THAT FAIL TO START OR ARE S/D DURING A LOCA OR	LOSP MAY NOT RESTART FROM THE CONTROL RM
G	EN2	023635	111378	FM25		M	U03		D	B		N	POWER AT 1464 MW, TESTING 2C DG, TS.4.8.1.1.1.A	SURV TIME LIMIT ON OTHERS RAN OUT--8 HOUR

UNAVAILABLE / NONFAILURE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	FP1	015656*	061676	GM25	K	U14			C	D	U	T	A,B,C,ED DGS WERE UNSTABLE DURING TESTING	DRIFT IN DROOP CKT-NOT NECSRY FOR EMERGCY
G	FP1	022115	073178	GM25	B	U03				D	G	T	L.O. SAMPLES NOT TAKEN IN REQD TIME INTERVAL	SAMPLE EQUIPMENT FAILURE
G	FP1	022278	082878	GM25	B	U05				D	G	N	EDG INOPERABLE BECAUSE OF NOISY LUBE OIL PUMP	PUMP - MOTOR MISALIGNMENT
G	MI1	016999	020177	FM25	A	U12	R	T	4	U			DG DECLARED INOPER IN ORDER TO REPAIR FUEL OIL LK	SMALL CRK IN PIPE NIPPLE TO NO. 12 INJ
G	MI1	019689	092777	FM25	A	U12	R	T	1	U			DG DECLARED INOPER IN ORDER TO REPAIR FUEL OIL LK	SMALL CRK IN PIPE NIPPLE TO NO. 12 INJ
G	MI1	019820	121077	FM25	I	U10			U	B	N		DIESEL GENERATOR BECAME INOPERABLE	GOV SHUTDOWN SOLENOID MALFUNCTION
G	PB2	013991	011176	FM30	C	U01	S	U	1	N			E-3 DG DC FEED BKR FOUND OPEN - PREVENTS STARTING	OPER LEFT OPEN AFTER DC GRND ISOL PROCED
G	PB2	019560	110177	FM30	B	U12		T	B	N			E-4 DG DECLARED INOPERABLE	CLEANUP ACCUM OIL UNDER MACHINE-FIRE HZD
G	PB2	019830	112277	FM30	A	U12		T	4	N			E2 DG DECLARED INOPERABLE	REPAIR FUEL OIL LEAK IN PLUG ON COND FLTR
G	PB2	020167	010378	FM30	B	U11	R	D	4	N			E-4 DG DECLARED INOPERABLE	LO LUBE OIL TEMP-REPLC LUBE OIL HTR ELEMT
G	PB2	020161	011878	FM30	B	U11	R	D	B	N			E2 DG DECLARED INOPERABLE	LO LUBE OIL TEMP-REPLC 2 COILS IN HTR ELE
G	PB3	019059*	061377	FM30	C	U10	C	T	U	N			3 OF 4 DIESEL GENERATORS INOPERABLE	START AIR COMPRESSORS TRPD - AIR TANKS MT
G	QC1	014426	031776	GM25	M	U02	C	D	4	M			1/2 DG COS TOO LONG FOR PREVENTATIVE MAINTENANCE	COMMUNICATIONS PROBLEM BETWEEN OPER-MAINT
G	QC1	015705	072776	GM25	M	U06		D	1	M			UNIT 1/2 DG OOS FOR LONGER THAN TS ALLOWANCE	MAINT MAN UNAWARE OF TIME LIMIT-PROCED ER
G	QC1	016904	120276	GM25	D	U02	C	D	B	M			COOLING WTR HDR FOR DG 1 CW PUMP - AIRBOUND	AIR LINE ATTACHD TO RHR PUMP-COMMON HEADR
G	QC1	018414	050677	GM25	A	U12		T	B	U			LEAK DISVD IN TAP OFF FUEL LINE TO FUEL PRESS GAGE	FOR 1/2 DG - CRACKS ATTRBTD TO NRML STRSS
G	QC1	022666	092878	GM25	A	U04		D	D	M			UNIT 1 FUEL XFER LINES REMOVED-TS DECLARES DG INOP	750 GAL DAY TANK FULL-DIESEL WOULD RUN
G	QC2	018745	081077	GM25	D	U12		T	G	N			MAN DG REMVD FRM SERV DUE TO DECRS IN ENG WTR LVL	EAST CW HT EXCHGR HAD A TUBE LEAK
G	QC2	020295	012478	GM25	D	U12	S	T	D	T			UNIT 2 DG CW PUMP DRAINS FAILED TO SHUT	AIR SUPPLY SOLENOID VALVES FAILED
*	BV1	018669	062277	GM25	M	U01		D	G	N			MODE 3 (HOT STNDBY) TO MODE 1(PWR OPS) 1DG OOS	REG GUIDE 1.16-C.2.B.(2) MISINTERPRETED

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	EFFECT	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	BV1	022395A	090578	GM25	M	U03	R	D	U	T	2 DG OOS FOR TESTN DIESL AIR AND OIL RELIEFS	#1 DG BRKR FAILD TO CLOSE AUTO DURN TEST
W	BV1	022394A	091278	GM25	M	U03	R	D	U	T	#2 DG OOS FOR TESTN AIR AND RELIEFS,TESTD #1 DG	1 DG BRKR FAILD TO CLOSE USIN CONTROL SW.
W	DC1	0144154A	040176	WD30	M	U12	R	T	G	M	1CD DG REAR BANK AIR AFTRCOOLR HAD TUBE LEAK	COOLER REPLACED ON 4-6-76
W	DC1	0144158	040176	WD30	M	U12	R	T	G	N	1AB DG REAR BANK AIR AFTERCOOLER HAD TUBE LEAK	REPLACED ON 4-24-76
W	DC1	022520	120977	WD30	M	U11	C	D	B	N	WITHIN 3HRS. 3 SPURIOUS OS TRIP SIGNALS ON 1AB,1CD	DG OPERABLE CHECKD TRIP POINTS DG COLD
W	DC1	022946	110778	WD30	K	U04		D	1	N	AB DG INOPERABLE DUE TO INADV.REMOVAL OF CKT.BOARD	CKT.BOARD SNAGGD ON CLOTHING;DESIGN CHANG
W	DC2	021217	041578	WD30	M	U03		D	G	N	SURVEILLANCE TESTING OF CD DG NOT PERFORMED	OPERATOR THOUGHT TEST SCHEDULE IN ERROR
W	DC2	022280	061378	WD30	M	U01		D	G	N	MODE1 ,AB DG INOP. FROM 2100 HR. 6-13 TO 1030 HRS.	6-14 --- INVE.TER BEING REPAIRED
W	DC2	021634*	061578	WD30	M	U02	C	D	4	N	BOTH EDG'S PLACED IN A JND. OF NOT AUTO STARTING	TAGGED OUT WRONG STARTING AIR PILOT VALVS
W	DC2	021675	061778	WD30	D	U05		I	G	N	NORMAL OPNS. WELD CRACK ON ESW OUTLET ON 2AB L.O	COOLR,TOOK 2AB DG OOS TO REPAIR
W	DC2	022330	090178	WD30	A	U12		D	1	T	#2CD DECLARED INOPERABLE DUE TO L.O. VISCOSTY VIOL	REPLACED 4 INJ. PMPS E1 INJ AS THE ANSWER
W	HN1	021376	050878	GM25	M	U04	C	D	U	R	IF ONE DG FAILS TO START DURING CEINCDT LOCA/LOSP	LOADING ON RMNG DG MAY EXCEED SPECS
W	IP2	018641	121276	AL18	B	U11	R	T	4	T	LUBE OIL TEMP FOR 22 EDG BELOW MINIMUM FOR OPERATN	CHROMALOX HTR MTD-330A FOUND SHORTED
W	IP2	018913	022677	AL18	B	U14	J	D	4	N	23 EDG REMOVED FROM SERVICE - DEFECTIVE PRESS SWCH	PRESS SW SETTING WAS FOUND TO BE INCORRCT
W	IP2	018914	082977	AL18	D	U12		T	G	N	23 EDG REMVD FROM SERV TO REPAIR JACKET WTR COOLER	AMER STD HX,MOD 1205-6CP,DEVLPD TUBE LKS
W	IP2	019244	091477	AL18	H	U10		T	G	N	22 EDG DEVLPD PHASE-TO-PHASE SHORT IN EXH HOOD MTR	DEFCTVE DSL EXH BLWR MTR,GE 5K49HG61A
W	IP2	019598	101977	AL18	B	U11	R	T	4	N	22 EDG FOUND TO HAVE LOW LUBE OIL TEMPERATURE	DEF TERMINAL BLK SHORTED CHROMALOX HTRS
W	IP2	023579	121978	AL18	C	U10		I	4	N	21 EDG INOP DUE TO AIR START MOTOR PROBLEMS	MOTORS CLEANED.DG TESTED SAT
W	IP3	015120	061576	AL18	M	U03	S	D	1	T	LOST AC AUX FOR EDG 31 FOR 19 MINUTES	MECHANIC CAUSED A SUCCESSION OF BKR TRIPS
W	IP3	022416	082978	AL18	A	U10	S	I	U	N	VALVE FAILURE CAUSED AN INBALANCED DIST OF FUEL	AMONG THE 3 GEN TKS-DG 33 LT PERMIT BY TS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	020291	010378	FM40	C	010	S			D	U	M	DG 1B DECLARED INOPERABLE	BOTH AIR COMPRESSORS ASSOC W 1B WERE OOS
W	JF1	023152	091478	FM40	C	010				D	4	N	1B DG DECLARED INOPERABLE	1AE1B AIR RESVRS WERE BLED DOWN-RLF VLV
W	KE1	018941	082477	GM25	F	010	S			D	U	M	PUSH-BUTTON TIMER IN CARDOX FIRE PROT SYS FAILED	IN INTER POSIT-CONT S/D SIGNAL TO DG 1B
W	PR1	019919	120977	FM30	M	001	C			D	1	U	BOTH DGS INOPER FOR APPROXIMATELY 10 MINUTES	OPERATOR ERROR IN RESETTING MCA RELAYS
W	PR1	021704	062278	FM30	A	002	C			D	G	N	ROOT VLV ON D1 DSL OIL DAY TK INST LVL COLMN-SHUT	IMPROPER VLV L/U DURING TEST ON JUNE 9TH
W	PR2	014766	040276	FM30	M	002	C			D	1	M	D2 DIESEL GENERATOR MOMENTARILY LOCKED OUT	DURING MAINT.TECH ACTUATED WRONG RELAY
W	PR2	017618	041277	FM30	M	010	C			D	4	U	LIGHT SOCKET FOR DG D2 GOV READY LITE SHORTED CAUS	ING 2 HOUR LOSS OF CONTROL POWER
W	PR2	021358	032978	FM30	D	002	C			D	1	M	NO. 12 DIESEL CW PUMP LOCKED OUT APROX 1 MINUTE	MAINT MAN PLACED JUMPER BEFORE SUPPSD TO
W	RG1	015126	070976	AL18	J	010				D	U	T	1B EG OUTPUT BREAKER COULD NOT BE CLSD RMTLY AFTER	TEST; SWITCH WEAR PREVENTED BRKR ELEC RST
W	RG1	021625	030478	AL18	A	010				T	4	N	MAM DG FUEL XFER PUMP LOST-DG STILL HAD 3HR FUEL	POOR ELEC CONN CAUSED THRML DEVICE TRIP
W	SA1	022870	101178	AL25	B	012				D	G	N	1B DIESEL DECLARED INOPERABLE-PRE-LUBE MTR FAILED	WATER JKT CLR LKNG ONTO PRELUBE PUMP MTR
W	SD1	017760*	051077	DL10	A	005				D	U	R	2 DIESELS HAD FUEL OIL BYPASS LINE SUPPORTS MISSNG	INADV OMITTED DURING ASSY OF BYPASS PIPNG
W	SD1	014840	050876	GM25	F	012	R			D	G	N	#1 CYLINDER IN #1 DG WAS FOUND FLOODED	CRACK IN #1 CYL HD THRU TO WATER JACKET
W	SD1	015521	070276	GM25	F	012	R			D	G	N	#19 CYLINDER IN #1 DG WAS FOUND FLOODED	CRACK IN #19 CYL HD THRU TO WATER JACKET
W	SD1	015523	072376	GM25	F	012	R			D	G	N	#7 CYLINDER IN #1 DG WAS FOUND FLOODED	CRACK IN #7 CYL HD THRU TO WATER JACKET
W	SD1	022919*	103178	GM25	M	006				U	U	R	PT TO INSPECT DGS DURING OUTAGE NOT PERF FOR 183	ADMINISTRATIVE SCHEDULING ERROR
W	TR1	014668	042076	GM40	A	006	C		T	G	U		BOTH DSL FUEL OIL TANKS LT TS LIMIT OF 33000 GAL	PROCEDURE NOT REVISED TO INDIC CORRCT LIM
W	TR1	014929	051276	GM40	A	006				D	U	R	PERIOD SURVEIL TO SAMPLE & VER DSL FUEL NOT PERFMD	PROC FOR PROPER SCHED & RECORDKPG INADEQ
W	TR1	014930	052176	GM40	A	006				D	1	M	EMER DIESEL FO DAY TANK LVL WAS LESS THAN TS REQMT	AUTO M/U SETPOINT WAS SET LOW
W	TR1	020902	021778	GM40	L	006				D	U	R	DG PHASE DIFFNTL TRIP NOT VERIFIED BYPASSED ON STA	DEFECTIVE PROCEDURES

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	TU3	014879	030676	GM25	J	U1C	B		B	D	B	N	DISCOVD THAT 3B EDG OUTPUT BRKR INDIC NOT CHARGED	CHG MTR DRIVE PAWL MISALGND W CHG SPRING
W	TU3	015963	090976	GM25	J	U10	B		B	D	B	U	3A DG OUTPUT BRKR WAS NOT IN CHARGED POSITION	WORN NYLON BUSHING-DRV MTR ECC/RATCHT WHL
W	TU3	016138	100276	GM25	D	P9_				D	1	N	DG "A" COOLING WTR SURGE TNK LO LVL ALARM	PARTIALLY OPEN SAMPLE VALVE-OPERTR ERROR
W	TU3	019423	061077	GM25	D	U08			T	U	M		FOUND PINHOLE LEAK IN "B" DG RADIATOR	EXT ENVIRON COND - INCOMPLETE CHEM MIXING
W	TR1	020476	012878	GM02	D	U01			D	B	N		MODE 3;#1CG TAKEN OOS TO REPAIR WTR HEATER	HEATR COIL FAILURE--T.S.VIOLATN (3 DG'S)
W	ZI1	020348A	011678	C840	B	U12	B		D	G	T		1A DG INOPERABLE - HI DELTA-P ACROSS LUBE OIL CLR	OIL CLR TUBE LK CONTAMINATED OIL W WATER
W	ZI1	021968	071778	C840	B	U12	B		D	G	T		1A DG INOPERABLE - HI DELTA-P ACROSS LUBE OIL CLR	OIL CLR TUBE LK CONTAMINATED OIL W WATER

APPENDIX I

DIESEL-GENERATOR EVENTS (FAILURES) SORTED BY FAILURE MECHANISM

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
16	566-1660 KW
38	1750-1950 KW
45	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

UNKNOWN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	021663	032078	GM25		E	BOE			T	G	T	DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
B	CR3	023166	111778	FM30	M	A00	K	U	1	T	EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWICE AFTER ANOMALY
B	DB1	021580	050976	GM25	E	B00		U	G	T	GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
B	RB1	015359	071576	GM25	M	A0C		U	D	T	SEVERAL ATTEMPTS TO START "B" DG WERE UNSUCCESSFUL	NO DEFINITE CAUSE COULD BE FOUND
B	RB1	018853	082477	GM25	M	A00	K	U	1	T	DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED
B	TI2	021609	042578	FM30	F	B00	R	U	1	T	"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
C	CC1	016405	102576	FM25	M	B00	K	U	1	T	#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C	CC1	017213	111876	FM25	M	A00	K	U	1	T	#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	021660	041078	FM25	L	A00		U	1	T	#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEAT FIM
C	CC1	021655	041378	FM25	M	A00		U	1	N	#11 DG FAILD TO START ON LOSS OF OFFSITE POWER	START/FAILURE ALARM DISPLAYD NO ABNORMALS
C	CC1	023380	121878	FM25	M	B00	R	U	1	T	#11 DG SHUTDOWN DUE TO ROOM VENT,FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS
C	CC2	018422	022277	FM25	C	A00		U	8	T	#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	CC2	017457	031777	FM25	M	A00	R	U	1	T	#12 DG VENT FAN FAILD TO START ON BIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
G	BP1	015449	080576	CA02	D	A00	K	U	8	N	DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	016072	090276	CA02	A	A00	R	U	U	T	FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016304	102876	CA02	G	A00	R	U	U	T	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02	G	A00	R	U	U	T	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016597	120276	CA02	G	A00	R	U	U	T	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016910	010377	CA02	G	A00	R	U	U	T	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV-?
G	BP1	020298	032477	CA02	G	A00	R	U	U	T	EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	018102	051877	CA02		D	A06		R	T	4	T	H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	T TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	018163	052677	CA02		A	A00		R	U	6	T	START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	019541	102077	CA02		C	A00		R	U	6	T	START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	019993	112477	CA02		A	A00		R	U	1	T	START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BP1	020575	020278	CA02		M	A00		R	U	U	T	START TIME 28.5 SECS VS 13.9 SECS	CAUSE UNKNOWN
G	BR1	019948	121077	NM30		J	B00			D	D	T	SMOKE COMING FROM 320 RELAY AND 80DB RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	CO1	015672	082376	CB40		A	B00			U	8	T	FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	DR2	014913	052376	GM25		C	A00			U	1	T	UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYST
G	DR2	018283	063077	GM25		G	A00		R	D	1	T	2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE OUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25		G	A00		R	D	1	T	U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE OUT-OF ADJUST GOVENOR COMPENSTIN
G	DR2	019732	111677	GM25		I	A00		S	D	1	T	AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	DR2	019905	120477	GM25		J	A00			U	U	T	U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	DR2	021848	030778	GM25		C	A00		S	D	8	T	OPERATR SHOOK AIR START SOLENOID CONIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC
G	DR2	022589	092278	GM25		C	A00		R	U	8	T	UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	DR2	023337	121678	GM25		C	A00		R	D	4	T	2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TDZ RELAY CLEANED;TDZ AND AIR VALVE ?
G	EN1	014746	051576	FM25		M	A00			U	U	T	1B DG FAILD TO START ON FIRST ATTEMPT	UNKNOWN WILL DO WEEKLY START TO DETERMINE
G	EN1	015447	081476	FM25		M	A00		R	D	U	T	1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	EN1	016842	122576	FM25		M	B00		R	U	U	T	DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITVE	CHECKNG EGF LOGIC ON 1C DG
G	EN1	016843	123176	FM25		M	A00		R	U	1	T	MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY
G	EN1	018141	052677	FM25		M	A00			U	U	T	1A DG FAILD TO COME UP TO RATED VOLT IN REQD. TIME	TOOK 16 SEC VS 12 SEC RETESTED SATISFAC

UNKNOWN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MK #	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	020C31	081877	FM25	F	BQC			R	U	G	T	DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	OC1	015042	060876	GM25	C	AQO				U	1	T	DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	PB2	020090	121977	FM30	L	AQO				U	U	T	E1 DG TRIPPED ON "AM" PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXIV TST
G	PB2	0233498	122178	FM30	G	AQO				U	1	T	E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
W	BV1	015913	090376	GM25	J	AQO				U	1	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
W	BV1	0223958	090578	GM25	J	AQO			R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY, 1 HOUR RUN AT FULL LD
W	BV1	0223948	091278	GM25	J	AQO			R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWTCH	CLOSED LATER NEGATING TROUBLESHOOTING
W	DC2	022039	101978	WD30	A	AQO				U	1	T	2AB FAILD TO START DUE TO LACK OF FUEL TO INJECTRS	UNKNOWN BUT REPLACED FUEL FILTER ELEMENT
W	KE1	019519	102577	GM25	M	AQO				U	U	T	D/G 1A STARTED & WAS AT 70 RPM WHEN IT STOPPED	COULD NOT DETERMINE CAUSE OF FAILURE
W	TK1	018007	042977	GM40	M	AQO				U	U	N	EDG FAILD TO START ON LOSP (PARTIAL) THE 2ND TIME	NO LER FOR DG FAILURE JUST THE LOSP
W	ZI1	016179	092476	CB40	M	AQO				U	U	T	"OM" DIESEL GENERATOR FAILED TO START	NO CAUSE COULD BE DETERMINED
W	ZI1	023368	122078	CB40	M	AQO				U	D	N	1B DG FAILD TO START DURN AN INADVRTNT SAFTY INJEC	EXTENSIVE TESTING REVEALD NO CAUSE

HUMAN ERROR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	RS1	022613	100478	GM25		A	B01	S	D	1	N	"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
C	CC1	015567	072976	FM25	D	A02	S	D	4	N	#12 DG FAILD TO START ALTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	015584	080776	FM25	J	A02	S	U	G	T	11 DG FAILD TO SENSE "AT VOLTAGE"COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	CC1	018306	061777	FM25	F	B02		D	1	T	#11 DG STARTD;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOOSE AND FELL OFF DG
C	CC1	018488	071177	FM25	B	B02	C	D	4	M	#11 DG ON FIRE DUE TO L.O. HITTNG HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY
C	CC1	018487	071377	FM25	D	B02	S	D	1	T	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN STAS	SIGNAL REMOVED;OP SWITCH ISOLATED
C	FC1	014590	042776	GM25	C	A02	T	D	8	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPROPR SETNG FOR MAG PKUP ON SWITCHG TACH
C	MI2	018923	081077	FM25	G	A01	S	D	1	N	DG 120 FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN "NO FUEL" FROM PREV S/D
C	MI2	019929	110977	FM25	K	A01	S	D	1	T	DG 130 TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
C	SL1	016881	110276	GM30	M	A01	S	D	4	T	1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP
C	SL1	017441	030177	GM30	I	A01	S	D	1	T	1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
G	BP1	015448	080576	CA02	M	A03	R	U	U	T	DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BR2	015461	061176	NM30	A	A02	C	D	D	T	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL H2O IN SADDLE & 4 DAY TANK
G	BR2	020612	021378	NM30	K	A01	S	D	1	N	FOLLOWING SCRAM ON UNIT 1 ;#1 DG LO RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET
G	CO1	016712	111076	CB40	J	A03	S	D	8	T	EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 5YRELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	DR2	016654	121876	GM25	A	B02	S	D	D	T	UNIT 2 DG FAILD TO CARRY REQD LOAD ;2000KW MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATON
G	DR2	021538	052278	GM25	G	A02		D	8	T	G-2 DG TRIPPD 4 TIMES ON OVERSPEED;R/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH
G	EN1	015457	062676	FM25	B	B02	S	D	8	T	DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH
G	EN1	020613	111977	FM25	K	B02	S	D	4	T	1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	FP1	021101	120578	GM25	G	A02	S	D	4	T	"A"DGTRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR

HUMAN ERROR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	PB2	018886	082677	FM30	D	A01	S	D	1	T	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP,BUT NOT DIESEL EXP
G	PB2	019414	101877	FM30	D	A02	S	D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	PI1	022128	080278	AL25	K	B01		D	8	T	B DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
W	BV1	021647	060178	GM25	B	B02		D	1	T	#2 DG LUBE OIL LEAK AT ENGINE CONTROL PANEL GAUGE	GAUGE WAS CALIBRATED ON 5/21;LOOSE CONN.
W	HN1	014162	020376	GM25	A	A02	S	D	1	T	EDG-2B TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	IP3	015733	083076	AL18	G	B02	I	D	1	T	EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY
W	IP3	016035	092476	AL18	G	B02	I	D	4	T	EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONT ELE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	JF1	021185	032378	FM40	C	A02		D	D	N	DSL GEN 18 FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING
W	JF1	022987	100378	FM25	J	A02	S	D	1	T	1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR,INCRCTLY POS
W	KL1	020695	122177	GM25	G	B02	S	D	4	T	D/G 1B WOULD NOT PICK UP MORE THAN 1500 KW LOAD	SYNCHRO MOTOR LIMIT SWCHS ADJUSTED IMPROP
W	PR2	015735	091076	FM30	F	B02		D	4	T	D1 DG TRIPPED ON HIGH CRANKCASE PRESSURE	HOSE CLAMPS ON PIPE NOT CONN AFTER MAINT
W	SG1	014869	041676	GM25	F	A01	R	D	G	I	#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
W	ZI1	022846	091478	CB4G	B	A02	C	D	4	N	1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T

DESIGN ERROR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	MI2	0142000	022376	FM25	F	F	B04	B	T	G	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR, (75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	SL1	017134	011077	GM30	E	B	B04	R	T	G	T	1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	019121	092677	GM30	E	B	B04	R	T	G	T	1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
G	BP1	016913	122076	CA02	G	A	A04	R	U	U	T	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE & FUEL SYS UNDER INVESTIGTN
G	BP1	016912	122776	CA02	A	A	A04	R	U	U	T	START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	018742	080577	CA02	J	A	A04	S	D	G	T	TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR
G	BR1	016624A	010477	NM30	B	A	A04	C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER , JACKT
G	BR1	016854B	010477	NM30	B	A	A04	C	D	4	T	#4 DG TRIPPD R/X AT POWER, TD SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT
G	DA1	016452	110476	FM25	A	B	B04		D	D	T	DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	PI1	015966	092276	AL25	H	B	B04	B	T	D	T	MAN DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	016368	111776	AL25	H	B	B04	B	T	D	T	"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
*	BV1	017346	031477	GM25	J	A	A04	B	D	4	T	#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH
*	BV1	017021	041177	GM25	J	A	A04	B	D	4	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
*	BV1	017693	042677	GM25	J	A	A04	B	D	4	T	#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
*	BV1	017827	050977	GM25	J	A	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
*	BV1	018408	060377	GM25	J	A	A04	R	D	1	T	#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
*	BV1	020437	011178	GM25	J	A	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
*	SA1	019924	120277	AL25	E	B	B04		T	G	T	1B DIESEL DECLARED INOP-TURBOCHGR & EXH EXP JT FLD	CAUSE DETERMINED TO BE TURB BLADE FAILURE

FABRICATION / CONSTRUCTION / QUALITY CONTROL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	DB1	020768	020878	GM25	E	B05		D	G	T	1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
B	F12	021667	052678	FM30	F	A05	C	D	G	I	DG B FAILED TO START	VERT SHFT BTW LP & LWR CRANKS FLD-IMP MIL
G	BR1	019391	101177	NM30	G	B05		D	B	T	#2 DG UNABLE TO MAINTAIN LO/O CYCLING 500KW	SHORTED LEADS TO GOVERNOR; INCORRECT ASPB
G	DA1	015993	100776	FM25	F	A05		D	D	T	1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL
W	BW1	017883	022477	GM25	L	B05		D	4	T	DG OUTPUT BREAKER TRIPPED;INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST

PROCEDURAL DISCREPANCY

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	EFFE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018565	072677	FM30		I	A06		S	D	1	T	"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
B	TI1	014298	022176	FM30		J	A06		S	D	1	T	"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW
C	FC1	014559	040776	GM25		M	A06		S	D	1	T	START ON SECONDRY AIR REQUD 10.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE
C	MI2	016755	121876	FM25		F	B06			D	G	T	DG 13G #3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS
C	MY1	022715	092578	GM25		A	A06		S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
G	DA1	017963	051277	FM25		G	B06		S	D	1	T	1G-31 DG WOULD NOT REACH FULL LOADING ONLY 2500 Kw	SPEED SETTING ADJUSTMNT NOT RESET
G	DA1	021171	040578	FM25		F	A06			D	G	M	BEARING WIPED ON 4/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	DR2	019651	103077	GM25		E	B06			T	G	F	UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTART	TURBO-CHARGR CLUCTHESHAFT BEARING
G	EN1	015568	080576	FM25		K	A06		S	D	1	T	DG 1A TRIPPED DUE TO LOSS OF EXCITATION DRNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	PB2	018887	062677	FM30		I	A06		S	D	4	T	E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
W	KE1	019171	092077	GM25		E	B06		C	D	4	T	DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBOCHG	CARBON BUILDUP DUE TO SHORT DURATION OPER
W	SO1	022100	071878	DL10		A	A06			D	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCORP PROC TO EXERCISE

DEFECTIVE FUEL INJECTOR(S)

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	M12	022131	080378	FM25	A	807			T	8	T	DG 13U SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
G	BR1	022454	091178	NM30	A	807			I	4	T	#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
W	DC2	021681	061778	WD30	A	807			I	6	I	2CD DG WIDELY VARYING CYLNDR TEMP TAGGED OUT	FUEL INJECT. PUMP FAILD
W	RU2	W14823	030176	FM25	A	807	R	I	8	T	T	"B" EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	RD2	019354	091377	FM25	A	807	K	I	8	T	T	"A" DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING

CORROSION / EROSION

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BR2	016399	111176	NM30		C	A08			I	D	T	DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	CO1	016560	110776	CB40	K	808				I	D	T	DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	POT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	EN1	020214	112577	FM25	G	A08				I	B	T	1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED

FOREIGN MATERIAL CONTAMINATION

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	020221	122777	FM30		G	A09		R	D	B	I	3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
B	CR3	020278	010378	FM30		G	A09		R	D	B	I	3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
B	DB1	020273	011978	GM25		F	A09			I	4	T	DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR
B	TI2	021605	052378	FM30		F	B09		R	I	B	M	DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
B	TI2	023430	122878	FM30		A	A09			T	B	T	DF-X-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER
C	CC1	017822	051577	FM25		M	A09		R	I	B	T	#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC2	016722	121576	FM25		C	A09			I	4	T	#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	FC1	017662B	040677	GM25		C	A09		R	I	4	T	DG-1 FAILD TO STRT WTHN 10 SEC,STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017662A	041477	GM25		C	A09		R	I	4	T	DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
C	MI2	0142608	021776	FM25		A	A09		B	I	1	N	DG 12U FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142608	021876	FM25		A	B09		B	I	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142660	022076	FM25		A	B09		B	I	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	015166	060276	FM25		F	B09		B	I	1	T	DG 13U TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	MI2	016031	092276	FM25		D	B09		B	I	G	T	12U DG RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016626	120176	FM25		D	A09		B	I	G	T	13U DG STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	018972	061777	FM25		D	B09		B	I	G	T	12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	0189768	092077	FM25		D	B09		B	I	G	N	COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	021386	050878	FM25		D	B09		B	I	G	T	12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	023213	120578	FM25		D	B09		B	I	G	T	12U DG S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
C	MY1	020733	021878	GM25		G	A09			I	B	T	DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD

FOREIGN MATERIAL CONTAMINATION

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	SL1	017135A	011977	GM30		A	A09		R	I	1	T	THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017,358	011977	GM30		A	A09		R	I	1	T	THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
G	BF1	016201	110376	GM30		G	B09		C	T	4	T	D OG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BP1	014417	032476	CA02		D	B09		R	I	8	T	DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	014894	051676	CA02		D	B09		R	I	G	N	DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BR1	020668	120977	NM36		C	A09			I	D	T	#3 DG START TIME 16.2 SEC VS 10	CARBON BUILDUP ON AIR VALVE STUCK SHUT
G	CO1	023644	091278	CB40		F	A09			T	G	T	#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL
G	DA1	014953	062276	FM25		D	B09	C	T	8	T		1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DR2	016168	093076	GM25		K	B09		I	D	T		2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR3	016015	092176	GM25		B	B09		T	4	T		DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	MO1	016186	101676	GM25		C	A09		T	D	T		#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 STA.T SYS AIR CONT COMP FOULED W RUST
G	VY1	014740	050676	FM30		F	A09	R	T	4	N		"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VY1	019858	072677	FM30		C	A09		I	4	T		"A" DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
G	VY1	020464	012478	FM36		D	B09		T	4	T		DIESEL GENERATOR "A" TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNG ARND HX
W	BV1	014963	052076	GM25		C	A09	R	T	4	N		DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEMS
W	BV1	017696	042477	GM25		C	A09	R	I	4	N		DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	JF1	020992	030278	FM40		C	A09	C	T	D	T		DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	020996	030878	FM25		C	A09	C	T	8	T		DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	YR1	018653	080277	GM02		D	B09	C	T	D	T		#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
W	YR1	018654	080277	GM02		D	B09	C	T	D	T		#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDG. SCAL

MECHANICAL / ELECTRICAL CONTROL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL M/CH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	014638	051176	GM25	C	A10			D	8	T	DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT
B	CR3	019302	092877	FM30	B	A10		S	D	8	T	3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
B	DB1	021852	060478	GM25	K	A10			D	4	T	1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE FOR DG 1-1
B	RS1	015622	080676	GM25	C	A10			D	4	T	"A" DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR STRT MTR DOC
B	RS1	016656	120676	GM25	G	B10			D	8	T	DG "A" TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED,SPD DECR TO TRIP
B	TI1	020997	031878	FM30	B	A10			T	8	T	EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH
C	CC2	020226	011078	FM25	J	B10			T	1	T	#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
C	CC2	021991	080178	FM25	D	B10		S	D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C	FC1	015614	081576	GM25	G	B10			T	8	N	SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING
C	FC1	021692	081978	GM25	K	A10	R		D	1	T	DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	FC1	021799	071278	GM25	K	B10	R		D	8	T	DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDT)
C	FC1	022249	080978	GM25	K	B10	R		D	8	T	DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C	MI2	015583A	081676	FM25	G	A10	B		T	4	T	DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583B	081776	FM25	G	A10	B		T	4	T	DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583C	082376	FM25	G	B10	B		T	4	T	DG 12U TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	SL1	022532	090578	GM30	J	A10			T	6	I	"A" DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BP3	019133	091977	GM30	K	A10			D	1	T	3D DG TRIPPD ON OVERSPEED ;GOVERNOR INOPERABLE	TD FUSE OPEN DISENABLING FIELD CIRCUIT
G	BP1	015444	081276	CA02	C	A10	R		T	8	I	WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BP1	016587	111876	CA02	C	A10	R		D	4	T	FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016911	122876	CA02	C	A10	R		D	4	M	DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945467

MECHANICAL / ELECTRICAL CONTROL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BR2	014136	010976	NM30		J	A10		D	4	N		#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	BR2	016623	122976	NM30	G	B1G		T	8	T			#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC
G	DA1	017756	051077	FM25	J	A10	S	D	8	T			16-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DR1	020852	030478	GM10	C	A10		D	G	T			D-1 B/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR1	021517	050778	GM10	B	A10		T	D	N			TEMORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR1	021516	051178	GM10	A	A10	R	D	G	T			TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP
G	DR2	017397	032277	GM25	C	A10	R	O	1	T			UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	022262	062478	GM25	C	A10	R	U	4	T			2/3 UNIT DOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR3	016455	110576	GM25	G	B1G	R	T	8	T			LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	017509	032277	GM25	K	A10		D	G	M			GEN FIELD FAILD TO FLASH	INTERMITINT CAPACITOR SHORT IN FLASH CIRC
G	DR3	019722	112277	GM25	G	A10	R	D	8	T			3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	DR3	019727	112977	GM25	G	B1G	R	U	8	N			3 DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	EN1	014778	031576	FM2	C	A10		D	D	T			1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	EN1	016665	091176	FM25	G	A10	R	D	1	T			1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	018839	081277	FM25	K	B1G		D	8	T			1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG MTR OPER XFMR PWR SUP DIODES FAIL
G	EN2	022751A	102878	FM25	G	A10	R	D	8	T			MCM DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	022751B	103178	FM25	G	A10	R	T	8	N			MCM DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	FP1	016496	111776	GM25	I	A10	R	D	8	T			MBM EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	016600	121576	GM25	B	A10	R	D	1	T			DURING TESTING MAM EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016971	011977	GM25	B	A10	R	D	1	T			DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL

MECHANICAL / ELECTRICAL CONTROL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	FP1	017725	042077	GM25		I	A10		R	D	8	T	DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	FP1	020518	021578	GM25		J	B10			1	1	T	"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH CKT FOR OUTPUT BRKR
G	DC1	019447	030376	GM25		K	A10			D	8	T	DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	WESTHSE FFCO RELAY FLD TO ENRGZ FLD FLASH
G	DC1	023119	113078	GM25		K	A10			D	8	T	#1DG STARTED BUT GEN FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	PB2	022462	083078	FM30		G	A10			I	1	T	E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD SY
G	PB2	023349A	122178	FM30		G	A10			D	1	T	E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/28/78
G	QC1	014120	011276	GM25		C	A10			D	8	T	UNIT 1 DG FAILED TO START WHEN MODE SW IN START MO	AIR START SOL VLV DIRTY-NOT OPEN FULLY
G	QC1	018112	042577	GM25		K	A10			D	G	I	WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
G	QC1	019994	112877	GM25		K	A10			D	4	M	1/2 DG WOULD NOT START SUCCESSFLY,FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT
*	BV1	018828	071777	GM25		K	A10		R	I	8	T	#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
*	BV1	022137	072878	GM25		K	A10		R	D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
*	DC1	016647	120976	WD30		K	A10			D	1	T	C-D DG TRIPPD ON OVERSPEED--BLOWN FUSE ON INVERTER	FAILD SILICONE RECTIFIER IN DG INVERTER
*	DC2	020981	031978	WD30		C	B10			U	4	T	2CD DG GASKETS ON AIR LINE TO #5 CYL BLEW OUT	FRACTURED AIR START CHECK VALVE
*	DC2	022043	072878	WD30		G	B10		R	I	4	T	#2 AB DG OVERSPED WHL UNLOADG PREVIOUS OCCURRENCE?	WORN LINKAGE CAP SCREW BROKE IN GOVENOR
*	IP3	016286	102176	AL18		L	B10		S	D	8	T	UNABLE TO CONTROL SPEED OF NO 31 DG	UNIT/PARA RELAY OPER INTRMIT-DEFECTV CONN
*	1	019055	081777	FM40		C	A10		B	D	U	I	DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
*	F1	019062	082877	FM40		C	A10		B	D	U	T	DG 1B TRIPPED ON OVSPD DURING MANLAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
*	JF1	019359	091377	FM40		C	B10		B	D	D	N	DSL GEN 1B EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
*	JF1	019360	091677	FM40		C	B10		B	D	8	N	DSL GEN 1-2A EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
*	JF1	019368	100277	FM40		G	A10			D	8	T	DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 136V RATING

MECHANICAL / ELECTRICAL CONTROL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	C22235	081278	FM40	J	A10	S	D	8	N	OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWTCHS OUT OF ALIGNMT
W	JF1	022374	082778	FM25	G	A10	R	D	8	N	2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022373	090578	FM40	G	A10	R	D	8	M	1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP,CAUSED BY FAIL DIODES
W	JF1	022636	091778	FM40	G	A10		D	4	T	1B DG FREQ COULD NOT BE INCR ABOVE 58.5 HZ	CPLNG BET DC MTR AND GOV POS POT WAS LOOS
W	PR1	018342	061777	FM30	G	B10		T	8	T	D2 DG FAILED TO RESPOND TO LOAD CHANGE SIGNALS	LINK LEVER KEY MISSING,CAPSCREWS LOOSE
W	PT1	017146	020977	GM25	J	A10	R	D	8	T	3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
W	PT1	021445	051778	GM25	J	A10	R	D	D	T	4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	WEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
W	RG1	022450	081678	AL18	J	A10		T	8	T	B EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS
W	SA1	018799A	073077	AL25	A	A10	C	T	4	N	1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	018799B	073077	AL25	A	A10	C	T	4	N	1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA
W	SD1	021910	032878	DL10	A	A10	W	T	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
W	TR1	018447	062277	GM40	G	B10		T	4	N	WEST DG FAILED TO ASSUME MIN REQUIRED LOAD	BRUSH FALLEN OUT OF DC GOV DRIVE MOTOR
W	TU3	021919	060178	GM25	A	B10		T	4	T	B DG HI LEVEL IN FUEL TANK (ENG.MOUNTD) DG S/D	LEVEL SWITCH MALFUNCTION--REPLACED SWITC
W	YR1	017316	030177	GM02	C	A10		D	4	T	#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
W	ZI1	020255	010378	CB40	K	B10	R	T	D	T	1B DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
W	ZI1	0233488	011678	CB40	G	B10		T	4	T	DG "D" STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTROL AIR PRESS-TRIP VLV 'O' RING LK
W	ZI1	022110	080178	CB40	C	A10		T	1	T	1B DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
W	ZI1	022515	090278	CB40	C	A10		D	4	T	1B DIESEL GENERATOR FAILED TO START	STARTING AIR DIST BUSHING RELATED IMPROP
W	ZI2	017868	042777	CB40	G	B10	R	D	1	T	GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGAIT HI SPD STO
W	ZI2	020258	010678	CB40	K	B10	R	T	8	T	2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	ZI2	020260	010978	CB40	G	B10	R	D	1	T	2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP

HI / LOW AMBIENT TEMPERATURE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	DB1	023667	103178	GM25	M	B11			S	D	4	T	1-2 DG S/D DUE TO ROOM TEMP ROSE TO 110 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
G	DR1	020408B	012778	GM10	M	A11			C	D	1	N	0-1 B/U DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER
G	DR1	020408A	012978	GM10	M	A11			C	D	G	N	0-1 FAILD TO START DUE TO COLD WEATHR 6 HEATRS	INSTALLED & ROOM WINTERIZED

LUBE / FUEL / WATER / AIR LEAKAGE

VEN	PLNT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	CC2	017986	060177	FM25	D	A12			T	D	T		#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESVL
C	MI2	015966	090176	FM25	B	B12	C	F	1	N			DG 13U SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	016636	091976	FM25	B	B12	B	D	4	N			12U DG HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET
G	BF1	014102	011476	GM30	G	A12		F	1	T			FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRAULIC ACTUATOR
G	BP1	020580	020978	CA02	D	B12		I	4	T			DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT
G	BR2	014614	031476	NM30	A	B12		F	D	T			AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANUL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	DA1	014334	022776	FM25	B	B12	R	T	D	T			SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DA1	014337	031776	FM25	H	B12	R	T	D	T			SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE G/SKET
G	DR2	019728	112977	GM25	D	B12	C	D	D	T			2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GROUNDE PUMP STATOR
G	DR2	019810	120377	GM25	C	A12		D	4	T			2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM
G	PB2	020685	022878	FM30	B	B12	C	D	B	T			E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
W	BV1	021355	041878	GM25	A	B12		T	U	N			#1 DG WAS S/D AND DECLARED INOPERABLE--OIL LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL
W	TU3	017591	020377	GM25	A	A12	R	T	6	T			DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	TU3	018147	033177	GM25	A	A12	R	T	4	T			DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
W	ZI2	019714	111077	CB40	B	B12	B	D	G	T			"D" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL

VIBRATION

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018231	060277	FM30		A	A13			T	4	T	"A" DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS
C	CC1	019192	101077	FM25	K	A13			1	8	T		#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	M12	017020	011077	FM25	F	B13	S	D	G	T			DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQU
G	DR2	019723	120277	GM25	C	A13	R	T	1	T			UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	020242	010378	GM25	C	A13	R	T	8	T			UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR3	014439	030376	GM25	G	A13	R	T	4	T			DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016187	100976	GM25	G	A13	R	T	4	T			LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	EN1	014795	050176	FM25	M	B13	S	T	8	T			NORMAL SURV. TEST DG 1C TRIPPD; LOOSE WIRE	NUT VIBRATED OFF WIRE-PANEL R43-PD01C
G	QC1	019100	082477	GM25	L	A13		T	4	T			UNIT 1 DG STARTED AND RAN,BUT NO VLTG,SYNCH,FREQ	FREQ GEN TACH SET SCREWS VIBRATED LOOSE
G	VY1	015739	082576	FM30	A	B13		T	1	T			"B" DG DOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
G	VY1	018323	062377	FM30	F	B13	R	T	4	T			"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VY1	020194	121977	FM30	F	B13	R	T	4	T			"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
W	DC2	022503	091178	WD30	C	A13		T	4	T			2AB STARTED FOR LOAD TEST WAS TRIPPED OFF MANUALLY	PISTON BOLT FOR AIR CHECK VALV LOOSE
W	RD2	021313	041078	FM25	G	B13		T	4	T			EDG LOAD FAILED TO INCREASE ABOVE 900Kw	COMM BRUSH VIBRATED OUT OF GOV SPD CHGR
W	SA1	019920	111777	AL25	D	B13	B	1	4	T			1C DIESEL DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
W	Z11	015188	062176	C840	A	B13		T	4	N			1A DG HAD FO LEAKAGE AT THE 8L FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ
W	Z12	017869	050677	C840	I	B13	C	T	4	T			DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	Z12	019780	111777	C840	I	B13	C	T	4	T			"D" DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
										OUT OF ADJUSTMENT / CALIBRATION				
B	AN1	019578	102377	GM25		C	A14	I	T	8	T		#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
B	DB1	019816	122977	GM25		G	A14	S	D	G	N		DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
B	EI1	020295	011278	FM30		B	A14	S	T	4	T		EDG 18 FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
C	FC1	015722	081576	GM25		C	A14	I	D	8	U		DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWTCHG GACH DRIFTED
C	MI2	019255	092477	FM25		I	B14	S	T	8	T		12U DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW OUT OF ADJ ON DG OVSPD TRIP MECH
G	DR2	016443	102976	GM25		I	A14	S	T	D	T		UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLENO	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	020855	030878	GM25		G	A14	S	D	8	T		ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021882	063078	GM25		D	B14	I	D	G	T		2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	EN1	018644	061377	FM25		D	B14	I	D	4	T		1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25		D	B14	I	D	4	T		1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS
G	EN1	018647	062577	FM25		D	B14	I	D	4	N		1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
W	PT1	018417	062977	GM25		I	A14	S	T	4	T		3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	ZI2	021544	051778	C846	K	B14	I	T	8	T		2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUI	

APPENDIX J

DIESEL-GENERATOR EVENTS (FAILURES) SORTED BY SUBSYSTEM

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	250-450 KW
10	500-1000 KW
18	1750-1850 KW
25	2500-2850 KW
36	3000-3500 KW
40	4000-4400 KW

FUEL OIL SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAILURE MODE	FAILURE MECHANISM	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018231	06C277	FM30	A	A13			T	4	T		MAN DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS
B	RS1	022613	100478	GM25	A	B01	S	D	1	N			MAN DG S/D DUE TO SPRAY OF FUEL OIL; MBM DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
B	TI2	023430	122878	FM30	A	A09		T	8	T			DF-X-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER
C	MI2	0142B0A	021776	FM25	A	A04	B	T	1	N			DG 12U FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142B0B	021876	FM25	A	B09	B	T	1	N			DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142B0C	022076	FM25	A	B09	B	T	1	N			DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	022431	080378	FM25	A	B07		T	8	T			DG 13U SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
C	MY1	022715	092578	GM25	A	A06	S	D	1	T			DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
C	SL1	017135A	011977	GM30	A	A09	R	T	1	T			THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	0171358	011977	GM30	A	A09	R	T	1	T			THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
G	BP1	016072	090276	CA02	A	A00	R	U	U	T			FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016912	122776	CA02	A	A04	R	U	U	T			START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	018463	052677	CA02	A	A00	R	U	U	T			START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	019993	112477	CA02	A	A00	R	U	1	T			START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BR1	022454	091178	NM30	A	B07		T	4	T			#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
G	BR2	014014	031476	NM30	A	B12		T	D	T			AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANUL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	BR2	015461	061176	NM30	A	A02	C	D	D	T			#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL HOC IN SADDLE & 4 DAY TANK
G	CO1	015672	082376	CB40	A	B00		U	8	T			FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	DA1	016452	110476	FM25	A	B04		D	D	T			DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	DK1	021516	051178	GM10	A	A10	R	U	G	T			TEMP. UG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP

FUEL OIL SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MOD	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	SECOND	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR2	016654	121876	GM25	A	802			S	D	D	T		UNIT 2 DG FAILD TO CARRY REQD LOAD ;2000Kw MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATION
G	VT1	015739	082576	FM30	A	813			T	1	T			"8" DG OOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
W	BW1	021355	041878	GM25	A	812			T	U	N			#1 DG WAS S/D AND DECLARED INOPERABLE--OIL LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL
W	DC2	021681	061778	WD30	A	807			T	8	T			2CD DG WIDELY VARYING CYLNDR TEMP TAGGED OUT	FUEL INJ[illegible]. PUMP FAILD
W	DC2	022839	101978	WD30	A	A00			U	1	T			2AB FAILD TO START DUE TO LACK OF FUEL TO INJECTRS	UNKNOWN. [illegible] REPLACED FUEL FILTER ELEMENT
W	HN1	014162	020376	GM25	A	A02	S	D	1	T				EDG-2B TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	RU2	014823	030176	FM25	A	807	R	T	8	T				"8" EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	RU2	014954	091377	FM25	A	807	R	T	8	T				"A" DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING
W	SA1	018799A	073077	AL25	A	A10	C	T	4	N				1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	018799B	073077	AL25	A	A10	C	T	4	N				1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA
W	SD1	022516	032878	DL10	A	A10	R	T	1	T				NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
W	SD1	022100	071878	DL10	A	A06		D	1	T				NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCORP PROC TO EXERCISE
W	TD3	017591	020377	GM25	A	A12	R	T	U	T				DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	TD3	018147	033177	GM25	A	A12	R	T	4	T				DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
W	TD3	021919	060178	GM25	A	B10		T	4	T				B DG HI LEVEL IN FUEL TANK (ENG.MOUNTD) DG S/D	LEVEL SWITCH MALFUNCTION--REPLACED SWITC
W	ZI1	015188	062176	CB40	A	B13		T	4	N				1A DG HAD FO LEAKAGE AT THE 8L FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ

LUBE OIL SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	EFFECT	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	019302	092877	FM30	B	A10	S	D	6	T	3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
B	TI1	020295	011278	FM30	B	A14	S	T	4	T	EDG 1B FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
B	TI1	620497	031878	FM30	B	A10		T	6	T	EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH
C	CC1	018488	071177	FM25	B	B02	C	D	4	M	#11 DG ON FIRE DUE TO L.O. HITING HOT EXHAUST	O-RING SEAL ON SIRNR NOT GLUED PROPERLY
C	MI2	015906	090176	FM25	B	B12	C	T	1	N	DG 13U SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	016036	091976	FM25	B	B12	B	D	4	N	12U DG HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET
G	BR1	0166549A	010477	NM30	B	A04	C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER ,JACKT
G	BR1	0166549B	010477	NM30	B	A04	C	D	4	T	#4 DG TRIPPD R/X AT POWER, TO SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT
G	DA1	014334	022776	FM25	B	B12	R	T	D	I	SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DR1	021517	050778	GM10	B	A10		T	D	N	TEMORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR3	016015	092176	GM25	B	B09		T	4	T	DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	EN1	015557	062676	FM25	B	B02	S	D	8	T	DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH
G	FP1	616606	121576	GM25	B	A10	R	D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016471	011977	GM25	B	A10	R	D	1	T	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL
G	PR2	020685	022878	FM30	B	B12	C	D	8	T	E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
W	BV1	622647	060178	GM25	B	B02		D	1	I	#2 DG LUBE OIL LEAK AT ENGINE CONTROL PANEL GAUGE	GAUGE WAS CALIBRATED ON 5/21;LOOSE CONN.
W	ZI1	022846	091478	C840	B	A02	C	D	4	N	1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T
W	ZI2	019714	111077	C840	B	B12	B	D	G	T	"D" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL

STARTING SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	014838	051176	GM25	C	A10			D	8	T		DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT
B	AR1	015578	102377	GM25	C	A14	I	T	8	T			#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
B	AR1	015622	080676	GM25	C	A10			D	4	T		MAN DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR STRT MTR DOC
C	CC2	016722	121576	GM25	C	A09			I	4	T		#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	CC2	018422	022277	FM25	C	A00			U	8	I		#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	FC1	014590	042776	GM25	C	A02	I	D	8	U			DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPROPR SETNG FOR MAG PKUP ON SWTCHG TACH
C	FC1	015722	081576	GM25	C	A14	I	D	8	U			DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWTCHG TACH DRIFTED
C	FC1	0176628	040677	GM25	C	A09	R	T	4	I			DG-1 FAILD TO STRT WTHN 10 SEC,STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017662A	041477	GM25	C	A09	R	I	4	T			DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
G	BP1	015444	081276	CA02	C	A10	R	T	8	I			WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BP1	016587	111876	CA02	C	A10	R	D	4	T			FAILD TO STARY IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016911	122876	CA02	C	A10	R	D	4	M			DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945487
G	BP1	017541	102077	CA02	C	A00	R	U	U	T			START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BR1	020668	120977	NM30	C	A09		E	D	T			#3 DG START TIME 10.2 SEC VS 10	CARBON BUILDUP ON AIR VALVE STUCK SHUT
G	BR2	016399	111176	NM30	C	A08		E	U	I			DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	DR1	020852	030478	GM10	C	A10		D	G	T			D-1 B/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR2	014913	052376	GM25	C	A00		U	1	T			UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYST
G	DR2	017397	032277	GM25	C	A10	R	D	1	I			UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	017723	120277	GM25	C	A13	R	T	1	T			UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	017816	120377	GM25	C	A12		D	4	T			2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM

STARTING SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR2	020242	010378	GM25	C	A13			R	I	B	T	UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR2	021648	030778	GM25	C	A00	S	D	B	T			OPERATR SHOOK AIR START SOLENOID &UNIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC
G	DR2	022262	082478	GM25	C	A10	R	U	4	I			2/3 UNIT OOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR2	022589	092278	GM25	C	A00	R	U	8	I			UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	DR2	023337	121678	GM25	C	A00	R	D	4	T			2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TD2 RELAY CLEANED;TD2 AND AIR VALVE 7
G	EN1	024778	031976	FM25	C	A10		D	D	T			1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	MO1	016186	101076	GM25	C	A09		T	D	T			#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 START SYS AIR CONT COMP FOULED W RUST
G	QC1	015642	060876	GM25	C	A00		U	2	T			DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	QC1	014120	011276	GM25	C	A10		D	8	T			UNIT 1 DG FAILED TO START WHEN MODE SW IN START MD	AIR START SOL VLV DIRTY-NOT OPEN FULLY
G	VY1	019858	072677	FM30	C	A09		T	4	I			MAM DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
W	BV1	014963	052076	GM25	C	A09	R	I	4	N			DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEMS
W	BV1	017696	042977	GM25	C	A09	R	I	4	N			DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	DC2	020981	031978	WD30	C	B10		U	4	I			2CD DG GASKETS ON AIR LINE TO #5 CYL BLEW OUT	FRACTURED AIR START CHECK VALVE
W	DC2	022503	091178	WD30	C	A13		T	4	I			2AB STARTED FOR LOAD TEST WAS TRIPPED OFF MANUALLY	PISTON BOLT FOR AIR CHECK VALV LOOSE
W	JF1	019055	081777	FM40	C	A10	B	D	U	T			DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM40	C	A10	B	D	U	T			DG 1B TRIPPED ON OVSPD DURING MANLAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
W	JF1	019359	091377	FM40	C	B10	B	D	D	N			DSL GEN 1B EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019360	091677	FM40	C	B10	B	D	B	N			DSL GEN 1-2A EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	020492	030278	FM40	C	A09	C	T	D	T			DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	020496	030878	FM25	C	A09	C	T	B	T			DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS

STARTING SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	RECOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	021185	032378	FM40		C	A02			D	U	N	DSL GEN 1B FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING
W	FR1	617316	030177	GM02		C	A10			D	4	T	#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
W	ZI1	022116	080178	CB40		C	A10			T	1	T	1B DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
W	ZI1	022515	090278	CB40		C	A10			D	4	T	1B DIESEL GENERATOR FAILED TO START	STARTING AIR DIST BUSHING ROTATED IMPROP

COOLING SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	CC1	015587	072976	FM25	D	A02	S		D	4	N	#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	018487	071377	FM25	G	B02	S		D	1	T	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;OP SWITCH ISOLATED
C	CC2	017985	060177	FM25	D	A12		I	D	T		#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESVL
C	CC2	021991	080178	FM25	D	B16	S		D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C	M12	016031	092276	FM25	D	B09	B	I	G	1		12U DG RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	016626	120176	FM25	D	A09	B	I	G	T		13U DG STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	018972	081777	FM25	D	B09	B	I	G	T		12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	0189768	092077	FM25	D	B09	B	I	G	N		COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	M12	021386	050878	FM25	D	B09	B	T	G	T		12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	023213	120578	FM25	D	B09	B	I	G	T		12U DG S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
G	BP1	014417	032476	CA02	D	B09	R	I	B	T		DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	014894	051676	CA02	D	B09	R	T	G	N		DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	015449	080576	CA02	D	A06	R	U	B	N		DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	018102	051677	CA02	D	A00	R	T	4	T		H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	T TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	020580	020978	CA02	D	B12		I	4	T		DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT
G	DA1	014953	062276	FM25	D	B09	C	T	B	T		1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DR2	019728	112977	GM25	D	B12	C	D	D	T		2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN, LOADED	WATER LEAKD GRDUNDED PUMP STATOR
G	DR2	021882	063078	GM25	D	B14	F	D	G	T		2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	EN1	013644	061377	FM25	D	B14	I	D	4	I		1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25	D	B14	I	D	4	T		1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS

COOLING SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	018647	062577	FM25	D	B14	T	D	4	N	1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
G	P82	018866	082677	FM36	D	A01	S	D	1	I	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP, BUT NOT DIESEL TRP
G	P82	019919	101877	FM30	D	A02	S	D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	VT1	020464	012478	FM30	D	B09		T	4	T	DIESEL GENERATOR WAS TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNT ARND HX
*	SA1	019920	111777	AL25	D	B13	B	T	4	T	1C DIESEL DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
*	YR1	018653	080277	GM02	D	B09	C	T	D	T	#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
*	YR1	018654	080277	GM02	D	B09	C	T	D	T	#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL

SCAVENGING AIR SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	021083	032078	GM25	E	800				T	G	T	DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
B	DR1	020768	020878	GM25	E	805				D	G	T	1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
B	DB1	021580	050978	GM25	E	800				U	G	T	GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
C	SL1	017134	011877	GM30	E	804	R	F		G	T		1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	019511	092677	GM30	E	804	R	T		G	T		1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
G	DR2	019651	103077	GM25	E	806		T		G	T		UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTART	TURBO-CHARGR CLUCTHESHAFT BEARING
W	KE1	019171	092077	GM25	E	806	C	D	4	T			DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBOCHG	CARBON BUILDUP DUE TO SHORT DURATION OPER
W	SA1	019924	120277	AL25	E	804		T		G	T		1B DIESEL DECLARED INOP-TURBOCHGR & EXH EXP JT FLD	CAUSE DETERMINED TO BE TURB BLADE FAILURE

ENGINE FRAME / INTERNALS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
d	D81	020273	010978	GM25	F	A09			I	4	I	DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR
B	I12	021669	042578	FM30	F	B06	R	U	1	T		"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
B	I12	021667	052078	FM30	F	A05	C	D	G	I		DG B FAILED TO START	VERT SHFT BTW UP & LWR CRANKS FLD-IMP MTL
d	I12	021665	052378	FM30	F	B09	R	I	8	M		DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
C	CC1	018306	061777	FM25	F	B02		D	1	T		#11 DG STARTD;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOOSE AND FELL OFF DG
C	M12	0142600	022376	FM25	F	B04	B	I	G	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	M12	015106	060276	FM25	F	B09	B	I	1	T		DG 13U TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	M12	016755	121676	FM25	F	B06		D	G	I		DG 13U #3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS
C	M12	017626	011077	FM25	F	B13	S	D	G	T		DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN
G	CO1	023044	091278	C840	F	A09		I	G	I		#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL
G	DA1	013993	100776	FM25	F	A05		D	D	T		1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL
G	DA1	021171	040578	FM25	F	A06		D	G	M		BEARING WIPED ON 4/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	EN1	020031	081877	FM25	F	B00	R	U	G	I		DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	VY1	014740	050676	FM30	F	A09	R	I	4	N		"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VY1	018323	062377	FM30	F	B13	R	I	4	T		"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VY1	020194	121977	FM30	F	B13	R	I	4	I		"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
W	PR2	015735	091076	FM30	F	B02		D	4	T		D1 DG TRIPPED ON HIGH CRANKCASE PRESSURE	HOSE CLAMPS ON PIPE NOT CONN AFTER MAINT
W	SU1	014669	041676	GM25	F	A01	R	D	G	T		#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS

GOVERNOR

WLN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYST	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	020221	122777	FM30	G	A09	R	D	B	T	3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
B	CR3	020278	010378	FM30	G	A09	R	D	B	T	3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
B	D81	019816	122977	GM25	G	A14	S	D	G	N	DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
B	R51	016656	120676	GM25	G	B10		D	B	T	DG WAS TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED,SPD DECR TO TRIP
C	FC2	015614	081576	GM25	G	B10		T	B	N	SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING
C	M12	015583A	081676	FM25	G	A10	B	T	4	T	DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	M12	015583B	081776	FM25	G	A10	B	T	4	T	DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	M12	015583C	082376	FM25	G	B10	B	T	4	T	DG 12U TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	M12	018923	081077	FM25	G	A01	S	D	1	N	DG 12U FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN "NO FUEL" FROM PREV S/D
C	MY1	020733	021878	GM25	G	A09		T	B	T	DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD
G	BF2	014162	011476	GM30	G	A12		T	1	T	FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRAULIC ACTUATOR
G	BF1	016261	110376	GM30	G	B09	C	T	4	T	D DG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BP2	016364	102876	CA02	G	A00	R	U	U	T	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02	G	A0C	R	U	U	T	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016597	120276	CA02	G	A00	R	U	U	T	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122076	CA02	G	A04	R	U	U	T	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN
G	BP1	016910	010377	CA02	G	A00	R	U	U	T	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?
G	BP1	020298	032477	CA02	G	A00	R	U	U	T	EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BK1	019391	101177	NM30	G	B05		D	B	T	#2 DG UNABLE TO MAINTAIN LOAD CYCLING 500KW	SHORTED LEADS TO GOVERNOR; INCORRECT ASMB
G	BK2	016823	122976	NM30	G	B10		T	B	T	#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC

GOVERNOR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DA1	017963	051277	FM25		G	B06	S	D	1	T		1G-31 DG WOULD NOT REACH FULL LOADING ONLY 2500 Kw	SPEED SETTING ADJUSTMNT NOT RESET
G	DR2	018283	063077	GM25		G	A00	R	D	1	T		2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE OUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25		G	A0L	R	D	1	T		U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE OUT-OF ADJUST GOVENOR COMPENSATIN
G	DR2	020855	030878	GM25		G	A14	S	D	8	T		ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021538	052278	GM25		G	A02		D	8	T		U-2 DG TRIPPD 4 TIMES ON OVERSPEED;R/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH
G	DR3	014439	030376	GM25		G	A13	R	T	4	T		DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016187	100976	GM25		G	A13	R	T	4	T		LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	DR3	016455	110576	GM25		G	B10	R	T	8	T		LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	019722	112277	GM25		G	A10	R	D	8	T		3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	DR3	019727	112977	GM25		G	B10	R	D	8	N		3 DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	EN1	016065	091176	FM25		G	A10	R	D	1	T		1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	020214	112577	FM25		G	A08		T	8	T		1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED
G	EN2	022751A	102878	FM25		G	A10	R	D	8	T		MCM DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	022751B	103178	FM25		G	A10	R	T	8	N		MCM DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	FP1	023104	120578	GM25		G	A02	S	D	4	T		MAMDGTRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR
G	PB2	022466	083078	FM30		G	A10		T	1	T		E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD SY
G	PB2	023349A	122178	FM30		G	A10		D	1	T		E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/28/78
G	PB2	023349B	122178	FM30		G	A00		U	1	T		E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
W	DC2	022026	072878	WD30		G	B10	R	T	4	T		#2 AB DG OVERSPED WHL UNLOADG PREVIOUS OCCURRENCE?	WORN LINKAGE CAP SCREW BROKE IN GOVENOR
W	IP3	015733	083076	AL18		G	B02	I	D	1	T		EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY

GOVERNOR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	IP3	016635	092476	AL18	G	B02	T		D	4	T		EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONT ELE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	JF1	019368	100277	FM40	G	A10			D	8	T		DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 130V RATING
W	JF1	022374	082778	FM25	G	A10	R		D	8	N		2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022373	090578	FM46	G	A10	R		D	8	M		1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP,CAUSED BY FAIL DIODES
W	JF1	022630	091778	FM40	G	A10			D	4	T		1B DG FREQ COULD NOT BE INCR ABOVE 58.5 HZ	CPLNG BET DC MTR AND GOV POS POT WAS LOOS
W	KR1	020095	122177	GM25	G	B02	S		D	4	T		D/G 1B WOULD NOT PICK UP MORE THAN 1500 KW LOAD	SYNCHRO MOTOR LIMIT SWCHS ADJUSTED IMPROP
W	PR1	018342	061777	FM30	G	B10			T	8	T		D2 DG FAILED TO RESPOND TO LOAD CHANGE SIGNALS	LINK LEVER KEY MISSING,CAPSCREWS LOOSE
W	RU2	021313	041678	FM25	G	B13			T	4	T		EDG LOAD FAILED TO INCREASE ABOVE 900KW	COMM BRUSH VIBRATED OUT OF GOV SPD CHGR
W	TH1	018447	062277	GM40	G	B10			T	4	N		WEST DG FAILED TO ASSUME MIN REQUIRED LOAD	BRUSH FALLEN OUT OF DC GOV DRIVE MOTOR
W	ZI1	0203488	011678	CB46	G	B10			T	4	T		DG MOM STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTROL AIR PRESS-TRIP VLV MOM RING LK
W	ZI2	017808	042777	CB40	G	B10	R		D	1	I		GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
W	ZI2	020260	010978	CB40	G	B10	R		D	1	T		2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP

EXHAUST SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DA1	024537	031776	FM25	H	812	R	T	D	T	SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	PI1	015966	092276	AL25	H	804	B	T	D	T	"A" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	016308	111776	AL25	H	804	B	T	D	T	"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED

SHUTDOWN SYSTEM

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018565	072677	FM30	I	A06	S	D	1	T			"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
C	MI2	019255	092477	FM25	I	B14	S	T	8	I			12D DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW OUT OF ADJ ON DG OVSPD TRIP MECH
C	SL1	017441	030177	GM30	I	A01	S	D	1	T			1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
G	DR2	016443	102976	GM25	I	A14	S	F	D	T			UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLENO	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	019732	111677	GM25	I	A00	S	D	1	T			AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	FP1	016496	111776	GM25	I	A10	R	D	8	T			"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	017725	042077	GM25	I	A10	R	D	8	T			DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	P02	018887	082677	FM30	I	A06	S	D	4	T			E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
W	P11	018417	062977	GM25	I	A14	S	F	4	T			3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	ZI2	017809	050677	CB40	I	B13	C	T	4	T			DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	ZI2	019780	111777	CB40	I	B13	C	T	4	T			"0" DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE

OUTPUT BREAKER

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	111	014298	022176	FM30	J	A06			S	D	1	T	"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW
C	CC1	015284	080776	FM25	J	A02	S		D	G	T		11 DG FAILD TO SENSE "AT VOLTAGE"COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	CC2	020226	011078	FM25	J	B10			T	1	T		#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
G	SC1	022532	090578	GM30	J	A10			T	8	T		"A" DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BP1	018742	090577	CA02	J	A04	S		D	G	T		TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR
G	BR1	019448	121077	NM30	J	B00			D	D	T		SMOKE COMING FROM 320 RELAY AND 86DB RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	BR2	014136	010976	NM30	J	A10			D	4	N		#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	CD1	018742	111076	CB40	J	A03	S		D	8	T		EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 59RELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	DA1	017756	051077	FM25	J	A10	S		D	8	T		1G-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DR2	014905	120477	GM25	J	A00			U	6	T		U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	FP1	020518	021578	GM25	J	B10			T	1	T		"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH CKT FOR OUTPUT BRKR
*	BV1	015913	090376	GM25	J	A00			U	1	T		#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
*	BV1	017348	031477	GM25	J	A04	B		D	4	T		#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH
*	BV1	017621	041177	GM25	J	A04	B		D	4	T		#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
*	BV1	017693	042677	GM25	J	A04	B		D	4	T		#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
*	BV1	017827	050977	GM25	J	A04	R		D	4	T		#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
*	BV1	018168	060377	GM25	J	A04	R		D	1	T		#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
*	BV1	020437	011178	GM25	J	A04	R		D	4	T		#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
*	BV1	0223958	090578	GM25	J	A00	R		D	1	T		#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY,1 HOUR RUN AT FULL LO
*	BV1	0223948	091278	GM25	J	A00	R		D	1	T		#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWTCH	CLOSED LATER NEGATING TROUBLESHOOTING
*	JP1	022235	081278	FM40	J	A10	S		D	8	N		OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWTCHS OUT OF ALIGNMT
*	JP1	022987	100378	FM25	J	A02	S		D	1	T		1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR,INCRCTLY POS
*	PT1	017246	020977	GM25	J	A10	R		D	8	T		3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
*	PT1	021445	051778	GM25	J	A10	R		D	D	T		4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	WEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
*	RG1	022450	081678	AL18	J	A10			T	8	T		B EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS

EXCITER / VOLTAGE REGULATOR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	DB1	021852	060478	GM25	K	A10				D	4	T	1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE FOR DG 1-1
C	CC1	019592	101077	FM25	K	A13				F	8	T	#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	FC1	021892	061978	GM25	K	A10	R		D	1	T		DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	FC1	021799	071278	GM25	K	B10	R		D	8	T		DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDE)
C	FC1	022249	080978	GM25	K	B10	R		D	8	T		DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C	MI2	019929	110977	FM25	K	A01	S		D	1	T		DG 13U TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
G	BF3	019133	091977	GM30	K	A10			D	1	F		3D DG TRIPPD ON OVERSPEED ;GOVERNOR INOPERABLE	ID FUSE OPEN DISENABLING FIELD CIRCUIT
G	BR2	020612	021378	NM30	K	A01	S		D	1	N		FOLLOWING SCRAM ON UNIT 1 ;#1 DG LO RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET
G	CD1	016560	110776	CB40	K	B08			F	D	T		DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	PUT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	DR2	016186	093076	GM25	K	B09			T	D	T		2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR3	017509	032277	GM25	K	A10			D	G	M		GEN FIELD FAILD TO FLASH	INTERMITINT CAPACITOR SHORT IN FLASH CIRC
G	EN1	015568	080576	FM25	K	A06	S		D	1	T		DG 1A TRIPPED DUE TO LOSS OF EXCITATION ORNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	EN1	018839	091277	FM25	K	B10			D	8	T		1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG MTR OPER XFMR PWR SUP DIODES FAIL
G	EN2	020213	111977	FM25	K	B02	S		D	4	T		1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	GC1	014447	030376	GM25	K	A10			D	8	F		DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	WESTNSE FFCD RELAY FLD TO ENRGZ FLD FLASH
G	GC1	023119	113078	GM25	K	A10			D	8	T		#1DG STARTED BUT GEN FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	PI1	022135	080278	AL25	K	B01			D	8	T		8 DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
G	QC1	018112	042577	GM25	K	A10			D	G	T		WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
G	QC1	019494	112877	GM25	K	A10			D	4	M		1/2 DG WOULD NOT START SUCCESSFLY,FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT
W	BV1	018628	071777	GM25	K	A10	R		F	8	T		#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
W	BV1	022137	072878	GM25	K	A10	R		D	1	N		#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
W	DC1	018647	120976	WD30	K	A10			D	1	T		C-D DG TRIPPD ON OVERSPEED--BLOWN FUSE ON INVERTER	FAILD SILICONE RECTIFIER IN DG INVERTER
W	Z11	020255	010378	CB40	K	B10	R	T	D	T			1B DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
W	Z12	020258	010678	CB40	K	B10	M	F	F	8	T		2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	Z12	021544	051778	CB40	K	B14	T	T	F	8	T		2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUT

GENERATOR

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	CC1	021060	041078	FM25	L		A00			U	1	T	#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEXT TIM
G	PB2	026090	121977	FM30	L		A00			U	6	T	E1 DG TRIPPED ON "A" PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXTV T.I
G	QC1	019100	082477	GM25	L		A13			T	4	T	UNIT 1 DG STARTED AND RAN, BUT NO VLTG, SYNCH, FREQ	FREQ GEN TACH SET SCREWS VIBRATED LOOSE
W	BB1	017883	022477	GM25	L		B05			D	4	T	DG OUTPUT BREAKER TRIPPED; INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST
W	IP3	016286	102176	AL18	L		B10	S		D	8	T	UNABLE TO CONTROL SPEED OF NO 31 DG	UNIT/PARA RELAY OPER INTRMIT-DEFECTV CONN

APPENDIX K

DIESEL-GENERATOR EVENTS (FAILURES) SORTED BY TYPE OF EVENT

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
0	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
V	COMMAND FAULTS
Y	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WU	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
10	560-1000 KW
18	1750-1950 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4416 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY		FAILURE MODE	FAILURE MECHANISM
C	MI2	0142600A	021776	FM25		A	A09	B	T	1	N	DG	12U	FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142668	021876	FM25		A	809	B	T	1	N	DG	12U	TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	014260C	022076	FM25		A	809	B	T	1	N	DG	12U	TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	014260D	022376	FM25		F	B04	B	E	G	N	DG	12U	TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	MI2	015166	060276	FM25		F	809	B	T	1	T	DG	13U	TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	MI2	015583A	081676	FM25		G	A10	B	T	4	T	DG	12U	FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583B	081776	FM25		G	A10	B	T	4	T	DG	12U	FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583C	082376	FM25		G	B10	B	T	4	T	DG	12U	TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	016036	091976	FM25		B	812	B	D	4	N	12U	DG	HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET
C	MI2	016031	092276	FM25		D	809	B	T	G	T	12U	DG	RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016026	120176	FM25		D	A09	B	T	G	T	13U	DG	STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016972	081777	FM25		D	809	B	T	G	T	12U	DG	LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	0169768	092C77	FM25		D	809	B	T	G	N	COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	021.86	050878	FM25		U	809	B	T	G	T	12U	DG	LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	023213	120578	FM25		D	809	B	T	G	T	12U	DG	S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
G	PI1	015966	092276	AL25		H	B04	B	E	D	T	"A"	DG	EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	016368	111776	AL25		H	B04	B	T	L	T	"B"	DG	EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
W	BV1	017348	031477	GM25		J	A04	B	D	4	T	#2	DG	OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH
W	BV1	017021	041177	GM25		J	A04	B	D	4	T	#1	DG	OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAY,
W	BV1	017093	042677	GM25		J	A04	B	D	4	T	#1	DG	OUTPUT BKR, FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
W	JF1	019055	081777	FM40		C	A10	B	D	U	T	DG	1B	TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM40		C	A10	B	D	U	T	DG	1B	TRIPPED ON OVSPD DURING MANUAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
W	JF1	019359	091377	FM40		C	B10	B	D	U	N	DSL	GEN 1B	EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019360	091677	FM40		C	B10	B	D	U	N	DSL	GEN 1-2A	EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	SA1	019920	111777	AL25	D	B13	B	E	4	T		IC	DIESEL	DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
W	Z12	019714	111077	CB40	B	812	B	D	G	T		"0"	DIESEL GEN	TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM	COMMON CAUSE
B	TI2	021607	052078	FM30	F	AQ5	C	D	G	T	DG B FAILED TO START	VERT SHFT BTW UP & LWR CRANKS FLD-IMP MTL	
C	CC1	018468	071177	FM25	B	B02	C	D	4	M	#11 DG ON FIRE DUE TO L.O. HITTNG HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY	
C	M12	015906	090176	FM25	B	B12	C	T	1	N	DG 13D SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT	
G	BP4	016261	110376	GM30	G	B09	C	T	4	T	D DG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR	
G	BP1	0168548A	010477	NM30	B	A04	C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER JACKT	
G	BR1	0168548	010477	NM30	B	A04	C	D	4	T	#4 DG TRIPPD R/X AT POWER, TO SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT	
G	BR2	015461	061176	NM30	A	AQ2	C	D	D	T	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL H2O IN SADDLE & 4 DAY TANK	
G	DA1	014953	062276	FM25	D	B09	C	T	8	I	1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER	
G	DR1	0204088	012778	GM10	M	A11	C	D	1	N	D-1 B/O DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER	
G	DR1	0204088A	012978	GM10	M	A11	C	D	G	N	D-1 FAILD TO START DUE TO COLD WEATHR 6 HEATRS	INSTALLED & ROOM WINTERIZED	
G	DR2	019728	112977	GM25	D	B12	C	D	D	T	2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GRCUNDED PUMP STATOR	
G	P82	020685	022878	FM30	B	B12	C	D	8	T	E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS	
*	JF1	020992	030278	FM40	C	A09	C	T	D	T	DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS	
*	JF1	020996	030878	FM25	C	A09	C	T	6	T	DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS	
*	KE1	019171	092077	GM25	E	B06	C	D	4	I	DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBOCHG	CARBON BLILDUP DUE TO SHORT DURATION OPER	
*	SA1	0187994	073077	AL25	A	A10	C	T	4	N	1A DIESEL INOP-FAILED TO REACH RATED SPEED ON START	BINDING FUEL RACK LNKG - LACK OF LUBRICAT	
*	SA1	0187998	073077	AL25	A	A10	C	T	4	N	1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA	
*	YR1	018653	080277	GM02	D	B09	C	I	D	T	#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES	
*	YR1	018654	080277	GM02	D	B09	C	I	D	T	#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL	
*	ZI1	022646	091478	CB40	B	A02	C	D	4	N	1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T	
*	ZI2	017809	050677	CB40	I	B13	C	T	4	T	DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE	
*	ZI2	019780	111777	CB40	I	B13	C	T	4	T	HUM DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE	

RECURRING

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	020221	122777	FM30	G	A09	R	D	8	T	3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
B	CR3	020278	010378	FM30	G	A09	R	D	8	T	3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
B	CR3	023166	111778	FM30	M	A00	R	U	1	T	EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWICE AFTER ANOMALY
B	RS1	018853	082477	GM25	M	A00	R	U	1	T	DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED
B	SI2	021609	042578	FM30	F	B00	R	U	1	T	"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
B	SI2	021605	052378	FM30	F	B09	R	I	8	M	DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRNSE VAC EJC
C	CC1	016465	102576	FM25	M	B00	R	U	1	T	#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C	CC1	017213	111876	FM25	M	A00	R	U	1	T	#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	017822	051577	FM25	M	A09	R	I	8	T	#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC1	023360	121878	FM25	M	B00	R	D	1	T	#11 DG SHUTDOWN DUE TO ROOM VENT. FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS
C	CC2	017457	031777	FM25	M	A00	R	U	1	T	#12 DG VENT FAN FAILD TO START ON SIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
C	FC1	017662B	040677	GM25	C	A09	R	I	4	T	DG-1 FAILD TO STRT WTHN 10 SEC, STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017662A	041477	GM25	C	A09	R	I	4	T	DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
C	FC1	021692	061978	GM25	K	A10	R	D	1	T	DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	FC1	021799	071278	GM25	K	B10	R	D	8	T	DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCID?)
C	FC1	022249	080978	GM25	K	B10	R	D	8	T	DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C	SL1	017134	011877	GM30	E	B04	R	I	6	T	1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	017135A	011977	GM30	A	A09	R	I	1	T	THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017135B	011977	GM30	A	A04	R	I	1	T	THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	019511	092677	GM30	E	B04	R	S	1	T	1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	014417	032476	CA02		D	B09	R	T	B	T	DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	014894	051676	CA02		D	B09	R	T	G	N	DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	015448	080576	CA02		M	A03	R	U	U	T	DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BP1	015449	080576	CA02		D	A00	R	U	B	N	DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	015444	081276	CA02		C	A10	R	T	B	T	WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BP1	016072	090276	CA02		A	A00	R	U	U	T	FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016304	102876	CA02		G	A00	R	U	U	T	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02		G	A00	R	U	U	T	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016587	111876	CA02		C	A10	R	D	4	T	FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016597	120276	CA02		G	A00	R	U	U	T	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122076	CA02		G	A04	R	U	U	T	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN
G	BP1	016912	122776	CA02		A	A04	R	U	U	T	START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	016911	122876	CA02		C	A10	R	D	4	M	DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945487
G	BP1	016940	010377	CA02		G	A00	R	U	U	T	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?
G	BP1	020298	032477	CA02		G	A00	R	U	U	T	EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BP1	018102	051877	CA02		D	A00	R	T	4	T	H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	T TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	018103	052677	CA02		A	A00	R	U	U	T	START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	019941	102077	CA02		C	A00	R	U	U	T	START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	019993	112477	CA02		A	A00	R	U	1	T	START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BP1	020375	020278	CA02		M	A00	R	U	U	T	START TIME 26.5 SECS VS 13.9 SECS	CAUSE UNKNOWN

RECURRING

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DA1	014334	022776	FM25		B	B12		R	T	D	T	SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DA1	014337	031776	FM25		H	B12		R	T	D	T	SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	DR1	021516	051178	GM10		A	A10		R	D	G	T	TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP
G	DR2	017397	032277	GM25		C	A10		R	D	1	T	UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	016263	063077	GM25		G	A00		R	D	1	T	2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE OUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25		G	A00		R	D	1	T	U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE OUT-OF ADJUST GOVERNOR COMPENSTIN
G	DR2	019723	120277	GM25		C	A13		R	T	1	T	UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	020242	010378	GM25		C	A13		R	T	8	T	UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR2	022262	082478	GM25		C	A10		R	U	4	T	2/3 UNIT DOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR2	022589	092278	GM25		C	A00		R	U	8	T	UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	DR2	023337	121678	GM25		C	A00		R	D	4	T	2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TD2 RELAY CLEANED;TD2 AND AIR VALVE T
G	DR3	014439	030376	GM25		G	A13		R	T	4	T	DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016187	100976	GM25		G	A13		R	T	4	T	LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	DR3	016455	110576	GM25		G	B10		R	T	8	T	LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	019722	112277	GM25		G	A10		R	D	8	T	3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	DR3	019727	112977	GM25		G	B10		R	D	8	N	3 DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	EN1	015947	081476	FM25		M	A00		R	D	U	T	1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	EN1	016065	091176	FM25		G	A10		R	D	1	T	1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	016842	122576	FM25		M	B00		R	U	U	T	DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITVE	CHECKNG OUT LOGIC ON 1C DG
G	EN1	016843	123176	FM25		M	A00		R	U	1	T	MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY

RECURRING

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	EFFE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	G20C31	081877	FM25		F	B00		R	U	G	T	DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	EN2	0227518	102878	FM25		G	A10		R	D	B	T	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	0227518	103178	FM25		G	A10		R	F	B	N	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	FP1	016496	111776	GM25		I	A10		R	D	B	T	"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	016800	121576	GM25		B	A10		R	D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016971	011977	GM25		B	A10		R	D	1	T	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL
G	FP1	017725	042077	GM25		I	A10		R	D	B	T	DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	VT1	014740	050676	FM30		F	A09		R	T	4	N	"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VT1	018323	062377	FM30		F	B13		R	T	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VT1	020194	121977	FM30		F	B13		R	T	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
W	BV1	014903	052076	GM25		C	A09		R	T	4	N	DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEM
W	BV1	017696	042977	GM25		C	A09		R	F	4	N	DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	BV1	017827	050977	GM25		J	A04		R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
W	BV1	018068	060377	GM25		J	A04		R	D	1	T	#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
W	BV1	018828	071777	GM25		K	A10		R	T	B	F	#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
W	BV1	020437	011178	GM25		J	A04		R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
W	BV1	022137	072878	GM25		K	A10		R	D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
W	BV1	0223958	090578	GM25		J	A00		R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY,1 HOUR RUN AT FULL LD
W	BV1	0223948	091278	GM25		J	A00		R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWITCH	CLOSED LATER NEGATING TROUBLESHOOTING
W	DC2	022C26	072878	WD30		G	B10		R	F	4	T	#2 AB DG OVERSPED WHL UNLOADG PREVIOUS OCCURRENCE?	WORN LINKAGE CAP SCREW BROKE IN GOVENOR

RECURRING

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	022374	082778	FM25		G	A10	R	D	8	N	ZC	DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022373	090578	FM40		G	A10	R	D	8	M	1-2A	DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP,CAUSED BY FAIL DIODES
W	PI1	017146	020977	GM25	J	A	10	R	D	8	T	3D	EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
W	PI1	021445	051778	GM25	J	A	10	R	D	0	T	4D	EDG OUTPUT BREAKER WOULD NOT CLOSE DLRING TEST	WEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
W	R02	014823	030176	FM25		A	07	R	T	8	T	"B"	EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	R02	019354	091377	FM25		A	07	R	T	8	T	"A"	DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING
W	S01	021310	032878	DL10		A	A10	R	T	1	T	NO	1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
W	S01	014869	041676	GM25	F	A	01	R	D	G	T	#1	DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
W	T03	017591	020377	GM25		A	A12	R	T	U	T	DG	"B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	T03	018147	033177	GM25		A	A12	R	T	4	T	DG	"B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
W	Z11	020255	010378	CB40	K	B	10	R	T	D	T	1B	DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
W	Z12	017808	042777	CB40	G	B	10	R	D	1	T	GOVERNOR	SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
W	Z12	020258	010678	CB40	K	B	10	R	T	8	T	2A	DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	Z12	020260	010978	CB40	G	B	10	R	D	1	T	2B	DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP

COMMAND FAULTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018565	072677	FM30	I	A06	S	D	1	T	"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
B	CR3	019302	092877	FM30	B	A10	S	D	8	T	3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
B	D81	019816	122977	GM25	G	A14	S	D	G	N	DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
B	D81	023007	103178	GM25	M	B11	S	D	4	T	1-2 DG S/D DUE TO ROOM TEMP RCSE TO 110 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
B	RS1	022613	100478	GM25	A	B01	S	D	1	N	"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
B	TI1	014298	022176	FM30	J	A06	S	D	1	T	"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW
B	TI1	020295	011278	FM30	B	A14	S	T	4	I	EDG 1B FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
C	CC1	015587	072976	FM25	D	A02	S	D	4	N	#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	015584	080776	FM25	J	A02	S	D	G	T	11 DG FAILD TO SENSE MAY VOLTAGE"COND.-OUTPUT BKR.	WILL NOT CLOSE--CELD SOLDER CONN TO ERA
C	CC1	018487	071377	FM25	D	B02	S	D	1	T	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;DP SWITCH ISOLATED
C	CC2	021991	080178	FM25	D	B10	S	D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C	FC1	014559	040776	GM25	M	A06	S	D	1	T	START ON SECONDRY AIR REQUD 10.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE
C	MI2	017020	011077	FM25	F	B13	S	D	G	T	DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN
C	MI2	018923	081077	FM25	G	A01	S	D	1	N	DG 12U FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN "NO FUEL" FROM PREV S/D
C	MI2	019255	092477	FM25	I	B14	S	T	8	T	12U DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW CUT OF ADJ ON DG OVSPD TRIP MECH
C	MI2	019929	110977	FM25	K	A01	S	D	1	T	DG 13U TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
C	MY1	022715	092578	GM25	A	A06	S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
C	SC1	016881	110276	GM30	M	A01	S	D	4	T	1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP
C	SC1	017441	030177	GM30	I	A01	S	D	1	T	1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
G	BP1	018742	080577	CA02	J	A04	S	D	G	T	TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR

RECURRING COMMAND FAULTS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	019578	102377	GM25		C	A14	T	T		8	T	#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
C	FC1	014590	042776	GM25		C	A02	T	D		8	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPRPR SETNG FOR MAG PKUP ON SWITCHG TACH
C	FC1	015722	081576	GM25		C	A14	T	D		8	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWITCHG TACH DRIFTED
G	DK2	021882	063078	GM25		D	814	T	D		G	T	2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	EN1	018644	061377	FM25		D	814	T	D		4	T	1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25		D	814	T	D		4	T	1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS
G	EN1	018647	062577	FM25		D	814	T	D		4	M	1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
W	IP3	015733	083076	AL18	G	B02	T	D			1	T	EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY
W	IP3	016035	092476	AL18	G	B02	T	D			4	T	EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONT ELE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	ZI2	021544	051778	CB40	K	814	T	I			8	T	2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUT

APPENDIX L

DIESEL-GENERATOR EVENTS (FAILURES) SORTED BY FAILURE CLASSIFICATION

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
24	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
T	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
10	500-1000 KW
18	1750-1950 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	ETYPE	CLASS	REPAIR	DISCOVERY	DEMAND	FAILURE MODE	FAILURE MECHANISM
B	AR1	014838	051176	GM25	C	A10			D	8	T		DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT
B	CR3	018565	072677	FM30	L	A06	S	D	1	T			"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
B	CR3	019302	092877	FM30	B	A10	S	D	8	T			3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
B	CR3	020221	122777	FM30	G	A09	R	D	8	T			3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
B	CR3	020278	010378	FM30	G	A09	R	D	8	T			3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
B	D81	019816	122977	GM25	G	A14	S	D	G	N			DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
B	D81	020708	020878	GM25	E	B05		D	G	T			1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
B	D81	021852	060478	GM25	K	A10		D	4	T			1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE FOR DG 1-1
B	D81	023007	103178	GM25	M	B11	S	D	4	T			1-2 DG S/D DUE TO ROOM TEMP ROSE TO 110 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
B	RS1	015622	080676	GM25	C	A10		D	4	T			"A" DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR STRT MTR DOC
B	RS1	016656	120676	GM25	G	B10		D	8	T			DG "A" TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED,SPD DECR TO TRIP
B	RS1	022613	100478	GM25	A	B01	S	D	1	N			"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED SINR PKG GLND
B	TI1	014298	022176	FM30	J	A06	S	D	1	T			"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW
B	TI2	021607	052078	FM30	F	A05	C	D	G	T			DG B FAILED TO START	VERT SHFT BTW UP & LWR CRANKS FLD-IMP MTL
C	CC1	015587	072976	FM25	D	A02	S	D	4	N			#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	015984	[illegible]976	FM25	J	A02	S	D	G	T			11 DG FAILD TO SENSE MAT VOLTAGE=COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	CC1	018306	[illegible]77	FM25	F	B02		D	1	T			#11 DG START;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOUSE AND FELL OFF DG
C	CC1	018496	[illegible]177	FM25	B	B02	C	D	4	M			911 DG ON FIRE DUE TO L.O. HITTNG HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY
C	CC1	018487	[illegible]1377	FM25	D	B02	S	D	1	T			#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;OP SWITCH ISOLATED
C	CC1	023380	121878	FM25	M	B00	R	D	1	T			911 DG SHUTDOWN DUE TO ROOM VENT,FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	RECOVERY	DEMAND	FAILURE MODE	FAILURE MECHANISM
C	CC2	021991	080178	FM25		D	B10		S	D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP		SERV H2O SUPPLY VALV FAILD TO OPEN
C	FC1	014559	040776	GM25	M	A06			S	D	1	T	START ON SECONDRY AIR REQUD 10.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE	
C	FC1	014590	042776	GM25	C	A02			T	D	8	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPRPR SETNG FOR MAG PKUP ON SWTCHG TACH	
C	FC1	015722	081576	GM25	C	A14			T	D	8	U	DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWTCHG TACH DRIFTED	
C	FC1	021692	061978	GM25	K	A10			R	D	1	T	DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT	
C	FC1	021799	071278	GM25	K	B10			R	D	8	T	DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDE)	
C	FC1	022249	080978	GM25	K	B10			R	D	8	T	DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED	
C	MI2	016636	091976	FM25	B	B12			B	D	4	N	12U DG HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET	
C	MI2	016755	121876	FM25	F	B0C				D	6	T	DG 13U #3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS	
C	MI2	017020	011077	FM25	F	B13			S	D	6	T	DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN	
C	MI2	018923	081C77	FM25	G	A01			S	D	1	N	DG 12U FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN MNO FUELM FROM PREV S/D	
C	MI2	019929	110977	FM25	K	A01			S	D	1	T	DG 13U TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL	
C	MY1	022715	092578	GM25	A	A06			S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES	
C	SE1	016681	110276	GM30	M	A01			S	D	4	T	1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP	
C	SE1	017441	030177	GM30	I	A01			S	D	1	T	1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP	
G	BF3	019133	091977	GM30	K	A1C				D	1	T	3D DG TRIPPD ON OVERSPEED ;GOVERNOR INOPERABLE	TO FUSE OPEN DISENABLING FIELD CIRCUIT	
G	BP1	016587	111876	CA02	C	A10			R	D	4	T	FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM	
G	BP1	016911	122876	CA02	C	A10			R	D	4	M	DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945487	
G	BP1	018742	080577	CA02	J	A04			S	D	6	T	TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR	
G	BR1	016654A	010977	GM16	B	A04			C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER ,JACKI	

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	RECOVERY	FAILURE MODE	FAILURE MECHANISM
							DEMAND							
G	BR1	0168548	010477	NM30	B	A04		C		D	4	T	#4 DG TRIPPD R/X AT POWER, TO SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT
G	BR1	019391	101177	NM30	G	B05				D	6	T	#2 DG UNABLE TO MAINTAIN LOAD CYCLING 950Kw	SHORTED LEADS TO GOVERNOR; INCORRECT ASMB
G	BR1	019948	121077	NM30	J	B06				D	D	T	SMOKE COMING FROM 320 RELAY AND 86DB RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	BR2	014136	010976	NM30	J	A10				D	4	N	#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	BR2	015461	061176	NM30	A	A02	C			D	D	T	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL H2O IN SADDLE & 4 DAY TANK
G	BR2	020612	021378	NM30	K	A01	S			D	1	N	FOLLOWING SCRAM ON UNIT 1 ;#1 DG LO RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET
G	C01	016712	111076	C840	J	A03	S			D	8	I	EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 59RELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	DA1	015993	100776	FM25	F	A05				D	D	T	1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL
G	DA1	016452	110476	FM25	A	B04				D	D	T	DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	DA1	017756	051077	FM25	J	A10	S			D	8	I	1G-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DA1	017963	051277	FM25	G	B06	S			D	1	T	1G-31 DG WOULD NOT REACH FULL LOADING ONLY 2500 KW	SPEED SETTING ADJUSTMNT NOT RESET
G	DA1	021171	040578	FM25	F	A06				D	G	M	BEARING WIPED ON 4/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	DR1	0204088	012778	GM10	M	A11	C			D	1	N	U-1 B/U DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER
G	DR1	020408A	012978	GM16	M	A11	C			D	G	N	U-1 FAILD TO START DUE TO COLD WEATHR & HEATRS	INSTALLED & ROOM WINTERIZED
G	DR1	020852	030478	GM10	C	A10				D	G	T	D-1 B/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR1	021516	051178	GM10	A	A10	R			D	G	T	TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP
G	DR2	016654	121876	GM25	A	B02	S			D	D	T	UNIT 2 DG FAILD TO CARRY REQD LOAD ;2666Kw MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATON
G	DR2	017397	032277	GM25	C	A10	R			D	1	T	UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	018283	063077	GM25	G	A00	R			D	1	T	2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE OUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018444	071277	GM25	G	A00	R			D	1	T	U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE OUT-OF ADJUST GOVENOR COMPENSTIN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	DEMAND	FAILURE MODE	FAILURE MECHANISM
G	DR2	019732	111677	GM25	I	A00	S	D	1	F		AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	DR2	019728	112977	GM25	D	B12	C	D	D	T		2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GROUNDED PUMP STATOR
G	DR2	019810	120377	GM25	C	A12		D	4	T		2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM
G	DR2	021648	030778	GM25	C	A00	S	D	8	F		OPERATR SHOOK AIR START SOLENOID &UNIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC
G	DR2	020655	030878	GM25	G	A14	S	D	8	F		ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021538	052278	GM25	G	A02		D	8	T		U-2 DG TRIPPD 4 TIMES ON OVERSPEED;R/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH
G	DR2	021882	063078	GM25	D	B14	I	D	G	I		2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	DR2	023337	121678	GM25	C	A00	R	D	4	T		2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TD2 RELAY CLEANED;TD2 AND AIR VALVE ?
G	DR3	017509	032277	GM25	K	A10		D	G	M		GEN FIELD FAILD TO FLASH	INTERMITINT CAPACITOR SHORT IN FLASH CIRC
G	DR3	019722	112277	GM25	G	A10	R	D	8	T		3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	DR3	019727	112977	GM25	G	B10	R	D	8	N		3 DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	EN1	014778	031576	FM25	C	A10		D	D	T		1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	EN1	015557	062676	FM25	B	B02	S	D	8	T		DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH
G	EN1	015568	080576	FM25	K	A06	S	D	1	T		DG 1A TRIPPED DUE TO LOSS OF EXCITATION DRNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	EN1	015947	081476	FM25	M	A00	R	D	U	F		1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	EN1	016665	091176	FM25	G	A10	R	D	1	T		1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	018644	061377	FM25	D	B14	F	D	4	T		1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25	D	B14	I	D	4	F		1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS
G	EN1	018647	062577	FM25	D	B14	I	D	4	N		1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
G	EN1	018659	081277	FM25	K	B10		D	8	T		1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG MTR OPER XFMR PWR SUP DIODES FAIL

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
									DEMAND					
G	EN1	020013	111977	FM25	K	B02	S	D	4	T	1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	EN2	022751A	102878	FM25	G	A10	R	D	8	T	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	SITCKING GOVNR BOOSTR SERVO
G	FP1	016496	111776	GM25	I	A10	R	D	8	T	"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	016600	121576	GM25	B	A10	R	D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016971	011977	GM25	B	A10	R	D	1	T	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL
G	FP1	017725	042077	GM25	I	A10	R	D	8	T	DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	FP1	023101	120578	GM25	G	A02	S	D	4	T	"A"DGTRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR
G	QC1	014447	030376	GM25	K	A10		D	8	T	DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	WESTHSE FFCO RELAY FLD TO ENRGZ FLD FLASH
G	QC1	023119	113078	GM25	K	A10		D	8	T	#1DG STARTED BUT GEN FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	PB2	018886	082677	FM30	D	A01	S	D	1	T	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP, BUT NOT DIESEL TRP
G	PB2	018887	082677	FM30	I	A06	S	D	4	T	E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
G	PB2	019414	101877	FM30	D	A02	S	D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	PB2	020685	022878	FM30	B	B12	C	D	8	T	E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
G	PB2	023049A	122178	FM30	G	A10		D	1	T	E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/28/78
G	PI1	022128	080278	AL25	K	B01		D	8	T	B DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
G	QC1	014120	011276	GM25	C	A10		D	8	T	UNIT 1 DG FAILED TO START WHEN MODE SW IN START MD	AIR START SOL VLV DIRTY-NOT OPEN FULLY
G	QC1	018112	042577	GM25	K	A10		D	G	T	WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
G	QC1	019994	112877	GM25	K	A10		D	4	M	1/2 DG WOULD NOT START SUCCESSFLY, FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT
W	BV1	017883	022477	GM25	L	B05		D	4	T	DG OUTPUT BREAKER TRIPPED;INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST
W	BV1	017348	031477	GM25	J	A04	B	D	4	T	#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH

DEMAND

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	BV1	017621	041177	GM25	J	A04	R	D	4	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
W	BV1	017693	042677	GM25	J	A04	B	D	4	T	#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
W	BV1	017827	050977	GM25	J	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
W	BV1	018068	060377	GM25	J	A04	R	D	1	T	#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
W	BV1	020437	011178	GM25	J	A04	R	D	4	T	#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
W	BV1	021647	060178	GM25	B	B02		D	1	T	#2 DG LUBE OIL LEAK AT ENGINE CONTROL PANEL GAUGE	GAUGE WAS CALIBRATED ON 5/21;LOOSE CONN.
W	BV1	022137	072878	GM25	K	A10	R	D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
W	BV1	0223958	090578	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY,1 HOUR RUN AT FULL LD
W	BV1	0223948	091278	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWTCH	CLOSED LATER NEGATING TROUBLESHOOTING
W	DC1	016647	120976	WD30	K	A10		D	1	T	C-D DG TRIPPD ON OVERSPEED--BLOWN FUSE ON INVERTER	FAILD SILICONE RECTIFIER IN DG INVERTER
W	HN1	014162	020376	GM25	A	A02	S	D	1	T	EDG-2B TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	IP3	015733	083076	AL18	G	B02	T	D	4	T	EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY
W	IP3	016035	092476	AL18	G	B02	T	D	4	T	EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONTROLE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	IP3	016286	102176	AL18	L	B10	S	D	8	T	UNABLE TO CONTROL SPEED OF NO 31 DG	UNIT/PARA RELAY OPER INTRMIT-DEFECTV CONN
W	JF1	019055	081777	FM40	C	A10	B	D	U	T	DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM40	C	A10	B	D	U	T	DG 1B TRIPPED ON OVSPD DURING MANLAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
W	JF1	019359	091377	FM40	C	B10	B	D	D	N	DSL GEN 1B EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019360	091677	FM40	C	B10	B	D	8	N	DSL GEN 1-2A EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019368	100277	FM40	G	A10		D	8	T	DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 130V RATING
W	JF1	021185	032378	FM40	C	A02		D	D	N	DSL GEN 1B FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING

DEMAND

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MKW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	022235	081278	FM40		J	A10		S	D	8	N	OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWTCHS OUT OF ALIGNMT
W	JF1	022374	082778	FM25		G	A10	R	D	8	N		2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022373	090578	FM40		G	A10	R	D	8	N		1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP, CAUSED BY FAIL DIODES
W	JF1	022630	091778	FM40		G	A10		D	4	T		1B DG FREQ COULD NOT BE INCR ABOVE 58.5 HZ	CPLNG BET DC MTR AND GOV POS POT WAS LOOS
W	JF1	022987	100378	FM25		J	A02	S	D	1	T		1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR, INCRCTLY POS
W	KE1	019171	092077	GM25		E	B06	C	D	4	T		DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBOCHG	CARBON BUILDUP DUE TO SHORT DURATION OPER
W	KE1	020095	122177	GM25		G	B02	S	D	4	T		D/G 1B WOULD NOT PICK UP MORE THAN 1500 KW LOAD	SYNCHRO MOTOR LIMIT SWCHS ADJUSTED IMPROP
W	PR2	015735	091076	FM36		F	B02		D	4	T		D1 DG TRIPPED ON HIGH CRANKCASE PRESSURE	HOSE CLAMPS ON PIPE NOT CONN AFTER MAINT
W	PT1	017146	020977	GM25		J	A10	R	D	8	T		3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY IMG DISC
W	PT1	021445	051778	GM25		J	A10	R	D	D	T		4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	WEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
W	SU1	022100	071878	DL10		A	A06		D	1	T		NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCORP PROC TO EXERCISE
W	SU1	014869	041676	GM25		F	A01	R	D	G	T		#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
W	YR1	017316	030177	GM02		C	A10		D	4	T		#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
W	ZI1	022515	090278	CB40		C	A10		D	4	T		1B DIESEL GENERATOR FAILED TO START	STARTIN' AIR DIST BUSHING ROTATED IMPROP
W	ZI1	022646	091478	CB40		B	A02	C	D	4	N		1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T
W	ZI2	017808	042777	CB40		G	B10	R	D	1	T		GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
W	ZI2	019714	111077	CB40		B	B12	B	D	G	T		"OP" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL
W	ZI2	020260	010978	CB40		G	B10	R	D	1	T		2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP

TIME

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	019578	102377	GM25		C	A14		T	T	B	T	#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
B	AR1	021663	032078	GM25		E	B00		T	G	T		DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
B	CR3	018231	060277	FM30		A	A13		T	4	T		MAN DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS
B	DB1	020273	010978	GM25		F	A09		T	4	T		DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR
B	TI1	020295	011278	FM30		B	A14	S	T	4	T		EDG 18 FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
B	TI1	020997	031878	FM30		B	A10		T	B	T		EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH
B	TI2	021605	052378	FM30		F	B09	R	T	B	M		DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
B	TI2	023430	122878	FM30		A	A09		T	B	T		DF-X-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER
C	CC1	017622	051577	FM25		M	A09	R	T	B	T		#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC1	019592	101077	FM25		K	A13		T	B	T		#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	CC2	016722	121576	FM25		C	A09		T	4	T		#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	CC2	017986	060177	FM25		D	A12		T	D	T		#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESVL
C	CC2	020226	011078	FM25		J	B10		T	1	T		#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
C	FC1	015614	081576	GM25		G	B10		I	B	N		SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING
C	FC1	017628	040677	GM25		C	A09	R	I	4	T		DG-1 FAILD TO STRT WTHN 10 SEC,STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017662A	041477	GM25		C	A09	R	I	4	T		DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
C	MI2	0142600A	021776	FM25		A	A09	B	T	1	N		DG 12U FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142600B	021876	FM25		A	B09	B	T	1	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142600C	022076	FM25		A	B09	B	T	1	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	MI2	0142600D	022376	FM25		F	B04	B	T	G	N		DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
													TIME	
C	MI2	015106	060276	FM25	F	B09	B	T	1	T			DG 13U TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	MI2	015583A	081676	FM25	G	A10	B	T	4	T			DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583B	081776	FM25	G	A10	B	T	4	T			DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583C	082376	FM25	G	B10	B	T	4	T			DG 12U TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015906	090176	FM25	B	B12	C	T	1	N			DG 13U SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	016031	092276	FM25	D	B09	B	T	G	T			12U DG RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016626	120176	FM25	D	A09	B	T	G	T			13U DG STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016972	081777	FM25	D	B09	B	T	G	T			12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	0169768	092077	FM25	D	B09	B	T	G	N			COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	019255	092477	FM25	1	B14	S	I	8	T			12U DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW CUT OF ADJ ON DG OVSPD TRIP MECH
C	MI2	021386	050678	FM25	D	B09	B	T	G	T			12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	022131	080378	FM25	A	B07		I	8	T			DG 13U SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
C	MI2	023213	120578	FM25	D	B09	B	T	G	T			12U DG S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
C	MY1	020783	021878	GM25	G	A09		T	8	T			DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD
C	SL1	017134	011877	GM30	E	B04	R	T	G	T			1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	017135A	011977	GM30	A	A09	R	I	1	T			THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017135B	011977	GM30	A	A09	R	T	1	T			THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	019511	092677	GM30	E	B04	R	T	G	T			1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
C	SL1	022532	090578	GM30	J	A10		T	8	T			MAN DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BF1	014102	011476	GM30	G	A12		I	1	T			FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRAULIC ACTUATOR

TIME

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	016261	110376	GM30		G	B09		C	T	4	T	D DG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BP1	014417	032476	CA02	D		B09	R	T	8	T		DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP INLET SCREEN PLUGGD
G	BP1	014894	051676	CA02	D		B09	R	T	G	N		DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	015444	081276	CA02	C		A10	R	T	8	T		WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BP1	018102	051877	CA02	D		A00	R	T	4	T		H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	T TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	020580	020978	CA02	D		B12		T	4	T		DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT
G	BR1	020008	120977	NM30	C		A09		T	D	T		#3 DG START TIME 10.2 SEC VS 10	CARBON BUILDUP ON AIR VALVE STUCK SHUT
G	BR1	022454	091178	NM30	A		B07		T	4	T		#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
G	BR2	014614	031476	NM30	A		B12		T	D	T		AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANUL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	BR2	016399	111176	NM30	C		A08		T	D	T		DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	BR2	016823	122976	NM30	G		B10		T	8	T		#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC
G	CO1	016560	110776	CB40	K		B08		T	D	T		DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	POT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	CO1	023044	091278	CB40	F		A09		T	G	T		#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL
G	DA1	014334	022776	FM25	B		B12	R	T	D	T		SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT CLVER PLATE
G	DA1	014337	031776	FM25	H		B12	R	T	D	T		SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	DA1	014953	062276	FM25	D		B09	C	T	8	T		1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DR1	021517	050778	GM16	B		A10		I	D	N		TEMORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR2	016168	093076	GM25	K		B09		T	D	T		2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR2	016443	102976	GM25	I	A14	S	T	D	T			UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLEND	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	019651	103077	GM25	E		B06		T	G	T		UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTART	TURBO-CHARGR CLUCTHESHAFT BEARING

TIME

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MKW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR2	019723	120277	GM25	C	A13	R	T	1	T	UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	020242	010378	GM25	C	A13	R	T	8	T	UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR3	014439	030376	GM25	G	A13	R	I	4	T	DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016015	092176	GM25	B	B09		I	4	T	DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	DR3	016167	100976	GM25	G	A13	R	T	4	T	LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	DR3	016455	110576	GM25	G	B10	R	T	8	T	LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	EN1	014795	050176	FM25	M	B13	S	T	8	T	NORMAL SURV. TEST DG 1C TRIPPD; LOOSE WIRE	NUT VIBRATED OFF WIRE-PANEL R43-P001C
G	EN1	020214	112577	FM25	G	A08		T	8	T	1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED
G	EN2	0227518	103178	FM25	G	A10	R	I	8	N	"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	FP1	020518	021578	GM25	J	B10		I	1	T	"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH CKT FOR OUTPUT BRKR
G	MU1	016186	101076	GM25	C	A09		I	D	T	#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 START SYS AIR CONI COMP FOULED W RUST
G	PB2	022462	083078	FM30	G	A10		I	1	T	E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD SY
G	PI1	015966	092276	AL25	H	B04	B	T	D	T	"A" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	016368	111776	AL25	H	B04	B	T	D	T	"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	QC1	019100	082477	GM25	L	A13		T	4	T	UNIT 1 DG STARTED AND RAN,BUT NO VLTG,SYNCH,FREQ	FREQ GEN TACH SET SCREWS VIBRATED LOOSE
G	VY1	014740	050676	FM30	F	A09	R	I	4	N	"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VY1	015739	082576	FM30	A	B13		I	1	T	"B" DG OOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
G	VY1	016323	062377	FM30	F	B13	R	I	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VY1	019858	072677	FM30	C	A09		I	4	T	"A" DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
G	VY1	020194	121977	FM30	F	B13	R	I	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
										TIME				
G	VT1	020464	012478	FM30		D	B09			T	4	T	DIESEL GENERATOR WAS TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNT AROND HX
W	BV1	014903	052076	GM25		C	A09	R		T	4	N	DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEMS
W	BV1	017696	042977	GM25		C	A09	R		T	4	N	DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	BV1	018628	071777	GM25		K	A10	R		T	8	T	#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
W	BV1	021355	041878	GM25		A	B12			T	D	N	#1 DG WAS S/D AND DECLARED INOPERABLE--'L LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL
W	DC2	021681	061778	WD30		A	B07			T	6	T	2CD DG WIDELY VARYING CYLNDR TEMP TAGGED OUT	FUEL INJECT. PUMP FAILD
W	DC2	022026	072878	WD30		G	B10	R		T	4	T	#2 AB DG OVERSPED WHL UNLOADG PREVIOUS OCCURRENCE?	WORN LINKAGE CAP SCREW BROKE IN GOVENOR
W	DC2	022563	091178	WD30		C	A13			T	4	T	2AB STARTED FOR LOAD TEST WAS TRIPPED OFF MANUALLY	PISTON BOLT FOR AIR CHECK V'V LOOSE
W	JF1	020992	030278	FM40		C	A09	C	I	D	T		DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED START VLVS
W	JF1	020996	030878	FM25		C	A09	C	T	8	T		DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	PR1	018342	061777	FM30		G	B10		T	8	T		D2 DG FAILED TO RESPOND TO LOAD CHANGE SIGNALS	LINK LEVER KEY MISSING,CAPSCREWS LOUSE
W	PR1	018417	062977	GM25		I	A14	S	T	4	T		3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	RG1	022450	081678	AL18	J	A10			T	8	T		B EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS
W	RD2	014823	030176	FM25		A	B07	R	T	8	T		"B" EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	RD2	019354	091377	FM25		A	B07	R	T	8	T		"A" DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING
W	RD2	021313	041078	FM25		G	B13		T	4	T		EDG LOAD FAILED TO INCREASE ABOVE 900KW	COMM BRUSH VIBRATED OUT OF GOV SPD CHGR
W	SA1	018799A	073077	AL25		A	A10	C	T	4	N		1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	018799B	073077	AL25		A	A10	C	T	4	N		1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA
W	SA1	019920	111777	AL25		D	B13	B	I	4	T		1C DIESEL DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
W	SA1	019924	120277	AL25		E	B04		T	G	T		1B DIESEL DECLARED INOP-TURBOCHGR & EXH EXP JT FLD	CAUSE DETERMINED TO BE TURB BLADE FAILURE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	TIME	FAILURE MODE	FAILURE MECHANISM
W	SO1	021316	032678	DL10		A	A10		R	T	1	T		NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
W	TR1	018447	062277	GM40	G	B10			I	4	N			WESI DG FAILED TO ASSUME MIN REQUIRED LOAD	BRUSH FALLEN OUT OF DC GOV DRIVE MOTOR
W	TO3	017591	020377	GM25	A	A12		R	T	U	T			DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	TO3	018147	033177	GM25	A	A12		R	T	4	T			DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
W	TO3	021919	060178	GM25	A	B10			T	4	T			B DG HI LEVEL IN FUEL TANK (ENG.MOUNTD) DG S/D	LEVEL SWITCH MALFUNCTION--REPLACED SWITC
W	TR1	018653	080277	GM02	D	B09	C	I	D	T				#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
W	TR1	018654	080277	GM02	D	B09	C	I	D	T				#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL
W	ZI1	015288	062176	C840	A	B13			T	4	N			1A DG HAD FO LEAKAGE AT THE 8L FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ
W	ZI1	020255	010378	C840	K	B10	R	I	D	T				1B DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
W	ZI1	020348B	011678	C840	G	B10			T	4	T			DG "0" STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTRLL AIR PRESS-TRIP VLV "0" RING LK
W	ZI1	022110	080178	C840	C	A10			T	1	T			1B DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
W	ZI2	017809	050677	C840	I	B13	C	I	T	4	T			DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	ZI2	019780	111777	C840	I	B13	C	I	T	4	T			"0" DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	ZI2	020258	010678	C840	K	B10	R	I	T	8	T			2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	ZI2	021544	051778	C840	K	B14	I	I	T	8	T			2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUI

VEN-	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	023166	111778	FM30		M	A00		R	U	1	T	EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWICE AFTER ANOMALY
B	OB1	021580	050978	GM25		E	B00			U	G	T	GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
B	RS1	015359	071576	GM25		M	A00			U	D	T	SEVERAL ATTEMPTS TO START "B" DG WERE UNSUCCESSFUL	NO DEFINITE CAUSE COULD BE FOUND
B	RS1	018853	082477	GM25		M	A00		R	U	1	T	DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED
B	TI2	021669	042578	FM30		F	B00		R	U	1	T	"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
C	CC1	016405	102576	FM25		M	B00		R	U	1	T	#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C	CC1	017213	111876	FM25		M	A00		R	U	1	T	#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	021660	041678	FM25		L	A00			U	1	T	#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEXT TIM
C	CC1	021655	041378	FM25		M	A00			U	1	N	#11 DG FAILD TO START ON LOSS OF OFFSITE POWER	START/FAILURE ALARM DISPLAYD NO ABNORMALS
C	CC2	018422	022277	FM25		C	A00			U	8	T	#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	CC2	017457	031777	FM25		M	A00		R	U	1	T	#12 DG VENT FAN FAILD TO START ON SIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
G	BP1	015448	080576	CA02		M	A03		R	U	U	T	DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BP1	015449	080576	CA02		D	A00		R	U	8	N	DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	016072	090276	CA02		A	A06		R	U	U	T	FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016364	102876	CA02		G	A00		R	U	U	T	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02		G	A00		R	U	U	T	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016597	120276	CA02		G	A00		R	U	U	T	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122076	CA02		G	A04		R	U	U	T	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN
G	BP1	016912	122776	CA02		A	A04		R	U	U	T	START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	016910	010377	CA02		G	A00		R	U	U	T	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	ITEM	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	020298	032477	CA02		G	ALL		R	U	U	T	EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BP1	018103	052677	CA02		A	A00		R	U	U	T	START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	019541	102077	CA02		C	A00		R	U	U	T	START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	019993	112477	CA02		A	A00		R	U	1	T	START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BP1	020575	020278	CA02		M	A00		R	U	U	T	START TIME 28.5 SECS VS 13.9 SECS	CAUSE UNKNOWN
G	CD1	015872	082376	CB40		A	B00			U	B	T	FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	DR2	019913	052376	GM25		C	A00			U	1	T	UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYST
G	DR2	019905	120477	GM25		J	A00			U	U	T	U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	DR2	022262	082478	GM25		C	A10	R		U	4	T	2/3 UNIT OOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR2	022589	092278	GM25		C	A00	R		U	6	T	UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	EN1	014796	051576	FM25		M	A00			U	U	T	1B DG FAILD TO START ON FIRST ATTEMPT	UNKNOWN WILL DO WEEKLY START TO DETERMINE
G	EN1	016842	122576	FM25		M	B00	R		U	U	T	DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITVE	CHECKNG CLT LOGIC ON 1C DG
G	EN1	016843	123176	FM25		M	A00	R		U	1	T	MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY
G	EN1	018141	052877	FM25		M	A00			U	U	T	1A DG FAILD TO COME UP TO RATED VOLT IN REQD. TIME	TOOK 16 SEC VS 12 SEC RETESTED SATISFAC
G	EN1	020031	081877	FM25		F	B00	R		U	G	T	DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	UC1	015042	060876	GM25		C	A00			U	1	T	DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	PB2	020696	121977	FM36		L	A00			U	U	T	E1 DG TRIPPED ON "A" PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXTV TST
G	PB2	0233498	122178	FM30		G	A00			U	1	T	E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
W	BV1	015913	090376	GM25		J	A00			U	1	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
N	DC2	020984	031978	WD30		C	B10			U	4	F	2CD DG GASKETS ON AIR LINE TO #5 CYL BLEW OUT	FRACTURED AIR START CHECK VALVE

UNKNOWN

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	DC2	022839	101978	W030	A	A00			U	U	1	T	2AB FAILD TO START DUE TO LACK OF FUEL TO INJECTRS	UNKNOWN BUT REPLACED FUEL FILTER ELEMENT
W	KE1	019519	102577	GM25	M	A00			U	U	U	T	D/G 1A STARTED & WAS AT 70 RPM WHEN IT STOPPED	COULD NOT DETERMINE CAUSE OF FAILURE
W	TH1	018607	042977	GM40	M	A00			U	U	U	N	EDG FAILD TO START ON LOSP (PARTIAL) THE 2ND TIME	NO LER FOR DG FAILURE JUST THE LOSP
W	ZI1	018174	092478	CB40	M	A00			U	U	U	T	"C" DIESEL GENERATOR FAILED TO START	NO CAUSE COULD BE DETERMINED
W	ZI1	023308	122078	CB40	M	A00			U	U	D	N	1B DG FAILD TO START DURN AN INADVRTNT SAFTY INJEC	EXTENSIVE TESTING REVEALD NO CAUSE

APPENDIX M

DIESEL-GENERATOR EVENTS (FAILURES) SORTED BY REPAIR-TIME INTERVAL

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
V	COMMAND FAULTS
Y	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATION
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-400 KW
10	500-1000 KW
18	1750-1950 KW
25	2500-2850 KW
30	3000-3500 KW
40	4000-4418 KW

6 TO 1 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MKW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018565	072677	FM30		I	A06		S	D	1	I	"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
B	CR3	023166	111778	FM30		M	A06		R	U	1	T	EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWICE AFTER ANOMALY
B	R21	018653	082477	GM25		M	A06		R	U	1	T	DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED
B	R21	022613	100478	GM25		A	B01		S	U	1	N	"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
B	T11	014298	022178	FM30		J	A06		S	D	1	T	"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW
B	T12	021609	042578	FM30		F	B06		R	U	1	T	"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
C	CC1	016405	102576	FM25		M	B00		R	U	1	I	#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C	CC1	017213	111876	FM25		M	A00		R	U	1	T	#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	018306	061777	FM25		F	B02			D	1	I	#11 DG STARTD;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOOSE AND FELL OFF DG
C	CC1	018467	071377	FM25		D	B02		S	D	1	I	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;DP SWITCH ISOLATED
C	CC1	021060	041078	FM25		L	A00			U	1	T	#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEXT TIM
C	CC1	021055	041378	FM25		M	A00			U	1	N	#11 DG FAILD TO START ON LOSS OF OFFSITE POWER	START/FAIL E ALARM DISPLAYD NO ABNORMALS
C	CC1	023380	121878	FM25		M	B06		R	D	1	T	#11 DG SHUTDOWN DUE TO ROOM VENT,FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS
C	CC2	017457	031777	FM25		M	A06		R	U	1	T	#12 DG VENT FAN FAILD TO START ON SIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
C	CC2	020226	011078	FM25		J	B10			T	1	T	#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
C	FC1	014559	040776	GM25		M	A06		S	D	1	T	START ON SECONDRY AIR REQUD 16.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE
C	FC1	021692	061978	GM25		K	A10		R	D	1	T	DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	M12	014260A	021776	FM25		A	A09		B	I	1	N	DG 12U FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	M12	014260B	021876	FM25		A	B09		B	I	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT
C	M12	014260C	022076	FM25		A	B09		B	I	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR,CARBON IN CRKCSE VENT

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	MI2	015106	060276	FM25		F	B09		B	T	1	T	DG 13U TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRNCSE AIR EDUCTOR FOUND DIRTY
C	MI2	015406	090176	FM25		B	B12		C	T	1	N	DG 13U SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	016923	081077	FM25		G	A01		S	D	1	N	DG 12U FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN MNO FUEL* FROM PREV S/D
C	MI2	019929	110977	FM25		K	A01		S	D	1	T	DG 13U TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
C	MY1	022715	092578	GM25		A	A06		S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
C	SL1	027135A	011977	GM30		A	A09		R	T	1	T	THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017.35B	011977	GM30		A	A09		R	T	1	T	THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017441	030177	GM30		I	A01		S	D	1	T	1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
G	BF1	014162	011476	GM30		G	A12			T	1	T	FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRAULIC ACTUATOR
G	BF3	019133	091977	GM30		K	A10			D	1	T	3D DG TRIPPD ON OVERSPEED #GOVERNOR INOPERABLE	TD FUSE OPEN DISENABLING FIELD CIRCUIT
G	BP1	019993	112477	CA02		A	A00		R	U	1	T	START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BR2	020612	021378	NM30		K	A01		S	D	1	N	FOLLOWING SCRAM ON UNIT 1 #1 DG LO RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET
G	DA1	017963	051277	FM25		G	B06		S	D	1	T	1G-3I DG WOULD NOT REACH FULL LOADING ONLY 2500 KW	SPEED SETTING ADJUSTMNT NOT RESET
G	DR1	0204088	012778	GM10		M	A11		C	D	1	N	D-1 B/U DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER
G	DR2	014913	052376	GM25		C	A00			U	1	T	UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYS
G	DR2	017397	032277	GM25		C	A10		R	D	1	T	UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	018283	083077	GM25		G	A00		R	D	1	T	2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE OUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25		G	A00		R	D	1	T	D 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE OUT-OF ADJUST GOVENOR COMPENSATIN
G	DR2	019732	111677	GM25		I	A00		S	D	1	T	AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	DR2	019723	120277	GM25		C	A13		R	T	1	T	UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5

0 TO 1 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MDL	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	015968	080576	FM25	K	A06			S	D	1	T	DG 1A TRIPPED DUE TO LOSS OF EXCITATION DRNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	EN1	016065	091176	FM25	G	A10			R	D	1	T	1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	016043	123176	FM25	M	A00			R	U	1	F	MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY
G	FP1	015000	121576	GM25	B	A10			R	D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016971	011977	GM25	B	A16			R	D	1	F	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL
G	FP1	020518	021578	GM25	J	B10				I	1	T	"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH CKT FOR OUTPUT BRKR
G	DC1	015042	060876	GM25	C	A00				U	1	T	DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	PB2	018086	082677	FM30	D	A01		S	D	1	T	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP, BUT NOT DIESEL ERP
G	PB2	019414	101877	FM30	D	A02		,	D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	PB2	022462	083078	FM30	G	A10			T	1	T	E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD SY
G	PB2	023349A	122178	FM30	G	A10			D	1	T	E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/28/78
G	PB2	023349B	122178	FM30	G	A00			U	1	T	E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
G	VY1	015739	082576	FM30	A	B13			T	1	F	"B" DG OOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
*	BV1	015913	090376	GM25	J	A00			U	1	T	#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
*	BV1	018068	060377	GM25	J	A04	R		D	1	T	#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
*	BV1	021647	060178	GM25	B	B02			D	1	T	#2 DG LUBE OIL LEAK AT ENGINE CONTROL PANEL GAUGE	GAUGE WAS CALIBRATED ON 5/21;LOOSE CONN.
*	BV1	022137	072878	GM25	K	A10	R		D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
*	BV1	022395B	090578	GM25	J	A30	K		D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY, 1 HOUR RUN AT FULL LD
*	BV1	022394B	091278	GM25	J	A00	R		D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWTCH	CLOSED LATER NEGATING TROUBLESHOOTING
*	DC1	016047	120476	WC30	K	A10				D	1	T	C-D DG TRIPPD ON OVERSPEED--BLOWN FUSE ON INVERTER	FAILD SILICONE RECTIFIER IN DG INVERTER

6 TO 1 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	DC2	022839	101978	W030		A	A00			U	1	T	2A8 FAILD TO START DUE TO LACK OF FUEL TO INJECTRS	UNKNOWN BUT REPLACED FUEL FILTER ELEMENT
W	HN1	014162	020376	GM25		A	A02	3		D	1	T	EDG-28 TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	IP3	015733	083076	AL18		G	B02	1		D	1	T	EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY
W	JF1	022987	100378	FM25		J	A02	5		U	1	T	1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR, INCRCTLY PO>
W	S01	021316	032878	DL10		A	A10	R		4	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
W	S01	022106	071878	DL16		A	A06			D	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCOMP PROC TO EXERCI..
W	Z11	022110	080178	CB40		C	A10			T	1	T	1B DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
W	Z12	017808	042777	CB40		G	B10	R		D	1	T	GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
W	Z12	020260	010978	CB40		G	B1C	R		D	1	T	2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	EFFE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018631	060277	FM30		A	A13			T	4	I	"A" DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS
B	D81	020273	010978	GM25		F	A09			T	4	T	DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR
B	D81	021852	060478	GM25		K	A10			D	4	I	1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE FOR DG 1-1
B	D81	023607	103178	GM25		M	B11	S		D	4	T	1-2 DG S/D DUE TO ROOM TEMP ROSE TO 110 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
B	K51	015622	080676	GM25		C	A10			D	4	T	"A" DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR STRT MTR DOC
B	T11	020295	011278	FM30		B	A14			T	4	T	EDG 18 FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
C	CC1	019587	072976	FM25		D	A02	S		D	4	N	#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	018468	071177	FM25		B	B02	C		D	4	M	#11 DG ON FIRE DUE TO L.O. HITTING HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY
C	CC2	016722	121576	FM25		C	A09			T	4	T	#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	CC2	021491	080178	FM25		D	B10	S		D	4	I	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C	FC1	017E62B	040677	GM25		C	A09	R		T	4	T	DG-1 FAILD TO START WITHN 10 SEC, STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017E62A	041477	GM25		C	A09	R		T	4	I	DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS
C	MI2	015583A	081676	FM25		G	A10	B		T	4	T	DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583B	081776	FM25		G	A10	B		T	4	T	DG 12U FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583C	082376	FM25		G	B10	B		T	4	T	DG 12U TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	016036	091976	FM25		B	B12	B		D	4	N	12U DG HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET
C	SC1	016881	110276	GM36		M	A01	S		D	4	F	1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP
G	BP1	016261	110376	GM30		G	B09	C		T	4	T	D G ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BP1	016587	111876	CA02		C	A10	R		D	4	T	FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016911	122876	CA02		C	A10	R		D	4	M	DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945467

1 TO 4 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MKW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	018162	051877	CA02		D	A00		R	T	4	T	H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	1 TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	020580	020978	CA02		D	B12			T	4	T	DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT
G	BR1	0168548	010477	NM30		B	A04	C		D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER &JACKT
G	BR1	0168548	010477	NM30		B	A04	C		D	4	T	#4 DG TRIPPD R/X AT POWER, TO SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT
G	BR1	022454	091178	NM30		A	B07			T	4	T	#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
G	BR2	014136	010976	NM30		J	A10			D	4	N	#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	BR2	019810	120377	GM25		C	A12			D	4	T	2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM
G	BR2	022262	082478	GM25		C	A10		R	U	4	T	2/3 UNIT DOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	BR2	023337	121678	GM25		C	A00		K	D	4	T	2/3 DG AIR START MOTORS DISENGAGED AFTER FEW SECS.	TDZ RELAY CLEANED;TDZ AND AIR VALVE ?
G	BR3	014439	030376	GM25		G	A13		K	T	4	T	DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	BR3	016015	092176	GM25		B	B09			T	4	T	DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	BR3	016187	100976	GM25		G	A13		R	T	4	T	LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	EN1	018644	061377	FM25		D	B14		I	U	4	T	1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25		D	B14		I	D	4	T	1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS
G	EN1	018647	062577	FM25		D	B14		T	D	4	N	1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
G	EN1	020013	111977	FM25		K	B02		S	D	4	T	1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	FP1	023101	120578	GM25		G	A02		S	D	4	T	"A"DGTRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR
G	PB2	013087	082677	FM30		I	A06		S	D	4	T	E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
G	QC1	019166	092477	GM25		L	A13			T	4	T	UNIT 1 DG STARTED AND RAN,BUT NO VLTG,SYNCH,FREQ	FREQ GEN HUB SET SCREWS VIBRATED LOOSE
G	QC1	019994	112677	GM25		K	A10			D	4	M	1/2 DG WOULD NOT START SUCCESSFLY,FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT

1 TO 4 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	EFFECT	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	WF1	014740	050676	FM30		F	A09		R	T	4	N	"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	WF1	018323	062377	FM30		F	B13		R	I	4	I	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	WF1	019658	072677	FM30		C	A09			I	4	I	"A" DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
G	WF1	020194	121977	FM30		F	B13		R	I	4	I	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
G	WF1	020464	012478	FM30		D	B09			I	4	I	DIESEL GENERATOR "A" TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNT ARND HX
W	BV1	014903	052076	GM25		C	A09	K		I	4	N	DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEMS
W	BV1	017883	022477	GM25		L	B05			D	4	I	DG OUTPUT BREAKER TRIPPED;INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST
W	BV1	017348	031477	GM25		J	A04		B	D	4	I	#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH
W	BV1	017621	041177	GM25		J	A04		B	D	4	I	#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
W	BV1	017693	042677	GM25		J	A04		B	D	4	I	#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
W	BV1	017696	042977	GM25		C	A09		R	I	4	N	DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	BV1	017827	050977	GM25		J	A04		R	D	4	I	#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
W	BV1	020437	011178	GM25		J	A04		R	D	4	I	#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
W	DG2	020981	031978	WD30		C	B10			D	4	I	2CD DG GASKETS ON AIR LINE TO #5 CYL BLEW OUT	FRACTURED AIR START CHECK VALVE
W	DG2	022026	072878	WD30		G	B10		R	I	4	I	#2 AB DG OVERSPED WHL UNLOADG PREVIOUS OCCURRENCE?	WORN LINKAGE CAP SCREW BROKE IN GOVENOR
W	DG2	022563	091178	WD30		C	A13			I	4	I	2AB STARTED FOR LOAD TEST WAS TRIPPED OFF MANUALLY	PISTON BOLT FOR AIR CHECK VALV LOOSE
W	IP3	016035	092476	AL18		G	B02		I	D	4	I	EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONT ELE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	JF1	022630	091778	FM40		G	A10			D	4	I	1B DG FREQ COULD NOT BE INCR ABOVE 56.5 HZ	COPLNG BET DC MTR AND GOV POS POT WAS LOOS
W	KE1	019171	092077	GM25		E	B06		C	D	4	I	DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBOCHG	CARBON BUILDUP DUE TO SHORT DURATION OPER
W	KE1	020095	122177	GM25		G	B02		S	D	4	I	D/G 1B WOULD NOT PICK UP MORE THAN 1500 KW LOAD	SYNCHRO MOTOR LIMIT SWCHS ADJUSTED IMPROP

1 TO 4 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYST	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	PK2	015735	091076	FM30	F	B02			D	4	T		01 DG TRIPPED ON HIGH CRANKCASE PRESSURE	HOSE CLAMPS ON PIPE NOT CONN AFTER MAINT
W	PK1	018417	062977	GM25	I	A14	S		T	4	T		3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	RD2	021313	041078	FM25	G	B13			T	4	T		EDG LOAD FAILED TO INCREASE ABOVE 900KW	COMM BRUSH VIBRATED OUT OF GOV SPD CHGR
W	SA1	0187994	073077	AL25	A	A10	C		T	4	N		1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	0187998	073077	AL25	A	A10	C		T	4	N		1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA
W	SA1	019926	111777	AL25	D	B13	B		T	4	T		1C DIESEL DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
W	TR1	018447	062277	GM40	G	B10			T	4	N		WEST DG FAILED TO ASSUME MIN REQUIRED LOAD	BRUSH FALLEN OUT OF DC GOV DRIVE MOTOR
W	TD3	018147	033177	GM25	A	A12	R		T	4	T		DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
W	TD3	021919	060178	GM25	A	B10			T	4	T		B DG HI LEVEL IN FUEL TANK (ENG.MOUNTD) DG S/D	LEVEL SWITCH MALFUNCTION--REPLACED SWITC
W	YR1	017316	030177	GM02	C	A10			D	4	T		#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
W	ZI1	015188	062176	CB40	A	B13			T	4	N		1A DG HAD FO LEAKAGE AT THE BL FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ
W	ZI1	020348	011678	CB40	G	B10			T	4	T		3C "D" STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTROL AIR PRESS-TRIP VLV "D" RING LK
W	ZI1	022515	090278	CB40	C	A10			D	4	T		1B DIESEL GENERATOR FAILED TO START	STARTING AIR DIST BUSHING ROTATED IMPROP
W	ZI1	022646	091478	CB40	B	A02	C		D	4	N		1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T
W	ZI2	017809	050677	CB40	I	B13	C		T	4	T		DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
W	ZI2	019780	111777	CB40	I	B13	C		T	4	T		"D" DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE

4 TO 6 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AR1	014636	051176	GM25		C	A10			D	8	T	DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT
B	AR1	019578	102377	GM25		C	A14	F	F	8	T		#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
B	CR3	019302	092877	FM30	B	A10	S	D	8	T			3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
B	CR3	020221	122777	FM30	G	A09	R	D	8	T			3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
B	CR3	020278	010378	FM30	G	A09	R	D	8	T			3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
B	RS1	016656	120676	GM25	G	B10		D	8	T			DG #A# TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED,SPD DECR TO TRIP
B	T11	020997	031878	FM30	B	A10		T	8	T			EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH
B	T12	021605	052378	FM30	F	B09	R	F	6	M			DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
B	T12	023430	122878	FM30	A	A09		F	8	T			DF-A-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER
C	CC1	017822	051577	FM25	M	A09	R	F	8	T			#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC1	019592	101077	FM25	K	A13		F	8	T			#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	CC2	018422	022277	FM25	C	A00		U	8	T			#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	FC1	014590	042776	GM25	C	A02	T	D	8	U			DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPRPR SETNG FOR MAG PKUP ON SWITCHG TACH
C	FC1	015014	081576	GM25	G	B10		T	8	N			SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING
C	FC1	015722	081576	GM25	C	A14	T	D	8	U			DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWITCHG TACH DRIFTED
C	FC1	021799	071278	GM25	K	B10	R	D	8	T			DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDT)
C	FC1	022249	080978	GM25	K	B10	R	D	8	T			DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C	MI2	019255	092477	FM25	I	B14	S	T	8	T			12D DG APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW CUT OF ADJ ON DG OVSPD TRIP MECH
C	MI2	022131	080378	FM25	A	B07		T	8	T			DG 13D SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
C	MY1	020733	021878	GM25	G	A09		T	8	T			DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD

4 TO 8 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	SL1	022532	090578	GM30		J	A10		T	T	8	T	"A" DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BP1	019417	032476	CA02	D	809	R	T	8	T	DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	015449	080576	CA02	D	A00	R	U	8	N	DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	015444	081276	CA02	C	A10	R	T	8	T	WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BR1	019391	101177	NM30	G	805		D	8	T	#2 DG UNABLE TO MAINTAIN LOAD CYCLING SCORW	SHORTED LEADS TO GOVERNOR; INCORRECT ASMB
G	BR2	016823	122976	NM30	G	810		T	8	T	#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC
G	CO1	015872	082376	CB40	A	800		U	8	T	FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	CO1	016716	111076	CB40	J	A03	S	D	8	T	EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 59RELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	DA1	019953	062276	FM25	D	809	C	T	8	T	1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DA1	017756	051077	FM25	J	A10	S	D	8	T	1G-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DR2	020242	010378	GM25	C	A13	R	T	8	T	UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR2	021648	030778	GM25	C	A00	S	D	8	T	OPERATR SHOOK AIR START SOLENOID UNIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC
G	DR2	020855	030878	GM25	G	A14	S	D	8	T	ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021538	052278	GM25	G	A02		D	8	T	U-2 DG TRIPPD 4 TIMES ON OVERSPEED;R/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH
G	DR2	022589	092278	GM25	C	A00	R	U	8	T	UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR-START SYS WILL BE MODIFIED
G	DR3	016455	111576	GM25	G	B1C	R	T	8	T	LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	019722	112277	GM25	G	A10	R	D	8	T	3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT-2
G	DR3	019727	112977	GM25	G	B10	R	D	6	N	3 DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	EN1	016795	050176	FM25	M	B13	S	T	8	T	NORMAL SURV. TEST DG 1C TRIPPD; LOOSE WIRE	NUT VIBRATED OFF WIRE-PANEL R43-P001C
G	EN1	015557	062676	FM25	B	B02	S	D	8	T	DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH

4 TO 8 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	MKW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	018839	081277	FM25	K	B10				D	8	T	1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG MTR OPER XFMR PWR SUP DIODES FAIL
G	EN1	020214	112577	FM25	G	A06			T	8	T		1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED
G	EN2	022751A	102878	FM25	G	A10	R	D	8	F			"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	022751B	103178	FM25	G	A10	R	T	8	N			"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
G	FP1	016496	111776	GM25	I	A10	R	D	8	T			"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	017725	042077	GM25	I	A10	R	D	8	T			DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	GC1	014447	030376	GM25	K	A10		D	8	F			DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	WESTHSE FFCO RELAY FLD TO ENRGZ FLD FLASH
G	GC1	023119	113078	GM25	K	A10		D	8	T			#1DG STARTED BUT GEN FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	PB2	020685	022878	FM30	B	B12	C	D	8	F			E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
G	PI1	022128	080278	AL25	K	B01		D	8	F			B DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
G	QC1	014126	011276	GM25	C	A10		D	8	F			UNIT 1 DG FAILED TO START WHEN MODE SW IN START MD	AIR START SOL VLV DIRTY-NOT OPEN FULLY
*	BV1	018628	071777	GM25	K	A10	R	T	8	F			#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS *0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
*	DG2	021681	061778	WD30	A	B07		T	8	F			2CD DG WIDELY VARYING CYLNDR TEMP TAGGED OUT	FUEL INJECT. PUMP FAILD
*	IP3	010266	102176	AL16	L	B10	S	D	8	T			UNABLE TO CONTROL SPEED OF NO 31 DG	UNIT/PARA RELAY OPER INTRMIT-DEFECTV CONN
*	JF1	019360	091677	FM40	C	B10	B	D	8	N			DSL GEN 1-2A EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
*	JF1	019368	100277	FM40	G	A10		D	8	F			DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 130V RATING
*	JF1	020996	030878	FM25	C	A09	C	T	8	T			DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS
*	JF1	022235	081278	FM40	J	A10	S	D	8	N			OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWITCHS OUT OF ALIGNMT
*	JF1	022374	082778	FM25	G	A10	R	D	8	N			2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
*	JF1	022373	090578	FM40	G	A10	R	D	8	M			1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP, CAUSED BY FAIL DIODES

4 TO 8 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	PRI	018342	061777	FM30	G	B10			I	6	T	D2 DG FAILED TO RESPOND TO LOAD CHANGE SIGNALS	LINK LEVER KEY MISSING, CAPSCREWS LOOSE
W	PTI	017146	020977	GM25	J	A10	R	D	6	T		3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
W	RGA	022450	081678	AL18	J	A10		I	8	T		B EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS
W	R02	014823	030176	FM25	A	B07	R	I	8	T		"B" EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	R02	019354	091377	FM25	A	B07	R	I	8	T		"A" DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING
W	Z12	020258	010678	CB40	K	B10	R	I	8	T		2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
W	Z12	021544	051778	CB40	K	B14	I	I	8	T		2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUT

8 TO 24 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	RS1	015359	071576	GM25	M	A00				U	U	T	SEVERAL ATTEMPTS TO START "B" DG WERE UNSUCCESSFUL	NO DEFINITE CAUSE COULD BE FOUND
C	CC2	017486	060177	FM25	D	A12				F	D	T	#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESSI
G	BR1	020668	120977	NM30	C	A09				T	D	T	#3 DG START TIME 10.2 SEC VS 10	CARBON BUILDUP ON AIR VALVE SEICK SHUT
G	BR1	019948	121077	NM30	J	B00				D	D	T	SMOKE COMING FROM 32G RELAY AND 86DB RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	BR2	014614	031476	NM30	A	B12				T	D	T	AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANUL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	BR2	015461	061176	NM30	A	A02	C			D	D	T	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL H2O IN SADDLE & 4 DAY TANK
G	BR2	016399	111176	NM30	C	A08				T	D	T	DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	CO1	016560	110776	CB40	K	B08				T	D	T	DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	POT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	DA1	014334	022776	FM25	B	B12	R		T	D	T		SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DA1	014337	031776	FM25	H	B12	R		T	D	T		SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	DA1	015993	100776	FM25	F	A05				D	D	T	1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL
G	DA1	016452	110476	FM25	A	B04				D	D	T	DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	DR1	021517	050778	GM10	B	A10				T	D	N	TEMPORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR2	016468	093076	GM25	K	B09				T	D	T	2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR2	016443	102976	GM25	I	A14	S		T	D	T		UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLENO	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	016654	121876	GM25	A	B02	S		D	D	T		UNIT 2 DG FAILD TO CARRY REQD LOAD ;2000KW MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATON
G	DR2	019728	112977	GM25	D	B12	C		D	D	T		2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GROUNDED PUMP STATOR
G	EN1	014778	031576	FM25	C	A10				D	D	T	1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	MO1	016186	101076	GM25	C	A09				T	D	T	#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 START SYS AIR CONT COMP FOULED W RUST
G	PI1	015906	092276	AL25	H	B04	B		T	D	T		MAN DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED

8 TO 24 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	PI1	016368	111776	AL25		H	B04	B		I	D	T	"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
*	BV1	021355	041878	GM25		A	B12			I	D	N	#1 DG WAS S/D AND DECLARED INOPERABLE--OIL LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL
*	JF1	019359	091377	FM40		C	B10	B		U	D	N	DSL GEN 1B EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
*	JF1	020992	030278	FM40		C	A09	C		I	D	T	DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS
*	JF1	021185	032378	FM40		C	A02			D	D	N	DSL GEN 1B FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING
*	PI1	021445	051778	GM25		J	A10	R		D	D	I	4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	WEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
*	YK1	018653	080277	GM02		D	B09	C		I	D	T	#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
*	YK1	018654	080277	GM02		D	B09	C		I	D	T	#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL
*	ZI1	020255	010378	CB40	K	B10	R			I	D	I	1B DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
*	ZI1	023308	122078	CB40	M	A00				U	D	N	1B DG FAILD TO START DURN AN INADVRTNT SAFTY INJEC	EXTENSIVE TESTING REVEALD NO CAUSE

GREATER THAN 24 HOURS

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYSTEM	FAILURE MODE	FAILURE MECHANISM	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	AK1	022683	032078	GM25	E	B06			T	G	T		DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
B	D01	019816	122977	GM25	G	A14	3	0	G	N			DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
B	D01	020708	020878	GM25	E	B05		D	G	T			1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
B	D01	021086	050978	GM25	E	B00		U	G	T			GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
B	H12	022607	052078	FM30	F	A05	C	D	G	T			DG B FAILED TO START	VERT SHFT BTW UP & LWR CRANKS FLD-IMP MTL
C	CC1	015584	080776	FM25	J	A02	5	D	G	T			11 DG FAILD TO SENSE MAT VOLTAGE-COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	M12	014260	022376	FM25	F	B04	B	F	G	N			DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	M12	016031	092276	FM25	D	B09	B	T	G	T			12U DG RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	016626	120176	FM25	D	A09	B	F	G	T			13U DG STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	016755	121876	FM25	F	B06		D	G	T			DG 13U #3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS
C	M12	017020	011077	FM25	F	B13	5	D	G	T			DG 13U SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN
C	M12	016972	081777	FM25	D	B09	B	F	G	T			12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	016768	092077	FM25	D	B04	B	T	G	N			COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN	INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	M12	021386	050878	FM25	D	B09	B	F	G	T			12U DG LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	M12	023213	120578	FM25	D	B09	B	T	G	F			12U DG S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER
C	SL1	017134	011877	GM30	E	B04	R	F	G	T			1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	019511	092677	GM30	E	B04	R	F	G	T			1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
G	BP1	014894	051676	CA02	D	B09	R	F	G	N			DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	016742	080577	CA02	J	A04	5	D	G	F			TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR
G	C01	023044	041278	CB40	F	A09		T	G	T			#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL

GREATER THAN 24 HOURS

WEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DA1	021171	040578	FM25	F	A06			D	G	M	BEARING WIPED ON 4/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	DR1	020408A	012978	GM10	M	A11	C	D	G	N		D-1 FAILD TO START DUE TO COLD WEATHR 6 HEATRS	INSTALLED 6 ROOM WINTERIZED
G	DR1	020852	030478	GM10	C	A10		D	G	T		D-1 S/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR1	021516	051178	GM16	A	A16	R	D	G	T		TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP
.	DR2	019651	103077	GM25	E	B06		T	G	T		UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTART	TURBO-CHARGR CLUCTHESHAFT BEARING
G	DR2	021682	063078	GM25	D	B14	T	D	G	T		2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	DR3	017509	032277	GM25	K	A10		D	G	M		GEN FIELD FAILD TO FLASH	INTERMITINT CAPACITOR SHORT IN FLASH CIRC
G	EN1	020031	081877	FM25	F	B00	R	U	G	T		DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	QC1	018112	042577	GM25	K	A10		D	G	T		WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
W	SA1	019924	120277	AL25	E	B04		T	G	T		1B DIESEL DECLARED INOP-TURBOCHGR 6 EXH EXP JT FLD	CAUSE DETERMINED TO BE TURB BLADE FAILURE
W	SC1	014869	041676	GM25	F	A01	R	D	G	T		#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
W	ZI2	019714	111077	CB40	B	B12	B	D	G	T		"OM" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL

UNKNOWN / NOT APPLICABLE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	015448	080576	CA02	M	A03	R	U	U	I	DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BP1	016672	090276	CA02	A	A00	R	U	U	I	FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016304	102876	CA02	G	A00	R	U	U	I	DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02	G	A00	R	U	U	I	START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016597	120276	CA02	G	A00	R	U	U	I	FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122076	CA02	G	A04	R	U	U	I	START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN
G	BP1	016912	122776	CA02	A	A04	R	U	U	I	START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	016910	010377	CA02	G	A00	R	U	U	I	FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?
G	BP1	020298	032477	CA02	G	A00	R	U	U	I	EDG STARTING TIME EXCEEDED 12 SEC. BY .6 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BP1	018103	052677	CA02	A	A00	R	U	U	I	START TIME 16.5 SEC. SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	019341	102077	CA02	C	A00	R	U	U	I	START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	020575	020276	CA02	M	A00	R	U	U	I	START TIME 28.5 SECS VS 13.9 SECS	CAUSE UNKNOWN
G	DR2	019905	120477	GM25	J	A00		U	U	I	U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	EN1	014796	051576	FM25	M	A00		U	U	I	1B DG FAILD TO START ON FIRST ATTEMPT	UNKNOWN WILL DO WEEKLY START TO DETERMINE
G	EN1	015947	081476	FM25	M	A00	R	D	U	I	1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	EN1	016842	122576	FM25	M	B00	R	U	U	I	DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITVE	CHECKNG OUT LOGIC ON 1C DG
G	EN1	018141	052877	FM25	M	A00		U	U	I	1A DG FAILD TO COME UP TO RATED VOLT IN REQD. TIME	TOOK 16 SEC VS 12 SEC RETESTED SATISFAC
G	PB2	020490	121977	FM36	L	A00		U	U	I	E1 DG TRIPPED ON MAN PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXTV TST
W	JF1	019055	081777	FM40	C	A10	B	D	U	I	DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM40	C	A10	B	D	U	I	DG 1B TRIPPED ON OVSPD DURING MANUAL START	MAIN AIR START VLV FAILED TO FULLY SHUT

UNKNOWN / NOT APPLICABLE

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	KE1	017519	102577	GM25	M	A06			U	U	T	D/G 1A STARTED & WAS AT 70 RPM WHEN IT STOPPED	COULD NOT DETERMINE CAUSE OF FAILURE
W	TR1	018007	042977	GM40	M	A00			U	U	N	EDG FAILD TO START ON LOSP (PARTIAL) THE 2ND TIME	NO LER FOR DG FAILURE JUST THE LOSP
W	TU3	017591	020377	GM25	A	A12	R	T	U	T		DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	ZI1	016179	092476	CB40	M	A00			U	U	T	"OM DIESEL GENERATOR FAILED TO START	NO CAUSE COULD BE DETERMINED

APPENDIX N

DIESEL-GENERATOR EVENTS (FAILURES) SORTED BY MANUFACTURER/kW RATING

CODES USED IN LER ONE-LINE DESCRIPTIONS

REPAIR TIME

CODE	DESCRIPTION
1	0 TO 1 HOURS
4	1 TO 4 HOURS
8	4 TO 8 HOURS
D	8 TO 24 HOURS
G	GREATER THAN 24 HOURS
U	UNKNOWN / NOT APPLICABLE

SUB-SYSTEM

CODE	DESCRIPTION
A	FUEL OIL SYSTEM
B	LUBE OIL SYSTEM
C	STARTING SYSTEM
D	COOLING SYSTEM
E	SCAVENGING AIR SYSTEM
F	ENGINE FRAME / INTERNALS
G	GOVERNOR
H	EXHAUST SYSTEM
I	SHUTDOWN SYSTEM
J	OUTPUT BREAKER
K	EXCITER / VOLTAGE REGULATOR
L	GENERATOR
M	OTHER / UNKNOWN

TYPE OF EVENT

CODE	DESCRIPTION
B	RECURRING COMMON CAUSE
C	COMMON CAUSE
R	RECURRING
S	COMMAND FAULTS
X	RECURRING COMMAND FAULTS

FAILURE MODE

CODE	DESCRIPTION
A	DOES NOT START
B	DOES NOT CONTINUE TO RUN
U	UNAVAILABLE / NONFAILURE

FAILURE MECHANISM

CODE	DESCRIPTION
00	UNKNOWN
01	PERSONNEL OPERATION
02	PERSONNEL MAINTENANCE
03	PERSONNEL TESTING
04	DESIGN ERROR
05	FABRICATION / CONSTRUCTION / QUALITY CONTROL
06	PROCEDURAL DISCREPANCY
07	DEFECTIVE FUEL INJECTOR(S)
08	CORROSION / EROSION
09	FOREIGN MATERIAL CONTAMINATION
10	MECHANICAL / ELECTRICAL CONTROL
11	HI / LOW AMBIENT TEMPERATURE
12	LUBE / FUEL / WATER / AIR LEAKAGE
13	VIBRATION
14	OUT OF ADJUSTMENT / CALIBRATION

FAILURE CLASSIFICATION

CODE	DESCRIPTION
D	DEMAND
T	TIME
U	UNKNOWN

METHOD OF DISCOVERY

CODE	DESCRIPTION
M	DURING MAINTENANCE
N	DURING NORMAL OPERATIONS
R	DURING RECORDS REVIEW
T	DURING TESTING
U	UNKNOWN

NSSS VENDOR

CODE	DESCRIPTION
B	BABCOCK & WILCOX
C	COMBUSTION ENGINEERING
G	GENERAL ELECTRIC
W	WESTINGHOUSE

DG MANUFACTURER

CODE	DESCRIPTION
AL	ALCO
CA	CATERPILLAR
CB	COOPER-BESSEMER
DL	DE LAVAL
FM	FAIRBANKS MORSE
GM	GENERAL MOTORS
NM	NORDBERG MANUFACTURING
WO	WORTHINGTON

KW RATING

CODE	DESCRIPTION
02	200-466 KW
14	566-1666 KW
18	1750-1950 KW
25	2500-2850 KW
30	3000-3566 KW
40	4000-4416 KW

ALCO 1750-1950 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBASSY	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	IP3	015733	083076	AL	18	G	802		F	D	1	T	EDG 31 BEGAN CYCLING BETWEEN 56 AND 63 CPS	GOV OIL DRAIN VLV NOT SHUT TIGHTLY
W	IP3	016635	092476	AL	18	G	802		F	D	4	T	EDG 31 OUTPUT FREQ INC TO 62 HZ,COULD NOT CONT ELE	AIR IN GOV OIL LINES FROM PREVIOUS REPAIR
W	IP3	016286	102176	AL	18	L	810		S	D	6	T	UNABLE TO CONTROL SPEED OF NO 31 DG	UNIT/PARA RELAY OPER INTRMIT-DEFECTV CONN
W	RG1	022450	081679	AL	18	J	A10		T	B	8	T	8 EDG OUTPUT BREAKER WOULD NOT CLOSE	BAD CONN AT CONT PWR FUSE BLOCK STUBS

ALCO 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	PI1	015966	092276	AL25	H	804			B	T	D	T	"A" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	016368	111776	AL25	H	804			B	T	D	T	"B" DG EXHAUST MANIF LEAKING BLACK SMOKE	EXPANSION BELLOWS CONNECTOR SEPARATED
G	PI1	022128	080278	AL25	K	801			D	B	T		B DG BECAME INOPERABLE AFTER ONE HOUR RUN	OPERATOR CAUSED DIODE FAILURES IN VLT REG
W	SA1	0187994	073077	AL25	A	A10		C	T	4	N		1A DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICAT
W	SA1	0187998	073077	AL25	A	A10		C	T	4	N		1B DIESEL INOP-FAILED TO REACH RATED SPEED ON STRT	BINDING FUEL RACK LNKG - LACK OF LUBRICA
W	SA1	019920	111777	AL25	D	B13		B	T	4	T		1C DIESEL DEVELOPED WATER JACKET LEAK	CRACK FOUND ON 3/8" PIPE NIPPLE
W	SA1	019924	120277	AL25	E	804			T	G	T		1B DIESEL DECLARED INOP-TURBOCHGR & EXH EXP JT FLD	CAUSE DETERMINED TO BE TURB BLADE FAILURE

CATERPILLAR 200-400 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BP1	014417	032476	CA02	D	B09	R	T	G	T			DG TRIPPD ON HI COOLING WATER TEMP	WATER PUMP SUCT SCREEN PLUGGD
G	BP1	014894	051676	CA02	D	B09	R	T	G	N			DG TRIPPD ON HI COOLN WATER TEMP PUMP SHAFT SCORED	INLET SCREEN PARTIALLY PLUGGED
G	BP1	015448	080576	CA02	M	A03	R	U	U	T			DG FAILD TO START WITHIN 15 SEC NOT RETESTED	OPERATOR NOT AWARE OF SIGNIF OF START TIM
G	BP1	015449	080576	CA02	D	A00	R	U	6	N			DG FAILD TO START WITHIN 15 SECONDS DURIN WEEKLY	POSSIBLE WATER JACKET HEATER FAILURE
G	BP1	015464	081276	CA02	C	A10	R	T	6	T			WEEKLY TEST FAILD TO START	STARTING BATTERY CABLE FAILD LOOSE CONNEC
G	BP1	016072	090276	CA02	A	A00	R	U	U	T			FAILD TO MEET 15 SEC START TIME DURING WEEKLY TEST	POSSIBLE FUEL SYSTEM FAILURE
G	BP1	016304	102876	CA02	G	A00	R	U	U	T			DG FAILD TO START WITHIN 15 SEC	POSSIBLE FUEL GOVERNOR CONTROL PROBLEM
G	BP1	016460	110476	CA02	G	A00	R	U	U	T			START TIME 2.2 SEC SLOWER THAN REQUIRED	POSSIBLE FUEL GOVERNOR PROBLEM
G	BP1	016567	111876	CA02	C	A10	R	D	4	T			FAILD TO START IN AUTO TEST; STARTER MOTOR PROBLEM	BROKEN SPRING IN BENDIX MECHANISM
G	BP1	016597	120276	CA02	G	A00	R	U	U	T			FAILD TO MEET 12 SEC START TIME DURING AUTO TEST	FUEL GOVERNOR REPLACED ON 12/19/76
G	BP1	016913	122076	CA02	G	A04	R	U	U	T			START TIME EXCEEDED CRITERIA BY 4 SEC	GOVERNOR LUBE &FUEL SYS UNDER INVESTIGTN
G	BP1	016912	122776	CA02	A	A04	R	U	U	T			START TIME GT. CRITERIA 15 VS 12	FUEL GOV. LUBE OIL SUPPLY MODIFID 1/10/77
G	BP1	016911	122876	CA02	C	A10	R	D	4	M			DEFECTIVE STARTER DRIVE, DG FAILED TO START	BROKEN SPRING DELCO PART #1945487
G	BP1	016910	010377	CA02	G	A00	R	U	U	T			FAILD TO START IN AUTO TEST	CAUSE UNKNOWN LUBE OIL RETENTION IN GOV.?
G	BP1	020298	032477	CA02	G	A00	R	U	U	T			EDG STARTING TIME EXCEEDED 12 SEC. BY .8 SEC.	GOVERNOR LUBE SYS MODIFIED ON 1/10/77
G	BP1	018102	051877	CA02	D	A00	R	T	4	T			H2O JACKET HEATER FAILURE--EDG TESTED; DID NOT MEE	T TIME CRITERIA;EXCEEDED BY 12 SECONDS
G	BP1	018103	052677	CA02	A	A00	R	U	U	T			START TIME 16.5 SEC, SHOULD BE LT 13.9 SEC	FUEL CONTROL VALVE MODIFIED
G	BP1	018742	080577	CA02	J	A04	S	D	G	T			TESTED EDG WITH 2A-2B BKR RACKD OUT; AUTO TRANSFR	AND MAN TRANSFR FAILD TO CLOSE OUTPUT BKR
G	BP1	019541	102077	CA02	C	A00	R	U	U	T			START TIME 21.8 SEC VS. 13.9 SEC	CHECKD VOLTAGE DROP ON START CABLES
G	BP1	019993	112477	CA02	A	A00	R	U	1	T			START TIME 33 SECS TESTED SAT WITHIN ONE HOUR	FUEL CHECKED OK PREM GRADE OF FUEL USED
G	BP1	020575	020278	CA02	M	A00	R	U	U	T			START TIME 28.5 SECS VS 13.9 SECS	CAUSE UNKNOWN
G	BP1	020580	020978	CA02	D	B12		T	4	T			DG TRIPPD ON HI WATER TEMP AFTR 25 MIN OF OPS	AIR LEAKAGE ON PUMP COOLING WATER SHAFT

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	RECOVERY	FAILURE MODE	FAILURE MECHANISM
G	C01	015872	082376	C840		A	B00			U	B	T	FUEL LINE TO AN INJECTOR OF #1 DG BURST	CAUSE UNDETERMINED
G	C01	016560	110776	C840	K	B08			T	D	I		DG-2 LOST ELECT GOVERNOR CONTROL AND VOLTAGE	POT. TRANSFRMR FUSE CONTACTS OXIDIZED
G	C01	016712	111076	C840	J	A03	J		D	B	T		EG-1 OUTPUT BKR FAILD TO CLOSE--BLOWN FUSE 59RELAY	DISCONNECTD ONLY ONE WIRE ON 11/8/76
G	C01	023044	091278	C840	F	A09			T	G	T		#2 DG TRIPPD APPROX 1 MIN AFTR REACH RATED SPEED	MAIN BEARING FAILD DUE TO LOW LUBE OIL
*	Z11	015188	062176	C840	A	B13			T	4	N		1A DG HAD FO LEAKAGE AT THE 8L FUEL INJ PUMP	VIB CAUSED CRACKED FTNG ON LINE TO INJ
*	Z11	016179	092476	C840	M	A00			U	U	I		"0" DIESEL GENERATOR FAILED TO START	NO CAUSE COULD BE DETERMINED
*	Z11	020255	010378	C840	K	B10	R		T	D	T		1B DG OUTPUT VOLTAGE PEGGED HIGH-COULD NOT LOWER	PC BOARD FAILURE IN THE VOLTAGE REGULATOR
*	Z11	0203488	011678	C840	G	B10			T	4	T		DG "0" STARTED & LOADED, BUT DECLARED INOPERABLE	LO CONTRCL AIR PRESS-TRIP VLV "0" RING LK
*	Z11	022110	080178	C840	C	A10			T	1	T		1B DIESEL GENERATOR FAILED TO START	AIR LEAK IN STARTING AIR PILOT VALVE
*	Z11	022515	090278	C840	C	A10			D	4	T		1B DIESEL GENERATOR FAILED TO START	STARTING AIR DIST BUSHING ROTATED IMPROP
*	Z11	022846	091478	C840	B	A02	C		D	4	N		1A DG CAME UP TO SPEED AND THEN TRIPPED - 5 TIMES	RAG IN OIL STRAINER CAUSED LO OIL PRESS T
*	Z11	023308	122078	C840	M	A00			U	D	N		1B DG FAILD TO START DURN AN INADVRTNT SAFTY INJEC	EXTENSIVE TESTING REVEALD NO CAUSE
*	Z12	017868	042777	C840	G	B10	R		D	1	T		GOVERNOR SPEED CONTROL FAILED ON 2B DIESEL GEN	GOV SPD CONT GEAR JAMMED AGNST HI SPD STO
*	Z12	017809	050677	C840	I	B13	C		T	4	T		DIESEL GENERATOR 2A TRIPPED FROM FULL LOAD	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
*	Z12	019714	111077	C840	B	B12	B		D	G	T		"0" DIESEL GEN TRIPPED ON LOW LUBE OIL PRESSURE	CAVITATION OF LO PUMP - WATER IN LUBE OIL
*	Z12	019780	111777	C840	I	B13	C		T	4	T		"0" DIESEL GENERATOR TRIPPED OFF-LINE	LEAK IN AIR LINE TO MASTER SHUTDOWN VALVE
*	Z12	020258	010678	C840	K	B10	R		T	8	T		2A DG OUTPUT VOLTAGE INCREASED AND COULD NOT LOWER	BURNED CONTACT IN THE VOLTAGE REGULATOR
*	Z12	020260	010978	C840	G	B10	R		D	1	T		2B DG POWER OUTPUT OVLD - COULD NOT LOWER MANUALLY	GOV SYNCH IND GR JAMMED ON HI SPD STOP
*	Z12	021544	051778	C840	K	B14	T	T	T	8	T		2A DG OUTPUT VOLTAGE CYCLED - COULD NOT CONTROL	DRIFT OF VLTGE REGULATOR STABILITY CIRCUI

DE LAVAL 500-1000 Kw

EVENT	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAILMODE	FAILMECH	ITEM	CLASS	REPAIR	RECOVERY	FAILURE MODE	FAILURE MECHANISM
*	S01	021310	032878	DL10	A	A	A10		R	T	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL LNKG BINDING - BEARINGS IN LNKG DRY
*	S01	022100	071878	DL10	A	A	A06			D	1	T	NO 1 DIESEL GENERATOR FAILED TO START	FUEL RACK BINDING-INCORP PROC TO EXERCISE

FAIRBANKS MORSE 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	CC1	015587	072976	FM25	D	A02	S	D	4	N	#12 DG FAILD TO START AUTO FAILD ALSO FROM CONT RM	JACKET COOLING H2O SYS AIRBOUND NOT VENTD
C	CC1	015584	080776	FM25	J	A02	S	U	G	T	11 DG FAILD TO SENSE "AT VOLTAGE"COND.-OUTPUT BKR.	WILL NOT CLOSE--COLD SOLDER CONN TO ERA
C	CC1	016405	102576	FM25	M	B00	R	U	1	T	#12 DG S/D DUE TO DG VENT FAN STOPPED-BLOWN FUSE	CAUSE FOR BLOWN FUSE NOT DETERMINED
C	CC1	017213	111876	FM25	M	A00	R	U	1	T	#12 DG S/D DUE TO ITS VENT FAN NOT STARTING	BLOWN FUSE--REPLACED CONTROLLER COIL ??
C	CC1	017822	051577	FM25	M	A09	R	T	8	T	#12 DG FAN FAILD TO START WHEN GEN RECEIVD SIGNAL	DIRT ON FAN MAIN BKR CONTACTS
C	CC1	018366	061777	FM25	F	B02		D	1	T	#11 DG STARTD;LATER DISCOVERD #6 CYLINDR RELIEF	VALVE VIBRATED LOOSE AND FELL OFF DG
C	CC1	018488	071177	FM25	B	B02	L	D	4	M	#11 DG ON FIRE DUE TO L.O. HITTNG HOT EXHAUST	O-RING SEAL ON STRNR NOT GLUED PROPERLY
C	CC1	018487	071377	FM25	D	B02	S	D	1	T	#11 DG TRIPPD ON LOW JACKET COOLNT PRESS WHEN SIAS	SIGNAL REMOVED;OP SWITCH ISOLATED
C	CC1	019592	101077	FM25	K	A13		T	8	T	#12 DG FAILD TO REACH VOLTAGE WITHIN 10 SEC.	2 LOOSE FUSE HLDRS IN EXCITATION CIRCUIT
C	CC1	021060	041078	FM25	L	A00		U	1	T	#12 DG OVERSPED & TRIPPED RESTARTED SUCCESSFULLY	CAUSE NOT DETERMINED TESTED SAT NEXT TIM
C	CC1	021055	041378	FM25	M	A00		U	1	N	#11 DG FAILD TO START ON LOSS OF OFFSITE POWER	START/FAILURE ALARM DISPLAYD NO ABNORMALS
C	CC1	023380	121878	FM25	M	B00	R	D	1	T	#11 DG SHUTDOWN DUE TO ROOM VENT,FAN FAILD TO STRT	FAN FAILURE--RESET OVERLOADS
C	CC2	016722	121576	FM25	C	A09		T	4	T	#21 DG FAILD TO START FROM CONTROL ROOM & LOCALLY	CLOGGED AIR STRT DISTRIBUTOR PILOT VALVES
C	CC2	018422	022277	FM25	C	A00		U	8	T	#21 FAILD TO START & ASSUME RATED SPEED IN 10 SEC	AIR START SYS DISASSMBLD &INSPECTED
C	CC2	017457	031777	FM25	M	A00	R	U	1	T	#12 DG VENT FAN FAILD TO START ON SIAS SIGNAL	OVERLOADS TRIPPD ON FAN; RESET OVERLOADS
C	CC2	017986	060177	FM25	D	A12		T	D	T	#21 DG FAILD TO MEET START TIME CRITERIA	SERVICE WATER INLET VALVE LEAKING EXCESVL
C	CC2	020226	011178	FM25	J	B10		T	1	T	#21 DG TRIPPED AFTR 29 MIN. DUE TO GEN FAULT	LOSS OF FIELD & REVERSE POWER RELAYS
C	CC2	021991	080178	FM25	D	B10	S	D	4	T	#21 DG TRIPPD ON HI JACKET COOLNT TEMP	SERV H2O SUPPLY VALV FAILD TO OPEN
C	MI2	0142608A	021776	FM25	A	A09	B	T	1	N	DG 12U FAILED TO START - SIMILAR OCCUR,LER (75-23)	DIRTY FUEL OIL FLTR*CARBON IN CRKCSE VENT
C	MI2	0142608B	021876	FM25	A	B09	B	T	1	N	DG 12U TRIPPED OFF-LINE - SIMILAR OCCUR,(75-23)	DIRTY FUEL OIL FLTR*CARBON IN CRKCSE VENT

FAIRBANKS MORSE 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	MI2	0142660	022076	FM25		A	809	B	I	1	N	DG 12U	TRIPPED OFF-LINE - SIMILAR OCCUR, (75-23)	DIRTY FUEL OIL FLTR, CARBON IN CRKCSE VENT
C	MI2	0142600	022376	FM25		F	804	B	T	G	N	DG 12U	TRIPPED OFF-LINE - SIMILAR OCCUR, (75-23)	UPPER ROD BEARING FAILURE - LACK OF LUBRI
C	MI2	015106	060276	FM25		F	809	B	T	1	T	DG 13U	TRIPPED ON HI CRANKCASE PRESS - 11 MIN RUN	CRKCSE AIR EDUCTOR FOUND DIRTY
C	MI2	015583A	081676	FM25		G	A10	B	T	4	T	DG 12U	FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583B	081776	FM25		G	A10	B	T	4	T	DG 12U	FAILED TO START	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015583C	082376	FM25		G	810	B	T	4	T	DG 12U	TRIPPED OFF-LINE	DRIED LEATHER WASHER IN BOOSTR SERVOMOTOR
C	MI2	015906	090176	FM25		B	812	C	T	1	N	DG 13U	SHUTDOWN - FIRE ON EXHAUST MANIFOLD	LUBE & FUEL OIL ACCUM UNDER MANIF INSULAT
C	MI2	016036	091976	FM25		B	812	B	D	4	N	12U DG	HAD TO BE SECURED AND DECLARED INOPERABLE	EXCSV LEAKAGE OF LUBE OIL FILTER GASKET
C	MI2	016631	092276	FM25		D	809	B	T	G	T	12U DG	RECVD LOW CW FLO ALA-UNIT UNLOADED, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016646	120176	FM25		D	A09	B	T	G	T	13U DG	STARTED, NO CW FLOW, SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	016759	121876	FM25		F	806		D	G	T	DG 13U	#3 UPPER PISTON CON ROD BRNG CAP SHEARED	CAPSCREWS FAILED - PROB DUE TO DRY STARTS
C	MI2	017020	011077	FM25		F	813	S	D	G	T	DG 13U	SHUTDOWN DUE TO HIGH VIBRATION	SKID MOUNT IN RESONANCE WITH ENG FREQUEN
C	MI2	018923	081077	FM25		G	A01	S	D	1	N	DG 12U	FAILED TO RESTART ON DEMAND	GOVERNOR STILL IN MNO FUEL* FROM PREV S/D
C	MI2	018972	081777	FM25		D	809	B	T	G	T	12U DG	LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	0189768	092677	FM25		D	809	B	T	G	N	COOLING WTR LOW FLOW ALARM - 12U DIESEL GEN		INSUF CL INJECTION FOR ADQ MUSSEL CONTROL
C	MI2	019259	092477	FM25		I	814	S	T	6	T	12U DG	APPEARED TO TRIP ON GEN OVERCURRENT	MICRO SW OUT OF ADJ ON DG OVSPD TRIP MECH
C	MI2	019929	110977	FM25		K	A01	S	D	1	T	DG 13U	TRIPPED WHILE PARALLELING WITH 4160V BUS	IMPROPER VOLTAGE SETTING PRIOR TO PARALL
C	MI2	021386	050878	FM25		D	809	B	T	G	T	12U DG	LOW CW FLOW ALARM, DG UNLOADED AND SECURED	EXCSV MUSSEL FOULING OF DG HT EXCHANGERS
C	MI2	022131	080378	FM25		A	807		T	8	T	DG 13U	SHUTDOWN DUE TO LEAKING INJECTOR	CRACK IN INJ PUMP DISCH VALVE CAGE
C	MI2	023213	120578	FM25		D	809	B	T	G	T	12U DG	S/D DUE TO LOW COOLING WATER FLOW	MUSSEL SHELLS IN THE HEAT EXCHANGER

FAIRBANKS MORSE 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DA1	014334	022776	FM25	B	B12	R	T	D	T	SMALL FIRE ON EXHAUST MANIFOLD OF DG 1G21	OIL LEAK FROM FRONT COVER PLATE
G	DA1	014337	031776	FM25	H	B12	R	T	D	T	SMALL FIRE NEAR EXHAUST MAN-TURBOCHRGR FLANGE	1G21 LEAKY FLANGE GASKET
G	DA1	014953	062276	FM25	D	B09	C	T	B	T	1G-31 DG TRIPPD ON HI JACKET TEMP-DECLARED INOPRBL	ESW LOW FLOW DUE TO MUD IN STRAINER
G	DA1	015993	100776	FM25	F	A05		D	D	T	1G21 BROKEN LOWER VERT DRIVE COUPLNG HUB	HUB MADE OF WRONG MATERIAL
G	DA1	016452	110476	FM25	A	B04		D	D	T	DG 1G-21 S/D DUE TO FIRE -FUEL LINE FRACTURE	INADEQUATE DESIGN
G	DA1	017756	051077	FM25	J	A10	S	D	B	T	1G-21 DG OUTPUT BKR FAILD TO CLOSE	AUX CONTACTS OF STNDBY TRANSFORMER OPEN
G	DA1	017963	051277	FM25	G	B06	S	D	1	T	1G-31 DG WOULD NOT REACH FULL LOADING ONLY 2500 KW	SPEED SETTING ADJUSTMNT NOT RESET
G	DA1	021171	040578	FM25	F	A06		D	G	M	BEARING WIPED ON 4/13/77 NOT DUE TO MISALIGNMENT	LUBE OIL FILTER DRAIN VALVE WAS OPEN
G	EN1	014778	031576	FM25	C	A10		D	D	T	1A DG FAILED TO START DURING SURVEILLANCE	SOL OPER AIR VLV IN START SYS STUCK SHUT
G	EN1	014795	050176	FM25	M	B13	S	T	B	T	NORMAL SURV. TEST DG 1C TRIPPD; LOOSE WIRE	NUT VIBRATED OFF WIRE-PANEL R43-PC01C
G	EN1	014796	051576	FM25	M	A00		U	U	I	1B DG FAILD TO START ON FIRST ATTEMPT	UNKNOWN WILL DO WEEKLY START TO DETERMINE
G	EN1	015557	062676	FM25	B	B02	S	D	B	T	DG 1C TRIPPD DUE TO LUBE OIL SWITCH NOT CALIBRATED	PERSONNEL DID NOT CALIBRATE SWITCH
G	EN1	015568	080576	FM25	K	A06	S	D	1	T	DG 1A TRIPPED DUE TO LOSS OF EXCITATION DRNG SYNCH	DEFECTIVE PROCEDURE - PARALLED OUT OF SYN
G	EN1	015947	081476	FM25	M	A00	R	D	U	T	1C DG FAILED TO START DURING SURV TEST - RECURRING	EXACT CAUSE OF START FAILURE NOT KNOWN
G	EN1	016065	091176	FM25	G	A10	R	D	1	T	1A DG FAILED TO START - SURV TEST - OCCURRED PREV	LOW OIL LEVEL IN GOVERNOR
G	EN1	016842	122576	FM25	M	B00	R	U	U	T	DG 1C TRIPPD APPROX 45 MIN. OF RUN TIME; REPETITIVE	CHECKNG OUT LOGIC ON 1C DG
G	EN1	016843	123176	FM25	M	A00	R	U	1	T	MAN START OF 1A DG FAILD THIS HAS HAPPND BEFORE	INSPECTED & RETESTED SATISFACTORILY
G	EN1	018141	052877	FM25	M	A00		U	U	T	1A DG FAILD TO COME UP TO RATED VOLT IN REQD. TIME	TOOK 16 SEC VS 12 SEC RETESTED SATISFAC
G	EN1	018644	061377	FM25	D	B14	I	D	4	T	1C DG TRIPPD RESTARTED SATISFACT LO JACKET CLNT	LOW COOLNT PRESS SWITCH TO BE CALIBRATED
G	EN1	018646	061877	FM25	D	B14	I	D	4	T	1C DG TRIPPD ON LO COOLNT JACKET PRESSURE	POSSIBLE INCORRECT PRESSURE SETPOINTS

FAIRBANKS MORSE 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	EN1	018647	062577	FM25	U	B14		T	D	4	N	1C DG TRIPPD ON LO COOLNT JACKT PRESS	OPERT PRESSURE WAS ABOVE TRIP SETPOINT
G	EN1	018839	081277	FM25	K	B10			D	8	I	1A DG LOST MANUAL VOLTAGE CONTROL	MAN REG MTR OPER XFMR PWR SUP DIODES FAIL
G	EN1	020031	081677	FM25	F	B00	R	U	G	T		DURING SURV TESTING, DG 1B GEN INBOARD BRNG FAILED	BEARING OVERHEATED - EXACT CAUSE UNKNOWN
G	EN1	020013	111977	FM25	K	B02	S	D	4	T		1B DG OUTPUT VOLTAGE TOO HIGH - 1B DG SHUTDOWN	IMPROPER ADJUSTMENT OF AUTO REG SETPOINT
G	EN1	020214	112577	FM25	G	A08		T	8	T		1A DG FAILD TO START;STUCK GOVNR BOOSTR SERVOMOTOR	AIR PISTON WAS CORRODED
G	EN2	022751A	102878	FM25	G	A10	R	D	8	T		"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	STICKING GOVNR BOOSTR SERVO
G	EN2	022751B	103178	FM25	G	A10	R	T	8	N		"C" DIESL FAILD TO REACH 250RPM IN 7 SEC.	FAULTY ELECTRONIC SPEED SWITCH SIGNAL
W	JF1	020996	030878	FM25	C	A09	C	T	8	T		DSL GEN 1C FAILED TO START DURING TEST	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	022374	082778	FM25	G	A10	R	D	8	N		2C DG WOULD NOT RESPOND TO AUTO OR MAN SPEED CHG	BLOWN FUSES FOR MOP AND MOT
W	JF1	022987	100378	FM25	J	A02	S	D	1	T		1C DG OUTPUT BRKR FAILED TO CLOSE ON START	JUMPER FOR UNIT1/UNIT2 SEPAR, INCRCTLY POS
W	RO2	019023	030176	FM25	A	B07	R	T	8	T		"B" EMER DIESEL DID NOT REACH RATED CAPACITY	# 12 CYL INJ PLUNGER & BARREL GALLED
W	RO2	019354	091377	FM25	A	B07	R	T	8	T		"A" DIESEL GEN FAILED TO ASSUME FULL LOAD	SEVERAL FUEL INJ RODS WERE STICKING
W	RO2	021313	041078	FM25	G	B13		T	4	T		EDG LOAD FAILED TO INCREASE ABOVE 900KW	COMM BRUSH VIBRATED OUT OF GOV SPD CHGR

FAIRBANKS HORSE 3000-3500 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
B	CR3	018231	060277	FM30	A	A13		T		4	T	"A" DG FAILD TO START ON MONTHLY TEST	LOOSE INJECTOR HOLD-DOWN NUTS
B	CR3	018565	072677	FM30	I	A06	S	D	1	T	"3B" DG FAILD TO START DIESEL TRIPS WERE NOT RESET	REVISED PROCEDURES TO RESET TRIPS
B	CR3	019362	092877	FM30	B	A10	S	D	8	T	3B DG FAILD TO START DUE TO START PERMISSIVE LOST	D START PERM. DUE TO LOW LUBE OIL PRESSUR
B	CR3	020221	122777	FM30	G	A09	R	D	8	T	3B DG FAILD TO START--3RD OCCURANCE	SMALL PIECES OF INSULATION PREVNT GOVENOR
B	CR3	020278	010378	FM30	G	A09	R	D	8	T	3B DG FAILD TO START --4TH OCCURANCE	FOREIGN MATTER IN SERVO BOOSTR
B	CR3	023166	111778	FM30	M	A00	R	U	1	T	EDG-B FAILD TO FAST START ON TWO CONS. ATTEMPTS	STARTED SUCCESSFULLY TWICE AFTER ANOMALY
B	TI1	014298	022176	FM30	J	A06	S	D	1	T	"1B" DG OUTPUT BREAKER FAILED TO CLOSE	PROCED ERROR-IMP GOV SETTING-FREQ TOO LOW
B	TI1	020295	011278	FM30	B	A14	S	T	4	T	EDG 1B FAILED TO START ON SIMULATED AUTO ES TEST	OIL PRESS LIM SW PRESS SETTING DRIFTED
B	TI1	020997	031878	FM30	B	A10		T	8	T	EDG FAILED TO START	DEFECTIVE OIL PRESSURE LIMIT SWITCH
B	TI2	021609	042578	FM30	F	B00	R	U	1	T	"B" DG TRIPPED ON HI CRNKSE PRESS AFTER 32 MIN RUN	NO ABNORMAL PARAMETERS WERE FOUND
B	TI2	021867	052078	FM30	F	A05	C	D	G	T	DG B FAILED TO START	VERT SHFT BTW UP & LWR CRANKS FLD-IMP MTL
B	TI2	021605	052378	FM30	F	B09	R	T	6	M	DG B TRIPPED ON HIGH CRANKCASE PRESS - 32 MIN RUN	PART PLUGD ORIFICE PLATE-TO-CRKSE VAC EJC
B	TI2	023430	122878	FM30	A	A09		T	8	T	DF-X-1B DID NOT START	PARTIALLY CLOGGED FUEL OIL FILTER
G	PB2	018886	082677	FM30	D	A01	S	D	1	T	E1 DG FAILED TO START DUE TO HI JKT CLG WTR TEMP	OPER RESET TRIPPED PMP, BUT NOT DIESEL TRP
G	PB2	018887	082677	FM30	I	A06	S	D	4	T	E4 DG TRIPPED ON OVERSPEED	OVSPD TRIP SET BELOW DESIGN VALUE
G	PB2	019414	101877	FM30	D	A02	S	D	1	N	E3 DG TRIPPED FOLLOWING MANUAL START	3 VALVES TO LOW PRESS SW LEFT SHUT
G	PB2	020090	121977	FM30	L	A00		U	U	T	E1 DG TRIPPED ON "A" PHASE DIFF AFTER PARALLELING	CAUSE COULD NOT BE DETERMD AFTER EXTV TST
G	PB2	020665	022678	FM30	B	B12	C	D	8	T	E-2 DIESEL TRIPPED ON HIGH CRANKCASE PRESSURE	WATER IN OIL VAPORIZED - LEAKY OIL DRUMS
G	PB2	022462	083078	FM30	G	A10		T	1	T	E-3 DG START TIME DID NOT MEET TS REQUIREMENT	LEAKY CHK VLV IN AIR BOOSTER RELAY HYD LY
G	PB2	023349A	122178	FM30	G	A10		D	1	T	E3 DG START TIME 13 SEC. VS. REQUIRED 10 SEC.	E3 DG GOVERNOR REPLACED ON 12/28/78

FAIRBANKS MORSE 3660-3500 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	P82	0233498	122178	FM3G		G	A00			G	1	T	E2 DG START TIME 11 SEC. VS. 10 SEC	POSSIBLE GOVERNOR PROBLEMS
G	VY1	014740	050676	FM3G		F	A09		R	T	4	N	"B" DIESEL GENERATOR TRIPPED ON HI CRNKSE PRESS	CLOGGED CRNKSE EJ SUP ORIFICE OR EJ BODY
G	VY1	015739	082576	FM3G		A	B13			1	1	T	"B" DG OOS TO TIGHTEN FUEL HEADER FITTINGS	ENGINE VIBRATION LOOSENED MECHANICAL CONN
G	VY1	016323	062377	FM3G		F	B13		R	T	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	VIBRTN CAUSED HOSE CLMP ON AIR EJECT FAIL
G	VY1	019858	072677	FM3G		C	A09			T	4	T	"A" DIESEL GENERATOR FAILED TO START	AIR START SOL VALVES BOUND CLSD BY DEBRIS
G	VY1	020194	121977	FM3G		F	B13		R	T	4	T	"B" DG TRIPPED ON HIGH CRANKCASE PRESSURE	ENG VIB CAUSED AIR EJECT HOSE TO LOOSEN
G	VY1	020464	012478	FM3G		D	B09			T	4	T	DIESEL GENERATOR "A" TRIPPED ON HI JAKET CLNG TEMP	3-WAY VLV BLOCKED TO BYPASS CLNT ARND HX
W	PR1	016342	061777	FM3G		G	B10			T	8	T	D2 DG FAILED TO RESPOND TO LOAD CHANGE SIGMALS	LINK LEVER KEY MISSING,CAPSCREWS LOOSE
W	PR2	015735	091076	FM3G		F	B02			D	4	T	D1 DG TRIPPED ON HIGH CRANKCASE PRESSURE	HOSE CLAMPS ON PIPE NOT CONN AFTER MAINT

FAIRBANKS MORSE 4000-4418 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	JF1	019655	081777	FM40	C	A10	B	D	U	T	DG 1B TRIPPED DURING ATTEMT TO VERIFY OPERABILITY	MAIN AIR VALVE FAILD TO SHUT,CAUSED OVRSP
W	JF1	019062	082877	FM40	C	A10	B	D	U	T	DG 1B TRIPPED ON OVSPD DURING MANUAL START	MAIN AIR START VLV FAILED TO FULLY SHUT
W	JF1	019359	091377	FM40	C	B10	B	D	D	N	DSL GEN 1B EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	019366	091677	FM40	C	B10	B	D	B	N	DSL GEN 1-2A EVENTUALLY TRPD ON OVSPD AFTER START	MAIN AIR START VALVE FAILED TO FULLY SHUT
W	JF1	014368	100277	FM40	G	A10		D	B	T	DSL GEN 1-2A FAILED TO START DURING TEST	SPEED SWITCH FAILED - 120V VS 32V RATING
W	JF1	020492	030278	FM40	C	A09	C	T	D	T	DSL GEN 1B FAILED TO ATTAIN RATED SPEED	CORROSION PRODUCTS CLOGGED AIR START VLVS
W	JF1	021185	032378	FM40	C	A02		D	D	N	DSL GEN 1B FAILED TO COME UP TO SPEED PER TECH SP	MAIN AIR START VLV PUSHER ASSY MISSING
W	JF1	022235	081278	FM40	J	A10	S	D	B	N	OUTPUT BKR FOR DG 1B FAILED TO CLOSE AUTOMATICALLY	OPER MECH FOR AUX SWTCHS OUT OF ALIGNMT
W	JF1	022373	090578	FM40	G	A10	R	D	B	M	1-2A DG WOULD NOT RESPOND TO AUTO VLTG OR SPD CHGS	BLOWN FUSES FOR MOP,CAUSED BY FAIL DIODES
W	JF1	022630	091778	FM40	G	A10		D	4	T	1B DG FREQ COULD NOT BE INCR ABOVE 58.5 HZ	CPLNG BET DC MTR AND GOV POS POT WAS LOOS

GENERAL MOTORS 200-400 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	YR1	017316	030177	GM02		C	A10			D	4	T	#1 EDG FAILD TO START DUE TO FAILD STARTER MOTOR	ARMATURE SHAFT BROKEN--REPLACED W SPARE
W	YR1	018653	080277	GM02		D	809	C	T	D	T		#1 DG OVERHEATED--RUNNING FOR APPROX 25 MINUTES	SLUDGE AND SCALE IN 67% OF RADIATOR TUBES
W	YR1	018654	080277	GM02		D	809	C	T	D	T		#3 DG OVERHEATD AFTR 30 MIN. OF OPERATION	72% OF RADIATOR TUBES BLOCKED SLUDGE SCAL

GENERAL MOTORS 500-1000 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	RECOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR1	G204088	012778	GM1G		M	A11		C	D	I	N	U-1 B/U DG FAILD TO START 1ST 5 TIMES-LOW TEMPERAT	WINTER WEATHER
G	DR1	G204088A	012978	GM1Q		M	A11		C	D	G	N	U-1 FAILD TO START DUE TO COLD WEATHR e HEATRS	INSTALLED & ROOM WINTERIZED
G	DR1	G20852	030478	GM1Q		C	A10		D	G	T	N	D-1 B/U FAILD TO START R/X IN HOT S/D MODE	SYNCHRO START SWITCH FAILD
G	DR1	G21517	050778	GM1G		B	A10		T	D	N		TEMORARY DG FAILD TO START DUE TO LOW LUBE OIL PRS	L.O. PUMP COUPLING DAMAGED
G	DR1	G21516	051178	GM1Q		A	A10	R	D	G	T		TEMP. DG FAILD TO START-BLOW FUSES IN CONT LOGIC	SHORTED DIODE ACROSS FUEL PRIMING PUMP

GENERAL MOTORS 2560-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
8	AR1	014838	051176	GM25	C	A10			D	8	T	DG #1 FAILD TO START ON SIMULTED E.S. ACTUATION	FAILD DIODE IN AUTO START CIRCUIT
8	AR1	019578	102377	GM25	C	A14	T	T	8	T		#1 DG FAILD TO START;DRIFT OF TD RELAY SETPOINT	ALSO DIODE CR-1 FOUND SHORTED
8	AR1	021663	032078	GM25	E	B00		I	G	T		DG #2 ON FIRE DUE TO LUBE OIL GETTING INTO EXHAUST	TURBOCHGR BRNG FAILED,CAUSNG SEAL FAILURE
8	D81	019816	122977	GM25	G	A14	S	D	G	N		DURIN LOSP DG 1-1 STARTD AND TRIPPD ON OVERSPEED	IMPROPER SETTINGS OF HI SPEED AND OVERSPD
8	D81	020273	010978	GM25	F	A09		I	4	T		DG 1-1 TRIPPD ON HI CRANKCASE PRESSURE	DIRTY CRANKCASE VENT OIL COLLECTOR
8	D81	020708	020878	GM25	E	B05		D	G	T		1-1 DG S/D DUE TO NOISY TURBOCHARGER	DESIGN/FABRICTN OR COMPNT FAILURE,REPLACD
8	D81	021560	050978	GM25	E	B60		U	G	T		GEN LOAD FLUCTUATING AIR INTAKE LO PRESS ALARM	CAUSE UNKNOWN EXTENSIVE MAINT PERFORMED
8	D81	021652	060478	GM25	K	A10		D	4	T		1-1 DG FAILD TO OPERATE WITH PROPER FREQ/VOLT	FAILD PRIMARY POTENTIAL FUSE FOR DG 1-1
8	D81	023007	103178	GM25	M	B11	S	D	4	T		1-2 DG S/D DUE TO ROOM TEMP RISE TO 110 DEG.	OUTSIDE AIR DAMPER WOULD NOT OPEN
8	RS1	015359	071576	GM25	M	A00		U	D	T		SEVERAL ATTEMPTS TO START "B" DG WERE UNSUCCESSFUL	NO DEFINITE CAUSE COULD BE FOUND
8	RS1	015622	080676	GM25	C	A10		D	4	T		"A" DG FAILED TO START DURING SPECIAL TEST	IMPROPER GEAR ENGAGEMENT-AIR STRT MTR DOC
8	RS1	016656	120676	GM25	G	B10		D	8	T		DG "A" TRIPPED OFF-LINE 25 MIN INTO TEST	SPEED CONT SW FLD CLOSED,SPD DECR TO TRIP
8	RS1	018853	082477	GM25	M	A00	R	U	1	T		DIESEL GENERATOR "B" FAILED TO START	NO SPECIFIC CAUSE COULD BE DETERMINED
8	RS1	022613	100478	GM25	A	B01	S	D	1	N		"A" DG S/D DUE TO SPRAY OF FUEL OIL; "B" DG OOS	FUEL LEAK-EXCSVLY LOOSENED STNR PKG GLND
C	FC1	014559	040776	GM25	M	A06	S	D	1	T		START ON SECONDRY AIR REQUD 10.6 SECS.VS. 10SECS.	PROCEDURE WAS INADEQUATE
C	FC1	014596	042776	GM25	C	A02	4	D	8	U		DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	IMPRPR SETNG FOR MAG PKUP ON SWITCHG TACH
C	FC1	015614	081576	GM25	G	B10		T	8	N		SMOKE COMING FROM DG-2 GOVENOR MOTOR ENCLOSURE	ARMATURE HAD OPEN WINDING
C	FC1	015722	081576	GM25	C	A14	1	D	8	U		DG-2 PRIMARY AIR START MTR FAILED TO DISENGAGE	SETNG FOR MAG PKUP ON SWITCHG TACH DRIFTED
C	FC1	0178628	040677	GM25	C	A09	R	T	4	T		DG-1 FAILD TO STRT WTHN 10 SEC,STRTD OK ON PRI AIR	DEPOSITS FOUND ON SECONDARY AIR MOTORS
C	FC1	017862A	041477	GM25	C	A09	R	T	4	T		DG-2 FAILD TO START IN 10 SEC STRTD OK ON PRIMARY	DEPOSITS IN SECONDARY AIR MOTORS

GENERAL MOTORS 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	FC1	021692	061978	GM25		K	A10	R	D	1	T	DG-1 FAILED TO REACH RATED TERM VLTG ON STARTUP	BLOWN FUSE IN GEN FIELD CIRCUIT
C	FC1	021799	071278	GM25		K	B10	R	D	8	T	DG-1 FIELD WENT TO MAX EXITATION - UNIT SHUTDOWN	3 EXCITER SUBCOMPONENT FAILURES(COINCIDT)
C	FC1	022249	080978	GM25		K	B10	R	D	8	T	DG-1 FIELD WENT TO MAX EXCITATION - UNIT SHUTDOWN	REFER VOLTAGE ZENER DIODE OUTPUT DRIFTED
C	MY1	020733	021978	GM25		G	A09		T	8	T	DG-1A FAILED TO RESPOND DURING TEST RUN FOR TRAING	DIRTY CONTACT ON SPEED CONTROL PC BOARD
C	MY1	022715	092578	GM25		A	A06	S	D	1	T	DG-1B COULD NOT BE LOADED DURING TEST AFTER MAINT	AIR WAS NOT PURGED FROM FUEL LINES
G	DR2	014913	052376	GM25		C	A00		U	1	T	UNIT 2/3 DG FAILD TO START	CAUSE UNKNOWN BUT POSSIBLE AIR START SYST
G	DR2	016168	093076	GM25		K	B09		T	D	T	2/3 DG OUTPUT ERRATIC AFTR CONTRO PLACED IN "STOP"	SHORTD SELENIUM RECTIFIER DUE TO DIRT
G	DR2	016443	102976	GM25		I	A14	S	T	D	T	UNIT 2 DG FAILD TO START TWICE MALFUNCT S/D SOLEND	SOLENOID PLUNGER OUT OF ADJUSTMENT
G	DR2	016654	121876	GM25		A	B02	S	D	D	T	UNIT 2 DG FAILD TO CARRY REQD LOAD 2200KW MAX	H2O IN FUEL SUPPLY FROM FLUSHING OPERATON
G	DR2	017397	032277	GM25		C	A10	R	D	1	T	UNIT 2/3 FAILED TO START	AIR START MOTOR PINION GEAR JAMMED
G	DR2	018283	063077	GM25		G	A00	R	D	1	T	2/3 DG TRIPPD ON OVERSPEED DURING 2 ATTEMPTS	POSSIBLE CUT-OF-ADJUST GOVENR COMPENSATIN
G	DR2	018494	071277	GM25		G	A00	R	D	1	T	U 2/3 D/G TRIPPD ON OVERSPEED--OCCURD ALSO 6/30/77	PROBABLE CUT-OF ADJUST GOVENOR COMPENSTIN
G	DR2	019651	103077	GM25		E	B06		I	G	T	UNIT 2/3 UNLOADED TRIPPD ON LOW H2O PRESS RESTA..T	TURBO-CHARGR CLUCTHLSHAFT BEARING
G	DR2	019732	111677	GM25		I	A00	S	D	1	T	AUTO-START SIGNAL SENT TO UNIT 2/3 DURIN CORE SPRY	RESET START FAILURE RELAY & DIESEL STARTD
G	DR2	019728	112977	GM25		D	B12	C	D	D	T	2/3 DG S/D DUE TO COOL H2O PUMP TRIP 10MIN. LOADED	WATER LEAKD GROUNDED PUMP STATOR
G	DR2	019723	120277	GM25		C	A13	R	T	1	T	UNIT 2 DG AIR RECIEVR LOW PRESS TERMINATD START	LOOSE WIRE AT TERMINAL 25A5
G	DR2	019816	120377	GM25		C	A12		D	4	T	2/3 DG FAILD TO ROLL OVER--LOW START AIR PRESSURE	RUPTURED REGULATOR DIAPHRAM
G	DR2	019905	120477	GM25		J	A00		U	D	T	U2 DG OUTPUT BKR FAILD TO CLOSE--NO APPARENT CAUSE	3 SUBSEQNT TESTS WERE SUCCESSFUL
G	DR2	020642	010378	GM25		C	A13	R	T	8	T	UNIT 2 DG FAILD TO START WEEKLY SURV TEST	LOOSE WIRE AT TERMINAL 25A5
G	DR2	021848	030778	GM25		C	A00		D	8	T	OPERATR SHOOK AIR START SOLENOID &UNIT 2/3 STARTED	POSSIBLE WIRE DAMAGED DUE TO FREQ INSPEC

GENERAL MOTORS 2500-2850 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	DR2	020855	030878	GM25		G	A14		S	D	8	T	ENGINE OVERSHOT AT 1010 RPM WHILE OS SET AT 1020	HI OVERSHOOT BY OUT-OF-ADJUST GOVNR COMP
G	DR2	021538	052278	GM25		G	A02			D	8	T	U-2 DG TRIPPD 4 TIMES ON OVERSPEED;P/X IN S/D MODE	GOVNR SETTING FOUND SET TOO HIGH
G	DR2	021682	063078	GM25		D	B14		T	D	6	T	2/3 DG COOLING H2O PUMP TRIP ON HI AMPS; REPLACED	OVERLOAD TRIP SET CLOSE TO RUNNING AMPS
G	DR2	022262	082478	GM25		C	A10	R		D	4	T	2/3 UNIT OOS UNIT 2 FAILD TO START ON 1ST ATTEMP	PINION GEAR NOT ENGAGED ON AIR START MTR
G	DR2	022589	092278	GM25		C	A00	R		D	8	T	UNIT 2/3 FAILD TO START; AIR STRT MTRS ENGAGED	AIR->START SYS WILL BE MODIFIED
G	DR2	023337	121678	GM25		C	A00	R		D	4	T	2/3 DG AIR >START MOTORS DISENGAGED AFTER FEW SECS.	TDZ RELAY CLEANED;TDZ AND AIR VALVE ?
G	DR3	[illegible]	030376	GM25		G	A13	R		T	4	I	DG COULD NOT BE LOADED FROM CONTROL ROOM	GOVNR CONTROL WIRE VIBRATED FREE FROM LUG
G	DR3	016615	092176	GM25		B	B09			T	4	T	DIESEL 3 RECIEVD HI TEMP ALARM	PARTIALLY CLOGGD STRAINR IN L.O. CIRC PMP
G	DR3	016187	100976	GM25		G	A13	R		T	4	T	LOSS OF CONTROL ROOM SPEED CONTROL	LOOSE WIRE ON GOVNR CONTROL CIRCUIT
G	DR3	016455	110576	GM25		G	B10	R		T	8	T	LOST SPEED CONTROL FROM CONTROL ROOM	FAILD OVERTRAVL LIMIT SWITCH ON GOVNR
G	DR3	017569	032277	GM25		K	A16			D	6	M	GEN FIELD FAILD TO FLASH	INTERMITTNT CAPACITOR SHORT IN FLASH CIRC
G	DR3	019722	112277	GM25		G	A10	R		D	8	T	3 DG STARTD/LOADED-OVERLOAD ALARM-DG TRIPPD	BAD CAPACITOR IN SPEED SENSING CKT.?
G	DR3	019727	112977	GM25		G	B10	R		D	8	N	3 DG TRIPPD 30 MIN AFTER START AND LOADING	SHORTED CAPICITOR ON SPEED SENSING BOARD
G	FP1	016496	111776	GM25		I	A16	R		D	6	T	"B" EDG FAILED TO START DURING SURVEILLANCE TEST	GEN TACH RELAY DID NOT OPERATE, DEF CNVTR
G	FP1	016600	121576	GM25		B	A10	R		D	1	T	DURING TESTING "A" EDG FAILED TO START	LOW LUBE OIL PRESS - RELIEF VLV LEAKAGE
G	FP1	016971	011977	GM25		B	A10	R		D	1	T	DURING SURV, EDG TRIPPED ON EMERGENCY START	LOW LUBE OIL PRESS, SECOND ATTMPT SUCCSFL
G	FP1	017725	042677	GM25		I	A10	R		D	8	T	DURING ROUTINE SURV TEST, EDG FAILED TO START	TACHOMETER RELAY FAILED
G	FP1	020518	021578	GM25		J	B10			T	1	T	"A" EDG TRIPPED DURING SURVEILLANCE TEST	BLOWN FUSE IN SYNCH CKT FOR OUTPUT BRKR
G	FP1	023101	120578	GM25		G	A02		S	D	4	T	"A"DGTRIPPD WHEN BEING PARALLED	MISADJUSTMENT OF GOVENOR
G	MD1	016186	101676	GM25		C	A09			T	D	T	#11 DG FAILED TO START ON #2 STARTING SYSTEM	#2 START SYS AIR CONT COMP FOULED W RUST

GENERAL MOTORS 2500-2650 Kw

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYST	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	QC1	014447	030376	GM25	K	A10				D	B	T	DG 2 STARTED BUT DID NOT DEV SUFF VLTG TO LOAD	WESTHSE FFCO RELAY FLD TO ENRGZ FLD FLASH
G	QC1	015642	[illegible]	GM25	C	A00				U	1	T	DG #2 FAILED TO START DURING OPERABILITY TEST	CONTROL SEQ FAULT - HOWEVER, SEQ CORRECT
G	QC1	023119	113078	GM25	K	A10				D	B	T	#1DG STARTED BUT [illegible] FAILD TO EXCITE--AUTO ACT.TES	UNUSED TARGET MECH LINKAGE IN RELAY BINDN
G	QC1	014120	011276	GM25	C	A10				D	B	I	UNIT 1 DG FAILED TO ST[illegible]T WHEN MODE SW IN START MD	AIR START SOL VLV DIRTY-NOT OPEN FULLY
G	QC1	018112	042577	GM25	K	A10				D	G	T	WHILE TESTING THE DG, THE FIELD FAILED TO FLASH	CAPACITOR ACROSS VLTG SUP RELAY DEFECTIVE
G	QC1	019100	082477	GM25	L	A13				T	4	T	UNIT 1 DG STARTED AND R[illegible], BUT NO VLTG,SYNCH,FREQ	FREQ GEN TACH SET SCREWS VIBRATED LOOSE
G	QC1	019994	112877	GM25	K	A10				D	4	M	1/2 DG WOULD NOT START ,UCCESSFLY,FIELD BKR DEFECT	FAILED DIODE IN FLD BKR INTLK CIRCUIT
W	BV1	014663	052076	GM25	C	A04	R	T	4	N			DG #1 FAILD TO START 3 TIMES DG #2 STARTED OK	WATER ACCUMULATION IN AIR START SYSTEMS
W	BV1	015913	090376	GM25	J	A00		U	1	T			#1 DG OUTPUT BREAKER FAILD TO CLOSE	NO APPARENT CAUSE
W	BV1	017683	022477	GM25	L	B05		D	4	T			DG OUTPUT BREAKER TRIPPED;INTERNAL LOSS OF FIELD	TRIP NOT DISCONNECTED DURING ACCEPT.TEST
W	BV1	017348	031477	GM25	J	A04	B	D	4	T			#2 DG OUTPUT BREAKER FAILD TO CLOSE	DIRTY CONTACTS ON BKR CONT SWITCH
W	BV1	017621	041177	GM25	J	A04	B	D	4	T			#1 DG OUTPUT BREAKER FAILD TO CLOSE--DIRTY CONTACT	DESIGN CHANGE REQUEST FOR SEALED RELAYS
W	BV1	017693	042677	GM25	J	A04	B	D	4	T			#1 DG OUTPUT BKR. FAILD TO CLOSE--DESIGN REQUESTED	DIRTY CONTACTS ON NFLDA(NO FIELD) RELAY
W	BV1	017696	042977	GM25	C	A09	R	T	4	N			DG #1 FAILD TO START REPETITIVE	MOISTURE IN STARTING AIR
W	BV1	017627	050977	GM25	J	A04	R	D	4	T			#2 DG OUTPUT BKR. FAILD TO CLOSE--REPETITIVE	STICKING RELAY(MSR2) IN MANUAL START CKT.
W	BV1	018668	060377	GM25	J	A04	R	D	1	T			#2 DG OUTPUT BKR. FAILD TO CLOSE ON FIRST ATTEMPT	CLOSED ON NEXT ATTEMPT; STICKY NFLDA RELA
W	BV1	018528	071777	GM25	K	A10	R	T	8	T			#2 DG STARTED AND CLOSED ONTO BUS;OUTPUT VOLTS =0.	LOOSE CONNECTIONS IN AUTO FIELD FLASH CKT
W	BV1	020437	011178	GM25	J	A04	R	D	4	I			#2 DG OUTPUT BKR. FAILD TO CLOSE IN EXERCISE MODE	NO CAUSE COULD BE DETERMINED
W	BV1	021355	041878	GM25	A	B12		T	D	N			#1 DG WAS S/D AND DECLARED INOPERABLE--OIL LEAKS	FLAW IN FUEL OIL PUMP DISCHARGE PIPE NIPL
W	BV1	021647	060178	GM25	B	B02		D	1	T			#2 DG LUBE OIL LEAK AT ENGINE CONTROL PANEL GAUGE	GAUGE WAS CALIBRATED ON 5/21;LOOSE CONN.

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	BV1	022167	072878	GM25	K	A10	R	D	1	N	#2 DG FAILD TO FLASH DURING SI AND LOSP EVENT	STICKY FIELD FLASH CUTOUT RELAY;AUTO CKT.
W	BV1	0223958	090578	GM25	J	A00	K	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE; #2 DG OOS	BKR CLOSED MANUALLY,1 HOUR RUN AT FULL LD
W	BV1	0223948	091278	GM25	J	A00	R	D	1	T	#1 DG OUTPUT BKR. FAILD TO CLOSE USING CONT. SWITCH	CLOSED LATER NEGATING TROUBLESHOOTING
W	HN1	014162	020376	GM25	A	A02	S	D	1	T	EDG-2B TRIPPED ON OVERSPEED WHILE STARTING	CALIB TOOL LEFT IN FUEL RACK-RACK HLD OPN
W	KE1	019174	092077	GM25	E	B06	C	D	4	T	DSL GEN 1A S/D WHEN SMOKE & FIRE OBSVD IN TURBOCHG	CARBON BUILDUP DUE TO SHORT DURATION OPER
W	KE1	019519	102577	GM25	M	A00		U	U	T	D/G 1A STARTED & WAS AT 70 RPM WHEN IT STOPPED	COULD NOT DETERMINE CAUSE OF FAILURE
W	KE1	020095	122177	GM25	G	B02	S	D	4	T	D/G 1B WOULD NOT PICK UP MORE THAN 1500 KW LOAD	SYNCHRO MOTOR LIMIT SWCHS ADJUSTED IMPROP
W	PT1	017146	020977	GM25	J	A10	R	D	8	T	3D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	DIRT IN LWR BRNG OF OVRCRT RELAY TMG DISC
W	PT1	018417	062977	GM25	I	A14	S	T	4	T	3D DIESEL GENERATOR FAILED TO START - LOGIC FAILUR	SPEED SENSING ASSY SETPOINT DRIFTED
W	PT1	021445	051778	GM25	J	A10	R	D	D	T	4D EDG OUTPUT BREAKER WOULD NOT CLOSE DURING TEST	WEST 662A143H01 LATCH-CHKNG SW DEFECTIVE
W	SU1	014869	041676	GM25	F	A01	R	D	G	T	#1 DIESEL GENERATOR DAMAGED ON START	#17 CYL FLOODED - CAUSED BROKEN INTERNALS
W	TU3	017591	020377	GM25	A	A12	R	T	U	T	DG "B" FAILED TO START	PROBABLE-AIR IN FUEL SUPPLY LINES
W	TU3	018147	033177	GM25	A	A12	P	T	4	T	DG "B" DID NOT REACH SPEED & VLTG WITHIN SPEC TIME	AIR IN FUEL LINE-CRACKS IN SUCTION TUBING
W	TU3	021919	060178	GM25	A	B16		T	4	T	B DG HI LEVEL IN FUEL TANK (ENG.MOUNTD) DG S/D	LEVEL SWITCH MALFUNCTION--REPLACED SWITC

GENERAL MOTORS 3600-3500 KW

VEN	PLNT	CONTROL NO.	FAIL DATE	MFG	KW	SUB/SYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
C	SL1	016881	110276	GM30		M	A01		S	D	4	T	1A DG FAILED TO START	PERSONNEL ERROR - INCORRECT VALVE LINEUP
C	SL1	017134	011877	GM30		E	B04		R	T	G	T	1B DG RAN FOR 55 MIN THEN TRIPPED ON LOCKOUT	TURBOCHARGER SHAFT AND OIL SEAL DAMAGED
C	SL1	017139A	011977	GM30		A	A09		R	T	1	T	THE 1A DIESEL GENERATOR FAILED TO START	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017139B	011977	GM30		A	A09		R	T	1	T	THE 1A DG FAILED TO START AGAIN - LATER SAME DAY	DIRTY FUEL RACK LINKAGE-RACK STUCK OPEN
C	SL1	017441	030177	GM30		I	A01		S	D	1	T	1A DIESEL GENERATOR FAILED TO START	OPER FAILED TO RESET OVERSPEED TRIP
C	SL1	019511	092677	GM30		E	B04		R	T	G	T	1A DG SHUTDOWN WHEN SMOKE ISSUED FROM TURBOCHARGER	FAILED TURBO CHARGER UNIT
C	SL1	022532	090578	GM30		J	A10		T	B	T		"AM" DG OUTPUT BREAKER WOULD NOT CLOSE REMOTELY	DIRTY CONTACTS ON ITS OPERATION RELAY
G	BF1	014102	011476	GM30		G	A12		T	1	T		FAILD TO RESPOND TO ELEC. GOVNR SIGNALS DG #D	OIL DRAIND FROM HYDRAULIC ACTUATOR
G	BF1	016261	110376	GM30		G	B09		C	T	4	T	D DG ERRATIC SPEED BEHAVIOR UNDER LOAD	DIRTY OIL IN GOVERNOR
G	BF3	019133	091977	GM30		K	A10		D	1	T		3D DG TRIPPD ON OVERSPEED ;GOVERNOR INOPERABLE	TO FUSE OPEN DISENABLING FIELD CIRCUIT

GENERAL MOTORS 4000-4418 KW

VEN	PLANT	CONTROL NO.	FAIL DATE	MFG KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
W	TR1	018067	042977	GM40	M	A06			U	U	N	EDG FAILD TO START ON LOSP (PARTIAL) THE 2ND TIME	NO LER FOR DG FAILURE JUST THE LOSP
W	TR1	018447	062277	GM40	G	B10			I	4	N	WEST DG FAILED TO ASSUME MIN REQUIRED LOAD	BRUSH FALLEN OUT OF DC GOV DRIVE MOTOR

NORDBERG MANUFACTURING 3000-3500 Kw

VEN	PLANT	CON&RDL NO.	FAIL DATE	MFG	KW	SUBSYS	FAIL MODE	FAIL MECH	TYPE	CLASS	REPAIR	DISCOVERY	FAILURE MODE	FAILURE MECHANISM
G	BR1	0168548	010477	NM30	B	A04	C	D	4	T	#3 DG TRIPPD R/X AT POWER LOW LUBE OIL TEMP	LOW SETPOINT FOR PRE-FILTER HEATER JACKT
G	BR1	0168548	010477	NM30	B	A04	C	D	4	T	#4 DG TRIPPD R/X AT POWER, TO SWITCH NOT RESET	L.O.PRESS SWITCH TIME DELAY INCORRECT
G	BR1	019391	101177	NM30	G	B05		D	8	I	#2 DG UNABLE TO MAINTAIN LOAD CYCLING 500Kw	SHORTED LEADS TO GOVERNOR; INCORRECT ASMB
G	BR1	020008	120977	NM30	C	A09		T	D	T	#3 DG START TIME 10.2 SEC VS 10	CARBON BUILDUP ON AIR VALVE STUCK SHUT
G	BR1	019548	121077	NM30	J	B0C		D	D	I	SMOKE COMING FROM 326 RELAY AND 660B RELAY FLAMING	REPLACED AND CALIBRATED RELAYS
G	BR1	022454	091178	NM30	A	B07		T	4	T	#1 DG CYLINDER #1 NOT FIRING--HEAVY LOADING ???	FAULTY FUEL PUMP REPLACED
G	BR2	014136	010976	NM30	J	A1C		D	4	N	#1 DG STARTED BUT OUTPUT BKR FAILD TO CLOSE TO E-1	BROKEN LUG WIRE DUE TO STRESS
G	BR2	014614	031476	NM30	A	B12		T	D	T	AT 96% POWER #2 DG STARTED TO CYCLE IN LOCAL-MANLL	FUELOIL SHIFT VALVE LEAKN GASKET RENEWED
G	BR2	015461	061176	NM30	A	A02	C	D	D	I	#1 DG STALLED & FAILD TO TIE INTO E-BUS R/X AT PR	40 GAL H2O IN SADDLE & 4 DAY TANK
G	BR2	016399	111176	NM30	C	A08		T	D	T	DG FAILD OPER TEST-12.2 ON #2 AIR RECIEVER	CHECK VALVE RUSTED SHUT
G	BR2	016823	122976	NM30	G	B10		T	8	T	#2 DG FAILD OPERABILITY TEST --LOSS OF SPEED CONT.	CLUTCH ADJUSTED AND STATOR VOLTMTR REPLAC
G	BR2	020612	021378	NM30	K	A01	S	D	1	N	FOLLOWING SCRAM ON UNIT 1 ;#1 DG LO RELAY WOULDN'T	RESET;LOSS OF EXCITATION RELAY NOT RESET

APPENDIX O

RESULTS OF THE DIESEL-GENERATOR, DOES NOT START, FAILURE RATE ESTIMATIONS

DOES NOT START - (WEEKLY TESTING) - 1976

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
RS1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
TI1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
			TOTALS	4	52560.0	312		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
CC1	8760.0	2	52	3	17520.0	104	1.7E-04	2.9E-02
CC2	744.0	2	4	1	1488.0	8	6.7E-04	1.3E-01
FC1	8760.0	2	52	3	17520.0	104	1.7E-04	2.9E-02
MI2	8760.0	2	52	4	17520.0	104	2.3E-04	3.8E-02
MY1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PA1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SL1	6072.0	2	36	1	12144.0	72	8.2E-05	1.4E-02
			TOTALS	12	101232.0	600		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	8760.0	4	52	1	35040.0	208	2.9E-05	4.8E-03
BP1	8760.0	1	52	11	8760.0	52	1.3E-03	2.1E-01
BR2	8760.0	4	52	3	35040.0	208	8.6E-05	1.4E-02
CO1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
DA1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
DR1	8760.0	1	12	0	8760.0	12	3.4E-04*	2.5E-01*
DR2	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
DR3	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
EN1	8760.0	3	52	6	26280.0	156	2.3E-04	3.8E-02
FP1	8760.0	4	52	2	35040.0	208	5.7E-05	9.6E-03
MI1	8760.0	1	52	0	8760.0	52	3.4E-04*	5.8E-02*
MO1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
NM1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
OC1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
PB2	8760.0	4	52	0	35040.0	208	8.5E-05*	1.4E-02*
PI1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
QC1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
QC2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
VY1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
			TOTALS	34	385440.0	2248		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	5616.0	2	33	2	11232.0	66	1.8E-04	3.0E-02
DC1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
HN1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
IP2	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
IP3	6432.0	3	38	0	19296.0	114	1.6E-04*	2.6E-02*
KE1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PR1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PR2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PT1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PT2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
RG1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
RD2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SA1	456.0	3	3	0	1368.0	9	2.2E-03*	3.3E-01*
SO1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SU1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
SU2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TP1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TU3	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TU4	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
YK1	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
ZI1	8760.0	3	52	1	26280.0	156	3.8E-05	6.4E-03
ZI2	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
			TOTALS	6	399816.0	2373		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	2.3	2.3
BAB.&WIL.	7.3E-05	1.3E-02
	2.9	2.9
	1.6	1.6
COMB.ENG.	1.2E-04	2.0E-02
	1.7	1.7
	1.3	1.3
GEN.ELEC.	8.8E-05	1.5E-02
	1.4	1.4
	2.0	2.0
WESTINGH.	1.5E-05	2.5E-03
	2.3	2.3
	1.4	1.4
PWR'S	4.0E-05	6.7E-03
	1.5	1.5
	1.2	1.2
OVERALL	6.0E-05	1.0E-02
	1.3	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1977

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
CR3	8424.0	2	50	4	16848.0	100	2.4E-04	4.0E-02
DB1	2664.0	2	16	1	5328.0	32	1.9E-04	3.1E-02
RS1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
TI1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
			TOTALS	7	74736.0	444		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1977

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
CC1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
CC2	8760.0	2	52	3	17520.0	104	1.7E-04	2.9E-02
FC1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
MI2	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
MY1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PA1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SL1	8760.0	2	52	3	17520.0	104	1.7E-04	2.9E-02
			TOTALS	12	122640.0	728		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1977

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	8760.0	4	52	1	35040.0	208	2.9E-05	4.8E-03
BP1	8760.0	1	52	7	8760.0	52	8.0E-04	1.3E-01
BR2	8760.0	4	52	3	35040.0	208	8.6E-05	1.4E-02
CC1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
DA1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
DR1	8760.0	1	52	0	8760.0	52	3.4E-04*	5.8E-02*
DR2	8760.0	2	52	7	17520.0	104	4.0E-04	6.7E-02
DR3	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
EN1	8760.0	3	52	2	26280.0	156	7.6E-05	1.3E-02
FP1	8760.0	4	52	2	35040.0	208	5.7E-05	9.6E-03
MI1	8760.0	1	52	0	8760.0	52	3.4E-04*	5.8E-02*
MO1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
NM1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
OC1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PB2	8760.0	4	52	4	35040.0	208	1.1E-04	1.9E-02
PI1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
QC1	8760.0	2	52	3	17520.0	104	1.7E-04	2.9E-02
QC2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
VY1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
			TOTALS	33	385440.0	2288		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1977

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	8760.0	2	52	7	17520.0	104	4.0E-04	6.7E-02
DC1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
HN1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
IP2	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
IP3	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
JF1	3432.0	5	20	3	17160.0	100	1.7E-04	3.0E-02
KE1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
PR1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PR2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PT1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
PT2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
RG1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
RC2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SA1	8760.0	3	52	2	26280.0	156	7.6E-05	1.3E-02
SO1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SU1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SU2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TR1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
TL3	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
TU4	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
YK1	8760.0	3	52	1	26280.0	156	3.8E-05	6.4E-03
ZI1	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
ZI2	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
			TOTALS	19	455160.0	2704		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1977

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
BAB.&WIL.	1.9	1.9
	9.4E-05	1.6E-02
	2.1	2.1
COMB.ENG.	1.6	1.6
	9.8E-05	1.6E-02
	1.7	1.7
GEN.ELEC.	1.3	1.3
	8.6E-05	1.4E-02
	1.4	1.4
WESTINGH.	1.5	1.5
	4.2E-05	7.0E-03
	1.5	1.5
PWR'S	1.3	1.3
	5.8E-05	9.8E-03
	1.3	1.3
OVERALL	1.2	1.2
	6.8E-05	1.2E-02
	1.2	1.2

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1978

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
CR3	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
DB1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
RS1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TI1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
TI2	6648.0	2	40	2	13296.0	80	1.5E-04	2.5E-02
			TOTALS	8	100896.0	600		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1978

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR2	600.0	2	4	0	1200.0	8	2.5E-03*	3.7E-01*
CC1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
CC2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
FC1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
MI2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
MY1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
PA1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SL1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
			TOTALS	6	123840.0	736		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1978

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	8760.0	4	52	0	35040.0	208	8.5E-05*	1.4E-02*
BP1	8760.0	1	52	1	8760.0	52	1.1E-04	1.9E-02
BR2	8760.0	4	52	1	35040.0	208	2.9E-05	4.8E-03
CD1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
DA1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
DR1	8760.0	1	52	5	8760.0	52	5.7E-04	9.6E-02
DR2	8760.0	2	52	7	17520.0	104	4.0E-04	6.7E-02
DR3	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
EN1	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
EN2	4296.0	3	26	2	12888.0	78	1.6E-04	2.6E-02
FP1	8760.0	4	52	1	35040.0	208	2.9E-05	4.8E-03
MI1	8760.0	1	52	0	8760.0	52	3.4E-04*	5.8E-02*
MO1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
NM1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
OC1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
PB2	8760.0	4	52	3	35040.0	208	8.6E-05	1.4E-02
PI1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
QC1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
QC2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
VY1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
			TOTALS	23	398328.0	2366		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1978

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	8760.0	2	52	4	17520.0	104	2.3E-04	3.8E-02
DC1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
DC2	7080.0	2	42	2	14160.0	84	1.4E-04	2.4E-02
HN1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
IP2	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
IP3	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
JF1	8760.0	5	52	8	43800.0	260	1.8E-04	3.1E-02
KE1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
NA1	6456.0	2	38	0	12912.0	76	2.3E-04*	3.9E-02*
PR1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PR2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
PT1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
PT2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
RG1	8760.0	2	52	1	17520.0	104	5.7E-05	9.6E-03
RO2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SA1	8760.0	3	52	6	26280.0	156	1.1E-04*	1.9E-02*
SO1	8760.0	2	52	2	17520.0	104	1.1E-04	1.9E-02
SU1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
SU2	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TR1	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TU3	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
TU4	8760.0	2	52	0	17520.0	104	1.7E-04*	2.9E-02*
YR1	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
ZI1	8760.0	3	52	4	26280.0	156	1.5E-04	2.6E-02
ZI2	8760.0	3	52	0	26280.0	156	1.1E-04*	1.9E-02*
			TOTALS	22	508872.0	3020		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1978

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	1.8	1.8
BAB.&WIL.	7.9E-05	1.3E-02
	2.0	2.0
	2.0	2.0
COMB.ENG.	4.8E-05	8.2E-03
	2.3	2.3
	1.4	1.4
GEN.ELEC.	5.8E-05	9.7E-03
	1.5	1.5
	1.4	1.4
WESTINGH.	4.3E-05	7.3E-03
	1.5	1.5
	1.3	1.3
PWR'S	4.9E-05	8.3E-03
	1.3	1.3
	1.2	1.2
OVERALL	5.2E-05	8.8E-03
	1.3	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976 THRU 1978

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
CR3	17184.0	2	102	6	34368.0	204	1.7E-04	2.9E-02
DB1	11424.0	2	68	3	22848.0	136	1.3E-04	2.2E-02
RS1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
TI1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
TI2	6648.0	2	40	2	13296.0	80	1.5E-04	2.5E-02
			TOTALS	19	228192.0	1356		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976 THRU 1978

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR2	600.0	2	4	0	1200.0	8	2.5E-03*	3.7E-01*
CC1	26280.0	2	156	7	52560.0	312	1.3E-04	2.2E-02
CC2	18264.0	2	108	4	36528.0	216	1.1E-04	1.9E-02
FC1	26280.0	2	156	6	52560.0	312	1.1E-04	1.9E-02
MI2	26280.0	2	156	6	52560.0	312	1.1E-04	1.9E-02
MY1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
PA1	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
SL1	23592.0	2	140	5	47184.0	280	1.1E-04	1.8E-02
			TOTALS	36	347712.0	2064		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976 THRU 1978

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	26280.0	4	156	2	105120.0	624	1.9E-05	3.2E-03
BP1	26280.0	1	156	19	26280.0	156	7.2E-04	1.2E-01
BR2	26280.0	4	156	7	105120.0	624	6.7E-05	1.1E-02
CO1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
DA1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
DR1	26280.0	1	156	5	26280.0	156	1.9E-04	3.2E-02
DR2	26280.0	2	156	16	52560.0	312	3.0E-04	5.1E-02
DR3	26280.0	2	156	4	52560.0	312	7.6E-05	1.3E-02
EN1	26280.0	3	156	8	78840.0	468	1.0E-04	1.7E-02
EN2	4296.0	3	26	2	12888.0	78	1.6E-04	2.6E-02
FP1	26280.0	4	156	5	105120.0	624	4.8E-05	8.0E-03
MI1	26280.0	1	156	0	26280.0	156	1.1E-04*	1.9E-02*
MO1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
NM1	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
OC1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
PB2	26280.0	4	156	7	105120.0	624	6.7E-05	1.1E-02
PI1	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
QC1	26280.0	2	156	4	52560.0	312	7.6E-05	1.3E-02
QC2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
VY1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
			TOTALS	90	1169208.0	6942		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1975 THRU 1978

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	23136.0	2	137	13	46272.0	274	2.8E-04	4.7E-02
DC1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
DC2	7080.0	2	42	2	14160.0	84	1.4E-04	2.4E-02
HN1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
IP2	26280.0	3	156	0	78840.0	468	3.8E-05*	6.4E-03*
IP3	23952.0	3	142	0	71856.0	426	4.2E-05*	7.0E-03*
JF1	12192.0	5	72	11	60960.0	360	1.8E-04	3.1E-02
KE1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
NA1	6456.0	2	38	0	12912.0	76	2.3E-04*	3.9E-02*
PR1	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
PR2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
PT1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
PT2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
RG1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
RO2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
SA1	17976.0	3	107	2	53928.0	321	3.7E-05	6.2E-03
SO1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
SU1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
SU2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
TR1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
TU3	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
TU4	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
YR1	26280.0	3	156	1	78840.0	468	1.3E-05	2.1E-03
ZI1	26280.0	3	156	5	78840.0	468	6.3E-05	1.1E-02
ZI2	26280.0	3	156	0	78840.0	468	3.8E-05*	6.4E-03*
			TOTALS	47	1363848.0	8093		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (WEEKLY TESTING) - 1976 THRU 1978

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	1.5	1.5
BAB.&WIL.	8.3E-05	1.4E-02
	1.5	1.5
	1.4	1.4
COMB.ENG.	8.6E-05	1.5E-02
	1.4	1.4
	1.2	1.2
GEN.ELEC.	7.7E-05	1.3E-02
	1.2	1.2
	1.3	1.3
WESTINGH.	3.4E-05	5.8E-03
	1.3	1.3
	1.2	1.2
PWR'S	4.9E-05	8.3E-03
	1.2	1.2
	1.1	1.1
OVERALL	6.0E-05	1.0E-02
	1.1	1.1

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
RS1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
TI1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
			TOTALS	4	52560.0	72		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
CC1	8760.0	2	12	3	17520.0	24	1.7E-04	1.3E-01
CC2	744.0	2	1	1	1488.0	2	6.7E-04	5.0E-01
FC1	8760.0	2	12	3	17520.0	24	1.7E-04	1.3E-01
MI2	8760.0	2	12	4	17520.0	24	2.3E-04	1.7E-01
MY1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PA1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SL1	6072.0	2	8	1	12144.0	16	8.2E-05	6.3E-02
			TOTALS	12	101232.0	138		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	8760.0	4	12	1	35040.0	48	2.9E-05	2.1E-02
BP1	8760.0	1	12	11	8760.0	12	1.3E-03	9.2E-01
BR2	8760.0	4	12	3	35040.0	48	8.6E-05	6.3E-02
CO1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
DA1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
DR1	8760.0	1	12	0	8760.0	12	3.4E-04*	2.5E-01*
DR2	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
DR3	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
EN1	8760.0	3	12	6	26280.0	36	2.3E-04	1.7E-01
FP1	8760.0	4	12	2	35040.0	48	5.7E-05	4.2E-02
MI1	8760.0	1	12	0	8760.0	12	3.4E-04*	2.5E-01*
MO1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
NM1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
OC1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
PB2	8760.0	4	12	0	35040.0	48	8.5E-05*	6.2E-02*
PI1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
QC1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
QC2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
VY1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
			TOTALS	34	385440.0	528		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BW1	5616.0	2	8	2	11232.0	16	1.8E-04	1.3E-01
DC1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
HN1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
IP2	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
IP3	6432.0	3	9	0	19296.0	27	1.6E-04*	1.1E-01*
KE1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PR1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PR2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PT1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PT2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
RG1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
RC2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SA1	456.0	3	1	0	1368.0	3	2.2E-03*	1.6E+00*
SO1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SU1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
SU2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TR1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TU3	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TU4	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
VR1	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
ZI1	8760.0	3	12	1	26280.0	36	3.8E-05	2.8E-02
ZI2	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
			TOTALS	6	399816.0	550		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	2.3	2.3
BAB.&WIL.	7.6E-05	5.6E-02
	2.9	2.9
	1.6	1.6
COMB.ENG.	1.2E-04	8.7E-02
	1.7	1.7
	1.3	1.3
GEN.[illegible] EC.	8.8E-05	6.4E-02
	1.4	1.4
	2.6	2.6
WESTINGH.	1.5E-05	1.1E-02
	2.3	2.3
	1.4	1.4
PWR'S	4.0E-05	2.9E-02
	[illegible]	1.5
	1.2	1.2
OVERALL	6.0E-05	4.3E-02
	1.3	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1977

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
CR3	8424.0	2	12	4	16848.0	24	2.4E-04	1.7E-01
DB1	2664.0	2	4	1	5328.0	8	1.9E-04	1.3E-01
RS1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
TI1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
			TOTALS	7	74736.0	104		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1977

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
CC1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
CC2	8760.0	2	12	3	17520.0	24	1.7E-04	1.3E-01
FC1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
MI2	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
MY1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PA1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SL1	8760.0	2	12	3	17520.0	24	1.7E-04	1.3E-01
			TOTALS	12	122640.0	168		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1977

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	8760.0	4	12	1	35040.0	48	2.9E-05	2.1E-02
BP1	8760.0	1	12	7	8760.0	12	8.0E-04	5.8E-01
BR2	8760.0	4	12	3	35040.0	48	8.6E-05	6.3E-02
CO1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
DA1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
DR1	8760.0	1	12	0	8760.0	12	3.4E-04*	2.5E-01*
DR2	8760.0	2	12	7	17520.0	24	4.0E-04	2.9E-01
DR3	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
EN1	8760.0	3	12	2	26280.0	36	7.6E-05	5.6E-02
FP1	8760.0	4	12	2	35040.0	48	5.7E-05	4.2E-02
MI1	8760.0	1	12	0	8760.0	12	3.4E-04*	2.5E-01*
MO1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
NM1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
OC1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PB2	8760.0	4	12	4	35040.0	48	1.1E-04	8.3E-02
PI1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
QC1	8760.0	2	12	3	17520.0	24	1.7E-04	1.3E-01
QC2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
VY1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
			TOTALS	33	385440.0	528		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1977

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	8760.0	2	12	7	17520.0	24	4.0E-04	2.9E-01
DC1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
HN1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
IP2	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
IP3	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
JF1	3432.0	5	5	3	17160.0	25	1.7E-04	1.2E-01
KE1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
PR1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PR2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PT1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
PT2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
RG1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
RO2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SA1	8760.0	3	12	2	26280.0	36	7.6E-05	5.6E-02
SO1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SU1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SU2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TR1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
TU3	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
TU4	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
YR1	8760.0	3	12	1	26280.0	36	3.8E-05	2.8E-02
ZI1	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
ZI2	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
			TOTALS	19	455160.0	625		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1977

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	1.9	1.9
BAR.&WIL.	9.4E-05	6.7E-02
	2.1	2.1
	1.6	1.6
COMB.ENG.	9.8E-05	7.1E-02
	1.7	1.7
	1.3	1.3
GEN.ELEC.	8.6E-05	6.3E-02
	1.4	1.4
	1.5	1.5
WESTINGH.	4.2E-05	3.0E-02
	1.5	1.5
	1.3	1.3
PWR'S	5.8E-05	4.2E-02
	1.3	1.3
	1.2	1.2
OVERALL	6.3E-05	5.0E-02
	1.2	1.2

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1978

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
CR3	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
DB1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
RS1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TI1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
TI2	6648.0	2	9	2	13296.0	18	1.5E-04	1.1E-01
			TOTALS	8	100896.0	138		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1978

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR2	600.0	2	1	0	1200.0	2	2.5E-03*	1.5E+00*
CC1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
CC2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
FC1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
MI2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
MY1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
PA1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SL1	8760.0	2	12	1	17520.0	24	5.7E-0*	4.2E-02
			TOTALS	6	123840.0	170		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1978

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	8760.0	4	12	0	35040.0	48	8.5E-05*	6.2E-02*
BP1	8760.0	1	12	1	8760.0	12	1.1E-04	8.3E-02
BR2	8760.0	4	12	1	35040.0	48	2.9E-05	2.1E-02
CO1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
DA1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
DR1	8760.0	1	12	5	8760.0	12	5.7E-04	4.2E-01
DR2	8760.0	2	12	7	17520.0	24	4.0E-04	2.9E-01
DR3	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
EN1	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
EN2	4296.0	3	6	2	12888.0	18	1.6E-04	1.1E-01
FP1	8760.0	4	12	1	35040.0	48	2.9E-05	2.1E-02
MI1	8760.0	1	12	0	8760.0	12	3.4E-04*	2.5E-01*
MO1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
NM1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
OC1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
PB2	8760.0	4	12	3	35040.0	48	8.6E-05	6.3E-02
PI1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
QC1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
QC2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
VY1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
			TOTALS	23	398328.0	546		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1978

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	8760.0	2	12	4	17520.0	24	2.3E-04	1.7E-01
DC1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
DC2	7080.0	2	10	2	14160.0	20	1.4E-04	1.0E-01
HN1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
IP2	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
IP3	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
JF1	8760.0	5	12	8	43800.0	60	1.8E-04	1.3E-01
KE1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
NA1	6456.0	2	9	0	12912.0	18	2.3E-04*	1.7E-01*
PR1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PR2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
PT1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
PT2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
RG1	8760.0	2	12	1	17520.0	24	5.7E-05	4.2E-02
RC2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SA1	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
SC1	8760.0	2	12	2	17520.0	24	1.1E-04	8.3E-02
SU1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
SU2	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TR1	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TU3	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
TU4	8760.0	2	12	0	17520.0	24	1.7E-04*	1.2E-01*
YR1	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
ZI1	8760.0	3	12	4	26280.0	36	1.5E-04	1.1E-01
ZI2	8760.0	3	12	0	26280.0	36	1.1E-04*	8.3E-02*
			TOTALS	22	508872.0	698		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1978

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	1.8	1.8
BAB.&WIL.	7.9E-05	5.8E-02
	2.0	2.0
	2.0	2.0
COMB.ENG.	4.8E-05	3.5E-02
	2.3	2.3
	1.4	1.4
GEN.ELEC.	5.8E-05	4.2E-02
	1.5	1.5
	1.4	1.4
WESTINGH.	4.3E-05	3.2E-02
	1.5	1.5
	1.3	1.3
PWR'S	4.9E-05	3.6E-02
	1.3	1.3
	1.2	1.2
OVERALL	5.2E-05	3.8E-02
	1.3	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976 THRU 1978

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
CR3	17184.0	2	24	4	34368.0	48	1.7E-04	1.3E-01
DB1	11424.0	2	16	3	22848.0	32	1.3E-04	9.4E-02
RS1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
TI1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
TI2	6648.0	2	9	2	13296.0	18	1.5E-04	1.1E-01
			TOTALS	19	228192.0	314		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976 THRU 1978

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR2	600.0	2	1	0	1200.0	2	2.5E-03*	1.5E+00*
CC1	26280.0	2	36	7	52560.0	72	1.3E-04	9.7E-02
CC2	18264.0	2	25	4	36528.0	50	1.1E-04	8.0E-02
FC1	26280.0	2	36	6	52560.0	72	1.1E-04	8.3E-02
MI2	26280.0	2	36	6	52560.0	72	1.1E-04	8.3E-02
MY1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
PA1	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
SL1	23592.0	2	32	5	47184.0	64	1.1E-04	7.8E-02
			TOTALS	30	347712.0	476		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976 THRU 1978

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	26280.0	4	36	2	105120.0	144	1.9E-05	1.4E-02
BP1	26280.0	1	36	19	26280.0	36	7.2E-04	5.3E-01
BR2	26280.0	4	36	7	105120.0	144	6.7E-05	4.9E-02
CO1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
DA1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
DR1	26280.0	1	36	5	26280.0	36	1.9E-04	1.4E-01
DR2	26280.0	2	36	16	52560.0	72	3.0E-04	2.2E-01
DR3	26280.0	2	36	4	52560.0	72	7.6E-05	5.6E-02
EN1	26280.0	3	36	8	78840.0	108	1.0E-04	7.4E-02
EN2	4296.0	3	6	2	12888.0	18	1.6E-04	1.1E-01
FP1	26280.0	4	36	5	105120.0	144	4.8E-05	3.5E-02
MI1	26280.0	1	36	0	26280.0	36	1.1E-04*	8.3E-02*
MO1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
NM1	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
OC1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
PB2	26280.0	4	36	7	105120.0	144	6.7E-05	4.9E-02
PI1	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
QC1	26280.0	2	36	4	52560.0	72	7.6E-05	5.6E-02
QC2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
VY1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
			TOTALS	90	1169208.0	1602		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT START - (MONTHLY TESTING) - 1976 THRU 1978

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	23136.0	2	32	13	46272.0	64	2.8E-04	2.0E-01
DC1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
DC2	7080.0	2	10	2	14160.0	20	1.4E-04	1.0E-01
HN1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
IP2	26280.0	3	36	0	78840.0	108	3.8E-05*	2.8E-02*
IP3	23952.0	3	33	0	71856.0	99	4.2E-05*	3.0E-02*
JF1	12192.0	5	17	11	60960.0	85	1.8E-04	1.3E-01
KE1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
NA1	6456.0	2	9	0	12912.0	18	2.3E-04*	1.7E-01*
PR1	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
PR2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
PT1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
PT2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
RG1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
RC2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
SA1	17976.0	3	25	2	53928.0	75	3.7E-05	2.7E-02
SO1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
SL1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
SU2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
TR1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
TU3	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
TU4	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
YR1	26280.0	3	36	1	78840.0	108	1.3E-05	9.3E-03
ZI1	26280.0	3	36	5	78840.0	108	6.3E-05	4.6E-02
ZI2	26280.0	3	36	0	78840.0	108	3.8E-05*	2.8E-02*
			TOTALS	47	1363848.0	1873		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

APPENDIX P

RESULTS OF THE DIESEL-GENERATOR, DOES NOT CONTINUE TO RUN, FAILURE RATE ESTIMATIONS

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AK1	52.0	2	0	104.0	2.9E-02*
RS1	52.0	2	1	104.0	9.6E-03
TI1	52.0	2	0	104.0	2.9E-02*
		TOTALS	1	312.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
CC1	52.0	2	1	104.0	9.6E-03
CC2	4.0	2	0	8.0	3.7E-01*
FC1	52.0	2	1	104.0	9.6E-03
MI2	52.0	2	9	104.0	8.7E-02
MY1	52.0	2	0	104.0	2.9E-02*
PA1	52.0	2	0	104.0	2.9E-02*
SL1	36.0	2	0	72.0	4.2E-02*
		TOTALS	11	600.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	52.0	4	1	208.0	4.8E-03
BP1	52.0	1	2	52.0	3.8E-02
BR2	52.0	4	2	208.0	9.6E-03
CO1	52.0	2	2	104.0	1.9E-02
DA1	52.0	2	4	104.0	3.8E-02
DR1	52.0	1	0	52.0	5.8E-02*
DR2	52.0	2	2	104.0	1.9E-02
DR3	52.0	2	2	104.0	1.9E-02
EN1	52.0	3	3	156.0	1.9E-02
FP1	52.0	4	0	208.0	1.4E-02*
MI1	52.0	1	0	52.0	5.8E-02*
MO1	52.0	2	0	104.0	2.9E-02*
NM1	52.0	2	0	104.0	2.9E-02*
OC1	52.0	2	0	104.0	2.9E-02*
PB2	52.0	4	0	[illegible]	1.4E-02*
PI1	52.0	2	2	104.0	1.9E-02
QC1	52.0	2	0	104.0	2.9E-02*
QC2	52.0	2	0	104.0	2.9E-02*
VY1	52.0	2	1	104.0	9.6E-03
		TOTALS	21	2288.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BV1	33.0	2	0	66.0	4.5E-02*
DC1	52.0	2	0	104.0	2.9E-02*
HN1	52.0	2	0	104.0	2.9E-02*
IP2	52.0	3	0	156.0	1.9E-02*
IP3	36.0	3	3	114.0	2.6E-02
KE1	52.0	2	0	104.0	2.9E-02*
PR1	52.0	2	0	104.0	2.9E-02*
PR2	52.0	2	1	104.0	9.6E-03
PT1	52.0	2	0	104.0	2.9E-02*
PT2	52.0	2	0	104.0	2.9E-02*
RG1	52.0	2	0	104.0	2.9E-02*
RO2	52.0	2	1	104.0	9.6E-03
SA1	3.0	3	0	9.0	3.3E-01*
SO1	52.0	2	0	104.0	2.9E-02*
SU1	52.0	2	0	104.0	2.9E-02*
SU2	52.0	2	0	104.0	2.9E-02*
TK1	52.0	2	0	104.0	2.9E-02*
TU3	52.0	2	0	104.0	2.9E-02*
TU4	52.0	2	0	104.0	2.9E-02*
YR1	52.0	3	0	156.0	1.9E-02*
ZI1	52.0	3	1	156.0	6.4E-03
ZI2	52.0	3	0	156.0	1.9E-02*
		TOTALS	6	2373.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976

FINAL STATISTICS

	OPERATING HOUR RATE
	4.7
BAB.&WIL.	3.2E-03
	19.5
	1.7
COMB.ENG.	1.8E-02
	1.8
	1.4
GEN.ELEC.	9.2E-03
	1.5
	2.0
WESTINGH.	2.5E-03
	2.3
	1.5
PWR'S	5.5E-03
	1.5
	1.3
OVERALL	7.0E-03
	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1977

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	52.0	2	0	104.0	2.9E-02*
CR3	50.0	2	0	100.0	3.0E-02*
DB1	16.0	2	0	32.0	9.4E-02*
RS1	52.0	2	0	104.0	2.9E-02*
TI1	52.0	2	0	104.0	2.9E-02*
		TOTALS	0	444.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1977

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
CC1	52.0	2	3	104.0	2.9E-02
CC2	52.0	2	0	104.0	2.9E-02*
FC1	52.0	2	0	104.0	2.9E-02*
MI2	52.0	2	4	104.0	3.8E-02
MY1	52.0	2	0	104.0	2.9E-02*
PA1	52.0	2	0	104.0	2.9E-02*
SL1	52.0	2	2	104.0	1.9E-02
		TOTALS	9	728.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1977

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	52.0	4	0	208.0	1.4E-02*
BP1	52.0	1	0	52.0	5.8E-02*
BR2	52.0	4	2	208.0	9.6E-03
CO1	52.0	2	0	104.0	2.9E-02*
DA1	52.0	2	1	104.0	9.6E-03
DR1	52.0	1	0	52.0	5.8E-02*
DR2	52.0	2	2	104.0	1.9E-02
DR3	52.0	2	1	104.0	9.6E-03
EN1	52.0	3	6	156.0	3.8E-02
FP1	52.0	4	0	208.0	1.4E-02*
MI1	52.0	1	0	52.0	5.8E-02*
MO1	52.0	2	0	104.0	2.9E-02*
NM1	52.0	2	0	104.0	2.9E-02*
OC1	52.0	2	0	104.0	2.9E-02*
PB2	52.0	4	0	208.0	1.4E-02*
PI1	52.0	2	0	104.0	2.9E-02*
QC1	52.0	2	0	104.0	2.9E-02*
QC2	52.0	2	0	104.0	2.9E-02*
VY1	52.0	2	2	104.0	1.9E-02
		TOTALS	14	2288.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1977

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BW1	52.0	2	1	104.0	9.6E-03
DC1	52.0	2	0	104.0	2.9E-02*
HN1	52.0	2	0	104.0	2.9E-02*
IP2	52.0	3	0	156.0	1.9E-02*
IP3	52.0	3	0	156.0	1.9E-02*
JF1	20.0	5	2	100.0	2.0E-02
KE1	52.0	2	2	104.0	1.9E-02
PR1	52.0	2	1	104.0	9.6E-03
PR2	52.0	2	0	104.0	2.9E-02*
PT1	52.0	2	0	104.0	2.9E-02*
PT2	52.0	2	0	104.0	2.9E-02*
RG1	52.0	2	0	104.0	2.9E-02*
RO2	52.0	2	1	104.0	9.6E-03
SA1	52.0	3	2	156.0	1.3E-02
SO1	52.0	2	0	104.0	2.9E-02*
SU1	52.0	2	0	104.0	2.9E-02*
SU2	52.0	2	0	104.0	2.9E-02*
TR1	52.0	2	1	104.0	9.6E-03
TU3	52.0	2	0	104.0	2.9E-02*
TU4	52.0	2	0	104.0	2.9E-02*
YR1	52.0	3	2	156.0	1.3E-02
ZI1	52.0	3	0	156.0	1.9E-02*
ZI2	52.0	3	4	156.0	2.6E-02
		TOTALS	16	2700.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1977

FINAL STATISTICS

	OPERATING HOUR RATE
BAB.&WIL.	6.7E-03*
	1.7
COMB.ENG.	1.2E-02
	1.9
	1.6
GEN.ELEC.	6.1E-03
	1.7
	1.5
WESTINGH.	5.9E-03
	1.6
	1.4
PWR'S	6.5E-03
	1.4
	1.3
OVERALL	6.3E-03
	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1978

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	52.0	2	1	104.0	9.6E-03
CR3	52.0	2	0	104.0	2.9E-02*
DB1	52.0	2	3	104.0	2.9E-02
RS1	52.0	2	1	104.0	9.6E-03
TI1	52.0	2	0	104.0	2.9E-02*
TI2	40.0	2	2	80.0	2.5E-02
		TOTALS	7	600.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1978

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR2	4.0	2	0	8.0	3.7E-01*
CC1	52.0	2	1	104.0	9.6E-03
CC2	52.0	2	2	104.0	1.9E-02
FC1	52.0	2	2	104.0	1.9E-02
MI2	52.0	2	3	104.0	2.9E-02
MY1	52.0	2	0	104.0	2.9E-02*
PA1	52.0	2	0	104.0	2.9E-02*
SL1	52.0	2	0	104.0	2.9E-02*
		TOTALS	8	736.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1978

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	52.0	4	0	208.0	1.4E-02*
BP1	52.0	1	1	52.0	1.9E-02
BR2	52.0	4	1	208.0	4.8E-03
CO1	52.0	2	0	104.0	2.9E-02*
DA1	52.0	2	0	104.0	2.9E-02*
DR1	52.0	1	0	52.0	5.8E-02*
DR2	52.0	2	1	104.0	9.6E-03
DR3	52.0	2	0	104.0	2.9E-02*
EN1	52.0	3	0	156.0	1.9E-02*
EN2	26.0	3	0	78.0	3.8E-02*
FP1	52.0	4	1	208.0	4.8E-03
MI1	52.0	1	0	52.0	5.8E-02*
MO1	52.0	2	0	104.0	2.9E-02*
NM1	52.0	2	0	104.0	2.9E-02*
OC1	52.0	2	0	104.0	2.9E-02*
PB2	52.0	4	1	208.0	4.8E-03
PI1	52.0	2	1	104.0	9.6E-03
QC1	52.0	2	0	104.0	2.9E-02*
QC2	52.0	2	0	104.0	2.9E-02*
VY1	52.0	2	1	104.0	9.6E-03
		TOTALS	7	2366.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1978

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BV1	52.0	2	2	104.0	1.9E-02
DC1	52.0	2	0	104.0	2.9E-02*
DC2	42.0	2	3	84.0	3.6E-02
HN1	52.0	2	0	104.0	2.9E-02*
IP2	52.0	3	0	156.0	1.9E-02*
IP3	52.0	3	0	156.0	1.9E-02*
JF1	52.0	5	0	260.0	1.2E-02*
KE1	52.0	2	0	104.0	2.9E-02*
NA1	38.0	2	0	76.0	3.9E-02*
PR1	52.0	2	0	104.0	2.9E-02*
PR2	52.0	2	0	104.0	2.9E-02*
PT1	52.0	2	0	104.0	2.9E-02*
PT2	52.0	2	0	104.0	2.9E-02*
RG1	52.0	2	0	104.0	2.9E-02*
RD2	52.0	2	1	104.0	9.6E-03
SA1	52.0	3	0	156.0	1.9E-02*
SU1	52.0	2	0	104.0	2.9E-02*
SU1	52.0	2	0	104.0	2.9E-02*
SU2	52.0	2	0	104.0	2.9E-02*
TR1	52.0	2	0	104.0	2.9E-02*
TU3	52.0	2	1	104.0	9.6E-03
TU4	52.0	2	0	104.0	2.9E-02*
YR1	52.0	3	0	156.0	1.9E-02*
ZI1	52.0	3	2	156.0	1.3E-02
ZI2	52.0	3	3	156.0	1.9E-02
		TOTALS	12	3020.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1978

FINAL STATISTICS

	OPERATING HOUR RATE
	1.9
BAB.&WIL.	1.2E-02
	2.1
	1.8
COMB.ENG.	1.1E-02
	2.0
	1.9
GEN.ELEC.	3.0E-03
	2.1
	1.6
WESTINGH.	4.0E-03
	1.7
	1.4
PWR'S	6.2E-03
	1.4
	1.3
OVERALL	5.1E-03
	1.4

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976 THRU 1976

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	156.0	2	1	312.0	3.2E-03
CR3	102.0	2	0	204.0	1.5E-02*
DB1	68.0	2	3	136.0	2.2E-02
RS1	156.0	2	2	312.0	6.4E-03
TI1	156.0	2	0	312.0	9.6E-03*
TI2	40.0	2	2	80.0	2.5E-02
		TOTALS	8	1356.0	

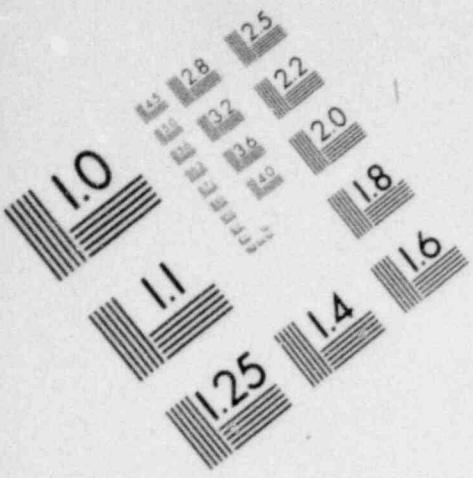
* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976 THRU 1976

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR2	4.0	2	0	8.0	3.7E-01*
CC1	156.0	2	5	312.0	1.6E-02
CC2	108.0	2	2	216.0	9.3E-03
FC1	156.0	2	3	312.0	9.6E-03
MI2	156.0	2	16	312.0	5.1E-02
MY1	156.0	2	0	312.0	9.6E-03*
PA1	156.0	2	0	312.0	9.6E-03*
SL1	140.0	2	2	280.0	7.1E-03
		TOTALS	28	2064.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED



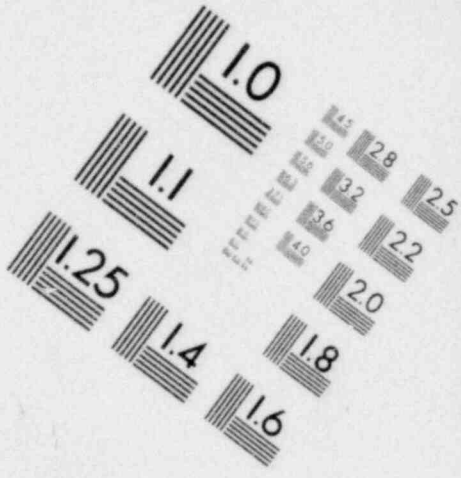
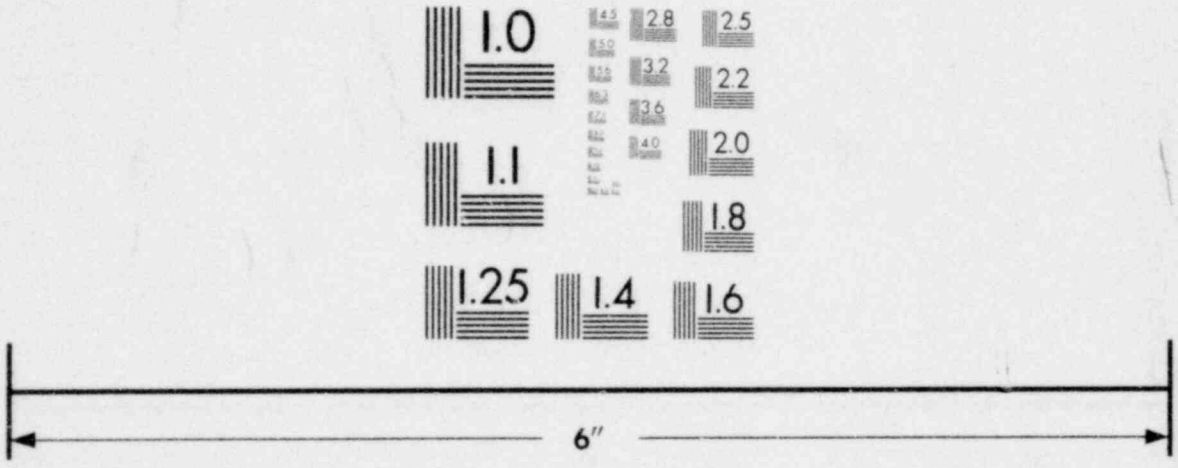
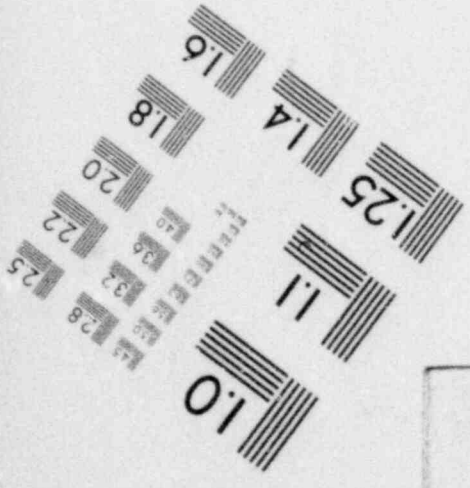
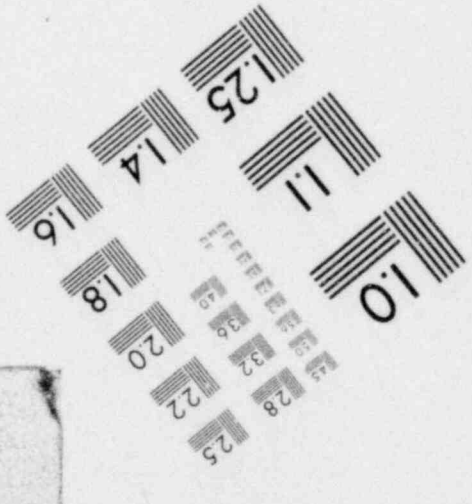


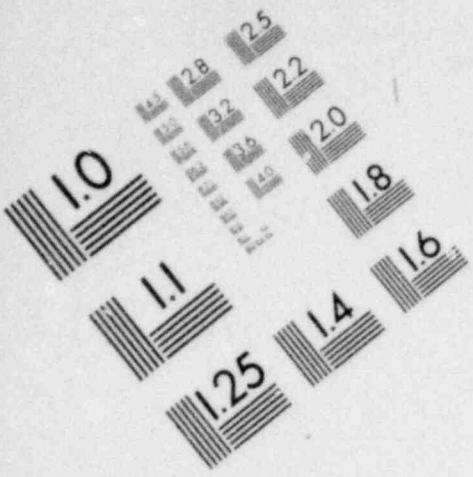
IMAGE EVALUATION
TEST TARGET (MT-3)



MICROCOPY RESOLUTION TEST CHART







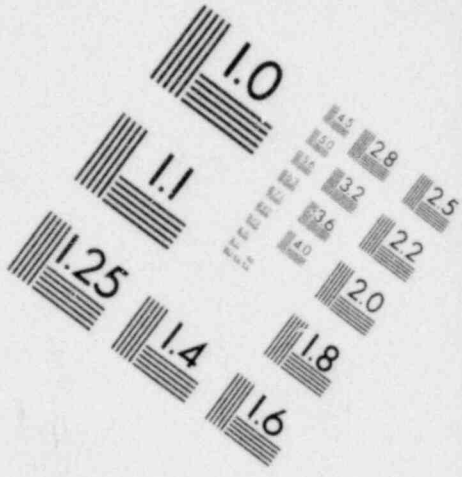
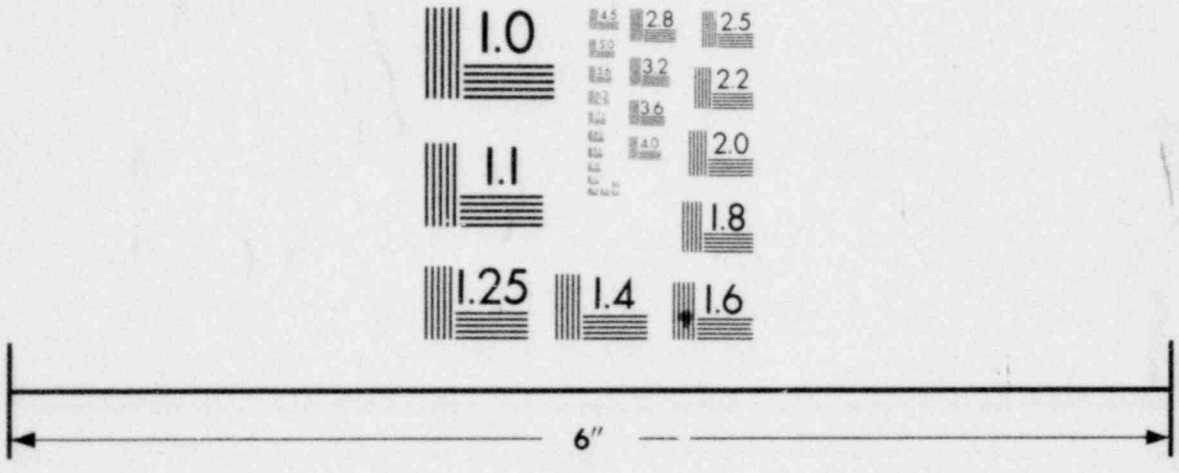
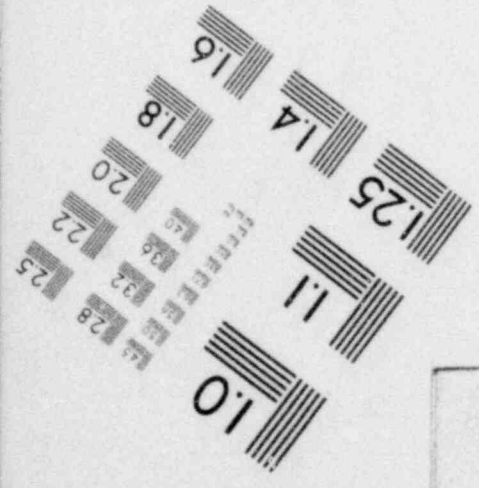
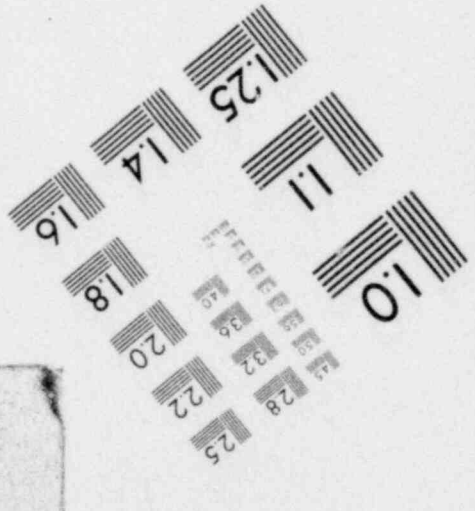


IMAGE EVALUATION
TEST TARGET (MT-3)



MICROCOPY RESOLUTION TEST CHART





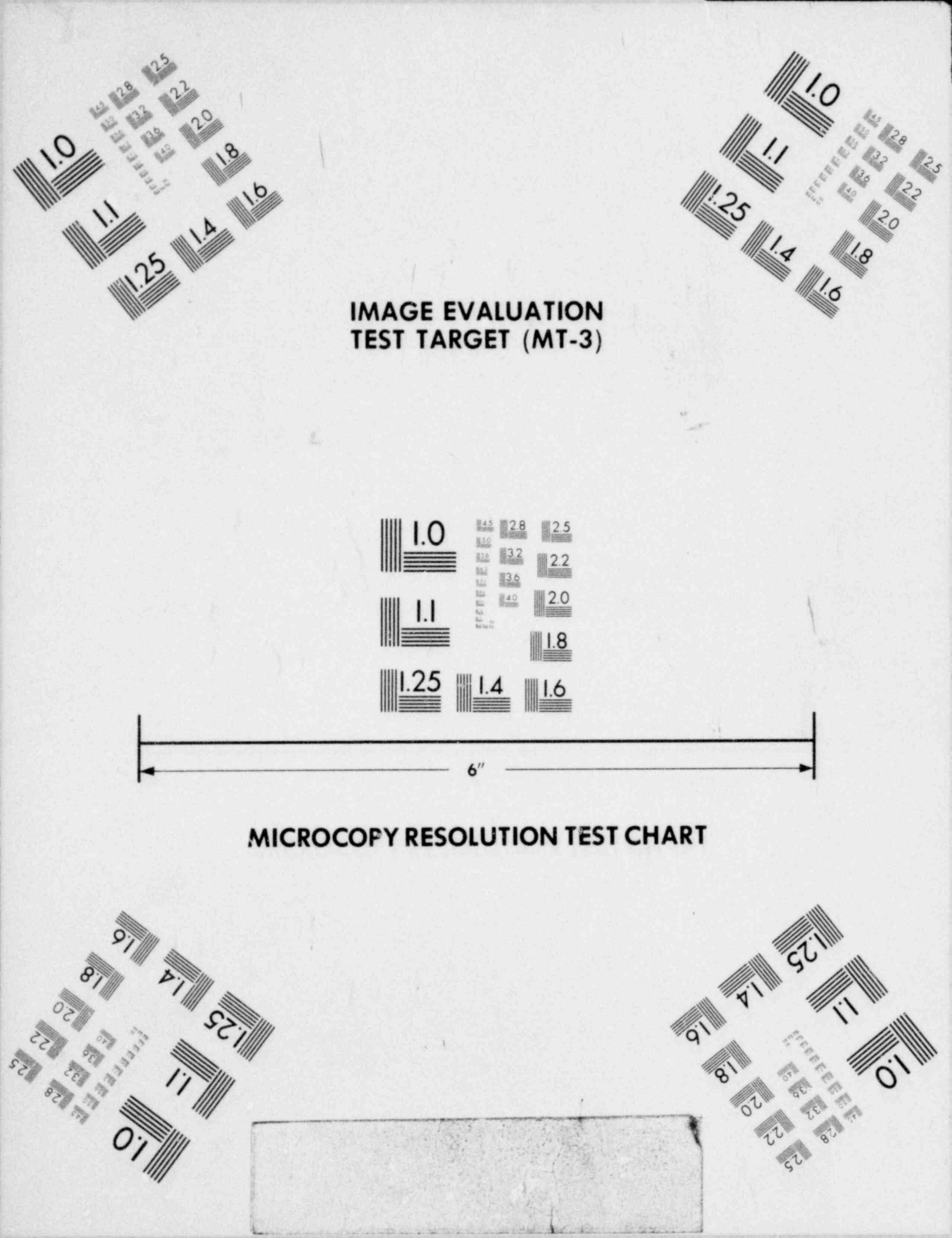


IMAGE EVALUATION
TEST TARGET (MT-3)
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
6"
MICROCOPY RESOLUTION TEST CHART

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976 THRU 1978

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	156.0	4	1	624.0	1.6E-03
BP1	156.0	1	3	156.0	1.9E-02
BR2	156.0	4	5	624.0	8.0E-03
CO1	156.0	2	2	312.0	6.4E-03
DA1	156.0	2	5	312.0	1.6E-02
DR1	156.0	1	0	156.0	1.9E-02*
DR2	156.0	2	5	312.0	1.6E-02
DR3	156.0	2	3	312.0	9.6E-03
EN1	156.0	3	9	468.0	1.9E-02
EN2	26.0	3	0	78.0	3.8E-02*
FP1	156.0	4	1	624.0	1.6E-03
MI1	156.0	1	0	156.0	1.9E-02*
MO1	156.0	2	3	312.0	9.6E-03*
NM1	156.0	2	0	312.0	9.6E-03*
OC1	156.0	2	0	312.0	9.6E-03*
PB2	156.0	4	1	624.0	1.6E-03
PI1	156.0	2	3	312.0	9.6E-03
QC1	156.0	2	0	312.0	9.6E-03*
QC2	156.0	2	0	312.0	9.6E-03*
VY1	156.0	2	4	312.0	1.3E-02
		TOTALS	42	6942.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976 THRU 1978

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BV1	137.0	2	3	274.0	1.1E-02
DC1	156.0	2	0	312.0	9.6E-03*
DC2	42.0	2	3	84.0	3.6E-02
HN1	156.0	2	0	312.0	9.6E-03*
IP2	156.0	3	0	468.0	6.4E-03*
IP3	142.0	3	3	426.0	7.0E-03
JF1	72.0	5	2	360.0	5.6E-03
KE1	156.0	2	2	312.0	6.4E-03
NA1	38.0	2	0	76.0	3.9E-02*
PR1	156.0	2	1	312.0	3.2E-03
PR2	156.0	2	1	312.0	3.2E-03
PT1	156.0	2	0	312.0	9.6E-03*
PT2	156.0	2	0	312.0	9.6E-03*
RG1	156.0	2	0	312.0	9.6E-03*
RD2	156.0	2	3	312.0	9.6E-03
SA1	107.0	3	2	321.0	6.2E-03
SU1	156.0	2	0	312.0	9.6E-03*
SU1	156.0	2	0	312.0	9.6E-03*
SU2	156.0	2	0	312.0	9.6E-03*
TR1	156.0	2	1	312.0	3.2E-03
TU3	156.0	2	1	312.0	3.2E-03
TU4	156.0	2	0	312.0	9.6E-03*
YR1	156.0	3	2	468.0	4.3E-03
ZI1	156.0	3	3	468.0	6.4E-03
ZI2	156.0	3	7	468.0	1.5E-02
		TOTALS	34	8093.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (WEEKLY TESTING) - 1976 THRU 1978

FINAL STATISTICS

	OPERATING HOUR RATE
	1.8
BAB.&WIL.	5.9E-03
	2.0
	1.4
COMB.ENG.	1.4E-02
	1.4
	1.3
GEN.ELEC.	6.1E-03
	1.3
	1.3
WESTINGH.	4.2E-03
	1.4
	1.2
PWR'S	6.1E-03
	1.2
	1.2
OVERALL	6.1E-03
	1.2

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	12.0	2	0	24.0	1.2E-01*
RS1	12.0	2	1	24.0	4.2E-02
TI1	12.0	2	0	24.0	1.2E-01*
		TOTALS	1	72.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
CC1	12.0	2	1	24.0	4.2E-02
CC2	1.0	2	0	2.0	1.5E+00*
FC1	12.0	2	1	24.0	4.2E-02
MI2	12.0	2	9	24.0	3.8E-01
MY1	12.0	2	0	24.0	1.2E-01*
PA1	12.0	2	0	24.0	1.2E-01*
SL1	8.0	2	0	16.0	1.9E-01*
		TOTALS	11	138.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	12.0	4	1	48.0	2.1E-02
BP1	12.0	1	2	12.0	1.7E-01
BR2	12.0	4	2	48.0	4.2E-02
CO1	12.0	2	2	24.0	8.3E-02
DA1	12.0	2	4	24.0	1.7E-01
DR1	12.0	1	0	12.0	2.5E-01*
DR2	12.0	2	2	24.0	8.3E-02
DR3	12.0	2	2	24.0	8.3E-02
EN1	12.0	3	3	36.0	8.3E-02
FP1	12.0	4	0	48.0	6.2E-02*
MI1	12.0	1	0	12.0	2.5E-01*
MO1	12.0	2	0	24.0	1.2E-01*
NM1	12.0	2	0	24.0	1.2E-01*
OC1	12.0	2	0	24.0	1.2E-01*
PB2	12.0	4	0	48.0	6.2E-02*
PI1	12.0	2	2	24.0	8.3E-02
QC1	12.0	2	0	24.0	1.2E-01*
QC2	12.0	2	0	24.0	1.2E-01*
VY1	12.0	2	1	24.0	4.2E-02
		TOTALS	21	526.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BW1	8.0	2	0	16.0	1.9E-01*
DC1	12.0	2	0	24.0	1.2E-01*
HN1	12.0	2	0	24.0	1.2E-01*
IP2	12.0	3	0	36.0	8.3E-02*
IP3	9.0	3	3	27.0	1.1E-01
KE1	12.0	2	0	24.0	1.2E-01*
PR1	12.0	2	0	24.0	1.2E-01*
PR2	12.0	2	1	24.0	4.2E-02
PT1	12.0	2	0	24.0	1.2E-01*
PT2	12.0	2	0	24.0	1.2E-01*
RG1	12.0	2	0	24.0	1.2E-01*
RU2	12.0	2	1	24.0	4.2E-02
SA1	1.0	3	0	3.0	1.0E+00*
SO1	12.0	2	0	24.0	1.2E-01*
SU1	12.0	2	0	24.0	1.2E-01*
SU2	12.0	2	0	24.0	1.2E-01*
TR1	12.0	2	0	24.0	1.2E-01*
TU3	12.0	2	0	24.0	1.2E-01*
TU4	12.0	2	0	24.0	1.2E-01*
YR1	12.0	3	0	36.0	8.3E-02*
ZI1	12.0	3	1	36.0	2.8E-02
ZI2	12.0	3	0	36.0	8.3E-02*
		TOTALS	6	550.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976

FINAL STATISTICS

	OPERATING HOUR RATE
	4.7
BAB.&WIL.	1.4E-02
	19.5
	1.7
COMB.ENG.	8.0E-02
	1.8
	1.4
GEN.ELEC.	4.0E-02
	1.5
	2.0
WESTINGH.	1.1E-02
	2.3
	1.5
P&R'S	2.4E-02
	1.5
	1.3
OVERALL	3.0E-02
	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1977

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	12.0	2	0	24.0	1.2E-01*
CR3	12.0	2	0	24.0	1.2E-01*
DB1	4.0	2	0	8.0	3.7E-01*
RS1	12.0	2	0	24.0	1.2E-01*
TI1	12.0	2	0	24.0	1.2E-01*
		TOTALS	0	104.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1977

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
CC1	12.0	2	3	24.0	1.3E-01
CC2	12.0	2	0	24.0	1.2E-01*
FC1	12.0	2	0	24.0	1.2E-01*
MI2	12.0	2	4	24.0	1.7E-01
MY1	12.0	2	0	24.0	1.2E-01*
PA1	12.0	2	0	24.0	1.2E-01*
SL1	12.0	2	2	24.0	8.3E-02
		TOTALS	9	168.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1977

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	12.0	4	0	48.0	6.2E-02*
BP1	12.0	1	0	12.0	2.5E-01*
BR2	12.0	4	2	48.0	4.2E-02
CO1	12.0	2	0	24.0	1.2E-01*
DA1	12.0	2	1	24.0	4.2E-02
DR1	12.0	1	0	12.0	2.5E-01*
DR2	12.0	2	2	24.0	8.3E-02
DR3	12.0	2	1	24.0	4.2E-02
EN1	12.0	3	6	36.0	1.7E-01
FP1	12.0	4	0	48.0	6.2E-02*
MI1	12.0	1	0	12.0	2.5E-01*
MO1	12.0	2	0	24.0	1.2E-01*
NM1	12.0	2	0	24.0	1.2E-01*
OC1	12.0	2	0	24.0	1.2E-01*
PB2	12.0	4	0	48.0	6.2E-02*
PI1	12.0	2	0	24.0	1.2E-01*
QC1	12.0	2	0	24.0	1.2E-01*
QC2	12.0	2	0	24.0	1.2E-01*
VY1	12.0	2	2	24.0	8.3E-02
		TOTALS	14	528.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1977

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BV1	12.0	2	1	24.0	4.2E-02
DC1	12.0	2	0	24.0	1.2E-01*
HN1	12.0	2	0	24.0	1.2E-01*
IP2	12.0	3	0	36.0	8.3E-02*
IP3	12.0	3	0	36.0	8.3E-02*
JF1	5.0	5	2	25.0	8.0E-02
KE1	12.0	2	2	24.0	8.3E-02
PR1	12.0	2	1	24.0	4.2E-02
PR2	12.0	2	0	24.0	1.2E-01*
PF1	12.0	2	0	24.0	1.2E-01*
PF2	12.0	2	0	24.0	1.2E-01*
RG1	12.0	2	0	24.0	1.2E-01*
RD2	12.0	2	1	24.0	4.2E-02
SA1	12.0	3	2	36.0	5.6E-02
SO1	12.0	2	0	24.0	1.2E-01*
SU1	12.0	2	0	24.0	1.2E-01*
SU2	12.0	2	0	24.0	1.2E-01*
TR1	12.0	2	1	24.0	4.2E-02
TU3	12.0	2	0	24.0	1.2E-01*
TU4	12.0	2	0	24.0	1.2E-01*
YR1	12.0	3	2	36.0	5.6E-02
ZI1	12.0	3	0	36.0	8.3E-02*
ZI2	12.0	3	4	36.0	1.1E-01
		TOTALS	16	625.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1977

FINAL STATISTICS

	OPERATING HOUR RATE
BAB.&WIL.	2.9E-02*
	1.7
COMB.ENG.	5.4E-02
	1.9
	1.6
GEN.ELEC.	2.7E-02
	1.7
	1.5
WESTINGH.	2.6E-02
	1.6
	1.4
PWR'S	2.8E-02
	1.4
	1.3
OVERALL	2.7E-02
	1.3

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1978

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	12.0	2	1	24.0	4.2E-02
CR3	12.0	2	0	24.0	1.2E-01*
DB1	12.0	2	3	24.0	1.3E-01
RS1	12.0	2	1	24.0	4.2E-02
TI1	12.0	2	0	24.0	1.2E-01*
TI2	9.0	2	2	18.0	1.1E-01
		TOTALS	7	138.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1978

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR2	1.0	2	0	2.0	1.5E+00*
CC1	12.0	2	1	24.0	4.2E-02
CC2	12.0	2	2	24.0	8.3E-02
FC1	12.0	2	2	24.0	8.3E-02
MI2	12.0	2	3	24.0	1.3E-01
MY1	12.0	2	0	24.0	1.2E-01*
PA1	12.0	2	0	[illegible]	[illegible]*
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]*
		TOTALS	8	170.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DGES NOT CONTRIBUTE TO RCN - (MONTHLY TESTING) - 1978

GENERAL ELECTRIC

PLANT	COMP.-HRS.	POPULATION	FAILURES	POP.-HOURS	OPERATING MODE RATE
BF1	12.0	4	0	48.0	2.1E-02*
BF2	12.0	1	1	12.0	8.3E-02
BR2	12.0	4	1	48.0	2.1E-02
CU1	12.0	2	0	24.0	4.2E-02*
DA1	12.0	2	0	24.0	4.2E-02*
DR1	12.0	1	0	12.0	8.3E-02*
DR2	12.0	2	1	24.0	4.2E-02
DR3	12.0	2	0	24.0	4.2E-02*
EN1	12.0	3	0	36.0	2.8E-02*
EN2	6.0	3	0	18.0	5.6E-02*
FP1	12.0	4	1	48.0	2.1E-02
MI1	12.0	1	0	12.0	8.3E-02*
MO1	12.0	2	0	24.0	4.2E-02*
NM1	12.0	2	0	24.0	4.2E-02*
OC1	12.0	2	0	24.0	4.2E-02*
PB2	12.0	4	1	48.0	2.1E-02
PI1	12.0	2	1	24.0	4.2E-02
QC1	12.0	2	0	24.0	4.2E-02*
QC2	12.0	2	0	24.0	4.2E-02*
WY1	12.0	2	1	24.0	4.2E-02
		TOTALS	7	546.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1978

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BV1	12.0	2	2	24.0	8.3E-02
DC1	12.0	2	0	24.0	1.2E-01*
DC2	10.0	2	3	20.0	1.5E-01
HN1	12.0	2	0	24.0	1.2E-01*
IP2	12.0	3	0	36.0	8.3E-02*
IP3	12.0	3	0	36.0	8.3E-02*
JF1	12.0	5	0	60.0	5.0E-02*
KE1	12.0	2	0	24.0	1.2E-01*
NA1	9.0	2	0	18.0	1.7E-01*
PR1	12.0	2	0	24.0	1.2E-01*
PR2	12.0	2	0	24.0	1.2E-01*
PT1	12.0	2	0	24.0	1.2E-01*
PT2	12.0	2	0	24.0	1.2E-01*
RG1	12.0	2	0	24.0	1.2E-01*
RO2	12.0	2	1	24.0	4.2E-02
SA1	12.0	3	0	36.0	8.3E-02*
SO1	12.0	2	0	24.0	1.2E-01*
SU1	12.0	2	0	24.0	1.2E-01*
SU2	12.0	2	0	24.0	1.2E-01*
TR1	12.0	2	0	24.0	1.2E-01*
TU3	12.0	2	1	24.0	4.2E-02
TU4	12.0	2	0	24.0	1.2E-01*
YR1	12.0	3	0	36.0	8.3E-02*
ZI1	12.0	3	2	36.0	5.6E-02
ZI2	12.0	3	3	36.0	8.3E-02
		TOTALS	12	698.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TEST) 31 - 1978

FINAL STATISTICS

	OPERATING HOUR RATE
	1.9
BAB.&WIL.	5.1E-02
	2.1
	1.8
COMB.ENG.	4.7E-02
	2.6
	1.9
GEN.ELEC.	1.3E-02
	2.1
	1.6
WESTINGH.	1.7E-02
	1.7
	1.4
PWR'S	2.7E-02
	1.4
	1.3
OVERALL	2.2E-02
	1.4

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976 THRU 1978

BABCOCK&WILCOX

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR1	36.0	2	1	72.0	1.4E-02
CR3	24.0	2	0	48.0	6.2E-02*
OB1	16.0	2	3	32.0	9.4E-02
RS1	36.0	2	2	72.0	2.8E-02
T.1	36.0	2	0	72.0	4.2E-02*
TI2	9.0	2	2	18.0	1.1E-01
		TOTALS	8	314.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976 THRU 1978

COMBUSTION ENGINEERING

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
AR2	1.0	2	0	2.0	1.5E+00*
CC1	36.0	2	5	72.0	6.9E-02
CC2	25.0	2	2	50.0	4.0E-02
FC1	36.0	2	3	72.0	4.2E-02
MI2	36.0	2	16	72.0	2.2E-01
MY1	36.0	2	0	72.0	4.2E-02*
PA1	36.0	2	0	72.0	4.2E-02*
SL1	32.0	2	2	64.0	3.1E-02
		TOTALS	28	476.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976 THRU 1978

GENERAL ELECTRIC

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BF1	36.0	4	1	144.0	6.9E-03
BP1	36.0	1	3	36.0	8.3E-02
BR2	36.0	4	5	144.0	3.5E-02
CO1	36.0	2	2	72.0	2.8E-02
DA1	36.0	2	5	72.0	6.9E-02
DR1	36.0	1	0	36.0	8.3E-02*
DR2	36.0	2	5	72.0	6.9E-02
DR3	36.0	2	3	72.0	4.2E-02
EN1	36.0	3	9	108.0	8.3E-02
EN2	6.0	3	0	18.0	1.7E-01*
FP1	36.0	4	1	144.0	6.9E-03
MI1	36.0	1	0	36.0	8.3E-02*
MO1	36.0	2	0	72.0	4.2E-02*
NM1	36.0	2	0	72.0	4.2E-02*
OC1	36.0	2	0	72.0	4.2E-02*
PB2	36.0	4	1	144.0	6.9E-03
PI1	36.0	2	3	72.0	4.2E-02
QC1	36.0	2	0	72.0	4.2E-02*
QC2	36.0	2	0	72.0	4.2E-02*
VY1	36.0	2	4	72.0	5.6E-02
		TOTALS	42	1602.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976 THRU 1978

WESTINGHOUSE

PLANT	COMP.HRS.	POPULATION	FAILURES	POP.HOURS.	OPERATING HOUR RATE
BV1	32.0	2	3	64.0	4.7E-02
DC1	36.0	2	0	72.0	4.2E-02*
DC2	10.0	2	3	20.0	1.5E-01
HN1	36.0	2	0	72.0	4.2E-02*
IP2	36.0	3	0	108.0	2.8E-02*
IP3	33.0	3	3	99.0	3.0E-02
JF1	17.0	5	2	85.0	2.4E-02
KE1	36.0	2	2	72.0	2.8E-02
NA1	9.0	2	0	18.0	1.7E-01*
PR1	36.0	2	1	72.0	1.4E-02
PR2	36.0	2	1	72.0	1.4E-02
PI1	36.0	2	0	72.0	4.2E-02*
PI2	36.0	2	0	72.0	4.2E-02*
RG1	36.0	2	0	72.0	4.2E-02*
RO2	36.0	2	3	72.0	4.2E-02
SA1	25.0	3	2	75.0	2.7E-02
SU1	36.0	2	0	72.0	4.2E-02*
SU1	36.0	2	0	72.0	4.2E-02*
SU2	36.0	2	0	72.0	4.2E-02*
TR1	36.0	2	1	72.0	1.4E-02
TU3	36.0	2	1	72.0	1.4E-02
TU4	36.0	2	0	72.0	4.2E-02*
YR1	36.0	3	2	108.0	1.9E-02
ZI1	36.0	3	3	108.0	2.8E-02
ZI2	36.0	3	7	108.0	6.5E-02
		TOTALS	34	1873.0	

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

DOES NOT CONTINUE TO RUN - (MONTHLY TESTING) - 1976 THRU 1978

FINAL STATISTICS

	OPERATING HOUR RATE
	1.8
BAB.&WIL.	2.5E-02
	2.0
	1.4
COMB.ENG.	5.9E-02
	1.4
	1.3
GEN.ELEC.	2.6E-02
	1.3
	1.3
WESTINGH.	1.8E-02
	1.4
	1.2
PWR'S	2.6E-02
	1.2
	1.2
OVERALL	2.6E-02
	1.2

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

APPENDIX Q

RESULTS OF THE DIESEL-GENERATOR, DOES NOT OPERATE, FAILURE RATE ESTIMATIONS

AGGREGATE STANDBY RATES - (WEEKLY TESTING) - 1976 THRU 1978

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AK1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
CR3	17184.0	2	102	6	34368.0	204	1.7E-04	2.9E-02
DB1	11424.0	2	68	6	22848.0	136	2.6E-04	4.4E-02
RS1	26280.0	2	156	5	52560.0	312	9.5E-05	1.6E-02
TI1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
TI2	6648.0	2	40	4	13296.0	80	3.0E-04	5.0E-02
			TOTALS	27	228192.0	1356		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (WEEKLY TESTING) - 1976 THRU 1978

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR2	600.0	2	4	0	1200.0	8	2.5E-03*	3.7E-01*
CC1	26280.0	2	156	12	52560.0	312	2.3E-04	3.8E-02
CC2	16264.0	2	108	6	36528.0	216	1.6E-04	2.8E-02
FC1	26280.0	2	156	9	52560.0	312	1.7E-04	2.9E-02
MI2	26280.0	2	156	22	52560.0	312	4.2E-04	7.1E-02
MY1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
PA1	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
SL1	23592.0	2	140	7	47184.0	280	1.5E-04	2.5E-02
			TOTALS	58	347712.0	2064		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (WEEKLY TESTING) - 1976 THRU 1978

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	26280.0	4	156	3	105120.0	624	2.9E-05	4.8E-03
BP1	26280.0	1	156	22	26280.0	156	8.4E-04	1.4E-01
BR2	26280.0	4	156	12	105120.0	624	1.1E-04	1.9E-02
CO1	26280.0	2	156	4	52560.0	312	7.6E-05	1.3E-02
DA1	26280.0	2	156	8	52560.0	312	1.5E-04	2.6E-02
DR1	26280.0	1	156	5	26280.0	156	1.9E-04	3.2E-02
DR2	26280.0	2	156	21	52560.0	312	4.0E-04	6.7E-02
DR3	26280.0	2	156	7	52560.0	312	1.3E-04	2.2E-02
EN1	26280.0	3	156	17	78840.0	468	2.2E-04	3.6E-02
EN2	4296.0	3	26	2	12888.0	78	1.6E-04	1.6E-02
FP1	26280.0	4	156	6	105120.0	624	5.7E-05	9.6E-03
MI1	26280.0	1	156	0	26280.0	156	1.1E-04*	1.9E-02*
MO1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
NM1	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
OC1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
PB2	26280.0	4	156	8	105120.0	624	7.6E-05	1.3E-02
PI1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
QC1	26280.0	2	156	4	52560.0	312	7.6E-05	1.3E-02
QC2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
VY1	26280.0	2	156	6	52560.0	312	1.1E-04	1.9E-02
			TOTALS	132	1169208.0	6942		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (WEEKLY TESTING) - 1976 THRU 1978

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	23136.0	2	137	16	46272.0	274	3.5E-04	5.8E-02
DC1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
DC2	7080.0	2	42	5	14160.0	84	3.5E-04	6.0E-02
HN1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
IP2	26280.0	3	156	0	78840.0	468	3.8E-05*	6.4E-03*
IP3	23952.0	3	142	3	71856.0	426	4.2E-05	7.0E-03
JF1	12192.0	5	72	1	60960.0	360	2.1E-04	3.6E-02
KE1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
NA1	6456.0	2	38	0	12912.0	76	2.3E-04*	3.9E-02*
PR1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
PR2	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
PT1	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
PT2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
RG1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
RO2	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
SA1	17976.0	3	107	4	53928.0	321	7.4E-05	1.2E-02
SO1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
SU1	26280.0	2	156	1	52560.0	312	1.9E-05	3.2E-03
SU2	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
TR1	26280.0	2	156	2	52560.0	312	3.8E-05	6.4E-03
TU3	26280.0	2	156	3	52560.0	312	5.7E-05	9.6E-03
TU4	26280.0	2	156	0	52560.0	312	5.7E-05*	9.6E-03*
YR1	26280.0	3	156	3	78840.0	468	3.8E-05	6.4E-03
ZI1	26280.0	3	156	8	78840.0	468	1.0E-04	1.7E-02
ZI2	26280.0	3	156	7	78840.0	468	8.9E-05	1.5E-02
			TOTALS	81	1363848.0	8093		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (WEEKLY TESTING) - 1976 THRU 1978

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	1.4	1.4
BAB.&WIL.	1.2E-04	2.0E-02
	1.4	1.4
	1.2	1.2
COMB.ENG.	1.7E-04	2.8E-02
	1.3	1.3
	1.2	1.2
GEN.ELEC.	1.1E-04	1.9E-02
	1.2	1.2
	1.2	1.2
WESTINGH.	5.9E-05	1.0E-02
	1.2	1.2
	1.1	1.1
PWR'S	8.6E-05	1.4E-02
	1.1	1.1
	1.1	1.1
OVERALL	9.6E-05	1.6E-02
	1.1	1.1

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (MONTHLY TESTING) - 1976 THRU 1978

BABCOCK&WILCOX

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
CR3	17184.0	2	24	6	34368.0	48	1.7E-04	1.3E-01
DB1	11424.0	2	16	6	22848.0	32	2.6E-04	1.9E-01
RS1	26280.0	2	36	5	52560.0	72	9.5E-05	6.9E-02
TI1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
TI2	6648.0	2	9	4	13296.0	18	3.0E-04	2.2E-01
			TOTALS	27	228192.0	314		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (MONTHLY TESTING) - 1976 THRU 1978

COMBUSTION ENGINEERING

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
AR2	600.0	2	1	0	1200.0	2	2.5E-03*	1.5E+00*
CC1	26280.0	2	36	12	52560.0	72	2.3E-04	1.7E-01
CC2	18264.0	2	25	6	36528.0	50	1.6E-04	1.2E-01
FC1	26280.0	2	36	9	52560.0	72	1.7E-04	1.3E-01*
MI2	26280.0	2	36	22	52560.0	72	4.2E-04	3.1E-01
MY1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
PA1	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
SL1	23592.0	2	32	7	47184.0	64	1.5E-04	1.1E-01
			TOTALS	58	347712.0	476		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (MONTHLY TESTING) - 1976 THRU 1976

GENERAL ELECTRIC

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BF1	26280.0	4	36	3	105120.0	144	2.9E-05	2.1E-02
BP1	26280.0	1	36	22	26280.0	36	8.4E-04	6.1E-01
BR2	26280.0	4	36	12	105120.0	144	1.1E-04	8.3E-02
CO1	26280.0	2	36	4	52560.0	72	7.6E-05	5.6E-02
DA1	26280.0	2	36	8	52560.0	72	1.5E-04	1.1E-01
DR1	26280.0	1	36	5	26280.0	36	1.9E-04	1.4E-01
DR2	26280.0	2	36	21	52560.0	72	4.0E-04	2.9E-01
DR3	26280.0	2	36	7	52560.0	72	1.3E-04	9.7E-02
EN1	26280.0	3	36	17	78840.0	108	2.2E-04	1.6E-01
EN2	4296.0	3	6	2	12888.0	18	1.6E-04	1.1E-01
FP1	26280.0	4	36	6	105120.0	144	5.7E-05	4.2E-02
MI1	26280.0	1	36	0	26280.0	36	1.1E-04*	8.3E-02*
MO1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
NM1	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
OC1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
PB2	26280.0	4	36	8	105120.0	144	7.6E-05	5.6E-02
PI1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
QC1	26280.0	2	36	4	52560.0	72	7.6E-05	5.6E-02
QC2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
VY1	26280.0	2	36	6	52560.0	72	1.1E-04	8.3E-02
			TOTALS	132	1169208.0	1602		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (MONTHLY TESTING) - 1976 THRU 1976

WESTINGHOUSE

PLANT	CRIT.HRS.	POPULATION	DEMANDS	FAILURES	POP.HOURS	POP.DEMANDS	STANDBY HOUR RATE	DEMAND RATE
BV1	23136.0	2	32	16	46272.0	64	3.5E-04	2.5E-01
DC1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
DC2	7080.0	2	10	5	14160.0	20	3.5E-04	2.5E-01
HN1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
IP2	26280.0	3	36	0	78840.0	108	3.8E-05*	2.8E-02*
IP3	23952.0	3	33	3	71856.0	99	4.2E-05	3.0E-02
JF1	12192.0	5	17	13	60960.0	85	2.1E-04	1.5E-01
KE1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
NA1	6456.0	2	9	0	12912.0	18	2.3E-04*	1.7E-01*
PR1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
PR2	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
PT1	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
PT2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
RG1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
RO2	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
SA1	17976.0	3	25	4	53928.0	75	7.4E-05	5.3E-02
SO1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
SU1	26280.0	2	36	1	52560.0	72	1.9E-05	1.4E-02
SU2	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
TH1	26280.0	2	36	2	52560.0	72	3.8E-05	2.8E-02
TU3	26280.0	2	36	3	52560.0	72	5.7E-05	4.2E-02
TU4	26280.0	2	36	0	52560.0	72	5.7E-05*	4.2E-02*
YK1	26280.0	3	36	3	78840.0	108	3.8E-05	2.8E-02
ZI1	26280.0	3	36	8	78840.0	108	1.0E-04	7.4E-02
ZI2	26280.0	3	36	7	78840.0	108	8.9E-05	6.5E-02
			TOTALS	81	1363848.0	1873		

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED

AGGREGATE STANDBY RATES - (MONTHLY TESTING) - 1976 THRU 1978

	FINAL STATISTICS	
	STANDBY HOUR RATE	DEMAND RATE
	1.4	1.4
BAB.&WIL.	1.2E-04	8.6E-02
	1.4	1.4
	1.2	1.2
COMB.ENG.	1.7E-04	1.2E-01
	1.3	1.3
	1.2	1.2
GEN.ELEC.	1.1E-04	8.2E-02
	1.2	1.2
	1.2	1.2
WESTINGH.	5.9E-05	4.3E-02
	1.2	1.2
	1.1	1.1
PWR'S	8.6E-05	6.2E-02
	1.1	1.1
	1.1	1.1
OVERALL	9.6E-05	7.0E-02
	1.1	1.1

* DENOTES UPPER 95 PERCENT CONFIDENCE BOUND WHEN NO FAILURES RECORDED