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A methodology is developed to incorporate aging effects into Probabilistic Risk Analyses (PRAs). The methodology separates the PRA analyses from the aging analyses, allowing available PRAs to be efficiently used in evaluating risk effects of aging. The methodology was applied to two NUREG 1150 PRAs using aging rate data that was developed for active components. Various surveillance and maintenance programs were evaluated to determine their effects in controlling aging. Both point evaluations and uncertainty evaluations were carried out. The results of the applications showed the sensitivity of aging effects on core melt frequency to the efficiency of the maintenance and surveillance program in managing aging effects. The detailed contributors to the aging effects showed relatively few components contributing, implying that prioritized aging management programs would be most effective in controlling risk.

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ABSTRACT

A methodology is developed to incorporate aging effects into a Probabilistic Risk Analysis (PRA). The methodology separates the PRA models from the aging models, allowing available PRAs to be efficiently used in evaluating risk effects of aging. The methodology is applied to two PRAs to demonstrate the results which are obtainable from current PRAs. Various component aging rates and various surveillance and maintenance programs are evaluated to determine their impacts on the resulting core melt frequency. Both point evaluations and uncertainty evaluations are carried out. The results of the applications show that for given aging rates, the core melt frequency impacts are very sensitive to the surveillance and maintenance program which is carried out. The detailed results which are obtained allow the aging contributors to be effectively prioritized to focus aging management programs.

EXECUTIVE SUMMARY

This report presents the results of a project which was carried out to develop a methodology to quantify risk effects due to component and structural aging using a probabilistic risk analysis (PRA) and component aging models. The methodology which was developed allows any present PRA to be used and allows any aging models to be used for the components and structures. As an important part of the evaluations, the effects of maintenance and surveillance programs in controlling aging are quantified. Maintenance programs and aging surveillance programs can be explicitly evaluated to determine their effectiveness in controlling aging impacts on system unavailability, core melt frequency and public risk. Both point evaluations and uncertainty evaluations can be carried out, and detailed contributors to the aging effects can be identified and can be prioritized.

To demonstrate the methodology, two PRAs, one PWR and one BWR, were used to calculate the increase in core melt frequency caused by aging for given aging data and for given assumed surveillance and maintenance programs. The increase in core melt frequency due to aging was averaged over time to obtain an average increase in core melt frequency. This average increase in core melt frequency due to aging characterized the effectiveness of the maintenance and surveillance program in controlling aging effects. The average increase in core melt frequency can be added to the baseline PRA core melt frequency to obtain the projected core melt frequency under a given maintenance and surveillance program with aging.

The aging of active components was modeled using the linear failure rate aging model developed in NRC's Nuclear Plant Aging Research (NPAR) program. In the linear aging model, the component failure rate linearly increases with age according to a characteristic aging rate. To demonstrate the methodology four aging rate data bases were used, which were titled TIRGALEX, MOD1, MOD2, and MOD3. The TIRGALEX aging rate data base was developed in the NPAR program and the other data bases were modifications of the TIRGALEX data base. These data bases were used to demonstrate the effects of different aging rates on the core melt frequency for a given maintenance and surveillance program.

The two figures on the next pages, entitled "Core Melt Frequency Increase ΔC Versus Maintenance Program Characteristics", summarize the point results that were obtained for Plant A (the PWR) and for Plant B (the BWR). The y-axis on the figures is the average increase in core melt frequency ΔC due to aging which is calculated to occur under a given maintenance program. The x-axis identifies the different surveillance and maintenance programs that were evaluated. L is the scheduled overhaul or replacement interval (in months) assumed for all components and T is the surveillance interval (in months) assumed. At an overhaul or replacement the component is assumed to be restored to essentially as good as new. At a surveillance the component is assured to be in an operational state with minimal repairs being performed if no failure is detected. At

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a failure the component is assumed to be restored to as good as new. Where there is no surveillance interval given, it is assumed that there are no surveillances for aging effects between overhauls or replacements.

The different results for a given surveillance and maintenance program correspond to the four different aging rate data bases that were used. The two figures show the large differences in core melt frequency increases that result from the different aging maintenance programs that were assumed. The large core melt frequency increases at the right hand side of the figures correspond to very ineffective maintenance programs which are not likely to occur in practice. The results are most meaningfully viewed as a sensitivity study, showing the sensitivity of the core melt frequency increase to the type of maintenance program and the aging rates. The results are significant from a technical standpoint because they explicitly quantify the impacts that aging and maintenance can have. These evaluations are the first quantifications of aging and maintenance impacts using full scale, up to date PRAs.

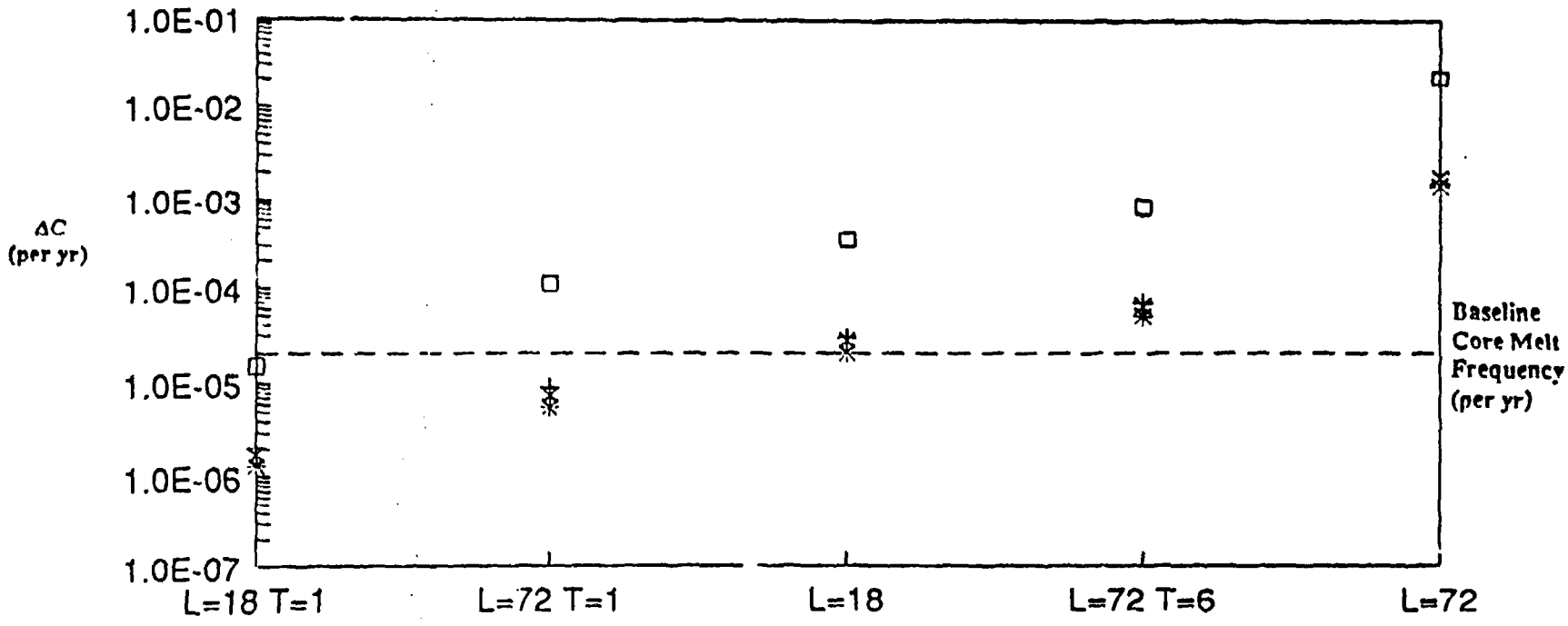
When the core melt frequency increase ΔC is high for a surveillance and maintenance program, then examination of the detailed aging contributors shows that relatively few components contribute. This implies that a "graded" maintenance program, or equivalently a "prioritized" maintenance program, can effectively control the core melt frequency increase due to aging. In a graded or prioritized maintenance program, most components can have a lower level of maintenance, provided core-melt-frequency-important components have a higher level of maintenance.

The dominant aging contributors for Plant A (the PWR) were found to be diesel generators, specific check valves and motor operated valves in the emergency core cooling system, and motor driven pumps and turbine driven pumps in the auxiliary feedwater system. For Plant B (the BWR) the dominant aging contributors were the diesels, the motor driven pumps in the service water system, and the turbine driven pumps in the reactor core isolation system. The aging contribution from every component in the PRA is provided and is prioritized. Also, the contributions from multiple component interactions are provided and are prioritized. These detailed contributors include contributions from specific systems, components, and failure modes, and provide a comprehensive means of focusing aging analyses and aging control efforts.

In addition to the point calculations, uncertainty evaluations were also carried out. For the uncertainty evaluations, ranges were assigned to each component aging rate, each effective overhaul interval, and each effective surveillance interval. These ranges described uncertainties and variabilities in the data. Log uniform distributions, which are flat distributions on a log scale, were used for the uncertainty propagations. All the variables were treated as being independent of one another for the evaluations.

Core Melt Frequency Increase ΔC Versus Maintenance Program Characteristics

Plant A



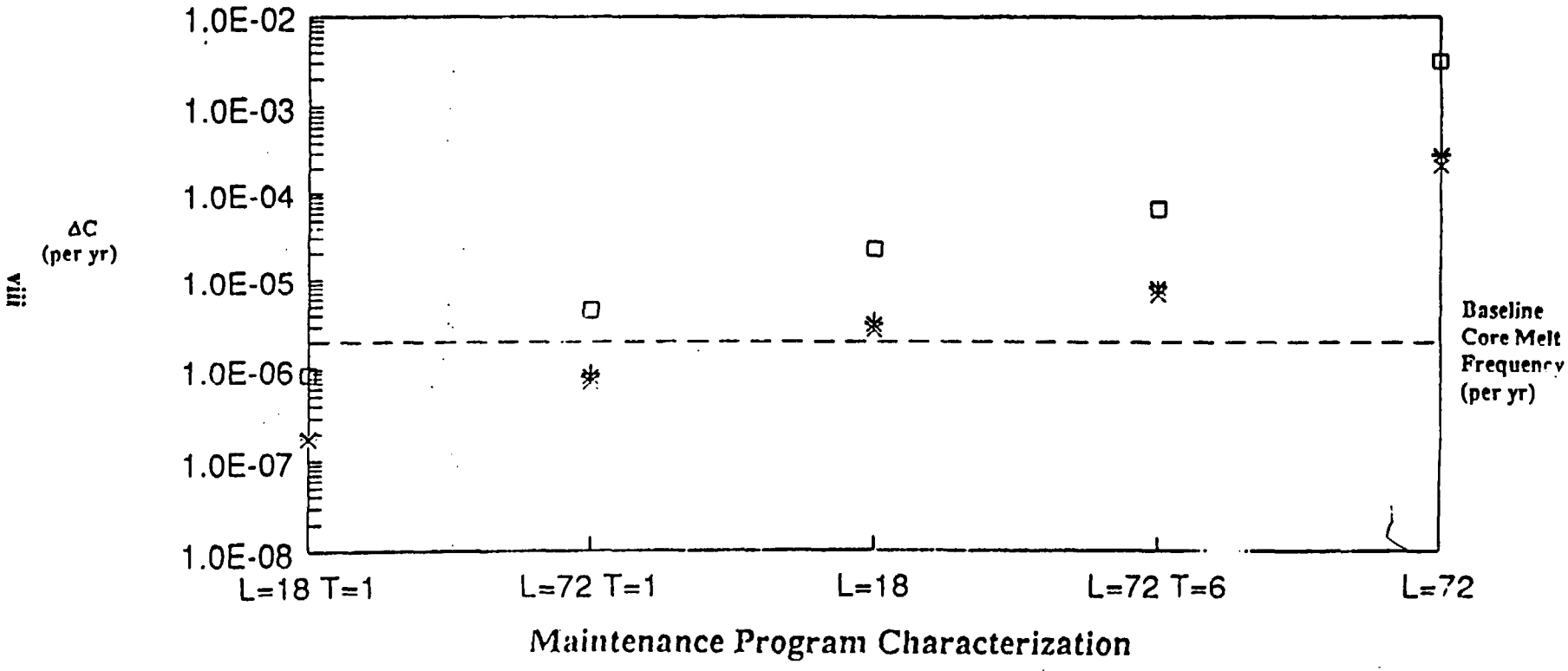
Maintenance Program Characterization

L = Overhaul interval (in months) for all components

T = Surveillance interval (in months) for all components (if intermediate surveillance is performed)

Core Melt Frequency Increase ΔC Versus Maintenance Program Characteristics

Plant B



L = Overhaul interval (in months) for all components

T = Surveillance interval (in months) for all components (if intermediate surveillance is performed)

The two figures on the subsequent pages, labelled "Probability That the Core Melt Frequency is Larger Than Given Values" show the probability distributions obtained for different surveillance and maintenance programs. For a given surveillance and maintenance program the probability curve is only given for one aging rate data base (the TIRGALEX data) since the other aging rate data sets produced similar probability curves. In the figures, a given point on a probability curve gives the probability (on the y-axis) that the core melt frequency increase due to aging is larger than a given value (on the x-axis).

Each curve shows the variation in core melt frequency which results from a given maintenance program characterization in terms of how the replacement and test intervals can vary. Case 1 corresponds to replacement intervals varying between 12 months and 120 months (a 90% range). Case 2 uses replacement interval ranges derived from the TIRGALEX study. Case 3 corresponds to replacement intervals varying between 12 months and 120 months and surveillance intervals varying between 1 month and 12 months (90% ranges).

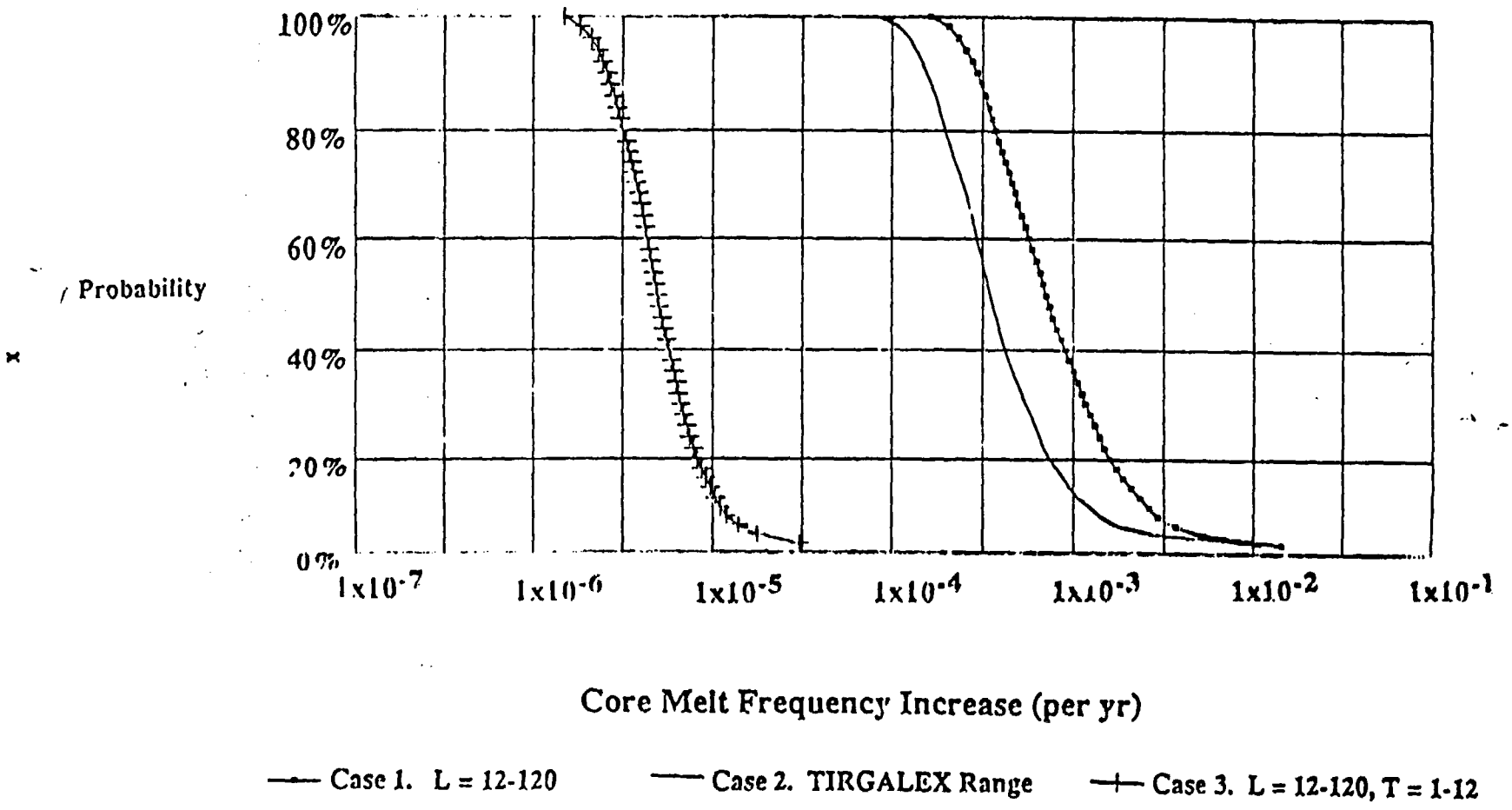
The higher probability curves to the right again correspond to very ineffective maintenance programs that would not likely occur in practice. The curves therefore should not be viewed as representing current maintenance practices. The curves are most meaningful if viewed in a comparative sense, showing the relative variability in core melt frequency increase which results from the variabilities assigned to the replacement and surveillance intervals. The probability curves show the sensitivity of the core melt frequency variability to the variability in the maintenance and test intervals. As for the point results, the detailed contributors indicate that variabilities in the core melt frequency increase can be reduced by focusing tighter maintenance controls on the core-melt-frequency-important components.

Based on the results of the work, various recommendations can be made. Because of the sensitivity of the core melt frequency to aging, plant maintenance programs need to be evaluated for their risk effectiveness. The approaches which have been developed here can be useful tools for evaluating the risk effectiveness of maintenance programs and for prioritizing aging contributors to more effectively focus maintenance programs. The demonstration aging data used here or other data can be used to test the effectiveness of a given or proposed maintenance program with regard to controlling risk impacts from assumed aging.

It is very important to collect plant specific data to determine the implied aging rates and the associated risk effects. Plant specific data can produce different results from those given here using the demonstration data sets. Because aging rates can be difficult to estimate, data analysis techniques need to be developed to efficiently detect and estimate component aging rates.

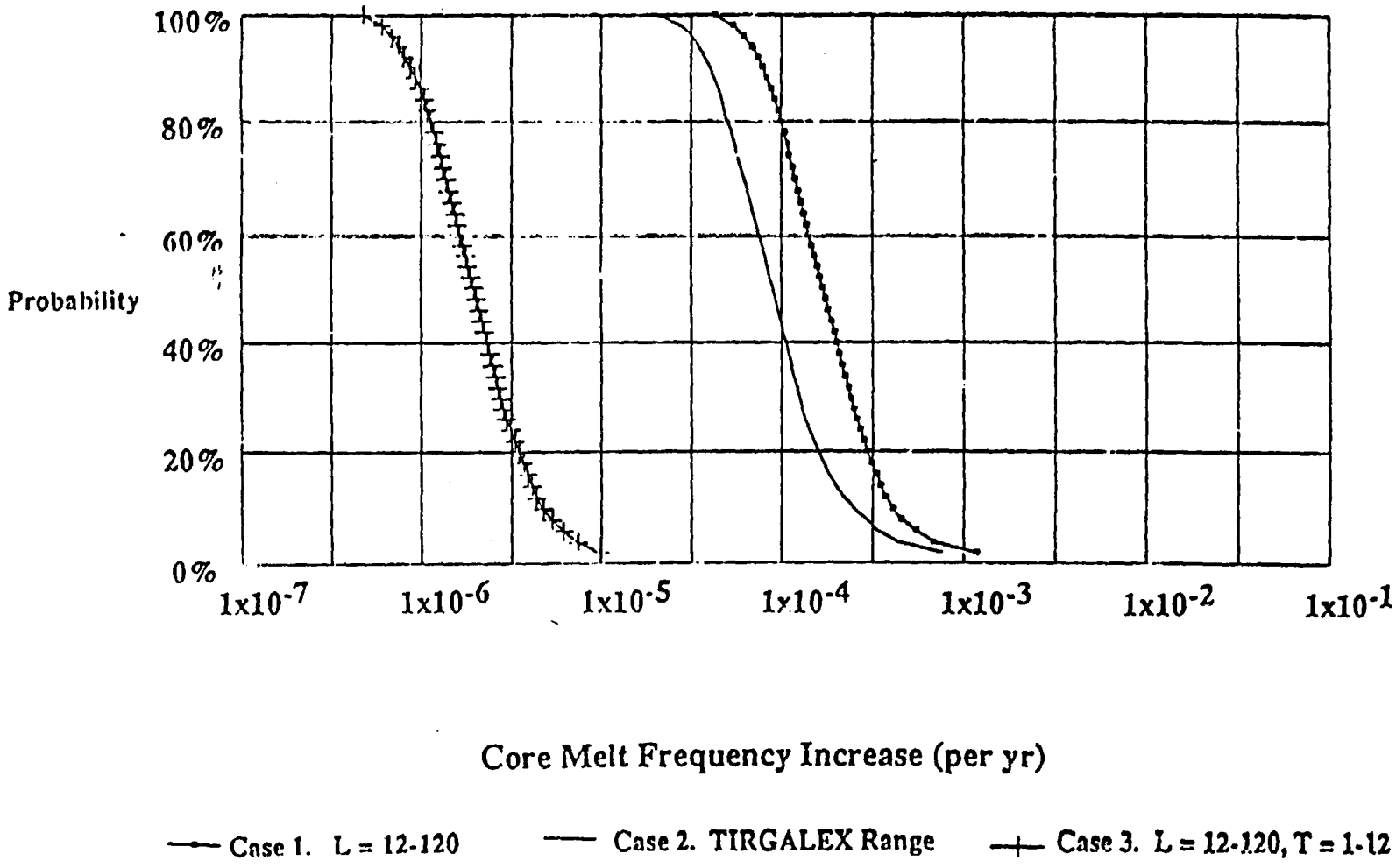
Probability that the Aging Increase in Core Melt Frequency is Larger than Given Values

Plant A



Probability that the Aging Increase in Core Melt Frequency is Larger than Given Values

Plant B



The aging contributions from balance of plant equipment, passive components, and structures are not included in the present evaluations. It is important to include these critical contributors to obtain a more complete picture of aging impacts not only on core melt frequency, but on public health risks. The approaches which have been developed can include these aging effects if aging information and models are assembled as they were for the active components. For passive components, since data are sparse, aging rates would need to be determined using probabilistic approaches. It is important to include these additional contributors since they can have large impacts.

Finally, with regard to regulatory applications, the approaches which have been developed can be useful in helping to define maintenance guidelines for controlling core melt frequency impacts and risk impacts from aging. The developed risk quantification approaches can serve as useful tools to complement deterministic evaluations. The approaches can be used to prioritize aging contributors to determine where to focus more detailed, deterministic aging analyses and aging maintenance programs. In the applications which were carried out, there was a relatively small number of important contributors which impacted the core melt frequency, implying that prioritization can be very effective. The approaches which have been developed can also be used to help define guidelines for risk-effective overhaul intervals and surveillance intervals to control aging impacts. The approaches can finally be used as independent tools to evaluate the risk effectiveness of proposed maintenance programs and proposed aging management programs.

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1. STATEMENT OF THE PROBLEM

To help assist in the evaluation of the safety impacts of aging, a project was undertaken to develop and demonstrate an approach to quantify the core melt frequency changes due to component and structural aging. The approach was to be applicable to PRAs using available aging data bases and aging models. By quantifying the sizes and sensitivities of core melt frequency changes to aging effects, insights could be provided on the benefits of regulatory programs for controlling aging effects. The ranking of the contributors to the core melt frequency changes could also provide a means of prioritizing aging impacts to help focus aging efforts. Also, and importantly, in quantifying core melt frequency changes due to aging effects, maintenance programs and maintenance guidelines could be explicitly evaluated for their effectiveness in controlling core melt frequency.*

The focus of the analysis was to predict the average core melt frequency increase which resulted from aging under a given maintenance program and using given aging data. The average increase in core melt frequency obtained by averaging the time dependent increase which occurred between overhauls or replacements. The methodology was also to have the capability of calculating aging effects on any risk result and to have the capability of calculating time dependent aging curves as well as average results. The component aging reliability models which have been assembled in NRC's Nuclear Plant Aging Research (NPAR) Program were to be utilized for the evaluations and sensitivity studies. Because there are large uncertainties associated with the aging data and with the quantification of aging effects, it was also important to quantify the uncertainties associated with the results.

The results which are presented in this report should be viewed as a demonstration of the methodology to quantify the core melt frequency effects due to aging. The core melt frequency increase due to aging of active components is specifically quantified in this study. The effects from balance of plant equipment, passive components, and structures are not evaluated, although the methodology which was developed can be applied to these contributors. When considering passive components and structures, it is also important to evaluate the impacts that aging has on accident sequence frequencies and public health consequences, which the methodology allows. Finally, it is important to note that proposed regulatory programs which can have important effects in controlling component aging are not explicitly taken into account in the present evaluations. The impacts of specific programs can be explicitly evaluated in future applications.

2. METHODOLOGY

The core melt frequency as calculated in a probabilistic risk analysis (PRA) is a function of the component unavailabilities, structure failure probabilities, and initiating event frequencies. Let C be the core melt frequency as calculated in a PRA. More generally, C

*"Maintenance programs" as used here means "surveillance and maintenance programs".

can be any result calculated in the PRA. Let q_i denote an individual component unavailability, structure failure probability, or initiating event frequency modeled in the PRA.

Aging effects can cause an increase Δq_i in q_i. The increase Δq_i is generally a function of the equipment aging rate and plant maintenance policy. The increase Δq_i is also generally a function of the age of the equipment. A particular increase Δq_i in turn will cause an increase ΔC in the core melt frequency. Multiple equipment which are aging will each have their own Δq_i which will collectively cause an overall increase in the core melt frequency. It is very important to consider the multiple effects of aging since in a plant multiple equipment are likely to be simultaneously aging.

To calculate the core melt frequency change ΔC as a function of the component and structure aging changes Δq_i, an approach was desired that would account for individual equipment aging effects as well as multiple aging effects. Since the Δq_i are not necessarily small, the approach needed to accommodate arbitrary sizes of Δq_i. Also, it was desired that explicit contributors to ΔC be quantified in detail to allow their identification and prioritization. Finally, an approach was desired that would allow maintenance programs to be evaluated and would allow different risk measures to be used if desired.

In order to address the above considerations, and to make maximum use of already available PRA software, a Taylor expansion approach was utilized to express ΔC as a function of the Δq_i. A Taylor expansion approach is a standard calculus approach used to express a change in a dependent variable as a function of the changes in the independent variables. (See for example Reference (1).) The standard Taylor expansion of ΔC as a function of Δq_i produces the following equation:

$$\Delta C = \sum_{i} S_i \Delta q_i + \sum_{i>j} S_{ij} \Delta q_i \Delta q_j + \sum_{i>j>k} S_{ijk} \Delta q_i \Delta q_j \Delta q_k$$

$$+ \ldots + S_{123\ldots n} \Delta q_i \Delta q_2 \ldots \Delta q_n. \qquad (1)$$

The S_i, S_{ij}, etc., are standard Taylor expansion coefficients (i.e., the first derivative of C, the second derivative of C divided by 2, etc.) The S_i, S_{ij}, etc., can termed the core melt frequency sensitivity coefficients or core melt frequency importance coefficients. Equation (1) gives the core melt frequency change as a sum of detailed contributions. The first term on the right hand side is the sum over all individual aging changes. The second summation is over all combinations (interactions) of two aging effects, etc. The expansion continues until all contributions and interactions are considered up to the maximum number (n) of aging effects considered and contained in the PRA.

Equation (1) has some important features. The equation is valid for any size of aging contribution Δq_i and includes aging contributions from components, structures, and

initiating events. The aging contributions are separated into individual aging contributions $S_i\Delta q_i$, two component (or structure or initiating event) interactions $S_{ij}\Delta q_i\Delta q_j$, three component interactions $S_{ijk}\Delta q_i\Delta q_j\Delta q_k$, etc. The aging contributions are thus very detailed, providing individual aging effects and multiple aging effects.

Each contribution clearly shows the core melt frequency importance factor and the aging factor. For each single component contribution $S_i\Delta q_i$, S_i is the core melt frequency importance factor and Δq_i is the aging factor. For each two component contribution $S_{ij}\Delta q_i\Delta q_j$, S_{ij} is the core melt frequency importance factor for the interaction and $\Delta q_i\Delta q_j$ is the double component aging factor. Similar breakdowns apply to all the other contributions. The sum of all the aging contributions gives the total core melt frequency change ΔC due to aging.

The computational advantage of Equation (1) is that the PRA evaluations are separated from the aging evaluations. The sensitivity coefficients S_i, S_{ij}, etc., can be computed from the PRA independently of any aging evaluations. Algorithms were developed to efficiently calculate the sensitivity coefficients from PRA models. The methodology and algorithms are described in Appendix A. The CAFTA computer code (2), which is a standard PRA code, was specifically modified to calculate the sensitivity coefficients for any PRA. The aging contributions Δq_i can be separately calculated using appropriate aging models. Any aging models can be used. The sensitivity coefficients S_i, S_{ij}, etc., can then be combined with the aging contributions using Equation (1). Software was developed to perform these synthesis evaluations.

As was indicated, the Taylor expansion for ΔC given by Equation (1) is valid for any model for Δq_i. The increase in unavailability Δq_i can be an average increase, or can be a time dependent or age dependent increase. For the applications that were carried out, the increase in unavailability between component replacements or overhauls was averaged to obtain an average increase in unavailability due to aging. Also, the linear aging model developed in the NPAR program (3) was specifically used to calculate Δq_i. From standard reliability theory, when a component is periodically overhauled, replaced, or is otherwise renewed, at intervals of L with no intermittent checking for aging effects then $\Delta q(L)$ at the end of the overhaul interval is given by the formula

$$\Delta q(L) = \exp\left(-\int_0^L \lambda dt\right) - \exp\left(-\int_0^L (\lambda + at)\, dt\right) \qquad (2)$$

or to first order,

$$\Delta q(L) = \frac{1}{2} a L^2, \qquad (3)$$

where λ is the constant failure rate and a is the aging rate for the pertinent failure mode.

The average unavailability Δq due to aging over the overhaul interval is then to first order

$$\Delta q = \frac{1}{6} a L^2, \tag{4}$$

The overhaul, or renewal, interval L is the interval at which the component is restored to essentially as good as new with regard to the pertinent failure modes in the PRA. The age of the component is restored effectively to a value of zero. In reliability terminology, L is termed the "good as new" interval since the component is basically restored to as good as new condition. If L varies, then L can be taken as the average interval.

If overhauls are not completely effective in detecting and removing aging effects then L is the effective overhaul interval. The effective overhaul interval can be defined to b actual overhaul interval divided by the efficiency of the overhaul in detecting and removing aging effects. If the component is overhauled only at failure then L can be taken to be the mean time between failures. The value of the effective overhaul interval for each component is determined by reviewing the plant's maintenance program.

If surveillance for aging effects is done between overhauls then the effects of the surveillance can be incorporated into the formula for Δq. Assume that, in addition to overhauls being performed at L, surveillance is performed at intervals of T on the component. Assume that at a surveillance the component is assured to be in an operational status with minimal repair being performed. As shown in Appendix B, the formula for the average unavailability increase Δq between overhauls then becomes

$$\Delta q = \frac{1}{4} a(L-T)T + \frac{1}{6} a T^2 . \tag{5}$$

If L is equal to T, or T is incorporated in the determination of L, then Equation (5) simplifies to Equation (4).

In reliability terminology, T is termed the "good as old interval" since the component, is basically in the same condition after the test as before the test. In reality, some surveillance tests can restore the component to a state somewhere between "as good as old" and "as good as new". Without additional test data, the good as old model is used here as a reasonable model for surveillance test effects on aging. If the surveillance is not completely effective in detecting and correcting aging effects then T in the above formula is the effective interval, which is the actual interval divided by the efficiency of the surveillance. If in a maintenance program, there is no aging surveillance beyond that specified by the plant's technical specifications then T is the surveillance interval specified by technical specifications, divided by the efficiency of the test in detecting and correcting aging effects. If the efficiency is assessed to be low then the formula for Δq with only overhauls, Equation (4), should be used. Reference (4) provides expert

estimates of efficiencies, in terms of aging detection probabilities and aging mitigation probabilities, for various components.

In application, the effective overhaul intervals and effective surveillance intervals can be determined by examining the plant's maintenance and surveillance program. If overhauls or surveillances are performed on specific component pieceparts (or subassemblies) the piecepart intervals can be averaged to obtain an overall component interval. The intervals need to apply to the specific failure mode identified in the PRA. Alternatively, more detailed risk modeling can be performed, in which the component is subdivided into its major pieceparts or subassemblies, each with its own overhaul interval and/or surveillance interval.

For the applications performed in this work, an effective overhaul interval and effective surveillance interval is assigned to each component, representing averages over the pieceparts or subassemblies contributing to the failure mode. For some evaluations, only an effective overhaul interval is assigned, implying that additional aging surveillance testing was not part of the maintenance program characterization or was treated as being ineffective in detecting aging effects.

The above formulas, even though they are basic formulas in reliability theory (as discussed in Appendix B), are not standardly used in probabilistic risk analyses (PRAs). This is because aging is not considered in standard PRAs, and hence the aging rate is assumed to be zero. The overhaul or replacement interval L thus does not enter in PRAs. The surveillance interval T enters as technical specification intervals, but it is not adjusted for its efficiency in detecting aging effects to obtain an effective aging surveillance interval, again because aging is not considered.

Finally, it should be noted that the above formulas represent the simplest formulas for modeling aging effects on the component unavailability. More complex formulas can incorporate threshold effects, where aging begins after some threshold age, and can incorporate nonlinear effects, in which the aging failure rate is a nonlinear function of the age. The component unavailability can furthermore be partitioned into a per cycle, or per demand, contribution plus a pure time dependent contribution. Each of these contributions can have its own aging effects. Using standard reliability theory, the above expressions for Δq can be modified to incorporate any of these extended models. These extended models can be useful for sensitivity studies or can be applicable if sufficient data are available to differentiate the more complex models from the above, simpler models.

3. AGING RATE DATA UTILIZED

Table 1 gives one set of aging rates (denoted by "a" in the previous equations for Δq) that were used to demonstrate the methodology. The aging rates in Table 1 are called the TIRGALEX aging rates since they were estimated in the NPAR program to help prioritize aging effects for research for use by the NRC TIRGALEX committee. These aging rates are reported in NUREG CR-5248(4). The aging rates in Table 1 are generic aging rates and are averages over failure modes, systems, and plants. The aging rates have large uncertainties and are used here to demonstrate the methodology.

For the uncertainty evaluations, the aging rates were treated as random variables with individual log uniform distributions. The log uniform distribution is a flat distribution on a log scale, which implies no most probable value. This assignment of the log uniform distribution was judged to be consistent with the minimal information that was available. For the uncertainty evaluations, the 90% error factor associated with each aging rate is taken to be a factor of 10. Thus, the aging rate multiplied by a factor of 10 gives the upper 95% probability bound and the aging rate divided by a factor of 10 gives the lower 5% probability bound for the aging rate. The factor of 10 was determined based on assigning an error factor of 3 to the aging fraction and an error factor of 3 to the mean time to failure, which were used in determining the aging rate in NUREG CR-5348. The error factors of 3 were then combined to give an error factor of 10 (to order of magnitude). The error factor of 10 can be viewed as a subjective estimate of the error for each aging rate.

To supplement the TIRGALEX data base, three additional demonstration data bases were constructed, which were modifications of the TIRGALEX data base. These data bases were titled TIRGALEX-MOD1, TIRGALEX-MOD2, and TIRGALEX-MOD3. TIRGALEX-MOD1 was constructed by modifying the TIRGALEX data to reflect results of a small study to estimate aging rates for specific plants. TIRGALEX-MOD2 and TIRGALEX-MOD3 were constructed as additional sensitivity study data bases to represent given types of aging in specific components.

As part of the NRC project to evaluate the core melt frequency impacts of aging, the Idaho National Engineering Laboratory (INEL) independently carried out a small study to estimate aging rates of specific components for the two plants (5). A limited set of plant specific data, data from the Licensee Event Reports (LERs) and the Nuclear Plant Reliability Data System (NPRDS) were used. In a number of cases, aging was not able to be definitively identified with the sample of data and the techniques that were used. The aging rate estimates obtained in the INEL study generally had large associated uncertainties.

To obtain the TIRGALEX-MOD1 aging rates, the TIRGALEX aging rates were compared to the INEL aging rate estimates and, where necessary, were modified to be

TABLE 1. TIRGALEX DATA BASE

COMPONENT	AGING RATE (failures per hour per year)
AC Bus	1E-09
Air-Operated Valve	4E-07
Battery	3E-07
Check Valve	4E-09
Circuit Breaker	2E-08
DC Bus	1E-09
Diesel Generator	4E-06
Fan	2E-07
Heat Exchanger	1E-08
Motor-Driven Pump	2E-07
Motor-Operated Valve	4E-06
Power-Operated Relief Valve	7E-07
Relay	3E-07
Safety/Relief Valve	7E-07
Transformer	2E-09
Turbine-Driven Pump	3E-06

consistent with the INEL estimates, within the uncertainties of the TIRGALEX and INEL data. The middle 50% aging rate values reported in the INEL study were used for the comparisons since they were midpoint estimates and best corresponded to the lower aging rates given in the TIRGALEX data base.

The INEL report presented aging rate estimates for pumps, valves, and diesels. Table 2 shows the middle 50% pump aging rates that were estimated in the report. The aging rates are arranged in decreasing order of value and are for turbine pumps, motor driven pumps, different failure modes (failure to run and failure to start), and are for different systems. As Table 2 indicates there is no apparent correlation between the aging rate value and the type of pump, failure mode, and system. The two higher aging rates are 6-05 and 1-05 and are from plant specific data for approximately a 7 year time period.* Other than these two high values, the aging rates lie between 3-07 and 5-05, approximately a factor of 10 spread. Including these two high values, the aging rates lie between 3-07 and 6-05, approximately a factor of 100 spread.

The TIRGALEX aging rate for motor driven pumps is 2-07, which is at the low end of the INEL range given in Table 2. The TIRGALEX motor driven pump aging rate of 2-07 was consequently increased by a factor of 5 to 1-06 to be more centered on the INEL range. The TIRGALEX turbine pump aging rate of 3-06 was not changed. The error factor of 10 assigned to the TIRGALEX aging rates was retained for the pump aging rates. The error factor of 10 on the modified motor driven pump aging rate and on the unmodified turbine driven pump aging rate served to cover the INEL ranges in Table 2.

Table 3 shows the middle 50% check valve aging rates estimated in the INEL report. The range of the aging rates is from 4-07 to 5-06, approximately a factor of 10, which covers all the failure modes and systems evaluated. The TIRGALEX aging rate of 4-09 was consequently increased by a factor of 100 to 4-07. The modified value of 4-07 was equal to the lower end values in the INEL range, for failure to open. The error factor of 10 on the modified value of 4-07 then served to cover the higher end of the INEL values in Table 3, for back leakage.

Table 4 shows the diesel aging rates estimated in the INEL report for the failure modes of failure to run and failure to start. They differ by less than a factor of 10 ranging from 1-06 to 8-06. The TIRGALEX value of 4-06 was not modified since it lies in the INEL range and the error factor of 10 covered the range.

Finally, Table 5 shows the two motor operated valve aging rates that were estimated in the INEL report, 3-07 and 5-07. The TIRGALEX value of 4-06 was decreased by a factor of 4 to 1-06 to be more consistent with the INEL values. The TIRGALEX value was not decreased further since it would then become inconsistent with other TIRGALEX aging rate values (e.g. aging rate values for air operated valves and for

*The notation 6-05 means 6×10^{-5}. All aging rates are in units of per hour per year.

TABLE 2. PUMP AGING RATES FROM THE INEL REPORT

Failure Mode	Middle 50% Aging Rate (per hour per year)
AFW turbine driven pump fails to run	6E-05
AFW motor driven pump fails to run	1E-05
AFW turbine driven pump fails to run	5E-06
AFW motor driven pump fails to run	5E-06
HPCI turbine driven pump fails to run	4E-06
AFW motor driven pump fails to start	3E-06
AFW turbine driven pump fails to start	2E-06
AFW turbine driven pump fails to start	2E-06
High pressure injection pump fails to run	2E-06
Low pressure injection pump fails to start	2E-06
LPI pump fails to start	2E-06
AFW turbine driven pump fails to run	2E-06
AFW motor driven pump fails to start	1E-06
Reactor core isolation cooling turbine driven pump fails to start	1E-06
Low pressure injection pump fails to run	1E-06
HPCI turbine driven pump fails to run	7E-07
Reactor core isolation cooling turbine driven pump fails to start	7E-07
AFW motor driven pump fails to run	6E-07
AFW motor driven pump fails to start	5E-07
Auxiliary feedwater pump steam binding	4E-07
Auxiliary feedwater pump steam binding	4E-07
ESW pump fails to run	3E-07
ESW pump fails to run	3E-07

TABLE 3. CHECK VALVE AGING RATES FROM THE INEL REPORT

Failure Mode	Middle 50% Aging Rate (per hour per year)
AFW pump discharge check valve backleakage	5E-06
Auxiliary feedwater pump discharge check valve backleakage	4E-06
Auxiliary feedwater pump discharge check valve backleakage	5E-07
Emergency service water check valve fails to open	5E-07
Emergency service water check valve fails to open	5E-07
High pressure coolant injection check valve fails to open	4E-07
High pressure coolant injection check valve fails to open	4E-07

TABLE 4. DIESEL AGING RATES FROM THE INEL REPORT

Failure Mode	Middle 50% Aging Rate (per hour per year)
Emergency diesel generator fails to run	8E-06
Emergency diesel generator fails to start	4E-06
Emergency diese' generator fails to run	1E-06

TABLE 5. MOTOR OPERATED VALVE AGING RATES FROM THE INEL REPORT

Failure Mode	Middle 50% Aging Rate (per hour per year)
HPCI motor operated valve fails to open	5E-07
HPCI motor operated valve fails to open	3E-07

relays). As NUREG/CR-5248 indicates, the relative values of the TIRGALEX aging rates were given most attention in establishing this data base. The error factor of 10 on the modified TIRGALEX value then covered the INEL values.

Table 6 shows the modified TIRGALEX aging rate data base, termed TIRGALEX-MOD1, with the three changes for motor driven pumps (a factor of 5 increase), motor operated valves (a factor of 4 decrease), and check valves (a factor of 100 increase). With the exception of check valves where the INEL estimates tended to be a factor of 100 higher, the other changes were moderate, considering the error factors of 10 on the TIRGALEX aging rates. Again, the turbine driven pump aging rate and the diesel aging rate were not changed because the TIRGALEX values lay in the center of the INEL values.

As was previously indicated, the second and third modifications of the TIRGALEX data base served as additional sensitivity study data bases. To obtain the second modified data base from the TIRGALEX data base, aging rates of selected components were modified to achieve given failure rate doubling times. A failure rate doubling time is the time at which the initial failure rate is doubled. The initial failure rate is the failure rate without aging and is the failure rate used in the PRA. Table 7 gives doubling times for major components for the PWR PRA (Plant A) using the TIRGALEX aging rates and the TIRGALEX-MOD1 aging rates. Table 8 shows the doubling times for selected components for the BWR (Plant B) using the TIRGALEX aging rates and the TIRGALEX-MOD1 aging rates. The components selected are those which are the dominant contributors in the PRA. The differences in the failure rates used in the PRAs cause the doubling times to be different for the two plants.

As Tables 7 and 8 indicate, the doubling times range from less than one year to 90 years. To obtain an aging rate data base that represents a lower threshold-type of aging, the aging rates of the components shown in the tables were modified so that the failure rate doubling time for each component became 20 years. If the doubling time is 20 years then it would be difficult to detect aging behaviors in the components because of the slow growth of the failure rates. In this sense, the aging rates represent a lower threshold aging behavior which would be difficult to detect with current data collection programs. Table 9 shows the modified TIRGALEX data base, termed TIRGALEX-MOD2, with the modified aging rates for diesels, pumps, and valves corresponding to doubling times of 20 years.*

Table 10 shows the final modified data base which was constructed, termed TIRGALEX-MOD3. This aging data base represents an upper threshold to aging, which is a maximum type aging rate that could occur and still be difficult to detect if appropriate analysis procedures were not used. For this aging rate data base, aging rates of 1×10^{-5}

*Where the PWR and BWR differed in failure rates, the minimum determined aging rate was used.

TABLE 6. TIRGALEX – MOD 1 DATA SET

COMPONENT	MODIFIED AGING RATE (failures per hour per year)
AC Bus	1E–09
Air–Operated Valve	4E–07
Battery	3E–07
Check Valve	4E–07
Circuit Breaker	2E–08
DC Bus	1E–09
Diesel Generator	4E–06
Fan	2E–07
Heat Exchanger	1E–08
Motor–Driven Pump	1E–06
Motor–Operated Valve	1E–06
Power–Operated Relief Valve	7E–07
Relay	3E–07
Safety/Relief Valve	7E–07
Transformer	2E–09
Turbine–Driven Pump	3E–06

TABLE 7. FAILURE RATE DOUBLING TIMES FOR THE AGING RATE DATA USED
(BASED ON SELECTED FAILURE RATES FOR PLANT A)

Component	Failure Rate (per hour)	TIRGALEX		TIRGALEX-MOD 1	
		Aging Rate a (per hour per year)	Doubling Time DT (year)	Aging Rate a (per hour per year)	Doubling Time DT (year)
Diesel FS	2E-05	4E-06	6E+00	4E-06	6E+00
Motor Driven Pump FS	2E-05	2E-07	9E+01	1E-06	2E+01
Turbine Driven Pump FS	2E-05	3E-06	7E+00	3E-06	7E+00
Check Valve FC	3E-07	4E-09	8E+01	4E-07	8E-01
Motor Operated Valve FC	8E-06	4E-06	2E+00	1E-06	7E+00

Modes:

FS = Fails to Start
FC = Fails Closed

TABLE 8. FAILURE RATE DOUBLING TIMES FOR THE AGING RATE DATA USED
(BASED ON SELECTED FAILURE RATES FOR PLANT B)

Component	Failure Rate (per hour)	TIRGALEX		TIRGALEX-MOD 1	
		Aging Rate a (per hour per year)	Doubling Time DT (year)	Aging Rate a (per hour per year)	Doubling Time DT (year)
Diesel FS	8E-05	4E-06	2E+01	4E-06	2E+01
Motor Driven Pump FS	6E-06	2E-07	3E+01	1E-06	5E+00
Motor Driven Pump FR	2E-05	2E-07	9E+01	1E-06	2E+01
Check Valve FC	3E-07	4E-09	8E+01	4E-07	8E-01
Motor Operated Valve FC	8E-06	4E-06	2E+00	1E-06	7E+00

Modes:

FS = Fails to Start
FC = Fails Closed
FR = Fails to Run

TABLE 9. TIRGALEX - MOD 2 DATA BASE SET

COMPONENT	AGING RATE (failures per hour per year)
AC Bus	1E-09
Air-Operated Valve	4E-07
Battery	3E-07
Check Valve	1E-08
Circuit Breaker	2E-08
DC Bus	1E-09
Diesel Generator	4E-06
Fan	2E-07
Heat Exchanger	1E-08
Motor-Driven Pump	3E-07
Motor-Operated Valve	4E-07
Power-Operated Relief Valve	7E-07
Relay	3E-07
Safety/Relief Valve	7E-07
Transformer	2E-09
Turbine-Driven Pump	3E-06

TABLE 10. TIRGALEX - MOD 3 DATA BASE SET

COMPONENT	AGING RATE (failures per hour per year)
AC Bus	1E-09
Air-Operated Valve	4E-07
Battery	3E-07
Check Valve	1E-05
Circuit Breaker	2E-08
DC Bus	1E-09
Diesel Generator	1E-05
Fan	2E-07
Heat Exchanger	1E-08
Motor-Driven Pump	1E-05
Motor-Operated Valve	1E-05
Power-Operated Relief Valve	7E-07
Relay	3E-07
Safety/Relief Valve	7E-07
Transformer	2E-09
Turbine-Driven Pump	1E-05

per hour per year were assigned to motor driven pumps, turbine pumps, diesels, check valves, and motor operated valves. This aging rate corresponds to one failure occurring on the average after 5 years due to aging. This aging rate is also equivalent to an unavailability contribution of approximately 0.1 after 18 months, if no intermediate corrective measures are taken. Appendix C presents further details on the derivation of the sensitivity aging rates used in the TIRGALEX-MOD2 and TIRGALEX-MOD3 data bases.

4. EFFECTIVE OVERHAUL INTERVALS UTILIZED

As used in this report, the effective overhaul interval, or effective renewal interval, is the interval at which the component is replaced or is effectively restored to as good as new condition and the component age is set back to zero. In actual practice, individual component subassemblies and pieceparts are generally replaced or overhauled. The component overhaul interval is then the average over the individual subassembly intervals or piecepart intervals. In more detailed modeling, each subassembly or piecepart can be modeled and given their associated overhaul intervals, or replacement intervals.

The effective overhaul or replacement interval is the maintenance parameter required for risk analysis. The effective interval is the actual interval divided by the efficiency of the overhaul activity in detecting and correcting the failure modes, which are caused by aging. Again, the component effective overhaul interval can be taken as the average over the subassembly or piecepart effective intervals.

To evaluate the effectiveness of different aging maintenance programs in terms of controlling the core melt frequency, several sets of effective overhaul intervals were used for the applications. The different effective overhaul intervals which were used for the point evaluations are shown in Table 11. The different effective overhaul intervals which were used for the uncertainty evaluations are shown in Table 12.

As Table 11 shows, for the point calculations there were three different sets of overhaul interval values used. For one calculation the effective overhaul interval for each active component was assigned to be 18 months. This is equivalent to all active components being overhauled, or renewed, at every scheduled shutdown, with shutdowns occurring on the average every 18 months. For a second calculation, each active component was assigned an effective overhaul interval of 72 months, or 6 years. This is equivalent to all components being overhauled, or renewed, on the average every 6 years.

For the third point calculation, the effective overhaul intervals developed in the TIRGALEX study (4) were used. The TIRGALEX overhaul, or renewal, intervals incorporated subjective assessments by a group of individuals on the effectiveness of present tests and maintenances. Since the TIRGALEX values have not been validated, the TIRGALEX values are only considered as one additional set of overhaul interval values serving to demonstrate the methodology.

For the uncertainty evaluations, the overhaul intervals were treated as varying, in order to determine how variabilities in the overhaul intervals impacted the variability of the core melt frequency. As Table 12 indicates there were two sets of effective overhaul interval ranges used for the uncertainty evaluations. For one uncertainty evaluation, the 90% overhaul interval range for each active component was defined to be 12 months (1 year) to 120 months (10 years). This range, for example, can be interpreted as implying that 5% of the plants have an overhaul interval less than 12 months and 5% more than 120

TABLE 11. EFFECTIVE OVERHAUL INTERVALS USED FOR THE POINT EVALUATIONS (IN MONTHS)

COMPONENT	18 MONTH CASE	72 MONTH CASE	TIRGALEX CASE
AC Bus	18	72	40
Air-Operated Valve	18	72	40
Battery	18	72	7
Check Valve	18	72	200
Circuit Breaker	18	72	40
DC Bus	18	72	40
Diesel Generator	18	72	11
Fan	18	72	29
Heat Exchanger	18	72	33
Motor-Driven Pump	18	72	27
Motor-Operated Valve	18	72	5
Power-Operated Relief Valv	18	72	22
Relay	18	72	33
Safety/Relief Valve	18	72	22
Transformer	18	72	29
Turbine-Driven Pump	18	72	27

TABLE 12. EFFECTIVE OVERHAUL INTERVAL RANGES USED FOR THE UNCERTAINY EVALUATIONS

COMPONENT	12 – 120 MONTH CASE	TIRGALEX CASE (months)
AC Bus	12 – 120	18 – 120
Air-Operated Valve	12 – 120	18 – 120
Battery	12 – 120	6 – 70
Check Valve	12 – 120	18 – 120
Circuit Breaker	12 – 120	18 – 120
DC Bus	12 – 120	18 – 120
Diesel Generator	12 – 20	3 – 110
Fan	12 – 120	18 – 120
Heat Exchanger	12 – 120	3 – 120
Motor-Driven Pump	12 – 120	12 – 120
Motor-Operated Valve	12 – 120	3 – 50
Power-Operated Relief Valve	12 – 120	18 – 120
Relay	12 – 120	6 – 120
Safety/Relief Valve	12 – 120	18 – 120
Transformer	12 – 120	18 – 120
Turbine-Driven Pump	12 – 120	12 – 120

months. The median of the range is 38 months or approximately 3 years. Thus, this range can equivalently be interpreted as representing 50% of the plants having overhaul intervals less than 3 years and 50% having overhaul intervals greater than 3 years, with an approximate factor of 3 variation about this median (given the 12 month to 120 month range).

The second uncertainty evaluation was performed using the second set of ranges shown in Table 12. These ranges are associated with the TIRGALEX-generated intervals. The lower bound corresponds to a minimum value of the overhaul interval given in NUREG/CR-5248 (4) corresponding to perfect detection and correction by the tests and maintenances. The upper bound interval was taken to be the interval assigned in the TIRGALEX study multiplied by a factor of 10. The factor of 10 was determined by assigning error factors of 3 to the detection probability and mitigation probability assessed in NUREG/CR-5248, which were then combined to give the error factor of 10 to an order of magnitude. To limit the size of the maximum renewal intervals considered, the upper bound was truncated at 120 months if it was larger than 120 months.

5. EFFECTIVE SURVEILLANCE INTERVALS UTILIZED

In addition to overhauls or replacements, the component may also be checked by surveillance tests to ensure it is operational. Of relevance for aging analysis is the effectiveness of the surveillance test in detecting degradations of the component which are due to aging. The effective surveillance interval is the actual interval divided by the efficiency of the test in detecting aging effects.

With regard to aging implications, surveillance tests generally do not have the same effect on the component as do overhauls or replacements. Generally minor maintenances or minor repairs are performed at surveillance tests. If a major subassembly or piecepart is found failed and is replaced then this constitutes an overhaul or replacement of the component. Surveillances are thus what are done between overhauls or replacements.

A surveillance test is modeled here as assuring the component is operational but not basically changing its age. In reliability terminology, the surveillance test intervals are called "as good as old" intervals since the component age coming out of the test is basically the same as the component age going into the test, i.e., the component is "as good as old" with regard to its age. The effective interval value includes the efficiency of the surveillance or overhaul in detecting and correcting aging effects. If, for example, surveillances are not assessed to be effective in detecting aging degradations then surveillances are not considered between overhauls.

Table 13 gives the effective surveillance intervals that were used for the point evaluations when both surveillance and overhaul intervals were considered as characterizing an aging maintenance program. As shown in Table 13, the effective surveillance intervals considered were 1 month and 6 months. The 1 month effective value can represent monthly tests which have perfect efficiency in detecting aging failure modes. The 6 month effective value can represent monthly tests with 16% (1/6) efficiency or alternatively 3 month tests with 50% efficiency.

Table 14 shows the effective surveillance interval range, 1-12 months, that was used for the uncertainty evaluations. This range can represent monthly tests with different possible efficiencies (of 1 to 1/12). This range of 1-12 months was taken to be a 90% range with 1 month as the 5% lower bound and 12 months as the 95% upper bound.

TABLE 13. EFFECTIVE SURVEILLANCE INTERVALS USED FOR THE POINT EVALUATIONS

COMPONENT	EFFECTIVE SURVEILLANCE INTERVAL
All active components	1 month
All active components	6 months

TABLE 14. EFFECTIVE SURVEILLANCE INTERVAL RANGES USED FOR THE UNCERTAINTY EVALUATIONS

COMPONENT	SURVEILLANCE INTERVAL RANGE (90%)
All active components	1-12 months

6. POINT EVALUATIONS WHICH WERE CARRIED OUT

As was indicated previously, point evaluations and uncertainty evaluations were carried out to determine the average core melt frequency increases that resulted from aging under given maintenance programs. For the point evaluations and the uncertainty evaluations, a PRA for a PWR plant and a PRA for a BWR plant were used. The PRAs were used to demonstrate the methodology and hence the particular PRAs which were used are not of relevance here.

The Taylor expansion methodology described in Section 2 was applied to calculate the single component contributions $S_i\Delta q_i$ and the double component contributions $S_{ij}\Delta q_i\Delta_j$. These were then summed over all the component contributions for which aging rates were assigned. Only single and double contributions were calculated. This will tend to underestimate the total core melt frequency change due to aging because of the truncation of the higher order contributors. However, spot checks indicated these higher order contributions were generally negligible except at high core melt frequency increases due to aging (e.g., for core melt frequency increases due to aging of 1×10^{-3} per year or higher). For these high cases, the single and double contributions were sufficient to indicate high core melt frequency increases due to aging. The contributions were manually checked for specific cases to validate their accuracy.

As was previously indicated, for the pointwise calculations and uncertainty calculations all the active components were assigned associated aging rates to represent simultaneous aging occurring in the components. Because the PRAs truncate contributions (truncate the minimal cut sets), only those cut set contributions retained in the PRAs were evaluated. Aging effects could cause negligible components to become important, which could be examined in more comprehensive evaluations.

Table 15 summarizes the different data sets that were used for the point evaluations; these data sets were previously described in Sections 3, 4, and 5. Table 16 shows the combination of different data sets that were used for each point evaluation. As indicated in the table for each maintenance program characterization, four different aging data sets were utilized. The pointwise calculations that were performed thus cover a range of different aging rates and cover a range of different aging maintenance programs to evaluate the resulting impacts on the core melt frequency increase.

As supplements to the pointwise calculations shown in Table 15, Appendices D and E give additional calculations that were performed for Plants A and B, which are variants of the basic calculations. In the variant calculations, the increase in unavailability Δq_i for each component is allowed only to reach a given maximum value and is not allowed to exceed this value. This control on Δq_i corresponds to certain types of maintenance programs which control component performance. Because controls were placed at high levels, the results for these variant calculations were not significantly different from the results given in the succeeding sections and corresponding to Table 15.

TABLE 15. SUMMARY OF THE DIFFERENT DATA SETS THAT WERE USED FOR THE POINTWISE CALCULATIONS

AGING RATE DATA BASES

Data Set Title	Comment
TIRGALEX	Basic data set
TIRGALEX-MOD1	TIRGALEX modified for additional data
TIRGALEX-MOD2	Aging rates corresponding to 20 year doubling times
TIRGALEX-MOD3	Aging rates corresponding to 1 failure in 5 years

OVERHAUL INTERVAL DATA BASES

18 MONTHS	Overhaul interval = 18 months for all active components
72 MONTHS	Overhaul interval = 72 months for all active components
TIRGALEX	TIRGALEX effective intervals

SURVEILLANCE INTERVAL DATA BASES

1 MONTH	Surveillance interval = 1 month for all active components
6 MONTHS	Surveillance interval = 6 months for all active components

TABLE 16. THE DIFFERENT POINTWISE CALCULATIONS THAT WERE CARRIED OUT

MAINTENANCE PROGRAM AGING RATE DATA SETS USED
CHARACTERIZATION

Overhaul Interval = 18 Months	TIRGALEX,MOD1,MOD2,MOD3
Overhaul Interval = 72 Months	TIRGALEX,MOD1,MOD2,MOD3
Overhaul Interval = TIRGALEX	TIRGALEX,MOD1,MOD2,MOD3
Overhaul Interval = 18 Months Surveillance Interval = 1 Month	TIRGALEX,MOD1,MOD2,MOD3
Overhaul Interval = 72 Months Surveillance Interval = 1 Month	TIRGALEX,MOD1,MOD2,MOD3
Overhaul Interval = 72 Months Surveillance Interval = 1 Month	TIRGALEX,MOD1,MOD2,MOD3
Overhaul Interval = 72 Months Surveillance Interval = 6 Months	TIRGALEX,MOD1,MOD2,MOD3

7. UNCERTAINTY EVALUATIONS WHICH WERE CARRIED OUT

The uncertainty evaluations were performed by assigning ranges to each PRA sensitivity coefficient, aging rate, overhaul interval, and surveillance interval to describe the possible values which could exist. A log uniform distribution was assigned to each range to describe the variation in the individual values. Monte Carlo sampling was then used to select an individual value from each distribution. All the random variables were treated as being independent of one another.

For a given Monte Carlo trial, a set of sensitivity coefficients S_i and S_{ij} were selected and an aging rate, overhaul interval, and surveillance interval were independently selected for each component. For the given selected values, a change in core melt frequency was calculated using the Taylor expansion equation (Equation (1) in Section 2). This was repeated 1000 times and the 1000 values of the core melt frequency increase were ordered to give the empirical distribution of the core melt frequency increase. A total of 1000 trials were carried out in this manner for each uncertainty evaluation which was performed.

As was previously indicated, log uniform distributions were used since they are flat distributions on a log scale and imply no structure to the uncertainty characterizations and no most likely value. With the log uniform distribution, all values are equally likely on a log scale over the range defined for the variable. For each uncertainty evaluation, an error factor of 5 was assigned to each PRA sensitivity coefficient representing its 5% and 95% values. This error factor was selected since it was approximately equal to the error factor on the core melt frequency. More accurate error factors could be determined by propagating the data uncertainties in the PRA to obtain the uncertainties and correlations among the sensitivity coefficients.

Table 17 summarizes the ranges that were used for the uncertainty evaluations for the aging rates, overhaul intervals, and surveillance intervals. These ranges were described in the previous sections and are assembled in Table 17 for the convenience of the reader. Table 18 summarizes the uncertainty evaluations that were carried out using these ranges. As Table 18 indicates for each maintenance characterization three aging data sets were utilized to evaluate the variability of the core melt frequency increase which arises from the variabilities in the overhaul and surveillance intervals as defined by their respective ranges. All aging rates, overhaul intervals, and surveillance intervals were again treated as being independent of one another. Correlation of intervals as might occur in plant practice would lengthen the tails of the distribution on the resulting core melt frequency increase. The actual Monte Carlo simulations and uncertainty propagations were carried out using software that was constructed for the study and that was written in Microsoft QuickBASIC. The random number generator utilized was the standard one available in QuickBASIC. The software was checked by manually checking specific results.

TABLE 17. SUMMARY OF RANGES THAT WERE USED FOR THE UNCERTAINTY EVALUATIONS

RANGES ON AGING RATES

TIRGALEX,MOD1,MOD2	Error factor of 10

RANGES ON EFFECTIVE OVERHAUL INTERVALS

12-120 Months for Each Component
TIRGALEX ranges for Each Component

RANGES ON EFFECTIVE SURVEILLANCE INTERVALS

1-12 Months for Each Component

TABLE 18. THE DIFFERENT UNCERTAINTY EVALUATIONS THAT WERE CARRIED OUT

MAINTENANCE CHARACTERIZATION USED	AGING RATE DATA SETS
Overhaul intervals in the range of 12-120 months for each component	TIRGALEX,MOD1,MOD2
Overhaul intervals in the TIRGALEX ranges	TIRGALEX,MOD1,MOD2
Overhaul intervals in the ranges of 12-120 months and surveillance intervals in the range of 1-12 months	TIRGALEX,MOD1,MOD2

8. POINT RESULTS FOR PLANT A (THE PWR)

The following pages give the pointwise results for Plant A, which is the PWR plant. The results of the average core melt frequency increases due to aging are organized according to the characterization of the aging maintenance program. The results are given immediately after these discussions. The first results summarize the core melt frequency increase from single component aging contributions, which is $\Sigma S_i \Delta q_i$, and from double component aging contributions, which is $\Sigma S_{ij} \Delta q_i \Delta q_j$, where the sum is over all pertinent contributors. The total core melt frequency increase is the sum of these two contributions.

The detailed results following the core melt frequency summaries give the top 25 single component aging contributors and the top 25 double component aging contributors for each maintenance program characterization and each aging rate data base. For each single or double contributor, the component designator is given, the core melt importance factor, S_i or S_{ij}, is given, and the unavailability increase factor due to aging is given, Δq_i or $\Delta q_i \Delta q_j$. The product of all these factors is the core melt frequency increase contribution. Appendix D gives additional results for further case studies in which the unavailability increase Δq was assumed to be controlled to be no larger than a given value by the maintenance program. Because the control value was fairly large (0.3), the results are not significantly different from the results presented in this section.

8.1. Core Melt Frequency Increases Versus Aging Maintenance Program Characterization

The following pages present the average core melt frequency increase ΔC (per year) for the different aging maintenance program characterizations. The first pages give the results for aging maintenance programs which are characterized by having only overhaul or replacement intervals with no intermediate surveillance intervals. The effective overhaul intervals are L = 18 mo, L = 72 mo and L = the TIRGALEX effective intervals.* The following pages give the results for aging maintenance programs which are characterized by having both overhaul intervals of L and aging surveillance intervals of T. The effective values of L and T used are L = 18 mo, T = 1 mo: L = 72 mo, T = 1 mo; and L = 72 mo, T = 6 mo. The discussions below summarize the results for each maintenance program case; the results are presented after the discussions.

<u>18 Month Overhauls Only</u>

The core melt frequency increase ΔC (per year) is basically the same for TIRGALEX, MOD1 and MOD2 aging rate data and is in the vicinity of 2.5-05. For MOD3, the 5-year aging rates, ΔC is approximately a factor of 10 higher at 3.6-04. The summaries of the single and double contributions show that the single component aging effects are generally dominant.

*The symbol "mo" denotes "months".

72 Month Overhauls Only

The core melt frequency increase ΔC for TIRGALEX, MOD1 and MOD2 is similar and is in the vicinity of 1.5-03. For MOD3 the core melt frequency increase grows to 2.1-02. The double component aging contributions dominate in all cases.

TIRGALEX Overhaul Intervals

For TIRGALEX aging rates and for MOD2 (the 20 year-doubling aging rates) ΔC is in the vicinity of 3.5-05 (the average of 1.9-05 and 5.0-05). For MOD1 and MOD3 aging rates, ΔC is significantly larger and is 1.1-03 and 7.0-03 respectively. MOD1 and MOD3 aging rates are characterized by larger check valve aging rates and the detailed contributors show that check valves are significant contributors to the core melt frequency increase for MOD1 and MOD3. The single contributors generally dominate.*

18 Month Overhauls and 1 Month Surveillances

ΔC is similar for TIRGALEX, MOD1, and MOD2 and is in the vicinity of 2-06. For MOD3, the 5-year aging rates, ΔC increases to 2.5-05. The single contributions dominate. As compared to 18 month overhauls only, carrying out additional surveillances at 1 month intervals lowers the average core melt frequency increase due to aging by more than a factor of 10.

72 Month Overhauls and 1 Month Surveillance

For TIRGALEX, MOD1 and MOD2 ΔC is in the vicinity of 7-06. For MOD3 ΔC is 1.1-04. The single contributions generally dominate for all cases. The 72 month overhaul and 1 month surveillance program control aging increases somewhat better than the 18 month overhaul only program with the average core melt frequency increase lowered by a factor of approximately 3.

72 Month Overhauls and 6 Month Surveillances

For TIRGALEX, MOD1, and MOD2, the increase in core melt frequency ΔC is centered around 6-05. For MOD3, ΔC increases to 8.6-04. The single contributions are generally most significant with the doubles also contributing. The 72 month overhaul and 6 month surveillance program provide control comparable to the 18 month overhaul only program.

*The PRA truncated multiple check valve contributions and if these were included, the double check valve aging contributions could be significantly larger.

8.2 Detailed Component Contributors

The last pages of the results for Plant A show the top 25 single aging component contributors and top 25 double aging component contributors for each of the maintenance cases analyzed. The pages show the specific system, component, and failure mode for the contributor. The pages give for each contributor, the increase in unavailability factor Δq due to aging, the core melt importance factor S, and the core melt frequency increase ΔC which is the product of the aging and importance factors. The total core melt frequency increase is the sum of the individual core melt frequency contributors. The detailed contributors show that diesel generators (OEP-DGN), check values and motor operated valves in the emergency core cooling system (e.g., HPI-CKV, HPI-MOV, LPI-CKV, LPI-MOV, ACC-CKV) are generally dominant contributors for all the maintenance cases with the absolute value and detailed order shifting, depending on the maintenance case. Motor driven and turbine driven pumps in the aux-feed system (AFW-MDP, AFW-TPD) are also contributors. These detailed contributors can be used to focus aging analyses and aging controls.

PLANT A
EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr-1)

TIRGALEX	$\Delta C =$	2.7E-05
MOD 1	$\Delta C =$	2.9E-05
MOD 2	$\Delta C =$	2.0E-05
MOD 3	$\Delta C =$	3.6E-04

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr-1)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	2.1E-05	2.5E-05	1.5E-05	3.0E-04
DOUBLES	5.5E-06	4.4E-06	4.9E-06	6.4E-05
TOTAL	2.7E-05	2.9E-05	2.0E-05	3.6E-04

PLANT A
EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr⁻¹)

TIRGALEX	ΔC =	1.7E-03
MOD 1	ΔC =	1.5E-03
MOD 2	ΔC =	1.4E-03
MOD 3	ΔC =	2.1E-02

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr⁻¹)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	3.3E-04	4.1E-04	2.5E-04	[illegible]
DOUBLES	1.4E-03	1.1E-03	1.2E-03	[illegible]
TOTAL	1.7E-03	1.5E-03	1.4E-03	[illegible]

PLANT A
EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr-1)

TIRGALEX	$\Delta C =$	1.9E-05
MOD 1	$\Delta C =$	1.1E-03
MOD 2	$\Delta C =$	5.0E-05
MOD 3	$\Delta C =$	7.0E-03

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr-1)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	1.8E-05	1.1E-03	4.9E-05	6.9E-03
DOUBLES	9.9E-07	2.8E-06	1.2E-06	7.9E-05
TOTAL	1.9E-05	1.1E-03	5.0E-05	7.0E-03

PLANT A

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr-1)

TIRGALEX	$\Delta C =$	1.7E-06
MOD 1	$\Delta C =$	2.1E-06
MOD 2	$\Delta C =$	1.3E-06
MOD 3	$\Delta C =$	2.5E-05

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr-1)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	1.7E-06	2.1E-06	1.3E-06	2.5E-05
DOUBLES	3.8E-08	3.1E-08	3.4E-08	4.4E-07
TOTAL	1.7E-06	2.1E-06	[illegible]E-06	2.5E-05

PLANT A
EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

TIRGALEX	ΔC =	7.5E-06
MOD 1	ΔC =	9.0E-06
MOD 2	ΔC =	5.6E-06
MOD 3	ΔC =	1.1E-04

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	6.9E-06	8.5E-06	5.1E-06	1.0E-04
DOUBLES	6.1E-07	4.9E-07	5.4E-07	7.1E-06
TOTAL	7.5E-06	9.0E-06	5.6E-06	1.1E-04

PLANT A
EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

TIRGALEX	ΔC =	6.4E-05
MOD 1	ΔC =	6.9E-05
MOD 2	ΔC =	5.0E-05
MOD 3	ΔC =	8.6E-04

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	4.2E-05	5.1E-05	3.1E-05	6.0E-04
DOUBLES	2.2E-05	1.8E-05	1.9E-05	2.6E-04
TOTAL	6.4E-05	6.9E-05	5.0E-05	8.6E-04

CONTRIBUTORS FOR
PLANT A

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.1E-05

Rank	Component Name	Δql	S1	ΔC
1	HPI-MOV-FT	1.2E-02	3.4E-04	4.0E-06
2	OEP-DGN-FS-DG01	1.2E-02	2.3E-04	2.8E-06
3	OEP-DGN-FR-6HDG1	1.2E-02	2.1E-04	2.5E-06
4	LPR-MOV-FT	1.2E-02	1.3E-04	1.6E-06
5	OEP-DGN-FS-DG02	1.2E-02	1.3E-04	1.5E-06
6	OEP-DGN-FS-DG03	1.2E-02	1.3E-04	1.5E-06
7	OEP-DGN-FR-6HDG3	1.2E-02	1.2E-04	1.4E-06
8	OEP-DGN-FR-6HDG2	1.2E-02	1.1E-04	1.3E-06
9	HPI-MOV-FT-1350	1.2E-02	6.7E-05	8.0E-07
10	OEP-DGN-FR-DG01	1.2E-02	3.8E-05	4.5E-07
11	AFW-TDP-FS-FW2	8.9E-03	2.9E-05	2.6E-07
12	LPR-MOV-FT-1862A	1.2E-02	2.1E-05	2.5E-07
13	LPR-MOV-FT-1862B	1.2E-02	2.1E-05	2.5E-07
14	LPR-MOV-FT-1860B	1.2E-02	2.1E-05	2.5E-07
15	LPR-MOV-FT-1860A	1.2E-02	2.1E-05	2.5E-07
16	OEP-DGN-FR-DG03	1.2E-02	2.0E-05	2.4E-07
17	OEP-DGN-FR-DG02	1.2E-02	2.0E-05	2.3E-07
18	LPI-MDP-FS	7.2E-04	2.2E-04	1.6E-07
19	PPS-MOV-FT-1535	1.2E-02	9.5E-06	1.1E-07
20	AFW-TDP-FR-2P6HR	8.9E-03	1.1E-05	1.0E-07
21	LPR-MOV-FT-1890B	1.2E-02	4.5E-06	5.3E-08
22	LPR-MOV-FT-1890A	1.2E-02	4.5E-06	5.3E-08
23	CVC-MDP-FR-2A1HR	7.2E-04	6.7E-05	4.9E-08
24	HPI-MOV-FT-1115E	1.2E-02	4.1E-06	4.9E-08
25	HPI-MOV-FT-1115B	1.2E-02	4.1E-06	4.9E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX / 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ▲C = 5.5E-06

Rank	Component Name	▲q1	Component Name	▲q2	S12	▲q1 ▲q2	▲C
1	OEP-DGN-FR-6HDG3	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	3.6E-03	1.4E-04	5.0E-07
2	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FS-DG03	1.2E-02	3.1E-03	1.4E-04	4.3E-07
3	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FS-DG02	1.2E-02	3.1E-03	1.4E-04	4.3E-07
4	OEP-DGN-FS-DG03	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	2.4E-03	1.4E-04	3.4E-07
5	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-6HDG2	1.2E-02	2.4E-03	1.4E-04	3.4E-07
6	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	2.4E-03	1.4E-04	3.4E-07
7	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-6HDG3	1.2E-02	2.4E-03	1.4E-04	3.4E-07
8	OEP-DGN-FR-6HDG2	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	2.4E-03	1.4E-04	3.4E-07
9	LPR-MOV-FT-1862B	1.2E-02	LPR-MOV-FT-1860A	1.2E-02	1.5E-03	1.4E-04	2.1E-07
10	LPR-MOV-FT-1862A	1.2E-02	LPR-MOV-FT-1862B	1.2E-02	1.5E-03	1.4E-04	2.1E-07
11	LPR-MOV-FT-1862A	1.2E-02	LPR-MOV-FT-1860B	1.2E-02	1.5E-03	1.4E-04	2.1E-07
12	LPR-MOV-FT-1860A	1.2E-02	LPR-MOV-FT-1860B	1.2E-02	1.5E-03	1.4E-04	2.1E-07
13	LPR-MOV-FT-1890B	1.2E-02	LPR-MOV-FT-1890A	1.2E-02	1.5E-03	1.4E-04	2.1E-07
14	HPI-MOV-FT-1115B	1.2E-02	HPI-MOV-FT-1115D	1.2E-02	1.4E-03	1.4E-04	1.9E-07
15	HPI-MOV-FT-1115C	1.2E-02	HPI-MOV-FT-1115E	1.2E-02	1.4E-03	1.4E-04	1.9E-07
16	OEP-DGN-FR-DG01	1.2E-02	OEP-DGN-FR-DG03	1.2E-02	6.4E-04	1.4E-04	9.0E-08
17	OEP-DGN-FS-DG03	1.2E-02	OEP-DGN-FR-DG01	1.2E-02	6.0E-04	1.4E-04	8.4E-08
18	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FR-DG01	1.2E-02	6.0E-04	1.4E-04	8.4E-08
19	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-DG02	1.2E-02	6.0E-04	1.4E-04	8.4E-08
20	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-DG03	1.2E-02	6.0E-04	1.4E-04	8.4E-08
21	OEP-DGN-FR-DG02	1.2E-02	OEP-DGN-FR-DG01	1.2E-02	5.8E-04	1.4E-04	8.1E-08
22	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FS-DG03	1.2E-02	2.2E-04	1.4E-04	3.1E-08
23	OEP-DGN-FR-6HDG3	1.2E-02	OEP-DGN-FR-6HDG2	1.2E-02	2.0E-04	1.4E-04	2.8E-08
24	OEP-DGN-FS-DG01	1.2E-02	AFW-TDP-FS-FW2	8.9E-03	2.6E-04	1.0E-04	2.7E-08
25	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FR-6HDG3	1.2E-02	1.9E-04	1.4E-04	2.7E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX – MOD 1 / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.5E-05

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	1.2E-02	2.3E-04	2.8E-06
2	HPI-CKV-FT-CV225	1.2E-03	2.1E-03	2.6E-06
3	OEP-DGN-FR-6HDG1	1.2E-02	2.1E-04	2.5E-06
4	HPI-CKV-FT-CV410	1.2E-03	1.4E-03	1.7E-06
5	HPI-CKV-FT-CV25	1.2E-03	1.4E-03	1.7E-06
6	OEP-DGN-FS-DG03	1.2E-02	1.3E-04	1.5E-06
7	OEP-DGN-FS-DG02	1.2E-02	1.3E-04	1.5E-06
8	OEP-DGN-FR-6HDG3	1.2E-02	1.2E-04	1.4E-06
9	HPI-MOV-FT	3.9E-03	3.4E-04	1.3E-06
10	OEP-DGN-FR-6HDG2	1.2E-02	1.1E-04	1.3E-06
11	LPI-MDP-FS	3.6E-03	2.2E-04	8.1E-07
12	ACC-CKV-FT-CV128	1.2E-03	5.0E-04	6.2E-07
13	ACC-CKV-FT-CV145	1.2E-03	5.0E-04	6.2E-07
14	ACC-CKV-FT-CV130	1.2E-03	5.0E-04	6.2E-07
15	ACC-CKV-FT-CV147	1.2E-03	5.0E-04	6.2E-07
16	LPR-MOV-FT	3.9E-03	1.3E-04	5.2E-07
17	OEP-DGN-FR-DG01	1.2E-02	3.8E-05	4.5E-07
18	HPI-MOV-FT-1350	3.9E-03	6.7E-05	2.7E-07
19	AFW-TDP-FS-FW2	8.9E-03	2.9E-05	2.6E-07
20	CVC-MDP-FR-2A1HR	3.6E-03	6.7E-05	2.4E-07
21	OEP-DGN-FR-DG03	1.2E-02	2.0E-05	2.4E-07
22	OEP-DGN-FR-DG02	1.2E-02	2.0E-05	2.3E-07
23	AFW-TDP-FR-2PG1R	8.9E-03	1.1E-05	1.0E-07
24	AFW-MDP-FS	3.6E-03	2.6E-05	9.5E-08
25	LPI-MDP-FS-S11B	3.6E-03	2.5E-05	8.9E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant A
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TIRGALEX -MOD 1 ' 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 4.4E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	3.6E-03	1.4E-04	5.0E-07
2	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FS-DG02	1.2E-02	3.1E-03	1.4E-04	4.3E-07
3	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FS-DG03	1.2E-02	3.1E-03	1.4E-04	4.3E-07
4	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-6HDG3	1.2E-02	2.4E-03	1.4E-04	3.4E-07
5	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-6HDG2	1.2E-02	2.4E-03	1.4E-04	3.4E-07
6	OEP-DGN-FS-DG03	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	2.4E-03	1.4E-04	3.4E-07
7	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	2.4E-03	1.4E-04	3.4E-07
8	OEP-DGN-FR-6HDG2	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	2.4E-03	1.4E-04	3.4E-07
9	OEP-DGN-FR-DG01	1.2E-02	OEP-DGN-FR-DG03	1.2E-02	6.4E-04	1.4E-04	9.0E-08
10	OEP-DGN-FS-DG03	1.2E-02	OEP-DGN-FR-DG01	1.2E-02	6.0E-04	1.4E-04	8.4E-08
11	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-DG02	1.2E-02	6.0E-04	1.4E-04	8.4E-08
12	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FR-DG01	1.2E-02	6.0E-04	1.4E-04	8.4E-08
13	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-DG03	1.2E-02	6.0E-04	1.4E-04	8.4E-08
14	OEP-DGN-FR-DG02	1.2E-02	OEP-DGN-FR-DG01	1.2E-02	5.8E-04	1.4E-04	8.1E-08
15	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FS-DG03	1.2E-02	2.2E-04	1.4E-04	3.1E-08
16	OEP-DGN-FR-6HDG3	1.2E-02	OEP-DGN-FR-6HDG2	1.2E-02	2.0E-04	1.4E-04	2.8E-08
17	OEP-DGN-FS-DG01	1.2E-02	AFW-TDP-FS-FW2	8.9E-03	2.6E-04	1.0E-04	2.7E-08
18	OEP-DGN-FS-DG02	1.2E-02	OEP-DGN-FR-6HDG3	1.2E-02	1.9E-04	1.4E-04	2.7E-08
19	OEP-DGN-FS-DG03	1.2E-02	OEP-DGN-FR-6HDG2	1.2E-02	1.9E-04	1.4E-04	2.7E-08
20	OEP-DGN-FR-6HDG1	1.2E-02	AFW-TDP-FS-FW2	8.9E-03	2.4E-04	1.0E-04	2.5E-08
21	LPR-MOV-FT-1862A	3.9E-03	LPR-MOV-FT-1862B	3.9E-03	1.5E-03	1.6E-05	2.3E-08
22	LPR-MOV-FT-1862A	3.9E-03	LPR-MOV-FT-1860B	3.9E-03	1.5E-03	1.6E-05	2.3E-08
23	LPR-MOV-FT-1862B	3.9E-03	LPR-MOV-FT-1860A	3.9E-03	1.5E-03	1.6E-05	2.3E-08
24	LPR-MOV-FT-1890B	3.9E-03	LPR-MOV-FT-1890A	3.9E-03	1.5E-03	1.6E-05	2.3E-08
25	LPR-MOV-FT-1860A	3.9E-03	LPR-MOV-FT-1860B	3.9E-03	1.5E-03	1.6E-05	2.3E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant A
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TIRGALEX – MOD 2 / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.5E-05

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	1.3E-02	2.3E-04	3.1E-06
2	OEP-DGN-FR-6HDG1	1.3E-02	2.1E-04	2.8E-06
3	OEP-DGN-FS-DG03	1.3E-02	1.3E-04	1.7E-06
4	OEP-DGN-FS-DG02	1.3E-02	1.3E-04	1.7E-06
5	OEP-DGN-FR-6HDG3	1.3E-02	1.2E-04	1.6E-06
6	OEP-DGN-FR-6HDG2	1.3E-02	1.1E-04	1.4E-06
7	OEP-DGN-FR-DG01	1.3E-02	3.8E-05	5.0E-07
8	HPI-MOV-FT	1.3E-03	3.4E-04	4.5E-07
9	OEP-DGN-FR-DG03	1.3E-02	2.0E-05	2.6E-07
10	OEP-DGN-FR-DG02	1.3E-02	2.0E-05	2.6E-07
11	AFW-TDP-FS-FW2	8.9E-03	2.9E-05	2.6E-07
12	LPI-MDP-FS	9.9E-04	2.2E-04	2.2E-07
13	LPR-MOV-FT	1.3E-03	1.3E-04	1.7E-07
14	HPI-CKV-FT-CV225	4.9E-05	2.1E-03	1.0E-07
15	AFW-TDP-FR-2P6HR	8.9E-03	1.1E-05	1.0E-07
16	HPI-MOV-FT-1350	1.3E-03	6.7E-05	8.8E-08
17	HPI-CKV-FT-CV410	4.9E-05	1.4E-03	6.8E-08
18	HPI-CKV-FT-CV25	4.9E-05	1.4E-03	6.8E-08
19	CVC-MDP-FR-2A1HR	9.9E-04	6.7E-05	6.6E-08
20	LPR-MOV-FT-1862B	1.3E-03	2.1E-05	2.7E-08
21	LPR-MOV-FT-1862A	1.3E-03	2.1E-05	2.7E-08
22	LPR-MOV-FT-1860B	1.3E-03	2.1E-05	2.7E-08
23	LPR-MOV-FT-1860A	1.3E-03	2.1E-05	2.7E-08
24	AFW-MDP-FS	9.9E-04	2.6E-05	2.6E-08
25	ACC-CKV-FT-CV145	4.9E-05	5.0E-04	2.5E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX – MOD 2 / 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 4.9E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	1.3E-02	OEP-DGN-FR-6HDG1	1.3E-02	3.6E-03	1.7E-04	6.2E-07
2	OEP-DGN-FS-DG01	1.3E-02	OEP-DGN-FS-DG03	1.3E-02	3.1E-03	1.7E-04	5.3E-07
3	OEP-DGN-FS-DG01	1.3E-02	OEP-DGN-FS-DG02	1.3E-02	3.1E-03	1.7E-04	5.3E-07
4	OEP-DGN-FS-DG02	1.3E-02	OEP-DGN-FR-6HDG1	1.3E-02	2.4E-03	1.7E-04	4.2E-07
5	OEP-DGN-FS-DG01	1.3E-02	OEP-DGN-FR-6HDG2	1.3E-02	2.4E-03	1.7E-04	4.2E-07
6	OEP-DGN-FS-DG01	1.3E-02	OEP-DGN-FR-6HDG3	1.3E-02	2.4E-03	1.7E-04	4.2E-07
7	OEP-DGN-FS-DG03	1.3E-02	OEP-DGN-FR-6HDG1	1.3E-02	2.4E-03	1.7E-04	4.2E-07
8	OEP-DGN-FR-6HDG2	1.3E-02	OEP-DGN-FR-6HDG1	1.3E-02	2.4E-03	1.7E-04	4.2E-07
9	OEP-DGN-FR-DG01	1.3E-02	OEP-DGN-FR-DG03	1.3E-02	6.4E-04	1.7E-04	1.1E-07
10	OEP-DGN-FS-DG03	1.3E-02	OEP-DGN-FR-DG01	1.3E-02	6.0E-04	1.7E-04	1.0E-07
11	OEP-DGN-FS-DG01	1.3E-02	OEP-DGN-FR-DG03	1.3E-02	6.0E-04	1.7E-04	1.0E-07
12	OEP-DGN-FS-DG01	1.3E-02	OEP-DGN-FR-DG02	1.3E-02	6.0E-04	1.7E-04	1.0E-07
13	OEP-DGN-FS-DG02	1.3E-02	OEP-DGN-FR-DG01	1.3E-02	6.0E-04	1.7E-04	1.0E-07
14	OEP-DGN-FR-DG02	1.3E-02	OEP-DGN-FR-DG01	1.3E-02	5.8E-04	1.7E-04	1.0E-07
15	OEP-DGN-FS-DG02	1.3E-02	OEP-DGN-FS-DG03	1.3E-02	2.2E-04	1.7E-04	3.8E-08
16	OEP-DGN-FR-6HDG3	1.3E-02	OEP-DGN-FR-6HDG2	1.3E-02	2.0E-04	1.7E-04	3.4E-08
17	OEP-DGN-FS-DG03	1.3E-02	OEP-DGN-FR-6HDG2	1.3E-02	1.9E-04	1.7E-04	3.3E-08
18	OEP-DGN-FS-DG02	1.3E-02	OEP-DGN-FR-6HDG3	1.3E-02	1.9E-04	1.7E-04	3.3E-08
19	OEP-DGN-FS-DG01	1.3E-02	AFW-TDP-FS-FW2	8.9E-03	2.6E-04	1.2E-04	3.0E-08
20	OEP-DGN-FR-6HDG1	1.3E-02	AFW-TDP-FS-FW2	8.9E-03	2.4E-04	1.2E-04	2.8E-08
21	OEP-DGN-FS-DG02	1.3E-02	AFW-TDP-FS-FW2	8.9E-03	1.4E-04	1.2E-04	1.6E-08
22	OEP-DGN-FS-DG03	1.3E-02	AFW-TDP-FS-FW2	8.9E-03	1.4E-04	1.2E-04	1.6E-08
23	OEP-DGN-FR-6HDG3	1.3E-02	AFW-TDP-FS-FW2	8.9E-03	1.3E-04	1.2E-04	1.5E-08
24	OEP-DGN-FR-6HDG2	1.3E-02	AFW-TDP-FS-FW2	8.9E-03	1.2E-04	1.2E-04	1.4E-08
25	OEP-DGN-FS-DG01	1.3E-02	AFW-TDP-FR-2P6HR	8.9E-03	9.5E-05	1.2E-04	1.1E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX - MOD 3 / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.0E-04

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	3.3E-02	2.1E-03	6.9E-05
2	HPI-CKV-FT-CV25	3.3E-02	1.4E-03	4.6E-05
3	HPI-CKV-FT-CV410	3.3E-02	1.4E-03	4.6E-05
4	ACC-CKV-FT-CV145	3.3E-02	5.0E-04	1.6E-05
5	ACC-CKV-FT-CV147	3.3E-02	5.0E-04	1.6E-05
6	ACC-CKV-FT-CV130	3.3E-02	5.0E-04	1.6E-05
7	ACC-CKV-FT-CV128	3.3E-02	5.0E-04	1.6E-05
8	HPI-MOV-FT	3.3E-02	3.4E-04	1.1E-05
9	OEP-DGN-FS-DG01	3.3E-02	2.3E-04	7.7E-06
10	LPI-MDP-FS	3.3E-02	2.2E-04	7.4E-06
11	OEP-DGN-FR-6HDG1	3.3E-02	2.1E-04	7.0E-06
12	LPR-MOV-FT	3.3E-02	1.3E-04	4.3E-06
13	OEP-DGN-FS-DG03	3.3E-02	1.3E-04	4.1E-06
14	OEP-DGN-FS-DG02	3.3E-02	1.3E-04	4.1E-06
15	OEP-DGN-FR-6HDG3	3.3E-02	1.2E-04	4.0E-06
16	OEP-DGN-FR-6HDG2	3.3E-02	1.1E-04	3.5E-06
17	HPI-MOV-FT-1350	3.3E-02	6.7E-05	2.2E-06
18	CVC-MDP-FR-2A1HR	3.3E-02	6.7E-05	2.2E-06
19	OEP-DGN-FR-DG01	3.3E-02	3.8E-05	1.2E-06
20	AFW-TDP-FS-FW2	3.3E-02	2.9E-05	9.5E-07
21	AFW-MDP-FS	3.3E-02	2.6E-05	8.7E-07
22	LPI-MDP-FS-SI1B	3.3E-02	2.5E-05	8.1E-07
23	LPI-MDP-FS-SI1A	3.3E-02	2.5E-05	8.1E-07
24	LPR-MOV-FT-1862B	3.3E-02	2.1E-05	6.9E-07
25	LPR-MOV-FT-1862A	3.3E-02	2.1E-05	6.9E-07

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX – MOD 3 / 18 M0.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 6.4E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	3.3E-02	OEP-DGN-FR-6HDG1	3.3E-02	3.6E-03	1.1E-03	3.9E-06
2	OEP-DGN-FS-DG01	3.3E-02	OEP-DGN-FS-DG02	3.3E-02	3.1E-03	1.1E-03	3.3E-06
3	OEP-DGN-FS-DG01	3.3E-02	OEP-DGN-FS-DG03	3.3E-02	3.1E-03	1.1E-03	3.3E-06
4	OEP-DGN-FS-DG01	3.3E-02	OEP-DGN-FR-6HDG3	3.3E-02	2.4E-03	1.1E-03	2.6E-06
5	OEP-DGN-FS-DG02	3.3E-02	OEP-DGN-FR-6HDG1	3.3E-02	2.4E-03	1.1E-03	2.6E-06
6	OEP-DGN-FS-DG01	3.3E-02	OEP-DGN-FR-6HDG2	3.3E-02	2.4E-03	1.1E-03	2.6E-06
7	OEP-DGN-FS-DG03	3.3E-02	OEP-DGN-FR-6HDG1	3.3E-02	2.4E-03	1.1E-03	2.6E-06
8	OEP-DGN-FR-6HDG2	3.3E-02	OEP-DGN-FR-6HDG1	3.3E-02	2.4E-03	1.1E-03	2.6E-06
9	LPR-MOV-FT-1862A	3.3E-02	LPR-MOV-FT-1860B	3.3E-02	1.5E-03	1.1E-03	1.6E-06
10	LPR-MOV-FT-1862A	3.3E-02	LPI-MDP-FS-SI1B	3.3E-02	1.5E-03	1.1E-03	1.6E-06
11	LPI-MDP-FS-SI1B	3.3E-02	LPI-MDP-FS-SI1A	3.3E-02	1.5E-03	1.1E-03	1.6E-06
12	LPR-MOV-FT-1862B	3.3E-02	LPI-MDP-FS-SI1A	3.3E-02	1.5E-03	1.1E-03	1.6E-06
13	LPR-MOV-FT-1890B	3.3E-02	LPR-MOV-FT-1890A	3.3E-02	1.5E-03	1.1E-03	1.6E-06
14	LPR-MOV-FT-1862B	3.3E-02	LPR-MOV-FT-1860A	3.3E-02	1.5E-03	1.1E-03	1.6E-06
15	LPR-MOV-FT-1860A	3.3E-02	LPI-MDP-FS-SI1B	3.3E-02	1.5E-03	1.1E-03	1.6E-06
16	LPR-MOV-FT-1860A	3.3E-02	LPR-MOV-FT-1860B	3.3E-02	1.5E-03	1.1E-03	1.6E-06
17	LPR-MOV-FT-1862A	3.3E-02	LPR-MOV-FT-1862B	3.3E-02	1.5E-03	1.1E-03	1.6E-06
18	LPI-MDP-FS-SI1A	3.3E-02	LPR-MOV-FT-1860B	3.3E-02	1.5E-03	1.1E-03	1.6E-06
19	HPI-MOV-FT-1115B	3.3E-02	HPI-MOV-FT-1115D	3.3E-02	1.4E-03	1.1E-03	1.5E-06
20	HPI-MOV-FT-1115C	3.3E-02	HPI-MOV-FT-1115E	3.3E-02	1.4E-03	1.1E-03	1.5E-06
21	CPC-MDP-FS-SW10B	3.3E-02	CPC-MDP-FR-SWA3H	3.3E-02	1.0E-03	1.1E-03	1.1E-06
22	LPI-MDP-FS-SI1B	3.3E-02	LPI-MDP-FR-A21HR	3.3E-02	1.0E-03	1.1E-03	1.1E-06
23	LPR-MOV-FT-1860B	3.3E-02	LPI-MDP-FR-A21HR	3.3E-02	1.0E-03	1.1E-03	1.1E-06
24	LPR-MOV-FT-1862A	3.3E-02	LPI-MDP-FR-B21HR	3.3E-02	1.0E-03	1.1E-03	1.1E-06
25	LPR-MOV-FT-1862B	3.3E-02	LPI-MDP-FR-A21HR	3.3E-02	1.0E-03	1.1E-03	1.1E-06

CONTRIBUTORS FOR
PLANT A

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

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TIRGALEX / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.3E-04

Rank	Component Name	Δq1	S1	ΔC
1	HPI-MOV-FT	1.9E-01	3.4E-04	6.4E-05
2	OEP-DGN-FS-DG01	1.9E-01	2.3E-04	4.4E-05
3	OEP-DGN-FR-6HDG1	1.9E-01	2.1E-04	4.0E-05
4	LPR-MOV-FT	1.9E-01	1.3E-04	2.5E-05
5	OEP-DGN-FS-DG02	1.9E-01	1.3E-04	2.4E-05
6	OEP-DGN-FS-DG03	1.9E-01	1.3E-04	2.4E-05
7	OEP-DGN-FR-6HDG3	1.9E-01	1.2E-04	2.3E-05
8	OEP-DGN-FR-6HDG2	1.9E-01	1.1E-04	2.0E-05
9	HPI-MOV-FT-1350	1.9E-01	6.7E-05	1.3E-05
10	OEP-DGN-FR-DG01	1.9E-01	3.8E-05	7.2E-06
11	AFW-TDP-FS-FW2	1.4E-01	2.9E-05	4.1E-06
12	LPR-MOV-FT-1862A	1.9E-01	2.1E-05	4.0E-06
13	LPR-MOV-FT-1862B	1.9E-01	2.1E-05	4.0E-06
14	LPR-MOV-FT-1860B	1.9E-01	2.1E-05	3.9E-06
15	LPR-MOV-FT-1860A	1.9E-01	2.1E-05	3.9E-06
16	OEP-DGN-FR-DG03	1.9E-01	2.0E-05	3.8E-06
17	OEP-DGN-FR-DG02	1.9E-01	2.0E-05	3.7E-06
18	LPI-MDP-FS	1.2E-02	2.2E-04	2.6E-06
19	PPS-MOV-FT-1535	1.9E-01	9.5E-06	1.8E-06
20	AFW-TDP-FR-2P6HR	1.4E-01	1.1E-05	1.6E-06
21	LPR-MOV-FT-1890B	1.9E-01	4.5E-06	8.5E-07
22	LPR-MOV-FT-1890A	1.9E-01	4.5E-06	8.5E-07
23	CVC-MDP-FR-2A1HR	1.2E-02	6.7E-05	7.8E-07
24	HPI-MOV-FT-1115E	1.9E-01	4.1E-06	7.8E-07
25	HPI-MOV-FT-1115B	1.9E-01	4.1E-06	7.8E-07

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

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TIRGALEX / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.4E-03

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	3.6E-03	3.6E-02	1.3E-04
2	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FS-DG03	1.9E-01	3.1E-03	3.6E-02	1.1E-04
3	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FS-DG02	1.9E-01	3.1E-03	3.6E-02	1.1E-04
4	OEP-DGN-FS-DG03	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	2.4E-03	3.6E-02	8.8E-05
5	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-6HDG2	1.9E-01	2.4E-03	3.6E-02	8.8E-05
6	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	2.4E-03	3.6E-02	8.8E-05
7	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-6HDG3	1.9E-01	2.4E-03	3.6E-02	8.8E-05
8	OEP-DGN-FR-6HDG2	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	2.4E-03	3.6E-02	8.7E-05
9	LPR-MOV-FT-1862B	1.9E-01	LPR-MOV-FT-1860A	1.9E-01	1.5E-03	3.6E-02	5.4E-05
10	LPR-MOV-FT-1862A	1.9E-01	LPR-MOV-FT-1862B	1.9E-01	1.5E-03	3.6E-02	5.4E-05
11	LPR-MOV-FT-1862A	1.9E-01	LPR-MOV-FT-1860B	1.9E-01	1.5E-03	3.6E-02	5.4E-05
12	LPR-MOV-FT-1860A	1.9E-01	LPR-MOV-FT-1860B	1.9E-01	1.5E-03	3.6E-02	5.4E-05
13	LPR-MOV-FT-1890B	1.9E-01	LPR-MOV-FT-1890A	1.9E-01	1.5E-03	3.6E-02	5.4E-05
14	HPI-MOV-FT-1115B	1.9E-01	HPI-MOV-FT-1115D	1.9E-01	1.4E-03	3.6E-02	4.9E-05
15	HPI-MOV-FT-1115C	1.9E-01	HPI-MOV-FT-1115E	1.9E-01	1.4E-03	3.6E-02	4.9E-05
16	OEP-DGN-FR-DG01	1.9E-01	OEP-DGN-FR-DG03	1.9E-01	6.4E-04	3.6E-02	2.3E-05
17	OEP-DGN-FS-DG03	1.9E-01	OEP-DGN-FR-DG01	1.9E-01	6.0E-04	3.6E-02	2.2E-05
18	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FR-DG01	1.9E-01	6.0E-04	3.6E-02	2.2E-05
19	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-DG02	1.9E-01	6.0E-04	3.6E-02	2.2E-05
20	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-DG03	1.9E-01	6.0E-04	3.6E-02	2.2E-05
21	OEP-DGN-FR-DG02	1.9E-01	OEP-DGN-FR-DG01	1.9E-01	5.8E-04	3.6E-02	2.1E-05
22	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FS-DG03	1.9E-01	2.2E-04	3.6E-02	7.8E-06
23	OEP-DGN-FR-6HDG3	1.9E-01	OEP-DGN-FR-6HDG2	1.9E-01	2.0E-04	3.6E-02	7.1E-06
24	OEP-DGN-FS-DG01	1.9E-01	AFW-TDP-FS-FW2	1.4E-01	2.6E-04	2.7E-02	7.0E-06
25	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FR-6HDG3	1.9E-01	1.9E-04	3.6E-02	6.9E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
20-Oct-89
03:18 PM

TIRGALEX – MOD 1 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 4.1E-04

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	1.9E-01	2.3E-04	4.4E-05
2	HPI-CKV-FT-CV225	2.0E-02	2.1E-03	4.2E-05
3	OEP-DGN-FR-6HDG1	1.9E-01	2.1E-04	4.0E-05
4	HPI-CKV-FT-CV410	2.0E-02	1.4E-03	2.8E-05
5	HPI-CKV-FT-CV25	2.0E-02	1.4E-03	2.8E-05
6	OEP-DGN-FS-DG03	1.9E-01	1.3E-04	2.4E-05
7	OEP-DGN-FS-DG02	1.9E-01	1.3E-04	2.4E-05
8	OEP-DGN-FR-6HDG3	1.9E-01	1.2E-04	2.3E-05
9	HPI-MOV-FT	6.3E-02	3.4E-04	2.1E-05
10	OEP-DGN-FR-6HDG2	1.9E-01	1.1E-04	2.0E-05
11	LPI-MDP-FS	5.8E-02	2.2E-04	1.3E-05
12	ACC-CKV-FT-CV128	2.0E-02	5.0E-04	1.0E-05
13	ACC-CKV-FT-CV145	2.0E-02	5.0E-04	1.0E-05
14	ACC-CKV-FT-CV130	2.0E-02	5.0E-04	1.0E-05
15	ACC-CKV-FT-CV147	2.0E-02	5.0E-04	1.0E-05
16	LPR-MOV-FT	6.3E-02	1.3E-04	8.3E-06
17	OEP-DGN-FR-DG01	1.9E-01	3.8E-05	7.2E-06
18	HPI-MOV-FT-1350	6.3E-02	6.7E-05	4.2E-06
19	AFW-TDP-FS-FW2	1.4E-01	2.9E-05	4.1E-06
20	CVC-MDP-FR-2A1HR	5.8E-02	6.7E-05	3.9E-06
21	OEP-DGN-FR-DG03	1.9E-01	2.0E-05	3.8E-06
22	OEP-DGN-FR-DG02	1.9E-01	2.0E-05	3.7E-06
23	AFW-TDP-FR-2P611R	1.4E-01	1.1E-05	1.6E-06
24	AFW-MDP-FS	5.8E-02	2.6E-05	1.5E-06
25	LPI-MDP-FS-SI1B	5.8E-02	2.5E-05	1.4E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
20-Oct-89
03:16 PM

TIRGALEX -MOD 1 / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.1E-03

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	3.6E-03	3.6E-02	1.3E-04
2	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FS-DG02	1.9E-01	3.1E-03	3.6E-02	1.1E-04
3	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FS-DG03	1.9E-01	3.1E-03	3.6E-02	1.1E-04
4	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-6HDG3	1.9E-01	2.4E-03	3.6E-02	8.8E-05
5	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-6HDG2	1.9E-01	2.4E-03	3.6E-02	8.8E-05
6	OEP-DGN-FS-DG03	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	2.4E-03	3.6E-02	8.8E-05
7	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	2.4E-03	3.6E-02	8.8E-05
8	OEP-DGN-FR-6HDG2	1.9E-01	OEP-DGN-FR-6HDG1	1.9E-01	2.4E-03	3.6E-02	8.7E-05
9	OEP-DGN-FR-DG01	1.9E-01	OEP-DGN-FR-DG03	1.9E-01	6.4E-04	3.6E-02	2.3E-05
10	OEP-DGN-FS-DG03	1.9E-01	OEP-DGN-FR-DG01	1.9E-01	6.0E-04	3.6E-02	2.2E-05
11	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-DG02	1.9E-01	6.0E-04	3.6E-02	2.2E-05
12	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FR-DG01	1.9E-01	6.0E-04	3.6E-02	2.2E-05
13	OEP-DGN-FS-DG01	1.9E-01	OEP-DGN-FR-DG03	1.9E-01	6.0E-04	3.6E-02	2.2E-05
14	OEP-DGN-FR-DG02	1.9E-01	OEP-DGN-FR-DG01	1.9E-01	5.8E-04	3.6E-02	2.1E-05
15	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FS-DG03	1.9E-01	2.2E-04	3.6E-02	7.8E-06
16	OEP-DGN-FR-6HDG3	1.9E-01	OEP-DGN-FR-6HDG2	1.9E-01	2.0E-04	3.6E-02	7.1E-06
17	OEP-DGN-FS-DG01	1.9E-01	AFW-TDP-FS-FW2	1.4E-01	2.6E-04	2.7E-02	7.0E-06
18	OEP-DGN-FS-DG02	1.9E-01	OEP-DGN-FR-6HDG3	1.9E-01	1.9E-04	3.6E-02	6.9E-06
19	OEP-DGN-FS-DG03	1.9E-01	OEP-DGN-FR-6HDG2	1.9E-01	1.9E-04	3.6E-02	6.9E-06
20	OEP-DGN-FR-6HDG1	1.9E-01	AFW-TDP-FS-FW2	1.4E-01	2.4E-04	2.7E-02	6.4E-06
21	LPR-MOV-FT-1862A	6.3E-02	LPR-MOV-FT-1862B	6.3E-02	1.5E-03	4.0E-03	6.0E-06
22	LPR-MOV-FT-1862A	6.3E-02	LPR-MOV-FT-1860B	6.3E-02	1.5E-03	4.0E-03	6.0E-06
23	LPR-MOV-FT-1862B	6.3E-02	LPR-MOV-FT-1860A	6.3E-02	1.5E-03	4.0E-03	6.0E-06
24	LPR-MOV-FT-1890B	6.3E-02	LPR-MOV-FT-1890A	6.3E-02	1.5E-03	4.0E-03	6.0E-06
25	LPR-MOV-FT-1860A	6.3E-02	LPR-MOV-FT-1860B	6.3E-02	1.5E-03	4.0E-03	6.0E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
20-Oct-89
03:20 PM

TIRGALEX – MOD 2 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.5E-04

Rank	Component Name	Δql	SI	ΔC
1	OEP-DGN-FS-DG01	2.1E-01	2.3E-04	4.9E-05
2	OEP-DGN-FR-6HDG1	2.1E-01	2.1E-04	4.5E-05
3	OEP-DGN-FS-DG03	2.1E-01	1.3E-04	2.6E-05
4	OEP-DGN-FS-DG02	2.1E-01	1.3E-04	2.6E-05
5	OEP-DGN-FR-6HDG3	2.1E-01	1.2E-04	2.6E-05
6	OEP-DGN-FR-6HDG2	2.1E-01	1.1E-04	2.2E-05
7	OEP-DGN-FR-DG01	2.1E-01	3.8E-05	7.9E-06
8	HPI-MOV-FT	2.1E-02	3.4E-04	7.1E-06
9	OEP-DGN-FR-DG03	2.1E-01	2.0E-05	4.2E-06
10	OEP-DGN-FR-DG02	2.1E-01	2.0E-05	4.1E-06
11	AFW-TDP-FS-FW2	1.4E-01	2.9E-05	4.1E-06
12	LPI-MDP-FS	1.6E-02	2.2E-04	3.5E-06
13	LPR-MOV-FT	2.1E-02	1.3E-04	2.8E-06
14	HPI-CKV-FT-CV225	7.9E-04	2.1E-03	1.7E-06
15	AFW-TDP-FR-2P6HR	1.4E-01	1.1E-05	1.6E-06
16	HPI-MOV-FT-1350	2.1E-02	6.7E-05	1.4E-06
17	HPI-CKV-FT-CV410	7.9E-04	1.4E-03	1.1E-06
18	HPI-CKV-FT-CV25	7.9E-04	1.4E-03	1.1E-06
19	CVC-MDP-FR-2A1HR	1.6E-02	6.7E-05	1.1E-06
20	LPR-MOV-FT-1862B	2.1E-02	2.1E-05	4.4E-07
21	LPR-MOV-FT-1862A	2.1E-02	2.1E-05	4.4E-07
22	LPR-MOV-FT-1860B	2.1E-02	2.1E-05	4.4E-07
23	LPR-MOV-FT-1860A	2.1E-02	2.1E-05	4.4E-07
24	AFW-MDP-FS	1.6E-02	2.6E-05	4.2E-07
25	ACC-CKV-FT-CV145	7.9E-04	5.0E-04	3.9E-07

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
20-Oct-89
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TIRGALEX - MOD 2 / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.2E-03

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	2.1E-01	OEP-DGN-FR-6HDG1	2.1E-01	3.6E-03	4.4E-02	1.6E-04
2	OEP-DGN-FS-DG01	2.1E-01	OEP-DGN-FS-DG03	2.1E-01	3.1E-03	4.4E-02	1.4E-04
3	OEP-DGN-FS-DG01	2.1E-01	OEP-DGN-FS-DG02	2.1E-01	3.1E-03	4.4E-02	1.4E-04
4	OEP-DGN-FS-DG02	2.1E-01	OEP-DGN-FR-6HDG1	2.1E-01	2.4E-03	4.4E-02	1.1E-04
5	OEP-DGN-FS-DG01	2.1E-01	OEP-DGN-FR-6HDG2	2.1E-01	2.4E-03	4.4E-02	1.1E-04
6	OEP-DGN-FS-DG01	2.1E-01	OEP-DGN-FR-6HDG3	2.1E-01	2.4E-03	4.4E-02	1.1E-04
7	OEP-DGN-FS-DG03	2.1E-01	OEP-DGN-FR-6HDG1	2.1E-01	2.4E-03	4.4E-02	1.1E-04
8	OEP-DGN-FR-6HDG2	2.1E-01	OEP-DGN-FR-6HDG1	2.1E-01	2.4E-03	4.4E-02	1.1E-04
9	OEP-DGN-FR-DG01	2.1E-01	OEP-DGN-FR-DG03	2.1E-01	6.4E-04	4.4E-02	2.8E-05
10	OEP-DGN-FS-DG03	2.1E-01	OEP-DGN-FR-DG01	2.1E-01	6.0E-04	4.4E-02	2.7E-05
11	OEP-DGN-FS-DG01	2.1E-01	OEP-DGN-FR-DG03	2.1E-01	6.0E-04	4.4E-02	2.7E-05
12	OEP-DGN-FS-DG01	2.1E-01	OEP-DGN-FR-DG02	2.1E-01	6.0E-04	4.4E-02	2.7E-05
13	OEP-DGN-FS-DG02	2.1E-01	OEP-DGN-FR-DG01	2.1E-01	6.0E-04	4.4E-02	2.7E-05
14	OEP-DGN-FR-DG02	2.1E-01	OEP-DGN-FR-DG01	2.1E-01	5.8E-04	4.4E-02	2.6E-05
15	OEP-DGN-FS-DG02	2.1E-01	OEP-DGN-FS-DG03	2.1E-01	2.2E-04	4.4E-02	9.7E-06
16	OEP-DGN-FR-6HDG3	2.1E-01	OEP-DGN-FR-6HDG2	2.1E-01	2.0E-04	4.4E-02	8.8E-06
17	OEP-DGN-FS-DG03	2.1E-01	OEP-DGN-FR-6HDG2	2.1E-01	1.9E-04	4.4E-02	8.5E-06
18	OEP-DGN-FS-DG02	2.1E-01	OEP-DGN-FR-6HDG3	2.1E-01	1.9E-04	4.4E-02	8.5E-06
19	OEP-DGN-FS-DG01	2.1E-01	AFW-TDP-FS-FW2	1.4E-01	2.6E-04	3.0E-02	7.8E-06
20	OEP-DGN-FR-6HDG1	2.1E-01	AFW-TDP-FS-FW2	1.4E-01	2.4E-04	3.0E-02	7.1E-06
21	OEP-DGN-FS-[illegible]2	2.1E-01	AFW-TDP-FS-FW2	1.4E-01	1.4E-04	3.0E-02	4.2E-06
22	OEP-DGN-FS-DG03	2.1E-01	AFW-TDP-FS-FW2	1.4E-01	1.4E-04	3.0E-02	4.2E-06
23	OEP-DGN-FR-6HDG3	2.1E-01	AFW-TDP-FS-FW2	1.4E-01	1.3E-04	3.0E-02	3.9E-06
24	OEP-DGN-FR-6HDG2	2.1E-01	AFW-TDP-FS-FW2	1.4E-01	1.2E-04	3.0E-02	3.7E-06
25	OEP-DGN-FS-DG01	2.1E-01	AFW-TDP-FR-2P6HR	1.4E-01	9.5E-05	3.0E-02	2.8E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
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04:03 PM

TIRGALEX – MOD 3 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 4.8E-03

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	5.3E-01	2.1E-03	1.1E-03
2	HPI-CKV-FT-CV25	5.3E-01	1.4E-03	7.3E-04
3	HPI-CKV-FT-CV410	5.3E-01	1.4E-03	7.3E-04
4	ACC-CKV-FT-CV145	5.3E-01	5.0E-04	2.6E-04
5	ACC-CKV-FT-CV147	5.3E-01	5.0E-04	2.6E-04
6	ACC-CKV-FT-CV130	5.3E-01	5.0E-04	2.6E-04
7	ACC-CKV-FT-CV128	5.3E-01	5.0E-04	2.6E-04
8	HPI-MOV-FT	5.3E-01	3.4E-04	1.8E-04
9	OEP-DGN-FS-DG01	5.3E-01	2.3E-04	1.2E-04
10	LPI-MDP-FS	5.3E-01	2.2E-04	1.2E-04
11	OEP-DGN-FR-6HDG1	5.3E-01	2.1E-04	1.1E-04
12	LPR-MOV-FT	5.3E-01	1.3E-04	6.9E-05
13	OEP-DGN-FS-DG03	5.3E-01	1.3E-04	6.6E-05
14	OEP-DGN-FS-DG02	5.3E-01	1.3E-04	6.6E-05
15	OEP-DGN-FR-6HDG3	5.3E-01	1.2E-04	6.4E-05
16	OEP-DGN-FR-6HDG2	5.3E-01	1.1E-04	5.6E-05
17	HPI-MOV-FT-1350	5.3E-01	6.7E-05	3.5E-05
18	CVC-MDP-FR-2A1HR	5.3E-01	6.7E-05	3.5E-05
19	OEP-DGN-FR-DG01	5.3E-01	3.8E-05	2.0E-05
20	AFW-TDP-FS-FW2	5.3E-01	2.9E-05	1.5E-05
21	AFW-MDP-FS	5.3E-01	2.6E-05	1.4E-05
22	LPI-MDP-FS-SI1B	5.3E-01	2.5E-05	1.3E-05
23	LPI-MDP-FS-SI1A	5.3E-01	2.5E-05	1.3E-05
24	LPR-MOV-FT-1862B	5.3E-01	2.1E-05	1.1E-05
25	LPR-MOV-FT-1862A	5.3E-01	2.1E-05	1.1E-05

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
20-Oct-89
04:04 PM

TIRGALEX – MOD 3 / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.6E-02

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	5.3E-01	OEP-DGN-FR-6HDG1	5.3E-01	3.6E-03	2.8E-01	9.9E-04
2	OEP-DGN-FS-DG01	5.3E-01	OEP-DGN-FS-DG02	5.3E-01	3.1E-03	2.8E-01	8.5E-04
3	OEP-DGN-FS-DG01	5.3E-01	OEP-DGN-FS-DG03	5.3E-01	3.1E-03	2.8E-01	8.5E-04
4	OEP-DGN-FS-DG01	5.3E-01	OEP-DGN-FR-6HDG3	5.3E-01	2.4E-03	2.8E-01	6.8E-04
5	OEP-DGN-FS-DG02	5.3E-01	OEP-DGN-FR-6HDG1	5.3E-01	2.4E-03	2.8E-01	6.8E-04
6	OEP-DGN-FS-DG01	5.3E-01	OEP-DGN-FR-6HDG2	5.3E-01	2.4E-03	2.8E-01	6.8E-04
7	OEP-DGN-FS-DG03	5.3E-01	OEP-DGN-FR-6HDG1	5.3E-01	2.4E-03	2.8E-01	6.8E-04
8	OEP-DGN-FR-6HDG2	5.3E-01	OEP-DGN-FR-6HDG1	5.3E-01	2.4E-03	2.8E-01	6.7E-04
9	LPR-MOV-FT-1862A	5.3E-01	LPR-MOV-FT-1860B	5.3E-01	1.5E-03	2.8E-01	4.1E-04
10	LPR-MOV-FT-1862A	5.3E-01	LPI-MDP-FS-SI1B	5.3E-01	1.5E-03	2.8E-01	4.1E-04
11	LPI-MDP-FS-SI1B	5.3E-01	LPI-MDP-FS-SI1A	5.3E-01	1.5E-03	2.8E-01	4.1E-04
12	LPR-MOV-FT-1862B	5.3E-01	LPI-MDP-FS-SI1A	5.3E-01	1.5E-03	2.8E-01	4.1E-04
13	LPR-MOV-FT-1890B	5.3E-01	LPR-MOV-FT-1890A	5.3E-01	1.5E-03	2.8E-01	4.1E-04
14	LPR-MOV-FT-1862B	5.3E-01	LPR-MOV-FT-1860A	5.3E-01	1.5E-03	2.8E-01	4.1E-04
15	LPR-MOV-FT-1860A	5.3E-01	LPI-MDP-FS-SI1B	5.3E-01	1.5E-03	2.8E-01	4.1E-04
16	LPR-MOV-FT-1860A	5.3E-01	LPR-MOV-FT-1860B	5.3E-01	1.5E-03	2.8E-01	4.1E-04
17	LPR-MOV-FT-1862A	5.3E-01	LPR-MOV-FT-1862B	5.3E-01	1.5E-03	2.8E-01	4.1E-04
18	LPI-MDP-FS-SI1A	5.3E-01	LPR-MOV-FT-1860B	5.3E-01	1.5E-03	2.8E-01	4.1E-04
19	HPI-MOV-FT-1115B	5.3E-01	HPI-MOV-FT-1115D	5.3E-01	1.4E-03	2.8E-01	3.8E-04
20	HPI-MOV-FT-1115C	5.3E-01	HPI-MOV-FT-1115E	5.3E-01	1.4E-03	2.8E-01	3.8E-04
21	CPC-MDP-FS-SW10B	5.3E-01	CPC-MDP-FR-SWA3H	5.3E-01	1.0E-03	2.8E-01	2.8E-04
22	LPI-MDP-FS-SI1B	5.3E-01	LPI-MDP-FR-A21HR	5.3E-01	1.0E-03	2.8E-01	2.8E-04
23	LPR-MOV-FT-1860B	5.3E-01	LPI-MDP-FR-A21HR	5.3E-01	1.0E-03	2.8E-01	2.8E-04
24	LPR-MOV-FT-1862A	5.3E-01	LPI-MDP-FR-B21HR	5.3E-01	1.0E-03	2.8E-01	2.8E-04
25	LPR-MOV-FT-1862B	5.3E-01	LPI-MDP-FR-A21HR	5.3E-01	1.0E-03	2.8E-01	2.8E-04

CONTRIBUTORS FOR
PLANT A

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

Plant A
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02:54 PM

TIRGALEX / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.8E-05

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	1.5E-03	2.1E-03	3.2E-06
2	HPI-CKV-FT-CV25	1.5E-03	1.4E-03	2.1E-06
3	HPI-CKV-FT-CV410	1.5E-03	1.4E-03	2.1E-06
4	OEP-DGN-FS-DG01	4.4E-03	2.3E-04	1.0E-06
5	OEP-DGN-FR-6HDG1	4.4E-03	2.1E-04	9.4E-07
6	ACC-CKV-FT-CV145	1.5E-03	5.0E-04	7.7E-07
7	ACC-CKV-FT-CV129	1.5E-03	5.0E-04	7.7E-07
8	ACC-CKV-FT-CV147	1.5E-03	5.0E-04	7.7E-07
9	ACC-CKV-FT-CV130	1.5E-03	5.0E-04	7.7E-07
10	AFW-TDP-FS-FW2	2.0E-02	2.9E-05	5.8E-07
11	OEP-DGN-FS-DG03	4.4E-03	1.3E-04	5.6E-07
12	OEP-DGN-FS-DG02	4.4E-03	1.3E-04	5.6E-07
13	OEP-DGN-FR-6HDG3	4.4E-03	1.2E-04	5.4E-07
14	OEP-DGN-FR-6HDG2	4.4E-03	1.1E-04	4.7E-07
15	LPI-MDP-FS	1.6E-03	2.2E-04	3.7E-07
16	HPI-MOV-FT	9.1E-04	3.4E-04	3.1E-07
17	AFW-TDP-FR-2P6HR	2.0E-02	1.1E-05	2.3E-07
18	OEP-DGN-FR-DG01	4.4E-03	3.8E-05	1.7E-07
19	LPR-MOV-FT	9.1E-04	1.3E-04	1.2E-07
20	CVC-MDP-FR-2A1HR	1.6E-03	6.7E-05	1.1E-07
21	OEP-DGN-FR-DG03	4.4E-03	2.0E-05	8.8E-08
22	OEP-DGN-FR-DG02	4.4E-03	2.0E-05	8.7E-08
23	OEP-CRB-FT-15H3	2.6E-04	2.4E-04	6.3E-08
24	HPI-MOV-FT-1350	9.1E-04	6.7E-05	6.1E-08
25	SIS-ACT-FA-SISB	2.8E-03	1.8E-05	4.9E-08

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 9.9E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	3.6E-03	2.0E-05	7.0E-08
2	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FS-DG02	4.4E-03	3.1E-03	2.0E-05	6.0E-08
3	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FS-DG03	4.4E-03	3.1E-03	2.0E-05	6.0E-08
4	SIS-ACT-FA-SISB	2.8E-03	SIS-ACT-FA-SISA	2.8E-03	6.5E-03	7.6E-06	4.9E-08
5	OEP-DGN-FS-DG03	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	2.0E-05	4.8E-08
6	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-6HDG2	4.4E-03	2.4E-03	2.0E-05	4.8E-08
7	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-6HDG3	4.4E-03	2.4E-03	2.0E-05	4.8E-08
8	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	2.0E-05	4.8E-08
9	OEP-DGN-FR-6HDG2	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	2.0E-05	4.8E-08
10	AFW-TDP-FS-FW2	2.0E-02	AFW-TDP-FS-U2FW2	2.0E-02	8.7E-05	4.0E-04	3.5E-08
11	OEP-DGN-FS-DG01	4.4E-03	AFW-TDP-FS-FW2	2.0E-02	2.6E-04	8.8E-05	2.3E-08
12	OEP-DGN-FR-6HDG1	4.4E-03	AFW-TDP-FS-FW2	2.0E-02	2.4E-04	8.8E-05	2.1E-08
13	AFW-TDP-FR-2P6HR	2.0E-02	AFW-TDP-FR-6HRU2	2.0E-02	3.4E-05	4.0E-04	1.4E-08
14	OEP-DGN-FR-DG01	4.4E-03	OEP-DGN-FR-DG03	4.4E-03	6.4E-04	2.0E-05	1.3E-08
15	OEP-DGN-FS-DG03	4.4E-03	AFW-TDP-FS-FW2	2.0E-02	1.4E-04	8.8E-05	1.2E-08
16	OEP-DGN-FS-DG02	4.4E-03	AFW-TDP-FS-FW2	2.0E-02	1.4E-04	8.8E-05	1.2E-08
17	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-DG02	4.4E-03	6.0E-04	2.0E-05	1.2E-08
18	OEP-DGN-FS-DG03	4.4E-03	OEP-DGN-FR-DG01	4.4E-03	6.0E-04	2.0E-05	1.2E-08
19	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-DG03	4.4E-03	6.0E-04	2.0E-05	1.2E-08
20	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FR-DG01	4.4E-03	6.0E-04	2.0E-05	1.2E-08
21	OEP-DGN-FR-6HDG3	4.4E-03	AFW-TDP-FS-FW2	2.0E-02	1.3E-04	8.8E-05	1.2E-08
22	RMT-ACT-FA-RMTSA	2.8E-03	RMT-ACT-FA-RMTSB	2.8E-03	1.5E-03	7.6E-06	1.1E-08
23	OEP-DGN-FR-DG02	4.4E-03	OEP-DGN-FR-DG01	4.4E-03	5.8E-04	2.0E-05	1.1E-08
24	OEP-DGN-FR-6HDG2	4.4E-03	AFW-TDP-FS-FW2	2.0E-02	1.2E-04	8.8E-05	1.1E-08
25	AFW-TDP-FR-2P6HR	2.0E-02	AFW-ACT-FA-PMP3A	2.8E-03	1.8E-04	5.5E-05	9.9E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 1 / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.1E-03

Rank	Component Name	Δql	S1	ΔC
1	HPI-CKV-FT-CV225	1.5E-01	2.1E-03	3.2E-04
2	HPI-CKV-FT-CV25	1.5E-01	1.4E-03	2.1E-04
3	HPI-CKV-FT-CV410	1.5E-01	1.4E-03	2.1E-04
4	ACC-CKV-FT-CV130	1.5E-01	5.0E-04	7.7E-05
5	ACC-CKV-FT-CV145	1.5E-01	5.0E-04	7.7E-05
6	ACC-CKV-FT-CV147	1.5E-01	5.0E-04	7.7E-05
7	ACC-CKV-FT-CV128	1.5E-01	5.0E-04	7.7E-05
8	LPI-MDP-FS	8.1E-03	2.2E-04	1.8E-06
9	OEP-DGN-FS-DG01	4.4E-03	2.3E-04	1.0E-06
10	OEP-DGN-FR-6HDG1	4.4E-03	2.1E-04	9.4E-07
11	AFW-CKV-FT-CV157	1.5E-01	5.4E-06	8.4E-07
12	AFW-CKV-FT-CV172	1.5E-01	5.4E-06	8.4E-07
13	MSS-CKV-FT-SGDHR	1.5E-01	4.1E-06	6.2E-07
14	AFW-TDP-FS-FW2	2.0E-02	2.9E-05	5.8E-07
15	OEP-DGN-FS-DG02	4.4E-03	1.3E-04	5.6E-07
16	OEP-DGN-FS-DG03	4.4E-03	1.3E-04	5.6E-07
17	CVC-MDP-FR-2A1HR	8.1E-03	6.7E-05	5.5E-07
18	OEP-DGN-FR-6HDG3	4.4E-03	1.2E-04	5.4E-07
19	OEP-DGN-FR-6HDG2	4.4E-03	1.1E-04	4.7E-07
20	AFW-TDP-FR-2P6HR	2.0E-02	1.1E-05	2.3E-07
21	AFW-MDP-FS	8.1E-03	2.6E-05	2.1E-07
22	LPI-MDP-FS-SI1B	8.1E-03	2.5E-05	2.0E-07
23	LPI-MDP-FS-SI1A	8.1E-03	2.5E-05	2.0E-07
24	OEP-DGN-FR-DG01	4.4E-03	3.8E-05	1.7E-07
25	AFW-MDP-FS-FW3A	8.1E-03	1.5E-05	1.3E-07

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 1 / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 2.8E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	AFW-TDP-FR-2P6HR	2.0E-02	AFW-CKV-FT-CV157	1.5E-01	1.8E-04	3.1E-03	5.5E-07
2	AFW-TDP-FR-2P6HR	2.0E-02	AFW-CKV-FT-CV172	1.5E-01	1.8E-04	3.1E-03	5.5E-07
3	LPI-MDP-FS-SI1B	8.1E-03	LPI-MDP-FS-SI1A	8.1E-03	1.5E-03	6.6E-05	9.9E-08
4	OEP-DGN-FR-6HDG3	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	3.6E-03	2.0E-05	7.0E-08
5	LPI-MDP-FS-SI1A	8.1E-03	LPI-MDP-FR-B21HR	8.1E-03	1.0E-03	6.6E-05	6.6E-08
6	LPI-MDP-FS-SI1B	8.1E-03	LPI-MDP-FR-A21HR	8.1E-03	1.0E-03	6.6E-05	6.6E-08
7	CPC-MDP-FS-SW10B	8.1E-03	CPC-MDP-FR-SWA3H	8.1E-03	1.0E-03	6.6E-05	6.6E-08
8	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FS-DG03	4.4E-03	3.1E-03	2.0E-05	6.0E-08
9	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FS-DG02	4.4E-03	3.1E-03	2.0E-05	6.0E-08
10	SIS-ACT-FA-SISB	2.8E-03	SIS-ACT-FA-SISA	2.8E-03	6.5E-03	7.6E-06	4.9E-08
11	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	2.0E-05	4.8E-08
12	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-6HDG3	4.4E-03	2.4E-03	2.0E-05	4.8E-08
13	OEP-DGN-FS-DG03	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	2.0E-05	4.8E-08
14	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-6HDG2	4.4E-03	2.4E-03	2.0E-05	4.8E-08
15	OEP-DGN-FR-6HDG2	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	2.0E-05	4.8E-08
16	AFW-TDP-FS-FW2	2.0E-02	AFW-MDP-FS	8.1E-03	2.2E-04	1.6E-04	3.6E-08
17	AFW-TDP-FS-FW2	2.0E-02	AFW-TDP-FS-U2FW2	2.0E-02	8.7E-05	4.0E-04	3.5E-08
18	LPI-MDP-FS-SI1A	8.1E-03	SIS-ACT-FA-SISB	2.8E-03	1.5E-03	2.2E-05	3.4E-08
19	LPI-MDP-FS-SI1B	8.1E-03	SIS-ACT-FA-SISA	2.8E-03	1.5E-03	2.2E-05	3.4E-08
20	LPI-MDP-FS-SI1A	8.1E-03	LPI-MDP-FR-B24HR	8.1E-03	5.0E-04	6.6E-05	3.3E-08
21	LPI-MDP-FS-SI1B	8.1E-03	LPI-MDP-FR-A24HR	8.1E-03	5.0E-04	6.6E-05	3.3E-08
22	AFW-TDP-FR-2P6HR	2.0E-02	AFW-MDP-FS-FW3B	8.1E-03	2.0E-04	1.6E-04	3.2E-08
23	AFW-TDP-FR-2P6HR	2.0E-02	AFW-MDP-FS-FW3A	8.1E-03	2.0E-04	1.6E-04	3.2E-08
24	AFW-TDP-FS-FW2	2.0E-02	AFW-MDP-FS-FW3B	8.1E-03	1.9E-04	1.6E-04	3.2E-08
25	AFW-TDP-FS-FW2	2.0E-02	AFW-MDP-FS-FW3A	8.1E-03	1.9E-04	1.6E-04	3.2E-08

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 2 / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 4.9E-05

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	6.1E-03	2.1E-03	1.3E-05
2	HPI-CKV-FT-CV25	6.1E-03	1.4E-03	8.4E-06
3	HPI-CKV-FT-CV410	6.1E-03	1.4E-03	8.4E-06
4	ACC-CKV-FT-CV130	6.1E-03	5.0E-04	3.0E-06
5	ACC-CKV-FT-CV145	6.1E-03	5.0E-04	3.0E-06
6	ACC-CKV-FT-CV147	6.1E-03	5.0E-04	3.0E-06
7	ACC-CKV-FT-CV128	6.1E-03	5.0E-04	3.0E-06
8	OEP-DGN-FS-DG01	4.9E-03	2.3E-04	1.1E-06
9	OEP-DGN-FR-6HDG1	4.9E-03	2.1E-04	1.0E-06
10	OEP-DGN-FS-DG02	4.9E-03	1.3E-04	6.2E-07
11	OEP-DGN-FS-DG03	4.9E-03	1.3E-04	6.2E-07
12	OEP-DGN-FR-6HDG3	4.9E-03	1.2E-04	6.0E-07
13	AFW-TDP-FS-FW2	2.0E-02	2.9E-05	5.8E-07
14	OEP-DGN-FR-6HDG2	4.9E-03	1.1E-04	5.3E-07
15	LPI-MDP-FS	2.2E-03	2.2E-04	5.0E-07
16	AFW-TDP-FR-2P6HR	2.0E-02	1.1E-05	2.3E-07
17	OEP-DGN-FR-DG01	4.9E-03	3.8E-05	1.9E-07
18	CVC-MDP-FR-2A1HR	2.2E-03	6.7E-05	1.5E-07
19	OEP-DGN-FR-DG03	4.9E-03	2.0E-05	9.8E-08
20	OEP-DGN-FR-DG02	4.9E-03	2.0E-05	9.7E-08
21	OEP-CRD-FT-15H3	2.6E-04	2.4E-04	6.3E-08
22	AFW-MDP-FS	2.2E-03	2.6E-05	5.9E-08
23	LPI-MDP-FS-SIIB	2.2E-03	2.5E-05	5.5E-08
24	LPI-MDP-FS-SIIA	2.2E-03	2.5E-05	5.5E-08
25	SIS-ACT-FA-SISB	2.8E-03	1.8E-05	4.9E-08

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 2 / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.2E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	4.9E-03	OEP-DGN-FR-6HDG1	4.9E-03	3.6E-03	2.4E-05	8.6E-08
2	OEP-DGN-FS-DG01	4.9E-03	OEP-DGN-FS-DG02	4.9E-03	3.1E-03	2.4E-05	7.4E-08
3	OEP-DGN-FS-DG01	4.9E-03	OEP-DGN-FS-DG03	4.9E-03	3.1E-03	2.4E-05	7.4E-08
4	OEP-DGN-FS-DG02	4.9E-03	OEP-DGN-FR-6HDG1	4.9E-03	2.4E-03	2.4E-05	5.9E-08
5	OEP-DGN-FS-DG01	4.9E-03	OEP-DGN-FR-6HDG3	4.9E-03	2.4E-03	2.4E-05	5.9E-08
6	OEP-DGN-FS-DG01	4.9E-03	OEP-DGN-FR-6HDG2	4.9E-03	2.4E-03	2.4E-05	5.9E-08
7	OEP-DGN-FS-DG03	4.9E-03	OEP-DGN-FR-6HDG1	4.9E-03	2.4E-03	2.4E-05	5.9E-08
8	OEP-DGN-FR-6HDG2	4.9E-03	OEP-DGN-FR-6HDG1	4.9E-03	2.4E-03	2.4E-05	5.9E-08
9	SIS-ACT-FA-SISB	2.8E-03	SIS-ACT-FA-SISA	2.8E-03	6.5E-03	7.6E-06	4.9E-08
10	AFW-TDP-FS-FW2	2.0E-02	AFW-TDP-FS-U2FW2	2.0E-02	8.7E-05	4.0E-04	3.5E-08
11	OEP-DGN-FS-DG01	4.9E-03	AFW-TDP-FS-FW2	2.0E-02	2.6E-04	9.8E-05	2.6E-08
12	OEP-DGN-FR-6HDG1	4.9E-03	AFW-TDP-FS-FW2	2.0E-02	2.4E-04	9.8E-05	2.3E-08
13	AFW-TDP-FR-2P6HR	2.0E-02	AFW-CKV-FT-CV172	6.1E-03	1.8E-04	1.2E-04	2.2E-08
14	AFW-TDP-FR-2P6HR	2.0E-02	AFW-CKV-FT-CV157	6.1E-03	1.8E-04	1.2E-04	2.2E-08
15	OEP-DGN-FR-DG01	4.9E-03	OEP-DGN-FR-DG03	4.9E-03	6.4E-04	2.4E-05	1.5E-08
16	OEP-DGN-FS-DG02	4.9E-03	OEP-DGN-FR-DG01	4.9E-03	6.0E-04	2.4E-05	1.5E-08
17	OEP-DGN-FS-DG03	4.9E-03	OEP-DGN-FR-DG01	4.9E-03	6.0E-04	2.4E-05	1.5E-08
18	OEP-DGN-FS-DG01	4.9E-03	OEP-DGN-FR-DG02	4.9E-03	6.0E-04	2.4E-05	1.5E-08
19	OEP-DGN-FS-DG01	4.9E-03	OEP-DGN-FR-DG03	4.9E-03	6.0E-04	2.4E-05	1.5E-08
20	OEP-DGN-FR-DG02	4.9E-03	OEP-DGN-FR-DG01	4.9E-03	5.8E-04	2.4E-05	1.4E-08
21	OEP-DGN-FS-DG01	4.9E-03	AFW-TDP-FS-FW2	2.0E-02	1.4E-04	9.8E-05	1.4E-08
22	OEP-DGN-FS-DG02	4.9E-03	AFW-TDP-FS-FW2	2.0E-02	1.4E-04	9.8E-05	1.4E-08
23	AFW-TDP-FR-2P6HR	2.0E-02	AFW-TDP-FR-6HRU2	2.0E-02	3.4E-05	4.0E-04	1.4E-08
24	OEP-DGN-FR-6HDG3	4.9E-03	AFW-TDP-FS-FW2	2.0E-02	1.3E-04	9.8E-05	1.3E-08
25	OEP-DGN-FR-6HDG2	4.9E-03	AFW-TDP-FS-FW2	2.0E-02	1.2E-04	9.8E-05	1.2E-08

EFFECTIVE OVERHAUL INTERVAL -- TIRGALEX

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TIRGALEX - MOD 3 / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 6.9E-03

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	1.0E+00	2.1E-03	2.1E-03
2	HPI-CKV-FT-CV25	1.0E+00	1.4E-03	1.4E-03
3	HPI-CKV-FT-CV410	1.0E+00	1.4E-03	1.4E-03
4	ACC-CKV-FT-CV145	1.0E+00	5.0E-04	5.0E-04
5	ACC-CKV-FT-CV128	1.0E+00	5.0E-04	5.0E-04
6	ACC-CKV-FT-CV147	1.0E+00	5.0E-04	5.0E-04
7	ACC-CKV-FT-CV130	1.0E+00	5.0E-04	5.0E-04
8	LPI-MDP-FS	7.4E-02	2.2E-04	1.7E-05
9	AFW-CKV-FT-CV172	1.0E+00	5.4E-06	5.4E-06
10	AFW-CKV-FT-CV157	1.0E+00	5.4E-06	5.4E-06
11	CVC-MDP-FR-2A1HR	7.4E-02	6.7E-05	5.0E-06
12	MSS-CKV-FT-SGDHR	1.0E+00	4.1E-06	4.1E-06
13	OEP-DGN-FS-DG01	1.2E-02	2.3E-04	2.9E-06
14	OEP-DGN-FR-6HDG1	1.2E-02	2.1E-04	2.6E-06
15	AFW-TDP-FS-FW2	7.4E-02	2.9E-05	2.1E-06
16	AFW-MDP-FS	7.4E-02	2.6E-05	2.0E-06
17	LPI-MDP-FS-SI1A	7.4E-02	2.5E-05	1.8E-06
18	LPI-MDP-FS-SI1B	7.4E-02	2.5E-05	1.8E-06
19	OEP-DGN-FS-DG03	1.2E-02	1.3E-04	1.5E-06
20	OEP-DGN-FS-DG02	1.2E-02	1.3E-04	1.5E-06
21	OEP-DGN-FR-6HDG3	1.2E-02	1.2E-04	1.5E-06
22	OEP-DGN-FR-6HDG2	1.2E-02	1.1E-04	1.3E-06
23	AFW-MDP-FS-FW3A	7.4E-02	1.5E-05	1.1E-06
24	AFW-MDP-FS-FW3B	7.4E-02	1.5E-05	1.1E-06
25	LPI-MDP-FR-B21HR	7.4E-02	1.3E-05	9.8E-07

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

Plant A
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03:05 PM

TIRGALEX – MOD 3 / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 7.9E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	AFW-TDP-FR-2P6HR	7.4E-02	AFW-CKV-FT-CV157	1.0E+00	1.8E-04	7.4E-02	1.3E-05
2	AFW-TDP-FR-2P6HR	7.4E-02	AFW-CKV-FT-CV172	1.0E+00	1.8E-04	7.4E-02	1.3E-05
3	LPI-MDP-FS-SI1B	7.4E-02	LPI-MDP-FS-SI1A	7.4E-02	1.5E-03	5.5E-03	8.2E-06
4	CPC-MDP-FS-SW10B	7.4E-02	CPC-MDP-FR-SWA3H	7.4E-02	1.0E-03	5.5E-03	5.5E-06
5	LPI-MDP-FS-SI1B	7.4E-02	LPI-MDP-FR-A21HR	7.4E-02	1.0E-03	5.5E-03	5.5E-06
6	LPI-MDP-FS-SI1A	7.4E-02	LPI-MDP-FR-B21HR	7.4E-02	1.0E-03	5.5E-03	5.5E-06
7	LPI-MDP-FS-SI1A	7.4E-02	LPI-MDP-FR-B24HR	7.4E-02	5.0E-04	5.5E-03	2.7E-06
8	LPI-MDP-FS-SI1B	7.4E-02	LPI-MDP-FR-A24HR	7.4E-02	5.0E-04	5.5E-03	2.7E-06
9	AFW-TDP-FS-FW2	7.4E-02	AFW-MDP-FS	7.4E-02	2.2E-04	5.5E-03	1.2E-06
10	AFW-MDP-FS-FW3B	7.4E-02	AFW-MDP-FS-FW3A	7.4E-02	2.2E-04	5.5E-03	1.2E-06
11	AFW-TDP-FR-2P6HR	7.4E-02	AFW-MDP-FS-FW3A	7.4E-02	2.0E-04	5.5E-03	1.1E-06
12	AFW-TDP-FR-2P6HR	7.4E-02	AFW-MDP-FS-FW3B	7.4E-02	2.0E-04	5.5E-03	1.1E-06
13	AFW-TDP-FS-FW2	7.4E-02	AFW-MDP-FS-FW3A	7.4E-02	1.9E-04	5.5E-03	1.1E-06
14	AFW-TDP-FS-FW2	7.4E-02	AFW-MDP-FS-FW3B	7.4E-02	1.9E-04	5.5E-03	1.1E-06
15	AFW-TDP-FS-FW2	7.4E-02	AFW-MDP-FR-3A6HR	7.4E-02	1.8E-04	5.5E-03	9.8E-07
16	AFW-TDP-FR-2P6HR	7.4E-02	AFW-MDP-FR-3B6HR	7.4E-02	1.8E-04	5.5E-03	9.8E-07
17	AFW-TDP-FS-FW2	7.4E-02	AFW-MDP-FR-3B6HR	7.4E-02	1.8E-04	5.5E-03	9.8E-07
18	AFW-TDP-FR-2P6HR	7.4E-02	AFW-MDP-FR-3A6HR	7.4E-02	1.8E-04	5.5E-03	9.8E-07
19	AFW-TDP-FR-2P6HR	7.4E-02	AFW-MDP-FS	7.4E-02	1.7E-04	5.5E-03	9.6E-07
20	AFW-TDP-FR-2P24H	7.4E-02	AFW-MDP-FS	7.4E-02	1.4E-04	5.5E-03	7.5E-07
21	OEP-DGN-FR-6HDG3	1.2E-02	OEP-DGN-FR-6HDG1	1.2E-02	3.6E-03	1.5E-04	5.4E-07
22	AFW-TDP-FS-FW2	7.4E-02	AFW-TDP-FS-U2FW2	7.4E-02	8.7E-05	5.5E-03	4.8E-07
23	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FS-DG03	1.2E-02	3.1E-03	1.5E-04	4.7E-07
24	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FS-DG02	1.2E-02	3.1E-03	1.5E-04	4.7E-07
25	OEP-DGN-FS-DG01	1.2E-02	OEP-DGN-FR-6HDG3	1.2E-02	2.4E-03	1.5E-04	3.7E-07

CONTRIBUTORS FOR
PLANT A

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
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TIRGALEX / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.7E-06

Rank	Component Name	Δq1	S1	ΔC
1	HPI-MOV-FT	9.9E-04	3.4E-04	3.4E-07
2	OEP-DGN-FS-DG01	9.9E-04	2.3E-04	2.3E-07
3	OEP-DGN-FR-6HDG1	9.9E-04	2.1E-04	2.1E-07
4	LPR-MOV-FT	9.9E-04	1.3E-04	1.3E-07
5	OEP-DGN-FS-DG02	9.9E-04	1.3E-04	1.2E-07
6	OEP-DGN-FS-DG03	9.9E-04	1.3E-04	1.2E-07
7	OEP-DGN-FR-6HDG3	9.9E-04	1.2E-04	1.2E-07
8	OEP-DGN-FR-6HDG2	9.9E-04	1.1E-04	1.1E-07
9	HPI-MOV-FT-1350	9.9E-04	6.7E-05	6.6E-08
10	OEP-DGN-FR-DG01	9.9E-04	3.8E-05	3.7E-08
11	AFW-TDP-FS-FW2	7.4E-04	2.9E-05	2.1E-08
12	LPR-MOV-FT-1862A	9.9E-04	2.1E-05	2.1E-08
13	LPR-MOV-FT-1862B	9.9E-04	2.1E-05	2.1E-08
14	LPR-MOV-FT-1860B	9.9E-04	2.1E-05	2.0E-08
15	LPR-MOV-FT-1860A	9.9E-04	2.1E-05	2.0E-08
16	OEP-DGN-FR-DG03	9.9E-04	2.0E-05	2.0E-08
17	OEP-DGN-FR-DG02	9.9E-04	2.0E-05	1.9E-08
18	LPI-MDP-FS	6.0E-05	2.2E-04	1.4E-08
19	PPS-MOV-FT-1535	9.9E-04	9.5E-06	9.3E-09
20	AFW-TDP-FR-2P6HR	7.4E-04	1.1E-05	8.4E-09
21	LPR-MOV-FT-1890B	9.9E-04	4.5E-06	4.4E-09
22	LPR-MOV-FT-1890A	9.9E-04	4.5E-06	4.4E-09
23	CVC-MDP-FR-2A1HR	6.0E-05	6.7E-05	4.1E-09
24	HPI-MOV-FT-1115E	9.9E-04	4.1E-06	4.1E-09
25	HPI-MOV-FT-1115B	9.9E-04	4.1E-06	4.1E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
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04:44 PM

TIRGALEX / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 3.8E-08

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	3.6E-03	9.7E-07	3.5E-09
2	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FS-DG03	9.9E-04	3.1E-03	9.7E-07	3.0E-09
3	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FS-DG02	9.9E-04	3.1E-03	9.7E-07	3.0E-09
4	OEP-DGN-FS-DG03	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	2.4E-03	9.7E-07	2.4E-09
5	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-6HDG2	9.9E-04	2.4E-03	9.7E-07	2.4E-09
6	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	2.4E-03	9.7E-07	2.4E-09
7	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-6HDG3	9.9E-04	2.4E-03	9.7E-07	2.4E-09
8	OEP-DGN-FR-6HDG2	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	2.4E-03	9.7E-07	2.4E-09
9	LPR-MOV-FT-1862B	9.9E-04	LPR-MOV-FT-1860A	9.9E-04	1.5E-03	9.7E-07	1.5E-09
10	LPR-MOV-FT-1862A	9.9E-04	LPR-MOV-FT-1862B	9.9E-04	1.5E-03	9.7E-07	1.5E-09
11	LPR-MOV-FT-1862A	9.9E-04	LPR-MOV-FT-1860B	9.9E-04	1.5E-03	9.7E-07	1.5E-09
12	LPR-MOV-FT-1860A	9.9E-04	LPR-MOV-FT-1860B	9.9E-04	1.5E-03	9.7E-07	1.5E-09
13	LPR-MOV-FT-1890B	9.9E-04	LPR-MOV-FT-1890A	9.9E-04	1.5E-03	9.7E-07	1.5E-09
14	HPI-MOV-FT-1115B	9.9E-04	HPI-MOV-FT-1115D	9.9E-04	1.4E-03	9.7E-07	1.3E-09
15	HPI-MOV-FT-1115C	9.9E-04	HPI-MOV-FT-1115E	9.9E-04	1.4E-03	9.7E-07	1.3E-09
16	OEP-DGN-FR-DG01	9.9E-04	OEP-DGN-FR-DG03	9.9E-04	6.4E-04	9.7E-07	6.2E-10
17	OEP-DGN-FS-DG03	9.9E-04	OEP-DGN-FR-DG01	9.9E-04	6.0E-04	9.7E-07	5.9E-10
18	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FR-DG01	9.9E-04	6.0E-04	9.7E-07	5.9E-10
19	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-DG02	9.9E-04	6.0E-04	9.7E-07	5.9E-10
20	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-DG03	9.9E-04	6.0E-04	9.7E-07	5.9E-10
21	OEP-DGN-FR-DG02	9.9E-04	OEP-DGN-FR-DG01	9.9E-04	5.8E-04	9.7E-07	5.6E-10
22	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FS-DG03	9.9E-04	2.2E-04	9.7E-07	2.1E-10
23	OEP-DGN-FR-6HDG3	9.9E-04	OEP-DGN-FR-6HDG2	9.9E-04	2.0E-04	9.7E-07	1.9E-10
24	OEP-DGN-FS-DG01	9.9E-04	AFW-TDP-FS-PW2	7.4E-04	2.6E-04	7.3E-07	1.9E-10
25	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FR-6HDG3	9.9E-04	1.9E-04	9.7E-07	1.9E-10

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
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TIPGALEX - MOD 1 / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.1E-06

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	9.9E-04	2.3E-04	2.3E-07
2	HPI-CKV-FT-CV225	1.0E-04	2.1E-03	2.2E-07
3	OEP-DGN-FR-6HDG1	9.9E-04	2.1E-04	2.1E-07
4	HPI-CKV-FT-CV410	1.0E-04	1.4E-03	1.4E-07
5	HPI-CKV-FT-CV25	1.0E-04	1.4E-03	1.4E-07
6	OEP-DGN-FS-DG03	9.9E-04	1.3E-04	1.2E-07
7	OEP-DGN-FS-DG02	9.9E-04	1.3E-04	1.2E-07
8	OEP-DGN-FR-6HDG3	9.9E-04	1.2E-04	1.2E-07
9	HPI-MOV-FT	3.3E-04	3.4E-04	1.1E-07
10	OEP-DGN-FR-6HDG2	9.9E-04	1.1E-04	1.1E-07
11	LPI-MDP-FS	3.0E-04	2.2E-04	6.8E-08
12	ACC-CKV-FT-CV128	1.0E-04	5.0E-04	5.2E-08
13	ACC-CKV-FT-CV145	1.0E-04	5.0E-04	5.2E-08
14	ACC-CKV-FT-CV130	1.0E-04	5.0E-04	5.2E-08
15	ACC-CKV-FT-CV147	1.0E-04	5.0E-04	5.2E-08
16	LPR-MOV-FT	3.3E-04	1.3E-04	4.3E-08
17	OEP-DGN-FR-DG01	9.9E-04	3.8E-05	3.7E-08
18	HPI-MOV-FT-1350	3.3E-04	6.7E-05	2.2E-08
19	AFW-TDP-FS-FW2	7.4E-04	2.9E-05	2.1E-08
20	CVC-MDP-FR-2A1HR	3.0E-04	6.7E-05	2.0E-08
21	OEP-DGN-FR-DG03	9.9E-04	2.0E-05	2.0E-08
22	OEP-DGN-FR-DG02	9.9E-04	2.0E-05	1.9E-08
23	AFW-TDP-FR-2P6HR	7.4E-04	1.1E-05	8.4E-09
24	AFW-MDP-FS	3.0E-04	2.6E-05	7.9E-09
25	LPI-MDP-FS-S1B	3.0E-04	2.5E-05	7.4E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
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TIRGALEX - MOD 1 / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 3.1E-08

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	3.6E-03	9.7E-07	3.5E-09
2	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FS-DG02	9.9E-04	3.1E-03	9.7E-07	3.0E-09
3	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FS-DG03	9.9E-04	3.1E-03	9.7E-07	3.0E-09
4	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-6HDG3	9.9E-04	2.4E-03	9.7E-07	2.4E-09
5	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-6HDG2	9.9E-04	2.4E-03	9.7E-07	2.4E-09
6	OEP-DGN-FS-DG03	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	2.4E-03	9.7E-07	2.4E-09
7	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	2.4E-03	9.7E-07	2.4E-09
8	OEP-DGN-FR-6HDG2	9.9E-04	OEP-DGN-FR-6HDG1	9.9E-04	2.4E-03	9.7E-07	2.4E-09
9	OEP-DGN-FR-DG01	9.9E-04	OEP-DGN-FR-DG03	9.9E-04	6.4E-04	9.7E-07	6.2E-10
10	OEP-DGN-FS-DG03	9.9E-04	OEP-DGN-FR-DG01	9.9E-04	6.0E-04	9.7E-07	5.9E-10
11	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-DG02	9.9E-04	6.0E-04	9.7E-07	5.9E-10
12	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FR-DG01	9.9E-04	6.0E-04	9.7E-07	5.9E-10
13	OEP-DGN-FS-DG01	9.9E-04	OEP-DGN-FR-DG03	9.9E-04	6.0E-04	9.7E-07	5.9E-10
14	OEP-DGN-FR-DG02	9.9E-04	OEP-DGN-FR-DG01	9.9E-04	5.8E-04	9.7E-07	5.6E-10
15	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FS-DG03	9.9E-04	2.2E-04	9.7E-07	2.1E-10
16	OEP-DGN-FR-6HDG3	9.9E-04	OEP-DGN-FR-6HDG2	9.9E-04	2.0E-04	9.7E-07	1.9E-10
17	OEP-DGN-FS-DG01	9.9E-04	AFW-TDP-FS-FW2	7.4E-04	2.6E-04	7.3E-07	1.9E-10
18	OEP-DGN-FS-DG02	9.9E-04	OEP-DGN-FR-6HDG3	9.9E-04	1.9E-04	9.7E-07	1.9E-10
19	OEP-DGN-FS-DG03	9.9E-04	OEP-DGN-FR-6HDG2	9.9E-04	1.9E-04	9.7E-07	1.9E-10
20	OEP-DGN-FR-6HDG1	9.9E-04	AFW-TDP-FS-FW2	7.4E-04	2.4E-04	7.3E-07	1.7E-10
21	LPR-MOV-FT-1862A	3.3E-04	LPR-MOV-FT-1862B	3.3E-04	1.5E-03	1.1E-07	1.6E-10
22	LPR-MOV-FT-1862A	3.3E-04	LPR-MOV-FT-1860B	3.3E-04	1.5E-03	1.1E-07	1.6E-10
23	LPR-MOV-FT-1862B	3.3E-04	LPR-MOV-FT-1860A	3.3E-04	1.5E-03	1.1E-07	1.6E-10
24	LPR-MOV-FT-1890B	3.3E-04	LPR-MOV-FT-1890A	3.3E-04	1.5E-03	1.1E-07	1.6E-10
25	LPR-MOV-FT-1860A	3.3E-04	LPR-MOV-FT-1860B	3.3E-04	1.5E-03	1.1E-07	1.6E-10

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
23-Oct-89
09:16 AM

TIRGALEX – MOD 2 / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.3E-06

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	1.1E-03	2.3E-04	2.6E-07
2	OEP-DGN-FR-6HDG1	1.1E-03	2.1E-04	2.3E-07
3	OEP-DGN-FS-DG03	1.1E-03	1.3E-04	1.4E-07
4	OEP-DGN-FS-DG02	1.1E-03	1.3E-04	1.4E-07
5	OEP-DGN-FR-6HDG3	1.1E-03	1.2E-04	1.3E-07
6	OEP-DGN-FR-6HDG2	1.1E-03	1.1E-04	1.2E-07
7	OEP-DGN-FR-DG01	1.1E-03	3.8E-05	4.1E-08
8	HPI-MOV-FT	1.1E-04	3.4E-04	3.7E-08
9	OEP-DGN-FR-DG03	1.1E-03	2.0E-05	2.2E-08
10	OEP-DGN-FR-DG02	1.1E-03	2.0E-05	2.2E-08
11	AFW-TDP-FS-FW2	7.4E-04	2.9E-05	2.1E-08
12	LPI-MDP-FS	8.2E-05	2.2E-04	1.8E-08
13	LPR-MOV-FT	1.1E-04	1.3E-04	1.4E-08
14	HPI-CKV-FT-CV225	4.1E-06	2.1E-03	8.6E-09
15	AFW-TDP-FR-2P6HR	7.4E-04	1.1E-05	8.4E-09
16	HPI-MOV-FT-1350	1.1E-04	6.7E-05	7.4E-09
17	HPI-CKV-FT-CV410	4.1E-06	1.4E-03	5.7E-09
18	HPI-CKV-FT-CV25	4.1E-06	1.4E-03	5.7E-09
19	CVC-MDP-FR-2A1HR	8.2E-05	6.7E-05	5.5E-09
20	LPR-MOV-FT-1862B	1.1E-04	2.1E-05	2.3E-09
21	LPR-MOV-FT-1862A	1.1E-04	2.1E-05	2.3E-09
22	LPR-MOV-FT-1860B	1.1E-04	2.1E-05	2.3E-09
23	LPR-MOV-FT-1860A	1.1E-04	2.1E-05	2.3E-09
24	AFW-MDP-FS	8.2E-05	2.6E-05	2.2E-09
25	ACC-CKV-FT-CV145	4.1E-06	5.0E-04	2.0E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

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TIRGALEX - MOD 2 / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC 3.4E-08

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	1.1E-03	OEP-DGN-FR-6HDG1	1.1E-03	3.6E-03	1.2E-06	4.3E-09
2	OEP-DGN-FS-DG01	1.1E-03	OEP-DGN-FS-DG03	1.1E-03	3.1E-03	1.2E-06	3.7E-09
3	OEP-DGN-FS-DG01	1.1E-03	OEP-DGN-FS-DG02	1.1E-03	3.1E-03	1.2E-06	3.7E-09
4	OEP-DGN-FS-DG02	1.1E-03	OEP-DGN-FR-6HDG1	1.1E-03	2.4E-03	1.2E-06	2.9E-09
5	OEP-DGN-FS-DG01	1.1E-03	OEP-DGN-FR-6HDG2	1.1E-03	2.4E-03	1.2E-06	2.9E-09
6	OEP-DGN-FS-DG01	1.1E-03	OEP-DGN-FR-6HDG3	1.1E-03	2.4E-03	1.2E-06	2.9E-09
7	OEP-DGN-FS-DG03	1.1E-03	OEP-DGN-FR-6HDG1	1.1E-03	2.4E-03	1.2E-06	2.9E-09
8	OEP-DGN-FR-6HDG2	1.1E-03	OEP-DGN-FR-6HDG1	1.1E-03	2.4E-03	1.2E-06	2.9E-09
9	OEP-DGN-FR-DG01	1.1E-03	OEP-DGN-FR-DG03	1.1E-03	6.4E-04	1.2E-06	7.7E-10
10	OEP-DGN-FS-DG03	1.1E-03	OEP-DGN-FR-DG01	1.1E-03	6.0E-04	1.2E-06	7.2E-10
11	OEP-DGN-FS-DG01	1.1E-03	OEP-DGN-FR-DG03	1.1E-03	6.0E-04	1.2E-06	7.2E-10
12	OEP-DGN-FS-DG01	1.1E-03	OEP-DGN-FR-DG02	1.1E-03	6.0E-04	1.2E-06	7.2E-10
13	OEP-DGN-FS-DG02	1.1E-03	OEP-DGN-FR-DG01	1.1E-03	6.0E-04	1.2E-06	7.2E-10
14	OEP-DGN-FR-DG02	1.1E-03	OEP-DGN-FR-DG01	1.1E-03	5.8E-04	1.2E-06	6.9E-10
15	OEP-DGN-FS-DG02	1.1E-03	OEP-DGN-FS-DG03	1.1E-03	2.2E-04	1.2E-06	2.6E-10
16	OEP-DGN-FR-6HDG3	1.1E-03	OEP-DGN-FR-6HDG2	1.1E-03	2.0E-04	1.2E-06	2.4E-10
17	OEP-DGN-FS-DG03	1.1E-03	OEP-DGN-FR-6HDG2	1.1E-03	1.9E-04	1.2E-06	2.3E-10
18	OEP-DGN-FS-DG02	1.1E-03	OEP-DGN-FR-6HDG3	1.1E-03	1.9E-04	1.2E-06	2.3E-10
19	OEP-DGN-FS-DG01	1.1E-03	AFW-TDP-FS-FW2	7.4E-04	2.6E-04	8.1E-07	2.1E-10
20	OEP-DGN-FR-6HDG1	1.1E-03	AFW-TDP-FS-FW2	7.4E-04	2.4E-04	8.1E-07	1.9E-10
21	OEP-DGN-FS-DG02	1.1E-03	AFW-TDP-FS-FW2	7.4E-04	1.4E-04	8.1E-07	1.1E-10
22	OEP-DGN-FS-DG03	1.1E-03	AFW-TDP-FS-FW2	7.4E-04	1.4E-04	8.1E-07	1.1E-10
23	OEP-DGN-FR-6HDG3	1.1E-03	AFW-TDP-FS-FW2	7.4E-04	1.3E-04	8.1E-07	1.1E-10
24	OEP-DGN-FR-6HDG2	1.1E-03	AFW-TDP-FS-FW2	7.4E-04	1.2E-04	8.1E-07	1.0E-10
25	OEP-DGN-FS-DG01	1.1E-03	AFW-TDP-FR-2P6HR	7.4E-04	9.5E-05	8.1E-07	7.7E-11

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

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TIRGALEX – MOD 3 / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.5E-05

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	2.7E-03	2.1E-03	5.7E-06
2	HPI-CKV-FT-CV25	2.7E-03	1.4E-03	3.8E-06
3	HPI-CKV-FT-CV410	2.7E-03	1.4E-03	3.8E-06
4	ACC-CKV-FT-CV145	2.7E-03	5.0E-04	1.4E-06
5	ACC-CKV-FT-CV147	2.7E-03	5.0E-04	1.4E-06
6	ACC-CKV-FT-CV130	2.7E-03	5.0E-04	1.4E-06
7	ACC-CKV-FT-CV128	2.7E-03	5.0E-04	1.4E-06
8	HPI-MOV-FT	2.7E-03	3.4E-04	9.3E-07
9	OEP-DGN-FS-DG01	2.7E-03	2.3E-04	6.4E-07
10	LPI-MDP-FS	2.7E-03	2.2E-04	6.2E-07
11	OEP-DGN-FR-6HDG1	2.7E-03	2.1E-04	5.8E-07
12	LPR-MOV-FT	2.7E-03	1.3E-04	3.6E-07
13	OEP-DGN-FS-DG03	2.7E-03	1.3E-04	3.4E-07
14	OEP-DGN-FS-DG02	2.7E-03	1.3E-04	3.4E-07
15	OEP-DGN-FR-6HDG3	2.7E-03	1.2E-04	3.3E-07
16	OEP-DGN-FR-6HDG2	2.7E-03	1.1E-04	2.9E-07
17	HPI-MOV-FT-1350	2.7E-03	6.7E-05	1.8E-07
18	CVC-MDP-FR-2A1HR	2.7E-03	6.7E-05	1.8E-07
19	OEP-DGN-FR-DG01	2.7E-03	3.8E-05	1.0E-07
20	AFW-TDP-FS-FW2	2.7E-03	2.9E-05	7.9E-08
21	AFW-MDP-FS	2.7E-03	2.6E-05	7.2E-08
22	LPI-MDP-FS-SI1B	2.7E-03	2.5E-05	6.8E-08
23	LPI-MDP-FS-SI1A	2.7E-03	2.5E-05	6.8E-08
24	LPR-MOV-FT-1862B	2.7E-03	2.1E-05	5.7E-08
25	LPR-MOV-FT-1862A	2.7E-03	2.1E-05	5.7E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

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TIRGALEX - MOD 3 / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 4.4E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	2.7E-03	OEP-DGN-FR-6HDG1	2.7E-03	3.6E-03	7.5E-06	2.7E-08
2	OEP-DGN-FS-DG01	2.7E-03	OEP-DGN-FS-DG02	2.7E-03	3.1E-03	7.5E-06	2.3E-08
3	OEP-DGN-FS-DG01	2.7E-03	OEP-DGN-FS-DG03	2.7E-03	3.1E-03	7.5E-06	2.3E-08
4	OEP-DGN-FS-DG01	2.7E-03	OEP-DGN-FR-6HDG3	2.7E-03	2.4E-03	7.5E-06	1.8E-08
5	OEP-DGN-FS-DG02	2.7E-03	OEP-DGN-FR-6HDG1	2.7E-03	2.4E-03	7.5E-06	1.8E-08
6	OEP-DGN-FS-DG01	2.7E-03	OEP-DGN-FR-6HDG2	2.7E-03	2.4E-03	7.5E-06	1.8E-08
7	OEP-DGN-FS-DG03	2.7E-03	OEP-DGN-FR-6HDG1	2.7E-03	2.4E-03	7.5E-06	1.8E-08
8	OEP-DGN-FR-6HDG2	2.7E-03	OEP-DGN-FR-6HDG1	2.7E-03	2.4E-03	7.5E-06	1.8E-08
9	LPR-MOV-FT-1862A	2.7E-03	LPR-MOV-FT-1860B	2.7E-03	1.5E-03	7.5E-06	1.1E-08
10	LPR-MOV-FT-1862A	2.7E-03	LPI-MDP-FS-SI1B	2.7E-03	1.5E-03	7.5E-06	1.1E-08
11	LPI-MDP-FS-SI1B	2.7E-03	LPI-MDP-FS-SI1A	2.7E-03	1.5E-03	7.5E-06	1.1E-08
12	LPR-MOV-FT-1862B	2.7E-03	LPI-MDP-FS-SI1A	2.7E-03	1.5E-03	7.5E-06	1.1E-08
13	LPR-MOV-FT-1890B	2.7E-03	LPR-MOV-FT-1890A	2.7E-03	1.5E-03	7.5E-06	1.1E-08
14	LPR-MOV-FT-1862B	2.7E-03	LPR-MOV-FT-1860A	2.7E-03	1.5E-03	7.5E-06	1.1E-08
15	LPR-MOV-FT-1860A	2.7E-03	LPI-MDP-FS-SI1B	2.7E-03	1.5E-03	7.5E-06	1.1E-08
16	LPR-MOV-FT-1860A	2.7E-03	LPR-MOV-FT-1860B	2.7E-03	1.5E-03	7.5E-06	1.1E-08
17	LPR-MOV-FT-1862A	2.7E-03	LPR-MOV-FT-1862B	2.7E-03	1.5E-03	7.5E-06	1.1E-08
18	LPI-MDP-FS-SI1A	2.7E-03	LPR-MOV-FT-1860B	2.7E-03	1.5E-03	7.5E-06	1.1E-08
19	HPI-MOV-FT-1115B	2.7E-03	HPI-MOV-FT-1115D	2.7E-03	1.4E-03	7.5E-06	1.0E-08
20	HPI-MOV-FT-1115C	2.7E-03	HPI-MOV-FT-1115E	2.7E-03	1.4E-03	7.5E-06	1.0E-08
21	CPC-MDP-FS-SW10B	2.7E-03	CPC-MDP-FR-SWA3H	2.7E-03	1.0E-03	7.5E-06	7.5E-09
22	LPI-MDP-FS-SI1B	2.7E-03	LPI-MDP-FR-A21HR	2.7E-03	1.0E-03	7.5E-06	7.5E-09
23	LPR-MOV-FT-1860B	2.7E-03	LPI-MDP-FR-A21HR	2.7E-03	1.0E-03	7.5E-06	7.5E-09
24	LPR-MOV-FT-1862A	2.7E-03	LPI-MDP-FR-B21HR	2.7E-03	1.0E-03	7.5E-06	7.5E-09
25	LPR-MOV-FT-1862B	2.7E-03	LPI-MDP-FR-A21HR	2.7E-03	1.0E-03	7.5E-06	7.5E-09

CONTRIBUTORS FOR
PLANT A

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

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TIRGALEX / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total AC = 6.9E-06

Rank	Component Name	Aql	RI	AC
1	HPI-MOV-FT	3.9E-03	3.4E-04	1.3E-06
2	OEP-DGN-FS-DG01	3.9E-03	2.3E-04	9.2E-07
3	OEP-DGN-FR-6HDG1	3.9E-03	2.1E-04	8.4E-07
4	LPR-MOV-FT	3.9E-03	1.3E-04	5.2E-07
5	OEP-DGN-FS-DG02	3.9E-03	1.3E-04	5.0E-07
6	OEP-DGN-FS-DG03	3.9E-03	1.3E-04	5.0E-07
7	OEP-DGN-FR-6HDG3	3.9E-03	1.2E-04	4.8E-07
8	OEP-DGN-FR-6HDG2	3.9E-03	1.1E-04	4.2E-07
9	HPI-MOV-FT-1350	3.9E-03	6.7E-05	2.7E-07
10	OEP-DGN-FR-DG01	3.9E-03	3.8E-05	1.5E-07
11	AFW-TDP-FS-FW2	3.0E-03	2.9E-05	8.6E-08
12	LPR-MOV-FT-1862A	3.9E-03	2.1E-05	8.2E-08
13	LPR-MOV-FT-1862B	3.9E-03	2.1E-05	8.2E-08
14	LPR-MOV-FT-1860B	3.9E-03	2.1E-05	8.2E-08
15	LPR-MOV-FT-1860A	3.9E-03	2.1E-05	8.2E-08
16	OEP-DGN-FR-DG03	3.9E-03	2.0E-05	7.8E-08
17	OEP-DGN-FR-DG02	3.9E-03	2.0E-05	7.8E-08
18	LPI-MDP-FR	2.4E-04	2.2E-04	5.4E-08
19	PPS-MOV-FT-1919	3.9E-03	9.5E-06	3.7E-08
20	AFW-TDP-FR-3P6[illegible]	[illegible]	1.1E-05	3.4E-08
21	LPR-MOV-FT-1860B	[illegible]	[illegible]	[illegible]
22	LPR-MOV-FT-1862A	[illegible]	[illegible]	[illegible]
23	CVC-MDP-FR-2A[illegible]	[illegible]	[illegible]	[illegible]
24	HPI-MOV-FT-[illegible]	[illegible]	[illegible]	[illegible]
25	HPI-MOV-FT-[illegible]	[illegible]	[illegible]	[illegible]

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

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TIRGALEX / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 6.1E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	3.6E-03	1.6E-05	5.6E-08
2	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FS-DG03	3.9E-03	3.1E-03	1.6E-05	4.8E-08
3	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FS-DG02	3.9E-03	3.1E-03	1.6E-05	4.8E-08
4	OEP-DGN-FS-DG03	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	2.4E-03	1.6E-05	3.8E-08
5	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-6HDG2	3.9E-03	2.4E-03	1.6E-05	3.8E-08
6	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	2.4E-03	1.6E-05	3.8E-08
7	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-6HDG3	3.9E-03	2.4E-03	1.6E-05	3.8E-08
8	OEP-DGN-FR-6HDG2	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	2.4E-03	1.6E-05	3.8E-08
9	LPR-MOV-FT-1862B	3.9E-03	LPR-MOV-FT-1860A	3.9E-03	1.5E-03	1.6E-05	2.3E-08
10	LPR-MOV-FT-1862A	3.9E-03	LPR-MOV-FT-1862B	3.9E-03	1.5E-03	1.6E-05	2.3E-08
11	LPR-MOV-FT-1862A	3.9E-03	LPR-MOV-FT-1860B	3.9E-03	1.5E-03	1.6E-05	2.3E-08
12	LPR-MOV-FT-1860A	3.9E-03	LPR-MOV-FT-1860B	3.9E-03	1.5E-03	1.6E-05	2.3E-08
13	LPR-MOV-FT-1890B	3.9E-03	LPR-MOV-FT-1890A	3.9E-03	1.5E-03	1.6E-05	2.3E-08
14	HPI-MOV-FT-1115B	3.9E-03	HPI-MOV-FT-1115D	3.9E-03	1.4E-03	1.6E-05	2.1E-08
15	HPI-MOV-FT-1115C	3.9E-03	HPI-MOV-FT-1115E	3.9E-03	1.4E-03	1.6E-05	2.1E-08
16	OEP-DGN-FR-DG01	3.9E-03	OEP-DGN-FR-DG03	3.9E-03	6.4E-04	1.6E-05	1.0E-08
17	OEP-DGN-FS-DG03	3.9E-03	OEP-DGN-FR-DG01	3.9E-03	6.0E-04	1.6E-05	9.4E-09
18	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FR-DG01	3.9E-03	6.0E-04	1.6E-05	9.4E-09
19	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-DG02	3.9E-03	6.0E-04	1.6E-05	9.4E-09
20	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-DG03	3.9E-03	6.0E-04	1.6E-05	9.4E-09
21	OEP-DGN-FR-DG02	3.9E-03	OEP-DGN-FR-DG01	3.9E-03	5.8E-04	1.6E-05	9.0E-09
22	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FS-DG03	3.9E-03	2.2E-04	1.6E-05	3.4E-09
23	OEP-DGN-FR-6HDG3	3.9E-03	OEP-DGN-FR-6HDG2	3.9E-03	2.0E-04	1.6E-05	3.1E-09
24	OEP-DGN-FS-DG01	3.9E-03	AFW-TDP-FS-FW2	3.0E-03	2.6E-04	1.2E-05	3.0E-09
25	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FR-6HDG3	3.9E-03	1.9E-04	1.6E-05	3.0E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
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TIRGALEX - MOD 1 / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 8.5E-06

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	3.9E-03	2.3E-04	9.2E-07
2	HPI-CKV-FT-CV225	4.2E-04	2.1E-03	8.7E-07
3	OEP-DGN-FR-6HDG1	3.9E-03	2.1E-04	8.4E-07
4	HPI-CKV-FT-CV410	4.2E-04	1.4E-03	5.8E-07
5	HPI-CKV-FT-CV25	4.2E-04	1.4E-03	5.8E-07
6	OEP-DGN-FS-DG03	3.9E-03	1.3E-04	5.0E-07
7	OEP-DGN-FS-DG02	3.9E-03	1.3E-04	5.0E-07
8	OEP-DGN-FR-6HDG3	3.9E-03	1.2E-04	4.8E-07
9	HPI-MOV-FT	1.3E-03	3.4E-04	4.5E-07
10	OEP-DGN-FR-6HDG2	3.9E-03	1.1E-04	4.2E-07
11	LPI-MDP-FS	1.2E-03	2.2E-04	2.7E-07
12	ACC-CKV-FT-CV128	4.2E-04	5.0E-04	2.1E-07
13	ACC-CKV-FT-CV145	4.2E-04	5.0E-04	2.1E-07
14	ACC-CKV-FT-CV130	4.2E-04	5.0E-04	2.1E-07
15	ACC-CKV-FT-CV147	4.2E-04	5.0E-04	2.1E-07
16	LPR-MOV-FT	1.3E-03	1.3E-04	1.7E-07
17	OEP-DGN-FR-DG01	3.9E-03	3.8E-05	1.5E-07
18	HPI-MOV-FT-1350	1.3E-03	6.7E-05	8.8E-08
19	AFW-TDP-FS-FW2	3.0E-03	2.9E-05	8.6E-08
20	CVC-MDP-FR-2A1HR	1.2E-03	6.7E-05	8.1E-08
21	OEP-DGN-FR-DG03	3.9E-03	2.0E-05	7.8E-08
22	OEP-DGN-FR-DG02	3.9E-03	2.0E-05	7.8E-08
23	AFW-TDP-FR-2P6HR	3.0E-03	1.1E-05	3.4E-08
24	AFW-MDP-FS	1.2E-03	2.6E-05	3.2E-08
25	LPI-MDP-FS-SI1B	1.2E-03	2.5E-05	3.0E-08

EFFECTIVE RENEWAL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
23-Oct-99
01:23 PM

TIRGALEX - MOD 1 / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 4.9E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	3.6E-03	1.6E-05	5.6E-08
2	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FS-DG02	3.9E-03	3.1E-03	1.6E-05	4.8E-08
3	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FS-DG03	3.9E-03	3.1E-03	1.6E-05	4.8E-08
4	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-6HDG3	3.9E-03	2.4E-03	1.6E-05	3.8E-08
5	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-6HDG2	3.9E-03	2.4E-03	1.6E-05	3.8E-08
6	OEP-DGN-FS-DG03	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	2.4E-03	1.6E-05	3.8E-08
7	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	2.4E-03	1.6E-05	3.8E-08
8	OEP-DGN-FR-6HDG2	3.9E-03	OEP-DGN-FR-6HDG1	3.9E-03	2.4E-03	1.6E-05	3.8E-08
9	OEP-DGN-FR-DG01	3.9E-03	OEP-DGN-FR-DG03	3.9E-03	6.4E-04	1.6E-05	1.0E-08
10	OEP-DGN-FS-DG03	3.9E-03	OEP-DGN-FR-DG01	3.9E-03	6.0E-04	1.6E-05	9.4E-09
11	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-DG02	3.9E-03	6.0E-04	1.6E-05	9.4E-09
12	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FR-DG01	3.9E-03	6.0E-04	1.6E-05	9.4E-09
13	OEP-DGN-FS-DG01	3.9E-03	OEP-DGN-FR-DG03	3.9E-03	6.0E-04	1.6E-05	9.4E-09
14	OEP-DGN-FR-DG02	3.9E-03	OEP-DGN-FR-DG01	3.9E-03	5.8E-04	1.6E-05	9.0E-09
15	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FS-DG03	3.9E-03	2.2E-04	1.6E-05	3.4E-09
16	OEP-DGN-FR-6HDG3	3.9E-03	OEP-DGN-FR-6HDG2	3.9E-03	2.0E-04	1.6E-05	3.1E-09
17	OEP-DGN-FS-DG01	3.9E-03	AFW-TDP-FS-FW2	3.0E-03	2.6E-04	1.2E-05	3.0E-09
18	OEP-DGN-FS-DG02	3.9E-03	OEP-DGN-FR-6HDG3	3.9E-03	1.9E-04	1.6E-05	3.0E-09
19	OEP-DGN-FS-DG03	3.9E-03	OEP-DGN-FR-6HDG2	3.9E-03	1.9E-04	1.6E-05	3.0E-09
20	OEP-DGN-FR-6HDG1	3.9E-03	AFW-TDP-FS-FW2	3.0E-03	2.4E-04	1.2E-05	2.8E-09
21	LPR-MOV-FT-1862A	1.3E-03	LPR-MOV-FT-1862B	1.3E-03	1.5E-03	1.7E-06	2.6E-09
22	LPR-MOV-FT-1862A	1.3E-03	LPR-MOV-FT-1860B	1.3E-03	1.5E-03	1.7E-06	2.6E-09
23	LPR-MOV-FT-1862B	1.3E-03	LPR-MOV-FT-1860A	1.3E-03	1.5E-03	1.7E-06	2.6E-09
24	LPR-MOV-FT-1890B	1.3E-03	LPR-MOV-FT-1890A	1.3E-03	1.5E-03	1.7E-06	2.6E-09
25	LPR-MOV-FT-1860A	1.3E-03	LPR-MOV-FT-1860B	1.3E-03	1.5E-03	1.7E-06	2.6E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
23-Oct-89
09:14 AM

TIRGALFX – MOD 2 / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 5.1E-06

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	4.4E-03	2.3E-04	1.0E-06
2	OEP-DGN-FR-6HDG1	4.4E-03	2.1E-04	9.3E-07
3	OEP-DGN-FS-DG03	4.4E-03	1.3E-04	5.5E-07
4	OEP-DGN-FS-DG02	4.4E-03	1.3E-04	5.5E-07
5	OEP-DGN-FR-6HDG3	4.4E-03	1.2E-04	5.3E-07
6	OEP-DGN-FR-6HDG2	4.4E-03	1.1E-04	4.7E-07
7	OEP-DGN-FR-DG01	4.4E-03	3.8E-05	1.7E-07
8	HPI-MOV-FT	4.4E-04	3.4E-04	1.5E-07
9	OEP-DGN-FR-DG03	4.4E-03	2.0E-05	8.7E-08
10	OEP-DGN-FR-DG02	4.4E-03	2.0E-05	8.6E-08
11	AFW-TDP-FS-FW2	3.0E-03	2.9E-05	8.6E-08
12	LPI-MDP-FS	3.3E-04	2.2E-04	7.4E-08
13	LPR-MOV-FT	4.4E-04	1.3E-04	5.8E-08
14	HPI-CKV-FT CV225	1.6E-05	2.1E-03	3.4E-08
15	AFW-TDP-FR-2P6HR	3.0E-03	1.1E-05	3.4E-08
16	HPI-MOV-FT-1350	4.4E-04	6.7E-05	2.9E-08
17	HPI-CKV-FT-CV410	1.6E-05	1.4E-03	2.3E-08
18	HPI-CKV-FT-CV25	1.6E-05	1.4E-03	2.3E-08
19	CVC-MDP-FR-2A1HR	3.3E-04	6.7E-05	2.2E-08
20	LPR-MOV-FT-1862B	4.4E-04	2.1E-05	9.2E-09
21	LPR-MOV-FT-1862A	4.4E-04	2.1E-05	9.2E-09
22	LPR-MOV-FT-1860B	4.4E-04	2.1E-05	9.1E-09
23	LPR-MOV-FT-1860A	4.4E-04	2.1E-05	9.1E-09
24	AFW-MDP-FS	3.3E-04	2.6E-05	8.7E-09
25	ACC-CKV-FT-CV145	1.6E-05	5.0E-04	8.2E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
23-Oct-89
01:24 PM

TIRGALEX - MOD 2 / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 5.4E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	3.6E-03	1.9E-05	6.9E-08
2	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FS-DG03	4.4E-03	3.1E-03	1.9E-05	5.9E-08
3	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FS-DG02	4.4E-03	3.1E-03	1.9E-05	5.9E-08
4	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	1.9E-05	4.7E-08
5	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-6HDG2	4.4E-03	2.4E-03	1.9E-05	4.7E-08
6	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-6HDG3	4.4E-03	2.4E-03	1.9E-05	4.7E-08
7	OEP-DGN-FS-DG03	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	1.9E-05	4.7E-08
8	OEP-DGN-FR-6HDG2	4.4E-03	OEP-DGN-FR-6HDG1	4.4E-03	2.4E-03	1.9E-05	4.7E-08
9	OEP-DGN-FR-DG01	4.4E-03	OEP-DGN-FR-DG03	4.4E-03	6.4E-04	1.9E-05	1.2E-08
10	OEP-DGN-FS-DG03	4.4E-03	OEP-DGN-FR-DG01	4.4E-03	6.0E-04	1.9E-05	1.2E-08
11	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-DG03	4.4E-03	6.0E-04	1.9E-05	1.2E-08
12	OEP-DGN-FS-DG01	4.4E-03	OEP-DGN-FR-DG02	4.4E-03	6.0E-04	1.9E-05	1.2E-08
13	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FR-DG01	4.4E-03	6.0E-04	1.9E-05	1.2E-08
14	OEP-DGN-FR-DG02	4.4E-03	OEP-DGN-FR-DG01	4.4E-03	5.8E-04	1.9E-05	1.1E-08
15	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FS-DG03	4.4E-03	2.2E-04	1.9E-05	4.2E-09
16	OEP-DGN-FR-6HDG3	4.4E-03	OEP-DGN-FR-6HDG2	4.4E-03	2.0E-04	1.9E-05	3.8E-09
17	OEP-DGN-FS-DG03	4.4E-03	OEP-DGN-FR-6HDG2	4.4E-03	1.9E-04	1.9E-05	3.7E-09
18	OEP-DGN-FS-DG02	4.4E-03	OEP-DGN-FR-6HDG3	4.4E-03	1.9E-04	1.9E-05	3.7E-09
19	OEP-DGN-FS-DG01	4.4E-03	AFW-TDP-FS-FW2	3.0E-03	2.6E-04	1.3E-05	3.4E-09
20	OEP-DGN-FR-6HDG1	4.4E-03	AFW-TDP-FS-FW2	3.0E-03	2.4E-04	1.3E-05	3.1E-09
21	OEP-DGN-FS-DG02	4.4E-03	AFW-TDP-FS-FW2	3.0E-03	1.4E-04	1.3E-05	1.8E-09
22	OEP-DGN-FS-DG03	4.4E-03	AFW-TDP-FS-FW2	3.0E-03	1.4E-04	1.3E-05	1.8E-09
23	OEP-DGN-FR-6HDG3	4.4E-03	AFW-TDP-FS-FW2	3.0E-03	1.3E-04	1.3E-05	1.7E-09
24	OEP-DGN-FR-6HDG2	4.4E-03	AFW-TDP-FS-FW2	3.0E-03	1.2E-04	1.3E-05	1.6E-09
25	OEP-DGN-FS-DG01	4.4E-03	AFW-TDP-FR-2P61R	3.0E-03	9.5E-05	1.3E-05	1.2E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
20-Oct-89
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TIRGALEX – MOD 3 / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.0E-04

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	1.1E-02	2.1E-03	2.3E-05
2	HPI-CKV-FT-CV25	1.1E-02	1.4E-03	1.5E-05
3	HPI-CKV-FT-CV410	1.1E-02	1.4E-03	1.5E-05
4	ACC-CKV-FT-CV145	1.1E-02	5.0E-04	5.5E-06
5	ACC-CKV-FT-CV147	1.1E-02	5.0E-04	5.5E-06
6	ACC-CKV-FT-CV130	1.1E-02	5.0E-04	5.5E-06
7	ACC-CKV-FT-CV128	1.1E-02	5.0E-04	5.5E-06
8	HPI-MOV-FT	1.1E-02	3.4E-04	3.7E-06
9	OEP-DGN-FS-DG01	1.1E-02	2.3E-04	2.6E-06
10	LPI-MDP-FS	1.1E-02	2.2E-04	2.5E-06
11	OEP-DGN-FR-6HDG1	1.1E-02	2.1E-04	2.3E-06
12	LPR-MOV-FT	1.1E-02	1.3E-04	1.4E-06
13	OEP-DGN-FS-DG03	1.1E-02	1.3E-04	1.4E-06
14	OEP-DGN-FS-DG02	1.1E-02	1.3E-04	1.4E-06
15	OEP-DGN-FR-6HDG3	1.1E-02	1.2E-04	1.3E-06
16	OEP-DGN-FR-6HDG2	1.1E-02	1.1E-04	1.2E-06
17	HPI-MOV-FT-1350	1.1E-02	6.7E-05	7.4E-07
18	CVC-MDP-FR-2A1HR	1.1E-02	6.7E-05	7.4E-07
19	OEP-DGN-FR-DG01	1.1E-02	3.8E-05	4.1E-07
20	AFW-TDP-FS-FW2	1.1E-02	2.9E-05	3.2E-07
21	AFW-MDP-FS	1.1E-02	2.6E-05	2.9E-07
22	LPI-MDP-FS-SI1B	1.1E-02	2.5E-05	2.7E-07
23	LPI-MDP-FS-SI1A	1.1E-02	2.5E-05	2.7E-07
24	LPR-MOV-FT-1862B	1.1E-02	2.1E-05	2.3E-07
25	LPR-MOV-FT-1862A	1.1E-02	2.1E-05	2.3E-07

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant A
20-Oct-89
04:59 PM

TIRGALEX - MOD 3 / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 7.1E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	1.1E-02	OEP-DGN-FR-6HDG1	1.1E-02	3.6E-03	1.2E-04	4.3E-07
2	OEP-DGN-FS-DG01	1.1E-02	OEP-DGN-FS-DG02	1.1E-02	3.1E-03	1.2E-04	3.7E-07
3	OEP-DGN-FS-DG01	1.1E-02	OEP-DGN-FS-DG03	1.1E-02	3.1E-03	1.2E-04	3.7E-07
4	OEP-DGN-FS-DG01	1.1E-02	OEP-DGN-FR-6HDG3	1.1E-02	2.4E-03	1.2E-04	2.9E-07
5	OEP-DGN-FS-DG02	1.1E-02	OEP-DGN-FR-6HDG1	1.1E-02	2.4E-03	1.2E-04	2.9E-07
6	OEP-DGN-FS-DG01	1.1E-02	OEP-DGN-FR-6HDG2	1.1E-02	2.4E-03	1.2E-04	2.9E-07
7	OEP-DGN-FS-DG03	1.1E-02	OEP-DGN-FR-6HDG1	1.1E-02	2.4E-03	1.2E-04	2.9E-07
8	OEP-DGN-FR-6HDG2	1.1E-02	OEP-DGN-FR-6HDG1	1.1E-02	2.4E-03	1.2E-04	2.9E-07
9	LPR-MOV-FT-1862A	1.1E-02	LPR-MOV-FT-1860B	1.1E-02	1.5E-03	1.2E-04	1.8E-07
10	LPR-MOV-FT-1862A	1.1E-02	LPI-MDP-FS-SI1B	1.1E-02	1.5E-03	1.2E-04	1.8E-07
11	LPI-MDP-FS-SI1B	1.1E-02	LPI-MDP-FS-SI1A	1.1E-02	1.5E-03	1.2E-04	1.8E-07
12	LPR-MOV-FT-1862B	1.1E-02	LPI-MDP-FS-SI1A	1.1E-02	1.5E-03	1.2E-04	1.8E-07
13	LPR-MOV-FT-1890B	1.1E-02	LPR-MOV-FT-1890A	1.1E-02	1.5E-03	1.2E-04	1.8E-07
14	LPR-MOV-FT-1862B	1.1E-02	LPR-MOV-FT-1860A	1.1E-02	1.5E-03	1.2E-04	1.8E-07
15	LPR-MOV-FT-1860A	1.1E-02	LPI-MDP-FS-SI1B	1.1E-02	1.5E-03	1.2E-04	1.8E-07
16	LPR-MOV-FT-1860A	1.1E-02	LPR-MOV-FT-1860B	1.1E-02	1.5E-03	1.2E-04	1.8E-07
17	LPR-MOV-FT-1862A	1.1E-02	LPR-MOV-FT-1862B	1.1E-02	1.5E-03	1.2E-04	1.8E-07
18	LPI-MDP-FS-SI1A	1.1E-02	LPR-MOV-FT-1860B	1.1E-02	1.5E-03	1.2E-04	1.8E-07
19	HPI-MOV-FT-1115B	1.1E-02	HPI-MOV-FT-1115D	1.1E-02	1.4E-03	1.2E-04	1.6E-07
20	HPI-MOV-FT-1115C	1.1E-02	HPI-MOV-FT-1115E	1.1E-02	1.4E-03	1.2E-04	1.6E-07
21	CPC-MDP-FS-SW10B	1.1E-02	CPC-MDP-FR-SWA3H	1.1E-02	1.0E-03	1.2E-04	1.2E-07
22	LPI-MDP-FS-SI1B	1.1E-02	LPI-MDP-FR-A21HR	1.1E-02	1.0E-03	1.2E-04	1.2E-07
23	LPR-MOV-FT-1860B	1.1E-02	LPI-MDP-FR-A21HR	1.1E-02	1.0E-03	1.2E-04	1.2E-07
24	LPR-MOV-FT-1862A	1.1E-02	LPI-MDP-FR-B21HR	1.1E-02	1.0E-03	1.2E-04	1.2E-07
25	LPR-MOV-FT-1862B	1.1E-02	LPI-MDP-FR-A21HR	1.1E-02	1.0E-03	1.2E-04	1.2E-07

CONTRIBUTORS FOR
PLANT A

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLLANCE INTERVAL = 6 MONTHS

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant A
23-Oct-89
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TIRGALEX / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 4.2E-05

Rank	Component Name	Δq1	S1	ΔC
1	HPI-MOV-FT	2.4E-02	3.4E-04	8.0E-06
2	OEP-DGN-FS-DG01	2.4E-02	2.3E-04	5.5E-06
3	OEP-DGN-FR-6HDG1	2.4E-02	2.1E-04	5.0E-06
4	LPR-MOV-FT	2.4E-02	1.3E-04	3.1E-06
5	OEP-DGN-FS-DG02	2.4E-02	1.3E-04	3.0E-06
6	OEP-DGN-FS-DG03	2.4E-02	1.3E-04	3.0E-06
7	OEP-DGN-FR-6HDG3	2.4E-02	1.2E-04	2.9E-06
8	OEP-DGN-FR-6HDG2	2.4E-02	1.1E-04	2.5E-06
9	HPI-MOV-FT-1350	2.4E-02	6.7E-05	1.6E-06
10	OEP-DGN-FR-DG01	2.4E-02	3.8E-05	8.9E-07
11	AFW-TDP-FS-FW2	1.8E-02	2.9E-05	5.1E-07
12	LPR-MOV-FT-1862A	2.4E-02	2.1E-05	4.9E-07
13	LPR-MOV-FT-1862B	2.4E-02	2.1E-05	4.9E-07
14	LPR-MOV-FT-1860B	2.4E-02	2.1E-05	4.9E-07
15	LPR-MOV-FT-1860A	2.4E-02	2.1E-05	4.9E-07
16	OEP-DGN-FR-DG03	2.4E-02	2.0E-05	4.7E-07
17	OEP-DGN-FR-DG02	2.4E-02	2.0E-05	4.7E-07
18	LPI-MDP-FS	1.4E-03	2.2E-04	3.3E-07
19	PPS-MOV-FT-1535	2.4E-02	9.5E-06	2.2E-07
20	AFW-TDP-FR-2P6HR	1.8E-02	1.1E-05	2.0E-07
21	LPR-MOV-FT-1890B	2.4E-02	4.5E-06	1.1E-07
22	LPR-MOV-FT-1890A	2.4E-02	4.5E-06	1.1E-07
23	CVC-MDP-FR-2A1HR	1.4E-03	6.7E-05	9.7E-08
24	HPI-MOV-FT-1115E	2.4E-02	4.1E-06	9.7E-08
25	HPI-MOV-FT-1115B	2.4E-02	4.1E-06	9.7E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant A
21-Oct-89
01:32 PM

TIRGALEX / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 2.2E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	3.6E-03	5.6E-04	2.0E-06
2	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FS-DG03	2.4E-02	3.1E-03	5.6E-04	1.7E-06
3	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FS-DG02	2.4E-02	3.1E-03	5.6E-04	1.7E-06
4	OEP-DGN-FS-DG03	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	2.4E-03	5.6E-04	1.4E-06
5	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-6HDG2	2.4E-02	2.4E-03	5.6E-04	1.4E-06
6	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	2.4E-03	5.6E-04	1.4E-06
7	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-6HDG3	2.4E-02	2.4E-03	5.6E-04	1.4E-06
8	OEP-DGN-FR-6HDG	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	2.4E-03	5.6E-04	1.4E-06
9	LPR-MOV-FT-1862B	2.4E-02	LPR-MOV-FT-1860A	2.4E-02	1.5E-03	5.6E-04	8.4E-07
10	LPR-MOV-FT-1862A	2.4E-02	LPR-MOV-FT-1862B	2.4E-02	1.5E-03	5.6E-04	8.4E-07
11	LPR-MOV-FT-1862A	2.4E-02	LPR-MOV-FT-1860B	2.4E-02	1.5E-03	5.6E-04	8.4E-07
12	LPR-MOV-FT-1860A	2.4E-02	LPR-MOV-FT-1860B	2.4E-02	1.5E-03	5.6E-04	8.4E-07
13	LPR-MOV-FT-1890B	2.4E-02	LPR-MOV-FT-1890A	2.4E-02	1.5E-03	5.6E-04	8.4E-07
14	HPI-MOV-FT-1115B	2.4E-02	HPI-MOV-FT-1115D	2.4E-02	1.4E-03	5.6E-04	7.7E-07
15	HPI-MOV-FT-1115C	2.4E-02	HPI-MOV-FT-1115E	2.4E-02	1.4E-03	5.6E-04	7.7E-07
16	OEP-DGN-FR-DG01	2.4E-02	OEP-DGN-FR-DG03	2.4E-02	6.4E-04	5.6E-04	3.6E-07
17	OEP-DGN-FS-DG03	2.4E-02	OEP-DGN-FR-DG01	2.4E-02	6.0E-04	5.6E-04	3.4E-07
18	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FR-DG01	2.4E-02	6.0E-04	5.6E-04	3.4E-07
19	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-DG02	2.4E-02	6.0E-04	5.6E-04	3.4E-07
20	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-DG03	2.4E-02	6.0E-04	5.6E-04	3.4E-07
21	OEP-DGN-FR-DG02	2.4E-02	OEP-DGN-FR-DG01	2.4E-02	5.8E-04	5.6E-04	3.2E-07
22	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FS-DG03	2.4E-02	2.2E-04	5.6E-04	1.2E-07
23	OEP-DGN-FR-6HDG	2.4E-02	OEP-DGN-FR-6HDG2	2.4E-02	2.0E-04	5.6E-04	1.1E-07
24	OEP-DGN-FS-DG01	2.4E-02	AFW-TDP-FS-FW2	1.8E-02	2.6E-04	4.2E-04	1.1E-07
25	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FR-6HDG3	2.4E-02	1.9E-04	5.6E-04	1.1E-07

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

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TIRGALEX – MOD 1 / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 5.1E-05

Rank	Component Name	Δqi	Si	ΔC
1	OEP-DGN-FS-DG01	2.4E-02	2.3E-04	5.5E-06
2	HPI-CKV-FT-CV225	2.5E-03	2.1E-03	5.2E-06
3	OEP-DGN-FR-6HDG1	2.4E-02	2.1E-04	5.0E-06
4	HPI-CKV-FT-CV410	2.5E-03	1.4E-03	3.5E-06
5	HPI-CKV-FT-CV25	2.5E-03	1.4E-03	3.5E-06
6	OEP-DGN-FS-DG03	2.4E-02	1.3E-04	3.0E-06
7	OEP-DGN-FS-DG02	2.4E-02	1.3E-04	3.0E-06
8	OEP-DGN-FR-6HDG3	2.4E-02	1.2E-04	2.9E-06
9	HPI-MOV-FT	7.9E-03	3.4E-04	2.7E-06
10	OEP-DGN-FR-6HDG2	2.4E-02	1.1E-04	2.5E-06
11	LPI-MDP-FS	7.2E-03	2.2E-04	1.6E-06
12	ACC-CKV-FT-CV128	2.5E-03	5.0E-04	1.2E-06
13	ACC-CKV-FT-CV145	2.5E-03	5.0E-04	1.2E-06
14	ACC-CKV-FT-CV130	2.5E-03	5.0E-04	1.2E-06
15	ACC-CKV-FT-CV147	2.5E-03	5.0E-04	1.2E-06
16	LPR-MOV-FT	7.9E-03	1.3E-04	1.0E-06
17	OEP-DGN-FR-DG01	2.4E-02	3.8E-05	8.9E-07
18	HPI-MOV-FT-1350	7.9E-03	6.7E-05	5.3E-07
19	AFW-TDP-FS-FW2	1.8E-02	2.9E-05	5.1E-07
20	CVC-MDP-FR-2A1HR	7.2E-03	6.7E-05	4.9E-07
21	OEP-DGN-FR-DG03	2.4E-02	2.0E-05	4.7E-07
22	OEP-DGN-FR-DG02	2.4E-02	2.0E-05	4.7E-07
23	AFW-TDP-FR-2P6HR	1.8E-02	1.1E-05	2.0E-07
24	AFW-MDP-FS	7.2E-03	2.6E-05	1.9E-07
25	LPI-MDP-FS-SI1B	7.2E-03	2.5E-05	1.8E-07

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

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TIRGALEX - MOD 1 / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.8E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	3.6E-03	5.6E-04	2.0E-06
2	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FS-DG02	2.4E-02	3.1E-03	5.6E-04	1.7E-06
3	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FS-DG03	2.4E-02	3.1E-03	5.6E-04	1.7E-06
4	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-6HDG3	2.4E-02	2.4E-03	5.6E-04	1.4E-06
5	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-6HDG2	2.4E-02	2.4E-03	5.6E-04	1.4E-06
6	OEP-DGN-FS-DG03	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	2.4E-03	5.6E-04	1.4E-06
7	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	2.4E-03	5.6E-04	1.4E-06
8	OEP-DGN-FR-6HDG2	2.4E-02	OEP-DGN-FR-6HDG1	2.4E-02	2.4E-03	5.6E-04	1.4E-06
9	OEP-DGN-FR-DG01	2.4E-02	OEP-DGN-FR-DG03	2.4E-02	6.4E-04	5.6E-04	3.6E-07
10	OEP-DGN-FS-DG03	2.4E-02	OEP-DGN-FR-DG01	2.4E-02	6.0E-04	5.6E-04	3.4E-07
11	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-DG02	2.4E-02	6.0E-04	5.6E-04	3.4E-07
12	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FR-DG01	2.4E-02	6.0E-04	5.6E-04	3.4E-07
13	OEP-DGN-FS-DG01	2.4E-02	OEP-DGN-FR-DG03	2.4E-02	6.0E-04	5.6E-04	3.4E-07
14	OEP-DGN-FR-DG02	2.4E-02	OEP-DGN-FR-DG01	2.4E-02	5.8E-04	5.6E-04	3.2E-07
15	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FS-DG03	2.4E-02	2.2E-04	5.6E-04	1.2E-07
16	OEP-DGN-FR-6HDG3	2.4E-02	OEP-DGN-FR-6HDG2	2.4E-02	2.0E-04	5.6E-04	1.1E-07
17	OEP-DGN-FS-DG01	2.4E-02	AFW-TDP-FS-FW2	1.8E-02	2.6E-04	4.2E-04	1.1E-07
18	OEP-DGN-FS-DG02	2.4E-02	OEP-DGN-FR-6HDG3	2.4E-02	1.9E-04	5.6E-04	1.1E-07
19	OEP-DGN-FR-DG03	2.4E-02	OEP-DGN-FR-6HDG2	2.4E-02	1.9E-04	5.6E-04	1.1E-07
20	OEP-DGN-FR-6HDG1	2.4E-02	AFW-TDP-FS-FW2	1.8E-02	2.4E-04	4.2E-04	1.0E-07
21	LPR-MOV-FT-1862A	7.9E-03	LPR-MOV-FT-1862B	7.9E-03	1.5E-03	6.2E-05	9.3E-08
22	LPR-MOV-FT-1862A	7.9E-03	LPR-MOV-FT-1860B	7.9E-03	1.5E-03	6.2E-05	9.3E-08
23	LPR-MOV-FT-1862B	7.9E-03	LPR-MOV-FT-1860A	7.9E-03	1.5E-03	6.2E-05	9.3E-08
24	LPR-MOV-FT-1890B	7.9E-03	LPR-MOV-FT-1890A	7.9E-03	1.5E-03	6.2E-05	9.3E-08
25	LPR-MOV-FT-1860A	7.9E-03	LPR-MOV-FT-1860B	7.9E-03	1.5E-03	6.2E-05	9.3E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

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TIRGALEX -- MGD 2 / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.1E-05

Rank	Component Name	Δq1	S1	ΔC
1	OEP-DGN-FS-DG01	2.6E-02	2.3E-04	6.1E-06
2	OEP-DGN-FR-6HDG1	2.6E-02	2.1E-04	5.6E-06
3	OEP-DGN-FS-DG03	2.6E-02	1.3E-04	3.3E-06
4	OEP-DGN-FS-DG02	2.6E-02	1.3E-04	3.3E-06
5	OEP-DGN-FR-6HDG3	2.6E-02	1.2E-04	3.2E-06
6	OEP-DGN-FR-6HDG2	2.6E-02	1.1E-04	2.8E-06
7	OEP-DGN-FR-DG01	2.6E-02	3.8E-05	9.9E-07
8	HPI-MOV-FT	2.6E-03	3.4E-04	8.9E-07
9	OEP-DGN-FR-DG03	2.6E-02	2.0E-05	5.2E-07
10	OEP-DGN-FR-DG02	2.6E-02	2.0E-05	5.2E-07
11	AFW-TDP-FS-FW2	1.8E-02	2.9E-05	5.1E-07
12	LPI-MDP-FS	2.0E-03	2.2E-04	4.4E-07
13	LPR-MOV-FT	2.6E-03	1.3E-04	3.5E-07
14	HPI-CKV-FT-CV225	9.8E-05	2.1E-03	2.1E-07
15	AFW-TDP-FR-2P6HR	1.8E-02	1.1E-05	2.0E-07
16	HPI-MOV-FT-1350	2.6E-03	6.7E-05	1.8E-07
17	HPI-CKV-FT-CV410	9.8E-05	1.4E-03	1.4E-07
18	HPI-CKV-FT-CV25	9.8E-05	1.4E-03	1.4E-07
19	CVC-MDP-FR-2A1HR	2.0E-03	6.7E-05	1.3E-07
20	LPR-MOV-FT-1862B	2.6E-03	2.1E-05	5.5E-08
21	LPR-MOV-FT-1862A	2.6E-03	2.1E-05	5.5E-08
22	LPR-MOV-FT-1860B	2.6E-03	2.1E-05	5.5E-08
23	LPR-MOV-FT-1860A	2.6E-03	2.1E-05	5.5E-08
24	AFW-MDP-FS	2.0E-03	2.6E-05	5.2E-08
25	ACC-CKV-FT-CV145	9.8E-05	5.0E-04	4.9E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

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TIRGALEX – MOD 2 / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.9E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	2.6E-02	OEP-DGN-FR-6HDG1	2.6E-02	3.6E-03	6.9E-04	2.5E-06
2	OEP-DGN-FS-DG01	2.6E-02	OEP-DGN-FS-DG03	2.6E-02	3.1E-03	6.9E-04	2.1E-06
3	OEP-DGN-FS-DG01	2.6E-02	OEP-DGN-FS-DG02	2.6E-02	3.1E-03	6.9E-04	2.1E-06
4	OEP-DGN-FS-DG02	2.6E-02	OEP-DGN-FR-6HDG1	2.6E-02	2.4E-03	6.9E-04	1.7E-06
5	OEP-DGN-FS-DG01	2.6E-02	OEP-DGN-FR-6HDG2	2.6E-02	2.4E-03	6.9E-04	1.7E-06
6	OEP-DGN-FS-DG01	2.6E-02	OEP-DGN-FR-6HDG3	2.6E-02	2.4E-03	6.9E-04	1.7E-06
7	OEP-DGN-FS-DG03	2.6E-02	OEP-DGN-FR-6HDG1	2.6E-02	2.4E-03	6.9E-04	1.7E-06
8	OEP-DGN-FR-6HDG2	2.6E-02	OEP-DGN-FR-6HDG1	2.6E-02	2.4E-03	6.9E-04	1.7E-06
9	OEP-DGN-FR-DG01	2.6E-02	OEP-DGN-FR-DG03	2.6E-02	6.4E-04	6.9E-04	4.4E-07
10	OEP-DGN-FS-DG03	2.6E-02	OEP-DGN-FR-DG01	2.6E-02	6.0E-04	6.9E-04	4.2E-07
11	OEP-DGN-FS-DG01	2.6E-02	OEP-DGN-FR-DG03	2.6E-02	6.0E-04	6.9E-04	4.2E-07
12	OEP-DGN-FS-DG01	2.6E-02	OEP-DGN-FR-DG02	2.6E-02	6.0E-04	6.9E-04	4.2E-07
13	OEP-DGN-FS-DG02	2.6E-02	OEP-DGN-FR-DG01	2.6E-02	6.0E-04	6.9E-04	4.2E-07
14	OEP-DGN-FR-DG02	2.6E-02	OEP-DGN-FR-DG01	2.6E-02	5.8E-04	6.9E-04	4.0E-07
15	OEP-DGN-FS-DG02	2.6E-02	OEP-DGN-FS-DG03	2.6E-02	2.2E-04	6.9E-04	1.5E-07
16	OEP-DGN-FR-6HDG3	2.6E-02	OEP-DGN-FR-6HDG2	2.6E-02	2.0E-04	6.9E-04	1.4E-07
17	OEP-DGN-FS-DG03	2.6E-02	OEP-DGN-FR-6HDG2	2.6E-02	1.9E-04	6.9E-04	1.3E-07
18	OEP-DGN-FS-DG02	2.6E-02	OEP-DGN-FR-6HDG3	2.6E-02	1.9E-04	6.9E-04	1.3E-07
19	OEP-DGN-FS-DG01	2.6E-02	AFW-TDP-FS-FW2	1.8E-02	2.6E-04	4.7E-04	1.2E-07
20	OEP-DGN-FR-6HDG1	2.6E-02	AFW-TDP-FS-FW2	1.8E-02	2.4E-04	4.7E-04	1.1E-07
21	OEP-DGN-FS-DG02	2.6E-02	AFW-TDP-FS-FW2	1.8E-02	1.4E-04	4.7E-04	6.5E-08
22	OEP-DGN-FS-DG03	2.6E-02	AFW-TDP-FS-FW2	1.8E-02	1.4E-04	4.7E-04	6.5E-08
23	OEP-DGN-FR-6HDG3	2.6E-02	AFW-TDP-FS-FW2	1.8E-02	1.3E-04	4.7E-04	6.2E-08
24	OEP-DGN-FR-6HDG2	2.6E-02	AFW-TDP-FS-FW2	1.8E-02	1.2E-04	4.7E-04	5.8E-08
25	OEP-DGN-FS-DG01	2.6E-02	AFW-TDP-FR-2P6HR	1.8E-02	9.5E-05	4.7E-04	4.4E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

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TIRGALHX - MOD 3 / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 6.0E-04

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	6.6E-02	2.1E-03	1.4E-04
2	HPI-CKV-FT-CV25	6.6E-02	1.4E-03	9.1E-05
3	HPI-CKV-FT-CV410	6.6E-02	1.4E-03	9.1E-05
4	ACC-CKV-FT-CV145	6.6E-02	5.0E-04	3.3E-05
5	ACC-CKV-FT-CV147	6.6E-02	5.0E-04	3.3E-05
6	ACC-CKV-FT-CV130	6.6E-02	5.0E-04	3.3E-05
7	ACC-CKV-FT-CV128	6.6E-02	5.0E-04	3.3E-05
8	HPI-MOV-FT	6.6E-02	3.4E-04	2.2E-05
9	OEP-DGN-FS-DG01	6.6E-02	2.3E-04	1.5E-05
10	LPI-MDP-FS	6.6E-02	2.2E-04	1.5E-05
11	OEP-DGN-FR-6HDG1	6.6E-02	2.1E-04	1.4E-05
12	LPR-MOV-FT	6.6E-02	1.3E-04	8.7E-06
13	OEP-DGN-FS-DG03	6.6E-02	1.3E-04	8.3E-06
14	OEP-DGN-FS-DG02	6.6E-02	1.3E-04	8.3E-06
15	OEP-DGN-FR-6HDG3	6.6E-02	1.2E-04	8.0E-06
16	OEP-DGN-FR-6HDG2	6.6E-02	1.1E-04	7.0E-06
17	HPI-MOV-FT-1350	6.6E-02	6.7E-05	4.4E-06
18	CVC-MDP-FR-2A1HR	6.6E-02	6.7E-05	4.4E-06
19	OEP-DGN-FR-DG01	6.6E-02	3.8E-05	2.5E-06
20	AFW-TDP-FS-FW2	6.6E-02	2.9E-05	1.9E-06
21	AFW-MDP-FS	6.6E-02	2.6E-05	1.7E-06
22	LPI-MDP-FS-SI1B	6.6E-02	2.5E-05	1.6E-06
23	LPI-MDP-FS-SI1A	6.6E-02	2.5E-05	1.6E-06
24	LPR-MOV-FT-1862B	6.6E-02	2.1E-05	1.4E-06
25	LPR-MOV-FT-1862A	6.6E-02	2.1E-05	1.4E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

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TIRGALEX - MOD 3 / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 2.6E-04

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	6.6E-02	OEP-DGN-FR-6HDG1	6.6E-02	3.6E-03	4.3E-03	1.5E-05
2	OEP-DGN-FS-DG01	6.6E-02	OEP-DGN-FS-DG02	6.6E-02	3.1E-03	4.3E-03	1.3E-05
3	OEP-DGN-FS-DG01	6.6E-02	OEP-DGN-FS-DG03	6.6E-02	3.1E-03	4.3E-03	1.3E-05
4	OEP-DGN-FS-DG01	6.6E-02	OEP-DGN-FR-6HDG3	6.6E-02	2.4E-03	4.3E-03	1.1E-05
5	OEP-DGN-FS-DG02	6.6E-02	OEP-DGN-FR-6HDG1	6.6E-02	2.4E-03	4.3E-03	1.1E-05
6	OEP-DGN-FS-DG01	6.6E-02	OEP-DGN-FR-6HDG2	6.6E-02	2.4E-03	4.3E-03	1.1E-05
7	OEP-DGN-FS-DG03	6.6E-02	OEP-DGN-FR-6HDG1	6.6E-02	2.4E-03	4.3E-03	1.1E-05
8	OEP-DGN-FR-6HDG2	6.6E-02	OEP-DGN-FR-6HDG1	6.6E-02	2.4E-03	4.3E-03	1.1E-05
9	LPR-MOV-FT-1862A	6.6E-02	LPR-MOV-FT-1860B	6.6E-02	1.5E-03	4.3E-03	6.5E-06
10	LPR-MOV-FT-1862A	6.6E-02	LPI-MDP-FS-SI1B	6.6E-02	1.5E-03	4.3E-03	6.5E-06
11	LPI-MDP-FS-SI1B	6.6E-02	LPI-MDP-FS-SI1A	6.6E-02	1.5E-03	4.3E-03	6.5E-06
12	LPR-MOV-FT-1862B	6.6E-02	LPI-MDP-FS-SI1A	6.6E-02	1.5E-03	4.3E-03	6.5E-06
13	LPR-MOV-FT-1890B	6.6E-02	LPR-MOV-FT-1890A	6.6E-02	1.5E-03	4.3E-03	6.5E-06
14	LPR-MOV-FT-1862B	6.6E-02	LPR-MOV-FT-1860A	6.6E-02	1.5E-03	4.3E-03	6.5E-06
15	LPR-MOV-FT-1860A	6.6E-02	LPI-MDP-FS-SI1B	6.6E-02	1.5E-03	4.3E-03	6.5E-06
16	LPR-MOV-FT-1860A	6.6E-02	LPR-MOV-FT-1860B	6.6E-02	1.5E-03	4.3E-03	6.5E-06
17	LPR-MOV-FT-1862A	6.6E-02	LPR-MOV-FT-1862B	6.6E-02	1.5E-03	4.3E-03	6.5E-06
18	LPI-MDP-FS-SI1A	6.6E-02	LPR-MOV-FT-1860B	6.6E-02	1.5E-03	4.3E-03	6.5E-06
19	HPI-MOV-FT-1115B	6.6E-02	HPI-MOV-FT-1115D	6.6E-02	1.4E-03	4.3E-03	5.9E-06
20	HPI-MOV-FT-1115C	6.6E-02	HPI-MOV-FT-1115E	6.6E-02	1.4E-03	4.3E-03	5.9E-06
21	CPC-MDP-FS-SW10B	6.6E-02	CPC-MDP-FR-SWA3H	6.6E-02	1.0E-03	4.3E-03	4.3E-06
22	LPI-MDP-FS-SI1B	6.6E-02	LPI-MDP-FR-A21HR	6.6E-02	1.0E-03	4.3E-03	4.3E-06
23	LPR-MOV-FT-1860B	6.6E-02	LPI-MDP-FR-A21HR	6.6E-02	1.0E-03	4.3E-03	4.3E-06
24	LPR-MOV-FT-1862A	6.6E-02	LPI-MDP-FR-B21HR	6.6E-02	1.0E-03	4.3E-03	4.3E-06
25	LPR-MOV-FT-1862B	6.6E-02	LPI-MDP-FR-A21HR	6.6E-02	1.0E-03	4.3E-03	4.3E-06

9. POINT RESULTS FOR PLANT B (THE BWR)

The following pages give the pointwise results for the average core melt frequency increases due to aging for Plant B, which is the BWR. The results are again organized according to the characterization of the aging maintenance program. The first results give a summary of the core melt frequency increases and give a breakdown of the summed contribution from single component aging effects, $\Sigma S_i \Delta q_i$, and the summed contribution from double component aging effects $\Sigma S_{ij} \Delta q_i \Delta q_j$. The results which follow give the top 25 single component aging contributors and the top 25 double component aging contributors for each case. Appendix E gives results for additional case studies in which the unavailability increase Δq was assumed to be controlled, but at a fairly high level (0.3). The results are similar to those presented here.

9.1. Core Melt Frequency Increase Versus Aging Maintenance Program Characterization

The following pages present the core melt frequency increase ΔC (per year) versus aging maintenance program. The first results are for maintenance programs characterized as having only overhauls (or replacements) at effective intervals of L = 18 mo, L = 72 mo, or L = the TIRGALEX intervals. The following results are for maintenance programs characterized as having both overhaul intervals of L and surveillance intervals of T for L = 18 mo, T = 1 mo; L = 72 mo, T = 1 mo; and L = 72 mo, T = 6 mo. The discussions below summarize the results for each case; the results are presented after the discussions.

18 Month Overhauls Only

The core melt frequency increase ΔC (per year) is basically the same for the TIRGALEX, MOD1, and MOD2 aging rates and is in the vicinity of 3-06. For MOD3, the 5-year aging rate data base, ΔC is 2.3-05. The summaries of the singles and doubles contributors show that the single component aging effects are generally dominant, except for MOD3 where the double component aging effects are slightly larger.

72 Month Overhauls Only

The core melt frequency increase ΔC is approximately 2.5-04 for TIRGALEX, MOD1, and MOD2 aging rates. For the MOD3 5-year aging rates, ΔC is 3.4-03, a factor of 10 higher. The contribution from double component aging effects dominates for all cases.

TIRGALEX Overhaul Intervals

The core melt frequency increase ΔC is similar for TIRGALEX, MOD1, and MOD2 and is in the vicinity of 2-06. For MOD3, ΔC grows to 2.7-05. The single component aging effects dominate for TIRGALEX, MOD1 and MOD2 while for MOD3 the double component aging effects are slightly larger.

18 Month Overhauls and 1 Month Surveillances

The core melt frequency increase ΔC is approximately 2-07 for TIRGALEX, MOD1, and MOD2. For MOD3 aging rates, the core melt frequency increase is 9-07. The single component aging effects dominate in all cases. As compared to the 18 month overhaul only case, carrying out additional aging surveillances at 1 month effective intervals reduces the average core melt increase by slightly more than a factor of 10.

72 Month Overhauls and 1 Month Surveillances

For TIRGALEX, MOD1, and MOD2 aging rates, ΔC is approximately 8-07. For MOD3, ΔC is 4.6-06. The single component aging contributions are generally most important. The 72 month overhaul and 1 month surveillance results are approximately a factor of 4 lower than the 18 month overhaul only results and are more than a factor of 300 lower than the 72 month overhaul only results.

72 Month Overhauls and 6 Month Surveillances

ΔC for TIRGALEX, MOD1, and MOD2 is in the vicinity of 8-06. For MOD3 ΔC becomes 7-05. The double component contributions generally dominate. The core melt frequency control provided by the 72 month overhaul and 6 month surveillance program is comparable to the control provided by the 18 month overhaul only maintenance program with ΔC differing by less than a factor of 3. As compared to the 72 month overhaul only program, the 72 month overhaul and 6 month surveillance program lowers the average core melt frequency increase ΔC by a factor of more than 30.

9.2 Detailed Component Contributors

The pages after the summary results present the top 25 aging single component contributors and top 25 double aging component contributors for each maintenance case that was analyzed. The specific system, component, and failure mode are identified for each contributor. For each contributor, the increase in unavailability factor Δq, core melt importance factor S, and the contribution to the core melt frequency increase ΔC is given, where the core melt frequency contribution is the product of the aging and importance factors. The results on the detailed contributors show that for all maintenance cases, diesels (ACP-DGN) are generally dominant contributors with the motor driven pumps in the service water system (SSW-MDP) also important contributors. The turbine driven pumps in the core isolation system (RCI-TDP) are also contributors. These detailed contributors can be used to focus aging analyses and aging control efforts.

PLANT B
EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

TIRGALEX	$\Delta C =$	2.7E-06
MOD 1	$\Delta C =$	3.3E-06
MOD 2	$\Delta C =$	3.1E-06
MOD 3	$\Delta C =$	2.3E-05

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	1.9E-06	2.3E-06	2.1E-06	9.7E-06
DOUBLES	8.0E-07	9.9E-07	9.7E-07	1.3E-05
TOTAL	2.7E-06	3.3E-06	3.1E-06	2.3E-05

PLANT B
EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr-1)

TIRGALEX	$\Delta C =$	2.1E-04
MOD 1	$\Delta C =$	2.9E-04
MOD 2	$\Delta C =$	2.8E-04
MOD 3	$\Delta C =$	3.4E-03

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr-1)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	3.0E-05	3.7E-05	3.3E-05	1.6E-04
DOUBLES	1.8E-04	2.5E-04	2.5E-04	3.2E-03
TOTAL	2.1E-04	2.9E-04	2.8E-04	3.4E-03

PLANT B
EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

TIRGALEX	ΔC =	1.5E-06
MOD 1	ΔC =	2.7E-06
MOD 2	ΔC =	1.7E-06
MOD 3	ΔC =	2.7E-05

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	1.2E-06	2.1E-06	1.3E-06	1.3E-05
DOUBLES	3.0E-07	6.0E-07	3.6E-07	1.4E-05
TOTAL	1.5E-06	2.7E-06	1.7E-06	2.7E-05

PLANT B
EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

TIRGALEX	ΔC =	1.7E-07
MOD 1	ΔC =	2.0E-07
MOD 2	ΔC =	1.8E-07
MOD 3	ΔC =	9.0E-07

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr^{-1})

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	1.6E-07	1.9E-07	1.7E-07	8.1E-07
DOUBLES	5.0E-09	6.9E-09	6.7E-09	8.8E-08
TOTAL	1.7E-07	2.0E-07	1.8E-07	9.0E-07

PLANT B
EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr-1)

TIRGALEX	$\Delta C =$	7.1E-07
MOD 1	$\Delta C =$	8.8E-07
MOD 2	$\Delta C =$	8.1E-07
MOD 3	$\Delta C =$	4.6E-06

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr-1)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	6.3E-07	7.7E-07	7.0E-07	3.2E-06
DOUBLES	8.0E-08	1.1E-07	1.1E-07	1.4E-06
TOTAL	7.1E-07	8.8E-07	8.1E-07	4.6E-06

PLANT B
EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

TOTAL CORE MELT FREQUENCY CHANGE ΔC (yr-1)

TIRGALEX	$\Delta C =$	6.7E-06
MOD 1	$\Delta C =$	8.6E-06
MOD 2	$\Delta C =$	8.1E-06
MOD 3	$\Delta C =$	7.0E-05

CONTRIBUTORS TO CORE MELT FREQUENCY CHANGE ΔC (yr-1)

	TIRGALEX	MOD 1	MOD 2	MOD 3
SINGLES	3.8E-06	4.6E-06	4.2E-06	1.9E-05
DOUBLES	2.9E-06	4.0E-06	3.9E-06	5.1E-05
TOTAL	6.7E-06	8.6E-06	8.1E-06	7.0E-05

CONTRIBUTORS FOR
PLANT B

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.9E-06

Rank	Component Name	Δql	S1	ΔC
1	ACP-DGN-FR-DG13	1.2E-02	2.6E-05	3.1E-07
2	ACP-DGN-FR-DG13	1.2E-02	2.6E-05	3.1E-07
3	ACP-DGN-FR-DG11	1.2E-02	1.9E-05	2.2E-07
4	ACP-DGN-FS-DG12	1.2E-02	1.9E-05	2.2E-07
5	ACP-DGN-FR-DG12	1.2E-02	1.9E-05	2.2E-07
6	ACP-DGN-FS-DG11	1.2E-02	1.9E-05	2.2E-07
7	ACP-DGS-FS-CM	1.2E-02	1.2E-05	1.4E-07
8	RCI-TDP-FR-TDP1	8.9E-03	6.4E-06	5.7E-08
9	RCI-TDP-FS-TDP1	8.9E-03	6.3E-06	5.6E-08
10	SSW-MDP-FS-CM	7.2E-04	7.7E-05	5.6E-08
11	SSW-MDP-FS-MDP2C	7.2E-04	1.8E-05	1.3E-08
12	SSW-MDP-FS-MDP1B	7.2E-04	1.2E-05	8.8E-09
13	SSW-MDP-FS-MDP1A	7.2E-04	1.2E-05	8.8E-09
14	SSW-MDP-FR-MDP2C	7.2E-04	1.1E-05	7.9E-09
15	EHV-FAN-FR-77C02	6.9E-04	8.9E-06	6.1E-09
16	EHV-FAN-FS-77C02	6.9E-04	8.9E-06	6.1E-09
17	SSW-MDP-FR-MDP1B	7.2E-04	7.2E-06	5.2E-09
18	SSW-MDP-FR-MDP1A	7.2E-04	7.2E-06	5.2E-09
19	EHV-FAN-FS-77C1B	6.9E-04	5.1E-06	3.5E-09
20	EHV-FAN-FS-77C1A	6.9E-04	5.1E-06	3.5E-09
21	EHV-FAN-FR-77C1B	6.9E-04	5.1E-06	3.5E-09
22	EHV-FAN-FR-77C1A	6.9E-04	5.1E-06	3.5E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX / 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 8.0E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FS-DG12	1.2E-02	3.5E-04	1.4E-04	4.9E-08
2	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FS-DG11	1.2E-02	3.5E-04	1.4E-04	4.9E-08
3	ACP-DGN-FS-DG12	1.2E-02	ACP-DGN-FR-DG13	1.2E-02	3.3E-04	1.4E-04	4.7E-08
4	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	3.3E-04	1.4E-04	4.7E-08
5	ACP-DGN-FS-DG11	1.2E-02	ACP-DGN-FR-DG[illegible]	1.2E-02	3.3E-04	1.4E-04	4.7E-08
6	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FR-DG11	1.2E-02	3.3E-04	1.4E-04	4.7E-08
7	ACP-DGN-FR-DG13	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	3.1E-04	1.4E-04	4.4E-08
8	ACP-DGN-FR-DG13	1.2E-02	ACP-DGN-FR-DG11	1.2E-02	3.1E-04	1.4E-04	4.4E-08
9	ACP-DGN-FS-DG11	1.2E-02	ACP-DGN-FS-DG12	1.2E-02	3.1E-04	1.4E-04	4.3E-08
10	ACP-DGN-FS-DG11	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	3.0E-04	1.4E-04	4.2E-08
11	ACP-DGN-FS-DG12	1.2E-02	ACP-DGN-FR-DG11	1.2E-02	3.0E-04	1.4E-04	4.2E-08
12	ACP-DGN-FR-DG11	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	2.8E-04	1.4E-04	3.9E-08
13	ACP-DGN-FS-DG13	1.2E-02	ACP-DGS-FS-CM	1.2E-02	1.9E-04	1.4E-04	2.7E-08
14	ACP-DGS-FS-CM	1.2E-02	ACP-DGN-FR-DG13	1.2E-02	1.9E-04	1.4E-04	2.6E-08
15	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG13	1.2E-02	1.3E-04	1.0E-04	1.4E-08
16	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG13	1.2E-02	1.2E-04	1.0E-04	1.2E-08
17	ACP-DGN-FS-DG13	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	1.1E-04	1.0E-04	1.2E-08
18	ACP-DGN-FR-DG13	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	1.1E-04	1.0E-04	1.1E-08
19	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG12	1.2E-02	9.6E-05	1.0E-04	1.0E-08
20	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG11	1.2E-02	9.6E-05	1.0E-04	1.0E-08
21	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG12	1.2E-02	8.7E-05	1.0E-04	9.2E-09
22	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG11	1.2E-02	8.7E-05	1.0E-04	9.2E-09
23	ACP-DGN-FS-DG12	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	8.3E-05	1.0E-04	8.7E-09
24	ACP-DGN-FS-DG11	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	8.2E-05	1.0E-04	8.6E-09
25	ACP-DGN-FR-DG12	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	7.8E-05	1.0E-04	8.2E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX – MOD 1 / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.3E-06

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	1.2E-02	2.6E-05	3.1E-07
2	ACP-DGN-FR-DG13	1.2E-02	2.6E-05	3.1E-07
3	SSW-MDP-FS-CM	3.6E-03	7.7E-05	2.8E-07
4	ACP-DGN-FR-DG11	1.2E-02	1.9E-05	2.2E-07
5	ACP-DGN-FR-DG12	1.2E-02	1.9E-05	2.2E-07
6	ACP-DGN-FS-DG12	1.2E-02	1.9E-05	2.2E-07
7	ACP-DGN-FS-DG11	1.2E-02	1.9E-05	2.2E-07
8	ACP-DGS-FS-CM	1.2E-02	1.2E-05	1.4E-07
9	SSW-MDP-FS-MDP2C	3.6E-03	1.8E-05	6.4E-08
10	RCI-TDP-FR-TDP1	8.9E-03	6.4E-06	5.7E-08
11	RCI-TDP-FS-TDP1	8.9E-03	6.3E-06	5.6E-08
12	SSW-MDP-FS-MDP1B	3.6E-03	1.2E-05	4.4E-08
13	SSW-MDP-FS-MDP1A	3.6E-03	1.2E-05	4.4E-08
14	SSW-MDP-FR-MDP2C	3.6E-03	1.1E-05	4.0E-08
15	SSW-MDP-FR-MDP1A	3.6E-03	7.2E-06	2.6E-08
16	SSW-MDP-FR-MDP1B	3.6E-03	7.2E-06	2.6E-08
17	EHV-FAN-FR-77C02	6.9E-04	8.9E-06	6.1E-09
18	EHV-FAN-FS-77C02	6.9E-04	8.9E-06	6.1E-09
19	EHV-FAN-FS-77C1A	6.9E-04	5.1E-06	3.5E-09
20	EHV-FAN-FS-77C1B	6.9E-04	5.1E-06	3.5E-09
21	EHV-FAN-FR-77C1B	6.9E-04	5.1E-06	3.5E-09
22	EHV-FAN-FR-77C1A	6.9E-04	5.1E-06	3.5E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

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TIRGALEX – MOD 1 / 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 9.9E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FS-DG12	1.2E-02	3.5E-04	1.4E-04	4.9E-08
2	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FS-DG11	1.2E-02	3.5E-04	1.4E-04	4.9E-08
3	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	3.3E-04	1.4E-04	4.7E-08
4	ACP-DGN-FS-DG12	1.2E-02	ACP-DGN-FR-DG13	1.2E-02	3.3E-04	1.4E-04	4.7E-08
5	ACP-DGN-FS-DG13	1.2E-02	ACP-DGN-FR-DG11	1.2E-02	3.3E-04	1.4E-04	4.7E-08
6	ACP-DGN-FS-DG11	1.2E-02	ACP-DGN-FR-DG13	1.2E-02	3.3E-04	1.4E-04	4.7E-08
7	ACP-DGN-FR-DG13	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	3.1E-04	1.4E-04	4.4E-08
8	ACP-DGN-FR-DG13	1.2E-02	ACP-DGN-FR-DG11	1.2E-02	3.1E-04	1.4E-04	4.4E-08
9	ACP-DGN-FS-DG11	1.2E-02	ACP-DGN-FS-DG12	1.2E-02	3.1E-04	1.4E-04	4.3E-08
10	ACP-DGN-FS-DG12	1.2E-02	ACP-DGN-FR-DG11	1.2E-02	3.0E-04	1.4E-04	4.2E-08
11	ACP-DGN-FS-DG11	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	3.0E-04	1.4E-04	4.2E-08
12	ACP-DGN-FR-DG11	1.2E-02	ACP-DGN-FR-DG12	1.2E-02	2.8E-04	1.4E-04	3.9E-08
13	ACP-DGN-FS-DG13	1.2E-02	ACP-DGS-FS-CM	1.2E-02	1.9E-04	1.4E-04	2.7E-08
14	ACP-DGS-FS-CM	1.2E-02	ACP-DGN-FR-DG13	1.2E-02	1.9E-04	1.4E-04	2.6E-08
15	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG13	1.2E-02	1.3E-04	1.0E-04	1.4E-08
16	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG13	1.2E-02	1.2E-04	1.0E-04	1.2E-08
17	ACP-DGN-FS-DG13	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	1.1E-04	1.0E-04	1.2E-08
18	ACP-DGN-FS-DG11	1.2E-02	SSW-MDP-FS-MDP2C	3.6E-03	2.6E-04	4.3E-05	1.1E-08
19	ACP-DGN-FS-DG13	1.2E-02	SSW-MDP-FS-MDP1B	3.6E-03	2.6E-04	4.3E-05	1.1E-08
20	ACP-DGN-FS-DG13	1.2E-02	SSW-MDP-FS-MDP1A	3.6E-03	2.6E-04	4.3E-05	1.1E-08
21	ACP-DGN-FS-DG12	1.2E-02	SSW-MDP-FS-MDP2C	3.6E-03	2.6E-04	4.3E-05	1.1E-08
22	ACP-DGN-FR-DG13	1.2E-02	RCI-TDP-FS-TDP1	8.9E-03	1.1E-04	1.0E-04	1.1E-08
23	RCI-TDP-FR-TDP1	8.9E-03	SSW-MDP-FS-CM	3.6E-03	3.2E-04	3.2E-05	1.0E-08
24	SSW-MDP-FS-CM	3.6E-03	RCI-TDP-FS-TDP1	8.9E-03	3.2E-04	3.2E-05	1.0E-08
25	ACP-DGN-FS-DG12	1.2E-02	SSW-MDP-FS-MDP1A	3.6E-03	2.4E-04	4.3E-05	1.0E-08

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant B
23-Oct-89
11:39 AM

TIRGALIX - MOD 2 / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.1E-06

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	1.3E-02	2.6E-05	3.4E-07
2	ACP-DGN-FR-DG13	1.3E-02	2.6E-05	3.4E-07
3	ACP-DGN-FR-DG11	1.3E-02	1.9E-05	2.5E-07
4	ACP-DGN-FS-DG12	1.3E-02	1.9E-05	2.5E-07
5	ACP-DGN-FR-DG12	1.3E-02	1.9E-05	2.5E-07
6	ACP-DGN-FS-DG11	1.3E-02	1.9E-05	2.5E-07
7	ACP-DGS-FS-CM	1.2E-02	1.2E-05	1.4E-07
8	SSW-MDP-FS-CM	9.9E-04	7.7E-05	7.6E-08
9	RCI-TDP-FR-TDP1	8.9E-03	6.4E-06	5.7E-08
10	RCI-TDP-FS-TDP1	8.9E-03	6.3E-06	5.6E-08
11	SSW-MDP-FS-MDP2C	9.9E-04	1.8E-05	1.7E-08
12	SSW-MDP-FS-MDP1B	9.9E-04	1.2E-05	1.2E-08
13	SSW-MDP-FS-MDP1A	9.9E-04	1.2E-05	1.2E-08
14	SSW-MDP-FR-MDP2C	9.9E-04	1.1E-05	1.1E-08
15	SSW-MDP-FR-MDP1A	9.9E-04	7.2E-06	7.1E-09
16	SSW-MDP-FR-MDP1B	9.9E-04	7.2E-06	7.1E-09
17	EHV-FAN-FR-77C02	6.9E-04	8.9E-06	6.1E-09
18	EHV-FAN-FS-77C02	6.9E-04	8.9E-06	6.1E-09
19	EHV-FAN-FS-77C1A	6.9E-04	5.1E-06	3.5E-09
20	EHV-FAN-FS-77C1B	6.9E-04	5.1E-06	3.5E-09
21	EHV-FAN-FR-77C1B	6.9E-04	5.1E-06	3.5E-09
22	EHV-FAN-FR-77C1A	6.9E-04	5.1E-06	3.5E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant B
23-Oct-89
11:41 AM

TIRGALEX - MOD 2 / 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 9.7E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	1.3E-02	ACP-DGN-FS-DG12	1.3E-02	3.5E-04	1.7E-04	6.0E-08
2	ACP-DGN-FS-DG13	1.3E-02	ACP-DGN-FS-DG11	1.3E-02	3.5E-04	1.7E-04	6.0E-08
3	ACP-DGN-FS-DG13	1.3E-02	ACP-DGN-FR-DG12	1.3E-02	3.3E-04	1.7E-04	5.8E-08
4	ACP-DGN-FS-DG12	1.3E-02	ACP-DGN-FR-DG13	1.3E-02	3.3E-04	1.7E-04	5.8E-08
5	ACP-DGN-FS-DG11	1.3E-02	ACP-DGN-FR-DG13	1.3E-02	3.3E-04	1.7E-04	5.7E-08
6	ACP-DGN-FS-DG13	1.3E-02	ACP-DGN-FR-DG11	1.3E-02	3.3E-04	1.7E-04	5.7E-08
7	ACP-DGN-FR-DG13	1.3E-02	ACP-DGN-FR-DG12	1.3E-02	3.1E-04	1.7E-04	5.4E-08
8	ACP-DGN-FR-DG13	1.3E-02	ACP-DGN-FR-DG11	1.3E-02	3.1E-04	1.7E-04	5.4E-08
9	ACP-DGN-FS-DG11	1.3E-02	ACP-DGN-FS-DG12	1.3E-02	3.1E-04	1.7E-04	5.4E-08
10	ACP-DGN-FS-DG12	1.3E-07	ACP-DGN-FR-DG11	1.3E-02	3.0E-04	1.7E-04	5.2E-08
11	ACP-DGN-FS-DG11	1.3E-02	ACP-DGN-FR-DG12	1.3E-02	3.0E-04	1.7E-04	5.2E-08
12	ACP-DGN-FR-DG11	1.3E-02	ACP-DGN-FR-DG12	1.3E-02	2.8E-04	1.7E-04	4.9E-08
13	ACP-DGN-FS-DG13	1.3E-02	ACP-DGS-FS-CM	1.2E-02	1.9E-04	1.6E-04	3.0E-08
14	ACP-DGS-FS-CM	1.2E-02	ACP-DGN-FR-DG13	1.3E-02	1.9E-04	1.6E-04	2.9E-08
15	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG13	1.3E-02	1.3E-04	1.2E-04	1.5E-08
16	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG13	1.3E-02	1.2E-04	1.2E-04	1.4E-08
17	ACP-DGN-FS-DG13	1.3E-02	RCI-TDP-FS-TDP1	8.9E-03	1.1E-04	1.2E-04	1.3E-08
18	ACP-DGN-FR-DG13	1.3E-02	RCI-TDP-FS-TDP1	8.9E-03	1.1E-04	1.2E-04	1.2E-08
19	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG12	1.3E-02	9.6E-05	1.2E-04	1.1E-08
20	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FS-DG11	1.3E-02	9.6E-05	1.2E-04	1.1E-08
21	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG12	1.3E-02	8.7E-05	1.2E-04	1.0E-08
22	RCI-TDP-FR-TDP1	8.9E-03	ACP-DGN-FR-DG11	1.3E-02	8.7E-05	1.2E-04	1.0E-08
23	ACP-DGN-FS-DG12	1.3E-02	RCI-TDP-FS-TDP1	8.9E-03	8.3E-05	1.2E-04	9.7E-09
24	ACP-DGN-FS-DG11	1.3E-02	RCI-TDP-FS-TDP1	8.9E-03	8.2E-05	1.2E-04	9.6E-09
25	ACP-DGN-FR-DG11	1.3E-02	RCI-TDP-FS-TDP1	8.9E-03	7.8E-05	1.2E-04	9.1E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant B
23-Oct-89
11:42 AM

TIRGALEX – MOD 3 / 18 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 9.7E-06

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	3.3E-02	7.7E-05	2.5E-06
2	ACP-DGN-FS-DG13	3.3E-02	2.6E-05	8.6E-07
3	ACP-DGN-FR-DG13	3.3E-02	2.6E-05	8.5E-07
4	ACP-DGN-FR-DG11	3.3E-02	1.9E-05	6.2E-07
5	ACP-DGN-FR-DG12	3.3E-02	1.9E-05	6.2E-07
6	ACP-DGN-FS-DG12	3.3E-02	1.9E-05	6.2E-07
7	ACP-DGN-FS-DG11	3.3E-02	1.9E-05	6.1E-07
8	SSW-MDP-FS-MDP2C	3.3E-02	1.8E-05	5.8E-07
9	SSW-MDP-FS-MDP1B	3.3E-02	1.2E-05	4.0E-07
10	SSW-MDP-FS-MDP1A	3.3E-02	1.2E-05	4.0E-07
11	ACP-DGS-FS-CM	3.3E-02	1.2E-05	3.8E-07
12	SSW-MDP-FR-MDP2C	3.3E-02	1.1E-05	3.6E-07
13	SSW-MDP-FR-MDP1B	3.3E-02	7.2E-06	2.4E-07
14	SSW-MDP-FR-MDP1A	3.3E-02	7.2E-06	2.4E-07
15	RCI-TDP-FR-TDP1	3.3E-02	6.4E-06	2.1E-07
16	RCI-TDP-FS-TDP1	3.3E-02	6.3E-06	2.1E-07
17	EHV-FAN-FR-77C02	6.9E-04	8.9E-06	6.1E-09
18	EHV-FAN-FS-77C02	6.9E-04	8.9E-06	6.1E-09
19	EHV-FAN-FS-77C1A	6.9E-04	5.1E-06	3.5E-09
20	EHV-FAN-FS-77C1B	6.9E-04	5.1E-06	3.5E-09
21	EHV-FAN-FR-77C1B	6.9E-04	5.1E-06	3.5E-09
22	EHV-FAN-FR-77C1A	6.9E-04	5.1E-06	3.5E-09

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant B
23-Oct-89
11:43 AM

TIRGALEX – MOD 3 / 18 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.3E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	3.3E-02	ACP-DGN-FS-DG12	3.3E-02	3.5E-04	1.1E-03	3.8E-07
2	ACP-DGN-FS-DG13	3.3E-02	ACP-DGN-FS-DG11	3.3E-02	3.5E-04	1.1E-03	3.8E-07
3	ACP-DGN-FS-DG13	3.3E-02	ACP-DGN-FR-DG12	3.3E-02	3.3E-04	1.1E-03	3.6E-07
4	ACP-DGN-FS-DG12	3.3E-02	ACP-DGN-FR-DG13	3.3E-02	3.3E-04	1.1E-03	3.6E-07
5	ACP-DGN-FS-DG11	3.3E-02	ACP-DGN-FR-DG13	3.3E-02	3.3E-04	1.1E-03	3.6E-07
6	ACP-DGN-FS-DG13	3.3E-02	ACP-DGN-FR-DG11	3.3E-02	3.3E-04	1.1E-03	3.6E-07
7	RCI-TDP-FR-TDP1	3.3E-02	SSW-MDP-FS-CM	3.3E-02	3.2E-04	1.1E-03	3.5E-07
8	SSW-MDP-FS-CM	3.3E-02	RCI-TDP-FS-TDP1	3.3E-02	3.2E-04	1.1E-03	3.5E-07
9	ACP-DGN-FR-DG13	3.3E-02	ACP-DGN-FR-DG11	3.3E-02	3.1E-04	1.1E-03	3.4E-07
10	ACP-DGN-FR-DG13	3.3E-02	ACP-DGN-FR-DG12	3.3E-02	3.1E-04	1.1E-03	3.4E-07
11	ACP-DGN-FS-DG11	3.3E-02	ACP-DGN-FS-DG12	3.3E-02	3.1E-04	1.1E-03	3.4E-07
12	ACP-DGN-FS-DG11	3.3E-02	ACP-DGN-FR-DG12	3.3E-02	3.0E-04	1.1E-03	3.2E-07
13	ACP-DGN-FS-DG12	3.3E-02	ACP-DGN-FR-DG11	3.3E-02	3.0E-04	1.1E-03	3.2E-07
14	ACP-DGN-FR-DG11	3.3E-02	ACP-DGN-FR-DG12	3.3E-02	2.8E-04	1.1E-03	3.0E-07
15	ACP-DGN-FS-DG13	3.3E-02	SSW-MDP-FS-MDP1A	3.3E-02	2.6E-04	1.1E-03	2.8E-07
16	ACP-DGN-FS-DG13	3.3E-02	SSW-MDP-FS-MDP1B	3.3E-02	2.6E-04	1.1E-03	2.8E-07
17	ACP-DGN-FS-DG12	3.3E-02	SSW-MDP-FS-MDP2C	3.3E-02	2.6E-04	1.1E-03	2.8E-07
18	ACP-DGN-FS-DG11	3.3E-02	SSW-MDP-FS-MDP2C	3.3E-02	2.6E-04	1.1E-03	2.8E-07
19	ACP-DGN-FS-DG12	3.3E-02	SSW-MDP-FS-MDP1A	3.3E-02	2.4E-04	1.1E-03	2.6E-07
20	ACP-DGN-FS-DG11	3.3E-02	SSW-MDP-FS-MDP1B	3.3E-02	2.4E-04	1.1E-03	2.6E-07
21	ACP-DGN-FR-DG13	3.3E-02	SSW-MDP-FS-MDP1B	3.3E-02	2.0E-04	1.1E-03	2.1E-07
22	ACP-DGN-FR-DG13	3.3E-02	SSW-MDP-FS-MDP1A	3.3E-02	2.0E-04	1.1E-03	2.1E-07
23	ACP-DGN-FS-DG13	3.3E-02	ACP-DGS-FS-CM	3.3E-02	1.9E-04	1.1E-03	2.1E-07
24	ACP-DGN-FR-DG11	3.3E-02	SSW-MDP-FS-MDP1B	3.3E-02	1.9E-04	1.1E-03	2.0E-07
25	ACP-DGN-FR-DG12	3.3E-02	SSW-MDP-FS-MDP1A	3.3E-02	1.9E-04	1.1E-03	2.0E-07

CONTRIBUTORS FOR PLANT B

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:44 AM

TIRGALEX / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.0E-05

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	1.9E-01	2.6E-05	4.9E-06
2	ACP-DGN-FR-DG13	1.9E-01	2.6E-05	4.9E-06
3	ACP-DGN-FR-DG11	1.9E-01	1.9E-05	3.6E-06
4	ACP-DGN-FS-DG12	1.9E-01	1.9E-05	3.6E-06
5	ACP-DGN-FR-DG12	1.9E-01	1.9E-05	3.6E-06
6	ACP-DGN-FS-DG11	1.9E-01	1.9E-05	3.5E-06
7	ACP-DGS-FS-CM	1.9E-01	1.2E-05	2.2E-06
8	RCI-TDP-FR-TDP1	1.4E-01	6.4E-06	9.1E-07
9	RCI-TDP-FS-TDP1	1.4E-01	6.3E-06	9.0E-07
10	SSW-MDP-FS-CM	1.2E-02	7.7E-05	8.9E-07
11	SSW-MDP-FS-MDP2C	1.2E-02	1.8E-05	2.0E-07
12	SSW-MDP-FS-MDP1B	1.2E-02	1.2E-05	1.4E-07
13	SSW-MDP-FS-MDP1A	1.2E-02	1.2E-05	1.4E-07
14	SSW-MDP-FR-MDP2C	1.2E-02	1.1E-05	1.3E-07
15	EHV-FAN-FR-77C02	1.1E-02	8.9E-06	9.8E-08
16	EHV-FAN-FS-77C02	1.1E-02	8.9E-06	9.8E-08
17	SSW-MDP-FR-MDP1B	1.2E-02	7.2E-06	8.3E-08
18	SSW-MDP-FR-MDP1A	1.2E-02	7.2E-06	8.3E-08
19	EHV-FAN-FS-77C1B	1.1E-02	5.1E-06	5.7E-08
20	EHV-FAN-FS-77C1A	1.1E-02	5.1E-06	5.7E-08
21	EHV-FAN-FR-77C1B	1.1E-02	5.1E-06	5.7E-08
22	EHV-FAN-FR-77C1A	1.1E-02	5.1E-06	5.7E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:46 AM

TIRGALEX / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.8E-04

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FS-DG12	1.9E-01	3.5E-04	3.6E-02	1.2E-05
2	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FS-DG11	1.9E-01	3.5E-04	3.6E-02	1.2E-05
3	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	3.3E-04	3.6E-02	1.2E-05
4	ACP-DGN-FS-DG12	1.9E-01	ACP-DGN-FR-DG13	1.9E-01	3.3E-04	3.6E-02	1.2E-05
5	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FR-DG11	1.9E-01	3.3E-04	3.6E-02	1.2E-05
6	ACP-DGN-FS-DG11	1.9E-01	ACP-DGN-FR-DG13	1.9E-01	3.3E-04	3.6E-02	1.2E-05
7	ACP-DGN-FR-DG13	1.9E-01	ACP-DGN-FR-DG11	1.9E-01	3.1E-04	3.6E-02	1.1E-05
8	ACP-DGN-FR-DG13	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	3.1E-04	3.6E-02	1.1E-05
9	ACP-DGN-FS-DG11	1.9E-01	ACP-DGN-FS-DG12	1.9E-01	3.1E-04	3.6E-02	1.1E-05
10	ACP-DGN-FS-DG11	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	3.0E-04	3.6E-02	1.1E-05
11	ACP-DGN-FS-DG12	1.9E-01	ACP-DGN-FR-DG11	1.9E-01	3.0E-04	3.6E-02	1.1E-05
12	ACP-DGN-FR-DG11	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	2.8E-04	3.6E-02	1.0E-05
13	ACP-DGN-FS-DG13	1.9E-01	ACP-DGS-FS-CM	1.9E-01	1.9E-04	3.6E-02	6.8E-06
14	ACP-DGS-FS-CM	1.9E-01	ACP-DGN-FR-DG13	1.9E-01	1.9E-04	3.6E-02	6.7E-06
15	ACP-DGN-FS-DG13	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	1.1E-04	2.7E-02	3.0E-06
16	ACP-DGN-FR-DG13	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	1.1E-04	2.7E-02	2.8E-06
17	ACP-DGN-FS-DG12	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	8.3E-05	2.7E-02	2.2E-06
18	ACP-DGN-FS-DG11	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	8.2E-05	2.7E-02	2.2E-06
19	ACP-DGN-FR-DG12	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	7.8E-05	2.7E-02	2.1E-06
20	ACP-DGN-FR-DG11	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	7.8E-05	2.7E-02	2.1E-06
21	ACP-DGS-FS-CM	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	4.9E-05	2.7E-02	1.3E-06
22	ACP-DGN-FS-DG12	1.9E-01	SSW-MDP-FS-MDP2C	1.2E-02	2.6E-04	2.2E-03	5.6E-07
23	ACP-DGN-FS-DG11	1.9E-01	SSW-MDP-FS-MDP2C	1.2E-02	2.6E-04	2.2E-03	5.6E-07
24	ACP-DGN-FS-DG13	1.9E-01	SSW-MDP-FS-MDP1A	1.2E-02	2.6E-04	2.2E-03	5.6E-07
25	ACP-DGN-FS-DG13	1.9E-01	SSW-MDP-FS-MDP1B	1.2E-02	2.6E-04	2.2E-03	5.6E-07

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:47 AM

TIRGALEX - MOD 1 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.7E-05

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	1.9E-01	2.6E-05	4.9E-06
2	ACP-DGN-FR-DG13	1.9E-01	2.6E-05	4.9E-06
3	SSW-MDP-FS-CM	5.8E-02	7.7E-05	4.4E-06
4	ACP-DGN-FR-DG11	1.9E-01	1.9E-05	3.6E-06
5	ACP-DGN-FR-DG12	1.9E-01	1.9E-05	3.6E-06
6	ACP-DGN-FS-DG12	1.9E-01	1.9E-05	3.6E-06
7	ACP-DGN-FS-DG11	1.9E-01	1.9E-05	3.5E-06
8	ACP-DGS-FS-CM	1.9E-01	1.2E-05	2.2E-06
9	SSW-MDP-FS-MDP2C	5.8E-02	1.8E-05	1.0E-06
10	RCI-TDP-FR-TDP1	1.4E-01	6.4E-06	9.1E-07
11	RCI-TDP-FS-TDP1	1.4E-01	6.3E-06	9.0E-07
12	SSW-MDP-FS-MDP1B	5.8E-02	1.2E-05	7.1E-07
13	SSW-MDP-FS-MDP1A	5.8E-02	1.2E-05	7.1E-07
14	SSW-MDP-FR-MDP2C	5.8E-02	1.1E-05	6.4E-07
15	SSW-MDP-FR-MDP1A	5.8E-02	7.2E-06	4.2E-07
16	SSW-MDP-FR-MDP1B	5.8E-02	7.2E-06	4.2E-07
17	EHV-FAN-FR-77C02	1.1E-02	8.9E-06	9.8E-08
18	EHV-FAN-FS-77C02	1.1E-02	8.9E-06	9.8E-08
19	EHV-FAN-FS-77C1A	1.1E-02	5.1E-06	5.7E-08
20	EHV-FAN-FS-77C1B	1.1E-02	5.1E-06	5.7E-08
21	EHV-FAN-FR-77C1B	1.1E-02	5.1E-06	5.7E-08
22	EHV-FAN-FR-77C1A	1.1E-02	5.1E-06	5.7E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:48 AM

TIRGALEX – MOD 1 / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 2.5E-04

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FS-DG12	1.9E-01	3.5E-04	3.6E-02	1.2E-05
2	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FS-DG11	1.9E-01	3.5E-04	3.6E-02	1.2E-05
3	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	3.3E-04	3.6E-02	1.2E-05
4	ACP-DGN-FS-DG12	1.9E-01	ACP-DGN-FR-DG13	1.9E-01	3.3E-04	3.6E-02	1.2E-05
5	ACP-DGN-FS-DG13	1.9E-01	ACP-DGN-FR-DG11	1.9E-01	3.3E-04	3.6E-02	1.2E-05
6	ACP-DGN-FS-DG11	1.9E-01	ACP-DGN-FR-DG13	1.9E-01	3.3E-04	3.6E-02	1.2E-05
7	ACP-DGN-FR-DG13	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	3.1E-04	3.6E-02	1.1E-05
8	ACP-DGN-FR-DG13	1.9E-01	ACP-DGN-FR-DG11	1.9E-01	3.1E-04	3.6E-02	1.1E-05
9	ACP-DGN-FS-DG11	1.9E-01	ACP-DGN-FS-DG12	1.9E-01	3.1E-04	3.6E-02	1.1E-05
10	ACP-DGN-FS-DG12	1.9E-01	ACP-DGN-FR-DG11	1.9E-01	3.0E-04	3.6E-02	1.1E-05
11	ACP-DGN-FS-DG11	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	3.0E-04	3.6E-02	1.1E-05
12	ACP-DGN-FR-DG11	1.9E-01	ACP-DGN-FR-DG12	1.9E-01	2.8E-04	3.6E-02	1.0E-05
13	ACP-DGN-FS-DG13	1.9E-01	ACP-DGS-FS-CM	1.9E-01	1.9E-04	3.6E-02	6.8E-06
14	ACP-DGS-FS-CM	1.9E-01	ACP-DGN-FR-DG13	1.9E-01	1.9E-04	3.6E-02	6.7E-06
15	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FS-DG13	1.9E-01	1.3E-04	2.7E-02	3.5E-06
16	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FR-DG13	1.9E-01	1.2E-04	2.7E-02	3.2E-06
17	ACP-DGN-FS-DG13	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	1.1E-04	2.7E-02	3.0E-06
18	ACP-DGN-FS-DG11	1.9E-01	SSW-MDP-FS-MDP2C	5.8E-02	2.6E-04	1.1E-02	2.8E-06
19	ACP-DGN-FS-DG13	1.9E-01	SSW-MDP-FS-MDP1B	5.8E-02	2.6E-04	1.1E-02	2.8E-06
20	ACP-DGN-FS-DG13	1.9E-01	SSW-MDP-FS-MDP1A	5.8E-02	2.6E-04	1.1E-02	2.8E-06
21	ACP-DGN-FS-DG12	1.9E-01	SSW-MDP-FS-MDP2C	5.8E-02	2.6E-04	1.1E-02	2.8E-06
22	ACP-DGN-FR-DG13	1.9E-01	RCI-TDP-FS-TDP1	1.4E-01	1.1E-04	2.7E-02	2.8E-06
23	RCI-TDP-FR-TDP1	1.4E-01	SSW-MDP-FS-CM	5.8E-02	3.2E-04	8.2E-03	2.6E-06
24	SSW-MDP-FS-CM	5.8E-02	RCI-TDP-FS-TDP1	1.4E-01	3.2E-04	8.2E-03	2.6E-06
25	ACP-DGN-FS-DG12	1.9E-01	SSW-MDP-FS-MDP1A	5.8E-02	2.4E-04	1.1E-02	2.6E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:49 AM

TIRGALEX – MOD 2 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.3E-05

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	2.1E-01	2.6E-05	5.5E-06
2	ACP-DGN-FR-DG13	2.1E-01	2.6E-05	5.5E-06
3	ACP-DGN-FR-DG11	2.1E-01	1.9E-05	4.0E-06
4	ACP-DGN-FS-DG12	2.1E-01	1.9E-05	4.0E-06
5	ACP-DGN-FR-DG12	2.1E-01	1.9E-05	4.0E-06
6	ACP-DGN-FS-DG11	2.1E-01	1.9E-05	3.9E-06
7	ACP-DGS-FS-CM	1.9E-01	1.2E-05	2.2E-06
8	SSW-MDP-FS-CM	1.6E-02	7.7E-05	1.2E-06
9	RCI-TDP-FR-TDP1	1.4E-01	6.4E-06	9.1E-07
10	RCI-TDP-FS-TDP1	1.4E-01	6.3E-06	9.0E-07
11	SSW-MDP-FS-MDP2C	1.6E-02	1.8E-05	2.8E-07
12	SSW-MDP-FS-MDP1B	1.6E-02	1.2E-05	1.9E-07
13	SSW-MDP-FS-MDP1A	1.6E-02	1.2E-05	1.9E-07
14	SSW-MDP-FR-MDP2C	1.6E-02	1.1E-05	1.7E-07
15	SSW-MDP-FR-MDP1A	1.6E-02	7.2E-06	1.1E-07
16	SSW-MDP-FR-MDP1B	1.6E-02	7.2E-06	1.1E-07
17	EHV-FAN-FR-77C02	1.1E-02	8.9E-06	9.8E-08
18	EHV-FAN-FS-77C02	1.1E-02	8.9E-06	9.8E-08
19	EHV-FAN-FS-77C1A	1.1E-02	5.1E-06	5.7E-08
20	EHV-FAN-FS-77C1B	1.1E-02	5.1E-06	5.7E-08
21	EHV-FAN-FR-77C1B	1.1E-02	5.1E-06	5.7E-08
22	EHV-FAN-FR-77C1A	1.1E-02	5.1E-06	5.7E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:50 AM

TIRGALEX - MOD 2/ 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 2.5E-04

Rank	Component Name	Δq1	Component Name	Δq2	δ12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	2.1E-01	ACP-DGN-FS-DG12	2.1E-01	3.5E-04	4.4E-02	1.5E-05
2	ACP-DGN-FS-DG13	2.1E-01	ACP-DGN-FS-DG11	2.1E-01	3.5E-04	4.4E-02	1.5E-05
3	ACP-DGN-FS-DG13	2.1E-01	ACP-DGN-FR-DG12	2.1E-01	3.3E-04	4.4E-02	1.5E-05
4	ACP-DGN-FS-DG12	2.1E-01	ACP-DGN-FR-DG13	2.1E-01	3.3E-04	4.4E-02	1.5E-05
5	ACP-DGN-FS-DG11	2.1E-01	ACP-DGN-FR-DG13	2.1E-01	3.3E-04	4.4E-02	1.5E-05
6	ACP-DGN-FS-DG13	2.1E-01	ACP-DGN-FR-DG11	2.1E-01	3.3E-04	4.4E-02	1.5E-05
7	ACP-DGN-FR-DG13	2.1E-01	ACP-DGN-FR-DG12	2.1E-01	3.1E-04	4.4E-02	1.4E-05
8	ACP-DGN-FR-DG13	2.1E-01	ACP-DGN-FR-DG11	2.1E-01	3.1E-04	4.4E-02	1.4E-05
9	ACP-DGN-FS-DG11	2.1E-01	ACP-DGN-FS-DG12	2.1E-01	3.1E-04	4.4E-02	1.4E-05
10	ACP-DGN-FS-DG12	2.1E-01	ACP-DGN-FR-DG11	2.1E-01	3.0E-04	4.4E-02	1.3E-05
11	ACP-DGN-FS-DG11	2.1E-01	ACP-DGN-FR-DG12	2.1E-01	3.0E-04	4.4E-02	1.3E-05
12	ACP-DGN-FR-DG11	2.1E-01	ACP-DGN-FR-DG12	2.1E-01	2.8E-04	4.4E-02	1.2E-05
13	ACP-DGN-FS-DG13	2.1E-01	ACP-DGS-FS-CM	1.9E-01	1.9E-04	4.0E-02	7.6E-06
14	ACP-DGS-FS-CM	1.9E-01	ACP-DGN-FR-DG13	2.1E-01	1.9E-04	4.0E-02	7.4E-06
15	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FS-DG13	2.1E-01	1.3E-04	3.0E-02	3.9E-06
16	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FR-DG13	2.1E-01	1.2E-04	3.0E-02	3.5E-06
17	ACP-DGN-FS-DG13	2.1E-01	RCI-TDP-FS-TDP1	1.4E-01	1.1E-04	3.0E-02	3.4E-06
18	ACP-DGN-FR-DG13	2.1E-01	RCI-TDP-FS-TDP1	1.4E-01	1.1E-04	3.0E-02	3.1E-06
19	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FS-DG12	2.1E-01	9.6E-05	3.0E-02	2.9E-06
20	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FS-DG11	2.1E-01	9.6E-05	3.0E-02	2.9E-06
21	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FR-DG12	2.1E-01	8.7E-05	3.0E-02	2.6E-06
22	RCI-TDP-FR-TDP1	1.4E-01	ACP-DGN-FR-DG11	2.1E-01	8.7E-05	3.0E-02	2.6E-06
23	ACP-DGN-FS-DG12	2.1E-01	RCI-TDP-FS-TDP1	1.4E-01	8.3E-05	3.0E-02	2.5E-06
24	ACP-DGN-FS-DG11	2.1E-01	RCI-TDP-FS-TDP1	1.4E-01	8.2E-05	3.0E-02	2.5E-06
25	ACP-DGN-FR-DG11	2.1E-01	RCI-TDP-FS-TDP1	1.4E-01	7.8E-05	3.0E-02	2.3E-06

Plant B
24-Oct-89
09:13 AM

TIRGALEX – MOD 3 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.6E-04

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	5.3E-01	7.7E-05	4.0E-05
2	ACP-DGN-FS-DG13	5.3E-01	2.6E-05	1.4E-05
3	ACP-DGN-FR-DG13	5.3E-01	2.6E-05	1.4E-05
4	ACP-DGN-FR-DG11	5.3E-01	1.9E-05	9.9E-06
5	ACP-DGN-FR-DG12	5.3E-01	1.9E-05	9.9E-06
6	ACP-DGN-FS-DG12	5.3E-01	1.9E-05	9.9E-06
7	ACP-DGN-FS-DG11	5.3E-01	1.9E-05	9.8E-06
8	SSW-MDP-FS-MDP2C	5.3E-01	1.8E-05	9.3E-06
9	SSW-MDP-FS-MDP1B	5.3E-01	1.2E-05	6.4E-06
10	SSW-MDP-FS-MDP1A	5.3E-01	1.2E-05	6.4E-06
11	ACP-DGS-FS-CM	5.3E-01	1.2E-05	6.1E-06
12	SSW-MDP-FR-MDP2C	5.3E-01	1.1E-05	5.8E-06
13	SSW-MDP-FR-MDP1B	5.3E-01	7.2E-06	3.8E-06
14	SSW-M[illegible]-FR-MDP1A	5.3E-01	7.2E-06	3.8E-06
15	RCI-TDP-FR-TDP1	5.3E-01	6.4E-06	3.4E-06
16	RCI-TDP-FS-TDP1	5.3E-01	6.3E-06	3.3E-06
17	EHV-FAN-FR-77C02	1.1E-02	8.9E-06	9.8E-08
18	EHV-FAN-FS-77C02	1.1E-02	8.9E-06	9.8E-08
19	EHV-FAN-FS-77C1A	1.1E-02	5.1E-06	5.7E-08
20	EHV-FAN-FS-77C1B	1.1E-02	5.1E-06	5.7E-08
21	EHV-FAN-FR-77C1B	1.1E-02	5.1E-06	5.7E-08
22	EHV-FAN-FR-77C1A	1.1E-02	5.1E-06	5.7E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:53 AM

TIRGALEX – MOD 3 / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 3.2E-03

Rank	Component Name	Δq1	Component Name	Δq2	δ12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	5.3E-01	ACP-DGN-FS-DG12	5.3E-01	3.5E-04	2.8E-01	9.6E-05
2	ACP-DGN-FS-DG13	5.3E-01	ACP-DGN-FS-DG11	5.3E-01	3.5E-04	2.8E-01	9.6E-05
3	ACP-DGN-FS-DG13	5.3E-01	ACP-DGN-FR-DG12	5.3E-01	3.3E-04	2.8E-01	9.2E-05
4	ACP-DGN-FS-DG12	5.3E-01	ACP-DGN-FR-DG13	5.3E-01	3.3E-04	2.8E-01	9.2E-05
5	ACP-DGN-FS-DG11	5.3E-01	ACP-DGN-FR-DG13	5.3E-01	3.3E-04	2.8E-01	9.2E-05
6	ACP-DGN-FS-DG13	5.3E-01	ACP-DGN-FR-DG11	5.3E-01	3.3E-04	2.8E-01	9.2E-05
7	RCI-TDP-FR-TDP1	5.3E-01	SSW-MDP-FS-CM	5.3E-01	3.2E-04	2.8E-01	8.9E-05
8	SSW-MDP-FS-CM	5.3E-01	RCI-TDP-FS-TDP1	5.3E-01	3.2E-04	2.8E-01	8.9E-05
9	ACP-DGN-FR-DG13	5.3E-01	ACP-DGN-FR-DG11	5.3E-01	3.1E-04	2.8E-01	8.7E-05
10	ACP-DGN-FR-DG13	5.3E-01	ACP-DGN-FR-DG12	5.3E-01	3.1E-04	2.8E-01	8.7E-05
11	ACP-DGN-FS-DG11	5.3E-01	ACP-DGN-FS-DG12	5.3E-01	3.1E-04	2.8E-01	8.6E-05
12	ACP-DGN-FS-DG11	5.3E-01	ACP-DGN-FR-DG12	5.3E-01	3.0E-04	2.8E-01	8.3E-05
13	ACP-DGN-FS-DG12	5.3E-01	ACP-DGN-FR-DG11	5.3E-01	3.0E-04	2.8E-01	8.3E-05
14	ACP-DGN-FR-DG11	5.3E-01	ACP-DGN-FR-DG12	5.3E-01	2.8E-04	2.8E-01	7.8E-05
15	ACP-DGN-FS-DG13	5.3E-01	SSW-MDP-FS-MDP1A	5.3E-01	2.6E-04	2.8E-01	7.1E-05
16	ACP-DGN-FS-DG13	5.3E-01	SSW-MDP-FS-MDP1B	5.3E-01	2.6E-04	2.8E-01	7.1E-05
17	ACP-DGN-FS-DG12	5.3E-01	SSW-MDP-FS-MDP2C	5.3E-01	2.6E-04	2.8E-01	7.1E-05
18	ACP-DGN-FS-DG11	5.3E-01	SSW-MDP-FS-MDP2C	5.3E-01	2.6E-04	2.8E-01	7.1E-05
19	ACP-DGN-FS-DG12	5.3E-01	SSW-MDP-FS-MDP1A	5.3E-01	2.4E-04	2.8E-01	6.5E-05
20	ACP-DGN-FS-DG11	5.3E-01	SSW-MDP-FS-MDP1B	5.3E-01	2.4E-04	2.8E-01	6.5E-05
21	ACP-DGN-FR-DG13	5.3E-01	SSW-MDP-FS-MDP1B	5.3E-01	2.0E-04	2.8E-01	5.4E-05
22	ACP-DGN-FR-DG13	5.3E-01	SSW-MDP-FS-MDP1A	5.3E-01	2.0E-04	2.8E-01	5.4E-05
23	ACP-DGN-FS-DG13	5.3E-01	ACP-DGS-FS-CM	5.3E-01	1.9E-04	2.8E-01	5.2E-05
24	ACP-DGN-FR-DG11	5.3E-01	SSW-MDP-FS-MDP1B	5.3E-01	1.9E-04	2.8E-01	5.2E-05
25	ACP-DGN-FR-DG12	5.3E-01	SSW-MDP-FS-MDP1A	5.3E-01	1.9E-04	2.8E-01	5.2E-05

CONTRIBUTORS FOR PLANT B

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

Plant B
23-Oct-89
01:51 PM

TIRGALEX / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.2E-06

Rank	Component Name	Δq1	S1	ΔC
1	RCI-TDP-FR-TDP1	2.0E-02	6.4E-06	1.3E-07
2	RCI-TDP-FS-TDP1	2.0E-02	6.3E-06	1.3E-07
3	SSW-MDP-FS-CM	1.6E-03	7.7E-05	1.2E-07
4	ACP-DGN-FS-DG13	4.4E-03	2.6E-05	1.2E-07
5	ACP-DGN-FR-DG13	4.4E-03	2.6E-05	1.1E-07
6	ACP-DGN-FR-DG12	4.4E-03	1.9E-05	8.3E-08
7	ACP-DGN-FS-DG12	4.4E-03	1.9E-05	8.3E-08
8	ACP-DGN-FR-DG11	4.4E-03	1.9E-05	8.3E-08
9	ACP-DGN-FS-DG11	4.4E-03	1.9E-05	8.3E-08
10	ACP-DGS-FS-CM	4.4E-03	1.2E-05	5.2E-08
11	SSW-MDP-FS-MDP2C	1.6E-03	1.8E-05	2.9E-08
12	SSW-MDP-FS-MDP1B	1.6E-03	1.2E-05	2.0E-08
13	SSW-MDP-FS-MDP1A	1.6E-03	1.2E-05	2.0E-08
14	SSW-MDP-FR-MDP2C	1.6E-03	1.1E-05	1.8E-08
15	EHV-FAN-FR-77C02	1.8E-03	8.9E-06	1.6E-08
16	EHV-FAN-FS-77C02	1.8E-03	8.9E-06	1.6E-08
17	SSW-MDP-FR-MDP1B	1.6E-03	7.2E-06	1.2E-08
18	SSW-MDP-FR-MDP1A	1.6E-03	7.2E-06	1.2E-08
19	EHV-FAN-FS-77C1B	1.8E-03	5.1E-06	9.2E-09
20	EHV-FAN-FS-77C1A	1.8E-03	5.1E-06	9.2E-09
21	EHV-FAN-FR-77C1B	1.8E-03	5.1E-06	9.2E-09
22	EHV-FAN-FR-77C1A	1.8E-03	5.1E-06	9.2E-09

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EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

TIRGALEX / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 3.0E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG13	4.4E-03	1.3E-04	8.8E-05	1.2E-08
2	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FS-CM	1.6E-03	3.2E-04	3.2E-05	1.0E-08
3	SSW-MDP-FS-CM	1.6E-03	RCI-TDP-FS-TDP1	2.0E-02	3.2E-04	3.2E-05	1.0E-08
4	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG13	4.4E-03	1.2E-04	8.8E-05	1.0E-08
5	ACP-DGN-FS-DG13	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	1.1E-04	8.8E-05	1.0E-08
6	ACP-DGN-FR-DG13	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	1.1E-04	8.8E-05	9.3E-09
7	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG11	4.4E-03	9.6E-05	8.8E-05	8.5E-09
8	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG12	4.4E-03	9.6E-05	8.8E-05	8.5E-09
9	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG12	4.4E-03	8.7E-05	8.8E-05	7.7E-09
10	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG11	4.4E-03	8.7E-05	8.8E-05	7.7E-09
11	ACP-DGN-FS-DG12	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	8.3E-05	8.8E-05	7.3E-09
12	ACP-DGN-FS-DG11	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	8.2E-05	8.8E-05	7.3E-09
13	ACP-DGN-FR-DG12	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	7.8E-05	8.8E-05	6.9E-09
14	ACP-DGN-FR-DG11	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	7.8E-05	8.8E-05	6.9E-09
15	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FS-DG12	4.4E-03	3.5E-04	2.0E-05	6.8E-09
16	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FS-DG11	4.4E-03	3.5E-04	2.0E-05	6.8E-09
17	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	3.3E-04	2.0E-05	6.5E-09
18	ACP-DGN-FS-DG12	4.4E-03	ACP-DGN-FR-DG13	4.4E-03	3.3E-04	2.0E-05	6.5E-09
19	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FR-DG11	4.4E-03	3.3E-04	2.0E-05	6.5E-09
20	ACP-DGN-FS-DG11	4.4E-03	ACP-DGN-FR-DG13	4.4E-03	3.3E-04	2.0E-05	6.5E-09
21	ACP-DGN-FR-DG13	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	3.1E-04	2.0E-05	6.1E-09
22	ACP-DGN-FR-DG13	4.4E-03	ACP-DGN-FR-DG11	4.4E-03	3.1E-04	2.0E-05	6.1E-09
23	ACP-DGN-FS-DG11	4.4E-03	ACP-DGN-FS-DG12	4.4E-03	3.1E-04	2.0E-05	6.1E-09
24	ACP-DGN-FS-DG12	4.4E-03	ACP-DGN-FR-DG11	4.4E-03	3.0E-04	2.0E-05	5.9E-09
25	ACP-DGN-FS-DG11	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	3.0E-04	2.0E-05	5.9E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX - MOD 1 / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.1E-06

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	8.1E-03	7.7E-05	6.2E-07
2	SSW-MDP-FS-MDP2C	8.1E-03	1.8E-05	1.4E-07
3	RCI-TDP-FR-TDP1	2.0E-02	6.4E-06	1.3E-07
4	RCI-TDP-FS-TDP1	2.0E-02	6.3E-06	1.3E-07
5	ACP-DGN-FS-DG13	4.4E-03	2.6E-05	1.2E-07
6	ACP-DGN-FR-DG13	4.4E-03	2.6E-05	1.1E-07
7	SSW-MDP-FS-MDP1B	8.1E-03	1.2E-05	9.9E-08
8	SSW-MDP-FS-MDP1A	8.1E-03	1.2E-05	9.9E-08
9	SSW-MDP-FR-MDP2C	8.1E-03	1.1E-05	8.9E-08
10	ACP-DGN-FS-DG12	4.4E-03	1.9E-05	8.3E-08
11	ACP-DGN-FR-DG12	4.4E-03	1.9E-05	8.3E-08
12	ACP-DGN-FR-DG11	4.4E-03	1.9E-05	8.3E-08
13	ACP-DGN-FS-DG11	4.4E-03	1.9E-05	8.3E-08
14	SSW-MDP-FR-MDP1A	8.1E-03	7.2E-06	5.9E-08
15	SSW-MDP-FR-MDP1B	8.1E-03	7.2E-06	5.9E-08
16	ACP-DGS-FS-CM	4.4E-03	1.2E-05	5.2E-08
17	EHV-FAN-FS-77C02	1.8E-03	8.9E-06	1.6E-08
18	EHV-FAN-FR-77C02	1.8E-03	8.9E-06	1.6E-08
19	EHV-FAN-FS-77C1B	1.8E-03	5.1E-06	9.2E-09
20	EHV-FAN-FS-77C1A	1.8E-03	5.1E-06	9.2E-09
21	EHV-FAN-FR-77C1B	1.8E-03	5.1E-06	9.2E-09
22	EHV-FAN-FR-77C1A	1.8E-03	5.1E-06	9.2E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 1 / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 6.0E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FS-CM	8.1E-03	3.2E-04	1.6E-04	5.2E-08
2	SSW-MDP-FS-CM	8.1E-03	RCI-TDP-FS-TDP1	2.0E-02	3.2E-04	1.6E-04	5.2E-08
3	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FS-MDP2C	8.1E-03	9.7E-05	1.6E-04	1.6E-08
4	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG13	4.4E-03	1.3E-04	8.8E-05	1.2E-08
5	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FS-MDP1B	8.1E-03	6.9E-05	1.6E-04	1.1E-08
6	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FS-MDP1A	8.1E-03	6.9E-05	1.6E-04	1.1E-08
7	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG13	4.4E-03	1.2E-04	8.8E-05	1.0E-08
8	ACP-DGN-FS-DG13	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	1.1E-04	8.8E-05	1.0E-08
9	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FR-MDP2C	8.1E-03	6.1E-05	1.6E-04	9.9E-09
10	RCI-TDP-FS-TDP1	2.0E-02	SSW-MDP-FS-MDP2C	8.1E-03	6.1E-05	1.6E-04	9.9E-09
11	ACP-DGN-FS-DG13	4.4E-03	SSW-MDP-FS-MDP1B	8.1E-03	2.6E-04	3.6E-05	9.3E-09
12	ACP-DGN-FS-DG13	4.4E-03	SSW-MDP-FS-MDP1A	8.1E-03	2.6E-04	3.6E-05	9.3E-09
13	ACP-DGN-FS-DG12	4.4E-03	SSW-MDP-FS-MDP2C	8.1E-03	2.6E-04	3.6E-05	9.3E-09
14	ACP-DGN-FS-DG11	4.4E-03	SSW-MDP-FS-MDP2C	8.1E-03	2.6E-04	3.6E-05	9.3E-09
15	ACP-DGN-FR-DG13	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	1.1E-04	8.8E-05	9.3E-09
16	ACP-DGN-FS-DG12	4.4E-03	SSW-MDP-FS-MDP1A	8.1E-03	2.4E-04	3.6E-05	8.5E-09
17	ACP-DGN-FS-DG11	4.4E-03	SSW-MDP-FS-MDP1B	8.1E-03	2.4E-04	3.6E-05	8.5E-09
18	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG12	4.4E-03	9.6E-05	8.8E-05	8.5E-09
19	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG11	4.4E-03	9.6E-05	8.8E-05	8.5E-09
20	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG12	4.4E-03	8.7E-05	8.8E-05	7.7E-09
21	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG11	4.4E-03	8.7E-05	8.8E-05	7.7E-09
22	ACP-DGN-FS-DG12	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	8.3E-05	8.8E-05	7.3E-09
23	ACP-DGN-FS-DG11	4.4E-03	RCI-TDP-FS-TDP1	2.0E-02	8.2E-05	8.8E-05	7.3E-09
24	ACP-DGN-FR-DG13	4.4E-03	SSW-MDP-FS-MDP1A	8.1E-03	2.0E-04	3.6E-05	7.0E-09
25	ACP-DGN-FR-DG13	4.4E-03	SSW-MDP-FS-MDP1B	8.1E-03	2.0E-04	3.6E-05	7.0E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX - MOD 2 / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.3E-06

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	2.2E-03	7.7E-05	1.7E-07
2	ACP-DGN-FS-DG13	4.9E-03	2.6E-05	1.3E-07
3	ACP-DGN-FR-DG13	4.9E-03	2.6E-05	1.3E-07
4	RCI-TDP-FR-TDP1	2.0E-02	6.4E-06	1.3E-07
5	RCI-TDP-FS-TDP1	2.0E-02	6.3E-06	1.3E-07
6	ACP-DGN-FR-DG11	4.9E-03	1.9E-05	9.2E-08
7	ACP-DGN-FR-DG12	4.9E-03	1.9E-05	9.2E-08
8	ACP-DGN-FS-DG12	4.9E-03	1.9E-05	9.2E-08
9	ACP-DGN-FS-DG11	4.9E-03	1.9E-05	9.2E-08
10	ACP-DGS-FS-CM	4.4E-03	1.2E-05	5.2E-08
11	SSW-MDP-FS-MDP2C	2.2E-03	1.8E-05	3.9E-08
12	SSW-MDP-FS-MDP1B	2.2E-03	1.2E-05	2.7E-08
13	SSW-MDP-FS-MDP1A	2.2E-03	1.2E-05	2.7E-08
14	SSW-MDP-FR-MDP2C	2.2E-03	1.1E-05	2.4E-08
15	SSW-MDP-FR-MDP1A	2.2E-03	7.2E-06	1.6E-08
16	SSW-MDP-FR-MDP1B	2.2E-03	7.2E-06	1.6E-08
17	EHV-FAN-FR-77C02	1.8E-03	8.9E-06	1.6E-08
18	EHV-FAN-FS-77C02	1.8E-03	8.9E-06	1.6E-08
19	EHV-FAN-FS-77C1A	1.8E-03	5.1E-06	9.2E-09
20	EHV-FAN-FS-77C1B	1.8E-03	5.1E-06	9.2E-09
21	EHV-FAN-FR-77C1B	1.8E-03	5.1E-06	9.2E-09
22	EHV-FAN-FR-77C1A	1.8E-03	5.1E-06	9.2E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 2 / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 3.6E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	SSW-MDP-FS-CM	2.2E-03	RCI-TDP-FS-TDP1	2.0E-02	3.2E-04	4.4E-05	1.4E-08
2	RCI-TDP-FR-TDP1	2.0E-02	SSW-MDP-FS-CM	2.2E-03	3.2E-04	4.4E-05	1.4E-08
3	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG13	4.9E-03	1.3E-04	9.8E-05	1.3E-08
4	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG13	4.9E-03	1.2E-04	9.8E-05	1.2E-08
5	ACP-DGN-FS-DG13	4.9E-03	RCI-TDP-FS-TDP1	2.0E-02	1.1E-04	9.8E-05	1.1E-08
6	ACP-DGN-FR-DG13	4.9E-03	RCI-TDP-FS-TDP1	2.0E-02	1.1E-04	9.8E-05	1.0E-08
7	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG12	4.9E-03	9.6E-05	9.8E-05	9.4E-09
8	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FS-DG11	4.9E-03	9.6E-05	9.8E-05	9.4E-09
.	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG12	4.9E-03	8.7E-05	9.8E-05	8.6E-09
10	RCI-TDP-FR-TDP1	2.0E-02	ACP-DGN-FR-DG11	4.9E-03	8.7E-05	9.8E-05	8.6E-09
11	ACP-DGN-FS-DG13	4.9E-03	ACP-DGN-FS-DG12	4.9E-03	3.5E-04	2.4E-05	8.4E-09
12	ACP-DGN-FS-DG13	4.9E-03	ACP-DGN-FS-DG11	4.9E-03	3.5E-04	2.4E-05	8.4E-09
13	ACP-DGN-FS-DG12	4.9E-03	RCI-TDP-FS-TDP1	2.0E-02	8.3E-05	9.8E-05	8.1E-09
14	ACP-DGN-FS-DG11	4.9E-03	RCI-TDP-FS-TDP1	2.0E-02	8.2E-05	9.8E-05	8.1E-09
15	ACP-DGN-FS-DG12	4.9E-03	ACP-DGN-FR-DG13	4.9E-03	3.3E-04	2.4E-05	8.0E-09
16	ACP-DGN-FS-DG13	4.9E-03	ACP-DGN-FR-DG12	4.9E-03	3.3E-04	2.4E-05	8.0E-09
17	ACP-DGN-FS-DG11	4.9E-03	ACP-DGN-FR-DG13	4.9E-03	3.3E-04	2.4E-05	8.0E-09
18	ACP-DGN-FS-DG13	4.9E-03	ACP-DGN-FR-DG11	4.9E-03	3.3E-04	2.4E-05	8.0E-09
19	ACP-DGN-FR-DG11	4.9E-03	RCI-TDP-FS-TDP1	2.0E-02	7.8E-05	9.8E-05	7.7E-09
20	ACP-DGN-FR-DG12	4.9E-03	RCI-TDP-FS-TDP1	2.0E-02	7.8E-05	9.8E-05	7.7E-09
21	ACP-DGN-FR-DG13	4.9E-03	ACP-DGN-FR-DG12	4.9E-03	3.1E-04	2.4E-05	7.6E-09
22	ACP-DGN-FR-DG13	4.9E-03	ACP-DGN-FR-DG11	4.9E-03	3.1E-04	2.4E-05	7.6E-09
23	ACP-DGN-FS-DG11	4.9E-03	ACP-DGN-FS-DG12	4.9E-03	3.1E-04	2.4E-05	7.5E-09
24	ACP-DGN-FS-DG12	4.9E-03	ACP-DGN-FR-DG11	4.9E-03	3.0E-04	2.4E-05	7.2E-09
25	ACP-DGN-FS-DG11	4.9E-03	ACP-DGN-FR-DG12	4.9E-03	3.0E-04	2.4E-05	7.2E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX – MOD 3 / TIRGALEX
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.3E-05

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	7.4E-02	7.7E-05	5.7E-06
2	SSW-MDP-FS-MDP2C	7.4E-02	1.8E-05	1.3E-06
3	SSW-MDP-FS-MDP1B	7.4E-02	1.2E-05	9.0E-07
4	SSW-MDP-FS-MDP1A	7.4E-02	1.2E-05	9.0E-07
5	SSW-MDP-FR-MDP2C	7.4E-02	1.1E-05	8.1E-07
6	SSW-MDP-FR-MDP1A	7.4E-02	7.2E-06	5.3E-07
7	SSW-MDP-FR-MDP1B	7.4E-02	7.2E-06	5.3E-07
8	RCI-TDP-FR-TDP1	7.4E-02	6.4E-06	4.7E-07
9	RCI-TDP-FS-TDP1	7.4E-02	6.3E-06	4.7E-07
10	ACP-DGN-FS-DG13	1.2E-02	2.6E-05	3.2E-07
11	ACP-DGN-FR-DG13	1.2E-02	2.6E-05	3.2E-07
12	ACP-DGN-FR-DG11	1.2E-02	1.9E-05	2.3E-07
13	ACP-DGN-FR-DG12	1.2E-02	1.9E-05	2.3E-07
14	ACP-DGN-FS-DG12	1.2E-02	1.9E-05	2.3E-07
15	ACP-DGN-FS-DG11	1.2E-02	1.9E-05	2.3E-07
16	ACP-DGS-FS-CM	1.2E-02	1.2E-05	1.4E-07
17	EHV-FAN-FS-77C02	1.8E-03	8.9E-06	1.6E-08
18	EHV-FAN-FR-77C02	1.8E-03	8.9E-06	1.6E-08
19	EHV-FAN-FS-77C1B	1.8E-03	5.1E-06	9.2E-09
20	EHV-FAN-FS-77C1A	1.8E-03	5.1E-06	9.2E-09
21	EHV-FAN-FR-77C1B	1.8E-03	5.1E-06	9.2E-09
22	EHV-FAN-FR-77C1A	1.8E-03	5.1E-06	9.2E-09

EFFECTIVE OVERHAUL INTERVAL = TIRGALEX

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TIRGALEX - MOD 3 / TIRGALEX
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.4E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	SSW-MDP-FS-CM	7.4E-02	RCI-TDP-FS-TDP1	7.4E-02	3.2E-04	5.5E-03	1.8E-06
2	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FS-CM	7.4E-02	3.2E-04	5.5E-03	1.8E-06
3	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FS-MDP2C	7.4E-02	9.7E-05	5.5E-03	5.3E-07
4	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FS-MDP1B	7.4E-02	6.9E-05	5.5E-03	3.8E-07
5	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FS-MDP1A	7.4E-02	6.9E-05	5.5E-03	3.8E-07
6	SSW-MDP-FS-MDP1B	7.4E-02	SSW-MDP-FS-MDP1A	7.4E-02	6.8E-05	5.5E-03	3.7E-07
7	SSW-MDP-FS-MDP2C	7.4E-02	SSW-MDP-FS-MDP1A	7.4E-02	6.8E-05	5.5E-03	3.7E-07
8	SSW-MDP-FS-MDP2C	7.4E-02	SSW-MDP-FS-MDP1B	7.4E-02	6.8E-05	5.5E-03	3.7E-07
9	RCI-TDP-FS-TDP1	7.4E-02	SSW-MDP-FS-MDP2C	7.4E-02	6.1E-05	5.5E-03	3.3E-07
10	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FR-MDP2C	7.4E-02	6.1E-05	5.5E-03	3.3E-07
11	ACP-DGN-FS-DG12	1.2E-02	SSW-MDP-FS-MDP2C	7.4E-02	2.6E-04	9.1E-04	2.3E-07
12	ACP-DGN-FS-DG13	1.2E-02	SSW-MDP-FS-MDP1A	7.4E-02	2.6E-04	9.1E-04	2.3E-07
13	ACP-DGN-FS-DG11	1.2E-02	SSW-MDP-FS-MDP2C	7.4E-02	2.6E-04	9.1E-04	2.3E-07
14	ACP-DGN-FS-DG13	1.2E-02	SSW-MDP-FS-MDP1B	7.4E-02	2.6E-04	9.1E-04	2.3E-07
15	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FR-MDP1B	7.4E-02	4.0E-05	5.5E-03	2.2E-07
16	RCI-TDP-FR-TDP1	7.4E-02	SSW-MDP-FR-MDP1A	7.4E-02	4.0E-05	5.5E-03	2.2E-07
17	RCI-TDP-FS-TDP1	7.4E-02	SSW-MDP-FS-MDP1A	7.4E-02	4.0E-05	5.5E-03	2.2E-07
18	RCI-TDP-FS-TDP1	7.4E-02	SSW-MDP-FS-MDP1B	7.4E-02	4.0E-05	5.5E-03	2.2E-07
19	ACP-DGN-FS-DG11	1.2E-02	SSW-MDP-FS-MDP1B	7.4E-02	2.4E-04	9.1E-04	2.1E-07
20	ACP-DGN-FS-DG12	1.2E-02	SSW-MDP-FS-MDP1A	7.4E-02	2.4E-04	9.1E-04	2.1E-07
21	ACP-DGN-FR-DG13	1.2E-02	SSW-MDP-FS-MDP1A	7.4E-02	2.0E-04	9.1E-04	1.8E-07
22	ACP-DGN-FR-DG13	1.2E-02	SSW-MDP-FS-MDP1B	7.4E-02	2.0E-04	9.1E-04	1.8E-07
23	ACP-DGN-FR-DG11	1.2E-02	SSW-MDP-FS-MDP2C	7.4E-02	1.9E-04	9.1E-04	1.7E-07
24	ACP-DGN-FR-DG11	1.2E-02	SSW-MDP-FS-MDP1B	7.4E-02	1.9E-04	9.1E-04	1.7E-07
25	ACP-DGN-FR-DG12	1.2E-02	SSW-MDP-FS-MDP1A	7.4E-02	1.9E-04	9.1E-04	1.7E-07

CONTRIBUTORS FOR
PLANT B

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:23 AM

TIRGALEX / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.6E-07

Rank	Component Name	Δqi	Si	ΔC
1	ACP-DGN-FS-DG13	9.9E-04	2.6E-05	2.6E-08
2	ACP-DGN-FR-DG13	9.9E-04	2.6E-05	2.6E-08
3	ACP-DGN-FR-DG11	9.9E-04	1.9E-05	1.9E-08
4	ACP-DGN-FS-DG12	9.9E-04	1.9E-05	1.9E-08
5	ACP-DGN-FR-DG12	9.9E-04	1.9E-05	1.9E-08
6	ACP-DGN-FS-DG11	9.9E-04	1.9E-05	1.8E-08
7	ACP-DGS-FS-CM	9.9E-04	1.2E-05	1.2E-08
8	RCI-TDP-FR-TDP1	7.4E-04	6.4E-06	4.7E-09
9	RCI-TDP-FS-TDP1	7.4E-04	6.3E-06	4.7E-09
10	SSW-MDP-FS-CM	6.0E-05	7.7E-05	4.6E-09
11	SSW-MDP-FS-MDP2C	6.0E-05	1.8E-05	1.1E-09
12	SSW-MDP-FS-MDP1B	6.0E-05	1.2E-05	7.3E-10
13	SSW-MDP-FS-MDP1A	6.0E-05	1.2E-05	7.3E-10
14	SSW-MDP-FR-MDP2C	6.0E-05	1.1E-05	6.6E-10
15	EHV-FAN-FR-77C02	5.7E-05	8.9E-06	5.1E-10
16	EHV-FAN-FS-77C02	5.7E-05	8.9E-06	5.1E-10
17	SSW-MDP-FR-MDP1B	6.0E-05	7.2E-06	4.3E-10
18	SSW-MDP-FR-MDP1A	6.0E-05	7.2E-06	4.3E-10
19	EHV-FAN-FS-77C1B	5.7E-05	5.1E-06	2.9E-10
20	EHV-FAN-FS-77C1A	5.7E-05	5.1E-06	2.9E-10
21	EHV-FAN-FR-77C1B	5.7E-05	5.1E-06	2.9E-10
22	EHV-FAN-FR-77C1A	5.7E-05	5.1E-06	2.9E-10

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:24 AM

TIRGALEX / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ▲C = 5.0E-09

Rank	Component Name	▲q1	Component Name	▲q2	B12	▲q1 ▲q2	▲C
1	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FS-DG12	9.9E-04	3.5E-04	9.7E-07	3.4E-10
2	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FS-DG11	9.9E-04	3.5E-04	9.7E-07	3.4E-10
3	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	3.3E-04	9.7E-07	3.2E-10
4	ACP-DGN-FS-DG12	9.9E-04	ACP-DGN-FR-DG13	9.9E-04	3.3E-04	9.7E-07	3.2E-10
5	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FR-DG11	9.9E-04	3.3E-04	9.7E-07	3.2E-10
6	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FR-DG13	9.9E-04	3.3E-04	9.7E-07	3.2E-10
7	ACP-DGN-FR-DG13	9.9E-04	ACP-DGN-FR-DG11	9.9E-04	3.1E-04	9.7E-07	3.0E-10
8	ACP-DGN-FR-DG13	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	3.1E-04	9.7E-07	3.0E-10
9	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FS-DG12	9.9E-04	3.1E-04	9.7E-07	3.0E-10
10	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	3.0E-04	9.7E-07	2.9E-10
11	ACP-DGN-FS-DG12	9.9E-04	ACP-DGN-FR-DG11	9.9E-04	3.0E-04	9.7E-07	2.9E-10
12	ACP-DGN-FR-DG11	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	2.8E-04	9.7E-07	2.7E-10
13	ACP-DGN-FS-DG13	9.9E-04	ACP-DGS-FS-CM	9.9E-04	1.9E-04	9.7E-07	1.8E-10
14	ACP-DGS-FS-CM	9.9E-04	ACP-DGN-FR-DG13	9.9E-04	1.9E-04	9.7E-07	1.8E-10
15	ACP-DGN-FS-DG13	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	1.1E-04	7.3E-07	8.2E-11
16	ACP-DGN-FR-DG13	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	1.1E-04	7.3E-07	7.6E-11
17	ACP-DGN-FS-DG12	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	8.3E-05	7.3E-07	6.1E-11
18	ACP-DGN-FS-DG11	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	8.2E-05	7.3E-07	6.0E-11
19	ACP-DGN-FR-DG12	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	7.8E-05	7.3E-07	5.7E-11
20	ACP-DGN-FR-DG11	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	7.8E-05	7.3E-07	5.7E-11
21	ACP-DGS-FS-CM	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	4.9E-05	7.3E-07	3.6E-11
22	ACP-DGN-FS-DG12	9.9E-04	SSW-MDP-FS-MDP2C	6.0E-05	2.6E-04	5.9E-08	1.5E-11
23	ACP-DGN-FS-DG11	9.9E-04	SSW-MDP-FS-MDP2C	6.0E-05	2.6E-04	5.9E-08	1.5E-11
24	ACP-DGN-FS-DG11	9.9E-04	SSW-MDP-FS-MDP1A	6.0E-05	2.6E-04	5.9E-08	1.5E-11
25	ACP-DGN-FS-DG13	9.9E-04	SSW-MDP-FS-MDP1B	6.0E-05	2.6E-04	5.9E-08	1.5E-11

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS

Plant B
23-Oct-89
11:26 AM

TIRGALEX – MOD 1 / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.9E-07

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	9.9E-04	2.6E-05	2.6E-08
2	ACP-DGN-FR-DG13	9.9E-04	2.6E-05	2.6E-08
3	SSW-MDP-FS-CM	3.0E-04	7.7E-05	2.3E-08
4	ACP-DGN-FR-DG11	9.9E-04	1.9E-05	1.9E-08
5	ACP-DGN-FR-DG12	9.9E-04	1.9E-05	1.9E-08
6	ACP-DGN-FS-DG12	9.9E-04	1.9E-05	1.9E-08
7	ACP-DGN-FS-DG11	9.9E-04	1.9E-05	1.8E-08
8	ACP-DGS-FS-CM	9.9E-04	1.2E-05	1.2E-08
9	SSW-MDP-FS-MDP2C	3.0E-04	1.8E-05	5.3E-09
10	RCI-TDP-FR-TDP1	7.4E-04	6.4E-06	4.7E-09
11	RCI-TDP-FS-TDP1	7.4E-04	6.3E-06	4.7E-09
12	SSW-MDP-FS-MDP1B	3.0E-04	1.2E-05	3.7E-09
13	SSW-MDP-FS-MDP1A	3.0E-04	1.2E-05	3.7E-09
14	SSW-MDP-FR-MDP2C	3.0E-04	1.1E-05	3.3E-09
15	SSW-MDP-FR-MDP1A	3.0E-04	7.2E-06	2.2E-09
16	SSW-MDP-FR-MDP1B	3.0E-04	7.2E-06	2.2E-09
17	EHV-FAN-FR-77C02	5.7E-05	8.9E-06	5.1E-10
18	EHV-FAN-FS-77C02	5.7E-05	8.9E-06	5.1E-10
19	EHV-FAN-FS-77C1A	5.7E-05	5.1E-06	2.9E-10
20	EHV-FAN-FS-77C1B	5.7E-05	5.1E-06	2.9E-10
21	EHV-FAN-FR-77C1B	5.7E-05	5.1E-06	2.9E-10
22	EHV-FAN-FR-77C1A	5.7E-05	5.1E-06	2.9E-10

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:27 AM

TIRGALEX – MOD 1/ 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 6.9E-09

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FS-DG12	9.9E-04	3.5E-04	9.7E-07	3.4E-10
2	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FS-DG11	9.9E-04	3.5E-04	9.7E-07	3.4E-10
3	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	3.3E-04	9.7E-07	3.2E-10
4	ACP-DGN-FS-DG12	9.9E-04	ACP-DGN-FR-DG13	9.9E-04	3.3E-04	9.7E-07	3.2E-10
5	ACP-DGN-FS-DG13	9.9E-04	ACP-DGN-FR-DG11	9.9E-04	3.3E-04	9.7E-07	3.2E-10
6	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FR-DG13	9.9E-04	3.3E-04	9.7E-07	3.2E-10
7	ACP-DGN-FR-DG13	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	3.1E-04	9.7E-07	3.0E-10
8	ACP-DGN-FR-DG13	9.9E-04	ACP-DGN-FR-DG11	9.9E-04	3.1E-04	9.7E-07	3.0E-10
9	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FS-DG12	9.9E-04	3.1E-04	9.7E-07	3.0E-10
10	ACP-DGN-FS-DG12	9.9E-04	ACP-DGN-FR-DG11	9.9E-04	3.0E-04	9.7E-07	2.9E-10
11	ACP-DGN-FS-DG11	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	3.0E-04	9.7E-07	2.9E-10
12	ACP-DGN-FR-DG11	9.9E-04	ACP-DGN-FR-DG12	9.9E-04	2.8E-04	9.7E-07	2.7E-10
13	ACP-DGN-FS-DG13	9.9E-04	ACP-DGS-FS-CM	9.9E-04	1.9E-04	9.7E-07	1.8E-10
14	ACP-DGS-FS-CM	9.9E-04	ACP-DGN-FR-DG13	9.9E-04	1.9E-04	9.7E-07	1.8E-10
15	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FS-DG13	9.9E-04	1.3E-04	7.3E-07	9.5E-11
16	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FR-DG13	9.9E-04	1.2E-04	7.3E-07	8.6E-11
17	ACP-DGN-FS-DG13	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	1.1E-04	7.3E-07	8.2E-11
18	ACP-DGN-FS-DG11	9.9E-04	SSW-MDP-FS-MDP2C	3.0E-04	2.6E-04	3.0E-07	7.7E-11
19	ACP-DGN-FS-DG13	9.9E-04	SSW-MDP-FS-MDP1B	3.0E-04	2.6E-04	3.0E-07	7.7E-11
20	ACP-DGN-FS-DG13	9.9E-04	SSW-MDP-FS-MDP1A	3.0E-04	2.6E-04	3.0E-07	7.7E-11
21	ACP-DGN-FS-DG12	9.9E-04	SSW-MDP-FS-MDP2C	3.0E-04	2.6E-04	3.0E-07	7.7E-11
22	ACP-DGN-FR-DG13	9.9E-04	RCI-TDP-FS-TDP1	7.4E-04	1.1E-04	7.3E-07	7.6E-11
23	RCI-TDP-FR-TDP1	7.4E-04	SSW-MDP-FS-CM	3.0E-04	3.2E-04	2.2E-07	7.2E-11
24	SSW-MDP-FS-CM	3.0E-04	RCI-TDP-FS-TDP1	7.4E-04	3.2E-04	2.2E-07	7.2E-11
25	ACP-DGN-FS-DG12	9.9E-04	SSW-MDP-FS-MDP1A	3.0E-04	2.4E-04	3.0E-07	7.0E-11

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:28 AM

TIRGALEX - MOD 2 / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.7E-07

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	1.1E-03	2.6E-05	2.9E-08
2	ACP-DGN-FR-DG13	1.1E-03	2.6E-05	2.8E-08
3	ACP-DGN-FR-DG11	1.1E-03	1.9E-05	2.1E-08
4	ACP-DGN-FS-DG12	1.1E-03	1.9E-05	2.1E-08
5	ACP-DGN-FR-DG12	1.1E-03	1.9E-05	2.1E-08
6	ACP-DGN-FS-DG11	1.1E-03	1.9E-05	2.0E-08
7	ACP-DGS-FS-CM	9.9E-04	1.2E-05	1.2E-08
8	SSW-MDP-FS-CM	8.2E-05	7.7E-05	6.3E-09
9	RCI-TDP-FR-TDP1	7.4E-04	6.4E-06	4.7E-09
10	RCI-TDP-FS-TDP1	7.4E-04	6.3E-06	4.7E-09
11	SSW-MDP-FS-MDP2C	8.2E-05	1.8E-05	1.4E-09
12	SSW-MDP-FS-MDP1B	8.2E-05	1.2E-05	1.0E-09
13	SSW-MDP-FS-MDP1A	8.2E-05	1.2E-05	1.0E-09
14	SSW-MDP-FR-MDP2C	8.2E-05	1.1E-05	9.0E-10
15	SSW-MDP-FR-MDP1A	8.2E-05	7.2E-06	5.9E-10
16	SSW-MDP-FR-MDP1B	8.2E-05	7.2E-06	5.9E-10
17	EHV-FAN-FR-77C02	5.7E-05	8.9E-06	5.1E-10
18	EHV-FAN-FS-77C02	5.7E-05	8.9E-06	5.1E-10
19	EHV-FAN-FS-77C1A	5.7E-05	5.1E-06	2.9E-10
20	EHV-FAN-FS-77C1B	5.7E-05	5.1E-06	2.9E-10
21	EHV-FAN-FR-77C1B	5.7E-05	5.1E-06	2.9E-10
22	EHV-FAN-FR-77C1A	5.7E-05	5.1E-06	2.9E-10

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:30 AM

TIRGALEX – MOD 2 / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ▲C = 6.7E-09

Rank	Component Name	▲q1	Component Name	▲q2	S12	▲q1 ▲q2	▲C
1	ACP-DGN-FS-DG13	1.1E-03	ACP-DGN-FS-DG12	1.1E-03	3.5E-04	1.2E-06	4.2E-10
2	ACP-DGN-FS-DG13	1.1E-03	ACP-DGN-FS-DG11	1.1E-03	3.5E-04	1.2E-06	4.2E-10
3	ACP-DGN-FS-DG13	1.1E-03	ACP-DGN-FR-DG12	1.1E-03	3.3E-04	1.2E-06	4.0E-10
4	ACP-DGN-FS-DG12	1.1E-03	ACP-DGN-FR-DG13	1.1E-03	3.3E-04	1.2E-06	4.0E-10
5	ACP-DGN-FS-DG11	1.1E-03	ACP-DGN-FR-DG13	1.1E-03	3.3E-04	1.2E-06	4.0E-10
6	ACP-DGN-FS-DG13	1.1E-03	ACP-DGN-FR-DG11	1.1E-03	3.3E-04	1.2E-06	4.0E-10
7	ACP-DGN-FR-DG13	1.1E-03	ACP-DGN-FR-DG12	1.1E-03	3.1E-04	1.2E-06	3.8E-10
8	ACP-DGN-FR-DG13	1.1E-03	ACP-DGN-FR-DG11	1.1E-03	3.1E-04	1.2E-06	3.8E-10
9	ACP-DGN-FS-DG11	1.1E-03	ACP-DGN-FS-DG12	1.1E-03	3.1E-04	1.2E-06	3.7E-10
10	ACP-DGN-FS-DG12	1.1E-03	ACP-DGN-FR-DG11	1.1E-03	3.0E-04	1.2E-06	3.6E-10
11	ACP-DGN-FS-DG11	1.1E-03	ACP-DGN-FR-DG12	1.1E-03	3.0E-04	1.2E-06	3.6E-10
12	ACP-DGN-FR-DG11	1.1E-03	ACP-DGN-FR-DG12	1.1E-03	2.8E-04	1.2E-06	3.4E-10
13	ACP-DGN-FS-DG13	1.1E-03	ACP-DGS-FS-CM	9.9E-04	1.9E-04	1.1E-06	2.1E-10
14	ACP-DGS-FS-CM	9.9E-04	ACP-DGN-FR-DG13	1.1E-03	1.9E-04	1.1E-06	2.0E-10
15	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FS-DG13	1.1E-03	1.3E-04	8.1E-07	1.1E-10
16	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FR-DG13	1.1E-03	1.2E-04	8.1E-07	9.6E-11
17	ACP-DGN-FS-DG13	1.1E-03	RCI-TDP-FS-TDP1	7.4E-04	1.1E-04	8.1E-07	9.1E-11
18	ACP-DGN-FR-DG13	1.1E-03	RCI-TDP-FS-TDP1	7.4E-04	1.1E-04	8.1E-07	8.5E-11
19	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FS-DG12	1.1E-03	9.6E-05	8.1E-07	7.8E-11
20	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FS-DG11	1.1E-03	9.6E-05	8.1E-07	7.8E-11
21	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FR-DG12	1.1E-03	8.7E-05	8.1E-07	7.1E-11
22	RCI-TDP-FR-TDP1	7.4E-04	ACP-DGN-FR-DG11	1.1E-03	8.7E-05	8.1E-07	7.1E-11
23	ACP-DGN-FS-DG12	1.1E-03	RCI-TDP-FS-TDP1	7.4E-04	8.3E-05	8.1E-07	6.7E-11
24	ACP-DGN-FS-DG11	1.1E-03	RCI-TDP-FS-TDP1	7.4E-04	8.2E-05	8.1E-07	6.7E-11
25	ACP-DGN-FR-DG11	1.1E-03	RCI-TDP-FS-TDP1	7.4E-04	7.8E-05	8.1E-07	6.3E-11

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:31 AM

TIRGALEX - MOD 3 / 18 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 8.1E-07

Rank	Component Name	Δql	Sl	ΔC
1	SSW-MDP-FS-CM	2.7E-03	7.7E-05	2.1E-07
2	ACP-DGN-FS-DG13	2.7E-03	2.6E-05	7.1E-08
3	ACP-DGN-FR-DG13	2.7E-03	2.6E-05	7.1E-08
4	ACP-DGN-FR-DG11	2.7E-03	1.9E-05	5.1E-08
5	ACP-DGN-FR-DG12	2.7E-03	1.9E-05	5.1E-08
6	ACP-DGN-FS-DG12	2.7E-03	1.9E-05	5.1E-08
7	ACP-DGN-FS-DG11	2.7E-03	1.9E-05	5.1E-08
8	SSW-MDP-FS-MDP2C	2.7E-03	1.8E-05	4.8E-08
9	SSW-MDP-FS-MDP1B	2.7E-03	1.2E-05	3.3E-08
10	SSW-MDP-FS-MDP1A	2.7E-03	1.2E-05	3.3E-08
11	ACP-DGS-FS-CM	2.7E-03	1.2E-05	3.2E-08
12	SSW-MDP-FR-MDP2C	2.7E-03	1.1E-05	3.0E-08
13	SSW-MDP-FR-MDP1B	2.7E-03	7.2E-06	2.0E-08
14	SSW-MDP-FR-MDP1A	2.7E-03	7.2E-06	2.0E-08
15	RCI-TDP-FR-TDP1	2.7E-03	6.4E-06	1.7E-08
16	RCI-TDP-FS-TDP1	2.7E-03	6.3E-06	1.7E-08
17	EHV-FAN-FR-77C02	5.7E-05	8.9E-06	5.1E-10
18	EHV-FAN-FS-77C02	5.7E-05	8.9E-06	5.1E-10
19	EHV-FAN-FS-77C1A	5.7E-05	5.1E-06	2.9E-10
20	EHV-FAN-FS-77C1B	5.7E-05	5.1E-06	2.9E-10
21	EHV-FAN-FR-77C1B	5.7E-05	5.1E-06	2.9E-10
22	EHV-FAN-FR-77C1A	5.7E-05	5.1E-06	2.9E-10

EFFECTIVE OVERHAUL INTERVAL = 18 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
11:32 AM

TIRGALEX – MOD 3 / 18 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 8.8E-08

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	2.7E-03	ACP-DGN-FS-DG12	2.7E-03	3.5E-04	7.5E-06	2.6E-09
2	ACP-DGN-FS-DG13	2.7E-03	ACP-DGN-FS-DG11	2.7E-03	3.5E-04	7.5E-06	2.6E-09
3	ACP-DGN-FS-DG13	2.7E-03	ACP-DGN-FR-DG12	2.7E-03	3.3E-04	7.5E-06	2.5E-09
4	ACP-DGN-FS-DG12	2.7E-03	ACP-DGN-FR-DG13	2.7E-03	3.3E-04	7.5E-06	2.5E-09
5	ACP-DGN-FS-DG11	2.7E-03	ACP-DGN-FR-DG13	2.7E-03	3.3E-04	7.5E-06	2.5E-09
6	ACP-DGN-FS-DG13	2.7E-03	ACP-DGN-FR-DG11	2.7E-03	3.3E-04	7.5E-06	2.5E-09
7	RCI-TDP-FR-TDP1	2.7E-03	SSW-MDP-FS-CM	2.7E-03	3.2E-04	7.5E-06	2.4E-09
8	SSW-MDP-FS-CM	2.7E-03	RCI-TDP-FS-TDP1	2.7E-03	3.2E-04	7.5E-06	2.4E-09
9	ACP-DGN-FR-DG13	2.7E-03	ACP-DGN-FR-DG11	2.7E-03	3.1E-04	7.5E-06	2.4E-09
10	ACP-DGN-FR-DG13	2.7E-03	ACP-DGN-FR-DG12	2.7E-03	3.1E-04	7.5E-06	2.4E-09
11	ACP-DGN-FS-DG11	2.7E-03	ACP-DGN-FS-DG12	2.7E-03	3.1E-04	7.5E-06	2.3E-09
12	ACP-DGN-FS-DG11	2.7E-03	ACP-DGN-FR-DG12	2.7E-03	3.0E-04	7.5E-06	2.3E-09
13	ACP-DGN-FS-DG12	2.7E-03	ACP-DGN-FR-DG11	2.7E-03	3.0E-04	7.5E-06	2.3E-09
14	ACP-DGN-FR-DG11	2.7E-03	ACP-DGN-FR-DG12	2.7E-03	2.8E-04	7.5E-06	2.1E-09
15	ACP-DGN-FS-DG13	2.7E-03	SSW-MDP-FS-MDP1A	2.7E-03	2.6E-04	7.5E-06	1.9E-09
16	ACP-DGN-FS-DG13	2.7E-03	SSW-MDP-FS-MDP1B	2.7E-03	2.6E-04	7.5E-06	1.9E-09
17	ACP-DGN-FS-DG12	2.7E-03	SSW-MDP-FS-MDP2C	2.7E-03	2.6E-04	7.5E-06	1.9E-09
18	ACP-DGN-FS-DG11	2.7E-03	SSW-MDP-FS-MDP2C	2.7E-03	2.6E-04	7.5E-06	1.9E-09
19	ACP-DGN-FS-DG12	2.7E-03	SSW-MDP-FS-MDP1A	2.7E-03	2.4E-04	7.5E-06	1.8E-09
20	ACP-DGN-FS-DG11	2.7E-03	SSW-MDP-FS-MDP1B	2.7E-03	2.4E-04	7.5E-06	1.8E-09
21	ACP-DGN-FR-DG13	2.7E-03	SSW-MDP-FS-MDP1B	2.7E-03	2.0E-04	7.5E-06	1.5E-09
22	ACP-DGN-FR-DG13	2.7E-03	SSW-MDP-FS-MDP1A	2.7E-03	2.0E-04	7.5E-06	1.5E-09
23	ACP-DGN-FS-DG13	2.7E-03	ACP-DGS-FS-CM	2.7E-03	1.9E-04	7.5E-06	1.4E-09
24	ACP-DGN-FR-DG11	2.7E-03	SSW-MDP-FS-MDP1B	2.7E-03	1.9E-04	7.5E-06	1.4E-09
25	ACP-DGN-FR-DG12	2.7E-03	SSW-MDP-FS-MDP1A	2.7E-03	1.9E-04	7.5E-06	1.4E-09

CONTRIBUTORS FOR
PLANT B

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
10:33 AM

TIRGALEX / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 6.3E-07

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	3.9E-03	2.6E-05	1.0E-07
2	ACP-DGN-FR-DG13	3.9E-03	2.6E-05	1.0E-07
3	ACP-DGN-FR-DG11	3.9E-03	1.9E-05	7.4E-08
4	ACP-DGN-FS-DG12	3.9E-03	1.9E-05	7.4E-08
5	ACP-DGN-FR-DG12	3.9E-03	1.9E-05	7.4E-08
6	ACP-DGN-FS-DG11	3.9E-03	1.9E-05	7.4E-08
7	ACP-DGS-FS-CM	3.9E-03	1.2E-05	4.6E-08
8	RCI-TDP-FR-TDP1	3.0E-03	6.4E-06	1.9E-08
9	RCI-TDP-FS-TDP1	3.0E-03	6.3E-06	1.9E-08
10	SSW-MDP-FS-CM	2.4E-04	7.7E-05	1.9E-08
11	SSW-MDP-FS-MDP2C	2.4E-04	1.8E-05	4.2E-09
12	SSW-MDP-FS-MDP1B	2.4E-04	1.2E-05	2.9E-09
13	SSW-MDP-FS-MDP1A	2.4E-04	1.2E-05	2.9E-09
14	SSW-MDP-FR-MDP2C	2.4E-04	1.1E-05	2.6E-09
15	EHV-FAN-FR-77C02	2.3E-04	8.9E-06	2.0E-09
16	EHV-FAN-FS-77C02	2.3E-04	8.9E-06	2.0E-09
17	SSW-MDP-FR-MDP1B	2.4E-04	7.2E-06	1.7E-09
18	SSW-MDP-FR-MDP1A	2.4E-04	7.2E-06	1.7E-09
19	EHV-FAN-FS-77C1B	2.3E-04	5.1E-06	1.2E-09
20	EHV-FAN-FS-77C1A	2.3E-04	5.1E-06	1.2E-09
21	EHV-FAN-FR-77C1B	2.3E-04	5.1E-06	1.2E-09
22	EHV-FAN-FR-77C1A	2.3E-04	5.1E-06	1.2E-09

EFFECTIVE RENEWAL INTERVAL = 72 MONTHS
DETECTION INTERVAL = 1 MONTH

Plant B
23-Oct-89
10:34 AM

TIRGALEX / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 8.0E-08

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FS-DG12	3.9E-03	3.5E-04	1.6E-05	5.4E-09
2	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FS-DG11	3.9E-03	3.5E-04	1.6E-05	5.4E-09
3	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	3.3E-04	1.6E-05	5.2E-09
4	ACP-DGN-FS-DG12	3.9E-03	ACP-DGN-FR-DG13	3.9E-03	3.3E-04	1.6E-05	5.2E-09
5	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FR-DG11	3.9E-03	3.3E-04	1.6E-05	5.2E-09
6	ACP-DGN-FS-DG11	3.9E-03	ACP-DGN-FR-DG13	3.9E-03	3.3E-04	1.6E-05	5.2E-09
7	ACP-DGN-FR-DG13	3.9E-03	ACP-DGN-FR-DG11	3.9E-03	3.1E-04	1.6E-05	4.9E-09
8	ACP-DGN-FR-DG13	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	3.1E-04	1.6E-05	4.9E-09
9	ACP-DGN-FS-DG11	3.9E-03	ACP-DGN-FS-DG12	3.9E-03	3.1E-04	1.6E-05	4.8E-09
10	ACP-DGN-FS-DG11	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	3.0E-04	1.6E-05	4.7E-09
11	ACP-DGN-FS-DG12	3.9E-03	ACP-DGN-FR-DG11	3.9E-03	3.0E-04	1.6E-05	4.7E-09
12	ACP-DGN-FR-DG11	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	2.8E-04	1.6E-05	4.4E-09
13	ACP-DGN-FS-DG13	3.9E-03	ACP-DGS-FS-CM	3.9E-03	1.9E-04	1.6E-05	3.0E-09
14	ACP-DGS-FS-CM	3.9E-03	ACP-DGN-FR-DG13	3.9E-03	1.9E-04	1.6E-05	2.9E-09
15	ACP-DGN-FS-DG13	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	1.1E-04	1.2E-05	1.3E-09
16	ACP-DGN-FR-DG13	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	1.1E-04	1.2E-05	1.2E-09
17	ACP-DGN-FS-DG12	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	8.3E-05	1.2E-05	9.7E-10
18	ACP-DGN-FS-DG11	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	8.2E-05	1.2E-05	9.6E-10
19	ACP-DGN-FR-DG12	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	7.8E-05	1.2E-05	9.1E-10
20	ACP-DGN-FR-DG11	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	7.8E-05	1.2E-05	9.1E-10
21	ACP-DGS-FS-CM	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	4.9E-05	1.2E-05	5.7E-10
22	ACP-DGN-FS-DG12	3.9E-03	SSW-MDP-FS-MDP2C	2.4E-04	2.6E-04	9.5E-07	2.5E-10
23	ACP-DGN-FS-DG11	3.9E-03	SSW-MDP-FS-MDP2C	2.4E-04	2.6E-04	9.5E-07	2.5E-10
24	ACP-DGN-FS-DG13	3.9E-03	SSW-MDP-FS-MDP1A	2.4E-04	2.6E-04	9.5E-07	2.5E-10
25	ACP-DGN-FS-DG13	3.9E-03	SSW-MDP-FS-MDP1B	2.4E-04	2.6E-04	9.5E-07	2.5E-10

EFFECTIVE RENEWAL INTERVAL = 72 MONTHS
DETECTION INTERVAL = 1 MONTH

Plant B
23-Oct-89
10:35 AM

TIRGALEX - MOD 1 / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 7.7E-07

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	3.9E-03	2.6E-05	1.0E-07
2	ACP-DGN-FR-DG13	3.9E-03	2.6E-05	1.0E-07
3	SSW-MDP-FS-CM	1.2E-03	7.7E-05	9.3E-08
4	ACP-DGN-FR-DG11	3.9E-03	1.9E-05	7.4E-08
5	ACP-DGN-FR-DG12	3.9E-03	1.9E-05	7.4E-08
6	ACP-DGN-FS-DG12	3.9E-03	1.9E-05	7.4E-08
7	ACP-DGN-FS-DG11	3.9E-03	1.9E-05	7.4E-08
8	ACP-DGS-FS-CM	3.9E-03	1.2E-05	4.6E-08
9	SSW-MDP-FS-MDP2C	1.2E-03	1.8E-05	2.1E-08
10	RCI-TDP-FR-TDP1	3.0E-03	6.4E-06	1.9E-08
11	RCI-TDP-FS-TDP1	3.0E-03	6.3E-06	1.9E-08
12	SSW-MDP-FS-MDP1B	1.2E-03	1.2E-05	1.5E-08
13	SSW-MDP-FS-MDP1A	1.2E-03	1.2E-05	1.5E-08
14	SSW-MDP-FR-MDP2C	1.2E-03	1.1E-05	1.3E-08
15	SSW-MDP-FR-MDP1A	1.2E-03	7.2E-06	8.7E-09
16	SSW-MDP-FR-MDP1B	1.2E-03	7.2E-06	8.7E-09
17	EHV-FAN-FR-77C02	2.3E-04	8.9E-06	2.0E-09
18	EHV-FAN-FS-77C02	2.3E-04	8.9E-06	2.0E-09
19	EHV-FAN-FS-77C1A	2.3E-04	5.1E-06	1.2E-09
20	EHV-FAN-FS-77C1B	2.3E-04	5.1E-06	1.2E-09
21	EHV-FAN-FR-77C1B	2.3E-04	5.1E-06	1.2E-09
22	EHV-FAN-FR-77C1A	2.3E-04	5.1E-06	1.2E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
10:36 AM

TIRGALEX - MOD 1 / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.1E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FS-DG12	3.9E-03	3.5E-04	1.6E-05	5.4E-09
2	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FS-DG11	3.9E-03	3.5E-04	1.6E-05	5.4E-09
3	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	3.3E-04	1.6E-05	5.2E-09
4	ACP-DGN-FS-DG12	3.9E-03	ACP-DGN-FR-DG13	3.9E-03	3.3E-04	1.6E-05	5.2E-09
5	ACP-DGN-FS-DG13	3.9E-03	ACP-DGN-FR-DG11	3.9E-03	3.3E-04	1.6E-05	5.2E-09
6	ACP-DGN-FS-DG11	3.9E-03	ACP-DGN-FR-DG13	3.9E-03	3.3E-04	1.6E-05	5.2E-09
7	ACP-DGN-FR-DG13	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	3.1E-04	1.6E-05	4.9E-09
8	ACP-DGN-FR-DG13	3.9E-03	ACP-DGN-FR-DG11	3.9E-03	3.1E-04	1.6E-05	4.9E-09
9	ACP-DGN-FS-DG11	3.9E-03	ACP-DGN-FS-DG12	3.9E-03	3.1E-04	1.6E-05	4.8E-09
10	ACP-DGN-FS-DG12	3.9E-03	ACP-DGN-FR-DG11	3.9E-03	3.0E-04	1.6E-05	4.7E-09
11	ACP-DGN-FS-DG11	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	3.0E-04	1.6E-05	4.7E-09
12	ACP-DGN-FR-DG11	3.9E-03	ACP-DGN-FR-DG12	3.9E-03	2.8E-04	1.6E-05	4.4E-09
13	ACP-DGN-FS-DG13	3.9E-03	ACP-DGS-FS-CM	3.9E-03	1.9E-04	1.6E-05	3.0E-09
14	ACP-DGS-FS-CM	3.9E-03	ACP-DGN-FR-DG13	3.9E-03	1.9E-04	1.6E-05	2.9E-09
15	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FS-DG13	3.9E-03	1.3E-04	1.2E-05	1.5E-09
16	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FR-DG13	3.9E-03	1.2E-04	1.2E-05	1.4E-09
17	ACP-DGN-FS-DG13	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	1.1E-04	1.2E-05	1.3E-09
18	ACP-DGN-FS-DG11	3.9E-03	SSW-MDP-FS-MDP2C	1.2E-03	2.6E-04	4.7E-06	1.2E-09
19	ACP-DGN-FS-DG13	3.9E-03	SSW-MDP-FS-MDP1B	1.2E-03	2.6E-04	4.7E-06	1.2E-09
20	ACP-DGN-FS-DG13	3.9E-03	SSW-MDP-FS-MDP1A	1.2E-03	2.6E-04	4.7E-06	1.2E-09
21	ACP-DGN-FS-DG12	3.9E-03	SSW-MDP-FS-MDP2C	1.2E-03	2.6E-04	4.7E-06	1.2E-09
22	ACP-DGN-FR-DG13	3.9E-03	RCI-TDP-FS-TDP1	3.0E-03	1.1E-04	1.2E-05	1.2E-09
23	RCI-TDP-FR-TDP1	3.0E-03	SSW-MDP-FS-CM	1.2E-03	3.2E-04	3.6E-06	1.1E-09
24	SSW-MDP-FS-CM	1.2E-03	RCI-TDP-FS-TDP1	3.0E-03	3.2E-04	3.6E-06	1.1E-09
25	ACP-DGN-FS-DG12	3.9E-03	SSW-MDP-FS-MDP1A	1.2E-03	2.4E-04	4.7E-06	1.1E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-8:
10:38 AM

TIRGALEX - MOD 2 / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ▲C = 7.0E-07

Rank	Component Name	▲q1	S1	▲C
1	ACP-DGN-FS-DG13	4.4E-03	2.6E-05	1.1E-07
2	ACP-DGN-FR-DG13	4.4E-03	2.6E-05	1.1E-07
3	ACP-DGN-FR-DG11	4.4E-03	1.9E-05	8.2E-08
4	ACP-DGN-FS-DG12	4.4E-03	1.9E-05	8.2E-08
5	ACP-DGN-FR-DG12	4.4E-03	1.9E-05	8.2E-08
6	ACP-DGN-FS-DG11	4.4E-03	1.9E-05	8.2E-08
7	ACP-DGS-FS-CM	3.9E-03	1.2E-05	4.6E-08
8	SSW-MDP-FS-CM	3.3E-04	7.7E-05	2.5E-08
9	RCI-TDP-FR-TDP1	3.0E-03	6.4E-06	1.9E-08
10	RCI-TDP-FS-TDP1	3.0E-03	6.3E-06	1.9E-08
11	SSW-MDP-FS-MDP2C	3.3E-04	1.8E-05	5.8E-09
12	SSW-MDP-FS-MDP1B	3.3E-04	1.2E-05	4.0E-09
13	SSW-MDP-FS-MDP1A	3.3E-04	1.2E-05	4.0E-09
14	SSW-MDP-FR-MDP2C	3.3E-04	1.1E-05	3.6E-09
15	SSW-MDP-FR-MDP1A	3.3E-04	7.2E-06	2.4E-09
16	SSW-MDP-FR-MDP1B	3.3E-04	7.2E-06	2.4E-09
17	EHV-FAN-FR-77C02	2.3E-04	8.9E-06	2.0E-09
18	EHV-FAN-FS-77C02	2.3E-04	8.9E-06	2.0E-09
19	EHV-FAN-FS-77C1A	2.3E-04	5.1E-06	1.2E-09
20	EHV-FAN-FS-77C1B	2.3E-04	5.1E-06	1.2E-09
21	EHV-FAN-FR-77C1B	2.3E-04	5.1E-06	1.2E-09
22	EHV-FAN-FR-77C1A	2.3E-04	5.1E-06	1.2E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant B
23-Oct-89
10:39 AM

TIRGALEX – MOD 2 / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.1E-07

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FS-DG12	4.4E-03	3.5E-04	1.9E-05	6.7E-09
2	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FS-DG11	4.4E-03	3.5E-04	1.9E-05	6.7E-09
3	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	3.3E-04	1.9E-05	6.4E-09
4	ACP-DGN-FS-DG12	4.4E-03	ACP-DGN-FR-DG13	4.4E-03	3.3E-04	1.9E-05	6.4E-09
5	ACP-DGN-FS-DG11	4.4E-03	ACP-DGN-FR-DG13	4.4E-03	3.3E-04	1.9E-05	6.4E-09
6	ACP-DGN-FS-DG13	4.4E-03	ACP-DGN-FR-DG11	4.4E-03	3.3E-04	1.9E-05	6.4E-09
7	ACP-DGN-FR-DG13	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	3.1E-04	1.9E-05	6.0E-09
8	ACP-DGN-FR-DG13	4.4E-03	ACP-DGN-FR-DG11	4.4E-03	3.1E-04	1.9E-05	6.0E-09
9	ACP-DGN-FS-DG11	4.4E-03	ACP-DGN-FS-DG12	4.4E-03	3.1E-04	1.9E-05	6.0E-09
10	ACP-DGN-FS-DG12	4.4E-03	ACP-DGN-FR-DG11	4.4E-03	3.0E-04	1.9E-05	5.8E-09
11	ACP-DGN-FS-DG11	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	3.0E-04	1.9E-05	5.8E-09
12	ACP-DGN-FR-DG11	4.4E-03	ACP-DGN-FR-DG12	4.4E-03	2.8E-04	1.9E-05	5.4E-09
13	ACP-DGN-FS-DG13	4.4E-03	ACP-DGS-FS-CM	3.9E-03	1.9E-04	1.7E-05	3.3E-09
14	ACP-DGS-FS-CM	3.9E-03	ACP-DGN-FR-DG13	4.4E-03	1.9E-04	1.7E-05	3.2E-09
15	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FS-DG13	4.4E-03	1.3E-04	1.3E-05	1.7E-09
16	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FR-DG13	4.4E-03	1.2E-04	1.3E-05	1.5E-09
17	ACP-DGN-FS-DG13	4.4E-03	RCI-TDP-FS-TDP1	3.0E-03	1.1E-04	1.3E-05	1.5E-09
18	ACP-DGN-FR-DG13	4.4E-03	RCI-TDP-FS-TDP1	3.0E-03	1.1E-04	1.3E-05	1.4E-09
19	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FS-DG12	4.4E-03	9.6E-05	1.3E-05	1.2E-09
20	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FS-DG11	4.4E-03	9.6E-05	1.3E-05	1.2E-09
21	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FR-DG12	4.4E-03	8.7E-05	1.3E-05	1.1E-09
22	RCI-TDP-FR-TDP1	3.0E-03	ACP-DGN-FR-DG11	4.4E-03	8.7E-05	1.3E-05	1.1E-09
23	ACP-DGN-FS-DG12	4.4E-03	RCI-TDP-FS-TDP1	3.0E-03	8.3E-05	1.3E-05	1.1E-09
24	ACP-DGN-FS-DG11	4.4E-03	RCI-TDP-FS-TDP1	3.0E-03	8.2E-05	1.3E-05	1.1E-09
25	ACP-DGN-FR-DG11	4.4E-03	RCI-TDP-FS-TDP1	3.0E-03	7.8E-05	1.3E-05	1.0E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 1 MONTH

Plant fi
23-Oct-89
11:18 AM

TIRGIALEX – MOD 3 / 72 MO. / 1 MO.
TOP SINGLE CONTRIBUTORS

Total ▲C = 3.2E-06

Rank	Component Name	▲ql	S1	▲C
1	SSW-MDP-FS-CM	1.1E-02	7.7E-05	8.4E-07
2	ACP-DGN-FS-DG13	1.1E-02	2.6E-05	2.9E-07
3	ACP-DGN-FR-DG13	1.1E-02	2.6E-05	2.8E-07
4	ACP-DGN-FR-DG11	1.1E-02	1.9E-05	2.1E-07
5	ACP-DGN-FR-DG12	1.1E-02	1.9E-05	2.1E-07
6	ACP-DGN-FS-DG12	1.1E-02	1.9E-05	2.1E-07
7	ACP-DGN-FS-DG11	1.1E-02	1.9E-05	2.1E-07
8	SSW-MDP-FS-MDP2C	1.1E-02	1.8E-05	1.9E-07
9	SSW-MDP-FS-MDP1B	1.1E-02	1.2E-05	1.3E-07
10	SSW-MDP-FS-MDP1A	1.1E-02	1.2E-05	1.3E-07
11	ACP-DGS-FS-CM	1.1E-02	1.2E-05	1.3E-07
12	SSW-MDP-FR-MDP2C	1.1E-02	1.1E-05	1.2E-07
13	SSW-MDP-FR-MDP1B	1.1E-02	7.2E-06	7.9E-08
14	SSW-MDP-FR-MDP1A	1.1E-02	7.2E-06	7.9E-08
15	RCI-TDP-FR-TDP1	1.1E-02	6.4E-06	7.0E-08
16	RCI-TDP-FS-TDP1	1.1E-02	6.3E-06	6.9E-08
17	EHV-FAN-FR-77C02	2.3E-04	8.9E-06	2.0E-09
18	EHV-FAN-FS-77C02	2.3E-04	8.9E-06	2.0E-09
19	EHV-FAN-FS-77C1A	2.3E-04	5.1E-06	1.2E-09
20	EHV-FAN-FS-77C1B	2.3E-04	5.1E-06	1.2E-09
21	EHV-FAN-FR-77C1B	2.3E-04	5.1E-06	1.2E-09
22	EHV-FAN-FR-77C1A	2.3E-04	5.1E-06	1.2E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
23-Oct-89
11:20 AM

TIRGALEX – MOD 3 / 72 MO. / 1 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 1.4E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	1.1E-02	ACP-DGN-FS-DG12	1.1E-02	3.5E-04	1.2E-04	4.2E-08
2	ACP-DGN-FS-DG13	1.1E-02	ACP-DGN-FS-DG11	1.1E-02	3.5E-04	1.2E-04	4.2E-08
3	ACP-DGN-FS-DG13	1.1E-02	ACP-DGN-FR-DG12	1.1E-02	3.3E-04	1.2E-04	4.0E-08
4	ACP-DGN-FS-DG12	1.1E-02	ACP-DGN-FR-DG13	1.1E-02	3.3E-04	1.2E-04	4.0E-08
5	ACP-DGN-FS-DG11	1.1E-02	ACP-DGN-FR-DG13	1.1E-02	3.3E-04	1.2E-04	4.0E-08
6	ACP-DGN-FS-DG13	1.1E-02	ACP-DGN-FR-DG11	1.1E-02	3.3E-04	1.2E-04	4.0E-08
7	RCI-TDP-FR-TDP1	1.1E-02	SSW-MDP-FS-CM	1.1E-02	3.2E-04	1.2E-04	3.9E-08
8	SSW-MDP-FS-CM	1.1E-02	RCI-TDP-FS-TDP1	1.1E-02	3.2E-04	1.2E-04	3.9E-08
9	ACP-DGN-FR-DG13	1.1E-02	ACP-DGN-FR-DG11	1.1E-02	3.1E-04	1.2E-04	3.8E-08
10	ACP-DGN-FR-DG13	1.1E-02	ACP-DGN-FR-DG12	1.1E-02	3.1E-04	1.2E-04	3.8E-08
11	ACP-DGN-FS-DG11	1.1E-02	ACP-DGN-FS-DG12	1.1E-02	3.1E-04	1.2E-04	3.7E-08
12	ACP-DGN-FS-DG11	1.1E-02	ACP-DGN-FR-DG12	1.1E-02	3.0E-04	1.2E-04	3.6E-08
13	ACP-DGN-FS-DG12	1.1E-02	ACP-DGN-FR-DG11	1.1E-02	3.0E-04	1.2E-04	3.6E-08
14	ACP-DGN-FR-DG11	1.1E-02	ACP-DGN-FR-DG12	1.1E-02	2.8E-04	1.2E-04	3.4E-08
15	ACP-DGN-FS-DG13	1.1E-02	SSW-MDP-FS-MDP1A	1.1E-02	2.6E-04	1.2E-04	3.1E-08
16	ACP-DGN-FS-DG13	1.1E-02	SSW-MDP-FS-MDP1B	1.1E-02	2.6E-04	1.2E-04	3.1E-08
17	ACP-DGN-FS-DG12	1.1E-02	SSW-MDP-FS-MDP2C	1.1E-02	2.6E-04	1.2E-04	3.1E-08
18	ACP-DGN-FS-DG11	1.1E-02	SSW-MDP-FS-MDP2C	1.1E-02	2.6E-04	1.2E-04	3.1E-08
19	ACP-DGN-FS-DG12	1.1E-02	SSW-MDP-FS-MDP1A	1.1E-02	2.4E-04	1.2E-04	2.8E-08
20	ACP-DGN-FS-DG11	1.1E-02	SSW-MDP-FS-MDP1B	1.1E-02	2.4E-04	1.2E-04	2.8E-08
21	ACP-DGN-FR-DG13	1.1E-02	SSW-MDP-FS-MDP1B	1.1E-02	2.0E-04	1.2E-04	2.4E-08
22	ACP-DGN-FR-DG13	1.1E-02	SSW-MDP-FS-MDP1A	1.1E-02	2.0E-04	1.2E-04	2.4E-08
23	ACP-DGN-FS-DG13	1.1E-02	ACP-DGS-FS-CM	1.1E-02	1.9E-04	1.2E-04	2.3E-08
24	ACP-DGN-FR-DG11	1.1E-02	SSW-MDP-FS-MDP1B	1.1E-02	1.9E-04	1.2E-04	2.3E-08
25	ACP-DGN-FR-DG12	1.1E-02	SSW-MDP-FS-MDP1A	1.1E-02	1.9E-04	1.2E-04	2.3E-08

CONTRIBUTORS FOR PLANT B

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:22 AM

TIRGALEX / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 3.8E-06

Rank	Component Name	Δql	Sl	ΔC
1	ACP-DGN-FS-DG13	2.4E-02	2.6E-05	6.2E-07
2	ACP-DGN-FR-DG13	2.4E-02	2.6E-05	6.1E-07
3	ACP-DGN-FR-DG11	2.4E-02	1.9E-05	4.4E-07
4	ACP-DGN-FS-DG12	2.4E-02	1.9E-05	4.4E-07
5	ACP-DGN-FR-DG12	2.4E-02	1.9E-05	4.4E-07
6	ACP-DGN-FS-DG11	2.4E-02	1.9E-05	4.4E-07
7	ACP-DGS-FS-CM	2.4E-02	1.2E-05	2.8E-07
8	RCI-TDP-FR-TDP1	1.8E-02	6.4E-06	1.1E-07
9	RCI-TDP-FS-TDP1	1.8E-02	6.3E-06	1.1E-07
10	SSW-MDP-FS-CM	1.4E-03	7.7E-05	1.1E-07
11	SSW-MDP-FS-MDP2C	1.4E-03	1.8E-05	2.5E-08
12	SSW-MDP-FS-MDP1B	1.4E-03	1.2E-05	1.8E-08
13	SSW-MDP-FS-MDP1A	1.4E-03	1.2E-05	1.8E-08
14	SSW-MDP-FR-MDP2C	1.4E-03	1.1E-05	1.6E-08
15	EHV-FAN-FR-77C02	1.4E-03	8.9E-06	1.2E-08
16	EHV-FAN-FS-77C02	1.4E-03	8.9E-06	1.2E-08
17	SSW-MDP-FR-MDP1B	1.4E-03	7.2E-06	1.0E-08
18	SSW-MDP-FR-MDP1A	1.4E-03	7.2E-06	1.0E-08
19	EHV-FAN-FS-77C1B	1.4E-03	5.1E-06	7.1E-09
20	EHV-FAN-FS-77C1A	1.4E-03	5.1E-06	7.1E-09
21	EHV-FAN-FR-77C1B	1.4E-03	5.1E-06	7.1E-09
22	EHV-FAN-FR-77C1A	1.4E-03	5.1E-06	7.1E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:24 AM

TIRGALEX / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ▲C = 2.9E-06

Rank	Component Name	▲q1	Component Name	▲q2	S12	▲q1 ▲q2	▲C
1	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FS-DG12	2.4E-02	3.5E-04	5.6E-04	2.0E-07
2	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FS-DG11	2.4E-02	3.5E-04	5.6E-04	1.9E-07
3	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	3.3E-04	5.6E-04	1.9E-07
4	ACP-DGN-FS-DG12	2.4E-02	ACP-DGN-FR-DG13	2.4E-02	3.3E-04	5.6E-04	1.9E-07
5	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FR-DG11	2.4E-02	3.3E-04	5.6E-04	1.9E-07
6	ACP-DGN-FS-DG11	2.4E-02	ACP-DGN-FR-DG13	2.4E-02	3.3E-04	5.6E-04	1.9E-07
7	ACP-DGN-FR-DG13	2.4E-02	ACP-DGN-FR-DG11	2.4E-02	3.1E-04	5.6E-04	1.8E-07
8	ACP-DGN-FR-DG13	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	3.1E-04	5.6E-04	1.8E-07
9	ACP-DGN-FS-DG11	2.4E-02	ACP-DGN-FS-DG12	2.4E-02	3.1E-04	5.6E-04	1.7E-07
10	ACP-DGN-FS-DG11	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	3.0E-04	5.6E-04	1.7E-07
11	ACP-DGN-FS-DG12	2.4E-02	ACP-DGN-FR-DG11	2.4E-02	3.0E-04	5.6E-04	1.7E-07
12	ACP-DGN-FR-DG11	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	2.8E-04	5.6E-04	1.6E-07
13	ACP-DGN-FS-DG13	2.4E-02	ACP-DGS-FS-CM	2.4E-02	1.9E-04	5.6E-04	1.1E-07
14	ACP-DGS-FS-CM	2.4E-02	ACP-DGN-FR-DG13	2.4E-02	1.9E-04	5.6E-04	1.0E-07
15	ACP-DGN-FS-DG13	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	1.1E-04	4.2E-04	4.7E-08
16	ACP-DGN-FR-DG13	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	1.1E-04	4.2E-04	4.4E-08
17	ACP-DGN-FS-DG12	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	8.3E-05	4.2E-04	3.5E-08
18	ACP-DGN-FS-DG11	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	8.2E-05	4.2E-04	3.5E-08
19	ACP-DGN-FR-DG12	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	7.8E-05	4.2E-04	3.3E-08
20	ACP-DGN-FR-DG11	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	7.8E-05	4.2E-04	3.3E-08
21	ACP-DGS-FS-CM	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	4.9E-05	4.2E-04	2.0E-08
22	ACP-DGN-FS-DG12	2.4E-02	SSW-MDP-FS-MDP2C	1.4E-03	2.6E-04	3.4E-05	8.8E-09
23	ACP-DGN-FS-DG11	2.4E-02	SSW-MDP-FS-MDP2C	1.4E-03	2.6E-04	3.4E-05	8.8E-09
24	ACP-DGN-FS-DG13	2.4E-02	SSW-MDP-FS-MDP1A	1.4E-03	2.6E-04	3.4E-05	8.8E-09
25	ACP-DGN-FS-DG13	2.4E-02	SSW-MDP-FS-MDP1B	1.4E-03	2.6E-04	3.4E-05	8.8E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:25 AM

TIRGALEX - MOD 1 / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 4.6E-06

Rank	Component Name	Δq1	S1	ΔC
1	ACP-DGN-FS-DG13	2.4E-02	2.6E-05	6.2E-07
2	ACP-DGN-FR-DG13	2.4E-02	2.6E-05	6.1E-07
3	SSW-MDP-FS-CM	7.2E-03	7.7E-05	5.6E-07
4	ACP-DGN-FR-DG11	2.4E-02	1.9E-05	4.4E-07
5	ACP-DGN-FR-DG12	2.4E-02	1.9E-05	4.4E-07
6	ACP-DGN-FS-DG12	2.4E-02	1.9E-05	4.4E-07
7	ACP-DGN-FS-DG11	2.4E-02	1.9E-05	4.4E-07
8	ACP-DGS-FS-CM	2.4E-02	1.2E-05	2.8E-07
9	SSW-MDP-FS-MDP2C	7.2E-03	1.8E-05	1.3E-07
10	RCI-TDP-FR-TDP1	1.8E-02	6.4E-06	1.1E-07
11	RCI-TDP-FS-TDP1	1.8E-02	6.3E-06	1.1E-07
12	SSW-MDP-FS-MDP1B	7.2E-03	1.2E-05	8.8E-08
13	SSW-MDP-FS-MDP1A	7.2E-03	1.2E-05	8.8E-08
14	SSW-MDP-FR-MDP2C	7.2E-03	1.1E-05	7.9E-08
15	SSW-MDP-FR-MDP1A	7.2E-03	7.2E-06	5.2E-08
16	SSW-MDP-FR-MDP1B	7.2E-03	7.2E-06	5.2E-08
17	EHV-FAN-FR-77C02	1.4E-03	8.9E-06	1.2E-08
18	EHV-FAN-FS-77C02	1.4E-03	8.9E-06	1.2E-08
19	EHV-FAN-FS-77C1A	1.4E-03	5.1E-06	7.1E-09
20	EHV-FAN-FS-77C1B	1.4E-03	5.1E-06	7.1E-09
21	EHV-FAN-FR-77C1B	1.4E-03	5.1E-06	7.1E-09
22	EHV-FAN-FR-77C1A	1.4E-03	5.1E-06	7.1E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:27 AM

TIRGALEX – MOD 1 / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 4.0E-06

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FS-DG12	2.4E-02	3.5E-04	5.6E-04	2.0E-07
2	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FS-DG11	2.4E-02	3.5E-04	5.6E-04	1.9E-07
3	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	3.3E-04	5.6E-04	1.9E-07
4	ACP-DGN-FS-DG12	2.4E-02	ACP-DGN-FR-DG13	2.4E-02	3.3E-04	5.6E-04	1.9E-07
5	ACP-DGN-FS-DG13	2.4E-02	ACP-DGN-FR-DG11	2.4E-02	3.3E-04	5.6E-04	1.9E-07
6	ACP-DGN-FS-DG11	2.4E-02	ACP-DGN-FR-DG13	2.4E-02	3.3E-04	5.6E-04	1.9E-07
7	ACP-DGN-FR-DG13	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	3.1E-04	5.6E-04	1.8E-07
8	ACP-DGN-FR-DG13	2.4E-02	ACP-DGN-FR-DG11	2.4E-02	3.1E-04	5.6E-04	1.8E-07
9	ACP-DGN-FS-DG11	2.4E-02	ACP-DGN-FS-DG12	2.4E-02	3.1E-04	5.6E-04	1.7E-07
10	ACP-DGN-FS-DG12	2.4E-02	ACP-DGN-FR-DG11	2.4E-02	3.0E-04	5.6E-04	1.7E-07
11	ACP-DGN-FS-DG11	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	3.0E-04	5.6E-04	1.7E-07
12	ACP-DGN-FR-DG11	2.4E-02	ACP-DGN-FR-DG12	2.4E-02	2.8E-04	5.6E-04	1.6E-07
13	ACP-DGN-FS-DG13	2.4E-02	ACP-DGS-FS-CM	2.4E-02	1.9E-04	5.6E-04	1.1E-07
14	ACP-DGS-FS-CM	2.4E-02	ACP-DGN-FR-DG13	2.4E-02	1.9E-04	5.6E-04	1.0E-07
15	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FS-DG13	2.4E-02	1.3E-04	4.2E-04	5.5E-08
16	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FR-DG13	2.4E-02	1.2E-04	4.2E-04	5.0E-08
17	ACP-DGN-FS-DG13	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	1.1E-04	4.2E-04	4.7E-08
18	ACP-DGN-FS-DG11	2.4E-02	SSW-MDP-FS-MDP2C	7.2E-03	2.6E-04	1.7E-04	4.4E-08
19	ACP-DGN-FS-DG13	2.4E-02	SSW-MDP-FS-MDP1B	7.2E-03	2.6E-04	1.7E-04	4.4E-08
20	ACP-DGN-FS-DG13	2.4E-02	SSW-MDP-FS-MDP1A	7.2E-03	2.6E-04	1.7E-04	4.4E-08
21	ACP-DGN-FS-DG12	2.4E-02	SSW-MDP-FS-MDP2C	7.2E-03	2.6E-04	1.7E-04	4.4E-08
22	ACP-DGN-FR-DG13	2.4E-02	RCI-TDP-FS-TDP1	1.8E-02	1.1E-04	4.2E-04	4.4E-08
23	RCI-TDP-FR-TDP1	1.8E-02	SSW-MDP-FS-CM	7.2E-03	3.2E-04	1.3E-04	4.1E-08
24	SSW-MDP-FS-CM	7.2E-03	RCI-TDP-FS-TDP1	1.8E-02	3.2E-04	1.3E-04	4.1E-08
25	ACP-DGN-FS-DG12	2.4E-02	SSW-MDP-FS-MDP1A	7.2E-03	2.4E-04	1.7E-04	4.1E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:28 AM

TIRGALEX – MOD 2 / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 4.2E-06

Rank	Component Name	Δql	Sl	ΔC
1	ACP-DGN-FS-DG13	2.6E-02	2.6E-05	6.9E-07
2	ACP-DGN-FR-DG13	2.6E-02	2.6E-05	6.8E-07
3	ACP-DGN-FR-DG11	2.6E-02	1.9E-05	4.9E-07
4	ACP-DGN-FS-DG12	2.6E-02	1.9E-05	4.9E-07
5	ACP-DGN-FR-DG12	2.6E-02	1.9E-05	4.9E-07
6	ACP-DGN-FS-DG11	2.6E-02	1.9E-05	4.9E-07
7	ACP-DGS-FS-CM	2.4E-02	1.2E-05	2.8E-07
8	SSW-MDP-FS-CM	2.0E-03	7.7E-05	1.5E-07
9	RCI-TDP-FR-TDP1	1.8E-02	6.4E-06	1.1E-07
10	RCI-TDP-FS-TDP1	1.8E-02	6.3E-06	1.1E-07
11	SSW-MDP-FS-MDP2C	2.0E-03	1.8E-05	3.5E-08
12	SSW-MDP-FS-MDP1B	2.0E-03	1.2E-05	2.4E-08
13	SSW-MDP-FS-MDP1A	2.0E-03	1.2E-05	2.4E-08
14	SSW-MDP-FR-MDP2C	2.0E-03	1.1E-05	2.2E-08
15	SSW-MDP-FR-MDP1A	2.0E-03	7.2E-06	1.4E-08
16	SSW-MDP-FR-MDP1B	2.0E-03	7.2E-06	1.4E-08
17	EHV-FAN-FR-77C02	1.4E-03	8.9E-06	1.2E-08
18	EHV-FAN-FS-77C02	1.4E-03	8.9E-06	1.2E-08
19	EHV-FAN-FS-77C1A	1.4E-03	5.1E-06	7.1E-09
20	EHV-FAN-FS-77C1B	1.4E-03	5.1E-06	7.1E-09
21	EHV-FAN-FR-77C1B	1.4E-03	5.1E-06	7.1E-09
22	EHV-FAN-FR-77C1A	1.4E-03	5.1E-06	7.1E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:29 AM

TIRGALEX – MOD 2 / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ▲C = 3.9E-06

Rank	Component Name	▲q1	Component Name	▲q2	S12	▲q1 ▲q2	▲C
1	ACP-DGN-FS-DG13	2.6E-02	ACP-DGN-FS-DG12	2.6E-02	3.5E-04	6.9E-04	2.4E-07
2	ACP-DGN-FS-DG13	2.6E-02	ACP-DGN-FS-DG11	2.6E-02	3.5E-04	6.9E-04	2.4E-07
3	ACP-DGN-FS-DG13	2.6E-02	ACP-DGN-FR-DG12	2.6E-02	3.3E-04	6.9E-04	2.3E-07
4	ACP-DGN-FS-DG12	2.6E-02	ACP-DGN-FR-DG13	2.6E-02	3.3E-04	6.9E-04	2.3E-07
5	ACP-DGN-FS-DG11	2.6E-02	ACP-DGN-FR-DG13	2.6E-02	3.3E-04	6.9E-04	2.3E-07
6	ACP-DGN-FS-DG13	2.6E-02	ACP-DGN-FR-DG11	2.6E-02	3.3E-04	6.9E-04	2.3E-07
7	ACP-DGN-FR-DG13	2.6E-02	ACP-DGN-FR-DG12	2.6E-02	3.1E-04	6.9E-04	2.2E-07
8	ACP-DGN-FR-DG13	2.6E-02	ACP-DGN-FR-DG11	2.6E-02	3.1E-04	6.9E-04	2.2E-07
9	ACP-DGN-FS-DG11	2.6E-02	ACP-DGN-FS-DG12	2.6E-02	3.1E-04	6.9E-04	2.1E-07
10	ACP-DGN-FS-DG12	2.6E-02	ACP-DGN-FR-DG11	2.6E-02	3.0E-04	6.9E-04	2.1E-07
11	ACP-DGN-FS-DG11	2.6E-02	ACP-DGN-FR-DG12	2.6E-02	3.0E-04	6.9E-04	2.1E-07
12	ACP-DGN-FR-DG11	2.6E-02	ACP-DGN-FR-DG12	2.6E-02	2.8E-04	6.9E-04	1.9E-07
13	ACP-DGN-FS-DG13	2.6E-02	ACP-DGS-FS-CM	2.4E-02	1.9E-04	6.2E-04	1.2E-07
14	ACP-DGS-FS-CM	2.4E-02	ACP-DGN-FR-DG13	2.6E-02	1.9E-04	6.2E-04	1.2E-07
15	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FS-DG13	2.6E-02	1.3E-04	4.7E-04	6.1E-08
16	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FR-DG13	2.6E-02	1.2E-04	4.7E-04	5.5E-08
17	ACP-DGN-FS-DG13	2.6E-02	RCI-TDP-FS-TDP1	1.8E-02	1.1E-04	4.7E-04	5.3E-08
18	ACP-DGN-FR-DG13	2.6E-02	RCI-TDP-FS-TDP1	1.8E-02	1.1E-04	4.7E-04	4.9E-08
19	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FS-DG12	2.6E-02	9.6E-05	4.7E-04	4.5E-08
20	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FS-DG11	2.6E-02	9.6E-05	4.7E-04	4.5E-08
21	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FR-DG12	2.6E-02	8.7E-05	4.7E-04	4.1E-08
22	RCI-TDP-FR-TDP1	1.8E-02	ACP-DGN-FR-DG11	2.6E-02	8.7E-05	4.7E-04	4.1E-08
23	ACP-DGN-FS-DG12	2.6E-02	RCI-TDP-FS-TDP1	1.8E-02	8.3E-05	4.7E-04	3.9E-08
24	ACP-DGN-FS-DG11	2.6E-02	RCI-TDP-FS-TDP1	1.8E-02	8.2E-05	4.7E-04	3.8E-08
25	ACP-DGN-FR-DG11	2.6E-02	RCI-TDP-FS-TDP1	1.8E-02	7.8E-05	4.7E-04	3.7E-08

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:31 AM

TIRGALEX - MOD 3 / 72 MO. / 6 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 1.9E-05

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	6.6E-02	7.7E-05	5.0E-06
2	ACP-DGN-FS-DG13	6.6E-02	2.6E-05	1.7E-06
3	ACP-DGN-FR-DG13	6.6E-02	2.6E-05	1.7E-06
4	ACP-DGN-FR-DG11	6.6E-02	1.9E-05	1.2E-06
5	ACP-DGN-FR-DG12	6.6E-02	1.9E-05	1.2E-06
6	ACP-DGN-FS-DG12	6.6E-02	1.9E-05	1.2E-06
7	ACP-DGN-FS-DG11	6.6E-02	1.9E-05	1.2E-06
8	SSW-MDP-FS-MDP2C	6.6E-02	1.8E-05	1.2E-06
9	SSW-MDP-FS-MDP1B	6.6E-02	1.2E-05	8.0E-07
10	SSW-MDP-FS-MDP1A	6.6E-02	1.2E-05	8.0E-07
11	ACP-DGS-FS-CM	6.6E-02	1.2E-05	7.7E-07
12	SSW-MDP-FR-MDP2C	6.6E-02	1.1E-05	7.2E-07
13	SSW-MDP-FR-MDP1B	6.6E-02	7.2E-06	4.7E-07
14	SSW-MDP-FR-MDP1A	6.6E-02	7.2E-06	4.7E-07
15	RCI-TDP-FR-TDP1	6.6E-02	6.4E-06	4.2E-07
16	RCI-TDP-FS-TDP1	6.6E-02	6.3E-06	4.2E-07
17	EHV-FAN-FR-77C02	1.4E-03	8.9E-06	1.2E-08
18	EHV-FAN-FS-77C02	1.4E-03	8.9E-06	1.2E-08
19	EHV-FAN-FS-77C1A	1.4E-03	5.1E-06	7.1E-09
20	EHV-FAN-FS-77C1B	1.4E-03	5.1E-06	7.1E-09
21	EHV-FAN-FR-77C1B	1.4E-03	5.1E-06	7.1E-09
22	EHV-FAN-FR-77C1A	1.4E-03	5.1E-06	7.1E-09

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS
EFFECTIVE SURVEILLANCE INTERVAL = 6 MONTHS

Plant B
23-Oct-89
10:32 AM

TIRGALEX - MOD 3 / 72 MO. / 6 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 5.1E-05

Rank	Component Name	Δq1	Component Name	Δq2	S12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	6.6E-02	ACP-DGN-FS-DG12	6.6E-02	3.5E-04	4.3E-03	1.5E-06
2	ACP-DGN-FS-DG13	6.6E-02	ACP-DGN-FS-DG11	6.6E-02	3.5E-04	4.3E-03	1.5E-06
3	ACP-DGN-FS-DG13	6.6E-02	ACP-DGN-FR-DG12	6.6E-02	3.3E-04	4.3E-03	1.4E-06
4	ACP-DGN-FS-DG12	6.6E-02	ACP-DGN-FR-DG13	6.6E-02	3.3E-04	4.3E-03	1.4E-06
5	ACP-DGN-FS-DG11	6.6E-02	ACP-DGN-FR-DG13	6.6E-02	3.3E-04	4.3E-03	1.4E-06
6	ACP-DGN-FS-DG13	6.6E-02	ACP-DGN-FR-DG11	6.6E-02	3.3E-04	4.3E-03	1.4E-06
7	RCI-TDP-FR-TDP1	6.6E-02	SSW-MDP-FS-CM	6.6E-02	3.2E-04	4.3E-03	1.4E-06
8	SSW-MDP-FS-CM	6.6E-02	RCI-TDP-FS-TDP1	6.6E-02	3.2E-04	4.3E-03	1.4E-06
9	ACP-DGN-FR-DG13	6.6E-02	ACP-DGN-FR-DG11	6.6E-02	3.1E-04	4.3E-03	1.4E-06
10	ACP-DGN-FR-DG13	6.6E-02	ACP-DGN-FR-DG12	6.6E-02	3.1E-04	4.3E-03	1.4E-06
11	ACP-DGN-FS-DG11	6.6E-02	ACP-DGN-FS-DG12	6.6E-02	3.1E-04	4.3E-03	1.3E-06
12	ACP-DGN-FS-DG11	6.6E-02	ACP-DGN-FR-DG12	6.6E-02	3.0E-04	4.3E-03	1.3E-06
13	ACP-DGN-FS-DG12	6.6E-02	ACP-DGN-FR-DG11	6.6E-02	3.0E-04	4.3E-03	1.3E-06
14	ACP-DGN-FR-DG11	6.6E-02	ACP-DGN-FR-DG12	6.6E-02	2.8E-04	4.3E-03	1.2E-06
15	ACP-DGN-FS-DG13	6.6E-02	SSW-MDP-FS-MDP1A	6.6E-02	2.6E-04	4.3E-03	1.1E-06
16	ACP-DGN-FS-DG13	6.6E-02	SSW-MDP-FS-MDP1B	6.6E-02	2.6E-04	4.3E-03	1.1E-06
17	ACP-DGN-FS-DG12	6.6E-02	SSW-MDP-FS-MDP2C	6.6E-02	2.6E-04	4.3E-03	1.1E-06
18	ACP-DGN-FS-DG11	6.6E-02	SSW-MDP-FS-MDP2C	6.6E-02	2.6E-04	4.3E-03	1.1E-06
19	ACP-DGN-FS-DG12	6.6E-02	SSW-MDP-FS-MDP1A	6.6E-02	2.4E-04	4.3E-03	1.0E-06
20	ACP-DGN-FS-DG11	6.6E-02	SSW-MDP-FS-MDP1B	6.6E-02	2.4E-04	4.3E-03	1.0E-06
21	ACP-DGN-FR-DG13	6.6E-02	SSW-MDP-FS-MDP1B	6.6E-02	2.0E-04	4.3E-03	8.5E-07
22	ACP-DGN-FR-DG13	6.6E-02	SSW-MDP-FS-MDP1A	6.6E-02	2.0E-04	4.3E-03	8.5E-07
23	ACP-DGN-FS-DG13	6.6E-02	ACP-DGS-FS-CM	6.6E-02	1.9E-04	4.3E-03	8.2E-07
24	ACP-DGN-FR-DG11	6.6E-02	SSW-MDP-FS-MDP1B	6.6E-02	1.9E-04	4.3E-03	8.2E-07
25	ACP-DGN-FR-DG12	6.6E-02	SSW-MDP-FS-MDP1A	6.6E-02	1.9E-04	4.3E-03	8.2E-07

10. VARIABILITY AND UNCERTAINTY RESULTS FOR PLANT A (THE PWR)

The pages which follow give the distributions of core melt frequency increases for Plant A, the PWR, using the ranges assigned to the sensitivity (importance) coefficients, aging rate data, overhaul intervals, and surveillance intervals. The aging maintenance program characterizations which are evaluated are: overhaul only intervals in the range between 12-120 months, overhaul only intervals in the TIRGALEX ranges, and overhaul intervals between 12-120 months with additional surveillance intervals between 1-12 months. These ranges were previously described in Section 7.

For each maintenance program characterization a table is first presented of the probability that the core melt frequency increase is larger than a given value. This probability is called the complementary cumulative distribution function (CCDF). The table thus gives the probability (the CCDF percentiles) that the core melt frequency increase is larger than given values. The table gives the CCDF probabilities at 4% increments for the TIRGALEX, MOD1, and MOD2 aging rate data bases that were used for the uncertainty evaluations.

After the table, curves are given of the CCDF probability values versus the log of the core melt frequency increase. The curves show the singles contribution from single component aging effects, the doubles contribution from double component aging effects, and the total contribution to the core melt frequency increase. The discussions below highlight features of the distribution results; the tables and curves follow these discussions.

12-120 Month Overhauls Only

The distribution results are similar for the TIRGALEX, MOD1, and MOD2 data. The distributions show that the core melt frequency increase generally lies between 3-04 and 3-03 (the approximate 90% and 10% values). There is a greater than a 30% probability that the core melt frequency increase is greater than 1-03, and hence in this regard there is a substantial tail on the distribution. This substantial tail comes from the possibility of having longer overhaul intervals in the upper end of the range of 12 to 120 months. The singles and doubles contributions show that the double component aging effects generally dominate.

TIRGALEX Overhaul Interval Ranges

For TIRGALEX, MOD1, and MOD2, the distributions are similar and show that the core melt frequency increases lie in the range of 1-04 to 1-03 (the approximate 90% and 10% values). The probability of the core melt frequency increase being above 1-03 is approximately 10%. This tail probability is due to the possibility of having larger overhaul intervals (e.g., for diesels and check valves) as allowed by the TIRGALEX

ranges. The contributions from double component aging effects dominate the distributions.

12-120 Month Overhauls and 1-12 Month Surveillances

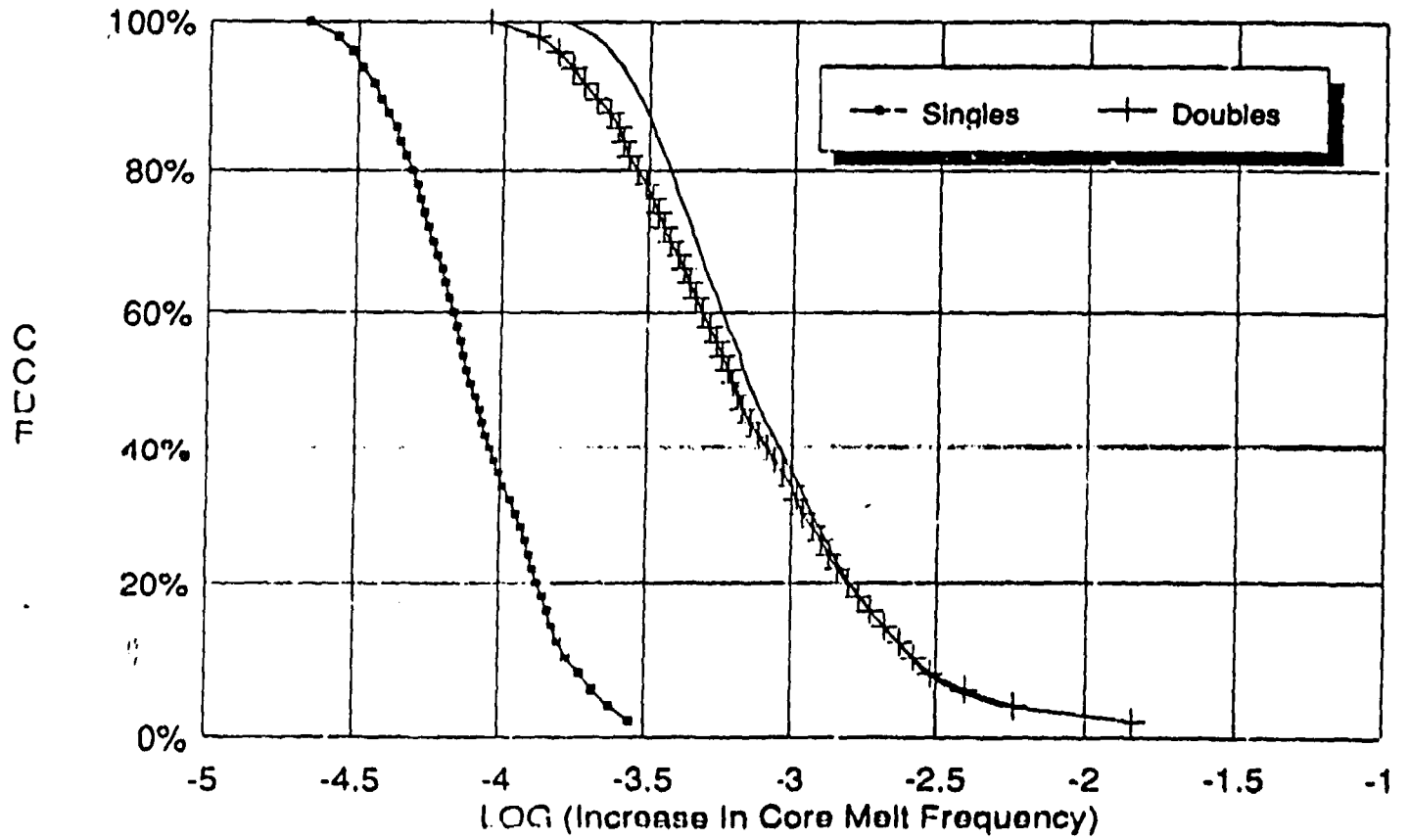
For TIRGALEX, MOD1, and MOD2 the distributions are again similar. The core melt frequency increases, however, now generally lie in the range of 3-06 to 1-05, the approximate 90% and 10% values. The probability of the core melt frequency increase being above 1-05 is approximately 10%. Aging maintenance programs conforming to the 12-120 month overhaul and 1-12 month surveillance range produce core melt frequency increases which are lower by approximately a factor of 100 for all distribution values as compared to programs characterized by 12-120 month overhaul only intervals or by the TIRGALEX ranges.

PLANT A
EFFECTIVE OVERHAUL INTERVAL = 12 - 120 MO.

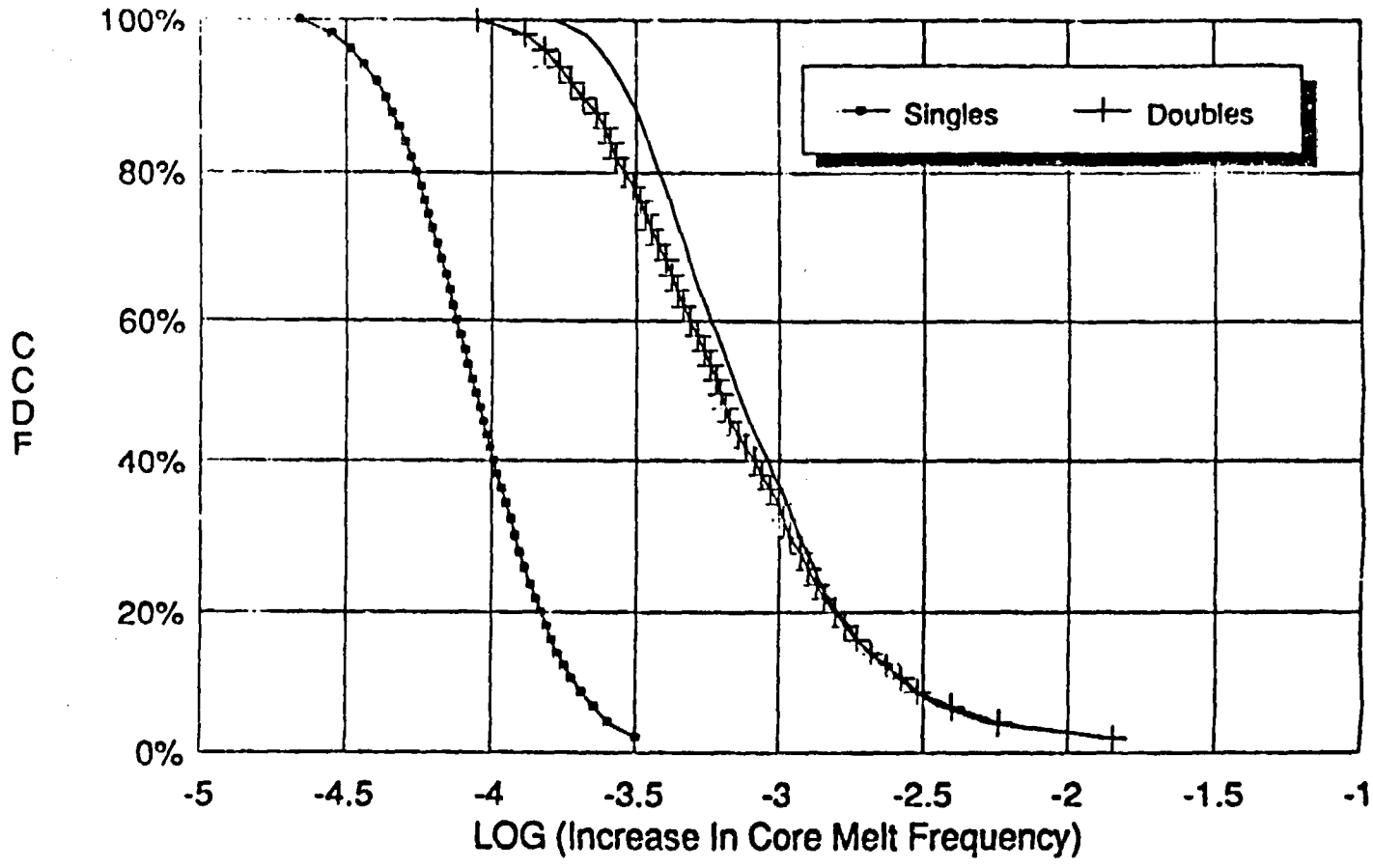
COMPLEMENTARY CUMULATIVE VALUES

PERCENTAGE	TIRGALEX	MOD 1	MOD 2
94%	2.6E-04	2.6E-04	2.0E-04
90%	2.9E-04	3.0E-04	2.4E-04
86%	3.2E-04	3.3E-04	2.7E-04
82%	3.6E-04	3.6E-04	3.0E-04
78%	3.9E-04	4.0E-04	3.3E-04
74%	4.2E-04	4.3E-04	3.6E-04
70%	4.6E-04	4.7E-04	3.9E-04
66%	4.9E-04	5.0E-04	4.2E-04
62%	5.5E-04	5.5E-04	4.5E-04
58%	5.9E-04	6.1E-04	5.0E-04
54%	6.6E-04	6.6E-04	5.5E-04
50%	7.1E-04	7.2E-04	6.1E-04
46%	7.7E-04	7.9E-04	6.6E-04
42%	8.6E-04	8.7E-04	7.5E-04
38%	9.5E-04	9.5E-04	8.4E-04
34%	1.1E-03	1.1E-03	9.5E-04
30%	1.2E-03	1.2E-03	1.1E-03
26%	1.3E-03	1.3E-03	1.2E-03
22%	1.5E-03	[illegible]E-03	1.3E-03
18%	1.7E-03	[illegible].7E-03	1.6E-03
14%	2.1E-03	2.1E-03	1.9E-03
10%	2.6E-03	2.6E-03	2.5E-03
6%	3.6E-03	3.7E-03	3.7E-03

Plant A Core Melt Frequency Distribution
TIRGALEX / 12-120 months

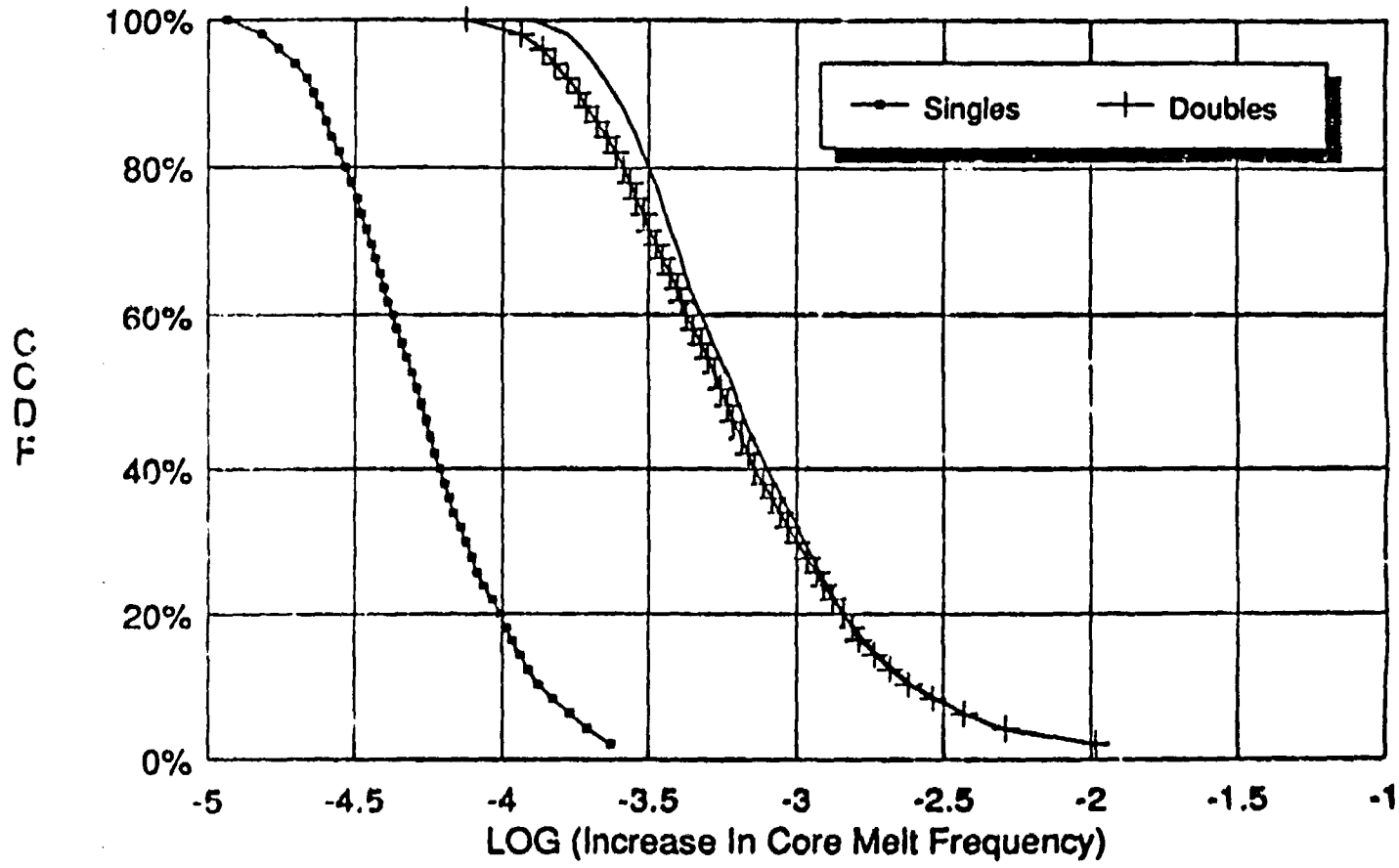


Plant A Core Melt Frequency Distribution
TIRGALEX-MOD1 / 12-120 months



Plant A Core Melt Frequency Distribution

TIRGALEX-MOD2 / 12-120 months

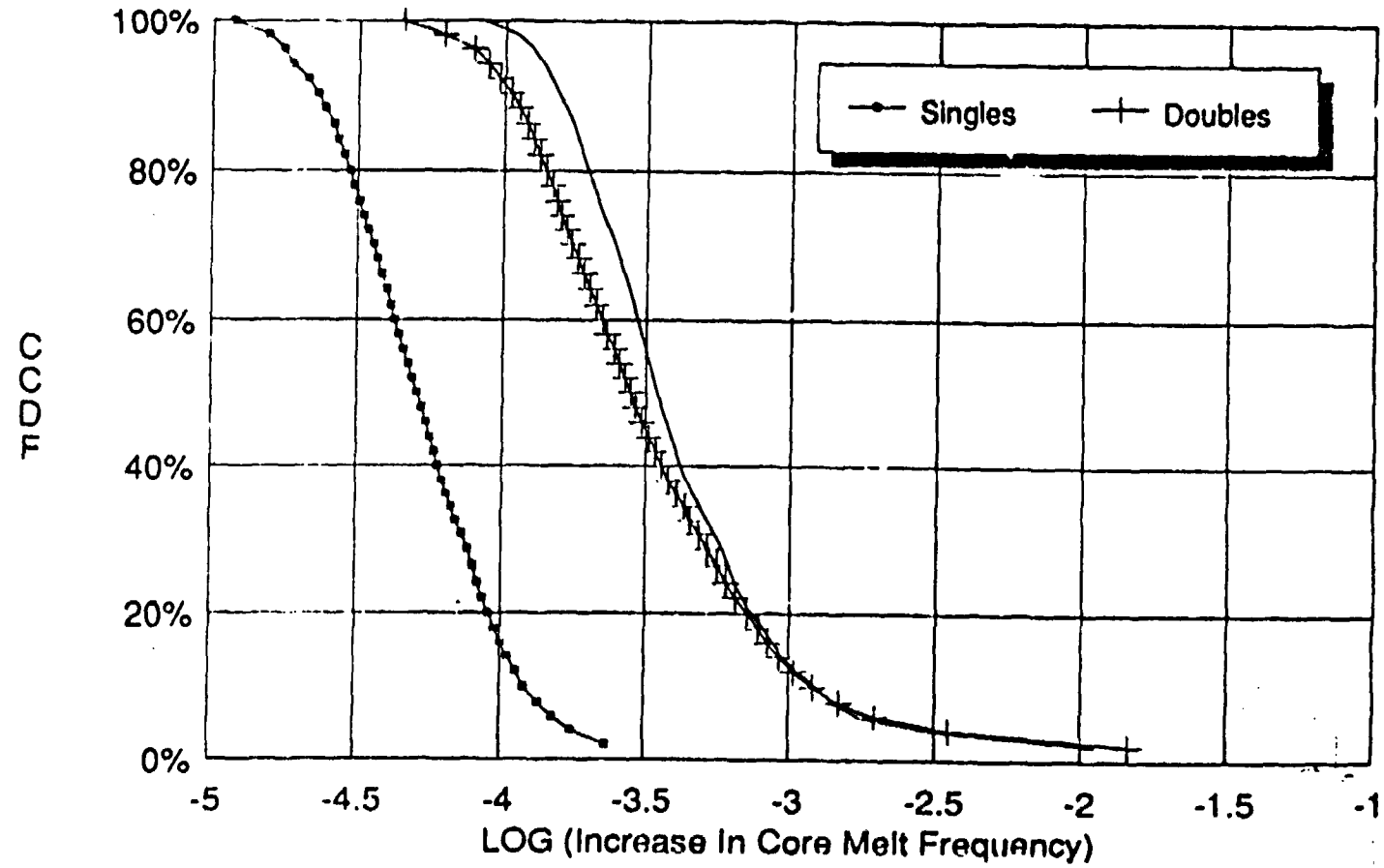


PLANT A
EFFECTIVE OVERHAUL INTERVAL = TIRGALEX RANGE

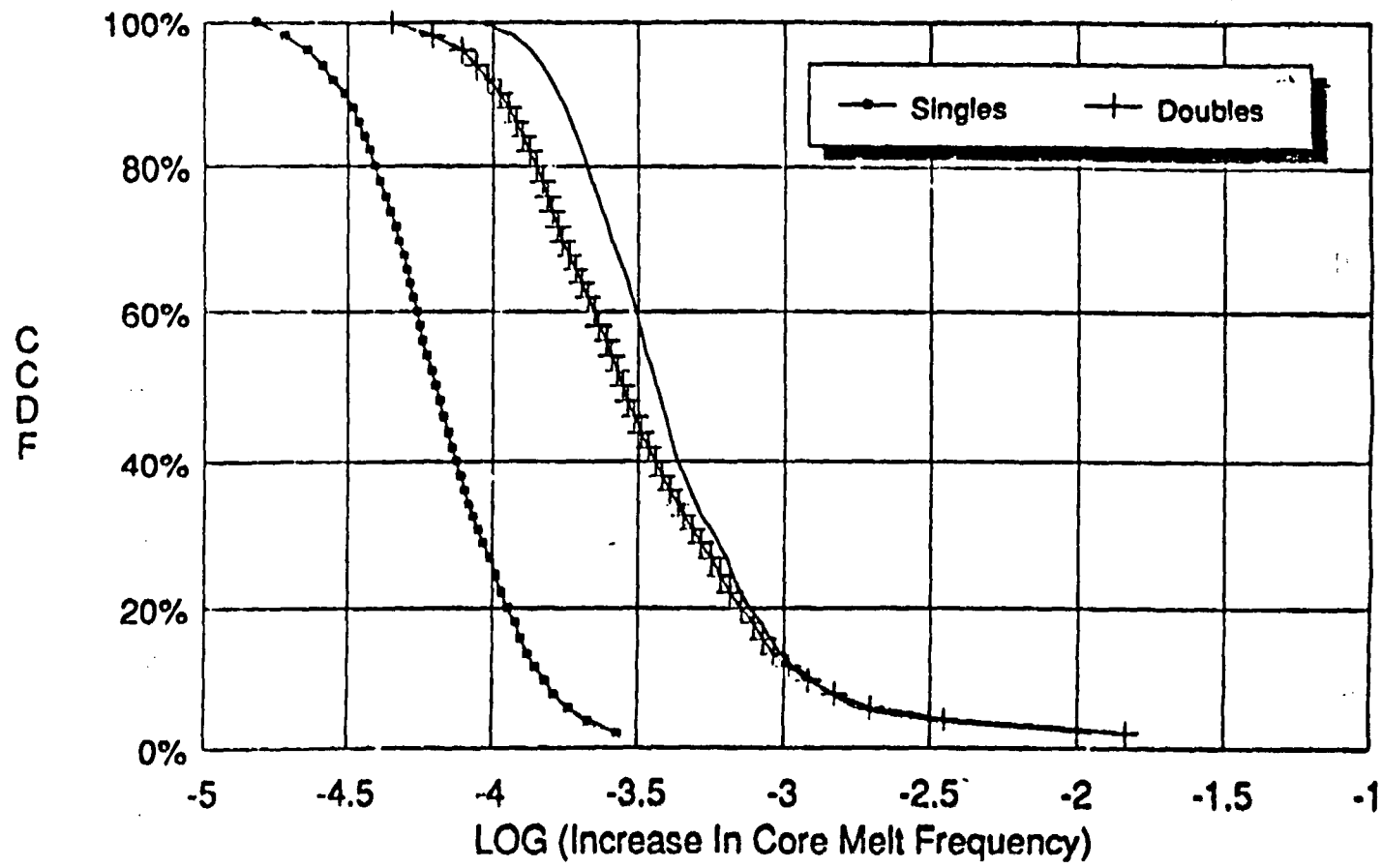
COMPLEMENTARY CUMULATIVE VALUES

PERCENTAGE	TIRGALEX	MOD 1	MOD 2
94%	1.4E-04	1.5E-04	9.8E-05
90%	1.5E-04	1.7E-04	1.1E-04
86%	1.7E-04	1.9E-04	1.3E-04
82%	1.9E-04	2.0E-04	1.4E-04
78%	2.1E-04	2.2E-04	1.6E-04
74%	2.2E-04	2.4E-04	1.7E-04
70%	2.4E-04	2.6E-04	1.8E-04
66%	2.6E-04	2.8E-04	2.0E-04
62%	2.9E-04	3.0E-04	2.2E-04
58%	3.0E-04	3.2E-04	2.3E-04
54%	3.2E-04	3.4E-04	2.5E-04
50%	3.5E-04	3.6E-04	2.8E-04
46%	3.8E-04	3.9E-04	3.0E-04
42%	4.0E-04	4.2E-04	3.3E-04
38%	4.4E-04	4.5E-04	3.6E-04
34%	4.9E-04	5.0E-04	4.0E-04
30%	5.5E-04	5.6E-04	4.4E-04
26%	6.2E-04	6.4E-04	5.1E-04
22%	6.9E-04	7.1E-04	5.6E-04
18%	8.2E-04	8.3E-04	6.4E-04
14%	9.5E-04	9.7E-04	7.8E-04
10%	1.2E-03	1.3E-03	1.1E-03
6%	1.7E-03	1.8E-03	1.6E-03

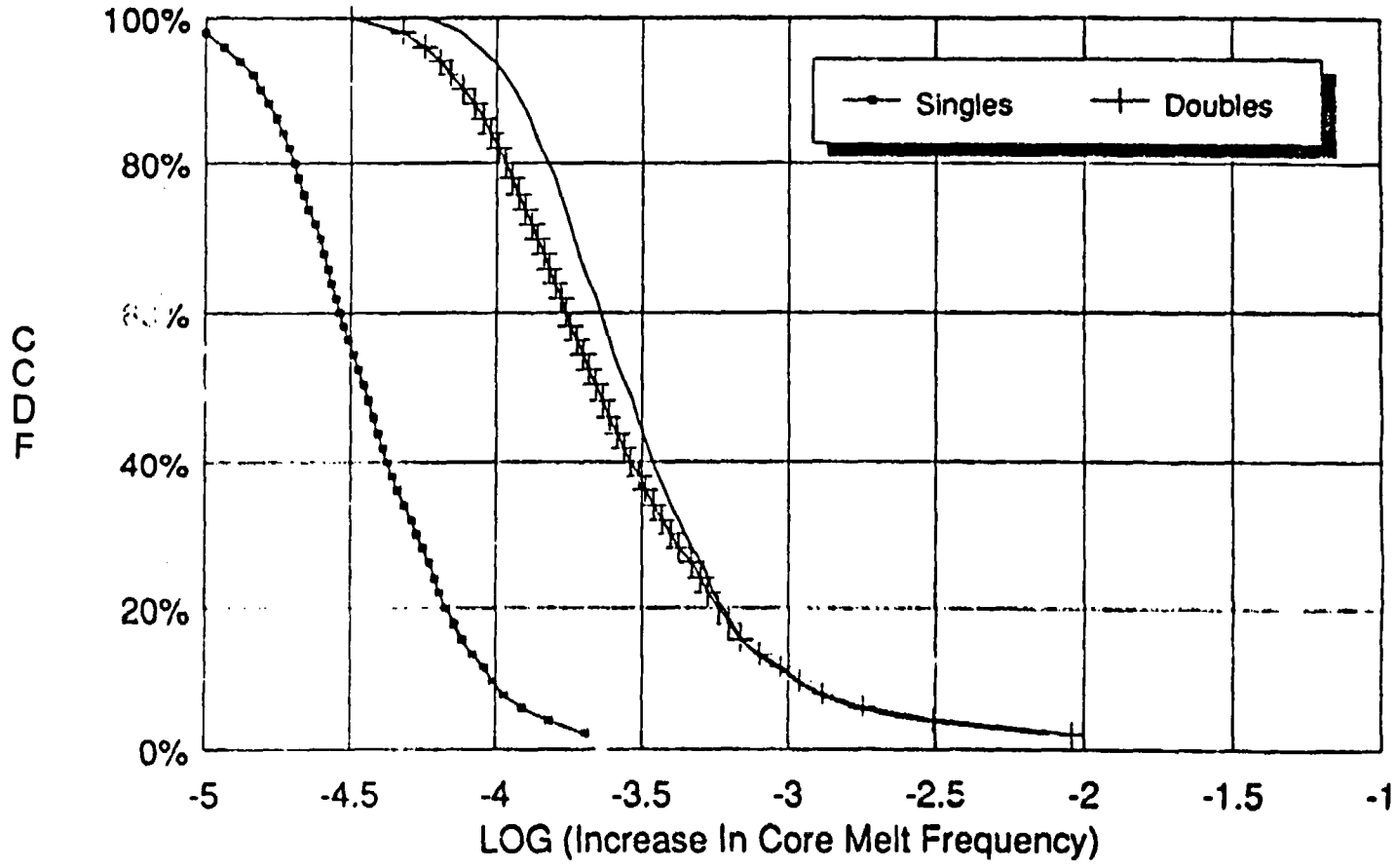
Plant A Core Melt Frequency Distribution
TIRGALEX / TIRGALEX Range



Plant A Core Melt Frequency Distribution
TIRGALEX-MOD1 / TIRGALEX Range



Plant A Core Melt Frequency Distribution
TIRGALEX-MOD2 / TIRGALEX Range



PLANT A
EFFECTIVE OVERHAUL INTERVAL = 12 - 120 MO.
EFFECTIVE SURVEILLANCE INTERVAL = 1 - 12 MO.

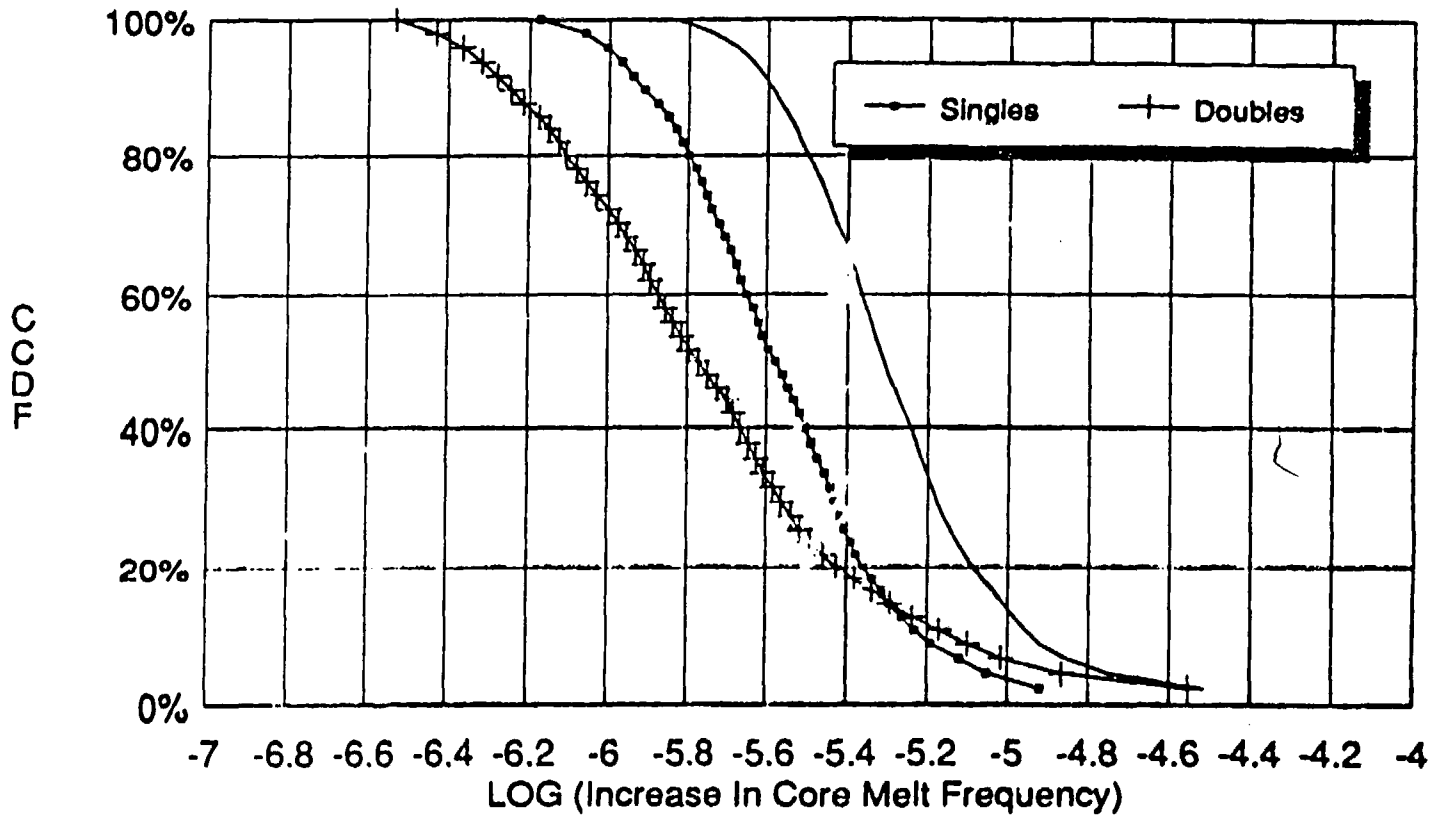
COMPLEMENTARY CUMULATIVE VALUES

PERCENTAGE	TIRGALEX	MOD 1	MOD 2
94%	2.3E-06	2.3E-06	1.8E-06
90%	2.6E-06	2.6E-06	2.0E-06
86%	2.8E-06	2.8E-06	2.2E-06
82%	3.0E-06	3.1E-06	2.4E-06
78%	3.3E-06	3.3E-06	2.6E-06
74%	3.5E-06	3.5E-06	2.7E-06
70%	3.7E-06	3.7E-06	2.9E-06
66%	4.0E-06	3.8E-06	3.2E-06
62%	4.2E-06	4.0E-06	3.4E-06
58%	4.4E-06	4.3E-06	3.6E-06
54%	4.7E-06	4.5E-06	3.8E-06
50%	4.9E-06	4.8E-06	4.1E-06
46%	5.2E-06	5.0E-06	4.3E-06
42%	5.5E-06	5.3E-06	4.6E-06
38%	5.9E-06	5.7E-06	4.9E-06
34%	6.3E-06	6.1E-06	5.2E-06
30%	6.6E-06	6.4E-06	5.6E-06
26%	7.2E-06	6.9E-06	6.1E-06
22%	7.8E-06	7.5E-06	6.8E-06
18%	8.7E-06	8.3E-06	7.7E-06
14%	9.7E-06	9.4E-06	8.9E-06
10%	1.1E-05	1.1E-05	1.0E-05
6%	1.4E-05	1.4E-05	1.4E-05

Plant A Core Melt Frequency Distribution

TIRGALEX / 12-120 months

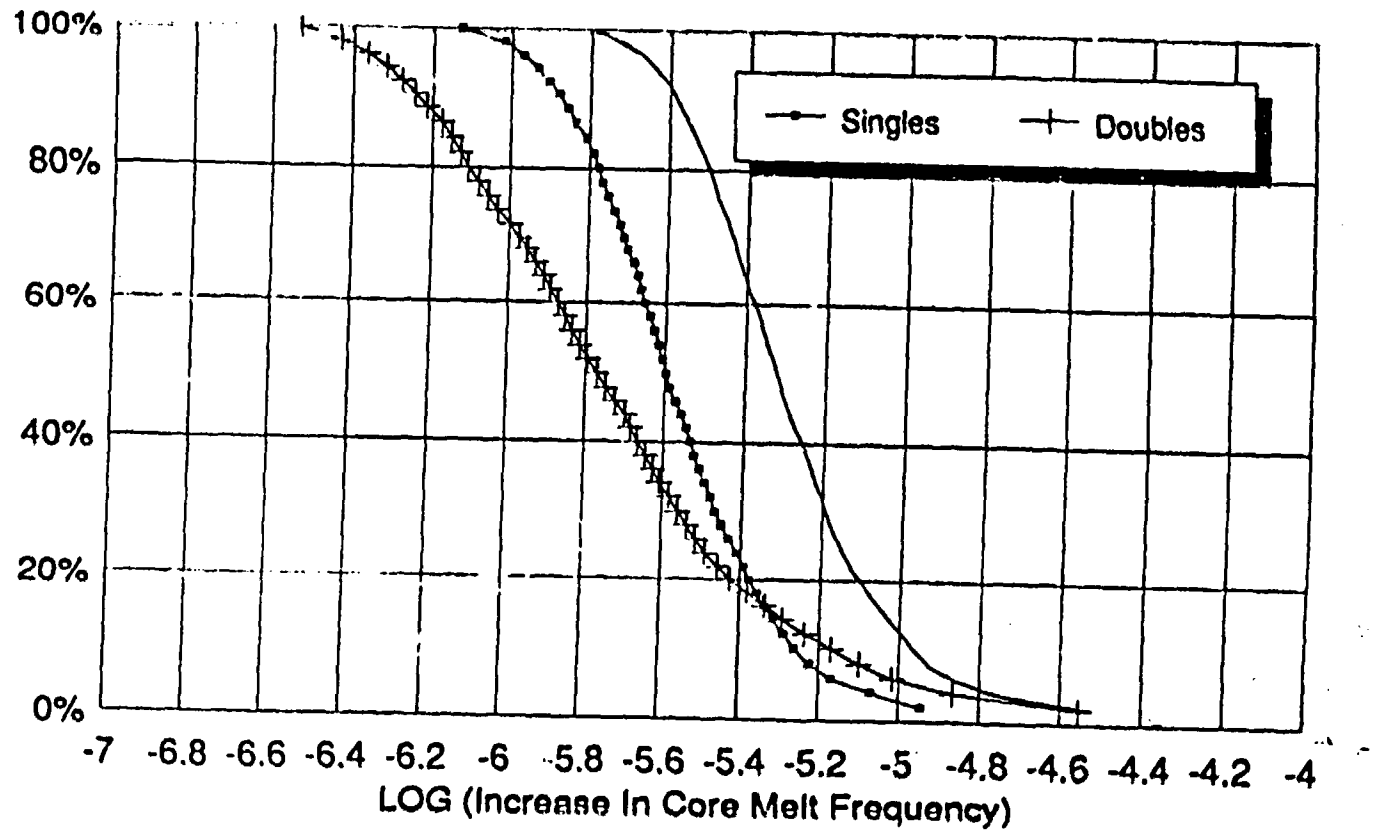
Test Range: 1-12 months

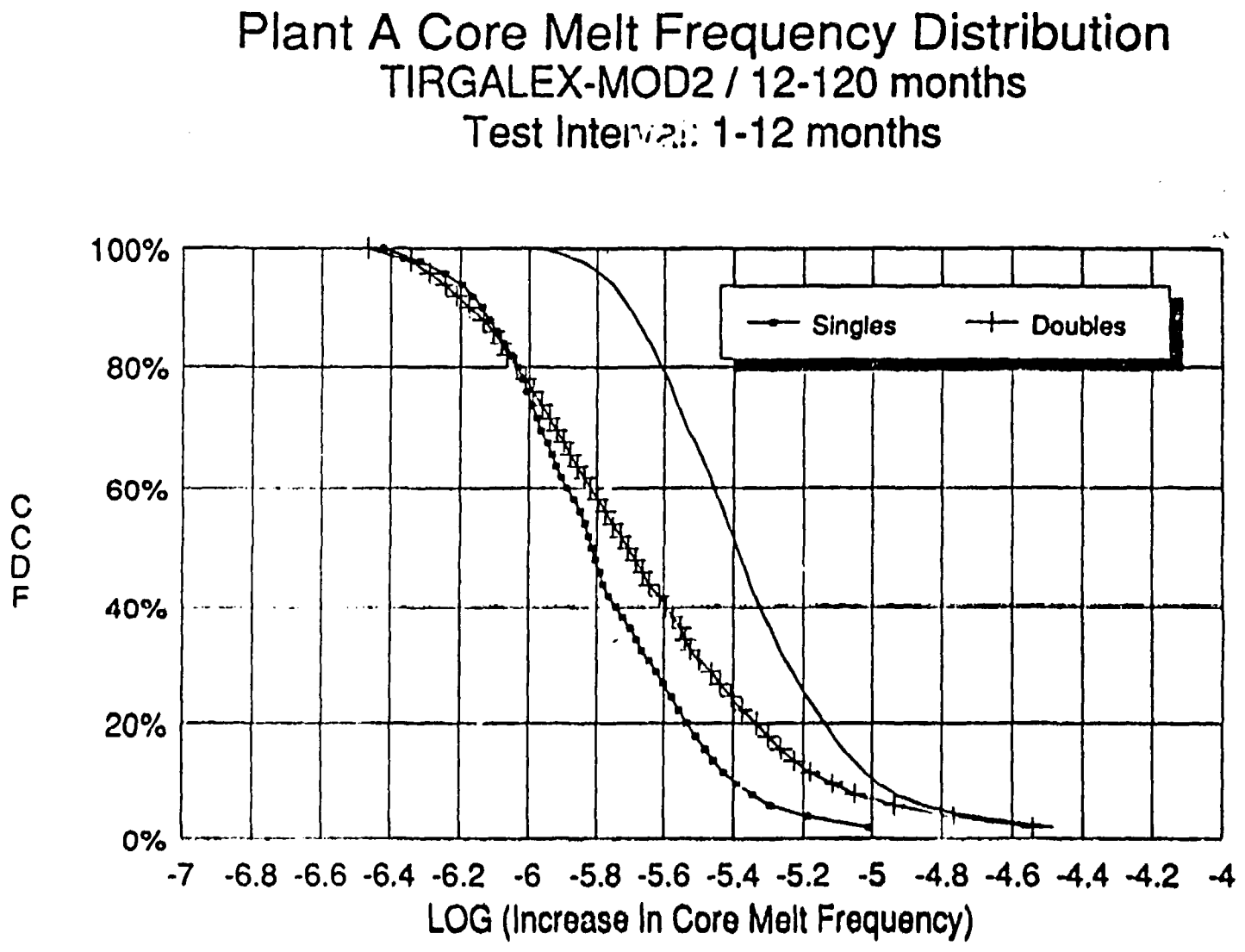


Plant A Core Melt Frequency Distribution

TIRGALEX-MOD1 / 12-120 months

Test Interval: 1-12 months




Plant A Core Melt Frequency Distribution
TIRGALEX-MOD2 / 12-120 months
Test Interval: 1-12 months
Singles
Doubles
CCDF
100%
80%
60%
40%
20%
0%
-7
-6.8
-6.6
-6.4
-6.2
-6
-5.8
-5.6
-5.4
-5.2
-5
-4.8
-4.6
-4.4
-4.2
-4
LOG (Increase in Core Melt Frequency)

11. VARIABILITY AND UNCERTAINTY RESULTS FOR PLANT B (THE BWR)

The following pages give the distribution results for the core melt frequency increase for Plant B, the BWR, for the ranges assigned to the PRA sensitivity (importance) coefficients, aging rates, overhaul intervals and surveillance intervals. The maintenance interval ranges again considered are overhauls only lying between 12-120 months, overhauls lying in the TIRGALEX ranges, and 12-120 month overhauls with 1-12 month surveillances. These cases were previously described in Section 7.

For each maintenance program characterization, a table is first presented of the complementary cumulative distribution function (CCDF) followed by graphs of the distribution. The table gives the probability (the CCDF percentiles) that the core melt frequency increase is larger than given values. The graphs show the curves for the single aging component contribution, the double aging component contribution and the total contribution. The discussions below summarize the distribution results, with the tables and curves following the discussions.

12-120 Month Overhauls Only

The distribution results are similar for TIRGALEX, MOD1, and MOD2. The increase in core melt frequency generally lies between 7-05 and 4-04 (the approximate 90% and 10% values). The probability of the core melt frequency increase being above 1-04 is approximately 75%. The doubles contribution dominates for TIRGALEX and MOD1, while for MOD2 the singles contribution is slightly larger.

TIRGALEX Overhaul Interval Ranges

The distribution results for TIRGALEX, MOD1, and MOD2 are again generally similar. The core melt frequency increase generally lies between 4-05 and 3-04, the approximate 90% and 10% values. The probability of the core melt frequency increase being above 1-04 is approximately 45%. The doubles dominate the TIRGALEX and MOD1, and for MOD2 the singles and doubles have very nearly the same distributions.

12-120 Month Overhauls and 1-12 Month Surveillances

The distributions are similar for TIRGALEX, MOD1, and MOD2, and the distribution results show the core melt frequency increase lies between 9-07 and 5-06. If aging maintenance programs conform to the 12-120 month overhaul and 1-12 month surveillance interval range description then the core melt frequency increase will be lowered by approximately a factor of 100 for all distribution values as compared to the other maintenance characterizations.

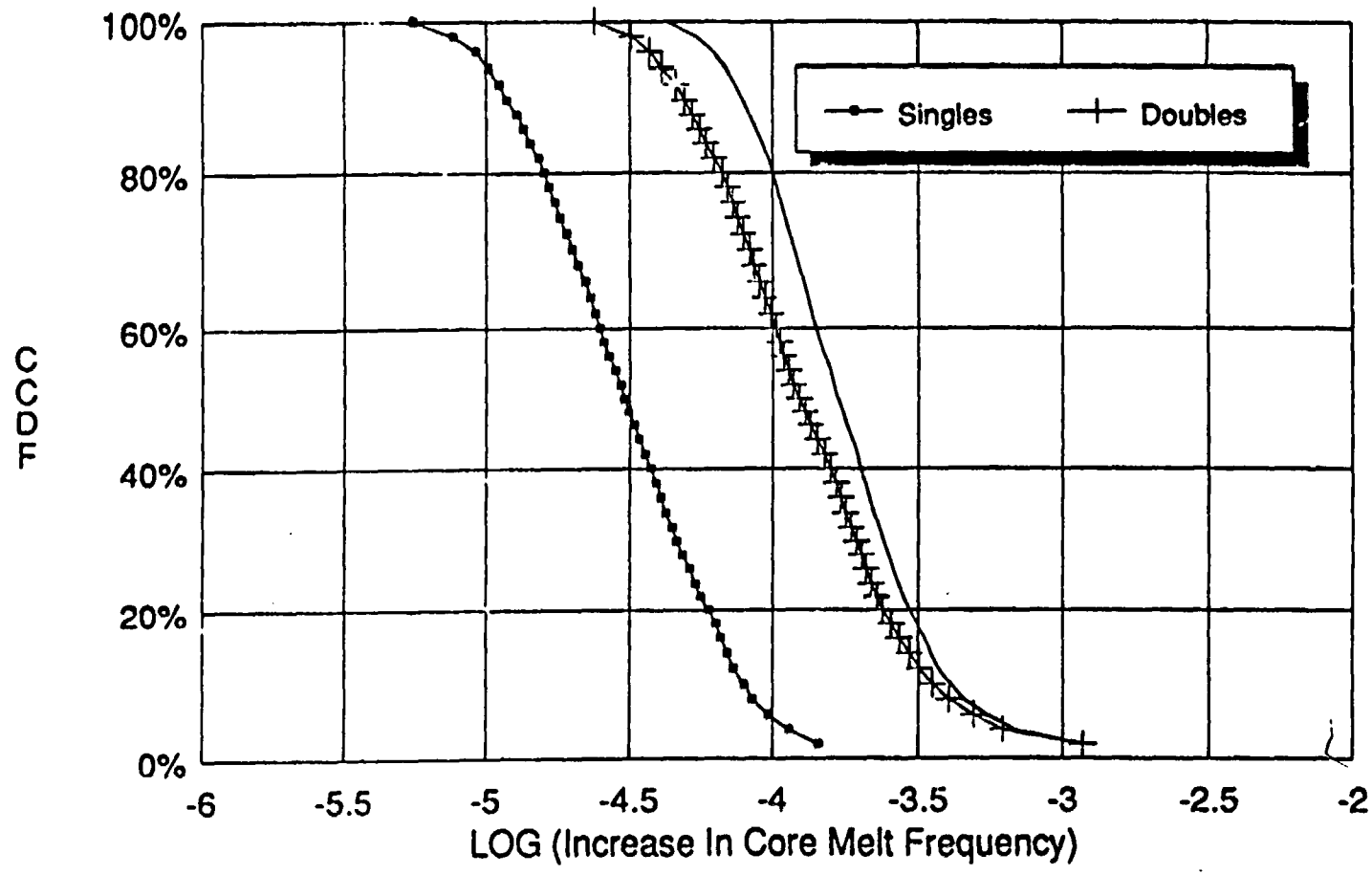
PLANT B
EFFECTIVE OVERHAUL INTERVAL = 12 - 120 MO.

COMPLEMENTARY CUMULATIVE VALUES

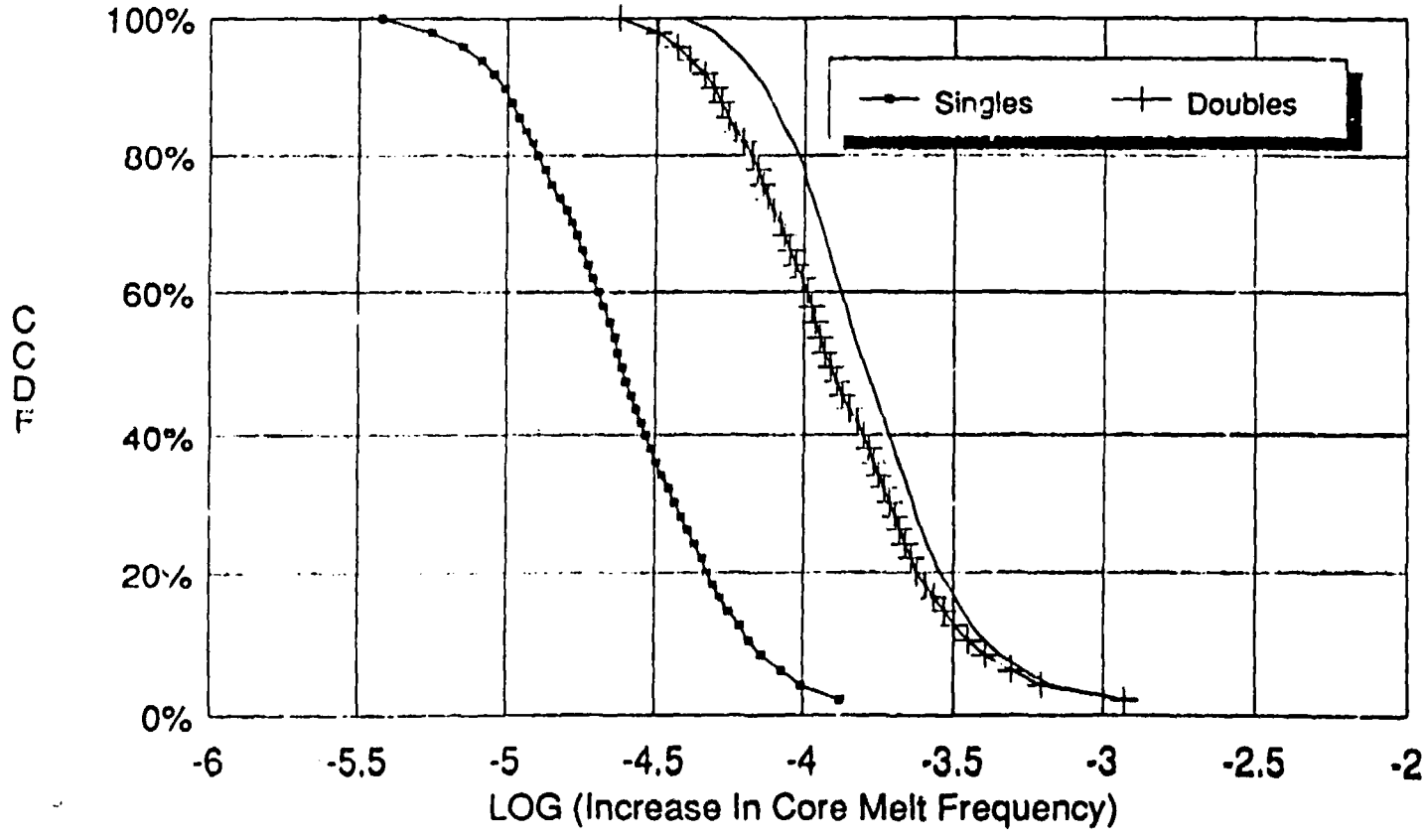
PERCENTAGE	TIRGALEX	MOD 1	MOD 2
94%	6.8E-05	6.2E-05	4.6E-05
90%	7.8E-05	7.3E-05	5.3E-05
86%	8.7E-05	8.2E-05	6.1E-05
82%	9.6E-05	9.1E-05	7.0E-05
78%	1.0E-04	9.9E-05	7.7E-05
74%	1.1E-04	1.1E-04	8.4E-05
70%	1.2E-04	1.1E-04	9.1E-05
66%	1.3E-04	1.2E-04	9.8E-05
62%	1.4E-04	1.3E-04	1.1E-04
58%	1.5E-04	1.4E-04	1.2E-04
54%	1.6E-04	1.5E-04	1.2E-04
50%	1.7E-04	1.6E-04	1.3E-04
46%	1.8E-04	1.7E-04	1.4E-04
42%	2.0E-04	1.9E-04	1.5E-04
38%	2.1E-04	2.0E-04	1.7E-04
34%	2.2E-04	2.2E-04	1.8E-04
30%	2.4E-04	2.3E-04	2.0E-04
26%	2.6E-04	2.5E-04	2.2E-04
22%	2.8E-04	2.7E-04	2.4E-04
18%	3.1E-04	3.0E-04	2.7E-04
14%	3.5E-04	3.4E-04	3.2E-04
10%	4.1E-04	4.0E-04	3.8E-04
6%	5.5E-04	5.4E-04	5.1E-04

Plant B Core Melt Frequency Distribution

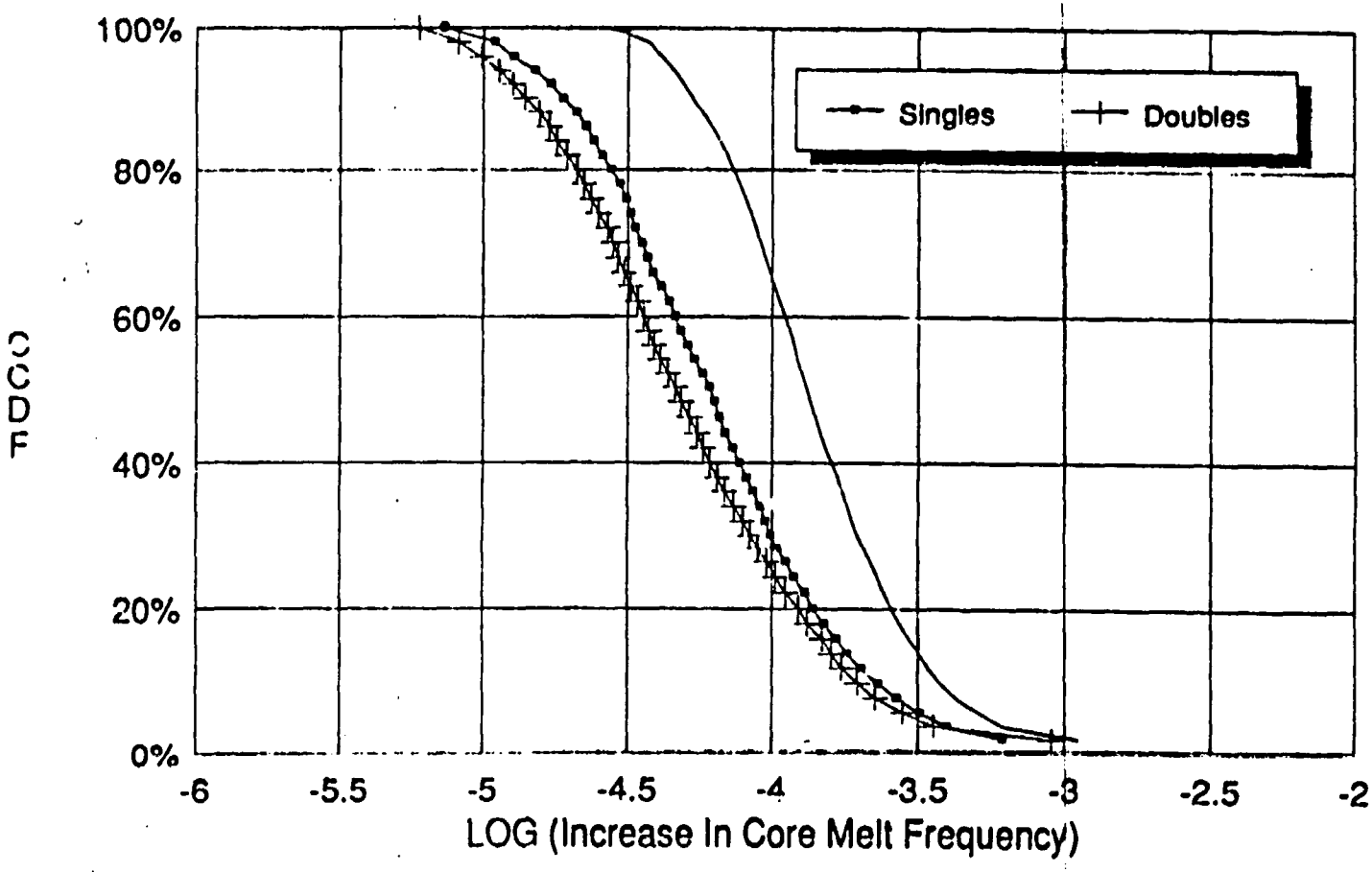
TIRGALEX / 12-120 months



Plant B Core Melt Frequency Distribution
TIRGALEX-MOD1 / 12-120 months



Plant B Core Melt Frequency Distribution
TIRGALEX-MOD2 / 12-120 months



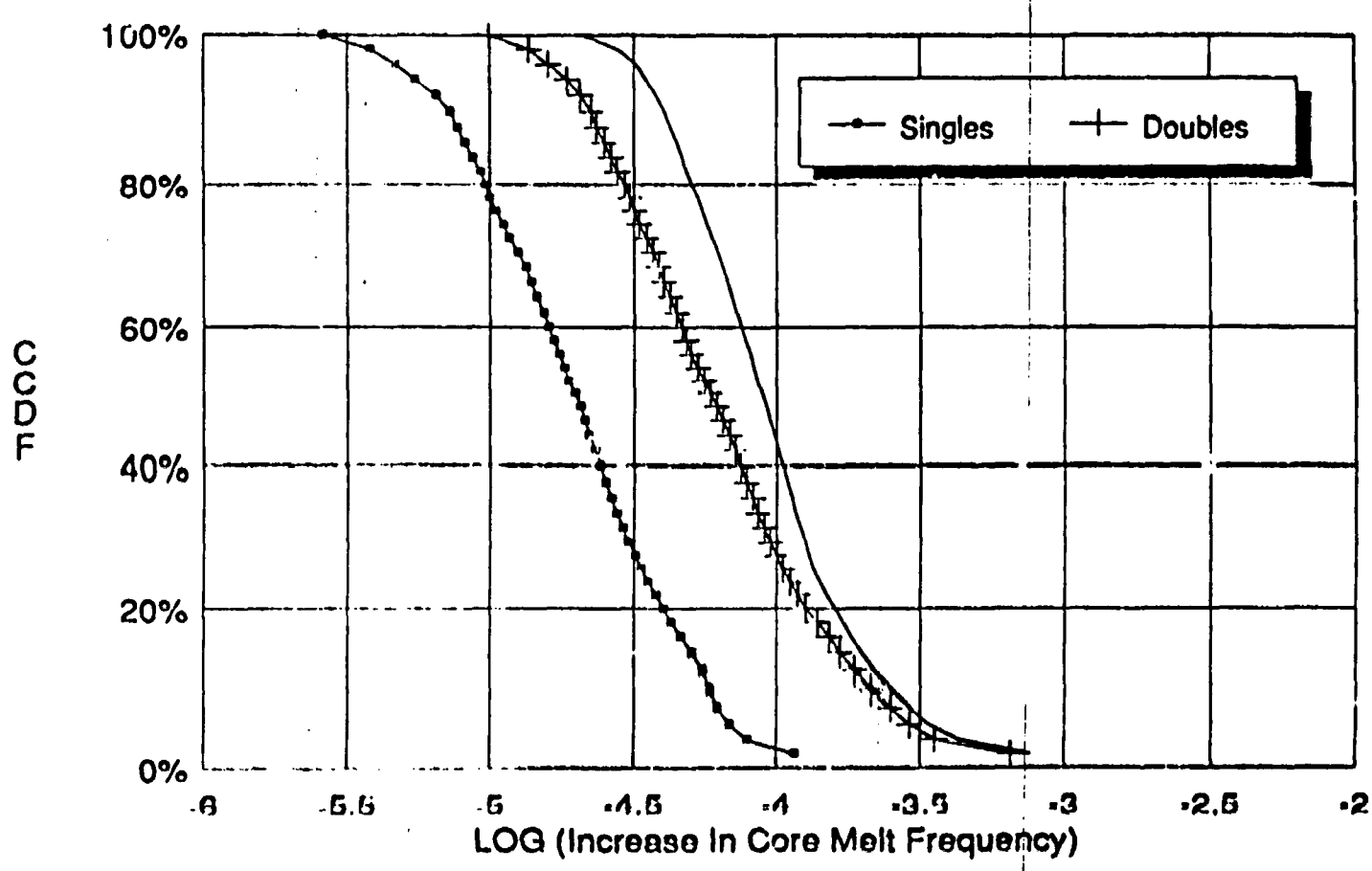
PLANT B
EFFECTIVE OVERHAUL INTERVAL = TIRGALEX RANGE

COMPLEMENTARY CUMULATIVE VALUES

PERCENTAGE	TIRGALEX	MOD 1	MOD 2
94%	3.5E-05	4.0E-05	2.4E-05
90%	4.0E-05	4.7E-05	2.8E-05
86%	4.5E-05	5.2E-05	3.2E-05
82%	4.8E-05	5.7E-05	3.5E-05
78%	5.3E-05	6.2E-05	3.9E-05
74%	5.7E-05	6.7E-05	4.3E-05
70%	6.2E-05	7.2E-05	4.7E-05
66%	6.7E-05	7.8E-05	5.2E-05
62%	7.2E-05	8.3E-05	5.7E-05
58%	7.8E-05	8.9E-05	6.2E-05
54%	8.3E-05	9.4E-05	6.6E-05
50%	8.9E-05	1.0E-04	7.1E-05
46%	9.5E-05	1.1E-04	7.8E-05
42%	1.0E-04	1.2E-04	8.7E-05
38%	1.1E-04	1.2E-04	9.7E-05
34%	1.2E-04	1.3E-04	1.1E-04
30%	1.3E-04	1.4E-04	1.2E-04
26%	1.3E-04	1.5E-04	1.3E-04
22%	1.5E-04	1.7E-04	1.4E-04
18%	1.7E-04	1.9E-04	1.7E-04
14%	2.0E-04	2.2E-04	2.0E-04
10%	2.5E-04	2.7E-04	2.4E-04
6%	3.4E-04	3.5E-04	3.2E-04

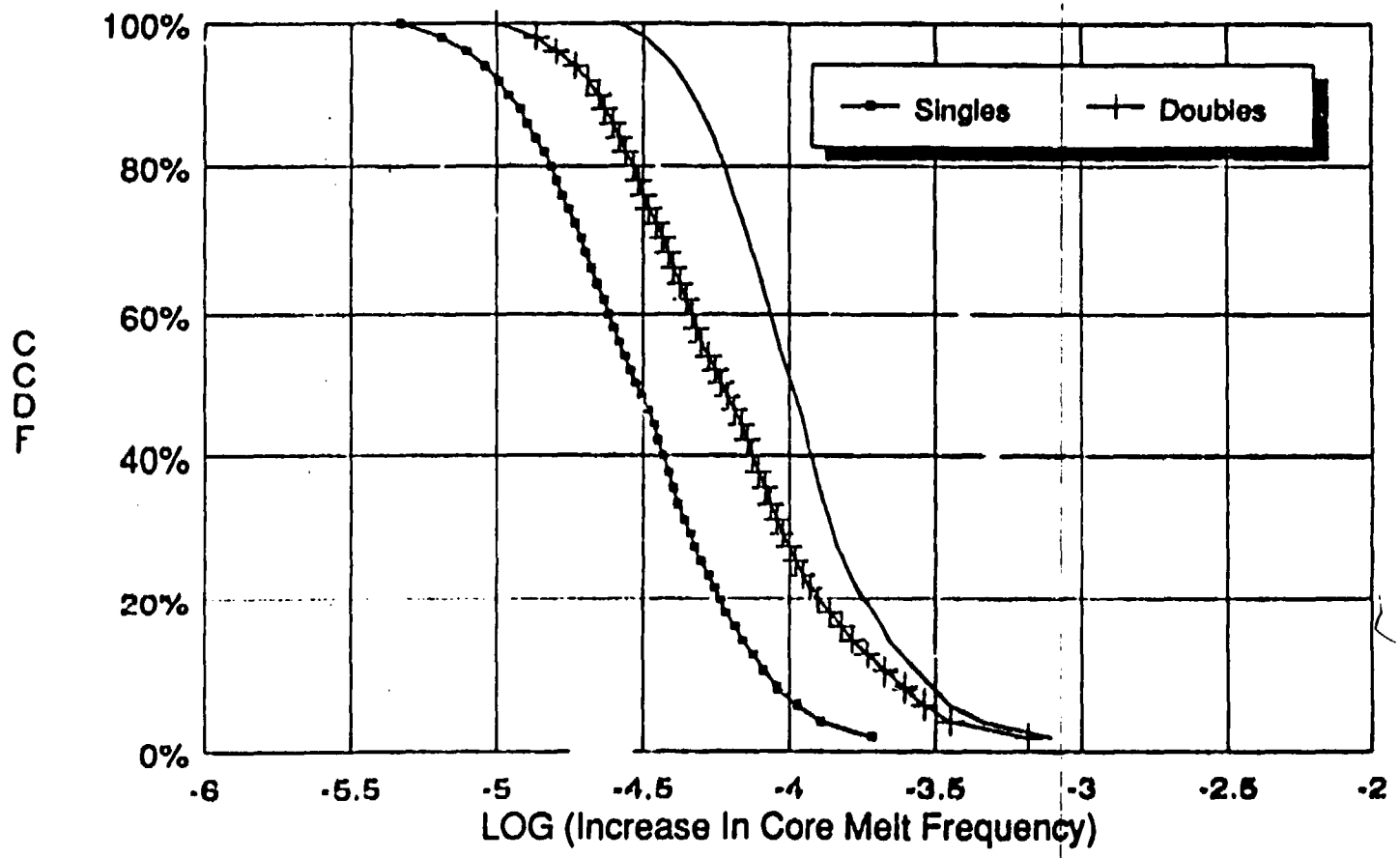
Plant B Core Melt Frequency Distribution

TIRGALEX / TIRALEX Range



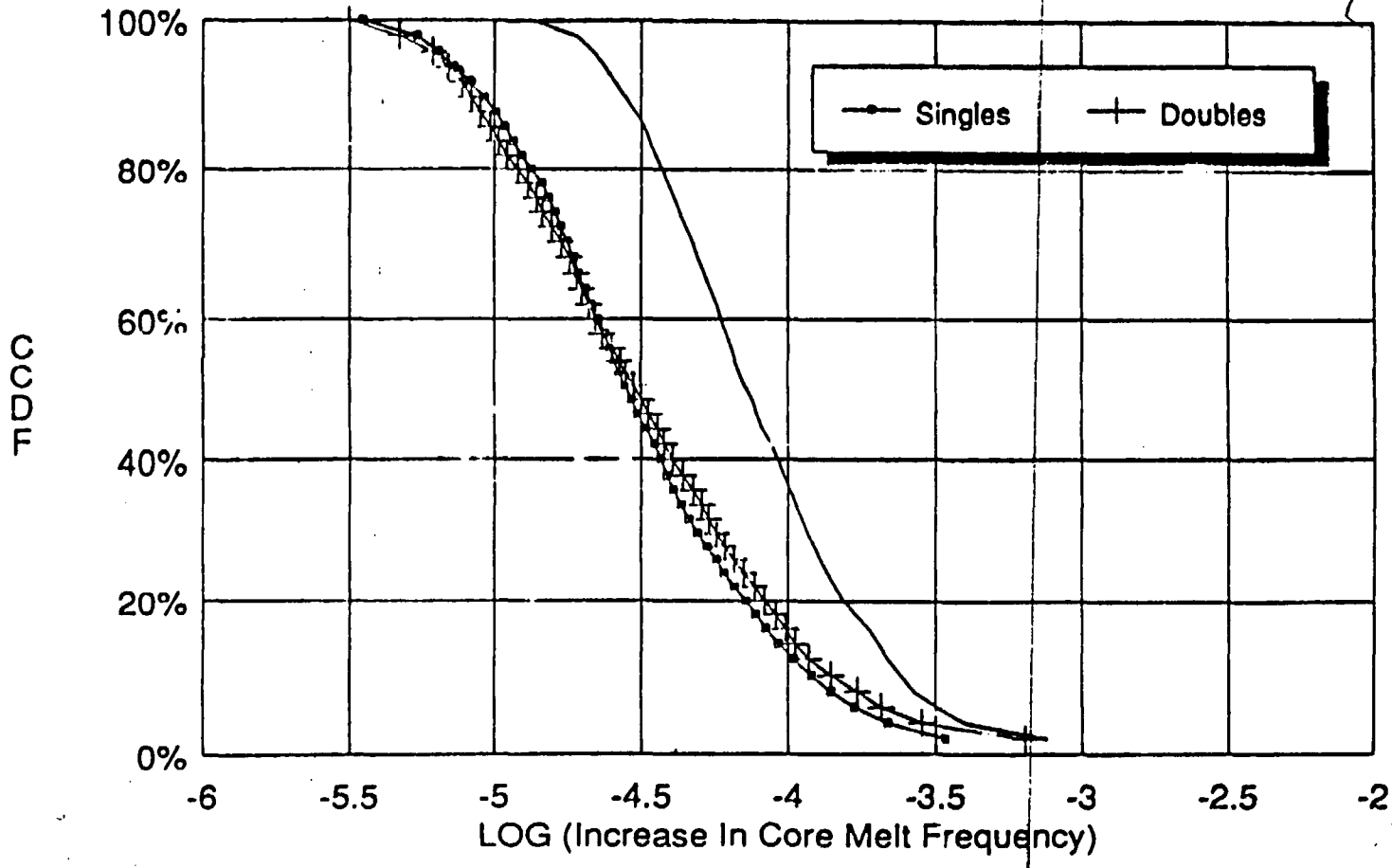
Plant B Core Melt Frequency Distribution

TIRGALEX-MOD1 / TIRGALEX Range



Plant B Core Melt Frequency Distribution

TIRGALEX-MOD2 / TIRGALEX Range



PLANT B
EFFECTIVE OVERHAUL INTERVAL = 12 - 120 MO.
EFFECTIVE SURVEILLANCE INTERVAL = 1 - 12 MO

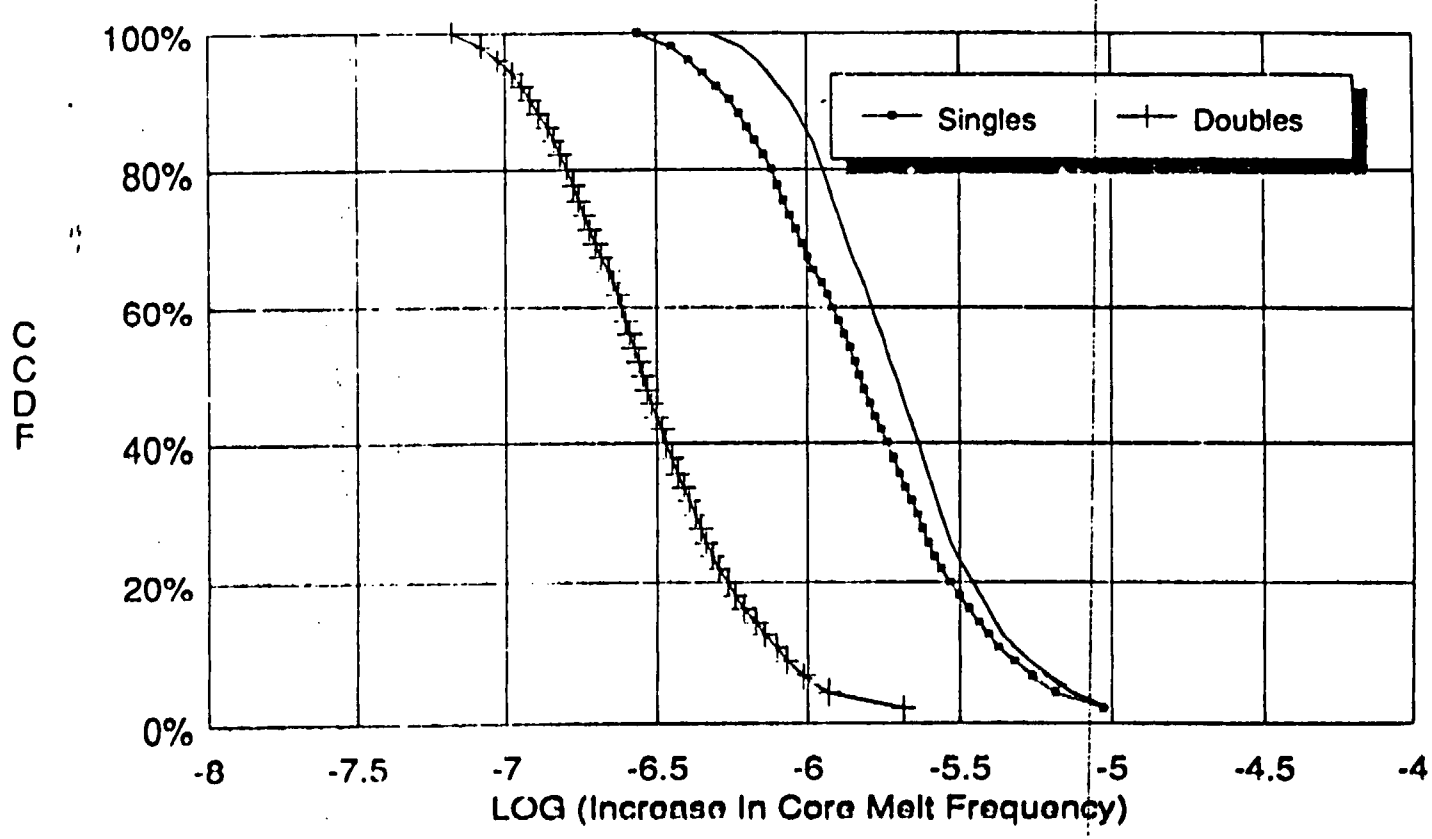
COMPLEMENTARY CUMULATIVE VALUES

PERCENTAGE	TIRGALEX	MOD 1	MOD 2
94%	7.4E-07	9.7E-07	5.6E-07
90%	8.7E-07	1.1E-06	6.7E-07
86%	9.8E-07	1.2E-06	7.6E-07
82%	1.1E-06	1.4E-06	8.6E-07
78%	1.2E-06	1.5E-06	9.5E-07
74%	1.3E-06	1.6E-06	1.0E-06
70%	1.4E-06	1.7E-06	1.1E-06
66%	1.5E-06	1.8E-06	1.3E-06
62%	1.6E-06	2.0E-06	1.4E-06
58%	1.7E-06	2.1E-06	1.5E-06
54%	1.8E-06	2.2E-06	1.6E-06
50%	1.9E-06	2.4E-06	1.7E-06
46%	2.1E-06	2.6E-06	1.9E-06
42%	2.2E-06	2.7E-06	2.1E-06
38%	2.4E-06	2.9E-06	2.3E-06
34%	2.6E-06	3.1E-06	2.5E-06
30%	2.7E-06	3.3E-06	2.7E-06
26%	3.0E-06	3.6E-06	2.9E-06
22%	3.3E-06	3.9E-06	3.2E-06
18%	3.7E-06	4.2E-06	3.7E-06
14%	4.1E-06	4.7E-06	4.2E-06
10%	4.8E-06	5.6E-06	4.7E-06
6%	6.2E-06	7.0E-06	6.3E-06

Plant B Core Melt Frequency Distribution

TIRGALEX / 12-120 months

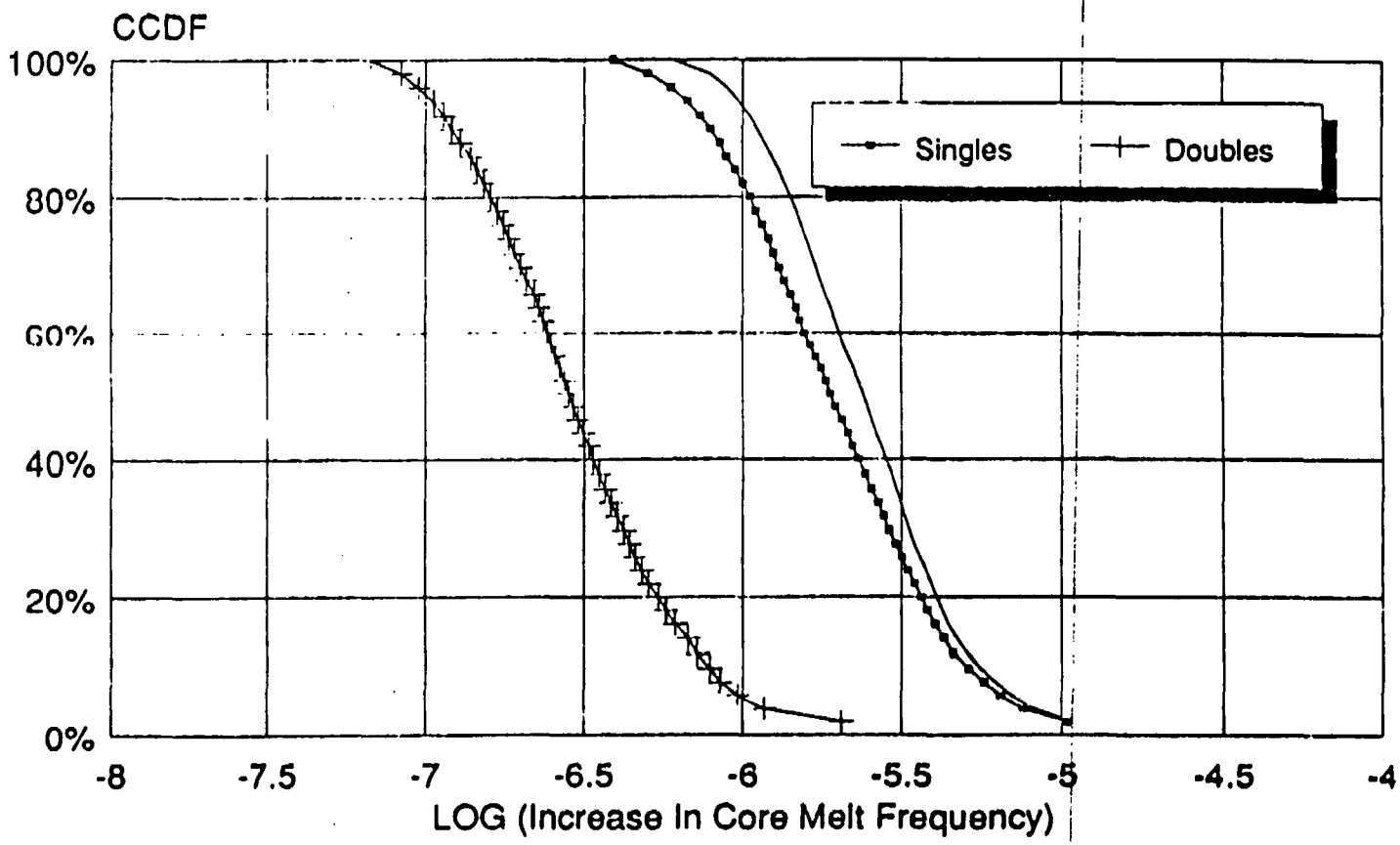
Test Interval: 1-12 months



Plant B Core Melt Frequency Distribution

TIRGALEX-MOD1 / 12-120 months

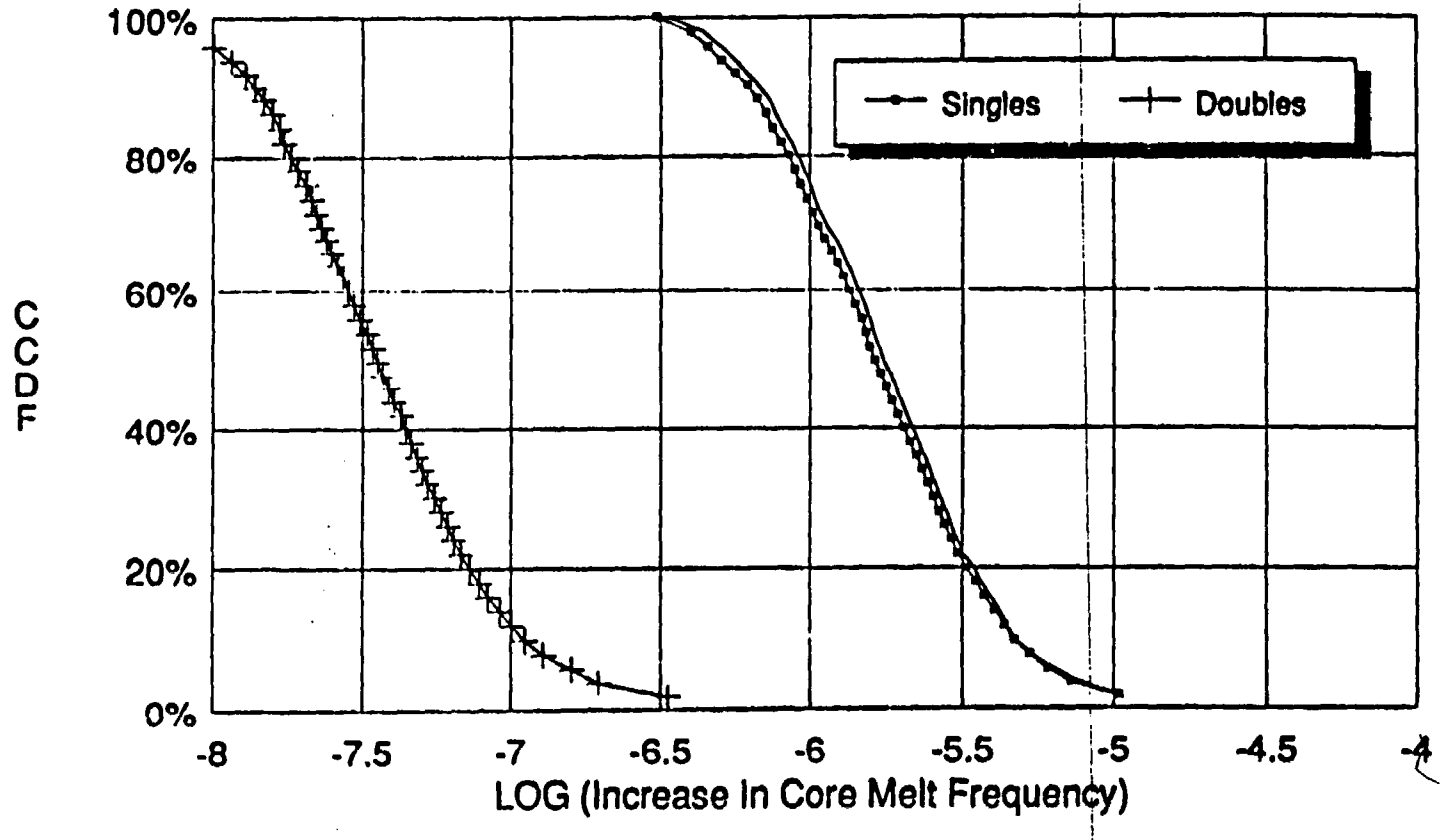
Test Interval: 1-12 months



Plant B Core Melt Frequency Distribution

TIRGALEX-MOD2 / 12-120 months

Test Interval: 1-12 months



12. CONCLUSIONS AND RECOMMENDATIONS

The methodology which was developed to quantify the core melt frequency effects from aging appears to be powerful and flexible. Any PRA model can be utilized and any risk result can be evaluated for the effects of aging. Any aging models can be used to describe the aging effects on the component unavailabilities, initiating event frequencies, and structure failure probabilities. Maintenance and surveillance programs can be modeled in a detailed manner to determine the core melt frequency and risk effectiveness of the programs. The results which are obtained show the detailed contributions from specific components and specific component interactions to focus and prioritize aging analyses and aging maintenance efforts.

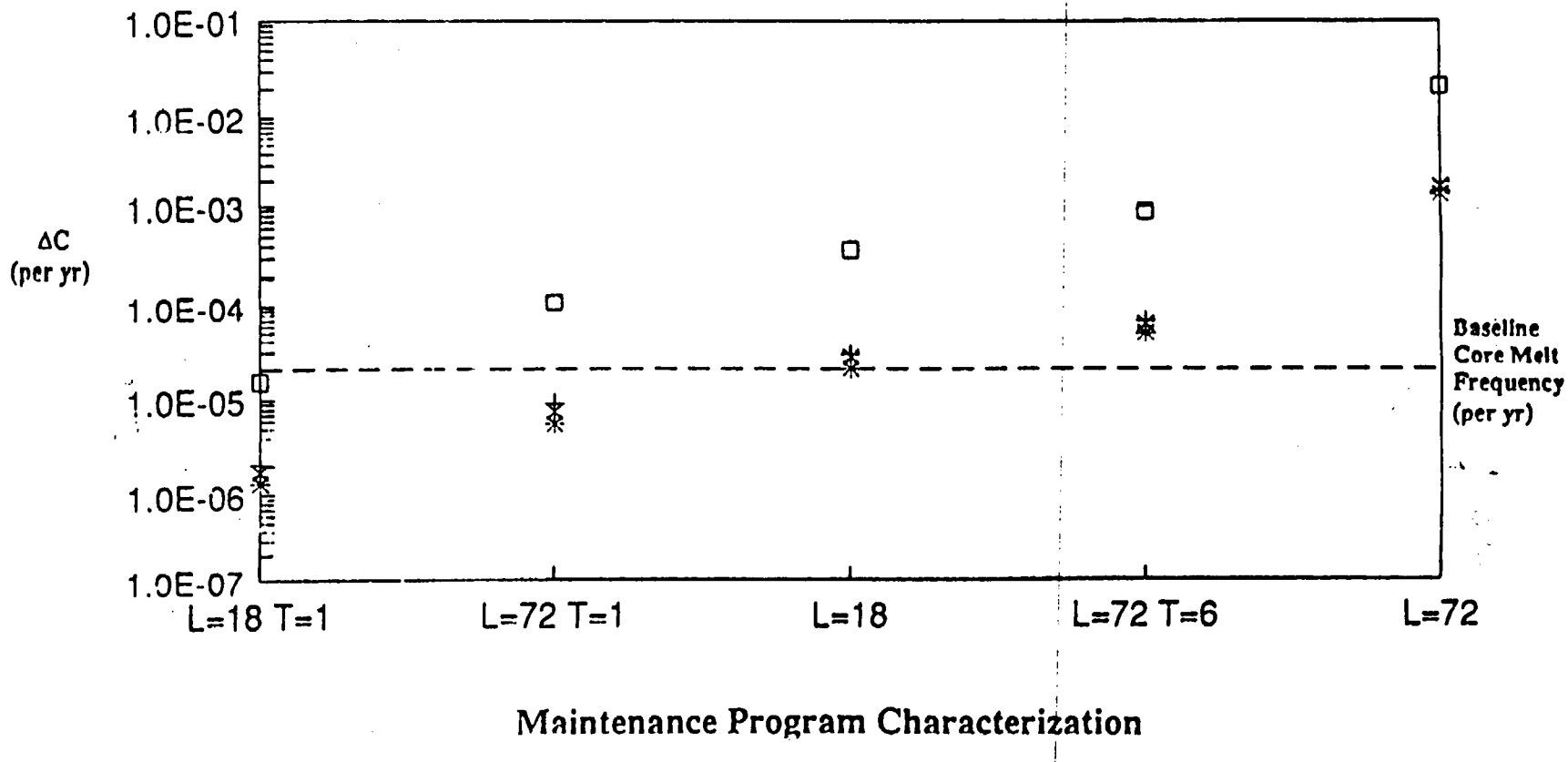
The demonstration applications which were described in this report utilized two PRAs, the linear aging model, four aging rate data sets, and evaluated a spectrum of aging maintenance program characterizations. The results of these applications showed the core melt frequency impacts that result from assumed different maintenance programs. The two figures on the next page, entitled "Core Melt Frequency Increase ΔC Versus Aging Maintenance Program", summarize the point results that were presented in the preceding sections.

The y-axis on the figures is the average increase in core melt frequency ΔC due to aging which is calculated to occur under a given maintenance program. The x-axis identifies the different aging maintenance programs that were evaluated. For example, L = 18 T = 1 denotes the maintenance program with effective overhaul intervals of 18 months and effective surveillance intervals of 1 month on all components. The maintenance programs are arranged in terms of the increasing core melt frequency ΔC they produce. The results for the TIRGALEX overhaul intervals are not shown since they involve a unique overhaul interval for each component; the TIRGALEX results are circumscribed by the results shown.

The different results for a maintenance program correspond to the four different aging rate data bases that were used. The two figures show the large differences in core melt frequency increases that result from the different assumed aging maintenance programs. The large core melt frequency increases at the right hand sides of the figures correspond to very ineffective maintenance programs which are not likely to occur in practice. Because of the limited scope of the applications, the results should not be interpreted as representing current maintenance programs. The results are most meaningful viewed as a sensitivity study, showing the sensitivity of the core melt frequency increase to the type of assumed maintenance program. The results are significant from a technical standpoint because they explicitly quantify the impacts that aging and maintenance can have. These evaluations are the first quantifications of aging and maintenance impacts using full scale, up to date PRAs.

Core Melt Frequency Increase ΔC Versus Maintenance Program Characteristics

Plant A

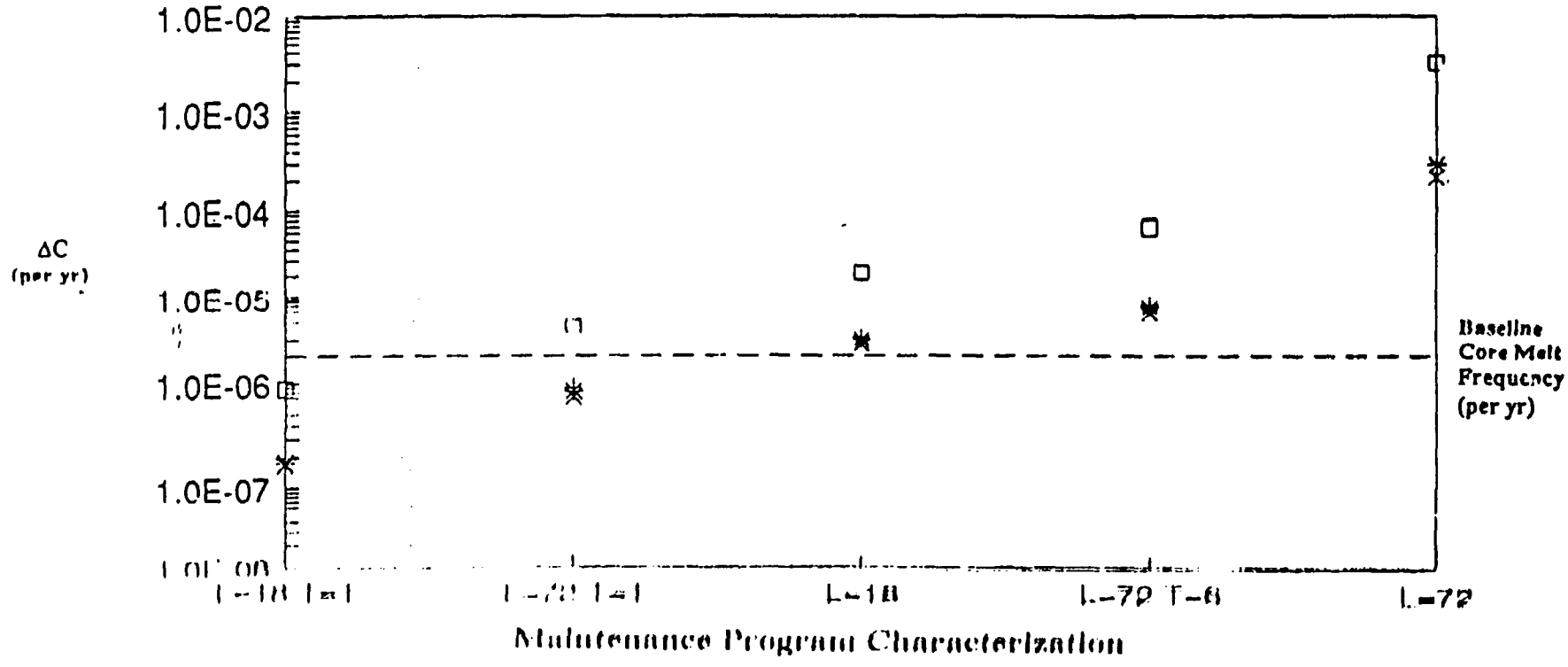


L = Overhaul interval (in months) for all components

T = Surveillance interval (in months) for all components (if intermediate surveillance is performed)

Core Melt Frequency Increase ΔC Versus Maintenance Program Characteristics

Plant B



L = Overhaul interval (in months) for all components

T = Surveillance interval (in months) for all components (if intermediate surveillance is performed)

When the core melt frequency increase ΔC is high for a maintenance program, then examination of the detailed aging contributors showed that relatively few components contribute. This implies that a "graded" maintenance program, or equivalently a "prioritized" maintenance program, could effectively control the core melt frequency increase due to aging. In a graded or prioritized maintenance program, most components can have a lower level of maintenance, provided core-melt-frequency-important components have a higher level of maintenance.

The dominant aging contributors for Plant A (the PWR) were found to be diesel generators, specific check valves and motor operated valves n the emergency core cooling system, and motor driven pumps and turbine driven pumps in the auxiliary feedwater system. For Plant B (the BWR) the dominant aging contributors were the diesels, the motor driven pumps in the service water system, and the turbine driven pumps in the reactor core isolation system. The aging contribution from every component in the PRA is provided, to the detailed defined in the PRA. Also, the contributions from multiple component interactions are provided; the interactions from multiple aging components were often the dominant contributors to the core melt frequency increase. These detailed contributors include contributions from specific systems, components, and failure modes, and provide a comprehensive means of focusing aging analyses and aging control efforts.

The uncertainty evaluations showed the large effects variabilities in the maintenance intervals can have on the resulting variability in the core melt frequency. The two figures on the subsequent pages, labelled "Probability That the Core Melt Frequency is Larger Than Given Values" show the probability distribution obtained for the different maintenance program characterizations. For each maintenance program characterization, the probability curve is only given for the TIRGALEX aging rates since the other aging rate data sets produced similar probability curves. A given point on a probability curve gives the probability (on the y-axis) that the average core melt frequency increase is larger than a given value (on the x-axis).

The higher probability curves again correspond to very ineffective maintenance programs that would not likely occur in practice. The curves therefore should not be viewed as representing current maintenance practices. The curves are most meaningful if viewed in a comparative sense, showing the relative variability in core melt frequency increase which results from the variabilities which were assigned to the overhaul and surveillance intervals. As for the point results, the detailed contributors indicate that the larger core melt frequency increases can be reduced by focusing tighter maintenance on the core-melt-frequency-important components.

Based on the results of the work, various recommendations can be made. Because of the core melt frequency impacts they can have, plant maintenance programs should be reviewed to determine their characterization in terms of effective overhaul intervals and effective surveillance intervals for components, subassemblies, and pieceparts. The

approaches which have been developed can then be used to evaluate current maintenance programs for their core melt frequency effectiveness.

The aging rate data which was used in the study was used as demonstration data. Plant specific data can produce significantly different aging rates. Plant specific data can also show threshold effects, where aging trends in the failure rate do not begin until after some threshold age. Plant specific data can furthermore show nonlinear aging effects, in which the aging trend in the failure rate is a nonlinear function of the age. It is therefore important to collect and analyze plant specific data to estimate aging component failure rates. Using standard reliability theory, the component unavailability modes developed in this study can be then straightforwardly extended to include threshold and nonlinear aging failure rates, where applicable.

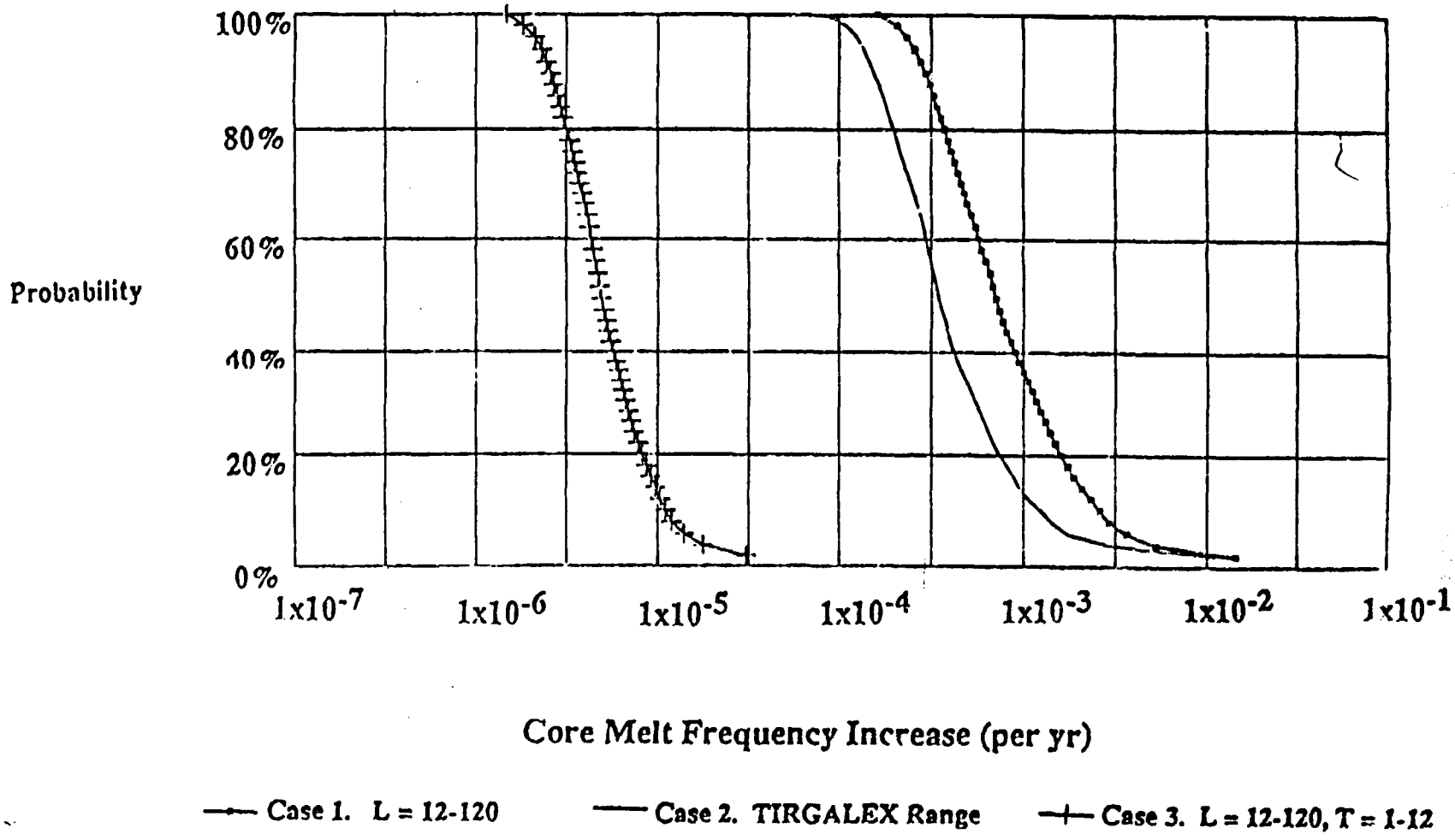
The PRAs truncated many contributions, (e.g., contributions from multiple check valve failures were excluded), that could become important when aging is considered. It would be useful to expand the PRA contributions (minimal cut sets) and rerun the aging evaluations to determine the contributions from higher order, multiple component aging effects. It would also be useful to evaluate additional PRAs to determine generic conclusions regarding aging effects and aging contributors.

The aging contributions from balance of plant equipment, passive components, and structures are not included in the present evaluations. It is important to include these critical contributors to obtain a more complete picture of aging impacts not only on core melt frequency, but on public health risks. The approaches which have been developed can include aging effects from balance of plant equipment, passive components, and structures if aging information and models are assembled as they were for the active components. It is important to include these additional contributors since they could have large impacts.

With regard to regulatory applications, the approaches which have been developed can be useful in helping to define maintenance guidelines for controlling core melt frequency impacts and risk impacts from aging. The developed risk quantification approaches can serve as useful tools to complement deterministic evaluations. The approaches can be used to prioritize aging contributors to determine where to focus more detailed, deterministic aging analyses and aging maintenance. In the applications which were carried out, there were a relatively small number of important contributors which impacted the core melt frequency, implying that prioritization can be very effective. The quantification approaches which have been developed can also be used to help define guidelines for risk-effective overhaul intervals and surveillance intervals to control aging impacts. The approaches can furthermore be used to define component performance guidelines in terms of component failure rate increases and unavailability increases which require action before risk is impacted. Data collection guidelines can also be developed to define what data should be collected and should be analyzed to audit and monitor aging effects and their risk implications.

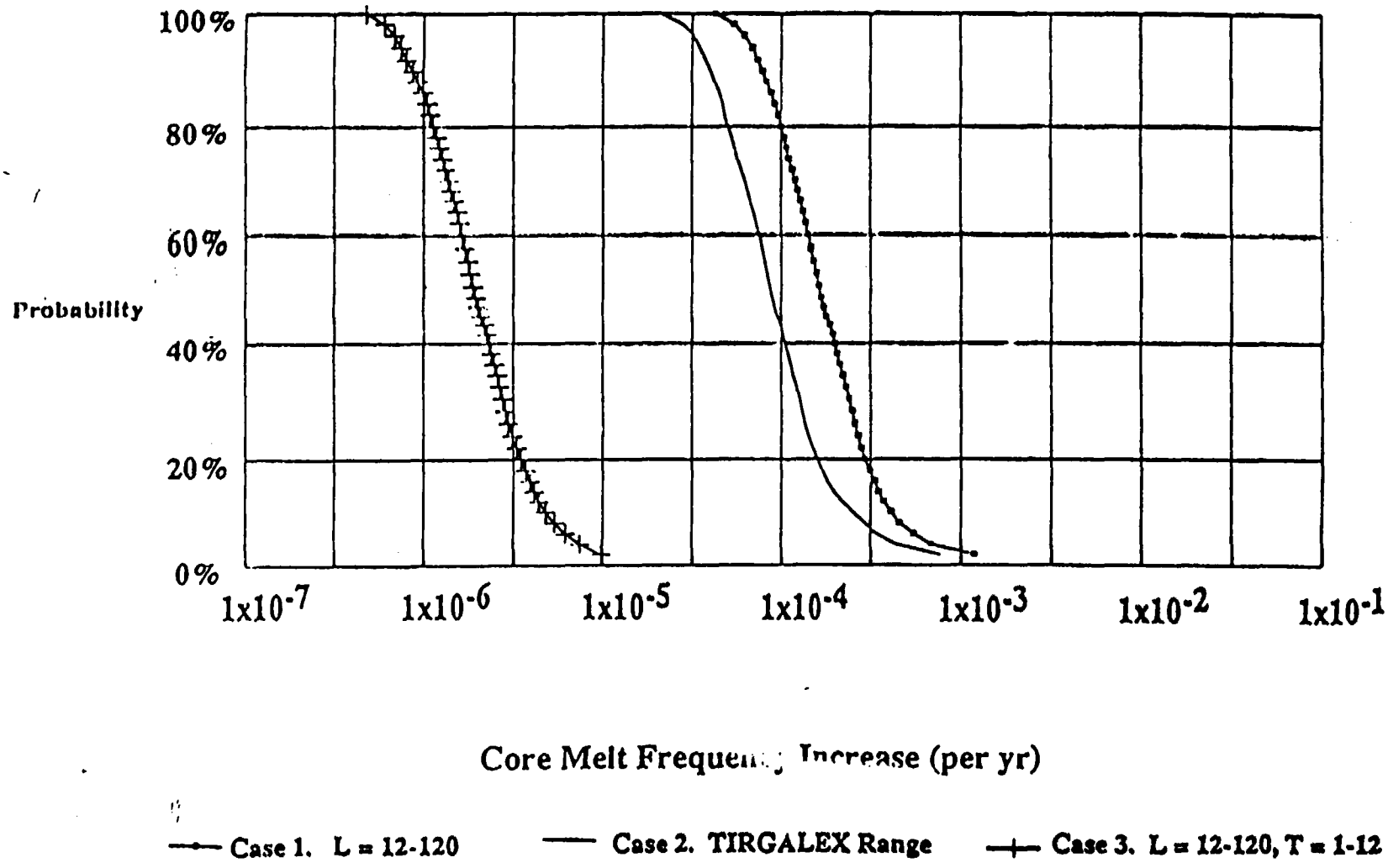
Probability that the Aging Increase in Core Melt Frequency is Larger than Given Values

Plant A



Probability that the Aging Increase in Core Melt Frequency is Larger than Given Values

Plant B



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APPENDIX A: A GENERAL SENSITIVITY METHODOLOGY WITH APPLICATIONS TO AGING PRIORITIZATIONS

A GENERAL SENSITIVITY METHODOLOGY WITH APPLICATIONS TO AGING PRIORITIZATIONS

General Formulation

Let R be an appropriate risk measure, for example the core melt frequency or system unavailability. Then R may be written in the general form

$$R = \sum_{i} R_i q_i + \sum_{i>j} R_{ij} q_i q_j + \sum_{i>j>k} R_{ijk} q_i q_j q_k + \ldots$$

$$+ R_{12\ldots n}\, q_1 q_2 \ldots q_n \qquad (1)$$

where R_i, R_{ij}, etc. are appropriate coefficients, some of which may be zero and where q_i are component unavailabilities. We assume there are n components unavailabilities $q_1, q_2, \ldots, q_n$. The sums are over all combinations of the component unavailabilities taken one at a time, two at a time, three at a time, up to n at a time. Equation (1) is valid in general for any risk measure.

To obtain a general sensitivity formula for R let us change each q_i to $q_i + u_i$. (The unavailability change u_i can be any incremental change, negative or positive, and does not need to be small compared to q_i. From Equation (1) the general expression for the change r in R due to the changes u_i can be expressed as

$$r = \sum_{i} S_i u_i + \sum_{i>j} S_{ij} u_i u_j + \sum_{i>j>k} S_{ij} u_i u_j u_k + \ldots$$

$$+ S_{12\ldots n}\, u_1 u_2 \ldots u_n \qquad (2)$$

where S_i, S_{ij}, $S_{ijk}, \ldots S_{12\ldots n}$ are different coefficients and are related to R_i, $R_{ij}, \ldots R_{12\ldots n}$. We shall call S_i, S_{ij}, $S_{ijk}, \ldots S_{12\ldots n}$ sensitivity coefficients since they give the sensitivity of r to particular combinations of unavailability changes.

When we determine the sensitivity coefficients S_i, S_{ij}, etc. then we have comprehensive knowledge about how changes u_i in the component unavailability contribute to the change in risk r. We not only have the linear contributions $S_i u_i$ but the two factor contributions $S_{ij} u_i u_{ij}$ the three factor contributions $S_{ijk} u_i u_j u_k$, up to the nth factor contribution $S_{12\ldots n} u_1 u_2 \ldots u_n$. For small unavailability changes the linear contribution dominates. However for larger unavailability changes the multiple factor contributions can dominate.

The individual contributions to the risk change in Equation (2) have the following interpretations:

$S_i u_i$ = the change in risk due to the individual unavailability change u_i. (3)

$S_{ij}u_iu_j$ = the change in risk due to the combination of changes u_i u_j (4)

. .

. .

. .

$S_{12...n}u_1u_2...u_n$ = the change in risk due to the combination of changes $u_1, u_2, ...u_n$ (5)

The sensitivity coefficients S_i, S_{ij}, etc. in turn have the following interpretations:

S_i = the linear change in risk per unit change in q_i (6)

S_{ij} = the two-factor change in risk per unit change in q_iq_j (7)

S_{ijk} = the three-factor change in risk per unit change in $q_iq_jq_k$ (8)

$S_{12...n}$ = the n-factor change in risk per unit change in $q_1q_2...q_n$ (9)

The general risk change expression, Equation (2), and the corresponding sensitivity coefficients are comprehensive and quite powerful. The risk change expression gives the change in the risk due to linear contributions from the unavailability changes. When only specific component unavailabilities are changed, for example u_1, u_2, and u_3, then the risk change is determined from the sensitivity coefficients encompassing combinations of the specific component indices. For the example in which u_1, u_2 and u_3 are the only changes, the risk change r is

$$r = S_1u_1 + S_2u_2 + S_3u_3 + S_{12}u_1u_2 + S_{13}u_1u_3 + S_2S_3u_2u_3 + S_{123}u_1u_2u_3 \quad (10)$$

Application to Prioritization of Aging Effects

For risk prioritizations of aging effects, the sensitivity expressions provide comprehensive information on the risk impacts from individual component aging effects and from multiple component aging effects. For aging studies, the changes in component unavailabilities u_i are those due to aging effects. For example, if components 1,2 and 3 are aging and have increases u_1, u_2, and u_3, respectively, in their unavailabilities due to aging effects then the increase r in core melt frequency (or another appropriate risk measure) due to the aging effects is given by the previous equation, Equation (10). Each of the sensitivities S_1 S_2 S_3, etc. can be interpreted as the impact on the core melt

frequency due to individual component aging effects and multiple component aging effects.

In general, for aging studies, the sensitivity coefficients S_i, S_{ij}, etc. have the following more specific definitions:

S_i = the change in risk per unit change in q_i due to individual aging effects in component i (11)

S_{ij} = the change in risk per unit change in $q_i q_j$ due to multiple aging effects in components i,j (12)

S_{ijk} = the change in risk per unit change in $q_i q_j q_k$ due to multiple aging effects in components i,j,k (13)

$S_{12...n}$ = the change in risk per unit change in $q_1 q_2 ... q_n$ due to multiple aging effects in 1,2,...n (14)

If over a time period the aging effects produce changes u_1, u_2,...u_n in the component unavailabilities as compared to the steady state unavailabilities then the contributions to the risk change are obtained by multiplying the unavailability changes by the sensitivity coefficients:

$S_i u_i$ = the change in risk due to individual aging effects in component i (15)

$S_{ij} u_i u_j$ = the change in risk due to multiple aging effects in components i and j (16)

$S_{ijk} u_i u_j u_k$ = the change in risk due to multiple aging effects in components i,j, and k (17)

$S_{123...n} u_1 u_2 ... u_n$ = the change in risk due to multiple aging effects in 1,2,3,..,n (18)

The total change in risk is the sum of the above individual contributions. If only certain components are aging or if the risk impact is only desired from a group of components which are hypothesized to be aging then only the pertinent contributions are computed. For example if components 1,2,3, and 4 are hypothesized to be aging with unavailability increases u_1, u_2, u_3, and u_4 then the total risk increase would consist of the sum of:

The individual contributions $S_1 u_1$,...,$S_4 u_4$

The two factor contributions $S_{12} u_1 u_2$, $S_{13} u_1 u_3$,...,$S_{34} u_3 u_4$

The three factor contribution $S_{123} u_1 u_2 u_3$, ..., $S_{234} u_2 u_3 u_4$

and

The four factor contribution $S_{1234}u_1u_2u_3u_4$

Organizing the Contributions into Various Order Approximations

For various applications, the unavailability changes u_1, u_2,...,u_n will be small enough such that the higher order contributions, e.g. $S_{1234}u_1u_2u_3u_4$ will be negligible compared to the lower ordered contributions, i.e. S_1u_1. In fact if u_1, u_2,...u_n are small enough than the dominant contributions will only be the first order terms, i.e. S_1u_1, S_2u_2,...,S_nu_n. These first order terms are the standard first order Taylor expansion terms approximating the change in risk r. However the general risk change expression, Equation (2), gives all the contributions.

We can order the contributions to the change in risk according to a first order model, which includes only the first order terms; a second order model which includes first order plus second order terms, etc., up to an n-th order model which has all the terms. This hierarchy of different model approximations is given below:

First Order Approximation for the Risk Change:

$$r = S_1u_1 + S_2u_2 + \ldots + S_nu_n \tag{19}$$

Second Order Approximation for the Risk Change:

$$r_2 = S_1u_1 + S_2u_2 + \ldots + S_nu_n + S_{12}u_1u_2 + S_{13}u_1u_3 + \ldots + S_{n-1\,n}\,u_{n-1}\,u_n \tag{20}$$

Exact (nth order) Formula for the Risk Change

$$r_n = S_1u_1 + \ldots + S_nu_n + S_{12}u_1u_2 + \ldots + S_{n-1\,n}\,u_{n-1}\,u_n + \ldots + S_{12\ldots n}\,u_1u_2\ldots u_n \tag{21}$$

Calculating the Sensitivity Coefficients by the MCS Approach

The sensitivity coefficients S_i, S_{ij}, etc. can be determined in a variety of ways. A straightforward approach is the minimal cut set-based approach, or mcs approach, for short. To understand the mcs approach, consider the minimal cut set contribution $q_1q_2q_3$.

Letting u_1, u_2, and u_3 be the changes in q_1, q_2, and q_3, the new minimal cut set contribution is

$$(q_1 + u_1)(q_2 + u_2)(q_3 + u_3) = q_1q_2q_3$$
$$+ q_2q_3\,u_1 + q_1q_3\,u_2 + q_1q_2u_3$$
$$+ q_3u_1\,u_2 + q_2\,u_1\,u_3 + q_1\,u_2\,u_3$$
$$+ u_1\,u_2\,u_3 \qquad (22)$$

The sensitivity coefficient contributions are therefore:

Sensitivity Coefficient	Contribution
S_1	q_2q_3
S_2	q_1q_3
S_3	q_1q_2
S_{12}	q_3
S_{13}	q_2
S_{23}	q_1
S_{123}	1

The sensitivity contributions can be simply obtained by setting the appropriate unavailability values equal to one in the expression $q_1q_2q_3$. For example, the contribution to S_1 is obtained by setting $q_1 = 1$, i.e. $S_1 = q_2q_3$. The contribution to S_{12} is obtained by setting $q_1 = 1$ and $q_2 = 1$, i.e. $S_{12} = q_3$. The contribution to S_{123} is obtained by setting $q_1 = 1$, $q_2 = 1$, $q_3 = 1$, i.e. $S_{123} = 1$.

For a general minimal cut set $q_{k_1}, q_{k_2}, \ldots q_{k_n}$ the

sensitivity coefficient contributions are obtained by setting the appropriate combinations of $q_{k_1}, q_{k_2} \ldots q_{k_n}$ equal to one:

Sensitivity Coefficient	Contribution
S_{k_1}	$q_{k_2}q_{k_3}\ldots q_{k_n}$
S_{k_2}	$q_{k_1}q_{k_3}\ldots q_{k_n}$
.	.
.	.
.	.
$S_{k_1k_2}$	$q_{k_3}q_{k_4}\ldots q_{k_n}$

$S_{k_1k_3}$	$q_{k_2}q_{k_4}\cdots q_{k_n}$
$\vdots$	
$S_{k_1k_2k_3}$	$q_{k_4}q_{k_5}\cdots q_{k_n}$
$\vdots$	
$S_{k_1k_2\cdots k_n}$	1

For each minimal cut set the respective sensitivity contributions are obtained in this manner. All the minimal cut sets are processed and the sensitivity coefficient contributions are summed for each sensitivity coefficient to obtain the total sensitivity coefficient value.

<u>Algorithm to Calculate the Sensitivity coefficients Using the MCS Approach</u>

Using the approach discussed in the previous section an algorithm can be constructed to calculate the sensitivity coefficients from any set of minimal cut sets. The steps of the algorithm are as follows:

Step 1. To calculate each single sensitivity coefficient S_i:

Identify all the minimal cut sets containing component i.

Set $q_i = 1$ and sum the minimal cut set contributions to obtain S_i.

Step 2. To calculate each double sensitivity coefficient S_{ij}:

Identify all the minimal cut sets, each containing i and j.

Set $q_i = 1$ and $q_j = 1$ in each minimal cut set and sum the contributions to obtain S_{ij}.

Step n. To calculate each nth order sensitivity coefficient $S_{k_1k_2\cdots k_n}$:

Identify all the minimal cut sets, each containing $q_{k_1}, q_{k_2}, \ldots, q_{k_n}$

Set $q_{k_1} = 1, q_{k_2} = 1, \ldots, q_{k_n} = 1$ in each minimal cut

set and sum the contributions to obtain $S_{k_1 k_2 \ldots k_n}$

By efficiently searching the minimal cut set list or by developing an efficient cross referencing procedure, the calculations can be carried out in an efficient manner. The calculations can also be terminated at a given step to produce the nth order model.

Calculating the Sensitivity Coefficients by Calculating Risk Changes

Instead of calculating the sensitivity coefficients using the minimal cut sets, the sensitivity coefficients can also be determined by directly calculating the risk changes. In this direct risk calculation approach, specific component unavailabilities q_i are changed by given amounts u_i and the corresponding risk change r is determined. By repeating these calculations for different sets of component unavailabilities and by manipulating the associated risk changes, the sensitivity coefficients can be obtained.

The approach proceeds as follows. From Equation (2) again, the risk change r due to arbitrary changes u_i in the component unavailabilities q_i is again:

$$r = \sum_i S_i u_i + \sum_{i>j} S_{ij} u_i u_j + \sum_{i>j>k} S_{ijk} u_i u_j u_k$$

$$+ \ldots + S_{12\ldots n} u_1 u_2 \ldots u_n \qquad (23)$$

To determine the sensitivity coefficient S_i, change only component unavailability q_i to $q_i + u_i$. Don't change any other component unavailabilities, i.e. all $u_j = 0$ for $j \neq i$. With the changed unavailability $q_i + u_i$ calculate the risk change r which equals the difference between the risk value with the change and the risk value without the change. Call this risk change r_i.

From Equation (23)

$$r_i = S_i u_i \qquad (24)$$

Hence

$$S_i = \frac{r_i}{u_i} \qquad (25)$$

Therefore by changing each q_i separately for all the components i=1,...,n, and determining the corresponding risk change r_i, the individual sensitivity coefficients S_i can be determined using Equation (25).

To determine the two factor sensitivity coefficient S_{ij} change q_i to $q_i + u_i$ and change q_j to $q_j + u_j$. Don't change any other component unavailability ($u_k = 0$, $k = i,j$). Calculate the resulting risk change r_{ij}. Then from Equation (23)

$$r_{ij} = S_i u_i + S_j u_j + S_{ij} u_i u_j \tag{26}$$

Since S_i and S_j have already been determined (from Equation (25)) the coefficient S_{ij} is determine from r_{ij}

$$S_{ij} = \frac{r_{ij} - S_i u_i - S_j u_j}{u_i u_j} \tag{27}$$

If u_i and u_j used in determining S_{ij} are the same values as used in determining S_i and S_j then Equation (25) can be substituted into Equation (27) to obtain S_{ij} in terms of r_{ij}, r_i and r_j,

$$S_{ij} = \frac{r_{ij} - r_i - r_j}{u_i u_j} \tag{28}$$

A general approach is thus apparent. To determine the three factor sensitivity coefficient S_{ijk} change q_i, q_j, q_k to $q_i + u_i$, $q_j + u_j$, $q_k + u_k$. Leave all other unavailabilities unchanged. Determine the resulting risk change r_{ijk}. From Equation (23), r_{ijk} is given by

$$r_{ijk} = \sum_1 S_x u_x + \sum_2 S_{xy} u_x u_y + S_{ijk} u_i u_j u_k \tag{29}$$

where

$$\sum_1 = \text{the sum over the individual indices in } (i, j, k) \tag{30}$$

and

$$\sum_2 = \text{sum over all combinations of two indices in } (i, j, k) \tag{31}$$

Therefore,

$$S_{ijk} = \frac{r_{ijk} - \sum_1 S_x u_x - \sum_2 S_{xy} u_x u_y}{u_i u_j u_k} \tag{32}$$

If the same values of u_i, u_j, u_k are used as far the previous two factor and one factor sensitivity determinations then the expressions for S_x and S_{xy}, i.e. Equations (25) and (27), respectively, can be substituted into Equation (32) to obtain S_{ijk} in terms of r_{ijk}, r_x, and r_{xy}.

In general $S_{i_1 i_2 \ldots i_k}$ can be determined from the formula

$$S_{i_1 i_2 \ldots i_k} = \frac{r_{i_1 i_2 \ldots i_k} - \sum_1 S_x u_x - \sum_2 S_{xy} u_x u_y - \ldots - \sum_{k-1} S_{x_1 \ldots x_{k-1}} u_{x_1} \ldots u_{x_{k-1}}}{u_{i_1} u_{i_2} \ldots u_{i_k}} \tag{33}$$

In using the above approach, numerical accuracy problems can be encountered because of the subtraction of the terms on the right hand side of Equation (33). The unavailability changes u_i, u_j, etc. must thus be large enough so that the risk change is larger than the lower order contributions.

APPENDIX B: AGING EFFECTS ON COMPONENT UNAVAILABILITY INCORPORATING OVERHAUL INTERVALS AND SURVEILLANCE INTERVALS

AGING EFFECTS ON COMPONENT UNAVAILABILITY INCORPORATING OVERHAUL INTERVALS AND SURVEILLANCE INTERVALS

Let $\lambda(t)$ be the general age dependent failure rate contribution due to aging. If the component is renewed at periodic intervals of L then the increase in unavailability $\Delta q(t)$ at a given age is

$$\Delta q(t) = 1\text{-}\exp\left(-\int_0^t \lambda(t')\,dt'\right) \tag{1}$$

where t is measured from the last renewal, or overhaul, point. The average value of $\Delta q(t)$ over the renewal interval L, which is denoted by Δq, is then

$$\Delta q = \frac{\int_0^L \Delta q(t)\,dt}{L} \tag{2}$$

If the exponential in Equation (1) is approximated by its linear term then

$$\Delta q = \frac{\int_0^L \int_0^t \lambda(t')dt'\,dt}{L} \tag{3}$$

If $\lambda(t)$ is given by the linear aging model then

$$\Delta q = \frac{\int_0^L \int_0^t at'\,dt'\,dt}{L} \tag{4}$$

$$= \frac{1}{6}\,aL^2 \tag{5}$$

In reliability terminology the renewal interval L is also termed the "good as new" interval since the component is effectively restored to as good as new with regard to the particular aging failure mode. If there are inefficiencies associated with the overhauls then L in the above equations is the effective overhaul interval, which is the actual interval divided by the efficiency. If L varies, the L can be taken as the average value.

Consider now the case where the component is periodically checked for aging effects at surveillance intervals of T in addition to being overhauled at intervals of L. At a

surveillance with interval T, the component is assured to be in an operational condition. However, subassemblies and major pieceparts are not replaced. (If the component is found failed and major replacements are made then this becomes an overhaul.) The intervals T in reliability terminology are termed "good as old" intervals if the component is treated as coming out of the test in basically the same condition (with basically the same age) as going into the test. This "good as old" model will be used as the model of surveillance test effects on aging.

When surveillance is performed at effective intervals of T, and overhauls (renewals) are performed at effective intervals L, the change in unavailability $\Delta q(t_o, u)$ is then given by

$$\Delta q(t_o, u) = 1 - \exp\left(-\int_{t_o}^{t_o+u} \lambda(t')dt'\right) \tag{6}$$

The time t_o is the time of the last surveillance test measured with regard to the point of last overhaul. The value u ranges from 0 to T.

Using the linear aging model and the linear term of the exponential, $\Delta q(t_o, u)$ is then given by the formula

$$\Delta q(t_o, u) = \int_{t_o}^{t_o+u} at' dt' \tag{7}$$

$$= \frac{1}{2} a \left[2t_o u + u^2\right] \tag{8}$$

Averaging u between 0 and T gives the average unavailability change $\Delta q(t_o)$ at t_o. Using Equation (8), $\Delta q(t_o)$ is thus given by

$$\Delta q(t_o) = \frac{1}{2} a\left[t_o T + \frac{T^2}{3}\right] \tag{9}$$

Finally treating t_o as a continuous variable and averaging $\Delta q(t_o)$ over $t_o = 0$ to $t_o = L\text{-}T$ (since the last surveillance test is at L-T) gives the overall average unavailability Δq. Using Equation (9) Δq is consequently

$$Dq = \frac{1}{2} a \left[\left(\frac{L-T}{2}\right) T + \frac{T^2}{3}\right] \tag{10}$$

If there are inefficiencies associated with the surveillance tests and overhauls then L and T in the above formulas are the effective intervals, which are the actual intervals divided by the efficiencies of the activities. If L and T vary then average values can be used. For more information on the underlying basic reliability approaches for the above formulas see references (B-1) or (B-2).

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B-1. R.E. Barlow and F. Proschan, Mathematical Theory of Reliability, Wiley and Sons, New York, 1965.

B-2. H. Ascher and H. Feingold, Repairable Systems Reliability, Marcel Dekker, New York 1984.

APPENDIX C: DETERMINATION OF AGING RATES FOR SENSITIVITY STUDIES

Aging rates for sensitivity studies as used in this report are aging rates determined to satisfy some condition on the resulting failure rate, unavailability, or observed number of failures. By using sensitivity-study aging rates, test and maintenance programs can be evaluated with regard to their effectiveness in controlling core melt frequency and risks from defined aging rates which characterize given types of aging.

For the linear aging model, the aging failure rate $\lambda(t)$ at age t is given by the formula

$$\lambda(t) = at \tag{1}$$

where a is the aging rate. The doubling time is the time at which the aging failure rate is equal to the steady state failure rate used in the FRA. If λ_0 is the steady state failure rate and t_2 the defined doubling time then

$$at_2 = \lambda_0 . \tag{2}$$

The aging rate is then given by

$$a = \frac{\lambda_0}{t_2} . \tag{3}$$

For a doubling time of 20 years, t_2 = 20 years is substituted into Equation (3); these were the aging rates determined for the TIRGALEX-MOD2 data base.

Another sensitivity-study aging rate can be determined by placing a criteria on the aging failure contribution. The expected aging failure contribution F in time t is

$$F = \frac{1}{2} at^2 . \tag{4}$$

For defined criteria values for F and t, the aging rate is thus determined to be

$$a = \frac{2F}{t^2} \tag{5}$$

Using F = 1 and t = 5 years gives the aging rates used in the TIRGALEX-MOD3 data base. (To obtain the aging rate in units of per hour per year as given in the report, the value in units of per year squared must be divided by 8760.)

Note that since $\frac{1}{2} at^2$ is also the unavailability contribution from the aging

(to first order), Equation (4) can be used to determine aging rates which satisfy given unavailability criteria where F is now the unavailability criteria. For example the aging rate which satisfies 1 failure in 5 years also satisfies, to order of magnitude, an unavailability of 0.1 in 18 months (1.5 years) i.e.

$$\frac{1}{(5\ \text{yrs})^2} = \frac{.1}{(1.5\ \text{yrs})^2} \tag{6}$$

Thus, the sensitivity-study aging rates used for the TIRGALEX-MOD3 data base can also be viewed as giving an unavailability of 0.1 in 18 months (the average time between shutdowns).

APPENDIX D: POINT CORE MELT FREQUENCY INCREASES FOR PLANT A WHEN UNAVAILABILITY IS CONTROLLED

The following pages show the pointwise core melt frequency increases for Plant A when the component unavailabilities are controlled to be no larger than 0.3. For the calculations, unavailability changes Δq above 0.3 were set to 0.3. The results are for the TIRGALEX-MOD3 aging rate data set and for the 72 month effective overhaul interval case. The other cases did not produce unavailabilities above 0.3 and hence would not be affected by this additional control.

This type of additional unavailability control characterizes maintenance programs which carry out additional sufficient maintenance to limit the unavailability until a renewal is performed. The results are not significantly different from the results without this control given in the main report. More stringent unavailability performance controls or overhauls which are triggered on unavailability performance levels could produce significantly lower core melt frequency increases.

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
30-Oct-89
01:39 PM

TIRGALEX - MOD 3 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 2.7E-03

Rank	Component Name	Δq1	S1	ΔC
1	HPI-CKV-FT-CV225	3.0E-01	2.1E-03	6.3E-04
2	HPI-CKV-FT-CV25	3.0E-01	1.4E-03	4.2E-04
3	HPI-CKV-FT-CV410	3.0E-01	1.4E-03	4.2E-04
4	ACC-CKV-FT-CV128	3.0E-01	5.0E-04	1.5E-04
5	ACC-CKV-FT-CV147	3.0E-01	5.0E-04	1.5E-04
6	ACC-CKV-FT-CV145	3.0E-01	5.0E-04	1.5E-04
7	ACC-CKV-FT-CV130	3.0E-01	5.0E-04	1.5E-04
8	HPI-MOV-FT	3.0E-01	3.4E-04	1.0E-04
9	OEP-DGN-FS-DG01	3.0E-01	2.3E-04	7.0E-05
10	LPI-MDP-FS	3.0E-01	2.3E-04	6.8E-05
11	OEP-DGN-FR-6HDG1	3.0E-01	2.1E-04	6.4E-05
12	LPR-MOV-FT	3.0E-01	1.3E-04	4.0E-05
13	OEP-DGN-FS-DG03	3.0E-01	1.3E-04	3.8E-05
14	OEP-DGN-FS-DG02	3.0E-01	1.3E-04	3.8E-05
15	OEP-DGN-FR-6HDG3	3.0E-01	1.2E-04	3.7E-05
16	OEP-DGN-FR-6HDG2	3.0E-01	1.1E-04	3.2E-05
17	HPI-MOV-FT-1350	3.0E-01	6.7E-05	2.0E-05
18	CVC-MDP-FR-2A1HR	3.0E-01	6.7E-05	2.0E-05
19	OEP-DGN-FR-DG01	3.0E-01	3.8E-05	1.1E-05
20	AFW-TDP-FS-FW2	3.0E-01	2.9E-05	8.7E-06
21	AFW-MDP-FS	3.0E-01	2.6E-05	7.9E-06
22	LPI-MDP-FS-SI1A	3.0E-01	2.5E-05	7.4E-06
23	LPI-MDP-FS-SI1B	3.0E-01	2.5E-05	7.4E-06
24	LPR-MOV-FT-1862B	3.0E-01	2.1E-05	6.3E-06
25	LPR-MOV-FT-1862A	3.0E-01	2.1E-05	6.3E-06

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant A
27-Oct-89
01:55 PM

TIRGALEX - MOD 3 / 72 MO.
TOP DOUBLE CONTRIBUTORS

Total ΔC = 4.2E-03

Rank	Component Name	Δq1	Component Name	Δq2	S1	Δq1 Δq2	ΔC
1	OEP-DGN-FR-6HDG3	3.0E-01	OEP-DGN-FR-6HDG1	3.0E-01	3.6E-03	9.0E-02	3.2E-04
2	OEP-DGN-FS-DG03	3.0E-01	OEP-DGN-FR-6HDG1	3.0E-01	2.5E-03	9.0E-02	2.2E-04
3	OEP-DGN-FS-DG02	3.0E-01	OEP-DGN-FR-6HDG1	3.0E-01	2.5E-03	9.0E-02	2.2E-04
4	OEP-DGN-FR-6HDG2	3.0E-01	OEP-DGN-FR-6HDG1	3.0E-01	2.4E-03	9.0E-02	2.2E-04
5	LPR-MOV-FT-1862A	3.0E-01	LPR-MOV-FT-1862B	3.0E-01	1.5E-03	9.0E-02	1.4E-04
6	LPR-MOV-FT-1890B	3.0E-01	LPR-MOV-FT-1890A	3.0E-01	1.5E-03	9.0E-02	1.4E-04
7	LPR-MOV-FT-1862A	3.0E-01	LPR-MOV-FT-1860B	3.0E-01	1.5E-03	9.0E-02	1.4E-04
8	LPI-MDP-FS-SI1B	3.0E-01	LPI-MDP-FS-SI1A	3.0E-01	1.5E-03	9.0E-02	1.4E-04
9	LPR-MOV-FT-1860A	3.0E-01	LPR-MOV-FT-1860B	3.0E-01	1.5E-03	9.0E-02	1.4E-04
10	LPI-MDP-FS-SI1A	3.0E-01	LPR-MOV-FT-1860B	3.0E-01	1.5E-03	9.0E-02	1.4E-04
11	LPR-MOV-FT-1862B	3.0E-01	LPI-MDP-FS-SI1A	3.0E-01	1.5E-03	9.0E-02	1.4E-04
12	LPR-MOV-FT-1862B	3.0E-01	LPR-MOV-FT-1860A	3.0E-01	1.5E-03	9.0E-02	1.4E-04
13	LPR-MOV-FT-1862A	3.0E-01	LPI-MDP-FS-SI1B	3.0E-01	1.5E-03	9.0E-02	1.4E-04
14	LPR-MOV-FT-1860A	3.0E-01	LPI-MDP-FS-SI1B	3.0E-01	1.5E-03	9.0E-02	1.4E-04
15	HPI-MOV-FT-1115C	3.0E-01	HPI-MOV-FT-1115E	3.0E-01	1.4E-03	9.0E-02	1.2E-04
16	HPI-MOV-FT-1115B	3.0E-01	HPI-MOV-FT-1115D	3.0E-01	1.4E-03	9.0E-02	1.2E-04
17	LPR-MOV-FT-1860B	3.0E-01	LPI-MDP-FR-A21HR	3.0E-01	1.0E-03	9.0E-02	9.0E-05
18	CPC-MDP-FS-SW10B	3.0E-01	CPC-MDP-FR-SWA3H	3.0E-01	1.0E-03	9.0E-02	9.0E-05
19	LPR-MOV-FT-1862A	3.0E-01	LPI-MDP-FR-B21HR	3.0E-01	1.0E-03	9.0E-02	9.0E-05
20	LPR-MOV-FT-1860A	3.0E-01	LPI-MDP-FR-B21HR	3.0E-01	1.0E-03	9.0E-02	9.0E-05
21	LPR-MOV-FT-1862B	3.0E-01	LPI-MDP-FR-A21HR	3.0E-01	1.0E-03	9.0E-02	9.0E-05
22	LPI-MDP-FS-SI1A	3.0E-01	LPI-MDP-FR-B21HR	3.0E-01	1.0E-03	9.0E-02	9.0E-05
23	LPI-MDP-FS-SI1B	3.0E-01	LPI-MDP-FR-A21HR	3.0E-01	1.0E-03	9.0E-02	9.0E-05
24	OEP-DGN-FR-DG01	3.0E-01	OEP-DGN-FR-DG03	3.0E-01	6.4E-04	9.0E-02	5.8E-05
25	OEP-DGN-FS-DG02	3.0E-01	OEP-DGN-FR-DG01	3.0E-01	6.0E-04	9.0E-02	5.4E-05

APPENDIX E: POINT CORE MELT FREQUENCIES INCREASES FOR PLANT B WHEN UNAVAILABILITY IS CONTROLLED

The following pages show the pointwise core melt frequency increases for Plant B when component unavailabilities are controlled to be no larger than 0.3. The results are for TIRGALEX-MOD3 aging rate data and 72 month effective renewal intervals. This type of unavailability control characterizes maintenance programs which limit the unavailability to be no larger than 0.3 through performance monitoring. The results are not significantly different from those presented in the main report without the unavailability control. More stringent unavailability performance controls or renewals which are triggered on unavailability levels could result in significantly lower core melt frequency increases.

EFFECTIVE OVERHAUL INTERVAL = 72 MONTHS

Plant B
27-Oct-89
02:00 PM

TIRGALEX - MOD 3 / 72 MO.
TOP SINGLE CONTRIBUTORS

Total ΔC = 8.6E-05

Rank	Component Name	Δq1	S1	ΔC
1	SSW-MDP-FS-CM	3.0E-01	7.7E-05	2.3E-05
2	ACP-DGN-FS-DG13	3.0E-01	2.6E-05	7.8E-06
3	ACP-DGN-FR-DG13	3.0E-01	2.6E-05	7.8E-06
4	ACP-DGN-FR-DG12	3.0E-01	1.9E-05	5.6E-06
5	ACP-DGN-FR-DG11	3.0E-01	1.9E-05	5.6E-06
6	ACP-DGN-FS-DG12	3.0E-01	1.9E-05	5.6E-06
7	ACP-DGN-FS-DG11	3.0E-01	1.9E-05	5.6E-06
8	SSW-MDP-FS-MDP2C	3.0E-01	1.8E-05	5.3E-06
9	SSW-MDP-FS-MDP1B	3.0E-01	1.2E-05	3.7E-06
10	SSW-MDP-FS-MDP1A	3.0E-01	1.2E-05	3.7E-06
11	SSW-MDP-FR-MDP2C	3.0E-01	1.1E-05	3.3E-06
12	SSW-MDP-FR-MDP1A	3.0E-01	7.2E-06	2.2E-06
13	SSW-MDP-FR-MDP1B	3.0E-01	7.2E-06	2.2E-06
14	RCI-TDP-FR-TDP1	3.0E-01	6.4E-06	1.9E-06
15	RCI-TDP-FS-TDP1	3.0E-01	6.3E-06	1.9E-06
16	EHV-FAN-FR-77C02	1.1E-02	8.9E-06	9.8E-08
17	EHV-FAN-FS-77C02	1.1E-02	8.9E-06	9.8E-08
18	EHV-FAN-FS-77C1B	1.1E-02	5.1E-06	5.7E-08
19	EHV-FAN-FS-77C1A	1.1E-02	5.1E-06	5.7E-08
20	EHV-FAN-FR-77C1B	1.1E-02	5.1E-06	5.7E-08
21	EHV-FAN-FR-77C1A	1.1E-02	5.1E-06	5.7E-08

Total ΔC = 9.9E-04

Rank	Component Name	Δq1	Component Name	Δq2	β12	Δq1 Δq2	ΔC
1	ACP-DGN-FS-DG13	3.0E-01	ACP-DGN-FS-DG12	3.0E-01	3.5E-04	9.0E-02	3.1E-05
2	ACP-DGN-FS-DG12	3.0E-01	ACP-DGN-FS-DG11	3.0E-01	3.5E-04	9.0E-02	3.1E-05
3	ACP-DGN-FS-DG13	3.0E-01	ACP-DGN-FR-DG12	3.0E-01	3.3E-04	9.0E-02	3.0E-05
4	ACP-DGN-FS-DG12	3.0E-01	ACP-DGN-FR-DG13	3.0E-01	3.3E-04	9.0E-02	3.0E-05
5	ACP-DGN-FS-DG11	3.0E-01	ACP-DGN-FR-DG13	3.0E-01	3.3E-04	9.0E-02	3.0E-05
6	ACP-DGN-FS-DG13	3.0E-01	ACP-DGN-FR-DG11	3.0E-01	3.3E-04	9.0E-02	3.0E-05
7	RCI-TDP-FR-TDP1	3.0E-01	SSW-MDP-FS-CM	3.0E-01	3.2E-04	9.0E-02	2.9E-05
8	SSW-MDP-FS-CM	3.0E-01	RCI-TDP-FS-TDP1	3.0E-01	3.2E-04	9.0E-02	2.9E-05
9	ACP-DGN-FR-DG13	3.0E-01	ACP-DGN-FR-DG12	3.0E-01	3.1E-04	9.0E-02	2.8E-05
10	ACP-DGN-FR-DG13	3.0E-01	ACP-DGN-FR-DG11	3.0E-01	3.1E-04	9.0E-02	2.8E-05
11	ACP-DGN-FS-DG11	3.0E-01	ACP-DGN-FS-DG12	3.0E-01	3.1E-04	9.0E-02	2.8E-05
12	ACP-DGN-FS-DG12	3.0E-01	ACP-DGN-FR-DG11	3.0E-01	3.0E-04	9.0E-02	2.7E-05
13	ACP-DGN-FS-DG11	3.0E-01	ACP-DGN-FR-DG12	3.0E-01	3.0E-04	9.0E-02	2.7E-05
14	ACP-DGN-FR-DG11	3.0E-01	ACP-DGN-FR-DG12	3.0E-01	2.8E-04	9.0E-02	2.5E-05
15	ACP-DGN-FS-DG11	3.0E-01	SSW-MDP-FS-MDP1B	3.0E-01	2.6E-04	9.0E-02	2.3E-05
16	ACP-DGN-FS-DG12	3.0E-01	SSW-MDP-FS-MDP2C	3.0E-01	2.6E-04	9.0E-02	2.3E-05
17	ACP-DGN-FS-DG11	3.0E-01	SSW-MDP-FS-MDP2C	3.0E-01	2.6E-04	9.0E-02	2.3E-05
18	ACP-DGN-FS-DG13	3.0E-01	SSW-MDP-FS-MDP1A	3.0E-01	2.6E-04	9.0E-02	2.3E-05
19	ACP-DGN-FS-DG12	3.0E-01	SSW-MDP-FS-MDP1A	3.0E-01	2.4E-04	9.0E-02	2.1E-05
20	ACP-DGN-FS-DG11	3.0E-01	SSW-MDP-FS-MDP1B	3.0E-01	2.4E-04	9.0E-02	2.1E-05
21	ACP-DGN-FR-DG13	3.0E-01	SSW-MDP-FS-MDP1B	3.0E-01	2.0E-04	9.0E-02	1.8E-05
22	ACP-DGN-FR-DG11	3.0E-01	SSW-MDP-FS-MDP1A	3.0E-01	2.0E-04	9.0E-02	1.8E-05
23	ACP-DGN-FR-DG11	3.0E-01	SSW-MDP-FS-MDP1B	3.0E-01	1.9E-04	9.0E-02	1.7E-05
24	ACP-DGN-FR-DG11	3.0E-01	SSW-MDP-FS-MDP2C	3.0E-01	1.9E-04	9.0E-02	1.7E-05
25	ACP-DGN-FR-DG12	3.0E-01	SSW-MDP-FS-MDP2C	3.0E-01	1.9E-04	9.0E-02	1.7E-05

END
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