SOUTHERN CALIFORNIA
EDISON
An *EDISON INTERNATIONAL*℠ Company

Dwight E. Nunn
Vice President

April 20, 2000

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: **Docket Nos. 50-361 and 50-362**
Reactor Coolant Pump Flywheel Inspection Program
Amendment Application Numbers 200 and 185
San Onofre Nuclear Generating Station Units 2 and 3

References: See Enclosure 1

Gentlemen:

Enclosed are Amendment Application Number 200 to Facility Operating License NPF-10, and Amendment Application Number 185 to Facility Operating License NPF-15, for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, respectively. The Amendment Applications consist of Proposed Technical Specification Change Number (PCN)-503 which is provided as Enclosure 2 to this letter.

Proposed Technical Specification Change Number 503 is a request to relax the inspection frequency currently required by Technical Specification (TS) 5.5.2.5, "Reactor Coolant Pump Flywheel Inspection Program." To support this request Southern California Edison (SCE) is submitting a plant specific calculation (M-DSC-372 "Safe-Life Evaluation and Inspection Requirements for Reactor Coolant Pump Flywheel – SONGS, Units 2 and 3") as Attachment G in Enclosure 2. This Safe-Life evaluation uses conservative linear elastic fracture mechanics analysis and plant specific data to support a 10-year inspection cycle.

PCN-503 was modeled after a similar request submitted by Consumers Energy and approved by the Nuclear Regulatory Commission. A list of Consumers Energy and NRC correspondence is provided in Enclosure 1. The major difference between the Consumers Energy request and PCN-503 is the Consumers Energy submittal included Combustion Engineering Owners Group (CEOG) calculation CEOG-01Q-305 "Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements," dated April 21, 1998, and then provided additional plant specific information. As stated above, SCE is submitting a plant specific calculation (M-DSC-372 "Safe-Life Evaluation and Inspection Requirements for Reactor Coolant Pump Flywheel – SONGS, Units 2 and 3") prepared by SCE and Aptech Engineering Services, Inc. in lieu of the CEOG calculation.

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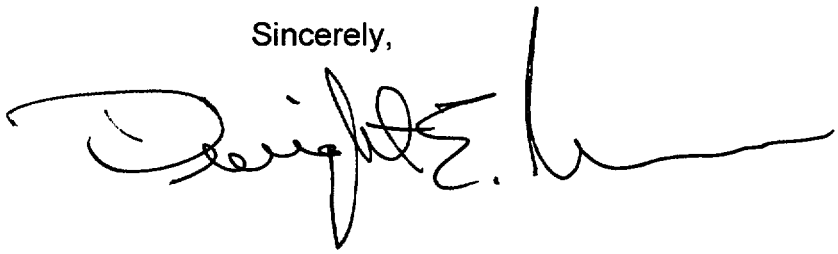
SCE requests that the effective date for this change be within 30 days of NRC issuance of the amendment to allow for distribution and procedural revisions necessary to implement this change. Although this request is neither exigent nor emergency, your approval is requested by October 7, 2000, to support the next San Onofre Unit 2 outage which is scheduled to begin on that date. Your approval will allow the next flywheel inspection to be rescheduled from the October 7, 2000, refueling outage to 2007. This will result in both a cost savings and reduced radiation exposure.

This letter contains no new commitments and no revisions to existing commitments.

In accordance with 10 CFR 50.91, a copy of these applications is being submitted to the designated California State Official.

If you would like additional information regarding this Proposed Technical Specification Change, please contact me or Mr. Jack L. Rainsberry (949) 368-7420.

Sincerely,



Enclosures

cc: E. W. Merschoff, Regional Administrator, NRC Region IV
J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 & 3
L. Raghavan, NRC Project Manager, San Onofre Units 2 and 3
S. Y. Hsu, Department of Health Services, Radiologic Health Branch

ENCLOSURE 1

REFERENCES

Amendment Application Numbers 200 and 185

References

1) Letter from R. W. Smedley (Consumers Power) to the Document Control Desk (NRC) dated January 18, 1996; Subject: Docket 50-255 - License DPR-20 - Palisades Plant Technical Specifications Change Request - Primary Coolant Pump Flywheel Inspections

2) Letter from T. C. Bordine (Consumers Energy) to the Document Control Desk (NRC) dated October 1, 1997; Subject: Docket 50-255 - License DPR-20 - Palisades Plant Technical Specifications Change Request - Primary Coolant Pump Flywheel Inspections

3) Letter from T. C. Bordine (Consumers Energy) to the Document Control Desk (NRC) dated January 29, 1998; Subject: Docket 50-255 - License DPR-20 - Palisades Plant Response to Request for Additional Information - Primary Coolant Pump Flywheel Inspection Technical Specifications Change Request

4) Letter from N. L. Haskell (Consumers Energy) to the Document Control Desk (NRC) dated April 27, 1998; Subject: Docket 50-255 - License DPR-20 - Palisades Plant Primary Coolant Pump Flywheel Inspection Technical Specifications Change - Supplemental Calculation

5) Letter from R. G. Schaaf (NRC) to N. L. Haskell (Consumers Energy) dated May 15, 1998; Subject: Palisades Plant - Issuance of Amendment Re: Primary Coolant Pump Flywheel Inspection Technical Specifications (TAC No. M94567)

ENCLOSURE 2

Amendment Application Numbers

200 and 185

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. for a Class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 2 of the San Onofre Nuclear Generating Station	)))))	Docket No. 50-361 Amendment Application No. 200

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 200. This amendment application consists of Proposed Technical Specification Change Number 503 to Facility Operating License NPF-10.

Proposed Technical Specification Change Number 503 is a request to relax the periodicity currently required by Technical Specification (TS) 5.5.2.5, "Reactor Coolant Pump Flywheel Inspection Program" from a 3-year inspection cycle to a 10-year inspection cycle.

Subscribed on this 20th day of April, 2000.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: _____
Dwight E. Nunn
Vice President

State of California
County of San Diego
On 4/20/00 before me, Mariane Sanchez, personally appeared DWIGHT E. NUNN personally known to me ~~(or proved to me on the basis of satisfactory evidence)~~ to be the person(s) whose name(s) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(ies), and that by his/~~her/their~~ signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature _____

MARIANE SANCHEZ
Commission #1196482
Notary Public - California
San Diego County
My Comm. Expires Oct 14, 2002

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. for a Class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 3 of the San Onofre Nuclear Generating Station	))))))	Docket No. 50-362 Amendment Application No. 185.

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 185. This amendment application consists of Proposed Technical Specification Change Number 503 to Facility Operating License NPF-10.

Proposed Technical Specification Change Number 503 is a request to relax the periodicity currently required by Technical Specification (TS) 5.5.2.5, "Reactor Coolant Pump Flywheel Inspection Program" from a 3-year inspection cycle to a 10-year inspection cycle.

Subscribed on this 20th day of April, 2000.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: Dwight E. Nunn
Vice President

State of California
County of San Diego
On 4/20/00 before me, Mariane Sanchez, personally appeared Dwight E. Nunn personally known to me ~~(or proved to me on the basis of satisfactory evidence)~~ to be the person(s) whose name(s) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature Mariane Sanchez

MARIANE SANCHEZ
Commission #1196482
Notary Public - California
San Diego County
My Comm. Expires Oct 14, 2002

DESCRIPTION AND SAFETY ANALYSIS OF PROPOSED CHANGE NPF-10/15-503

Proposed Technical Specification Change Number 503 is a request to relax the periodicity currently required by Technical Specification (TS) 5.5.2.5, "Reactor Coolant Pump Flywheel Inspection Program" from a 3-year inspection cycle to a 10-year inspection cycle.

Existing Technical Specifications and Bases:

Unit 2: See Attachment "A"

Unit 3: See Attachment "B"

Proposed Technical Specifications and Bases:

Unit 2: See Attachment "C" (Redline and Strikeout)

Unit 3: See Attachment "D" (Redline and Strikeout)

Proposed Technical Specifications and Bases:

Unit 2: See Attachment "E"

Unit 3: See Attachment "F"

RCP Flywheel Safe-Lite Evaluation:

Unit 2 and 3: See Attachment "G"

Description of Proposed Change

This technical specification change request proposes that Technical Specification (TS) Section 5.5.2.5 concerning periodic inservice inspection (ISI) of primary reactor coolant pump (RCP) flywheels be revised. The proposed change would decrease the required volumetric examination frequency of the upper flywheel on each RCP motor from a 3 year cycle to once each 10 years.

Background:

The flywheels on primary reactor coolant pump motors provide rotational inertia to prolong pump coastdown in the event pump power is lost, thus ensuring a more gradual decay of primary coolant flow to the reactor core.

General Design Criterion 4, "Environmental and Missile Design Bases," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires nuclear power plant structures, systems, and components important to safety be protected against the effects of missiles that might result from equipment failures. Conceptually,

RCP flywheels could degrade and produce high energy missiles at both normal operating and overspeed conditions (e.g., during a loss of coolant accident). In Regulatory Guide (RG) 1.14, Rev. 1 entitled "Reactor Coolant Pump Flywheel Integrity," the NRC provides recommendations for material fabrication, design, and preservice and inservice inspection for RCP flywheels. If those recommendations are followed, the probability of flywheel failure would be reduced to a level that would not require protection (e.g., missile shield) against the consequences of failure. The Inservice Inspection (ISI) recommendations in RG 1.14 are identified as providing an acceptable inspection program in Section 5.4.1.1 of the Standard Review Plan. The TS of most licensees include a requirement to provide ISI of RCP flywheels in accordance with the recommendations of RG 1.14 or other methods acceptable to the Staff.

DISCUSSION OF CHANGE:

Southern California Edison Company (SCE), along with its contractor Aptech Engineering Services, Inc. (APTECH), developed a justification of TS requirements being proposed for ISI of RCP flywheels. This justification is based on a detailed evaluation which included reviews of past ISI results, stress analysis of the flywheel designs, and fracture mechanics analysis for allowable flaw size and flaw growth.

There are a total of ten RCP motor/flywheel assemblies used at San Onofre Nuclear Generating Station (SONGS). There are four installed in each unit (Units 2 and 3) and two spares. Further, there are two basic designs. The original RCP motors (eight flywheels) were supplied by Allis-Chalmers (A-C). The replacement RCP motors (two flywheels) were supplied by ASEA Brown Boveri (ABB). The A-C flywheel is a flat disk and attached to the shaft via a spider arm assembly. The A-C design employs a key/keyway attachment between the flywheel and shaft. The ABB flywheel is a flat disk and attached to a solid shaft. The ABB design does not utilize a key/keyway attachment.

Review of past ISI results for San Onofre Nuclear Generating Station (SONGS) indicated no flaws have ever been observed in the ten flywheels utilized. Subsequent to the pre-service examinations of A-C design flywheels, each flywheel has been inspected in accordance with RG 1.14 since 1986, and received multiple in-service examinations. Specifically, four flywheels were inspected five times, another four were inspected four times, and two ABB flywheels were inspected twice for Preservice Inspection and once for Inservice Inspection. In summary, the flywheels are free from flaws at the critical (higher stress) locations.

Industry service experience, as related to RCP flywheel performance, has identified no reportable indications from past ISI. These findings are based on an industry survey of over 30 plants. Therefore, the structural performance of RCP flywheels, as a whole, has been excellent and without any indication of being a service-sensitive concern.

The allowable flaw sizes for the flywheels were determined for normal operating, design overspeed, and accident conditions. Linear elastic fracture mechanics (LEFM) analysis was used to compute the allowable flaw size. Stress analyses were performed to establish the stress distributions for use in the LEFM calculations. Potential loading conditions included shrink-fit, centrifugal loads, seismic loads, vibratory loads, and keyway loading due to shaft torque.

The shrink-fit and centrifugal loading conditions were considered significant to flywheel integrity and were evaluated in detail. Finite element models were developed to compute the stress at the bore and keyway locations. The flywheel and shaft assembly was represented in the model. The shrink-fit condition between the shaft and flywheel bore was explicitly modeled with contact (gap) elements. The stress analyses were performed for shrink-fit only, shrink-fit plus normal speed, shrink-fit plus overspeed, and shrink-fit plus accident speed. The normal operating speed is 1180 rpm for the A-C flywheel, and 1194 rpm for the ABB flywheel. The design overspeed is 125% higher than the normal speed. The accident speed was taken as 136% of normal speed (1624 rpm) based on the maximum transient speed occurring during faulted conditions.

The flywheel material for both A-C and ABB designs is A543 Class I, Grade B low alloy steel. RG 1.14 requires that the nil-ductility transition (NDT) temperature for the flywheel material be no higher than 10°F, the Charpy V-notch (CVN) upper shelf impact energy be at least 50 ft-lbs, and the minimum dynamic fracture toughness at normal operating temperature be 100 ksi $(in)^{1/2}$.

The material specification requirements and certified material test report (CMTR) information were reviewed to identify NDT temperature, CVN impact energy, and mils lateral expansion (MLE) properties for the flywheel material. The specification for the A-C flywheel forging required that NDT temperature be no higher than -50°F and the upper shelf CVN be at least 50 ft-lbs. CMTR data showed an NDT temperature of -100°F or less, an average CVN of 85 ft-lbs, and 70 MLE at 212°F. Similarly, based on CMTRs, actual supplied material for the ABB flywheels has a NDT temperature of no higher than -150°F, an average CVN of 68 ft-lbs, and 47 MLE at -10°F. Therefore, the flywheel material complies with the drop weight and upper shelf impact requirements of RG 1.14.

From this information, a minimum fracture toughness value for the flywheel material was conservatively established. First, the reference fracture toughness curves of ASME Section XI, Appendix A for pressure vessels steels were applied. The RT_{NDT} for the ABB flywheel was determined from CVN test data for the actual flywheel material. The CVN test temperature where 50 ft-lbs and 35 MLE criteria are satisfied is -10°F. Therefore, RT_{NDT} for the ABB flywheels is -70°F. For an operating temperature around 100°F, lower bound fracture toughness exceeds 200 ksi $(in)^{1/2}$. A fracture toughness level of 200 ksi $(in)^{1/2}$ is representative of upper shelf behavior for ferritic steels.

For A-C flywheels, CVN test data were only available at one test temperature. However, given that both flywheel designs are fabricated from the same material specification, and that the average CVN impact energy for the A-C flywheels significantly exceeds 50 ft-lbs and 35 MLE at upper shelf, it is reasonable to assume similar shifts in NDT. Applying the same observed shift in NDT temperature for the ABB material of 80°F, the RT_{NDT} for the A-C forgings gave RT_{NDT} equal to -20°F. Again, under normal operating conditions, the lower bound fracture toughness exceeds 200 ksi $(in)^{1/2}$. Therefore, it is reasonable to expect upper shelf behavior at operating and accident conditions.

Finally, to account for any uncertainty in fracture toughness (K_{IC}) when applying toughness curves for vessel steels to A543 steel, an upper shelf CVN correlation for various low alloy structural steels was used to compute fracture toughness. Conservatively using specified minimum properties for CVN of 50 ft-lbs and yield

strength of 85 ksi, a fractures toughness of 140 ksi $(in)^{1/2}$ was calculated. This value is 70% of the ASME Code, Appendix A reference toughness limit 200 ksi $(in)^{1/2}$ and would serve as a reasonable factor to apply in this evaluation. Therefore, a fracture toughness of 140 ksi $(in)^{1/2}$ was conservatively used in the fracture mechanics evaluation of all flywheels.

Following the flaw evaluation rules of ASME Section XI, a safety factor of $(10)^{1/2}$ was imposed for normal operating and upset conditions, and a factor of $(2)^{1/2}$ was used for accident conditions. These safety factors are consistent with flaw evaluations performed on Class 1 ferritic components.

The allowable flaw size was computed for the case of shrink-fit at zero speed as well as for shrink-fit plus normal speed, shrink-fit plus overspeed, and shrink-fit plus accident speed. The allowable sizes computed for each case were used to define the allowable flaw for the flywheel. The stress intensity factor for each case was calculated and compared with the minimum fracture toughness and appropriate safety factor. For the A-C flywheel, the allowable flaw size is 4.1 inches for normal operating conditions and > 4.0 inches for accident conditions. For the ABB flywheel, the allowable flaw sizes are 3.4 inches for normal operating and > 4.0 inches for accident conditions, respectively. For the conservative evaluation for design overspeed, the computed allowable flaw size is 0.56 inch for the A-C flywheel and 2.2 inches for the ABB flywheel. The design overspeed case was conservatively considered as an upset loading condition with an imposed safety factor of $(10)^{1/2}$.

A fatigue crack growth (FCG) analysis was performed to determine the time required to grow a postulated pre-existing flaw to the allowable size. It was established that FCG is the principal (relevant) service degradation mechanism for the RCP flywheel. Other mechanisms that were considered and found to be not significant included corrosion, pitting, and hydrogen embrittlement.

The FCG analysis was performed parametrically with respect to initial flaw depth (a_i) where $a_i \geq 0.25$ inch. The FCG analysis indicated that a pre-existing flaw of a size that would be reliably detected, and located in the highest stress region, would not grow significantly in size during the plant operation. Specifically, an initial flaw of 0.33 inch deep was assumed based upon NRC recommendations on a conservative detection threshold level for volumetric ultrasonic examination. It was then determined that this initial flaw will only enlarge to a depth of 0.35 inch for the A-C flywheel design in 4000 startup/shutdown cycles. For the ABB flywheel, the same FCG analysis yielded a final depth of 0.34 inch in the same number of cycles. Both these computed flaw sizes are below the allowable flaw size. Since the design basis for startup/shutdown cycles for the plant is 500 in the plant life, these flaw growth calculations are conservative.

Further, the NRC has recommended a flaw growth of 0.013 inch to be applied in a 10-year operating period for RCP flywheels at other plants. For this case, the final flaw depth for one plant lifetime (40 years) is 0.38 inch. This final flaw size is significantly below the allowable flaw size for either flywheel under normal operating conditions.

Based on this conservative safe-life analysis, it is established that an assumed pre-service flaw of a size that would not escape detection will remain smaller than the allowable size in several plant lifetimes. Therefore, inservice inspections of RCP flywheels do not significantly contribute to structural integrity and can be eliminated without adversely impacting plant safety. Elimination of the 3-year inspection is justified since the 10-year overhaul schedule is sufficient to detect any flywheel service degradation. Furthermore, extension of 3-year inspection intervals to 10-year inspection intervals will allow plant resources to be applied in other areas of greater safety significance and permit a reduction in radiation dose to plant personnel.

No Significant Hazards Considerations:

The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. A discussion of these standards as they relate to this amendment request follows to show that operation of the facility in accordance with this proposed amendment does not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   Missile generation from a Reactor Coolant Pump (RCP) flywheel could damage the reactor coolant system, the containment, or other equipment or systems important to safety. The fracture mechanics analysis performed to support the change shows that a preexisting flaw of an initial size at the detection threshold level will not grow to a flaw size necessary to create flywheel missiles within the life of the plant. The fracture mechanics analysis conservatively assumes minimum material toughness properties, maximum flywheel speed, location of flaw in the highest stress region of the flywheel, and a number of start/stop cycles eight times greater than the design basis. Therefore, an existing flaw in the flywheel will not grow to a size that exceeds the allowable flaw size for either normal operating or accident conditions over the plant life. On this basis, the extension of the 3-year interval inspection to a 10-year interval will not involve a significant increase in the probability of an accident previously considered.

   The proposed changes do not increase the amount of radioactive material available for release or modify any systems used for preventing or mitigating such releases during accident conditions. Therefore, these changes do not involve a significant increase in the consequences of any accident previously evaluated.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed changes will not change the design, configuration, or method of operation of the plant. Therefore, the proposed changes will not create the possibility of a new or different kind of accident from any previously evaluated.

3. Involve a significant reduction in a margin of safety?

   Response: No

   Significant conservatisms have been used in the calculation of allowable flaw size (critical flaw size) and flaw growth for each RCP flywheel design. These include minimum fracture toughness properties, code reference crack growth rate curves, maximum flywheel accident speed, postulated flaw location at the highest stress region of the flywheel, and a number of start/stop cycles that is eight times the number expected in a plant life. The final flaw size has been determined to remain smaller than the allowable flaw size for the flywheel under the relevant design conditions, including postulated accident conditions. Therefore, the extension of the 3-year interval inspection to a 10-year interval will not involve a significant reduction in a margin of safety.

Based on the response to these three criteria, the Southern California Edison Company (SCE) considers that the proposed change does not involve a significant hazards consideration.

Environmental Consideration

SCE has determined that the proposed amendment involves no changes in the amount or type of effluent that may be released offsite, and results in a decrease in the individual and cumulative occupational radiation exposure by significantly reducing the number of required inspections over the remainder of the life of San Onofre Units 2 and 3. As described above, the proposed amendment involves no significant hazards consideration, and as such, meets the eligibility criteria for categorical exclusion set forth in 10CFR51.22(c)(9).

Attachment A

(Existing Technical Specification Page)

SONGS Unit 2

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.5 Reactor Coolant Pump Flywheel Inspection Program

This program shall inspect each reactor coolant pump flywheel per the recommendations of regulation position c.4.b of Regulatory Guide 1.14, Revision 1, August 1975.

5.5.2.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical parameters and control points for these parameters;

b. Identification of the procedures used to measure the values of the critical parameters;

c. Identification of process sampling points;

d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off-control point chemistry conditions; and

f. A procedure identifying (a) the authority responsible for interpretation of data and (b) the sequence and timing of administrative events, required to initiate corrective action.

5.5.2.7 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Gaseous Radwaste System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following methodology comparable with Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

(continued)

Attachment B

(Existing Technical Specification Page)

SONGS Unit 3

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.5 Reactor Coolant Pump Flywheel Inspection Program

This program shall inspect each reactor coolant pump flywheel per the recommendations of regulation position c.4.b of Regulatory Guide 1.14, Revision 1, August 1975.

5.5.2.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

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d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off-control point chemistry conditions; and

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(continued)

Attachment C

(Proposed Technical Specification Page)

SONGS Unit 2

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.5 Reactor Coolant Pump Flywheel Inspection Program

~~This program shall inspect each reactor coolant pump flywheel per the recommendations of regulation position c.4.b of Regulatory Guide 1.14, Revision 1, August 1975.~~
Surveillance of the primary coolant pump flywheels shall consist of a 100% volumetric inspection of the flywheels each 10 years.

5.5.2.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical parameters and control points for these parameters;

b. Identification of the procedures used to measure the values of the critical parameters;

c. Identification of process sampling points;

d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off-control point chemistry conditions; and

f. A procedure identifying (a) the authority responsible for interpretation of data and (b) the sequence and timing of administrative events, required to initiate corrective action.

5.5.2.7 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Gaseous Radwaste System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following methodology comparable with Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

(continued)

Attachment D

(Proposed Technical Specification Page)

SONGS Unit 3

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.5 Reactor Coolant Pump Flywheel Inspection Program

~~This program shall inspect each reactor coolant pump flywheel per the recommendations of regulation position c.4.b of Regulatory Guide 1.14, Revision 1, August 1975.~~
Surveillance of the primary coolant pump flywheels shall consist of a 100% volumetric inspection of the flywheels each 10 years.

5.5.2.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical parameters and control points for these parameters;

b. Identification of the procedures used to measure the values of the critical parameters;

c. Identification of process sampling points;

d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off-control point chemistry conditions; and

f. A procedure identifying (a) the authority responsible for interpretation of data and (b) the sequence and timing of administrative events, required to initiate corrective action.

5.5.2.7 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Gaseous Radwaste System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following methodology comparable with Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

(continued)

Attachment E

(Proposed Technical Specification Page)

SONGS Unit 2

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.5 Surveillance of the primary coolant pump flywheels shall consist of a 100% volumetric inspection of the flywheels each 10 years.

5.5.2.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical parameters and control points for these parameters;

b. Identification of the procedures used to measure the values of the critical parameters;

c. Identification of process sampling points;

d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off-control point chemistry conditions; and

f. A procedure identifying (a) the authority responsible for interpretation of data and (b) the sequence and timing of administrative events, required to initiate corrective action.

5.5.2.7 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Gaseous Radwaste System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following methodology comparable with Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

(continued)

Attachment F

(Proposed Technical Specification Page)

SONGS Unit 3

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.5 Surveillance of the primary coolant pump flywheels shall consist of a 100% volumetric inspection of the flywheels each 10 years.

5.5.2.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical parameters and control points for these parameters;

b. Identification of the procedures used to measure the values of the critical parameters;

c. Identification of process sampling points;

d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off-control point chemistry conditions; and

f. A procedure identifying (a) the authority responsible for interpretation of data and (b) the sequence and timing of administrative events, required to initiate corrective action.

5.5.2.7 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Gaseous Radwaste System, the quantity of radioactivity contained in gas storage tanks, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following methodology comparable with Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

(continued)

Attachment G

(RCP Flywheel Safe-Lite Evaluation)

SONGS Unit 2 and 3

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	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
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1.0 INTRODUCTION

The flywheel on reactor coolant pump (RCP) provides inertia to ensure a slow decrease in coolant flow under accident conditions in order to prevent fuel damage. During normal operating conditions, the kinetic energy of the flywheel is sufficient to produce high-energy missiles and excessive vibrations of the RCP assembly if the flywheel should fail. Overspeed of the RCP assembly during a transient increases both the kinetic energy of the flywheel and the potential for failure. The safety consequences could be significant because of possible damage to the RCP assembly, the containment, or other equipment or systems.

Regulatory Guide (RG) 1.14 provides guidance on an acceptable assessment method for flywheel integrity (Ref. 1). This RG provides guidance on materials, design, testing, and inspection of flywheels. For fabrication, design, and testing, RG 1.14 gives details on acceptable cases for material selection, loading conditions, and speed limits.

These guidelines include several fabrication and design items important to flywheel integrity, such as:

1. Material chemistry control and plate production by the vacuum-melting and degassing process, or electroslag remelting process
2. Confirmation of fracture toughness and tensile properties
3. Removal of flame-cut surfaces and no welding permitted on the finished flywheel
4. Design overspeed limit at least 125% of normal speed
5. Design evaluation of critical speed by Appendix F of American Society of Mechanical Engineers (ASME) Section III (Ref. 2)
6. Spin testing of finished flywheels at the design speed
7. Preservice inspection of finished flywheel using 100% volumetric examination by ultrasonic methods following applicable ASME Section III procedures. Areas of higher stress concentrations are also examined for any surface defects

The flywheel designs used at San Onofre Nuclear Generating Station (SONGS) are in compliance with RG 1.14 guidelines for design and fabrication.

Further guidance for in-service inspections is also provided. Specifically, in-service inspections (ISI) of flywheels are recommended as follows:

1. Ultrasonic (volumetric) examination of areas of high stress concentration (bore and keyway) at approximately 3-year intervals during plant shutdowns coinciding with the ISI schedule, per ASME Section XI (Ref. 3).

2. Surface examination of all exposed surfaces, and complete ultrasonic examination at approximately 10-year intervals during plant shutdowns coinciding with the ISI schedule.

The purpose of this calculation is to establish an inspection interval that will provide adequate surveillance for flywheel integrity. The calculation utilizes the concept of fracture mechanics in a safe-life evaluation to compute the critical flaw size and flaw propagation time for failure. The methods and criteria of ASME Section XI are used as guidance. It is intended that the results from this evaluation will be used to extend the 3-year interval for examination of the bore and keyway regions to at least a 10-year interval.

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2.0 SUMMARY

Regulatory Guide 1.14 provides guidance on an acceptable assessment method for flywheel integrity. A safe-life evaluation has been performed to determine the allowable flaw sizes and inspection interval to maintain safe operation of RCP flywheels. The flaw evaluation acceptance criteria and analysis procedures of ASME Section XI have been used in this assessment. These procedures have been applied to the two RCP motor flywheel designs used at SONGS; namely, Allis-Chalmers (A-C) and ABB/Combustion Engineering (ABB).

The allowable flaw sizes for the flywheels were computed for normal operating, design overspeed, and accident speed conditions. Linear elastic fracture mechanics (LEFM) methods were used to calculate stress intensity factors for a postulated crack located in the bore region (location of highest stress). Flywheel stresses were determined by finite element analysis (FEA) methods. The allowable flaw size results are 0.56 inch deep for the A-C flywheel and 2.2 inches deep for the ABB flywheel. In determining the allowable flaw sizes, a safety factor of $\sqrt{10}$ was used for normal operation (including design overspeed) and a safety factor of $\sqrt{2}$ was used for accidents.

It had been established in previous evaluations that fatigue is the principal (relevant) service degradation mechanism for the flywheel. Other mechanisms that were considered and found not to be significant included corrosion, pitting, and hydrogen embrittlement.

The fatigue crack growth (FCG) analysis indicated that any pre-existing cracks located in the highest stress location will not grow significantly in size during the plant life. It was determined that an initial flaw of 0.25 inch deep and 1.0 inch long will only enlarge to a depth of 0.27 inch for the A-C flywheel or to a depth of 0.26 inch for the ABB flywheel in 4,000 start/stop cycles. Since the startup/shutdown cycles for the plant are 500 in a 40-year design life, the crack growth calculation is conservative. It was further determined that the initial flaw size which could grow to the allowable size in 4,000 cycles would have to be considerably deeper than 0.25 inch.

Based on this safe-life evaluation, the current 3-year inspection interval for the flywheels can be significantly extended without compromising plant safety. Elimination of the 3-year inspection would be justified since the 10-year overhaul schedule is a sufficient time period to detect any flywheel degradation due to fatigue.

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3.0 ANALYSIS ASSUMPTIONS

The following assumptions were made in performing the safe-life analysis calculations for the two flywheel designs:

1. The procedures of ASME Section XI, Appendix A, are used as guidance in the calculation of critical flaw size and flaw growth.

2. The critical locations for high stress are taken as the bore surface, keyways, and other surface geometric discontinuities associated with the bore/shaft attachment.

3. The dominant stress that will affect flywheel integrity is assumed to be the tangential (hoop) stress caused by interference fit and centrifugal loads.

4. Stresses resulting from seismic design loads are small and are neglected in the analysis.

5. The dominant cracking mode is conservatively assumed to be Mode I (normal opening mode). Maximum principal stresses are conservatively use to define the stress distribution acting on the postulated crack plane.

4.0 METHODOLOGY

4.1 Technical Approach

A safe-life analysis is performed to establish the allowable operating interval between inspections for the RCP flywheel. The safe-life analysis is based on LEFM. Surface flaws are postulated at the high stress locations (bore and keyway) and the safe-life is computed based on a flaw growth analysis. For the RCP flywheels, it has already been established that fatigue is the principal flaw growth mechanism (Ref. 4). Other degradation mechanisms that were evaluated and determined not to be significant included corrosion, pitting, and hydrogen embrittlement.

The evaluation procedures of ASME Section XI, Appendix A, are used to analyze the postulated flaw geometries. The flaw is evaluated as a sharp crack and normal to the maximum principal stress direction (hoop direction) of the flywheel. The flaws are postulated as radially oriented, semi-elliptical surface cracks originating at the bore, as shown in Figure 4-1. It is conservatively assumed that the flaws are very long in the axial direction ($a/\ell = 1/4$) and will grow radially into the flywheel material. The initial depth of the postulated flaw is a size that is likely to be detected by the previous inspection.

The evaluation procedure is described in Article A-5000 of Section XI, Appendix A. Both theoretical solutions and numerical methods are used to evaluate the flaw, given the flaw size and geometry data, material properties, and the cyclic stresses for the flywheel. These methods are used to calculate the following flaw parameters:

- a_f — The maximum size to which the postulated flaw is calculated to grow in a specified time period
- a_c — The minimum critical size of the flaw under normal/upset operating conditions
- a_i — The minimum critical size of the flaw under faulted accident conditions

The calculation for a_f is performed in a FCG analysis. This calculation method is typical for a safe-life evaluation. Stress results from FEA are used to determine cyclic stresses for the computations. The COSMOS/M FEA program (Ref. 5) is used to compute the flywheel stresses. The FEA models are shown in Figure 4-2 for the A-C design and Figure 4-3 for the ABB design. The models are composed of the flywheels and shafts, as illustrated. The BIGIF computer program (Ref. 6) is used to calculate crack tip stress intensity factors and FCG versus time. The accuracy of both COSMOS/M and BIGIF has been verified for use in these types of evaluations.

The flaw evaluation was completed using the 1992 Edition of ASME Section XI as guidance. The current approved Code for SONGS is the 1989 Edition of ASME Section XI. However, the flaw evaluation methods and criteria are very similar in both the 1989 and 1992 codes. The 1992 Edition is used herein because the equations and information are more complete and direct in application to the problem being evaluated. For these reasons, the 1992 Edition is technically equivalent to the 1989 Edition and can be used as guidance in the assessment of the RCP flywheel.

4.2 Flaw Acceptance Criteria

Flaw acceptance criteria for ferritic components are provided in IWB-3610. Flaws are acceptable if the critical flaw parameters satisfy the criteria of IWB-3611. These flaw size acceptance criteria are:

$$a_f < 0.1\, a_c \qquad \textbf{(4-1)}$$

$$a_f < 0.5\, a_i \qquad \textbf{(4-2)}$$

where a_f, a_c, and a_i are defined in Section 4.1.1. Equation 4-1 is the requirement for normal conditions and Eq. 4-2 governs the emergency/faulted conditions.

Alternatively, if the applied stress intensity factor and the flaw size, a_f, satisfy the following IWB-3612 criterion

$$a_f < a_{allow} \qquad \textbf{(4-3)}$$

where a_{allow} is the minimum value of "a" determined from the following equations:

$$K_I\,(a) < K_{Ia}/\sqrt{10}, \quad \text{(normal/upset)} \qquad \textbf{(4-4a)}$$

$$K_I\,(a) < K_{Ic}/\sqrt{2}, \quad \text{(emergency/faulted)} \qquad \textbf{(4-4b)}$$

then the flaw is acceptable based on load. For Eq. 4-4a, K_I is the maximum applied stress intensity factor under normal conditions and K_{Ia} is the available fracture toughness based on crack arrest for the corresponding crack tip temperature. For Eq. 4-4b, K_I is the maximum stress intensity factor under emergency and faulted conditions, and K_{Ic} is the available fracture toughness based on fracture initiation for the corresponding crack tip temperature.

4.3 Allowable Flaw Size

The allowable flaw size is determined from the fracture toughness and appropriate safety factors embodied in the flaw acceptance criteria of Eq. 4-4. Per Appendix A procedure,

$$K_I [a_{allow}] = \frac{K_{Ia} [T, RT_{NDT}]}{\sqrt{10}} \qquad (4\text{-}5)$$

for normal operating conditions, where T is the temperature at the crack tip and RT_{NDT} is the nil ductility temperature of the flywheel material. For accident conditions,

$$K_I [a_{allow}] = \frac{K_{Ic} [T, RT_{NDT}]}{\sqrt{2}} \qquad (4\text{-}6)$$

The smallest value for a_{allow} computed from the above relationships defines the allowable flaw size for the flywheel for preventing brittle fracture.

Satisfying either the flaw size criteria or the applied load criteria will demonstrate acceptance for safe-life of the flywheel. It is expected that the acceptance criteria for normal conditions will govern the allowable flaw size because of the higher required safety margins imposed by ASME Section XI.

4.3 Safe-Life Analysis

The expected end-of-period flaw size (a_f) is computed by a cumulative FCG analysis for normal operating conditions for the remainder of the expected service life of the component, according to Article A-5200 of Section XI, Appendix A. Normal conditions include all transients expected to occur during testing and normal operation. Included in normal operation are upset conditions that are anticipated to occur frequently enough as to warrant their consideration during design.

The FCG rate (da/dN) of the shell material is characterized by the following relation:

$$da/dN = C_O \Delta K_I^n \qquad (4\text{-}7)$$

where da/dN is the crack growth rate (i.e., inches per cycle of loading), C_O and n are material constants, and ΔK_I is the range in stress intensity factor for the load cycle ($\Delta K_I = K_{max} - K_{min}$). The material constants for alloy steel head material are given in Appendix A of ASME Section XI. The BIGIF computer program performs the FCG analysis by integrating Eq. 4-7. The number of applied load cycles, N, for the design transients is calculated from:

$$N = \int_{a_o}^{a_f} \frac{da}{da/dN} \qquad (4\text{-}8)$$

where a_o is the starting crack depth and a_f is the final crack depth.

4.5 Calculation of Stress Intensity Factor

The stress intensity factor is defined as

$$K_I = \sigma F \sqrt{\pi a/Q} \qquad (4\text{-}9)$$

where σ is the applied stress, F is a function which accounts for flaw geometry and loading mode, "a" is the crack depth, and Q is the flaw shape parameter. The explicit calculation of K_I is performed numerically by the BIGIF computer program.

4.6 Material Behavior

4.6.1 Fracture Toughness

Definition of fracture toughness at the flaw location as a function of temperature was obtained from Article A-4000 of Appendix A to Section XI (Ref. 3). Section XI defines lower-bound behavior for K_{Ia} and K_{Ic} for SA-533B-1, SA-508-2, and SA-508-3 steels and associated welds, as shown in Figure 4-4. The equational formats of these reference curves are given below:

$$K_{Ia} = 26.8 + 12.445 \exp[0.0145 (T - RT_{NDT})] \quad \textbf{(4-10)}$$

$$K_{Ic} = 33.2 + 20.734 \exp[0.02 (T - RT_{NDT})] \quad \textbf{(4-11)}$$

where T is the metal temperature in °F, RT_{NDT} is the reference nil ductility temperature in °F, and K_{Ia} and K_{Ic} are fracture toughness in ksi $in^{1/2}$. The toughness parameter, K_{Ic}, is based on the lower bound of static initiation critical K_I values measured from specimens tested at several temperatures. Similarly, K_{Ia} is based on the lower bound of crack-arrest toughness data. For upper-shelf conditions, the differences between dynamic and static toughness will be small. A lower bound upper-shelf toughness for materials represented by Eqs. 4-10 and 4-11 is taken as 200 ksi $in^{1/2}$. This upper-shelf toughness level is based on data evaluations in Refs. 7 and 8. The flywheel material is similar to the pressure vessel steels.

The flywheel material is of higher strength than the pressure vessel steels that compose the reference toughness curves. An alternate relationship for determining upper-shelf fracture toughness for various ferritic steels from Charpy V-Notch (CVN) impact energy is given in Ref. 9. The K_{Ic} – CVN correlation is defined as

$$\left(\frac{K_{Ic}}{\sigma_y}\right)^2 = 5\left(\frac{CVN}{\sigma_y} - 0.05\right) \quad \textbf{(4-12)}$$

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where σ_y is yield strength in ksi and CVN is impact energy in ft-lbs. The upper-shelf correlation was empirically based from 11 steels having yield strengths in the range of 110 ksi to 246 ksi.

4.6.2 Fatigue Crack Growth Rate

The FCG behavior of the flywheel material is obtained from Article A-4300 of ASME Section XI, Appendix A. The crack growth behavior of ferritic steel exposed to air environment is given by Eq. 4-7 where

$$C_o = 1.99 \times 10^{-10} S$$

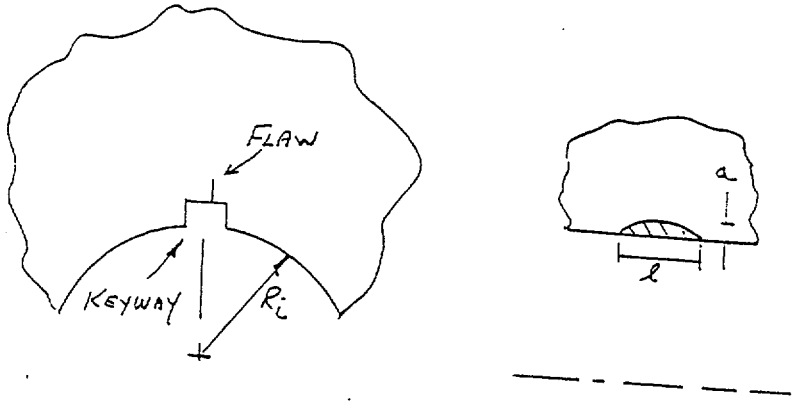
$$S = 25.72 (2.88 - R)^{-3.07} \qquad 0 \le R \le 1$$

$$n = 3.07$$

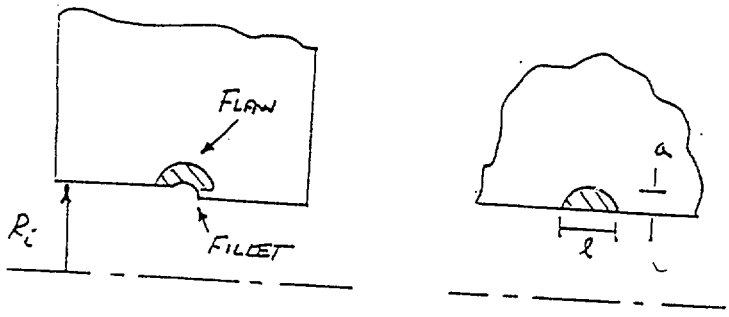
$$R = K_{min}/K_{max}$$

For the above constants, da/dN is in units of inches/cycle and ΔK is in units of ksi $in^{1/2}$. The FCG relationship is plotted in Figure 4-5.

The RCP flywheels are remote from the reactor coolant water and, therefore, the environment is ambient air.



a) Allis-Chalmers Flywheel



b) ABB Flywheel

Figure 4-1 — Postulated Flaw Locations in the Reactor Coolant Pump Flywheel.

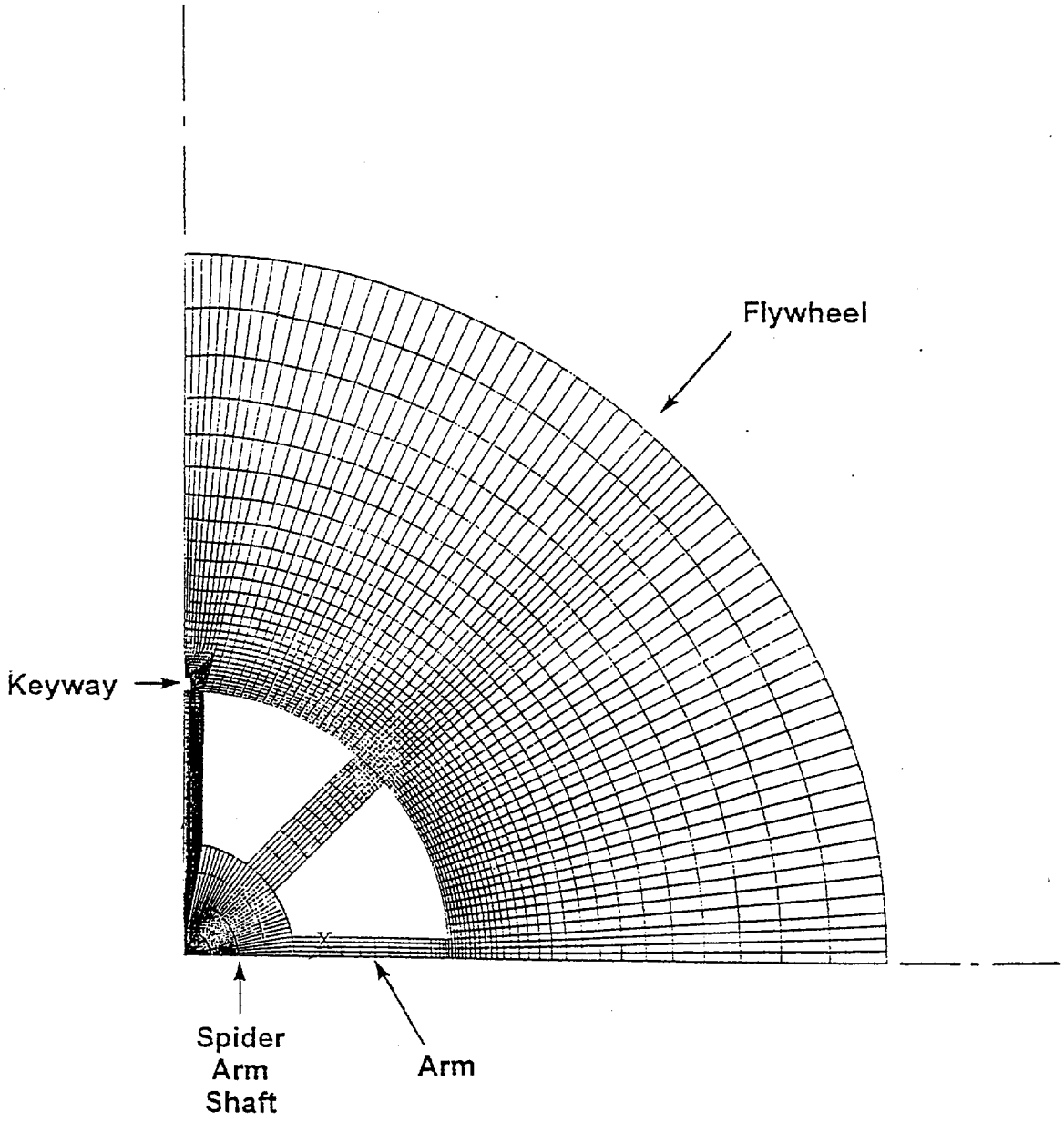


Figure 4-2 — Finite Element Model of A-C Design.

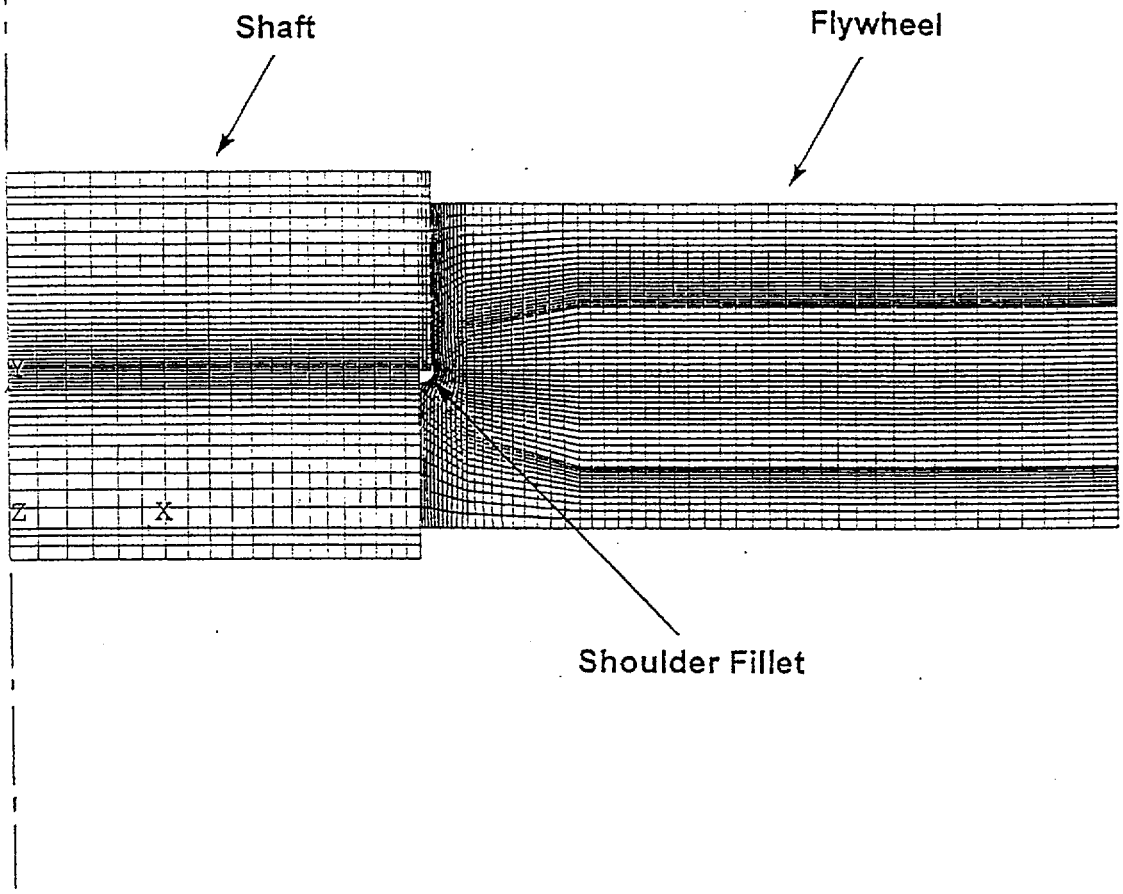


Figure 4-3 — Finite Element Model of ABB Design.

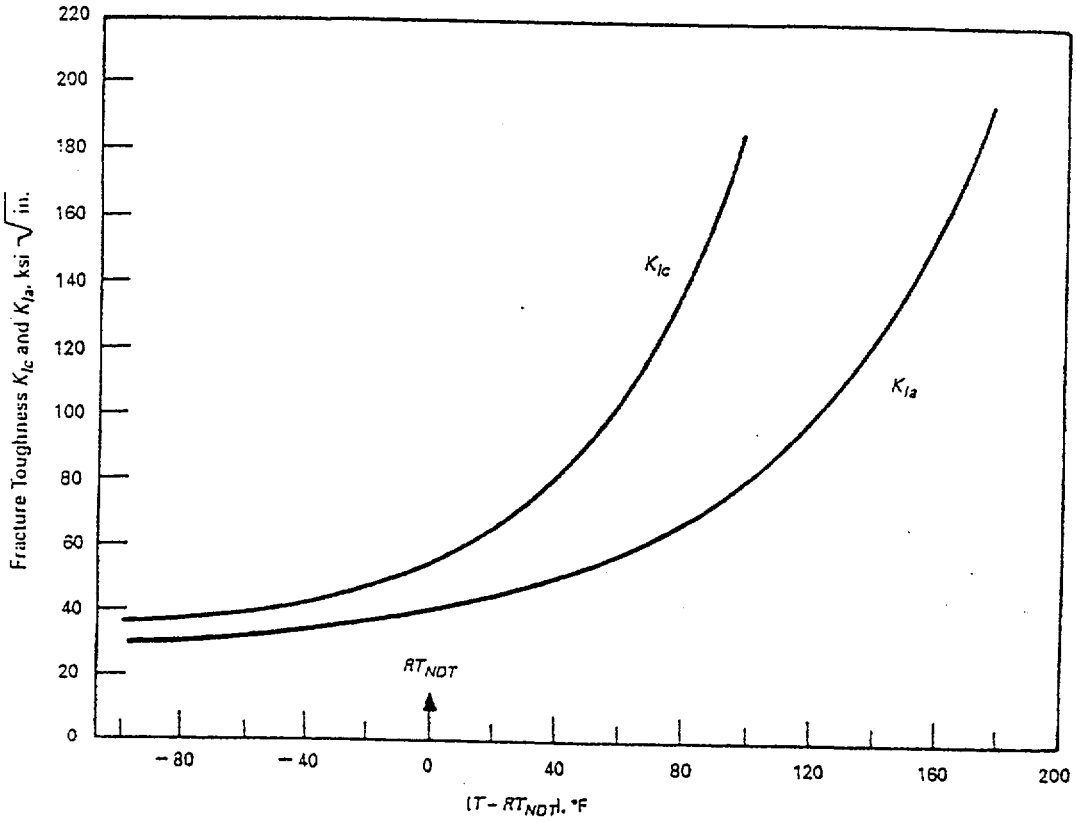


Figure 4-4 — Lower Bound Reference Fracture Toughness Curves (Figure A-4200-1 from ASME Section XI, Appendix A).

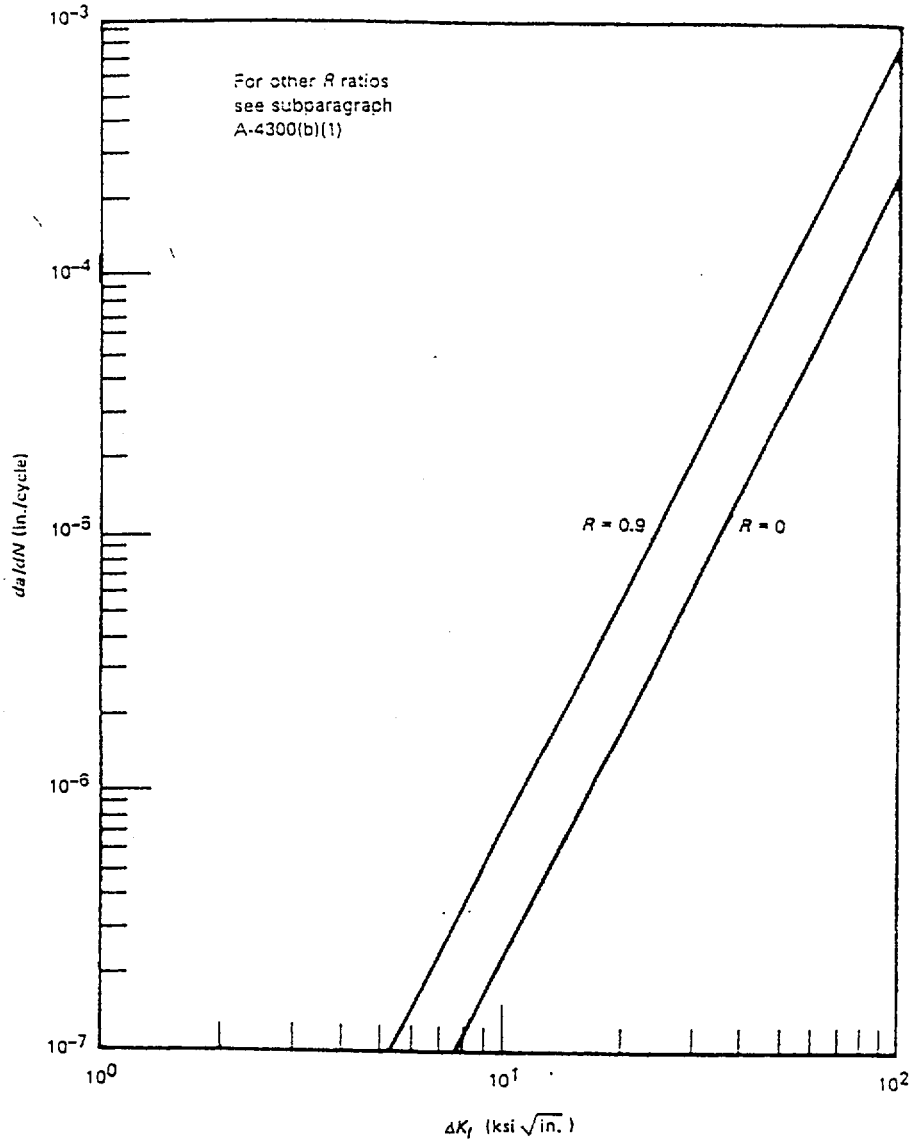


Figure 4-5 — Reference Fatigue Crack Growth Curves for Ferritic Steels in Air Environment (Figure A-4300-1 from ASME Section XI, Appendix A).

5.0 DESIGN INPUT

5.1 Flywheel Designs

There are a total of ten RCP motor/flywheel assemblies used at SONGS. There are four installed in each unit (Units 2 and 3) and two spares. Further, there are two basic designs: the original RCP motors (eight flywheels) were supplied by A-C, and replacement RCP motors (two flywheels) were supplied by ABB.

5.2 Allis-Chalmers Design

5.2.1 Geometry

The A-C flywheel is a flat disk, as shown in Figure 5-1, with the following dimensions (Ref. 10):

D_o = 82.00 inches
D_i = 31.00 inches
t = 7.90 inches

The flywheel is attached to the shaft via eight spider arms (i.e., spoked wheel). A heavy interference fit is used between the arms and the flywheel. The diameter of the inner shaft is 13.0 inches. Each spider arm is 9.0 inches long and rectangular in cross-section. The width of the arm is 2.25 inches. In the axial direction, each arm extends beyond the thickness of the flywheel.

The shaft spider arms are keyed to the flywheel with two axial keys and six circumferential keys. The keys are 0.75-inch square. The keyways have a 0.03 inch fillet at each corner.

5.2.2 Design Conditions

The flywheel is designed for the following conditions (Ref. 10):

Normal operating speed:	1180 rpm
Design Overspeed	1500 rpm

Per design requirements, the overspeed is 125% higher than normal speed conditions. No maximum transient speed was provided in the design report. The critical speed for ductile failure was determined in Ref. 10 as 3380 rpm.

The initial interference fit between spider arm and flywheel is 0.0145 ± 0.001 inch.

5.2.3 Material Properties

The flywheel is made from a single disk (no welding permitted). The material is American Society for Testing and Materials (ASTM) A543, Grade B, Class I. The following mechanical properties were used as per the original design analysis (Ref. 9):

Modulus of elasticity, E	30.0×10^6 psi
Poisson's ratio, ν	0.3
Density, ρ	0.283 lbs/in^3
Minimum yield strength, S_y	85 ksi
Minimum tensile strength, S_u	105 ksi

The flywheel material specification indicates a nil ductility temperature (NDT) no higher than –50°F (Ref. 10). CVN impact energy requirements for upper-shelf specifies at least 50 ft-lbs. Actual NDT values are less than or equal to –100°F (Ref. 10). Actual CVN values are in the range of 65 to 108 ft-lbs at 212°F. Based on the specified requirements and actual properties, the fracture toughness of the flywheel (i.e., fracture resistance) will be very high.

5.2.4 Fabrication

The A-C flywheels are made from steel plate per ASTM A543, Class I, Grade B. The plate is produced by the electric furnace process using a vacuum improved product method. The plates are heat treated per ASTM specifications (1650°F/1700°F water quenched, 1180°F temper). Each flywheel is subjected to 100% volumetric (ultrasonic) and wet magnetic particle examinations in accordance with ASME Section III. Further, each flywheel is overspeed tested at 1500 rpm for one minute.

Examinations are performed after finish machining and again after overspeed testing prior to shrinking the flywheels onto the rotor shafts. There are no welding operations performed on the flywheels.

These fabrication procedures comply with the guidelines of RG 1.14.

5.3 ABB Design

5.3.1 Geometry

The ABB flywheel is a flat disk, as shown in Figure 5-2, with the following dimensions (Ref. 11):

D_o = 69.70 inches
$D1_i$ = 26.7717 inches (+0.0016, –0.0)
$D2_i$ = 25.9843 inches (+0.0016, –0.0)
t = 10.24 inches

The flywheel is attached to a stepped shaft. A heavy interference fit is used between the shaft and the flywheel. The diameter of the shaft is (Ref. 12):

D1 = 26.797 inches (+0.0012, –0.0)
D2 = 26.008 inches (+0.0012, –0.0)

There are no keys utilized in the design. Initial interference fit is selected to maintain shaft contact for the design loads.

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5.3.2 Design Conditions

According to the flywheel specification, the flywheel shall maintain structural integrity during design, normal operating, upset, and faulted loading conditions. The flywheel is designed for the following conditions (Ref. 13):

Normal operating speed:	1194 rpm
Design Overspeed	1500 rpm
Maximum transient speed	1624 rpm

Per design requirements, the design overspeed is 125% higher than normal speed conditions. The maximum transient speed is 136% higher than the normal operating speed.

Seismic loading is defined in the design report (Ref. 13) for the flywheel as below:

	Horizontal	Vertical
Operating Basis Earthquake (OBE)	± 2.0 g	± 3.0 g
Design Basis Earthquake (DBE)	± 2.5 g	± 3.5 g

The maximum radial interference (shrink) fit between shaft and flywheel is determined from the nominal dimensions and machining tolerances. The values are summarized below:

D1: δ = 0.0133 inch

D2: δ = 0.0125 inch

5.3.3 Material Properties

The flywheel is made from a single disk (no welding permitted). The material is ASTM A543, Grade B, Class I. The mechanical properties are the same as those of the A-C flywheel.

Flywheel material specification indicates a NDT no higher than –70°F (Ref. 14). CVN impact energy requirements for upper-shelf specifies at least 50 ft-lbs. Actual NDT values are less than or equal to –150°F (Ref. 14). Actual CVN values are in the range of 63.5 to 72 ft-lbs at –10°F. Based on the specified requirements and actual properties, the fracture toughness of the flywheel (i.e., fracture resistance) will be very high.

5.3.4 Fabrication

The ABB flywheels are made from steel plate per ASTM A543, Class I, Grade B. The plates are produced by processes that minimize flaws and improve material fracture toughness (i.e., vacuum-melting and degassing or electroslag remelting). The plates are heat treated in accordance with ASTM specifications. Each flywheel is subjected to 100% ultrasonic testing. Magnetic particle inspection is performed on both flat surfaces within the bore region, as well as the finished machined bores, drilled holes, and other machined details. Examinations comply to ASME Section III. Further, each flywheel is overspeed tested to 1500 rpm for one minute.

Examinations are performed after finished machining and after overspeed testing. There are no welding operations performed on the flywheel for any purpose.

These fabrication procedures comply with the guidelines of RG 1.14.

5.4 Design Cycles

The primary fatigue cycles are due to plant startups/shutdowns. The design cycles for plant starts are 500 cycles in a 40-year plant life (Ref. 15). In previous fatigue evaluations (Refs. 4, 10, and 14), the number of fatigue cycles in a plant's life was assumed to be 4,000 (a factor of 8 on plant starts). In this evaluation, 4,000 cycles will be conservatively assumed to be the number of flywheel startup/shutdown cycles in one plant lifetime.

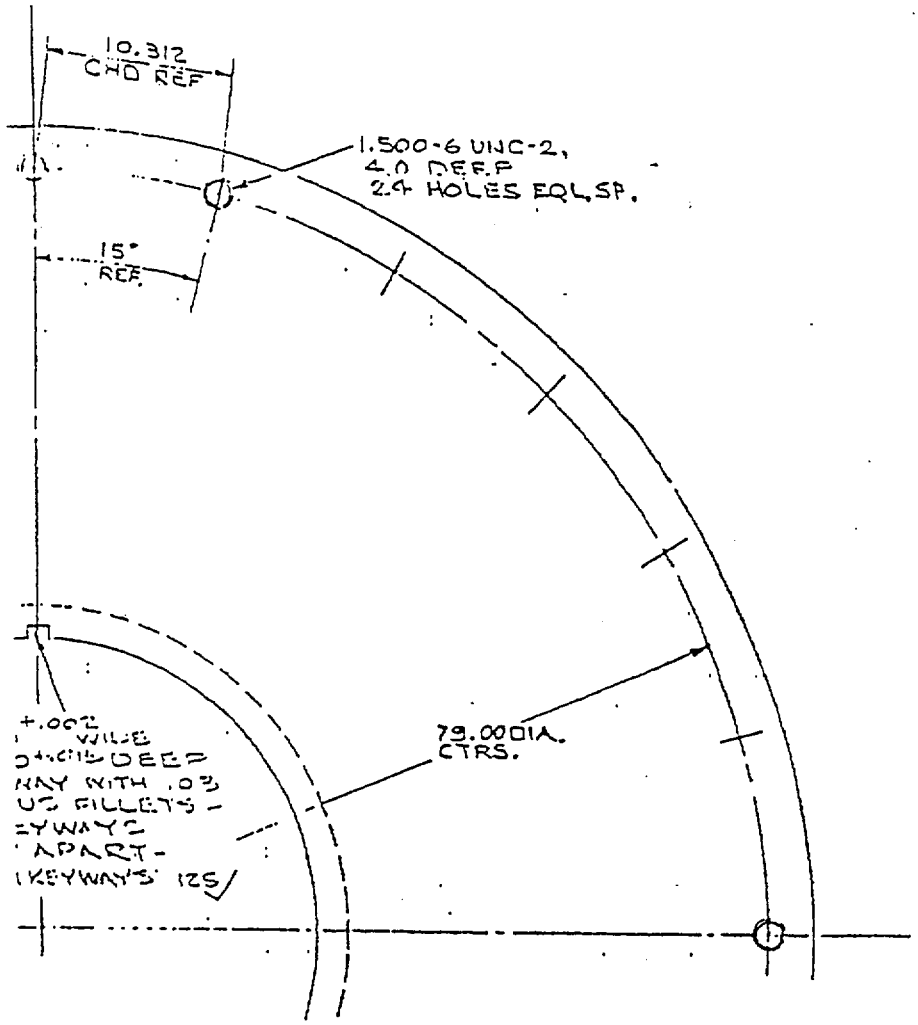

Figure 5-1 — Illustration of the A-C Flywheel.

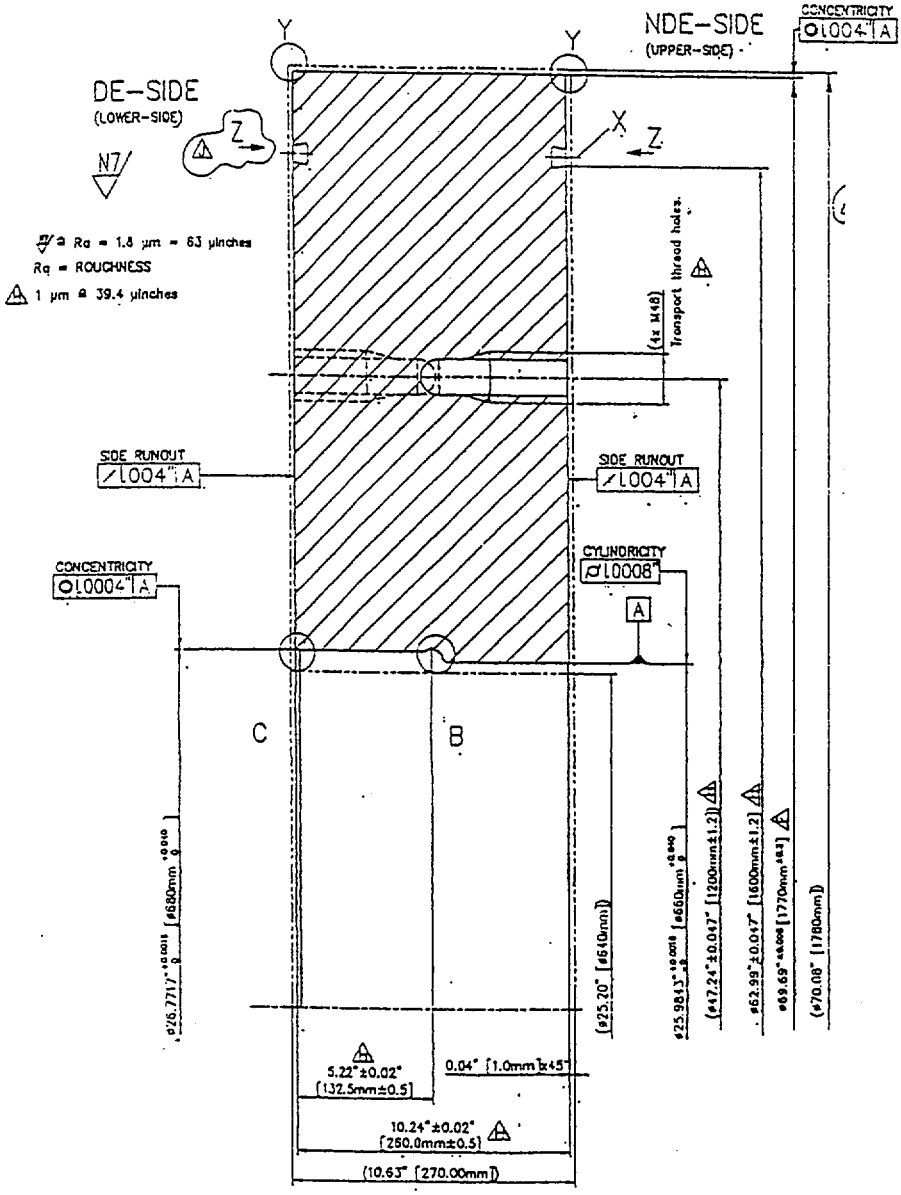

Figure 5-2 — Illustration of the ABB Flywheel.

6.0 REFERENCES

1. Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," U.S. Nuclear Regulatory Commission (August 1975).

2. ASME *Boiler and Pressure Vessel Code*, Section III, "Rules for Construction of Nuclear Power Plant Components," (1971 Edition, 1971 Addenda).

3. ASME *Boiler and Pressure Vessel Code*, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1992 Edition, American Society of Mechanical Engineers.

4. Letter from Nuclear Regulatory Commission to Entergy, "Acceptance for Referencing of Topical Report SIR-94-080 — Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements," with Attachments (May 21, 1997) (ECD-9).

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11. Document No. HTAM 123478, "Flywheel Manufacturing Drawing," Rev. J, SO23-405-30-119, ABB Industries (April 15, 1994) (ECD-6).

12. Document No. HTAM 123479, "Flywheel Assembly Drawing," Rev. E, SO23-405-30-13-2, ABB Industries (May 15, 1994) (ECD-6).

13. Document No. HTAM 622503, "Stress, Seismic, and Fracture Analysis of the Flywheel of the Reactor Coolant Pump Motor – San Onofre," Rev. 2, SO23-405-30, ABB Industries (November 16, 1994) (ECD-3).

14. "Flywheel Certified Material Test Report for ABB Motor," P.O. 6V2D3003, SO23-405-30-59 (November 4, 1994) (ECD-5).

15. "General Specification for a Reactor Vessel Assembly," Specification No. 00000-PE-110, Revision 1, Combustion Engineering Company (August 11, 1971) (ECD-4 from Project AES 98063465-1Q).

16. "SONGS ISI UT Examination Report — Unit 2 Spare RCP Motor," Report 293-07IUT-040 (July 29, 1993) (ECD-15).

17. "SONGS ISI UT Examination Report — Unit 3 Spare RCP Motor," Report 393-07IUT-039 (November 18, 1993) (ECD-16).

18. "SONGS ISI UT Examination Reports — Unit 2," Reports 296-09IUT-023, -024, -025, and -052 (December 1996) (ECD-7).

19. "SONGS ISI UT Examination Reports — Unit 3," Reports 396-09IUT-036, -039, -040, and -042 (May 1996) (ECD-8).

20. "Flywheel Inspection Summary," Southern California Edison Company, SCE Compilation (for information only) (February 7, 2000).

7.0 NOMENCLATURE

a	=	Flaw depth, inch
a_{allow}	=	Allowable flaw depth, inch
a_c	=	Minimum critical crack size for normal/upset conditions, inch
a_f	=	Final flaw depth, inch
a_i	=	Minimum critical crack size for accident conditions, inch
a_o	=	Initial flaw depth, inch
Δa	=	Change in flaw depth, inch
C_o	=	Material constant in the reference FCG equation
D	=	Depth of corrosion groove, inch
D_i	=	Inner bore diameter, inch
$D1$	=	First step diameter for shaft, inch
$D2$	=	Second step diameter for shaft, inch
D_o	=	Outer diameter, inch
F	=	Flaw correction factor
F	=	Force, lb
K	=	Stress intensity factor, ksi $in^{1/2}$
K_{allow}	=	Allowable stress intensity factor (includes safety margins), ksi $in^{1/2}$
K_I	=	Mode I stress intensity factor, ksi $in^{1/2}$
K_{Ia}	=	Fracture toughness for crack arrest, ksi $in^{1/2}$
K_{Ic}	=	Static fracture toughness for initiation, ksi $in^{1/2}$
K_{max}	=	Maximum value of K in stress cycle, ksi $in^{1/2}$
K_{min}	=	Minimum value of K in stress cycle, ksi $in^{1/2}$
ΔK	=	Range in stress intensity factor ($K_{max} - K_{min}$), ksi $in^{1/2}$
n	=	Exponent in the reference FCG equation
N	=	Number of cycles
Q	=	Flaw shape parameter

r	=	Radial distance, inch
r_o	=	Outer radius of nozzle, inch
r_i	=	Inner radius of nozzle, inch
R	=	R-ratio (K_{min} / K_{max})
R_o	=	Outer radius of head or shell, inch
R_i	=	Inner radius of head or shell, inch
S_u	=	Specified minimum ultimate strength, psi
S_y	=	Specified minimum yield strength, psi
t	=	Flywheel thickness, inch
T	=	Temperature, °F
ω	=	Rotational speed, rpm
σ_m	=	Applied membrane stress, psi
σ_b	=	Applied bending stress, psi
σ_f	=	Material flow stress, psi
σ_y	=	Yield strength, psi
σ_u	=	Ultimate tensile strength, psi
da/dN	=	Crack growth rate, inches/cycle

8.0 CALCULATIONS

8.1 Flaw Model

To evaluate the integrity of the flywheel and to establish a safe-life interval for inspection, an axially oriented flaw is postulated to exist at the bore. For the A-C flywheel design, the flaw is assumed to be at the axial keyway. For the ABB flywheel, the flaw is assumed to be at the internal shoulder fillet between the step change in diameter. In both cases, the flaw is assumed to have an initial depth, a_o, and a length that is four times its depth, as illustrated in Figure 8-1.

An initial depth of 0.25 inch is assumed for the flaw. This initial depth is considered reasonable and conservative and represents the largest flaw that could remain after inspection due to ultrasonic (UT) detection uncertainty. This initial depth has been used in other flaw evaluations performed on similar flywheels (Ref. 4). The sensitivity of the safe-life evaluation results to the assumed value of a_o will be investigated to ensure a conservative FCG analysis.

8.2 Inspection Results

Inspection results considered in this evaluation were provided by Southern California Edison Company (SCE). The results were examined to determine if any flaws have been identified during the RG 1.14 inspections. In-service inspections of the ten flywheels revealed no significant indications. A summary of the ISI findings is given below (Refs. 16 through 19).

	RCP	Design	Date	Indications
Unit 2	RCP001	A-C	12/13/96	Geometric
	RCP002	ABB	1/17/97	Geometric
	RCP003	A-C	12/13/96	Geometric
	RCP004	A-C	12/13/96	Geometric
	Spare	A-C	7/16/93	Geometric
Unit 3	P001	A-C	5/17/97	Geometric
	P002	ABB	5/3/97	Geometric
	P003	A-C	5/1/97	Geometric
	P004	A-C	5/1/97	Geometric
	Spare	A-C	11/11/93	Geometric

All indications were identified as geometric (result of part geometry) and are consistent with past observed indications. In summary, the flywheels are free from defects in critical (high stress) locations, as determined by UT and visual inspections.

Additional inspection history information was provided by SCE for information only (Ref. 20). This information is summarized in Appendix D and covers all flywheel inspections from 1986 to 1997. For all areas inspected, no flaws or cracks were detected.

Preservice examinations of A-C flywheels indicated the presence of flaws in one flywheel (Ref. 10). The flaws were detected by magnetic particle surface examination of the bore approximately at the mid-thickness locations, and running nearly parallel to the surface of the plate. The flaws were linear laminations and were not associated with the keyways. The vendor performed a detailed fracture and fatigue analysis and concluded that the flywheel was suitable for service without the need for repair.

Lamellar discontinuities frequently occur in rolled (thick) plate and are revealed during inspections. They are usually elongated non-metallic inclusions and their distribution is generally nonuniform in nature. Laminar indications also can be caused by the manufacturing process when air is trapped in the steel and rolled out during forming. Typically, they lie within a narrow band parallel to the top and bottom surfaces of the plate. These laminations do not pose an integrity concern for the flywheel since they are not oriented in the plane of stress.

Industry experience related to RCP flywheel performance has identified no reportable indications from past ISI examinations (other than laminations and other non-structurally significant fabrication flaws). These findings were obtained in a survey of over 30 plants (Ref. 4). For plants common to SONGS, no cracks have ever been reported during ISI. Only geometric reflectors and laminar-type indications have been observed. As discussed earlier, laminar indications are not structurally significant.

8.3 Fracture Toughness

The measured NDT for the flywheel materials has a maximum value of –100°F. This NDT is below ambient conditions and assures upper-shelf behavior at operating temperature. From the reference toughness curves defined in Section 4.6.1, the value for K_{Ia} and K_{Ic} will be 200 ksi $in^{1/2}$.

Calculation for K_{Ic} based on CVN was also performed to ensure a conservative analysis. The minimum measured CVN for the supplied material heats is 63 ft-lbs. Minimum specified CVN impact energy is 50 ft-lbs and specified minimum yield strength is 85 ksi. Conservatively, using the minimum specified properties in Eq. 4-11,

$$K_{Ic} = 5^{1/2}(85)(50/85 - 0.05)^{1/2}$$

$$K_{Ic} = 140 \text{ ksi in}^{1/2}$$

8.4 Loading Conditions

The potential loading conditions for the two flywheel designs include the following:

- Shrink-fit loads from shaft
- Centrifugal loads due to motor/pump speed
- Seismic loads
- Vibrational loads
- Key loading due to shaft torque

The most significant loads are the shrink-fit and centrifugal loads. The other loads have been judged not to significantly contribute to the fracture or fatigue life of the flywheel. This is consistent with other analyses (Refs. 4, 10, and 13).

As determined by the vendor, seismic loads do not significantly increase the hoop stress in the flywheel (Ref. 13). It is therefore reasonable to conclude that any vibratory stresses will be negligible.

With regard to key load, only the A-C flywheel utilizes a keyway. Torque is transmitted to the flywheel via the shrink-fit between shaft and wheel. Therefore, the key is not transmitting load, except possibly under accident conditions where the interference fit may be partially lost.

From the above considerations, the following loading conditions will be analyzed:

Loading	Flywheel Design	
	A-C	ABB
Shrink-fit, δ (in)	0.0155	0.0133 0.0125
Normal operating speed (rpm)	1180	1194
Design overspeed (rpm)	1500	1500
Accident speed (rpm)	1624*	1624

* Accident speed for the A-C flywheel is assumed to be the same as ABB design.

The four loading conditions that are evaluated are (1) shrink-fit only, (2) shrink-fit plus normal speed, (3) shrink-fit plus overspeed, and (4) shrink-fit plus accident.

8.5 Stress Analysis of the Allis-Chalmers Flywheel

8.5.1 Finite Element Model

The stress distributions for use in the safe-life analysis of the A-C flywheel design were computed by FEA. The COSMOS/M computer program was used to develop the model (Ref. 5). The flywheel and spider arm shaft were evaluated by FEA. Both components were modeled in two-dimensions (2D plane). The FEA model is shown in Figure 8-2. A total of 2,683 four-noded isoparametric elements were used to define the flywheel and shaft geometry. This corresponds to 5,630 degrees of freedom in the solution. Due to geometric symmetry, a 90 degree segment of the flywheel assembly is meshed. Plane stress assumption is made for the flywheel elements and plane strain is assumed for the spider arms and shaft.

The contact between the flywheel and spider arms is modeled by gap elements. The shrink-fit is introduced by forcing radial compatibility between the contact surfaces. When the centrifugal loading is included in the analysis, the contact points (i.e., positive gap forces) are checked to determine if liftoff of the flywheel has occurred. This results in a nonlinear analysis, which is solved in an iterative manner.

The keyway was explicitly modeled in order to capture the stress concentration effect of this bore discontinuity. The finite element mesh in this region was highly refined. The solid key was conservatively ignored in the model. It is assumed that the key carries no load during normal operating and overspeed conditions.

8.5.2 Stress Results

The 2D plane model was solved for the four loading cases. The highest stress location for the flywheel bore is the keyway. Maximum principal stress contour plots for the four cases are given in Appendix A (Figures A-1 through A-4). Peak surface stresses occur along the keyway flat, with the highest computed stress occurring near the corner. A summary of the peak stresses is given below.

Condition	Loading	Peak Stress in Keyway Region (ksi) Center	Corner
Shrink-fit	δ	2.90	1.34
Normal Operation	δ + 1180 rpm	32.4	56.3
Overspeed	δ + 1500 rpm	50.6	92.2
Accident	δ + 1624 rpm	58.7	108.5

The stress concentration factor for the keyway is approximately 3.5.

For the fracture and fatigue analyses, crack propagation will proceed radially from the keyway surface to the outside diameter. The principal stress distribution along radial planes from the keyway were developed from the FEA results. Two radial sections were evaluated: symmetry plane (through the center of the keyway) and the plane through the keyway corner (at peak stress location). The stress curves for these planes are given in Figures 8-3 and 8-4. These stress distributions are used for input to the BIGIF flaw model.

8.6 Stress Analysis of the ABB Flywheel

8.6.1 Finite Element Model

The stress distributions for use in the safe-life analysis of the ABB flywheel design were computed by FEA. Again, the COSMOS/M computer program was used to develop the stress model for the shrink-fit and centrifugal load cases. The flywheel and the shaft were modeled in two-dimensions. Because the flywheel is without a keyway, an axisymmetric modeling assumption was used to define the relevant geometry features.

The FEA model is shown in Figure 8-5. A total of 4,048 four-noded isoparametric elements were used to represent the flywheel and shaft. This represents a total of 8,390 degrees of freedom in the solution for displacements and stresses. The contact between flywheel and solid shaft is modeled by gap elements. Shrink-fit is introduced by forcing compatibility between the flywheel and shaft. Again, a nonlinear (iterative solution) analysis option is used to solve for contact forces for the four load cases.

The stepped shaft and shoulder represent a geometric discontinuity and location of stress concentration. The shoulder region of the flywheel incorporates a 10 mm (0.39 inch) fillet radius to transition from the larger bore diameter to the smaller diameter. The finite element mesh in this region was highly refined to improve numerical accuracy.

8.6.2 Stress Results

The axisymmetric model was solved for the four loading conditions. Maximum principal stress contour plots are given in Appendix A (Figures A-5 through A-8). The highest stress location for the flywheel occurs at the shoulder fillet on the bore surface. Peak stresses occur approximately at the deepest position of the fillet. A summary of the highest computed stresses for the fillet is given below:

Condition	Loading	Peak Shoulder Fillet Stress (ksi)
Shrink-fit	δ	24.4
Normal Operation	δ + 1194 rpm	26.4
Overspeed	δ + 1500 rpm	27.6
Accident	δ + 1624 rpm	28.1

For the fracture and fatigue analyses, crack propagation will proceed radially from the fillet surface to the outside diameter. The crack plane is oriented in the axial-radial direction. The maximum principal stress distribution along the radial centerline to the fillet is determined from the stress results. This stress distribution is shown in Figure 8-6. This stress distribution is used as input to the BIGIF flaw model.

8.7 Allowable Flaw Size

The allowable flaw size based on fracture mechanics was developed from the flaw acceptance criteria of Eqs. 4-5 and 4-6. The minimum fracture toughness of the flywheel materials was established as 140 ksi $in^{1/2}$. Because of upper-shelf behavior, $K_{Ia} = K_{Ic} = 140$ ksi $in^{1/2}$ will be used to compute the allowable flaw size for normal operating and accident conditions.

The limiting level for K_I for normal conditions is

$$K_I = 140/\sqrt{10} = 44.3 \text{ ksi in}^{1/2} \equiv K_{allow} \quad \text{(Normal)}$$

Similarly, for accident conditions

$$K_I = 140/\sqrt{2} = 99.0 \text{ ksi in}^{1/2} \equiv K_{allow} \quad \text{(Accident)}$$

The BIGIF computer program was used to compute K_I versus crack depth. A flaw aspect ratio of one-to-four (depth-to-length) is conservatively assumed for flaw shape. To determine the allowable flaw depth, the computed K_I versus depth is compared with the above allowable toughness limits. It should be noted that the maximum centrifugal stresses occur at maximum speed. Shrink-fit stresses relax when the flywheel is spinning and will reduce to near zero under overspeed/accident conditions. The shrink-fit stresses are maximum at zero speed when centrifugal stresses are zero. Therefore, K_I is computed for each load case to establish the minimum allowable flaw depth under all possible stress states.

The calculated stress intensity factors for the A-C and ABB flywheels are shown in Figures 8-7 and 8-8. The results are shown for each loading condition and are based on the BIGIF calculations provided in Appendices B and C. Also shown in Figures 8-7 and 8-8 are the allowable

K_I levels based on minimum fracture toughness with appropriate safety factors. The allowable flaw size corresponds to the intersection of the K_I versus flaw depth curve with the allowable material toughness. A summary of the allowable flaw size is given below.

Design	Allowable Flaw Size, a_{allow} (inches)		
	Normal Speed	Overspeed	Accident
A-C	4.1	0.56	> 4.0
ABB	3.4	2.2	> 4.0

It should be noted that the overspeed condition was conservatively treated as a normal/upset loading condition and the $\sqrt{10}$ safety factor was used. Under this assumption, the minimum allowable flaw size is 0.56 inch for the A-C flywheel and 2.2 inch for the ABB flywheel.

Additional comparison was made between the allowable flaw size for fracture with the ductile failure limits computed by the vendors (Refs. 9 and 10). For the A-C flywheel, a flaw size limit of 1.1 inches was established based on ASME Section III, Appendix F, analysis rules. For the ABB flywheel, a similar code evaluation indicated a critical flywheel speed of 4010 rpm. These flaw and critical speed limits based on faulted load stress limits exceed the allowable limits computed by LEFM.

8.8 Flaw Growth Evaluation

The final step in the safe-life analysis is to determine the allowable inspection interval based on conservative flaw growth analysis. As discussed in Section 4, the only relevant degradation mechanism for the flywheels is cyclic fatigue. Hence, an FCG analysis is performed to compute the growth of postulated pre-existing flaws located at high stress locations. Equation 4-8 is solved for cyclic life (N), conservatively assuming that the final flaw size is equal to the minimum allowable size ($a_f = a_{allow}$), and an initial flaw size of 0.25 inch (a_o = 0.25 inch). Since no flaw indications have been detected in the flywheels as SONGS or other plants as a result of RG 1.14 mandated inspections, the initial flaw size of 0.25 inch was based on the maximum flaw size that could be missed during these inspections. This initial size has been used in other flywheel evaluations and has been judged to be conservative.

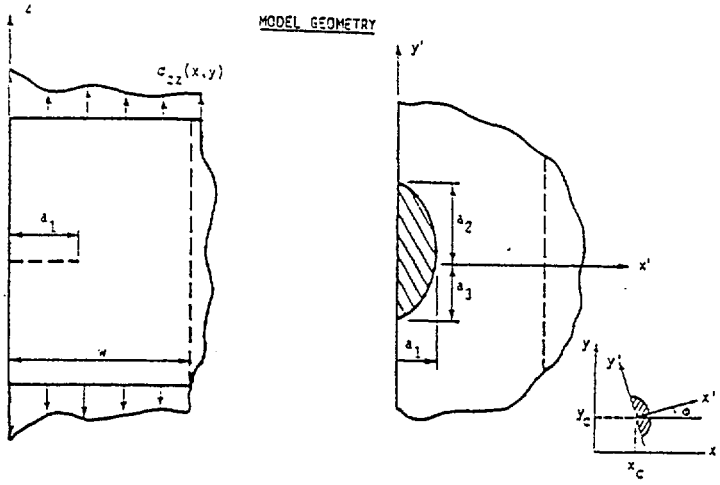
The design number of startup/shutdown cycles for the RCP is 500 for the plant life. In this evaluation, a conservative flywheel life was taken as 4,000 cycles (i.e., safety factor of eight on life). The maximum stress for each start was taken as the normal operating speed for the flywheel. For the A-C flywheel, the minimum stress for the cycle is the shrink-fit load case. For the ABB flywheel, a zero minimum stress was conservatively assumed. This assumption will result in the largest possible ΔK being computed for each cycle. The solution of Eq. 4-8 was numerically performed using BIGIF. The results of these calculations are given in Appendices B and C.

The flaw growth as a function of number of cycles is shown in Figures 8-9 and 8-10 for each flywheel. As indicated, the number of cycles to grow the initial flaw to the minimum allowable size is significantly greater than 4,000 cycles. A summary of the calculated flaw growth from the initial flaw size in 4,000 cycles (one plant lifetime) is provided below.

Design	N = 4,000 Cycles	
	Δa (inch)	a_f (inch)
A-C	0.016	0.27
ABB	0.007	0.26

The above results indicate that FCG degradation is not a concern to the structural integrity of the flywheels. Given the assumed initial flaw size that could be missed during previous inspections, the flywheels can operate for a significant number of cycles beyond the design plant life.

In performing the FCG analysis, the safe-life of the flywheel will depend on the assumed initial flaw size. In the previous discussion, $a_o = 0.25$ inch was assumed, which has been judged to be conservative. To evaluate the sensitivity of the safe-life results to the value of a_o, the number of allowable load cycles was computed for different initial flaw depths. These results are shown in Figure 8-11 for the A-C design and Figure 8-12 for the ABB design.



MODEL DESCRIPTION

MODEL FEATURES	PARAMETER	OPTION FEATURED
Model Index Number	IFI	305
Number of Degrees of Freedom	IDOF	3
Crack Front Shape	--	Semi-Elliptical
Crack Opening Mode	--	Mode I
Finite Width Effects	W	No
Variable Thickness Effects	NTH	No

DATA INPUT DESCRIPTION

INPUT DESCRIPTION	PARAMETER	INPUT FORMAT	CARD SERIES	REMARKS
Variable Thickness	NTH	Constant	8	Set NTH = 0 or leave blank
Initial Crack Size, a_1	AI(1)	Constant	C1	
a_2	AI(2)	Constant	C1	
a_3	AI(3)	Constant	C1	
Body Width, w	G(1)	Constant	C2	Used only to terminate analysis when $a_1 \geq w$.
Crack Position, x_c	G(6)	Constant	C2	
y_c	G(7)	Constant	C2	
Crack Orientation, ϕ	G(8)	Constant	C2	Angle ϕ in degrees
Load Input Option	IPLD	Constant	E2A	
Stress Input, $\sigma_{zz}(x,y)$	$\sigma(x,y)$	Equational	E2B	Format depends on IPLD.
	CS(IX,IY)	Tabular	E2C	

Figure 8-1 — Flywheel Flaw Models.

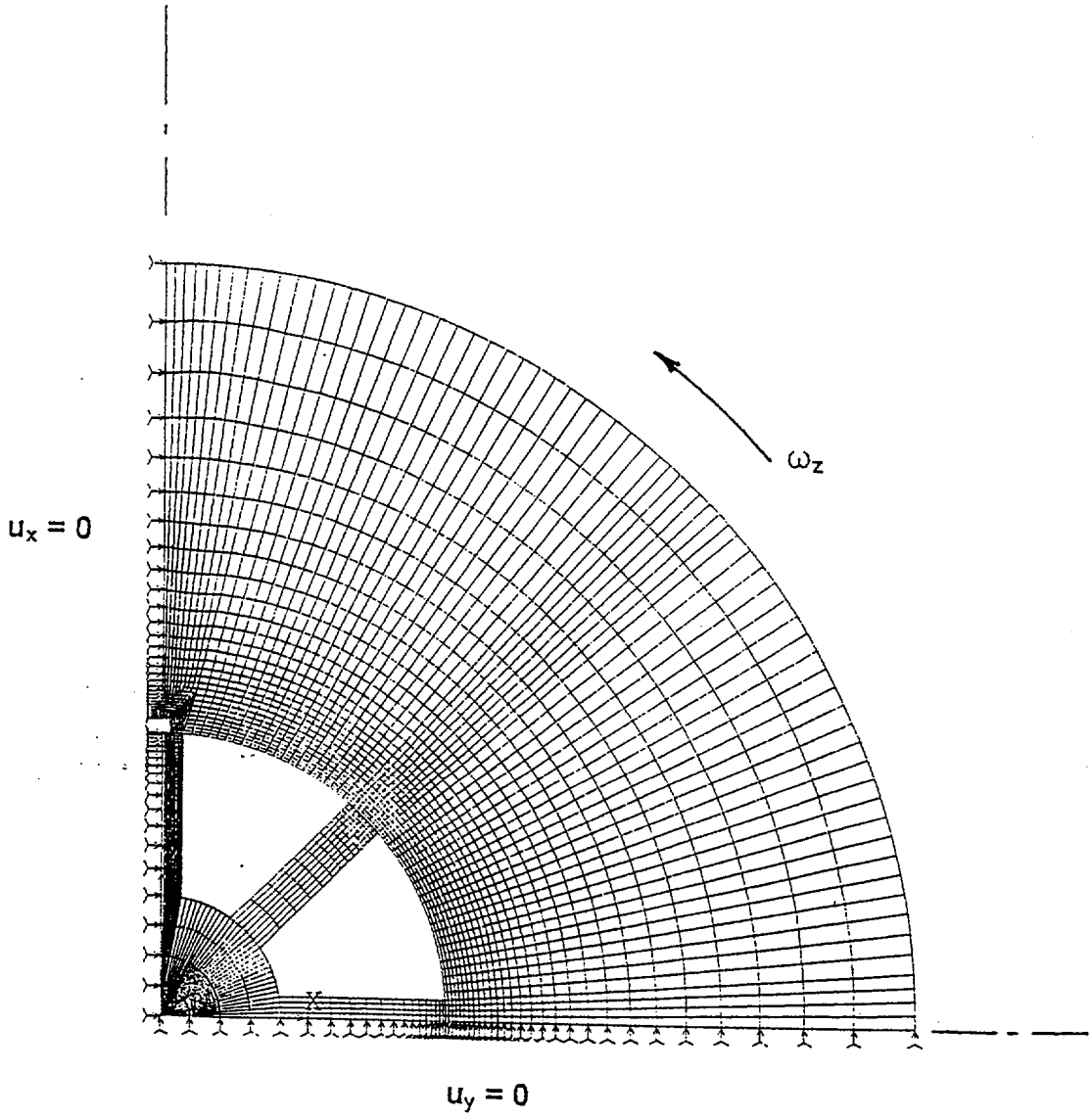


Figure 8-2 — Finite Element Model Boundary Conditions for the A-C Flywheel.

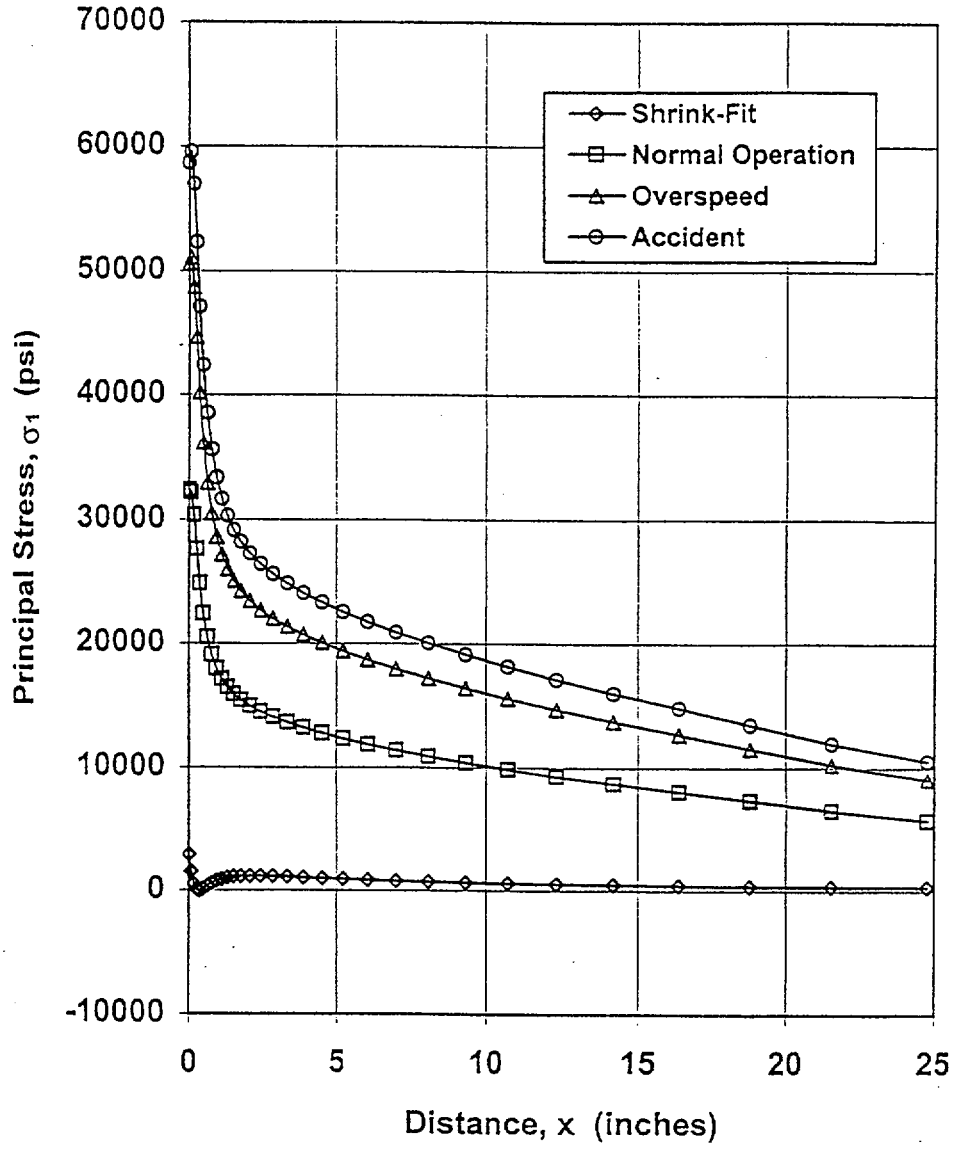


Figure 8-3 — Principal Stress Distribution at Keyway Along Symmetry Plane.

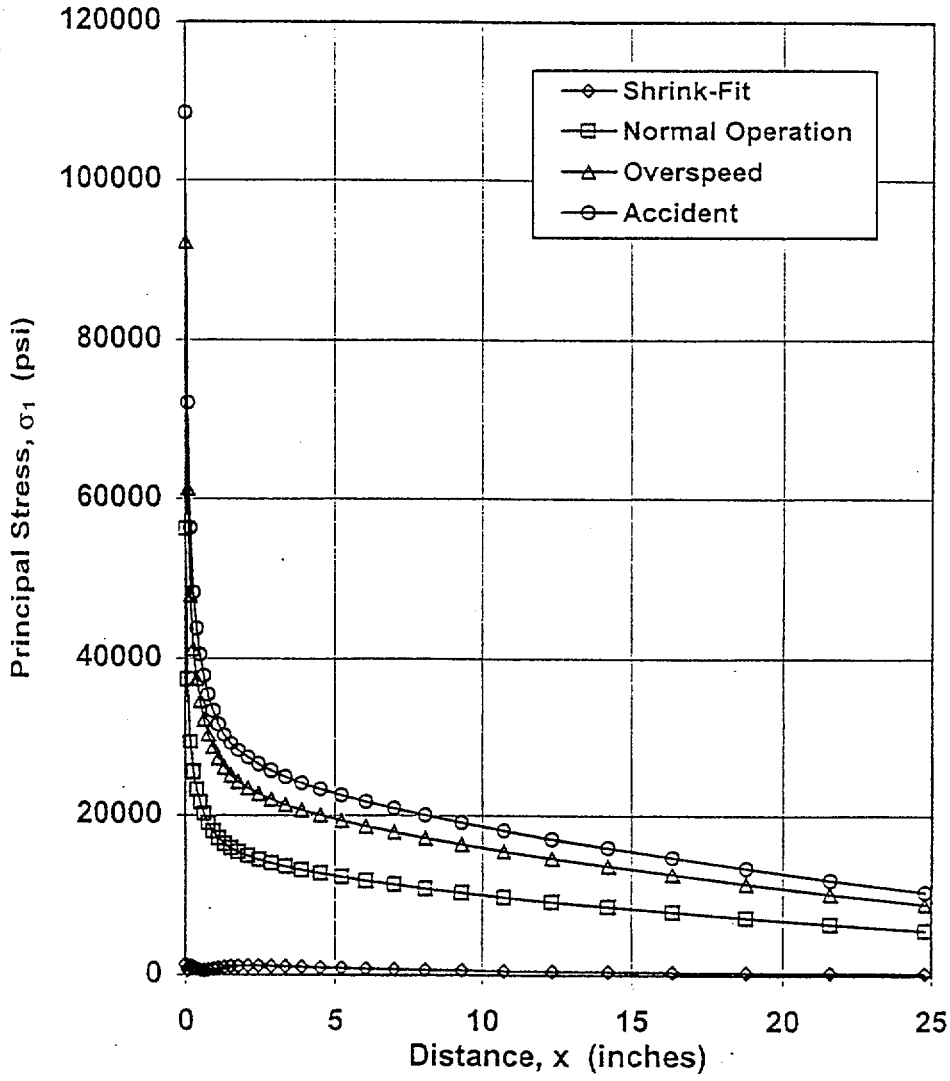


Figure 8-4 — Principal Stress Distribution at Keyway Corner.

Calculation No.: AES-C-3865-2	Made by: RLC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: 43 of 50

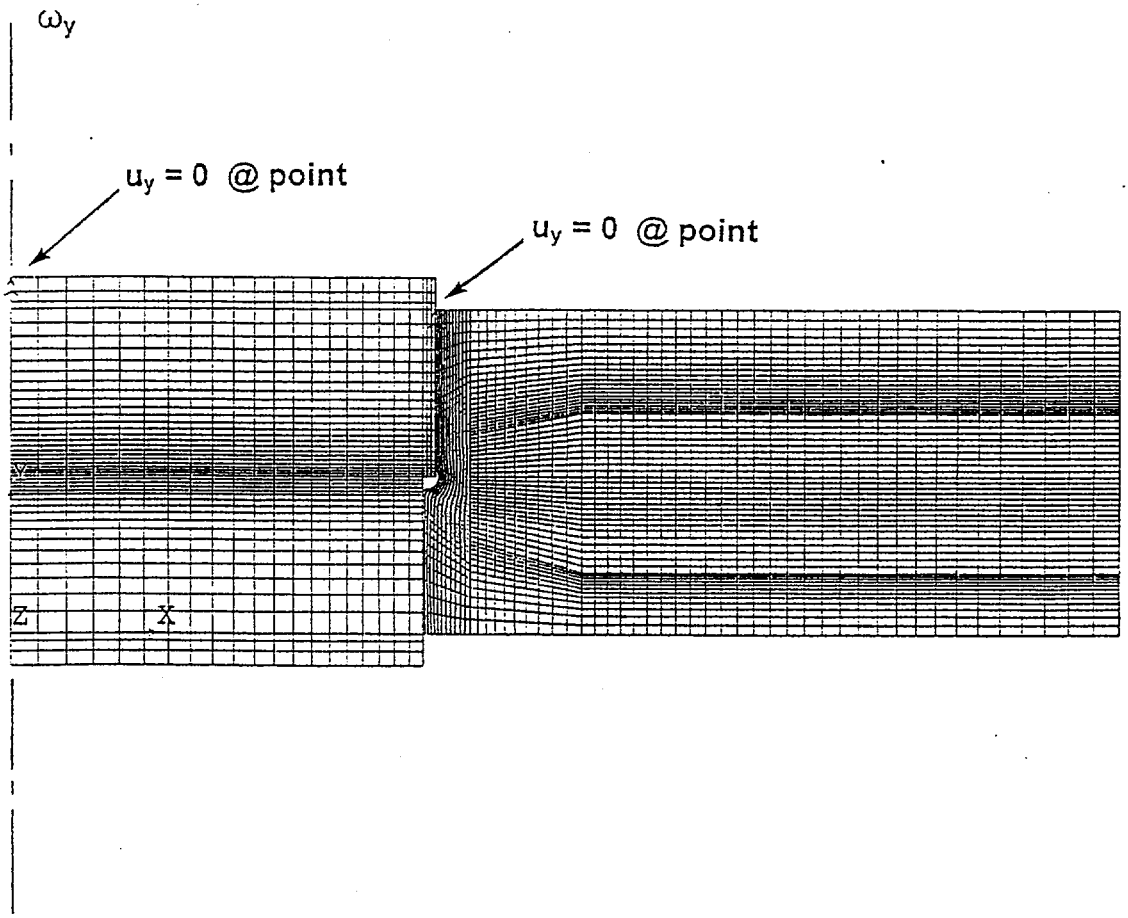


Figure 8-5 — Finite Element Model Boundary Conditions for the ABB Flywheel.

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	Checked by: WJC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: 44 of 50

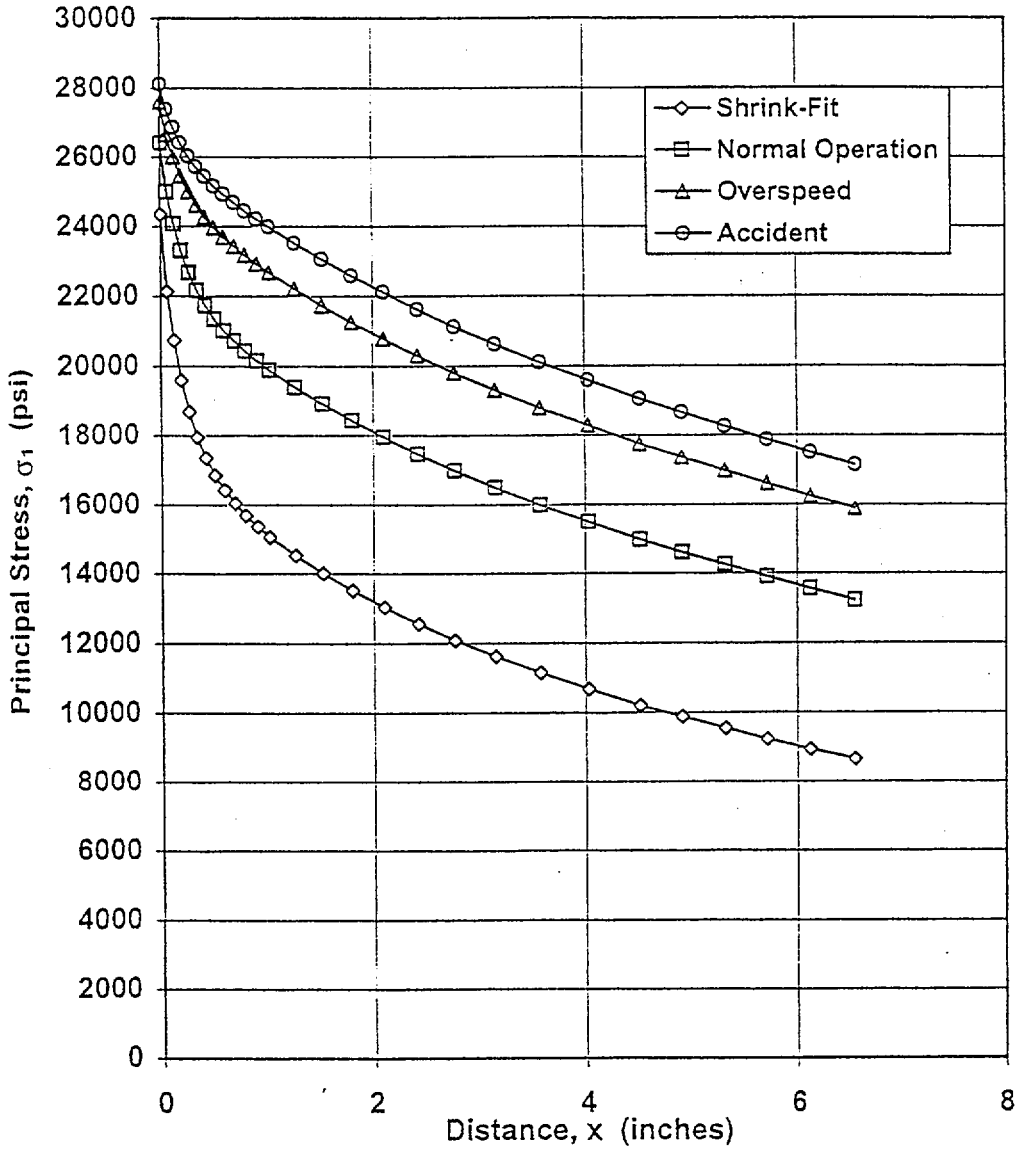

Figure 8-6 — Principal Stress Distribution at Shoulder Fillet.

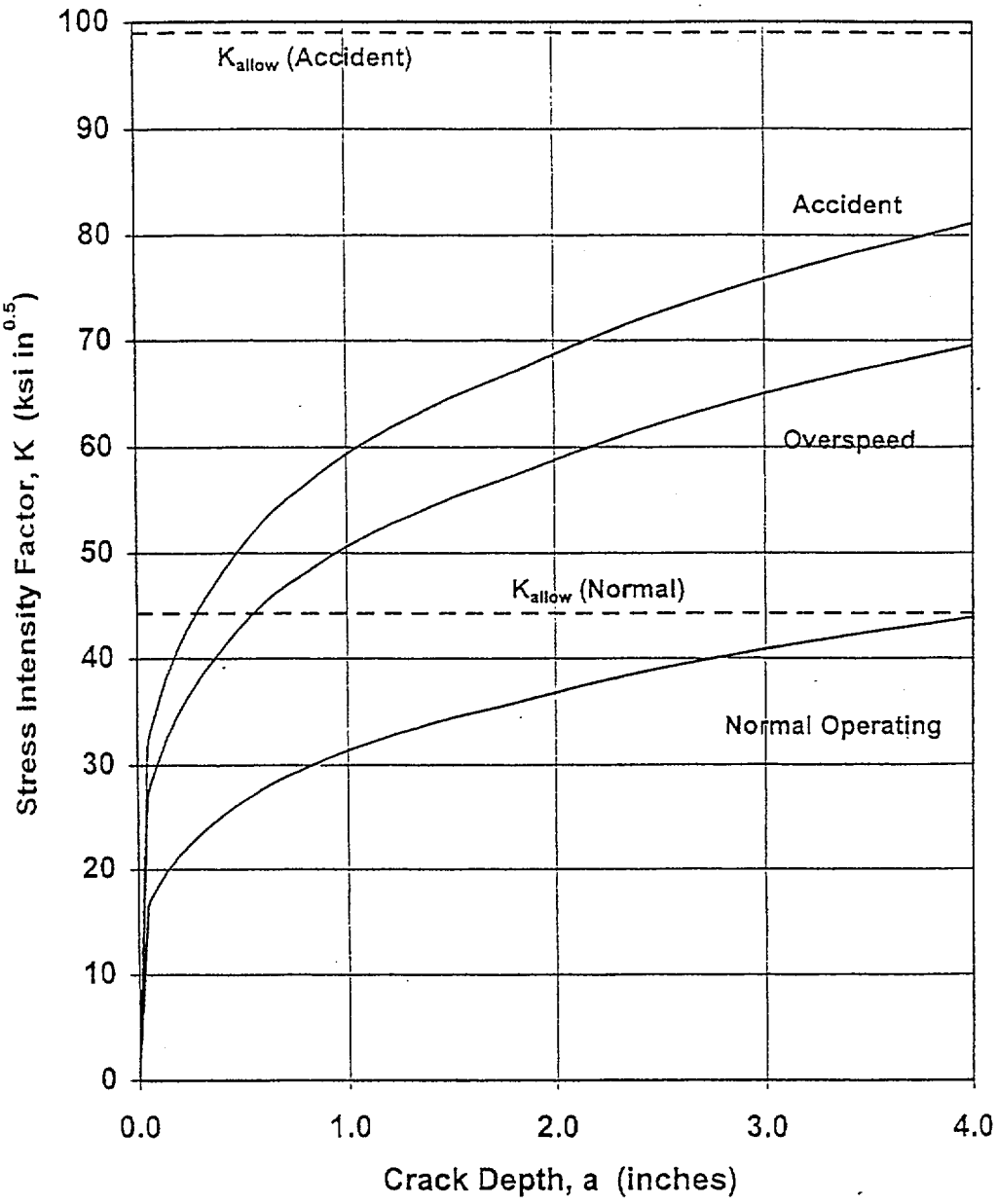

Figure 8-7 — Calculated Stress Intensity Factor versus Flaw Depth Under Various Flywheel Loading Conditions – A-C Design.

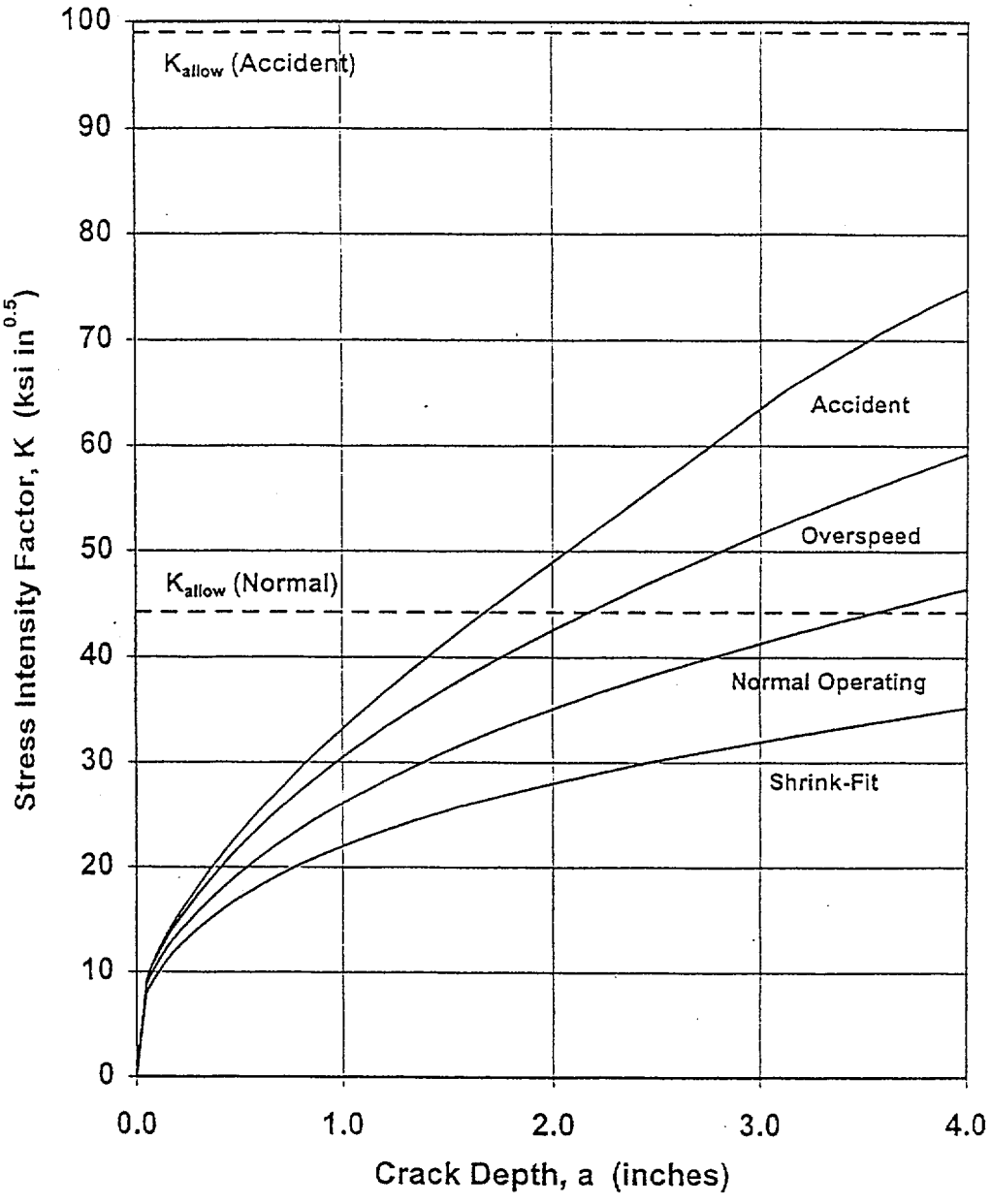

Figure 8-8 — Calculated Stress Intensity Factor versus Flaw Depth Under Various Flywheel Loading Conditions – ABB Design.

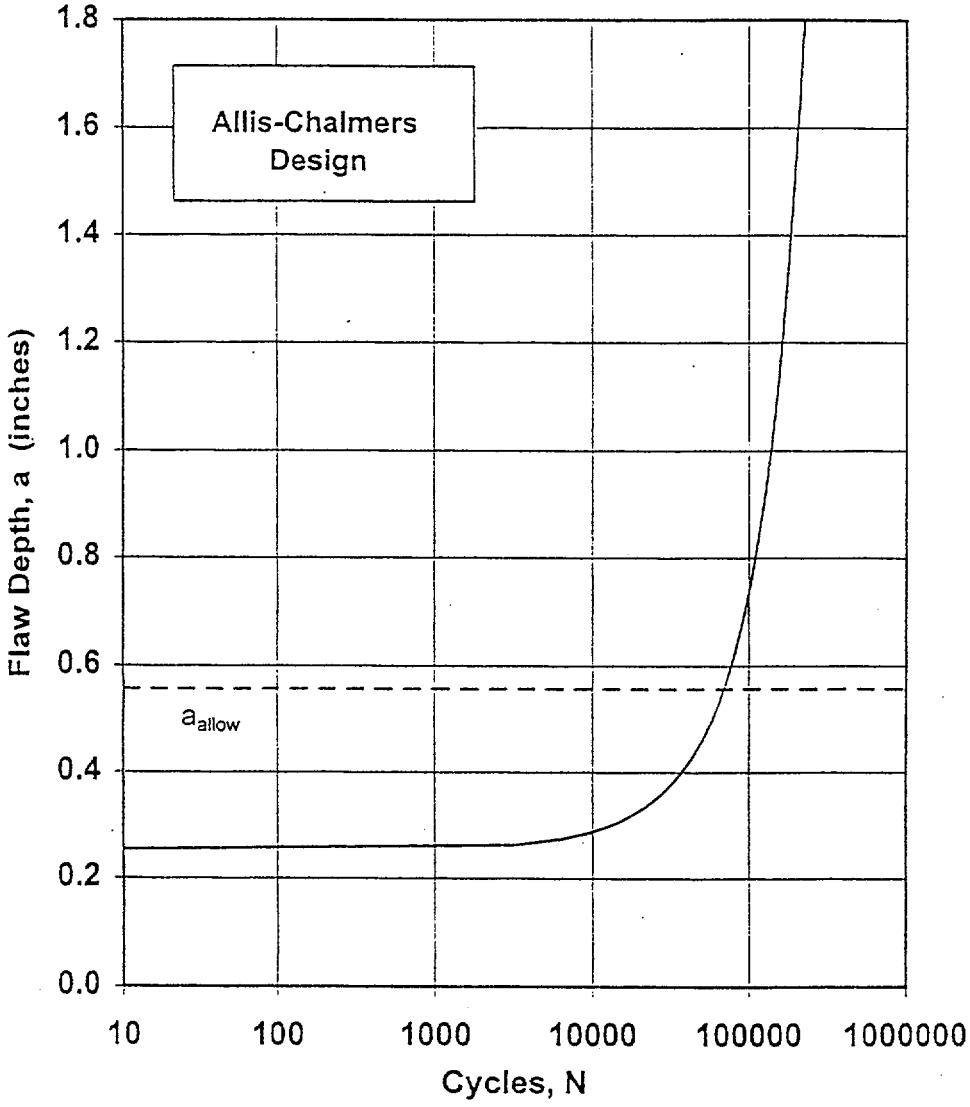

Figure 8-9 — Flaw Growth as a Function of Normal Load Cycles (Startup/Shutdown) – A-C Design.

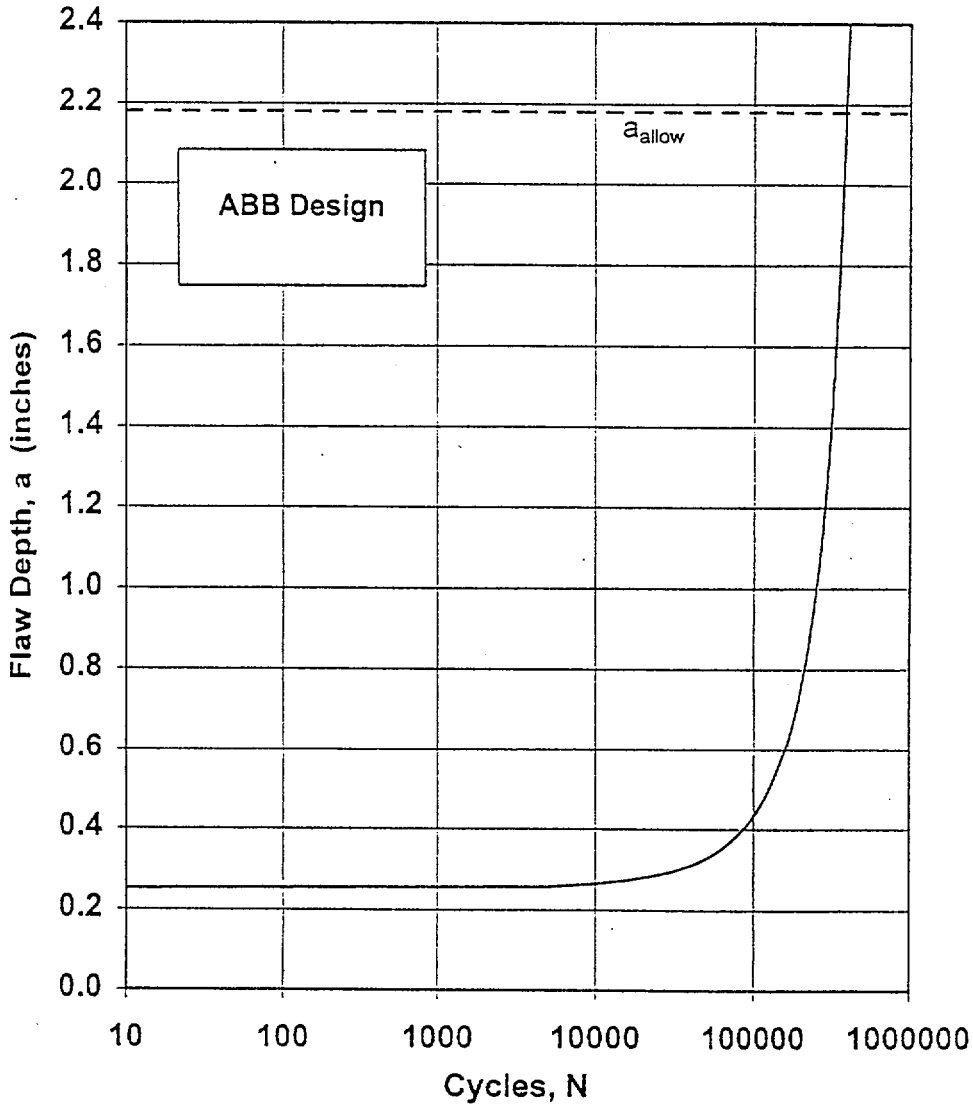

Figure 8-10 — Flaw Growth as a Function of Normal Load Cycles (Startup/Shutdown) – ABB Design.

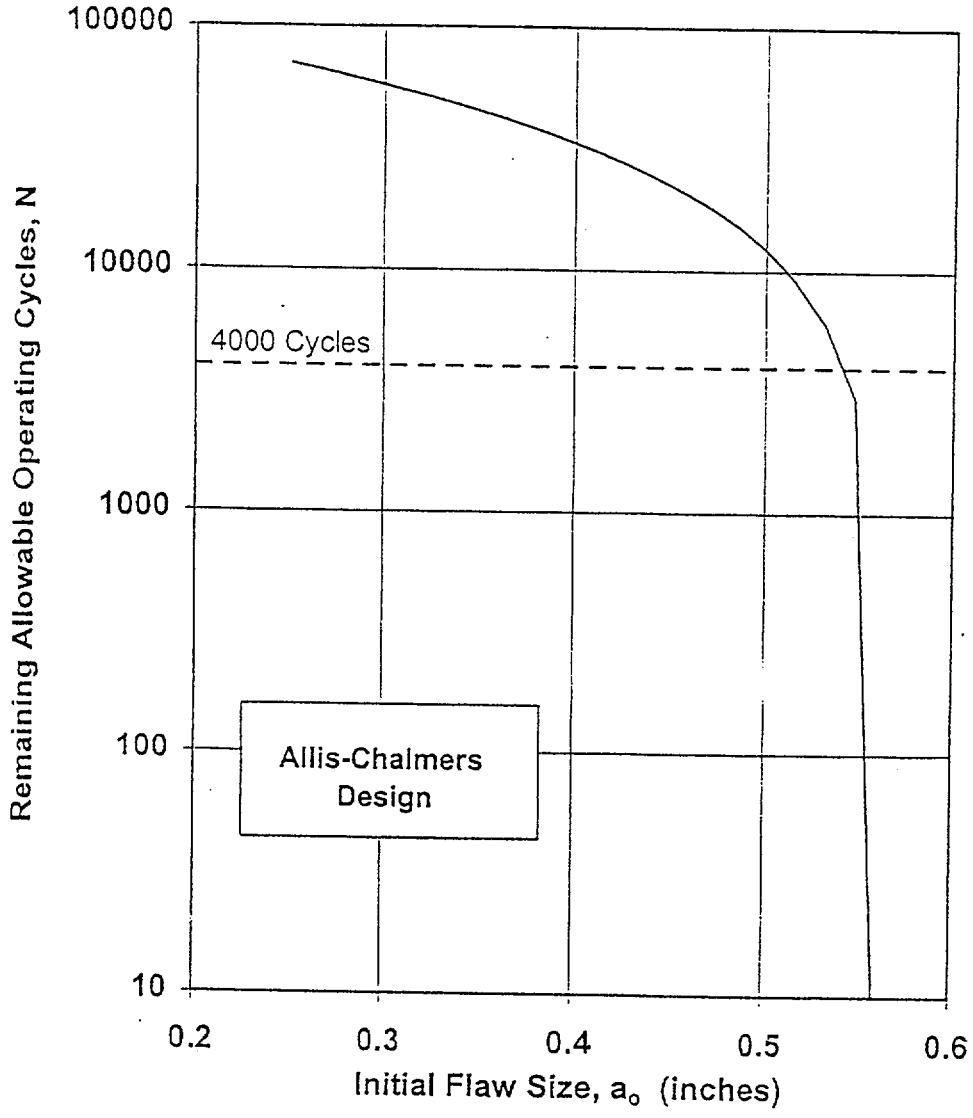

Figure 8-11 — Fatigue Crack Growth Safe-Life versus Initial Flaw Size — A-C Design.

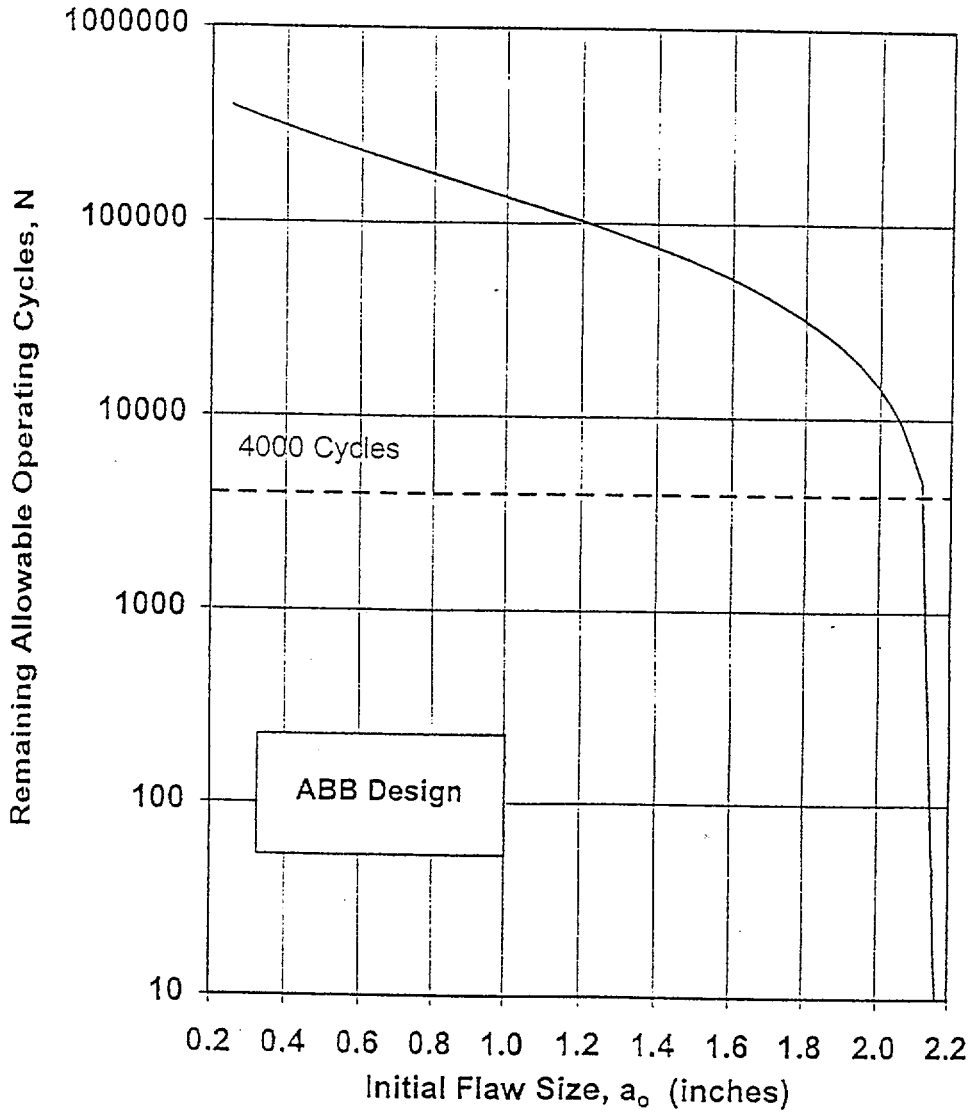

Figure 8-12 — Fatigue Crack Growth Safe-Life versus Initial Flaw Size — ABB Design.

Calculation No.: AES-C-3865-2	Made by: RLC	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: A-1 of A-9

Appendix A

MAXIMUM PRINCIPAL STRESS CONTOUR PLOTS

Calculation No.: AES-C-3865-2	Made by:	Date: 2/16/00	Client: SCE
	Checked by:	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: A-2 of A-9

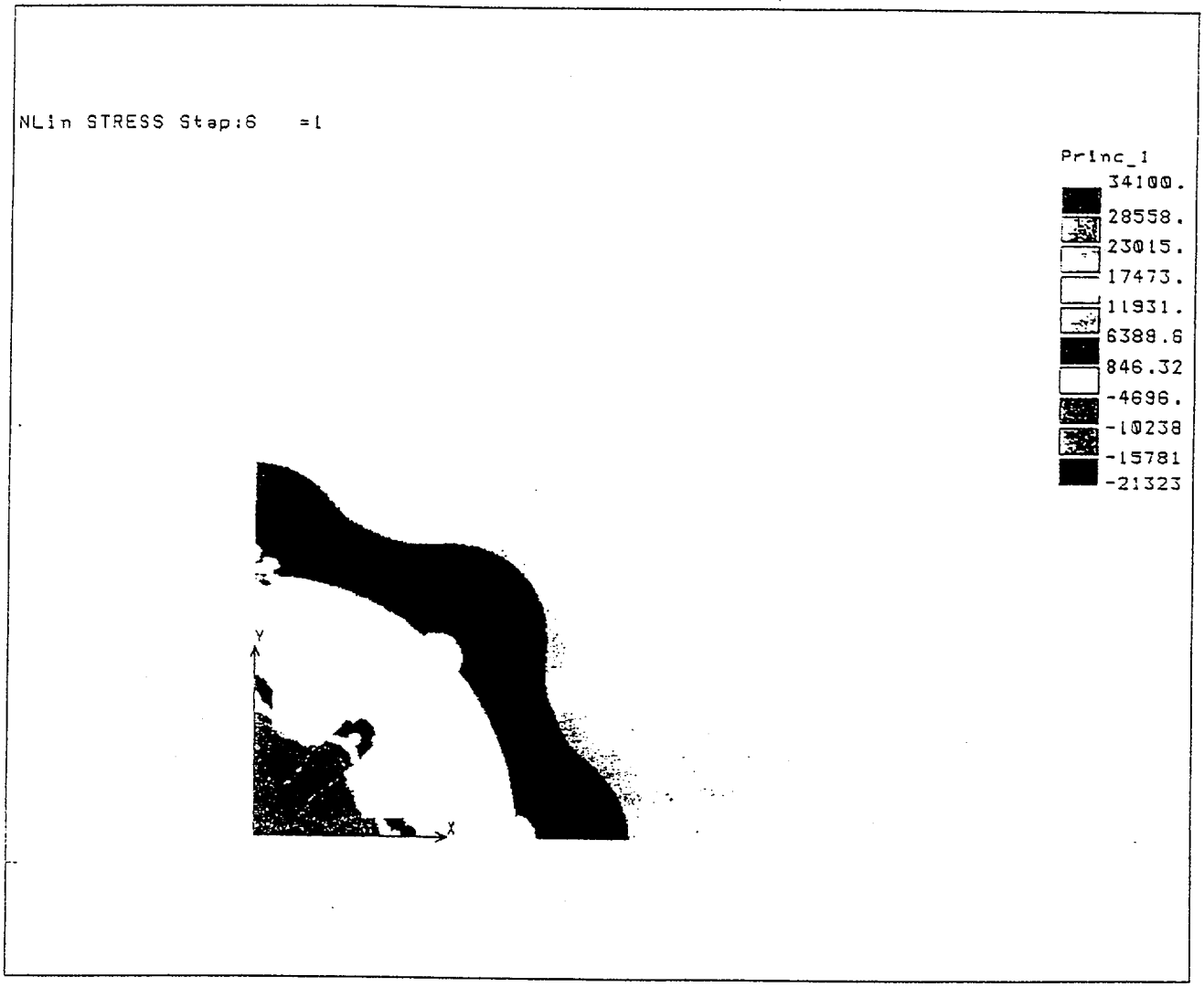

Figure A-1 — Principal Stress contour Plot for Shrink-Fit (δ) – Allis-Chalmers Flywheel.

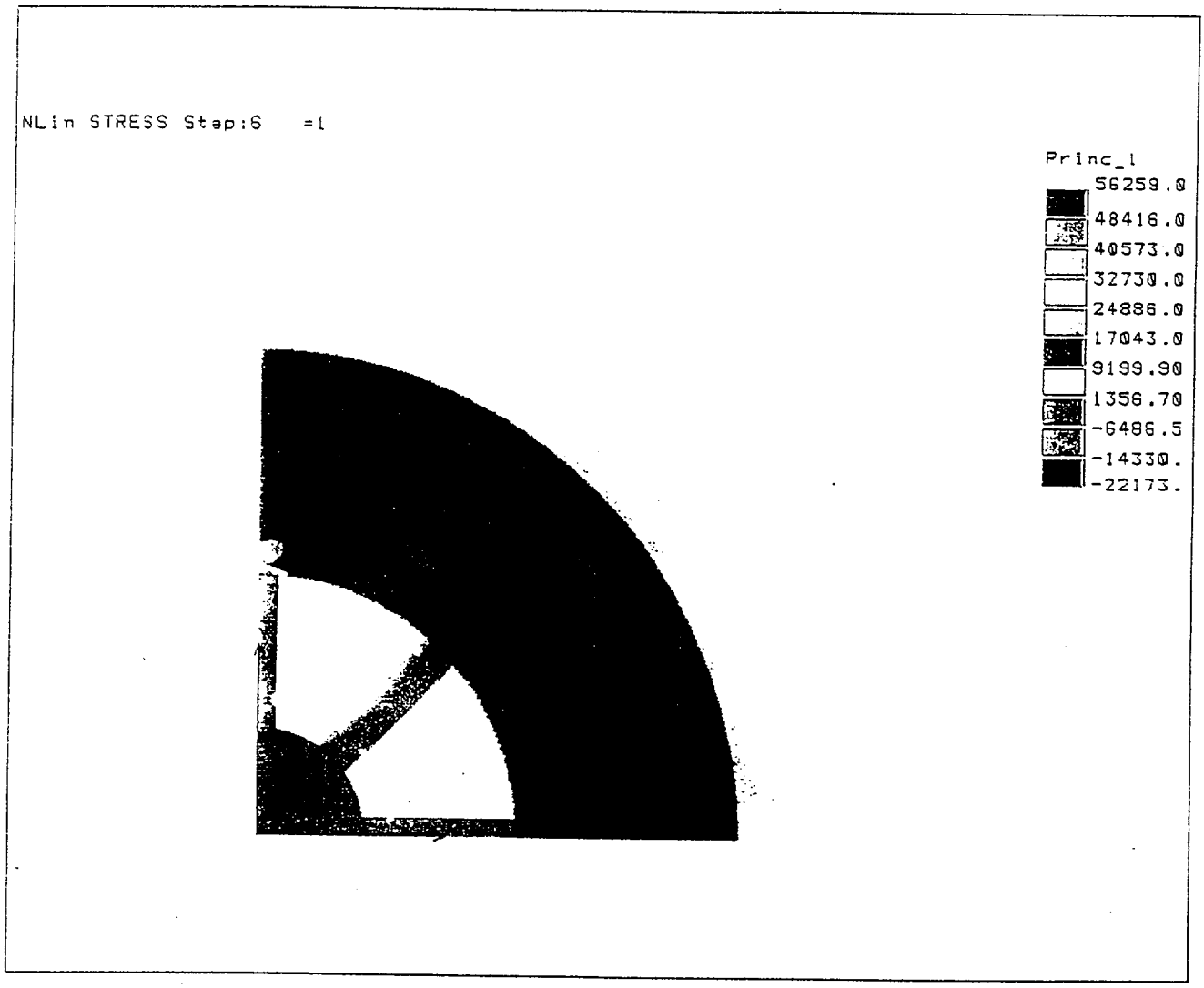

Figure A-2 — Principal Stress contour Plot for Normal Operating Speed (δ + 1180 rpm) – Allis-Chalmers Flywheel.

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: [illegible]	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: A-4 of A-9

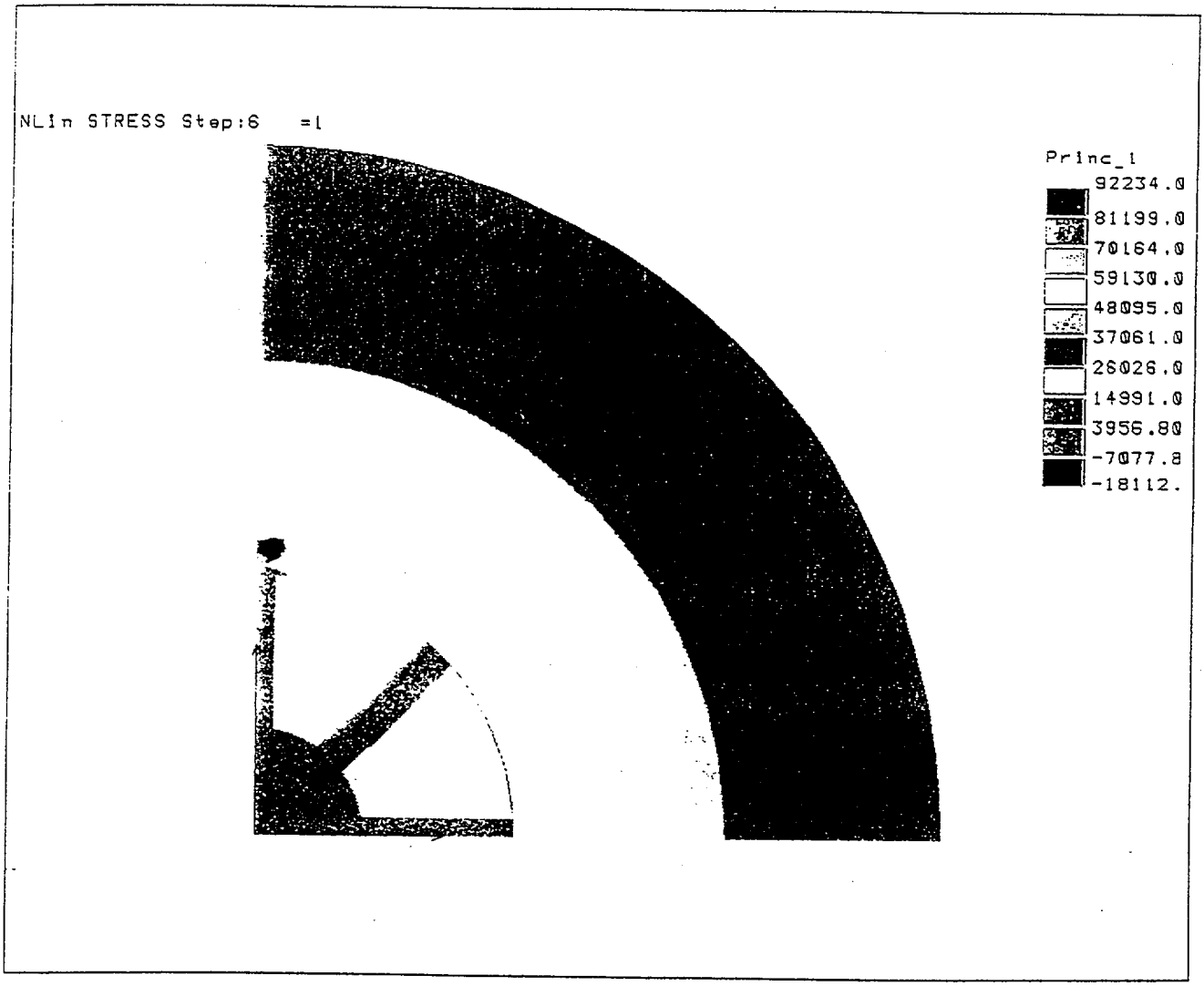

Figure A-3 — Principal Stress contour Plot for Overspeed (δ + 1500 rpm) – Allis-Chalmers Flywheel.

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: [illegible]	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: A-5 of A-9

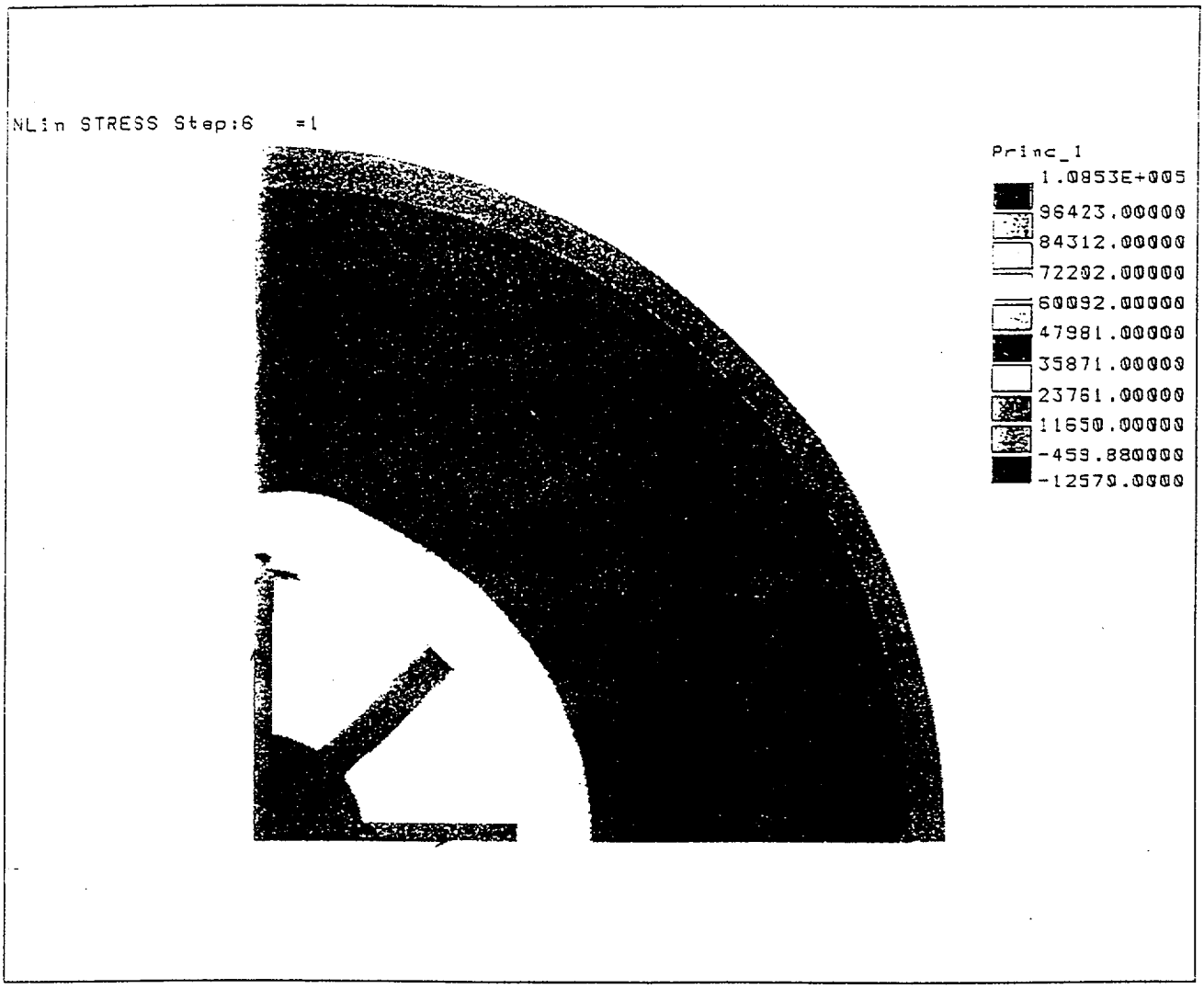

Figure A-4 — Principal Stress contour Plot for Accident Condition (δ + 1624 rpm) – Allis-Chalmers Flywheel.

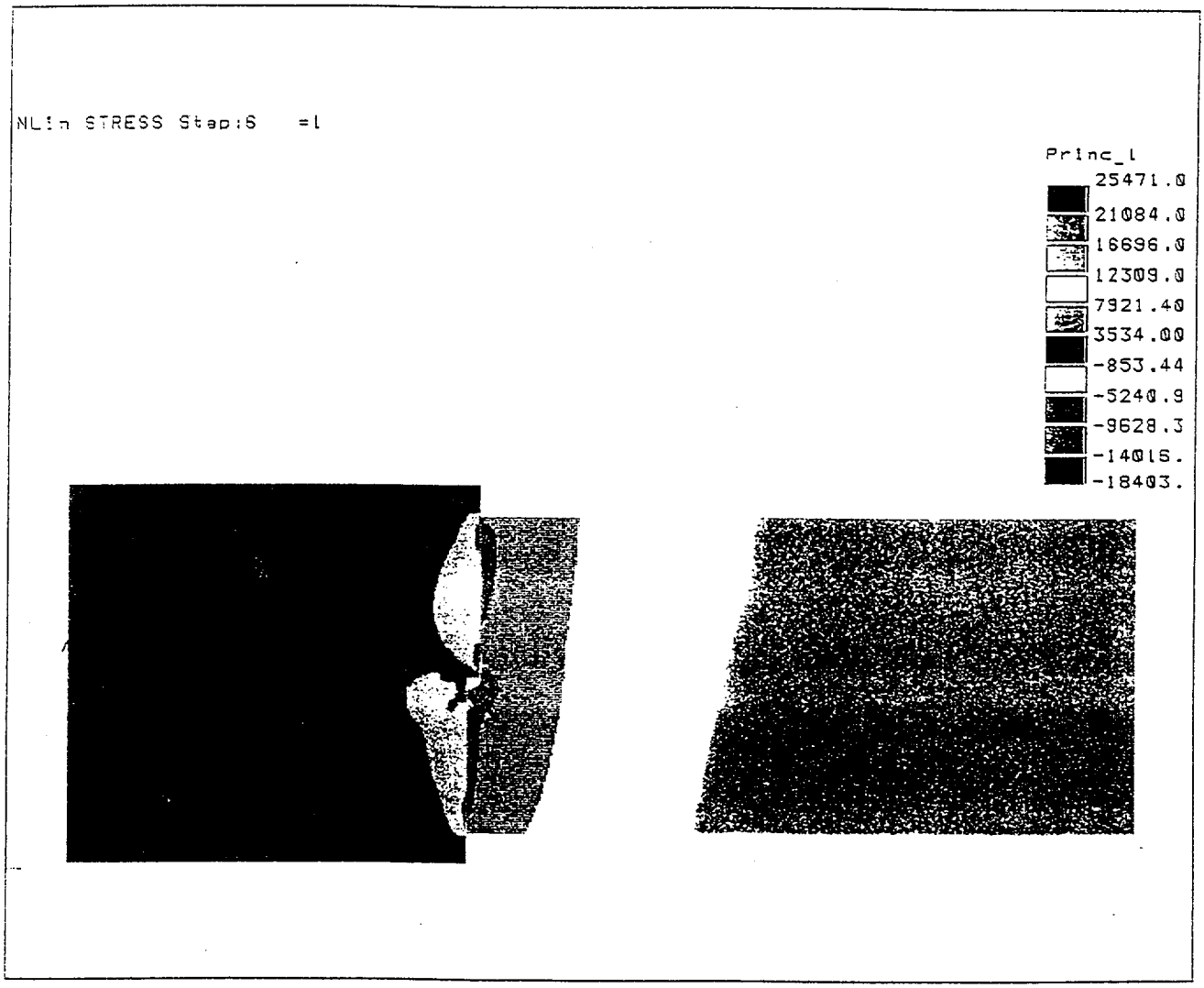

Figure A-5 — Principal Stress contour Plot for Shrink-Fit (δ) – ABB Flywheel.

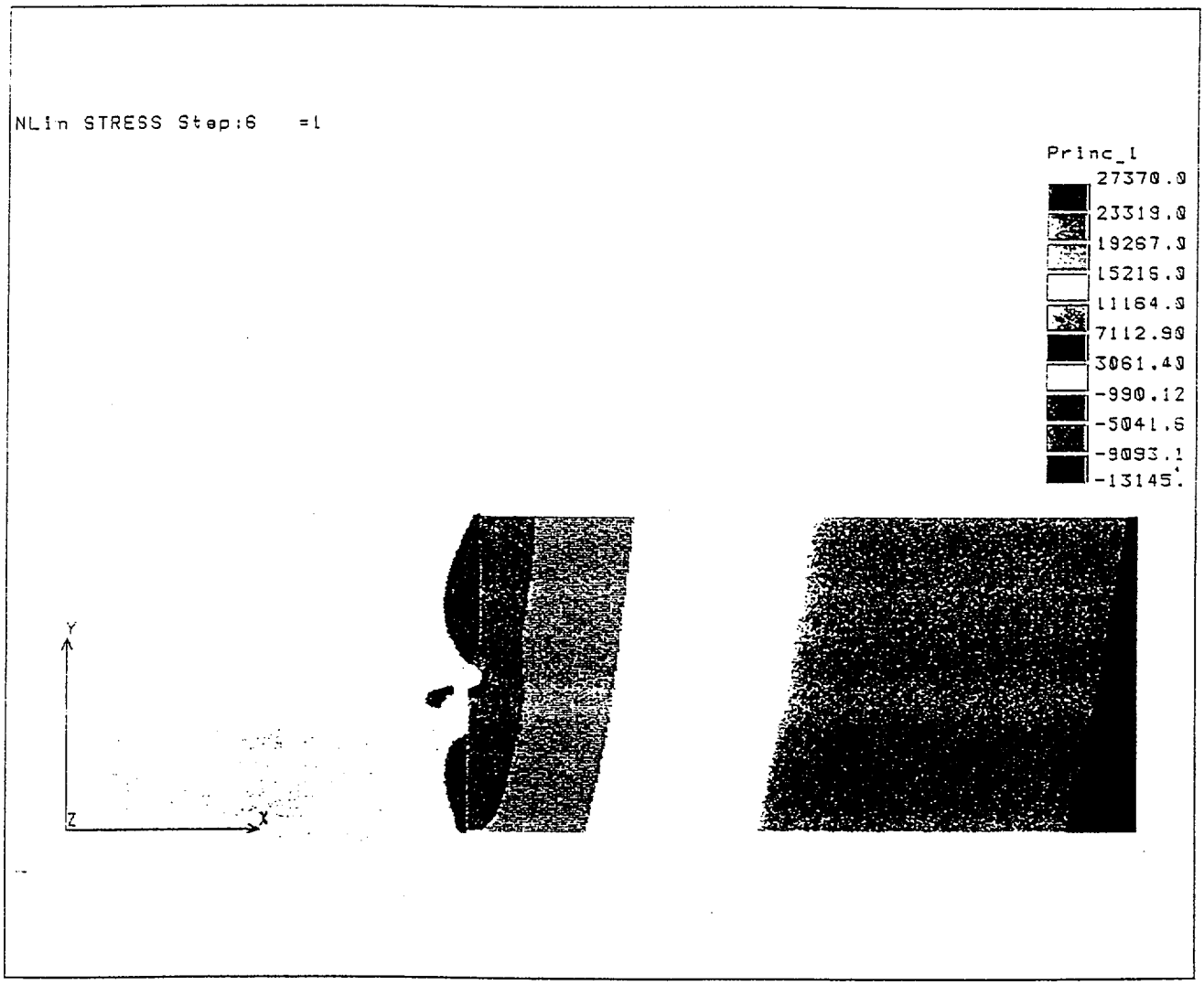

Figure A-6 —Principal Stress contour Plot for Normal Operating Speed (δ + 1194 rpm) – ABB Flywheel.

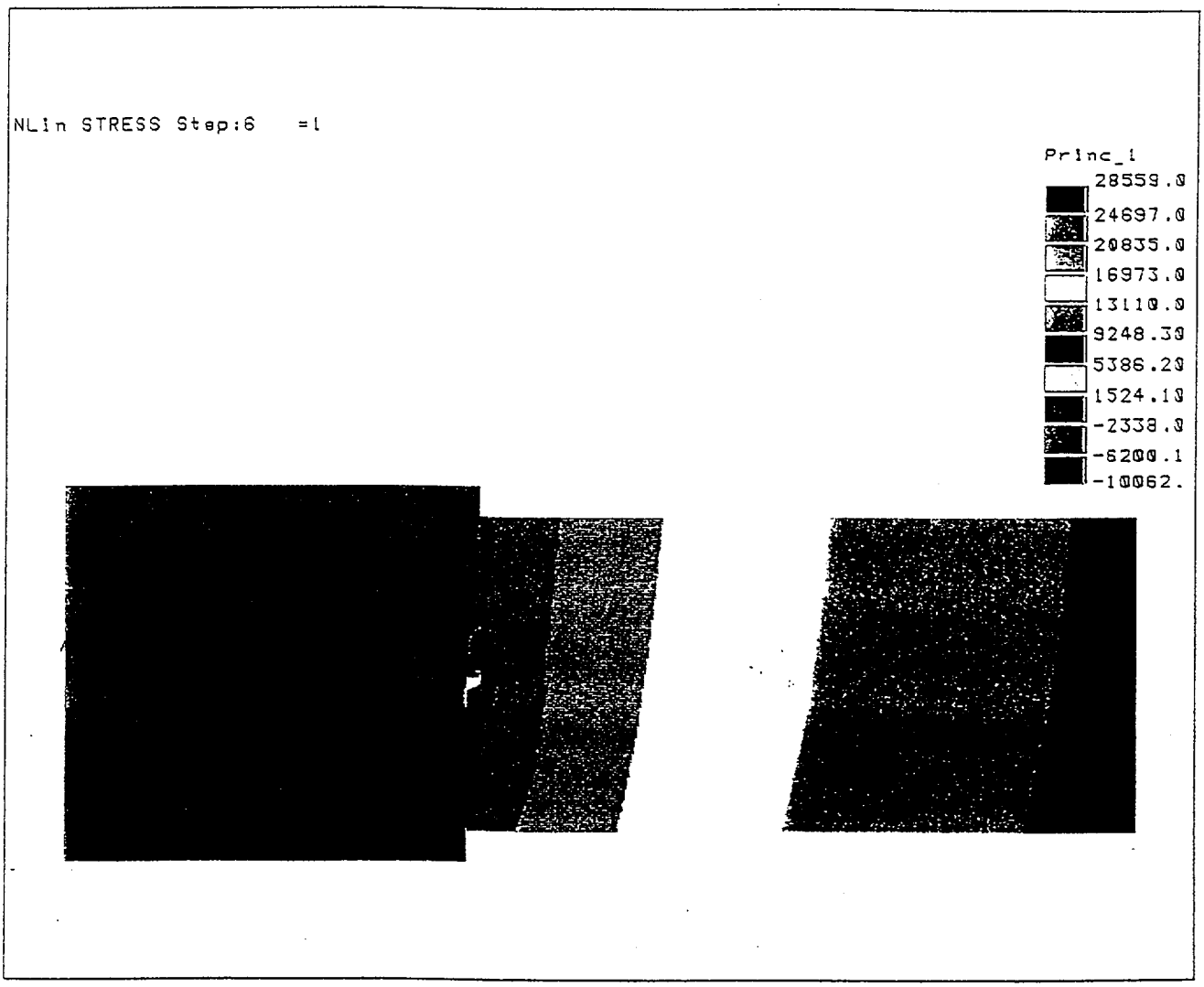

Figure A-7 — Principal Stress contour Plot for Overspeed (δ + 1500 rpm) – ABB Flywheel.

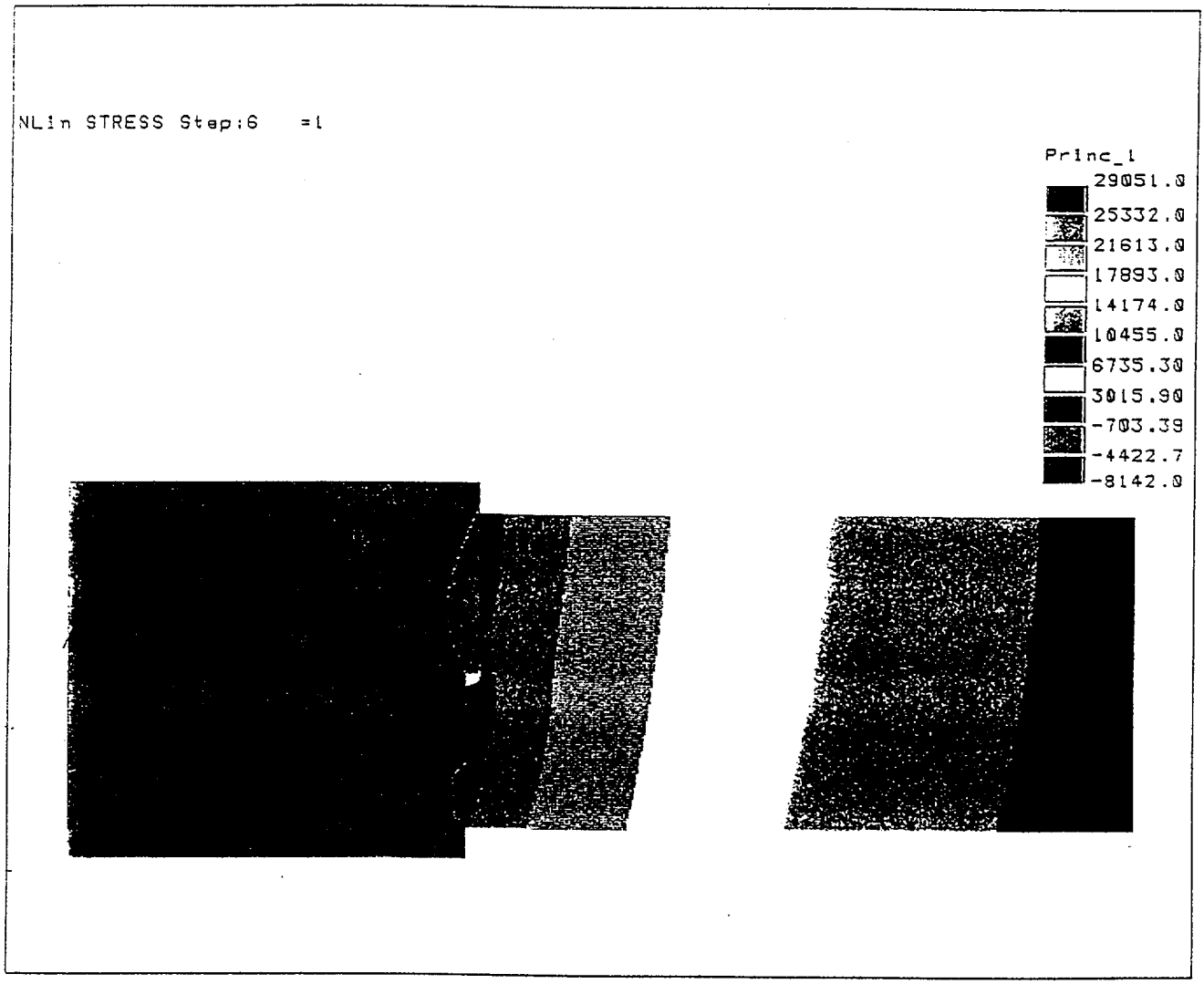

Figure A-8 —Principal Stress contour Plot for Accident Condition (δ + 1624 rpm) – ABB Flywheel.

Appendix B

FATIGUE CRACK GROWTH ANALYSIS OUTPUT FOR ALLIS-CHALMERS DESIGN

Calculation No.: AES-C-3865-2	Made by: RLC	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: MJC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-2 of B-14

```
          SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ALLIS-CHALMERS DESIGN)

          BIGIF:  BOUNDARY INTEGRAL EQUATION          IBM PC VERSION   REV. 0 - SEPTEMBER 23, 1985
                  GENERATED INFLUENCE FUNCTIONS
                  FOR USE IN FRACTURE MECHANICS
                  PROBLEMS

                    ANALYSIS SELECTION (IFAT)

                              1 FATIGUE ANALYSIS

                    CRACK GEOMETRY MODEL INDEX NUMBER (IFI)

                            305 3-DOF SURFACE CRACK


                    VARIABLE THICKNESS SPECIFICATION (NTH)

                              0 CONSTANT BODY THICKNESS


                    CRACK GROWTH RATE RULE (IDADN)

                              6 SAME AS #5 BUT FOR UP TO FIVE R VALUES


                    INTEGRATION INCREMENT SCHEME (INUM)

                              3 REFINED


                    SINGLE OR MULT INTEGRATION SCHEMES (INCL)

                              0 SINGLE


                    INCREMENTS USED TO DOUBLE CRACK SIZE (NDUB)

                                USER SPECIFIED NDUB =    28
          GEOMETRY AND MATERIAL                       SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ALLIS-CHALMERS DESIGN)
     CRACK GROWTH INPUT

     NUMBER OF DEGREES OF FREEDOM =  3


                   INITIAL A-VALUES FOR EACH DEGREE OF FREEDOM

                        CRACK LENGTH AI(1) =   .25000
                        CRACK LENGTH AI(2) =   .50000
                        CRACK LENGTH AI(3) =   .50000



                    GEOMETRY FACTORS

                       G(1)    2.0000          BODY WIDTH
                       G(2)    .00000
                       G(3)    .00000
                       G(4)    .00000
                       G(5)    .00000
                       G(6)    .00000          X-COORD. TO CRACK CENTER (XC)
                       G(7)    .00000          Y-COORD. TO CRACK CENTER (YC)
                       G(8)    .00000          CRACK ORIENTATION ANGLE (PHI, DEGREES)

                   DA/DN OPTION SELECTED:  6

                        KIC =  140.00        FRACTURE TOUGHNESS
```

Calculation No.: AES-C-3865-2	Made by:	Date: 2/16/00	Client: SCE
	Checked by:	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-3 of B-14

```
THERE ARE SETS OF INPUT DATA FOR  5 R-RATIOS

R-RATIO =  -1.0000          2 POINTS INPUT
     DELTA-K      DA/DN
  1.0000      1.99000E-10
  100.00      2.74700E-04

R-RATIO =   .00000          2 POINTS INPUT
     DELTA-K      DA/DN
  1.0000      1.99000E-10
  100.00      2.74700E-04

R-RATIO =   .10000          2 POINTS INPUT
     DELTA-K      DA/DN
  1.0000      2.21700E-10
  100.00      3.06000E-04

R-RATIO =   .50000          2 POINTS INPUT
     DELTA-K      DA/DN
  1.0000      3.57200E-10
  100.00      4.93100E-04

R-RATIO =   .00000          2 POINTS INPUT
     DELTA-K      DA/DN
  1.0000      7.36900E-10
  100.00      1.01700E-03

LOAD TRANSIENTS:   3 TRANSIENT(S) IN PROBLEM                    SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ALLIS-CHALMERS
DESIGN)

                                          NUMBER OF
                                            CYCLES
NUMBER          NAME                      PER BLOCK   SPECIFIER   AGLD      IPSRD  IPLD  KAME  IWO  NPX  NPY

  1     OPERATING STRESS                    1.0000          1      1.0000      0     4     0     0    20    0

        STRESS FUNCTION SIGMA(X)

           X            SIGMA(X)

         .00000          56.260
       7.26500E-02       37.160
         .15980          29.160
         .26200          25.470
         .37630          23.250
         .49890          21.610
         .62880          20.220
         .76830          19.020
         .92330          18.000
        1.1012           17.150
        1.2963           16.480
        1.5118           15.920
        1.7500           15.440
        2.0692           14.950
        2.4347           14.490
        2.8533           14.060
        3.3326           13.640
        3.8814           13.210
        4.5097           12.780
        24.750           5.7180

                                            2       1.0000      1     4     0     0    20    0

        STRESS FUNCTION SIGMA(X)

           X            SIGMA(X)

         .00000          1.3360
       7.26500E-02       .66300
         .15980          1.0800
         .26200          1.0080
         .37630          .77000
         .49890          .59900
         .62880          .56800
         .76830          .54500
         .92330          .77200
        1.1012           .90700
        1.2963           1.0160
        1.5118           1.0920
        1.7500           1.1380
        2.0692           1.1620
        2.4347           1.1580
        2.8533           1.1330
        3.3326           1.0910
        3.8814           1.0380
        4.5097           .97600
        24.750           .32600
```

Calculation No.: AES-C-3865-2	Made by: RLC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-4 of B-14

2 DESIGN OVERSPEED .00000 1 1.0000 0 4 0 0 20 0

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	92.230
7.26500E-02	61.280
.15980	47.930
.26200	41.190
.37630	37.400
.49890	34.650
.62880	32.340
.76830	30.340
.92330	28.600
1.1012	27.160
1.2963	26.010
1.5118	25.060
1.7500	24.250
2.0692	23.440
2.4347	22.700
2.8533	22.020
3.3326	21.360
3.8814	20.710
4.5097	20.050
24.750	9.0390

2 1.0000 1 4 0 0 20 0

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	1.3360
7.26500E-02	.66300
.15980	1.0800
.26200	1.0080
.37630	.77000
.49890	.59900
.62880	.56800
.76830	.64500
.92330	.77200
1.1012	.90700
1.2963	1.0160
1.5118	1.0920
1.7500	1.1380
2.0692	1.1620
2.4347	1.1580
2.8533	1.1330
3.3326	1.0910
3.8814	1.0380
4.5097	.97600
24.750	.32600

3 ACCIDENT STRESS .00000 1 1.0000 0 4 0 0 20 0

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	108.50
7.26500E-02	72.130
.15980	56.360
.26200	48.310
.37630	43.790
.49890	40.530
.62880	37.810
.76830	35.450
.92330	33.390
1.1012	31.670
1.2963	30.300
1.5118	29.170
1.7500	28.220
2.0692	27.260
2.4347	26.410
2.8533	25.610
3.3326	24.850
3.8814	24.090
4.5097	23.330
24.750	10.540

2 1.0000 1 4 0 0 20 0

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-5 of B-14

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	1.3360
7.26500E-02	.66300
.15980	1.0800
.26200	1.0080
.37630	.77000
.49890	.59900
.62880	.56800
.76830	.64500
.92330	.77200
1.1012	.90700
1.2963	1.0160
1.5118	1.0920
1.7500	1.1380
2.0692	1.1620
2.4347	1.1580
2.8533	1.1330
3.3326	1.0910
3.8814	1.0380
4.5097	.97600
24.750	.32600

DETAILED OUTPUT FOR ALL LOAD TRANSIENT(S) AND CRACK DEGREE(S) OF FREEDOM

INTEGRATION BREAKUP ********** * REFINED * **********

SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ALLIS-CHALMERS DESIGN)

TRANSIENT NUMBER	DEGREE OF FREEDOM	CYCLES /BLOCK	KMAX	KMIN	KMEAN	DEL-K	R-RAT	TRANSIENT DA/DN (PER CYCLE)	DA/DN (PER BLOCK)	DOF CRACK SIZE	N
1	1	1.000	25.22	.74	12.98	24.47	.030	3.7600E-06	3.760E-06	.250	.0000
1	2	1.000	25.44	.63	13.04	24.82	.025	3.9046E-06	3.905E-06	.500	
1	3	1.000	25.44	.63	13.04	24.82	.025	3.9046E-06	3.905E-06	.500	
2	1	.0000	41.19	.74	20.97	40.44	.018	1.7364E-05			
2	2	.0000	41.66	.63	21.15	41.04	.015	1.8103E-05			
2	3	.0000	41.66	.63	21.15	41.04	.015	1.8103E-05			
3	1	.0000	48.43	.74	24.59	47.68	.015	2.8707E-05			
3	2	.0000	49.02	.63	24.82	48.39	.013	2.9952E-05			
3	3	.0000	49.02	.63	24.82	48.39	.013	2.9952E-05			
1	1	1.000	25.33	.76	13.04	24.57	.030	3.8079E-06	3.808E-06	.262	3152.
1	2	1.000	25.75	.65	13.20	25.11	.025	4.0485E-06	4.048E-06	.513	
1	3	1.000	25.75	.65	13.20	25.11	.025	4.0485E-06	4.048E-06	.513	
2	1	.0000	41.35	.76	21.06	40.59	.018	1.7567E-05			
2	2	.0000	42.16	.65	21.40	41.52	.015	1.8765E-05			
2	3	.0000	42.16	.65	21.40	41.52	.015	1.8765E-05			
3	1	.0000	48.62	.76	24.69	47.86	.016	2.9034E-05			
3	2	.0000	49.60	.65	25.12	48.95	.013	3.1045E-05			
3	3	.0000	49.60	.65	25.12	48.95	.013	3.1045E-05			
1	1	1.000	25.43	.78	13.10	24.65	.030	3.8508E-06	3.851E-06	.274	6273.
1	2	1.000	26.01	.66	13.35	25.37	.025	4.1812E-06	4.181E-06	.525	
1	3	1.000	26.01	.66	13.35	25.37	.025	4.1812E-06	4.181E-06	.525	
2	1	.0000	41.50	.78	21.14	40.72	.019	1.7747E-05			
2	2	.0000	42.61	.66	21.64	41.95	.016	1.9375E-05			
2	3	.0000	42.61	.66	21.64	41.95	.016	1.9375E-05			
3	1	.0000	48.78	.78	24.78	48.01	.016	2.9323E-05			
3	2	.0000	50.12	.66	25.39	49.46	.013	3.2052E-05			
3	3	.0000	50.12	.66	25.39	49.46	.013	3.2052E-05			
1	1	1.000	25.56	.79	13.17	24.77	.031	3.9076E-06	3.908E-06	.286	9372.
1	2	1.000	26.31	.68	13.50	25.64	.026	4.3196E-06	4.320E-06	.539	
1	3	1.000	26.31	.68	13.50	25.64	.026	4.3196E-06	4.320E-06	.539	
2	1	.0000	41.69	.79	21.24	40.90	.019	1.7988E-05			
2	2	.0000	43.06	.68	21.87	42.39	.016	2.0008E-05			
2	3	.0000	43.06	.68	21.87	42.39	.016	2.0008E-05			
3	1	.0000	49.00	.79	24.89	48.21	.016	2.9712E-05			
3	2	.0000	50.65	.68	25.67	49.98	.013	3.3096E-05			
3	3	.0000	50.65	.68	25.67	49.98	.013	3.3096E-05			
1	1	1.000	25.68	.80	13.24	24.88	.031	3.9627E-06	3.963E-06	.298	1.2450E+04
1	2	1.000	26.58	.69	13.63	25.89	.026	4.4511E-06	4.451E-06	.552	
1	3	1.000	26.58	.69	13.63	25.89	.026	4.4511E-06	4.451E-06	.552	
2	1	.0000	41.86	.80	21.33	41.07	.019	1.8221E-05			
2	2	.0000	43.49	.69	22.09	42.79	.016	2.0609E-05			
2	3	.0000	43.49	.69	22.09	42.79	.016	2.0609E-05			
3	1	.0000	49.20	.80	25.00	48.41	.016	3.0088E-05			
3	2	.0000	51.15	.69	25.92	50.46	.013	3.4086E-05			
3	3	.0000	51.15	.69	25.92	50.46	.013	3.4086E-05			

Calculation No.: AES-C-3865-2	Made by: RLL	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-6 of B-14

1	1	1.000	25.79	.81	13.30	24.98	.031	4.0117E-06	4.014E-06	.310	1.551SE+04
1	2	1.000	26.82	.70	13.76	26.12	.026	4.5751E-06	4.575E-06	.566	
1	3	1.000	26.82	.70	13.76	26.12	.026	4.5751E-06	4.575E-06	.566	
2	1	.0000	42.03	.81	21.42	41.22	.019	1.8434E-05			
2	2	.0000	43.87	.70	22.29	43.17	.016	2.1174E-05			
2	3	.0000	43.88	.70	22.29	43.17	.016	2.1174E-05			
3	1	.0000	49.39	.81	25.10	48.58	.016	3.0431E-05			
3	2	.0000	51.60	.70	26.15	50.90	.014	3.5017E-05			
3	3	.0000	51.60	.70	26.15	50.90	.014	3.5017E-05			
1	1	1.000	25.90	.81	13.36	25.09	.031	4.0656E-06	4.066E-06	.323	1.8576E+04
1	2	1.000	27.05	.72	13.88	26.33	.027	4.6932E-06	4.693E-06	.580	
1	3	1.000	27.05	.72	13.88	26.33	.027	4.6932E-06	4.693E-06	.580	
2	1	.0000	42.19	.81	21.50	41.38	.019	1.8652E-05			
2	2	.0000	44.24	.72	22.48	43.52	.016	2.1711E-05			
2	3	.0000	44.24	.72	22.48	43.52	.016	2.1711E-05			
3	1	.0000	49.58	.81	25.19	48.76	.016	3.0781E-05			
3	2	.0000	52.03	.72	26.37	51.31	.014	3.5903E-05			
3	3	.0000	52.03	.72	26.37	51.31	.014	3.5903E-05			
1	1	1.000	26.00	.82	13.41	25.18	.032	4.1119E-06	4.112E-06	.335	2.1638E+04
1	2	1.000	27.26	.73	13.99	26.53	.027	4.8035E-06	4.804E-06	.595	
1	3	1.000	27.26	.73	13.99	26.53	.027	4.8035E-06	4.804E-06	.595	
2	1	.0000	42.34	.82	21.58	41.52	.019	1.8842E-05			
2	2	.0000	44.57	.73	22.65	43.85	.016	2.2212E-05			
2	3	.0000	44.57	.73	22.65	43.85	.016	2.2212E-05			
3	1	.0000	49.74	.82	25.28	48.92	.017	3.1086E-05			
3	2	.0000	52.42	.73	26.58	51.69	.014	3.6727E-05			
3	3	.0000	52.42	.73	26.58	51.69	.014	3.6727E-05			
1	1	1.000	26.11	.83	13.47	25.28	.032	4.1658E-06	4.166E-06	.348	2.4704E+04
1	2	1.000	27.47	.74	14.11	26.73	.027	4.9187E-06	4.919E-06	.610	
1	3	1.000	27.47	.74	14.11	26.73	.027	4.9186E-06	4.919E-06	.610	
2	1	.0000	42.50	.83	21.66	41.67	.019	1.9066E-05			
2	2	.0000	44.92	.74	22.83	44.18	.016	2.2733E-05			
2	3	.0000	44.92	.74	22.83	44.18	.016	2.2733E-05			
3	1	.0000	49.93	.83	25.38	49.10	.017	3.1445E-05			
3	2	.0000	52.82	.74	26.78	52.08	.014	3.7583E-05			
3	3	.0000	52.82	.74	26.78	52.08	.014	3.7583E-05			
1	1	1.000	26.23	.83	13.53	25.40	.032	4.2256E-06	4.226E-06	.361	2.7773E+04
1	2	1.000	27.69	.75	14.22	26.94	.027	5.0378E-06	5.038E-06	.625	
1	3	1.000	27.69	.75	14.22	26.94	.027	5.0378E-06	5.038E-06	.625	
2	1	.0000	42.68	.83	21.75	41.85	.019	1.9315E-05			
2	2	.0000	45.26	.75	23.00	44.51	.017	2.3270E-05			
2	3	.0000	45.26	.75	23.00	44.51	.017	2.3270E-05			
3	1	.0000	50.13	.83	25.48	49.30	.017	3.1844E-05			
3	2	.0000	53.22	.75	26.99	52.48	.014	3.8465E-05			
3	3	.0000	53.22	.75	26.99	52.48	.014	3.8465E-05			
1	1	1.000	26.36	.83	13.60	25.53	.032	4.2895E-06	4.290E-06	.374	3.0841E+04
1	2	1.000	27.93	.76	14.34	27.17	.027	5.1695E-06	5.169E-06	.640	
1	3	1.000	27.93	.76	14.34	27.17	.027	5.1695E-06	5.169E-06	.640	
2	1	.0000	42.87	.83	21.85	42.04	.019	1.9582E-05			
2	2	.0000	45.64	.76	23.20	44.88	.017	2.3864E-05			
2	3	.0000	45.64	.76	23.20	44.88	.017	2.3864E-05			
3	1	.0000	50.35	.83	25.59	49.52	.017	3.2272E-05			
3	2	.0000	53.66	.76	27.21	52.90	.014	3.9441E-05			
3	3	.0000	53.66	.76	27.21	52.90	.014	3.9441E-05			
1	1	1.000	26.51	.84	13.67	25.67	.032	4.3635E-06	4.363E-06	.387	3.3901E+04
1	2	1.000	28.20	.77	14.49	27.42	.027	5.3212E-06	5.321E-06	.656	
1	3	1.000	28.20	.77	14.49	27.42	.027	5.3212E-06	5.321E-06	.656	
2	1	.0000	43.09	.84	21.97	42.26	.019	1.9894E-05			
2	2	.0000	46.07	.77	23.42	45.29	.017	2.4550E-05			
2	3	.0000	46.07	.77	23.42	45.29	.017	2.4550E-05			
3	1	.0000	50.61	.84	25.72	49.77	.017	3.2775E-05			
3	2	.0000	54.17	.77	27.47	53.39	.014	4.0570E-05			
3	3	.0000	54.17	.77	27.47	53.39	.014	4.0570E-05			
1	1	1.000	26.66	.84	13.75	25.82	.032	4.4422E-06	4.442E-06	.400	3.6950E+04
1	2	1.000	28.46	.79	14.63	27.67	.028	5.4733E-06	5.473E-06	.673	
1	3	1.000	28.46	.79	14.63	27.67	.028	5.4733E-06	5.473E-06	.673	
2	1	.0000	43.33	.84	22.09	42.49	.019	2.0229E-05			
2	2	.0000	46.49	.79	23.64	45.70	.017	2.5239E-05			
2	3	.0000	46.49	.79	23.64	45.70	.017	2.5239E-05			
3	1	.0000	50.88	.84	25.86	50.03	.017	3.3316E-05			
3	2	.0000	54.66	.79	27.72	53.87	.014	4.1701E-05			
3	3	.0000	54.66	.79	27.72	53.87	.014	4.1701E-05			
1	1	1.000	26.81	.85	13.83	25.97	.032	4.5194E-06	4.519E-06	.414	3.9990E+04
1	2	1.000	28.72	.80	14.76	27.91	.028	5.6219E-06	5.622E-06	.690	
1	3	1.000	28.72	.80	14.76	27.91	.028	5.6218E-06	5.622E-06	.690	
2	1	.0000	43.56	.85	22.20	42.71	.019	2.0556E-05			
2	2	.0000	46.89	.80	23.85	46.09	.017	2.5909E-05			
2	3	.0000	46.89	.80	23.85	46.09	.017	2.5909E-05			
3	1	.0000	51.14	.85	25.99	50.29	.017	3.3843E-05			
3	2	.0000	55.13	.80	27.97	54.33	.015	4.2803E-05			
3	3	.0000	55.13	.80	27.97	54.33	.015	4.2803E-05			

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-7 of B-14

1	1	1.000	26.96	.85	13.90	25.11	.032	4.5952E-06	4.595E-06	.428	4.1027E+04
1	2	1.000	28.96	.82	14.89	28.14	.028	5.7667E-06	5.767E-06	.707	
1	3	1.000	28.96	.82	14.89	28.14	.028	5.7667E-06	5.767E-06	.707	
2	1	.0000	43.78	.85	22.31	42.92	.019	2.0877E-05			
2	2	.0000	47.28	.82	24.05	46.46	.017	2.6562E-05			
2	3	.0000	47.28	.82	24.05	46.46	.017	2.6562E-05			
3	1	.0000	51.39	.85	26.12	50.54	.017	3.4360E-05			
3	2	.0000	55.58	.82	28.20	54.76	.015	4.3874E-05			
3	3	.0000	55.58	.82	28.20	54.76	.015	4.3874E-05			
1	1	1.000	27.10	.86	13.98	26.24	.032	4.6683E-06	4.668E-06	.442	4.6063E+04
1	2	1.000	29.19	.83	15.01	28.36	.028	5.9074E-06	5.907E-06	.725	
1	3	1.000	29.19	.83	15.01	28.36	.028	5.9074E-06	5.907E-06	.725	
2	1	.0000	43.98	.86	22.42	43.13	.019	2.1183E-05			
2	2	.0000	47.65	.83	24.24	46.82	.017	2.7194E-05			
2	3	.0000	47.65	.83	24.24	46.82	.017	2.7194E-05			
3	1	.0000	51.63	.86	26.24	50.77	.017	3.4852E-05			
3	2	.0000	56.01	.83	28.42	55.18	.015	4.4911E-05			
3	3	.0000	56.01	.83	28.42	55.18	.015	4.4911E-05			
1	1	1.000	27.24	.86	14.05	26.38	.032	4.7446E-06	4.745E-06	.456	4.9102E+04
1	2	1.000	29.42	.85	15.13	28.58	.029	6.0485E-06	6.049E-06	.743	
1	3	1.000	29.42	.85	15.13	28.58	.029	6.0486E-06	6.049E-06	.743	
2	1	.0000	44.20	.86	22.53	43.34	.019	2.1505E-05			
2	2	.0000	48.01	.85	24.43	47.17	.018	2.7829E-05			
2	3	.0000	48.01	.85	24.43	47.17	.018	2.7829E-05			
3	1	.0000	51.88	.86	26.37	51.02	.017	3.5371E-05			
3	2	.0000	56.44	.85	28.64	55.59	.015	4.5953E-05			
3	3	.0000	56.44	.85	28.64	55.59	.015	4.5953E-05			
1	1	1.000	27.39	.86	14.12	26.52	.031	4.8245E-06	4.825E-06	.471	5.2145E+04
1	2	1.000	29.65	.86	15.26	28.80	.029	6.1921E-06	6.192E-06	.762	
1	3	1.000	29.65	.86	15.26	28.80	.029	6.1921E-06	6.192E-06	.762	
2	1	.0000	44.43	.86	22.64	43.56	.019	2.1844E-05			
2	2	.0000	48.38	.86	24.62	47.52	.018	2.8474E-05			
2	3	.0000	48.38	.86	24.62	47.52	.018	2.8474E-05			
3	1	.0000	52.14	.86	26.50	51.28	.017	3.5917E-05			
3	2	.0000	56.86	.86	28.86	56.00	.015	4.7011E-05			
3	3	.0000	56.86	.86	28.86	56.00	.015	4.7012E-05			
1	1	1.000	27.56	.86	14.21	26.69	.031	4.9179E-06	4.918E-06	.486	5.5186E+04
1	2	1.000	29.92	.87	15.39	29.05	.029	6.3617E-06	6.362E-06	.781	
1	3	1.000	29.92	.87	15.39	29.05	.029	6.3616E-06	6.362E-06	.781	
2	1	.0000	44.68	.86	22.77	43.82	.019	2.2239E-05			
2	2	.0000	48.80	.87	24.83	47.93	.018	2.9233E-05			
2	3	.0000	48.80	.87	24.83	47.93	.018	2.9233E-05			
3	1	.0000	52.43	.86	26.65	51.57	.016	3.6554E-05			
3	2	.0000	57.35	.87	29.11	56.48	.015	4.8254E-05			
3	3	.0000	57.35	.87	29.11	56.48	.015	4.8254E-05			
1	1	1.000	27.72	.86	14.29	26.86	.031	5.0123E-06	5.012E-06	.501	5.8222E+04
1	2	1.000	30.18	.88	15.53	29.30	.029	6.5300E-06	6.530E-06	.800	
1	3	1.000	30.18	.88	15.53	29.30	.029	6.5300E-06	6.530E-06	.800	
2	1	.0000	44.94	.86	22.90	44.08	.019	2.2639E-05			
2	2	.0000	49.20	.88	25.04	48.33	.018	2.9985E-05			
2	3	.0000	49.20	.88	25.04	48.33	.018	2.9985E-05			
3	1	.0000	52.73	.86	26.80	51.87	.016	3.7199E-05			
3	2	.0000	57.82	.88	29.35	56.95	.015	4.9486E-05			
3	3	.0000	57.82	.88	29.35	56.95	.015	4.9486E-05			
1	1	1.000	27.89	.86	14.38	27.02	.031	5.1057E-06	5.106E-06	.516	6.1255E+04
1	2	1.000	30.42	.89	15.66	29.54	.029	6.6965E-06	6.696E-06	.820	
1	3	1.000	30.42	.89	15.66	29.54	.029	6.6965E-06	6.696E-06	.820	
2	1	.0000	45.19	.86	23.03	44.33	.019	2.3034E-05			
2	2	.0000	49.60	.89	25.24	48.71	.018	3.0727E-05			
2	3	.0000	49.60	.89	25.24	48.71	.018	3.0727E-05			
3	1	.0000	53.02	.86	26.94	52.16	.016	3.7835E-05			
3	2	.0000	58.28	.89	29.58	57.40	.015	5.0701E-05			
3	3	.0000	58.28	.89	29.58	57.40	.015	5.0701E-05			
1	1	1.000	28.05	.86	14.46	27.18	.031	5.1975E-06	5.197E-06	.532	6.4288E+04
1	2	1.000	30.67	.89	15.78	29.77	.029	6.8603E-06	6.860E-06	.841	
1	3	1.000	30.67	.89	15.78	29.77	.029	6.8603E-06	6.860E-06	.841	
2	1	.0000	45.43	.86	23.15	44.57	.019	2.3420E-05			
2	2	.0000	49.98	.89	25.44	49.08	.018	3.1455E-05			
2	3	.0000	49.98	.89	25.44	49.08	.018	3.1455E-05			
3	1	.0000	53.30	.86	27.08	52.44	.016	3.8456E-05			
3	2	.0000	58.73	.89	29.81	57.83	.015	5.1891E-05			
3	3	.0000	58.73	.89	29.81	57.83	.015	5.1891E-05			
1	1	1.000	28.20	.87	14.53	27.34	.031	5.2876E-06	5.288E-06	.548	6.7325E+04
1	2	1.000	30.90	.90	15.90	30.00	.029	7.0212E-06	7.021E-06	.862	
1	3	1.000	30.90	.90	15.90	30.00	.029	7.0212E-06	7.021E-06	.862	
2	1	.0000	45.67	.87	23.27	44.80	.019	2.3798E-05			
2	2	.0000	50.35	.90	25.63	49.44	.018	3.2168E-05			
2	3	.0000	50.35	.90	25.63	49.44	.018	3.2168E-05			
3	1	.0000	53.57	.87	27.22	52.70	.016	3.9063E-05			
3	2	.0000	59.15	.90	30.03	58.25	.015	5.3055E-05			
3	3	.0000	59.15	.90	30.03	58.25	.015	5.3055E-05			

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: MJC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-8 of B-14

1	1	1.000	28.36	.87	14.62	27.50	.031	5.3821E-06	5.382E-06	.564	7.0366E+04
1	2	1.000	31.14	.91	16.02	30.22	.029	7.1852E-06	7.185E-06	.884	
1	3	1.000	31.14	.91	16.02	30.22	.029	7.1852E-06	7.185E-06	.884	
2	1	.0000	45.92	.87	23.39	45.05	.019	2.4197E-05			
2	2	.0000	50.72	.91	25.81	49.80	.018	3.2895E-05			
2	3	.0000	50.72	.91	25.81	49.80	.018	3.2895E-05			
3	1	.0000	53.85	.87	27.36	52.99	.016	3.9707E-05			
3	2	.0000	59.59	.91	30.25	58.67	.015	5.4245E-05			
3	3	.0000	59.59	.91	30.25	58.67	.015	5.4245E-05			
1	1	1.000	28.53	.87	14.70	27.66	.030	5.4832E-06	5.483E-06	.580	7.3412E+04
1	2	1.000	31.38	.92	16.15	30.46	.029	7.3581E-06	7.358E-06	.906	
1	3	1.000	31.38	.92	16.15	30.46	.029	7.3581E-06	7.358E-06	.906	
2	1	.0000	46.18	.97	23.52	45.31	.019	2.4627E-05			
2	2	.0000	51.10	.92	26.01	50.18	.018	3.3664E-05			
2	3	.0000	51.10	.92	26.01	50.18	.018	3.3665E-05			
3	1	.0000	54.16	.87	27.51	53.29	.016	4.0401E-05			
3	2	.0000	60.03	.92	30.48	59.11	.015	5.5503E-05			
3	3	.0000	60.03	.92	30.48	59.11	.015	5.5503E-05			
1	1	1.000	28.70	.87	14.78	27.83	.030	5.5827E-06	5.583E-06	.597	7.6462E+04
1	2	1.000	31.61	.93	16.27	30.69	.029	7.5284E-06	7.528E-06	.928	
1	3	1.000	31.61	.93	16.27	30.69	.029	7.5284E-06	7.528E-06	.928	
2	1	.0000	46.43	.87	23.65	45.56	.019	2.5048E-05			
2	2	.0000	51.47	.93	26.20	50.54	.018	3.4420E-05			
2	3	.0000	51.47	.93	26.20	50.54	.018	3.4420E-05			
3	1	.0000	54.45	.87	27.66	53.58	.016	4.1082E-05			
3	2	.0000	60.47	.93	30.70	59.54	.015	5.6738E-05			
3	3	.0000	60.47	.93	30.70	59.54	.015	5.6738E-05			
1	1	1.000	28.86	.87	14.87	27.99	.030	5.6811E-06	5.681E-06	.614	7.9519E+04
1	2	1.000	31.84	.94	16.39	30.91	.029	7.6961E-06	7.696E-06	.952	
1	3	1.000	31.84	.94	16.39	30.91	.029	7.6961E-06	7.696E-06	.952	
2	1	.0000	46.68	.87	23.78	45.81	.019	2.5464E-05			
2	2	.0000	51.83	.94	26.39	50.90	.018	3.5163E-05			
2	3	.0000	51.83	.94	26.39	50.90	.018	3.5163E-05			
3	1	.0000	54.74	.87	27.81	53.86	.016	4.1753E-05			
3	2	.0000	60.89	.94	30.91	59.95	.015	5.7951E-05			
3	3	.0000	60.89	.94	30.91	59.95	.015	5.7951E-05			
1	1	1.000	29.02	.87	14.95	28.14	.030	5.7768E-06	5.777E-06	.632	8.2585E+04
1	2	1.000	32.06	.94	16.50	31.12	.029	7.8606E-06	7.861E-06	.976	
1	3	1.000	32.06	.94	16.50	31.12	.029	7.8606E-06	7.861E-06	.976	
2	1	.0000	46.92	.87	23.90	46.04	.019	2.5866E-05			
2	2	.0000	52.18	.94	26.56	51.24	.018	3.5888E-05			
2	3	.0000	52.18	.94	26.56	51.24	.018	3.5889E-05			
3	1	.0000	55.01	.87	27.94	54.14	.016	4.2401E-05			
3	2	.0000	61.29	.94	31.12	60.35	.015	5.9135E-05			
3	3	.0000	61.29	.94	31.12	60.35	.015	5.9135E-05			
1	1	1.000	29.17	.88	15.02	28.29	.030	5.8719E-06	5.872E-06	.650	8.5664E+04
1	2	1.000	32.28	.95	15.62	31.33	.030	8.0229E-06	8.023E-06	1.00	
1	3	1.000	32.28	.95	16.62	31.33	.030	8.0229E-06	8.023E-06	1.00	
2	1	.0000	47.15	.88	24.01	46.27	.019	2.6266E-05			
2	2	.0000	52.52	.95	26.74	51.57	.018	3.6603E-05			
2	3	.0000	52.52	.95	26.74	51.57	.018	3.6603E-05			
3	1	.0000	55.28	.88	28.08	54.40	.016	4.3044E-05			
3	2	.0000	61.68	.95	31.32	60.73	.015	6.0301E-05			
3	3	.0000	61.68	.95	31.32	60.73	.015	6.0301E-05			
1	1	1.000	29.33	.88	15.11	28.44	.030	5.9701E-06	5.970E-06	.668	8.8757E+04
1	2	1.000	32.49	.96	16.73	31.53	.030	8.1855E-06	8.186E-06	1.03	
1	3	1.000	32.49	.96	16.73	31.53	.030	8.1855E-06	8.186E-06	1.03	
2	1	.0000	47.39	.88	24.14	46.51	.019	2.6681E-05			
2	2	.0000	52.85	.96	26.91	51.89	.018	3.7321E-05			
2	3	.0000	52.85	.96	26.91	51.89	.018	3.7321E-05			
3	1	.0000	55.56	.88	28.22	54.68	.016	4.3716E-05			
3	2	.0000	62.07	.96	31.52	61.11	.015	6.1472E-05			
3	3	.0000	62.07	.96	31.52	61.11	.015	6.1473E-05			
1	1	1.000	29.48	.89	15.19	28.59	.030	6.0662E-06	6.066E-06	.687	9.1865E+04
1	2	1.000	32.70	.97	16.84	31.73	.030	8.3444E-06	8.344E-06	1.05	
1	3	1.000	32.70	.97	16.84	31.73	.030	8.3444E-06	8.344E-06	1.05	
2	1	.0000	47.63	.89	24.26	46.74	.019	2.7087E-05			
2	2	.0000	53.18	.97	27.07	52.21	.018	3.8019E-05			
2	3	.0000	53.18	.97	27.07	52.21	.018	3.8019E-05			
3	1	.0000	55.83	.89	28.36	54.94	.016	4.4369E-05			
3	2	.0000	62.45	.97	31.71	61.48	.016	6.2611E-05			
3	3	.0000	62.45	.97	31.71	61.48	.016	6.2611E-05			
1	1	1.000	29.63	.90	15.26	28.73	.030	6.1597E-06	6.160E-06	.706	9.4993E+04
1	2	1.000	32.90	.98	16.94	31.92	.030	8.4989E-06	8.499E-06	1.08	
1	3	1.000	32.90	.98	16.94	31.92	.030	8.4989E-06	8.499E-06	1.08	
2	1	.0000	47.85	.90	24.17	46.96	.019	2.7479E-05			
2	2	.0000	53.49	.98	27.23	52.51	.018	3.8696E-05			
2	3	.0000	53.49	.98	27.23	52.51	.018	3.8696E-05			
3	1	.0000	56.09	.90	28.49	55.20	.016	4.5002E-05			
3	2	.0000	62.81	.98	31.89	61.83	.016	6.3713E-05			
3	3	.0000	62.81	.98	31.89	61.83	.016	6.3713E-05			

Calculation No.: AES-C-3865-2	Made by: RLL	Date: 2/16/00	Client: SCE
	Checked by: MJC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-9 of B-14

1	1	1.000	29.77	.90	15.34	28.87	.030	6.2507E-06	6.251E-06	.726	9.8141E+04
1	2	1.000	33.09	.99	17.04	32.10	.030	8.6487E-06	8.649E-06	1.10	
1	3	1.000	33.09	.99	17.04	32.10	.030	8.6487E-06	8.649E-06	1.10	
2	1	.0000	48.07	.90	24.49	47.17	.019	2.7859E-05			
2	2	.0000	53.78	.99	27.39	52.79	.018	3.9349E-05			
2	3	.0000	53.78	.99	27.39	52.79	.018	3.9349E-05			
3	1	.0000	56.34	.90	28.62	55.44	.016	4.5614E-05			
3	2	.0000	63.15	.99	32.07	62.16	.016	6.4776E-05			
3	3	.0000	63.15	.99	32.07	62.16	.016	6.4777E-05			
1	1	1.000	29.91	.91	15.41	29.00	.030	6.3395E-06	6.339E-06	.746	1.0131E+05
1	2	1.000	33.27	1.00	17.14	32.27	.030	8.7943E-06	8.794E-06	1.13	
1	3	1.000	33.27	1.00	17.14	32.27	.030	8.7942E-06	8.794E-06	1.13	
2	1	.0000	48.28	.91	24.60	47.37	.019	2.8230E-05			
2	2	.0000	54.06	1.00	27.53	53.07	.018	3.9982E-05			
2	3	.0000	54.06	1.00	27.53	53.07	.018	3.9982E-05			
3	1	.0000	56.58	.91	28.75	55.67	.016	4.6210E-05			
3	2	.0000	63.48	1.00	32.24	62.48	.016	6.5807E-05			
3	3	.0000	63.48	1.00	32.24	62.48	.016	6.5806E-05			
1	1	1.000	30.05	.92	15.49	29.13	.031	6.4267E-06	6.427E-06	.766	1.0451E+05
1	2	1.000	33.45	1.01	17.23	32.44	.030	8.9349E-06	8.935E-06	1.16	
1	3	1.000	33.45	1.01	17.23	32.44	.030	8.9349E-06	8.935E-06	1.16	
2	1	.0000	48.49	.92	24.70	47.57	.019	2.8594E-05			
2	2	.0000	54.34	1.01	27.67	53.33	.019	4.0592E-05			
2	3	.0000	54.34	1.01	27.67	53.33	.019	4.0592E-05			
3	1	.0000	56.82	.92	28.87	55.90	.016	4.6796E-05			
3	2	.0000	63.79	1.01	32.40	62.78	.016	6.6797E-05			
3	3	.0000	63.79	1.01	32.40	62.78	.016	6.6797E-05			
1	1	1.000	30.20	.93	15.56	29.27	.031	6.5195E-06	6.520E-06	.787	1.0774E+05
1	2	1.000	33.63	1.02	17.33	32.62	.030	9.0877E-06	9.088E-06	1.19	
1	3	1.000	33.63	1.02	17.33	32.62	.030	9.0877E-06	9.088E-06	1.19	
2	1	.0000	48.70	.93	24.82	47.77	.019	2.8984E-05			
2	2	.0000	54.63	1.02	27.82	53.61	.019	4.1260E-05			
2	3	.0000	54.63	1.02	27.82	53.61	.019	4.1260E-05			
3	1	.0000	57.07	.93	29.00	56.14	.016	4.7424E-05			
3	2	.0000	64.13	1.02	32.57	63.11	.016	6.7884E-05			
3	3	.0000	64.13	1.02	32.57	63.11	.016	6.7884E-05			
1	1	1.000	30.34	.94	15.64	29.40	.031	6.6141E-06	6.614E-06	.808	1.1099E+05
1	2	1.000	33.82	1.03	17.43	32.80	.030	9.2428E-06	9.243E-06	1.22	
1	3	1.000	33.82	1.03	17.43	32.80	.030	9.2428E-06	9.243E-06	1.22	
2	1	.0000	48.93	.94	24.93	47.98	.019	2.9381E-05			
2	2	.0000	54.92	1.03	27.97	53.89	.019	4.1937E-05			
2	3	.0000	54.92	1.03	27.97	53.89	.019	4.1937E-05			
3	1	.0000	57.33	.94	29.13	56.38	.016	4.8065E-05			
3	2	.0000	64.47	1.03	32.75	63.44	.016	6.8987E-05			
3	3	.0000	64.47	1.03	32.75	63.44	.016	6.8988E-05			
1	1	1.000	30.52	.95	15.74	29.57	.031	6.7336E-06	6.734E-06	.830	1.1426E+05
1	2	1.000	34.07	1.03	17.55	33.04	.030	9.4537E-06	9.454E-06	1.25	
1	3	1.000	34.07	1.03	17.55	33.04	.030	9.4537E-06	9.454E-06	1.25	
2	1	.0000	49.20	.95	25.08	48.25	.019	2.9888E-05			
2	2	.0000	55.31	1.03	28.17	54.28	.019	4.2863E-05			
2	3	.0000	55.31	1.03	28.17	54.28	.019	4.2863E-05			
3	1	.0000	57.65	.95	29.30	56.70	.016	4.8884E-05			
3	2	.0000	64.93	1.03	32.98	63.89	.016	7.0496E-05			
3	3	.0000	64.93	1.03	32.98	63.89	.016	7.0496E-05			
1	1	1.000	30.70	.96	15.83	29.74	.031	6.8530E-06	6.853E-06	.852	1.1754E+05
1	2	1.000	34.31	1.04	17.67	33.28	.030	9.6654E-06	9.665E-06	1.28	
1	3	1.000	34.31	1.04	17.67	33.28	.030	9.6654E-06	9.665E-06	1.28	
2	1	.0000	49.47	.96	25.22	48.51	.019	3.0194E-05			
2	2	.0000	55.70	1.04	28.37	54.66	.019	4.3789E-05			
2	3	.0000	55.70	1.04	28.37	54.66	.019	4.3789E-05			
3	1	.0000	57.96	.96	29.46	57.00	.017	4.9702E-05			
3	2	.0000	65.37	1.04	33.20	64.34	.016	7.2005E-05			
3	3	.0000	65.37	1.04	33.20	64.34	.016	7.2005E-05			
1	1	1.000	30.88	.97	15.93	29.91	.031	6.9747E-06	6.975E-06	.875	1.2082E+05
1	2	1.000	34.56	1.04	17.80	33.52	.030	9.8776E-06	9.878E-06	1.31	
1	3	1.000	34.56	1.04	17.80	33.52	.030	9.8776E-06	9.878E-06	1.31	
2	1	.0000	49.75	.97	25.36	48.78	.020	3.0910E-05			
2	2	.0000	56.08	1.04	28.56	55.04	.019	4.4718E-05			
2	3	.0000	56.08	1.04	28.56	55.04	.019	4.4718E-05			
3	1	.0000	58.28	.97	29.63	57.31	.017	5.0537E-05			
3	2	.0000	65.82	1.04	33.43	64.78	.016	7.3518E-05			
3	3	.0000	65.82	1.04	33.43	64.78	.016	7.3518E-05			
1	1	1.000	31.06	.98	16.02	30.07	.032	7.0941E-06	7.094E-06	.898	1.2412E+05
1	2	1.000	34.79	1.05	17.92	33.75	.030	1.0088E-05	1.009E-05	1.35	
1	3	1.000	34.79	1.05	17.92	33.75	.030	1.0088E-05	1.009E-05	1.35	
2	1	.0000	50.02	.98	25.50	49.04	.020	3.1415E-05			
2	2	.0000	56.45	1.05	28.75	55.40	.019	4.5637E-05			
2	3	.0000	56.45	1.05	28.75	55.40	.019	4.5637E-05			
3	1	.0000	58.59	.98	29.79	57.61	.017	5.1353E-05			
3	2	.0000	66.25	1.05	33.65	65.20	.016	7.5014E-05			
3	3	.0000	66.25	1.05	33.65	65.20	.016	7.5014E-05			

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-10 of B-14

1	1	1.000	31.23	1.00	16.11	30.23	.032	7.2124E-06	7.212E-06	.922	1.2743E+05
1	2	1.000	35.02	1.05	18.04	33.97	.030	1.0296E-05	1.030E-05	1.38	
1	3	1.000	35.02	1.05	18.04	33.97	.030	1.0296E-05	1.030E-05	1.38	
2	1	.0000	50.28	1.00	25.64	49.29	.020	3.1914E-05			
2	2	.0000	56.81	1.05	28.93	55.76	.018	4.6543E-05			
2	3	.0000	56.81	1.05	28.93	55.76	.018	4.6543E-05			
3	1	.0000	58.90	1.00	29.95	57.90	.017	5.2159E-05			
3	2	.0000	66.67	1.05	33.86	65.62	.016	7.6488E-05			
3	3	.0000	66.67	1.05	33.86	65.62	.016	7.6488E-05			
1	1	1.000	31.41	1.01	16.21	30.39	.032	7.3331E-06	7.333E-06	.946	1.3075E+05
1	2	1.000	35.25	1.06	18.15	34.20	.030	1.0504E-05	1.050E-05	1.41	
1	3	1.000	35.25	1.06	18.15	34.20	.030	1.0504E-05	1.050E-05	1.41	
2	1	.0000	50.55	1.01	25.78	49.54	.020	3.2423E-05			
2	2	.0000	57.17	1.06	29.11	56.11	.018	4.7446E-05			
2	3	.0000	57.17	1.06	29.11	56.11	.018	4.7446E-05			
3	1	.0000	59.20	1.01	30.11	58.19	.017	5.2981E-05			
3	2	.0000	67.08	1.06	34.07	66.03	.016	7.7956E-05			
3	3	.0000	67.08	1.06	34.07	66.03	.016	7.7956E-05			
1	1	1.000	31.58	1.03	16.30	30.55	.033	7.4523E-06	7.452E-06	.971	1.3410E+05
1	2	1.000	35.47	1.06	18.27	34.41	.030	1.0709E-05	1.071E-05	1.45	
1	3	1.000	35.47	1.06	18.27	34.41	.030	1.0709E-05	1.071E-05	1.45	
2	1	.0000	50.81	1.03	25.92	49.78	.020	3.2925E-05			
2	2	.0000	57.51	1.06	29.29	56.45	.018	4.8332E-05			
2	3	.0000	57.51	1.06	29.29	56.45	.018	4.8332E-05			
3	1	.0000	59.50	1.03	30.27	58.47	.017	5.3790E-05			
3	2	.0000	67.48	1.06	34.27	66.42	.016	7.9395E-05			
3	3	.0000	67.48	1.06	34.27	66.42	.016	7.9395E-05			
1	1	1.000	31.75	1.05	16.40	30.70	.033	7.5706E-06	7.571E-06	.996	1.3746E+05
1	2	1.000	35.69	1.07	18.38	34.62	.030	1.0910E-05	1.091E-05	1.49	
1	3	1.000	35.69	1.07	18.38	34.62	.030	1.0910E-05	1.091E-05	1.49	
2	1	.0000	51.07	1.05	26.06	50.02	.020	3.3421E-05			
2	2	.0000	57.84	1.07	29.46	56.78	.018	4.9198E-05			
2	3	.0000	57.84	1.07	29.46	56.78	.018	4.9198E-05			
3	1	.0000	59.80	1.05	30.42	58.75	.017	5.4589E-05			
3	2	.0000	67.87	1.07	34.47	66.80	.016	8.0799E-05			
3	3	.0000	67.87	1.07	34.47	66.80	.016	8.0799E-05			
1	1	1.000	31.92	1.06	16.49	30.86	.033	7.6893E-06	7.689E-06	1.02	1.4084E+05
1	2	1.000	35.90	1.07	18.48	34.83	.030	1.1108E-05	1.111E-05	1.52	
1	3	1.000	35.90	1.07	18.48	34.83	.030	1.1108E-05	1.111E-05	1.52	
2	1	.0000	51.32	1.06	26.19	50.26	.021	3.3917E-05			
2	2	.0000	58.17	1.07	29.62	57.10	.018	5.0050E-05			
2	3	.0000	58.17	1.07	29.62	57.10	.018	5.0050E-05			
3	1	.0000	60.09	1.06	30.58	59.03	.018	5.5387E-05			
3	2	.0000	68.24	1.07	34.66	67.17	.016	8.2181E-05			
3	3	.0000	68.24	1.07	34.66	67.17	.016	8.2181E-05			
1	1	1.000	32.09	1.08	16.58	31.01	.034	7.8078E-06	7.808E-06	1.05	1.4425E+05
1	2	1.000	36.10	1.08	18.59	35.02	.030	1.1303E-05	1.130E-05	1.56	
1	3	1.000	36.10	1.08	18.59	35.02	.030	1.1303E-05	1.130E-05	1.56	
2	1	.0000	51.57	1.08	26.33	50.49	.021	3.4411E-05			
2	2	.0000	58.48	1.08	29.78	57.40	.018	5.0882E-05			
2	3	.0000	58.48	1.08	29.78	57.40	.018	5.0882E-05			
3	1	.0000	60.38	1.08	30.73	59.30	.018	5.6181E-05			
3	2	.0000	68.61	1.08	34.84	67.53	.016	8.3527E-05			
3	3	.0000	68.61	1.08	34.84	67.53	.016	8.3527E-05			
1	1	1.000	32.25	1.10	16.67	31.15	.034	7.9237E-06	7.924E-06	1.08	1.4768E+05
1	2	1.000	36.30	1.08	18.69	35.22	.030	1.1494E-05	1.149E-05	1.60	
1	3	1.000	36.30	1.08	18.69	35.22	.030	1.1494E-05	1.149E-05	1.60	
2	1	.0000	51.82	1.10	26.46	50.72	.021	3.4893E-05			
2	2	.0000	58.79	1.08	29.93	57.70	.018	5.1697E-05			
2	3	.0000	58.79	1.08	29.93	57.70	.018	5.1697E-05			
3	1	.0000	60.66	1.10	30.88	59.56	.018	5.6955E-05			
3	2	.0000	68.96	1.08	35.02	67.88	.016	8.4845E-05			
3	3	.0000	68.96	1.08	35.02	67.88	.016	8.4845E-05			
1	1	1.000	32.42	1.12	16.77	31.30	.035	8.0411E-06	8.041E-06	1.10	1.5114E+05
1	2	1.000	36.50	1.09	18.79	35.41	.030	1.1686E-05	1.169E-05	1.64	
1	3	1.000	36.50	1.09	18.79	35.41	.030	1.1686E-05	1.169E-05	1.64	
2	1	.0000	52.06	1.12	26.59	50.94	.022	3.5384E-05			
2	2	.0000	59.09	1.09	30.09	58.00	.018	5.2518E-05			
2	3	.0000	59.09	1.09	30.09	58.00	.018	5.2518E-05			
3	1	.0000	60.94	1.12	31.03	59.82	.018	5.7744E-05			
3	2	.0000	69.31	1.09	35.20	68.22	.016	8.6173E-05			
3	3	.0000	69.31	1.09	35.20	68.22	.016	8.6173E-05			
1	1	1.000	32.59	1.14	16.87	31.45	.035	8.1659E-06	8.166E-06	1.13	1.5463E+05
1	2	1.000	36.70	1.10	18.90	35.60	.030	1.1886E-05	1.189E-05	1.68	
1	3	1.000	36.70	1.10	18.90	35.60	.030	1.1886E-05	1.189E-05	1.68	
2	1	.0000	52.33	1.14	26.74	51.18	.022	3.5910E-05			
2	2	.0000	59.41	1.10	30.25	58.11	.019	5.3378E-05			
2	3	.0000	59.41	1.10	30.25	58.11	.019	5.3378E-05			
3	1	.0000	61.24	1.14	31.19	60.10	.019	5.8592E-05			
3	2	.0000	69.68	1.10	35.39	68.58	.016	8.7569E-05			
3	3	.0000	69.68	1.10	35.39	68.58	.016	8.7569E-05			

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-11 of B-14

1	1	1.000	32.77	1.17	16.97	31.60	.036	8.2924E-06	8.292E-06	1.16	1.5815E+05
1	2	1.000	36.90	1.11	19.01	35.79	.030	1.2085E-05	1.209E-05	1.72	
1	3	1.000	36.90	1.11	19.01	35.79	.030	1.2085E-05	1.209E-05	1.72	
2	1	.0000	52.59	1.17	26.88	51.42	.022	3.6443E-05			
2	2	.0000	59.72	1.11	30.42	58.61	.019	5.4233E-05			
2	3	.0000	59.72	1.11	30.42	58.61	.019	5.4233E-05			
3	1	.0000	61.55	1.17	31.36	60.38	.019	5.9449E-05			
3	2	.0000	70.04	1.11	35.58	68.93	.016	8.8955E-05			
3	3	.0000	70.04	1.11	35.58	68.93	.016	8.8955E-05			
1	1	1.000	32.94	1.19	17.07	31.75	.036	8.4177E-06	8.418E-06	1.19	1.6170E+05
1	2	1.000	37.10	1.12	19.11	35.98	.030	1.2279E-05	1.228E-05	1.77	
1	3	1.000	37.10	1.12	19.11	35.98	.030	1.2279E-05	1.228E-05	1.77	
2	1	.0000	52.85	1.19	27.02	51.66	.023	3.6968E-05			
2	2	.0000	60.02	1.12	30.57	58.89	.019	5.5061E-05			
2	3	.0000	60.02	1.12	30.57	58.89	.019	5.5061E-05			
3	1	.0000	61.85	1.19	31.52	60.65	.019	6.0294E-05			
3	2	.0000	70.38	1.12	35.75	69.26	.016	9.0296E-05			
3	3	.0000	70.38	1.12	35.75	69.26	.016	9.0296E-05			
1	1	1.000	33.11	1.22	17.17	31.89	.037	8.5425E-06	8.543E-06	1.22	1.6528E+05
1	2	1.000	37.29	1.13	19.21	36.16	.030	1.2468E-05	1.247E-05	1.81	
1	3	1.000	37.29	1.13	19.21	36.16	.030	1.2468E-05	1.247E-05	1.81	
2	1	.0000	53.11	1.22	27.16	51.89	.023	3.7490E-05			
2	2	.0000	60.31	1.13	30.72	59.17	.019	5.5867E-05			
2	3	.0000	60.31	1.13	30.72	59.17	.019	5.5866E-05			
3	1	.0000	62.14	1.22	31.68	60.92	.020	6.1133E-05			
3	2	.0000	70.72	1.13	35.93	69.58	.016	9.1598E-05			
3	3	.0000	70.72	1.13	35.93	69.58	.016	9.1598E-05			
1	1	1.000	33.28	1.24	17.26	32.04	.037	8.6682E-06	8.668E-06	1.25	1.6889E+05
1	2	1.000	37.47	1.14	19.31	36.33	.031	1.2652E-05	1.265E-05	1.86	
1	3	1.000	37.47	1.14	19.31	36.33	.031	1.2652E-05	1.265E-05	1.86	
2	1	.0000	53.36	1.24	27.30	52.12	.023	3.8014E-05			
2	2	.0000	60.58	1.14	30.86	59.44	.019	5.6645E-05			
2	3	.0000	60.58	1.14	30.86	59.44	.019	5.6645E-05			
3	1	.0000	62.43	1.24	31.84	61.19	.020	6.1974E-05			
3	2	.0000	71.04	1.14	36.09	69.89	.016	9.2854E-05			
3	3	.0000	71.04	1.14	36.09	69.89	.016	9.2854E-05			
1	1	1.000	33.45	1.27	17.36	32.18	.038	8.7885E-06	8.788E-06	1.28	1.7254E+05
1	2	1.000	37.64	1.16	19.40	36.49	.031	1.2829E-05	1.283E-05	1.90	
1	3	1.000	37.64	1.16	19.40	36.49	.031	1.2829E-05	1.283E-05	1.90	
2	1	.0000	53.60	1.27	27.44	52.33	.024	3.8513E-05			
2	2	.0000	60.84	1.16	31.00	59.69	.019	5.7387E-05			
2	3	.0000	60.84	1.16	31.00	59.69	.019	5.7387E-05			
3	1	.0000	62.71	1.27	31.99	61.44	.020	6.2773E-05			
3	2	.0000	71.34	1.16	36.25	70.18	.016	9.4050E-05			
3	3	.0000	71.34	1.16	36.25	70.18	.016	9.4050E-05			
1	1	1.000	33.61	1.30	17.45	32.31	.039	8.9053E-06	8.905E-06	1.32	1.7624E+05
1	2	1.000	37.81	1.17	19.49	36.64	.031	1.2997E-05	1.300E-05	1.95	
1	3	1.000	37.81	1.17	19.49	36.64	.031	1.2997E-05	1.300E-05	1.95	
2	1	.0000	53.83	1.30	27.57	52.54	.024	3.8994E-05			
2	2	.0000	61.09	1.17	31.13	59.92	.019	5.8088E-05			
2	3	.0000	61.09	1.17	31.13	59.92	.019	5.8088E-05			
3	1	.0000	62.97	1.30	32.13	61.67	.021	6.3544E-05			
3	2	.0000	71.62	1.17	36.39	70.45	.016	9.5178E-05			
3	3	.0000	71.62	1.17	36.39	70.45	.016	9.5178E-05			
1	1	1.000	33.78	1.32	17.55	32.46	.039	9.0391E-06	9.039E-06	1.35	1.7997E+05
1	2	1.000	38.00	1.18	19.59	36.82	.031	1.3196E-05	1.320E-05	2.00	
1	3	1.000	38.00	1.18	19.59	36.82	.031	1.3196E-05	1.320E-05	2.00	
2	1	.0000	54.10	1.32	27.71	52.78	.024	3.9552E-05			
2	2	.0000	61.38	1.18	31.28	60.21	.019	5.8934E-05			
2	3	.0000	61.38	1.18	31.28	60.21	.019	5.8933E-05			
3	1	.0000	63.27	1.32	32.30	61.95	.021	6.4440E-05			
3	2	.0000	71.96	1.18	36.57	70.78	.016	9.6544E-05			
3	3	.0000	71.96	1.18	36.57	70.78	.016	9.6544E-05			
1	1	1.000	33.98	1.35	17.66	32.62	.040	9.1860E-06	9.186E-06	1.38	1.8374E+05
1	2	1.000	38.20	1.19	19.70	37.02	.031	1.3414E-05	1.341E-05	2.05	
1	3	1.000	38.20	1.19	19.70	37.02	.031	1.3414E-05	1.341E-05	2.05	
2	1	.0000	54.39	1.35	27.87	53.04	.025	4.0169E-05			
2	2	.0000	61.70	1.19	31.44	60.51	.019	5.9865E-05			
2	3	.0000	61.70	1.19	31.44	60.51	.019	5.9865E-05			
3	1	.0000	63.60	1.35	32.48	62.25	.021	6.5432E-05			
3	2	.0000	72.32	1.19	36.75	71.14	.016	9.8051E-05			
3	3	.0000	72.32	1.19	36.75	71.14	.016	9.8052E-05			
1	1	1.000	34.16	1.38	17.77	32.78	.040	9.3299E-06	9.330E-06	1.42	1.8754E+05
1	2	1.000	38.40	1.20	19.80	37.21	.031	1.3626E-05	1.363E-05	2.10	
1	3	1.000	38.40	1.20	19.80	37.21	.031	1.3626E-05	1.363E-05	2.10	
2	1	.0000	54.67	1.38	28.02	53.29	.025	4.0773E-05			
2	2	.0000	62.00	1.20	31.60	60.81	.019	6.0769E-05			
2	3	.0000	62.00	1.20	31.60	60.81	.019	6.0769E-05			
3	1	.0000	63.92	1.38	32.65	62.54	.022	6.6401E-05			
3	2	.0000	72.68	1.20	36.94	71.48	.016	9.9512E-05			
3	3	.0000	72.68	1.20	36.94	71.48	.016	9.9512E-05			

Calculation No.: AES-C-3865-2	Made by: RLL	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-12 of B-14

1	1	1.000	34.35	1.41	17.88	32.94	.041	9.4753E-06	9.475E-06	1.45	1.9138E+05
1	2	1.000	38.60	1.21	19.90	37.39	.031	1.3833E-05	1.383E-05	2.15	
1	3	1.000	38.60	1.21	19.90	37.39	.031	1.3833E-05	1.383E-05	2.15	
2	1	.0000	54.95	1.41	28.18	53.54	.026	4.1381E-05			
2	2	.0000	62.30	1.21	31.75	61.09	.019	6.1648E-05			
2	3	.0000	62.30	1.21	31.75	61.09	.019	6.1648E-05			
3	1	.0000	64.24	1.41	32.83	62.84	.022	6.7377E-05			
3	2	.0000	73.02	1.21	37.11	71.81	.017	1.0093E-04			
3	3	.0000	73.02	1.21	37.11	71.81	.017	1.0093E-04			
1	1	1.000	34.54	1.44	17.99	33.10	.042	9.6218E-06	9.622E-06	1.49	1.9525E+05
1	2	1.000	38.79	1.22	20.00	37.57	.031	1.4039E-05	1.404E-05	2.21	
1	3	1.000	38.79	1.22	20.00	37.57	.031	1.4039E-05	1.404E-05	2.21	
2	1	.0000	55.23	1.44	28.33	53.79	.026	4.1994E-05			
2	2	.0000	62.59	1.22	31.90	61.37	.019	6.2524E-05			
2	3	.0000	62.59	1.22	31.90	61.37	.019	6.2525E-05			
3	1	.0000	64.57	1.44	33.00	63.13	.022	6.8363E-05			
3	2	.0000	73.35	1.22	37.29	72.14	.017	1.0235E-04			
3	3	.0000	73.35	1.22	37.29	72.14	.017	1.0235E-04			
1	1	1.000	34.72	1.47	18.09	33.25	.042	9.7648E-06	9.765E-06	1.53	1.9917E+05
1	2	1.000	38.97	1.23	20.10	37.74	.032	1.4240E-05	1.424E-05	2.26	
1	3	1.000	38.97	1.23	20.10	37.74	.032	1.4240E-05	1.424E-05	2.26	
2	1	.0000	55.50	1.47	28.48	54.03	.026	4.2592E-05			
2	2	.0000	62.87	1.23	32.05	61.64	.020	6.3377E-05			
2	3	.0000	62.87	1.23	32.05	61.64	.020	6.3377E-05			
3	1	.0000	64.88	1.47	33.17	63.41	.023	6.9324E-05			
3	2	.0000	73.68	1.23	37.46	72.45	.017	1.0373E-04			
3	3	.0000	73.68	1.23	37.46	72.45	.017	1.0373E-04			
1	1	1.000	34.90	1.50	18.20	33.40	.043	9.9072E-06	9.907E-06	1.57	2.0312E+05
1	2	1.000	39.15	1.25	20.20	37.90	.032	1.4433E-05	1.443E-05	2.32	
1	3	1.000	39.15	1.25	20.20	37.90	.032	1.4433E-05	1.443E-05	2.32	
2	1	.0000	55.77	1.50	28.63	54.27	.027	4.3186E-05			
2	2	.0000	63.14	1.25	32.19	61.90	.020	6.4192E-05			
2	3	.0000	63.14	1.25	32.19	61.90	.020	6.4192E-05			
3	1	.0000	65.18	1.50	33.34	63.68	.023	7.0278E-05			
3	2	.0000	73.99	1.25	37.62	72.74	.017	1.0504E-04			
3	3	.0000	73.99	1.25	37.62	72.74	.017	1.0504E-04			
1	1	1.000	35.08	1.53	18.31	33.55	.044	1.0051E-05	1.005E-05	1.61	2.0713E+05
1	2	1.000	39.32	1.26	20.29	38.06	.032	1.4621E-05	1.462E-05	2.38	
1	3	1.000	39.32	1.26	20.29	38.06	.032	1.4621E-05	1.462E-05	2.38	
2	1	.0000	56.03	1.53	28.78	54.50	.027	4.3786E-05			
2	2	.0000	63.40	1.26	32.33	62.14	.020	6.4987E-05			
2	3	.0000	63.40	1.26	32.33	62.14	.020	6.4988E-05			
3	1	.0000	65.49	1.53	33.51	63.96	.023	7.1241E-05			
3	2	.0000	74.29	1.26	37.78	73.03	.017	1.0632E-04			
3	3	.0000	74.29	1.26	37.78	73.03	.017	1.0632E-04			
1	1	1.000	35.27	1.56	18.42	33.71	.044	1.0201E-05	1.020E-05	1.65	2.1118E+05
1	2	1.000	39.49	1.27	20.38	38.22	.032	1.4811E-05	1.481E-05	2.44	
1	3	1.000	39.49	1.27	20.38	38.22	.032	1.4811E-05	1.481E-05	2.44	
2	1	.0000	56.31	1.56	28.94	54.75	.028	4.4413E-05			
2	2	.0000	63.66	1.27	32.47	62.39	.020	6.5783E-05			
2	3	.0000	63.66	1.27	32.47	62.39	.020	6.5783E-05			
3	1	.0000	65.81	1.56	33.69	64.24	.024	7.2248E-05			
3	2	.0000	74.59	1.27	37.93	73.31	.017	1.0760E-04			
3	3	.0000	74.59	1.27	37.93	73.31	.017	1.0760E-04			
1	1	1.000	35.46	1.59	18.53	33.86	.045	1.0354E-05	1.035E-05	1.69	2.1528E+05
1	2	1.000	39.66	1.29	20.47	38.37	.032	1.4998E-05	1.500E-05	2.50	
1	3	1.000	39.66	1.29	20.47	38.37	.032	1.4998E-05	1.500E-05	2.50	
2	1	.0000	56.59	1.59	29.09	54.99	.028	4.5048E-05			
2	2	.0000	63.91	1.29	32.60	62.62	.020	6.6567E-05			
2	3	.0000	63.91	1.29	32.60	62.62	.020	6.6567E-05			
3	1	.0000	66.13	1.59	33.86	64.53	.024	7.3266E-05			
3	2	.0000	74.88	1.29	38.08	73.59	.017	1.0887E-04			
3	3	.0000	74.88	1.29	38.08	73.59	.017	1.0887E-04			
1	1	1.000	35.64	1.63	18.63	34.02	.046	1.0507E-05	1.051E-05	1.74	2.1943E+05
1	2	1.000	39.82	1.30	20.56	38.52	.033	1.5178E-05	1.518E-05	2.56	
1	3	1.000	39.82	1.30	20.56	38.52	.033	1.5178E-05	1.518E-05	2.56	
2	1	.0000	56.86	1.63	29.24	55.24	.029	4.5681E-05			
2	2	.0000	64.15	1.30	32.73	62.85	.020	6.7312E-05			
2	3	.0000	64.15	1.30	32.73	62.85	.020	6.7312E-05			
3	1	.0000	66.44	1.63	34.03	64.81	.024	7.4284E-05			
3	2	.0000	75.15	1.30	38.23	73.85	.017	1.1006E-04			
3	3	.0000	75.15	1.30	38.23	73.85	.017	1.1006E-04			
1	1	1.000	35.84	1.66	18.75	34.18	.046	1.0669E-05	1.067E-05	1.78	2.2363E+05
1	2	1.000	40.01	1.32	20.66	38.69	.033	1.5392E-05	1.539E-05	2.63	
1	3	1.000	40.01	1.32	20.66	38.69	.033	1.5392E-05	1.539E-05	2.63	
2	1	.0000	57.15	1.66	29.41	55.49	.029	4.6354E-05			
2	2	.0000	64.44	1.32	32.88	63.12	.020	6.8210E-05			
2	3	.0000	64.44	1.32	32.88	63.12	.020	6.8210E-05			
3	1	.0000	66.77	1.66	34.22	65.11	.025	7.5364E-05			
3	2	.0000	75.48	1.32	38.40	74.16	.017	1.1151E-04			
3	3	.0000	75.48	1.32	38.40	74.16	.017	1.1151E-04			

Calculation No.: AES-C-3865-2	Made by:	Date: 2/16/00	Client: SCE
	Checked by:	Date: 2/16/00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-13 of B-14

1	1	1.000	36.06	1.70	18.88	34.36	.047	1.0855E-05	1.085E-05	1.83	2.2787E+05
1	2	1.000	40.26	1.34	20.80	38.91	.033	1.5672E-05	1.567E-05	2.69	
1	3	1.000	40.26	1.34	20.80	38.91	.033	1.5672E-05	1.567E-05	2.69	
2	1	.0000	57.48	1.70	29.59	55.79	.029	4.7130E-05			
2	2	.0000	64.81	1.34	33.08	63.47	.021	6.9401E-05			
2	3	.0000	64.81	1.34	33.08	63.47	.021	6.9401E-05			
3	1	.0000	67.15	1.70	34.42	65.45	.025	7.6613E-05			
3	2	.0000	75.91	1.34	38.63	74.57	.018	1.1343E-04			
3	3	.0000	75.91	1.34	38.63	74.57	.018	1.1343E-04			
1	1	1.000	36.28	1.73	19.00	34.54	.048	1.1041E-05	1.104E-05	1.87	2.3213E+05
1	2	1.000	40.50	1.37	20.93	39.13	.034	1.5951E-05	1.595E-05	2.76	
1	3	1.000	40.50	1.37	20.93	39.13	.034	1.5951E-05	1.595E-05	2.76	
2	1	.0000	57.81	1.73	29.77	56.08	.030	4.7911E-05			
2	2	.0000	65.18	1.37	33.28	63.82	.021	7.0587E-05			
2	3	.0000	65.18	1.37	33.28	63.82	.021	7.0587E-05			
3	1	.0000	67.53	1.73	34.63	65.79	.026	7.7868E-05			
3	2	.0000	76.34	1.37	38.85	74.97	.018	1.1535E-04			
3	3	.0000	76.34	1.37	38.85	74.97	.018	1.1535E-04			
1	1	1.000	36.51	1.77	19.14	34.74	.049	1.1239E-05	1.124E-05	1.92	2.3643E+05
1	2	1.000	40.75	1.39	21.07	39.36	.034	1.6245E-05	1.624E-05	2.83	
1	3	1.000	40.75	1.39	21.07	39.36	.034	1.6245E-05	1.624E-05	2.83	
2	1	.0000	58.15	1.77	29.96	56.38	.030	4.8743E-05			
2	2	.0000	65.57	1.39	33.48	64.18	.021	7.1847E-05			
2	3	.0000	65.57	1.39	33.48	64.18	.021	7.1846E-05			
3	1	.0000	67.92	1.77	34.85	66.15	.026	7.9209E-05			
3	2	.0000	76.79	1.39	39.09	75.40	.018	1.1739E-04			
3	3	.0000	76.79	1.39	39.09	75.40	.018	1.1739E-04			
1	1	1.000	36.75	1.81	19.28	34.94	.049	1.1450E-05	1.145E-05	1.97	2.4075E+05
1	2	1.000	41.02	1.42	21.22	39.60	.035	1.6560E-05	1.656E-05	2.90	
1	3	1.000	41.02	1.42	21.22	39.60	.035	1.6560E-05	1.656E-05	2.90	
2	1	.0000	58.52	1.81	30.16	56.71	.031	4.9634E-05			
2	2	.0000	65.99	1.42	33.71	64.57	.022	7.3205E-05			
2	3	.0000	65.99	1.42	33.71	64.57	.022	7.3206E-05			
3	1	.0000	68.34	1.81	35.07	66.53	.026	8.0646E-05			
3	2	.0000	77.27	1.42	39.35	75.85	.018	1.1959E-04			
3	3	.0000	77.27	1.42	39.35	75.85	.018	1.1959E-04			

NOTE: CRACK SIZE OF 1ST DOF WILL EXCEED BODY WIDTH, G(1), ON NEXT ITERATION. PROCESSING TERMINATED.

REFINED BREAKUP

SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ALLIS-CHALMERS DESIGN)

FATIGUE CRACK GROWTH ANALYSIS SUMMARY

CRACK DIMENSION(S) A(I)			MAXIMUM STRESS INTENSITY FACTOR(S) FOR WORST INPUT LOAD TRANSIENT KMAX			TOTAL CRACK GROWTH RATE(S) DADN(I)			NUMBER OF CYCLES OR BLOCKS TO GROW CRACK FROM INITIAL SIZE N
A1	A2	A3	K1	K2	K3	DADN1	DADN2	DADN3	N
.250	.500	.500	48.427	49.016	49.016	3.7600E-06	3.9046E-06	3.9046E-06	.0000
.262	.513	.513	48.616	49.598	49.598	3.8079E-06	4.0485E-06	4.0485E-06	3152.
.274	.525	.525	48.781	50.124	50.124	3.8508E-06	4.1812E-06	4.1812E-06	6273.
.286	.539	.539	48.996	50.655	50.655	3.9076E-06	4.3196E-06	4.3196E-06	9372.
.298	.552	.552	49.202	51.148	51.149	3.9627E-06	4.4511E-06	4.4511E-06	1.2450E+04
.310	.566	.566	49.388	51.605	51.605	4.0137E-06	4.5751E-06	4.5751E-06	1.5515E+04
.323	.580	.580	49.576	52.031	52.031	4.0656E-06	4.6932E-06	4.6932E-06	1.8576E+04
.335	.595	.595	49.739	52.423	52.423	4.1119E-06	4.8035E-06	4.8035E-06	2.1638E+04
.348	.610	.610	49.927	52.822	52.822	4.1658E-06	4.9187E-06	4.9186E-06	2.4704E+04
.361	.625	.625	50.132	53.224	53.224	4.2256E-06	5.0378E-06	5.0378E-06	2.7773E+04
.374	.640	.640	50.351	53.664	53.664	4.2895E-06	5.1695E-06	5.1695E-06	3.0841E+04
.387	.656	.656	50.606	54.165	54.165	4.3635E-06	5.3212E-06	5.3212E-06	3.3901E+04
.400	.673	.673	50.876	54.658	54.658	4.4422E-06	5.4733E-06	5.4733E-06	3.6950E+04
.414	.690	.690	51.137	55.129	55.129	4.5194E-06	5.6219E-06	5.6218E-06	3.9990E+04
.428	.707	.707	51.391	55.580	55.580	4.5952E-06	5.7667E-06	5.7667E-06	4.3027E+04
.442	.725	.725	51.630	56.011	56.011	4.6683E-06	5.9074E-06	5.9074E-06	4.6063E+04
.456	.743	.743	51.879	56.436	56.436	4.7446E-06	6.0485E-06	6.0486E-06	4.9102E+04
.471	.762	.762	52.138	56.861	56.861	4.8245E-06	6.1921E-06	6.1921E-06	5.2145E+04
.486	.781	.781	52.434	57.348	57.348	4.9179E-06	6.3617E-06	6.3616E-06	5.5186E+04
.501	.800	.800	52.730	57.823	57.823	5.0123E-06	6.5300E-06	6.5300E-06	5.8222E+04
.516	.820	.820	53.020	58.283	58.283	5.1057E-06	6.6965E-06	6.6965E-06	6.1255E+04
.532	.841	.841	53.299	58.727	58.727	5.1975E-06	6.8603E-06	6.8603E-06	6.4288E+04
.548	.862	.862	53.570	59.155	59.155	5.2876E-06	7.0212E-06	7.0212E-06	6.7325E+04
.564	.884	.884	53.854	59.586	59.586	5.3821E-06	7.1852E-06	7.1852E-06	7.0366E+04
.580	.906	.906	54.157	60.033	60.033	5.4832E-06	7.3581E-06	7.3581E-06	7.3412E+04
.597	.928	.928	54.450	60.466	60.466	5.5827E-06	7.5284E-06	7.5284E-06	7.6462E+04
.614	.952	.952	54.737	60.886	60.886	5.6811E-06	7.6961E-06	7.6961E-06	7.9519E+04
.632	.976	.976	55.011	61.290	61.290	5.7768E-06	7.8606E-06	7.8606E-06	8.2585E+04
.650	1.000	1.000	55.281	61.683	61.683	5.8719E-06	8.0229E-06	8.0229E-06	8.5664E+04
.668	1.025	1.025	55.561	62.073	62.073	5.9701E-06	8.1855E-06	8.1855E-06	8.8757E+04
.687	1.051	1.051	55.832	62.448	62.448	6.0662E-06	8.3444E-06	8.3444E-06	9.1865E+04
.706	1.077	1.077	56.091	62.806	62.806	6.1597E-06	8.4989E-06	8.4989E-06	9.4993E+04
.726	1.104	1.104	56.341	63.149	63.149	6.2507E-06	8.6487E-06	8.6487E-06	9.8141E+04
.746	1.132	1.132	56.583	63.478	63.478	6.1395E-06	8.7943E-06	8.7942E-06	1.0131E+05
.766	1.160	1.160	56.820	63.792	63.792	6.4267E-06	8.9349E-06	8.9349E-06	1.0451E+05
.787	1.189	1.189	57.072	64.131	64.131	6.5195E-06	9.0877E-06	9.0877E-06	1.0774E+05

Calculation No.: AES-C-3865-2	Made by: RLC	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: B-14 of B-14

.808	1.219	1.219	57.326	64.471	64.471	6.6141E-06	9.2428E-06	9.2428E-06	1.1099E+05
.830	1.250	1.250	57.645	64.925	64.925	6.7336E-06	9.4537E-06	9.4537E-06	1.1425E+05
.852	1.281	1.281	57.961	65.372	65.372	6.8530E-06	9.6654E-06	9.6654E-06	1.1754E+05
.875	1.313	1.313	58.281	65.816	65.816	6.9747E-06	9.8776E-06	9.8776E-06	1.2092E+05
.898	1.346	1.346	58.592	66.248	66.248	7.0941E-06	1.0088E-05	1.0088E-05	1.2412E+05
.922	1.380	1.380	58.896	66.668	66.668	7.2124E-06	1.0296E-05	1.0296E-05	1.2741E+05
.946	1.414	1.414	59.204	67.082	67.082	7.3331E-06	1.0504E-05	1.0504E-05	1.3075E+05
.971	1.450	1.450	59.504	67.483	67.483	7.4523E-06	1.0709E-05	1.0709E-05	1.3410E+05
.996	1.486	1.486	59.798	67.869	67.869	7.5706E-06	1.0910E-05	1.0910E-05	1.3746E+05
1.022	1.523	1.523	60.090	68.245	68.245	7.6893E-06	1.1108E-05	1.1108E-05	1.4084E+05
1.048	1.561	1.561	60.378	68.607	68.607	7.8078E-06	1.1303E-05	1.1303E-05	1.4425E+05
1.075	1.601	1.601	60.657	68.958	68.958	7.9237E-06	1.1494E-05	1.1494E-05	1.4768E+05
1.103	1.641	1.641	60.942	69.310	69.310	8.0411E-06	1.1686E-05	1.1686E-05	1.5114E+05
1.131	1.682	1.682	61.245	69.677	69.677	8.1659E-06	1.1886E-05	1.1886E-05	1.5463E+05
1.160	1.724	1.724	61.549	70.039	70.039	8.2924E-06	1.2085E-05	1.2085E-05	1.5815E+05
1.190	1.767	1.767	61.846	70.385	70.385	8.4177E-06	1.2279E-05	1.2279E-05	1.6170E+05
1.220	1.811	1.811	62.139	70.718	70.718	8.5425E-06	1.2468E-05	1.2468E-05	1.6528E+05
1.251	1.857	1.857	62.430	71.037	71.037	8.6682E-06	1.2652E-05	1.2652E-05	1.6889E+05
1.283	1.903	1.903	62.706	71.338	71.338	8.7885E-06	1.2829E-05	1.2829E-05	1.7254E+05
1.316	1.951	1.951	62.971	71.620	71.620	8.9053E-06	1.2997E-05	1.2997E-05	1.7624E+05
1.349	2.000	2.000	63.273	71.956	71.956	9.0393E-06	1.3196E-05	1.3196E-05	1.7997E+05
1.384	2.050	2.050	63.604	72.324	72.324	9.1860E-06	1.3414E-05	1.3414E-05	1.8374E+05
1.419	2.102	2.102	63.924	72.677	72.677	9.3299E-06	1.3626E-05	1.3626E-05	1.8754E+05
1.455	2.154	2.154	64.244	73.017	73.017	9.4753E-06	1.3833E-05	1.3833E-05	1.9138E+05
1.492	2.208	2.208	64.565	73.354	73.354	9.6218E-06	1.4039E-05	1.4039E-05	1.9525E+05
1.530	2.264	2.264	64.877	73.681	73.681	9.7648E-06	1.4240E-05	1.4240E-05	1.9917E+05
1.569	2.320	2.320	65.184	73.990	73.990	9.9072E-06	1.4433E-05	1.4433E-05	2.0312E+05
1.609	2.378	2.378	65.491	74.290	74.290	1.0051E-05	1.4621E-05	1.4621E-05	2.0713E+05
1.650	2.438	2.438	65.808	74.586	74.586	1.0201E-05	1.4811E-05	1.4811E-05	2.1119E+05
1.692	2.499	2.499	66.126	74.877	74.877	1.0354E-05	1.4998E-05	1.4998E-05	2.1528E+05
1.735	2.562	2.562	66.441	75.151	75.151	1.0507E-05	1.5178E-05	1.5178E-05	2.1943E+05
1.780	2.626	2.626	66.772	75.480	75.480	1.0669E-05	1.5392E-05	1.5392E-05	2.2363E+05
1.825	2.692	2.692	67.149	75.913	75.913	1.0855E-05	1.5672E-05	1.5672E-05	2.2787E+05
1.872	2.759	2.759	67.525	76.341	76.341	1.1041E-05	1.5951E-05	1.5951E-05	2.3213E+05
1.920	2.828	2.828	67.922	76.793	76.793	1.1239E-05	1.6245E-05	1.6245E-05	2.3643E+05
1.969	2.899	2.899	68.341	77.275	77.275	1.1450E-05	1.6560E-05	1.6560E-05	2.4075E+05

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: [illegible]	Date: 2/18/00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-1 of C-16

Appendix C

FATIGUE CRACK GROWTH ANALYSIS OUTPUT FOR ABB DESIGN

```
SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ABB DESIGN)

BIGIF:  BOUNDARY INTEGRAL EQUATION          IBM PC VERSION   REV. 0 - SEPTEMBER 23, 1985
        GENERATED INFLUENCE FUNCTIONS
        FOR USE IN FRACTURE MECHANICS
        PROBLEMS

          ANALYSIS SELECTION (IFAT)

                    1 FATIGUE ANALYSIS

          CRACK GEOMETRY MODEL INDEX NUMBER (IFI)

                  305 3-DOF SURFACE CRACK

          VARIABLE THICKNESS SPECIFICATION (NTH)

                    0 CONSTANT BODY THICKNESS

          CRACK GROWTH RATE RULE (IDADN)

                    6 SAME AS #5 BUT FOR UP TO FIVE R VALUES

          INTEGRATION INCREMENT SCHEME (INUM)

                    3 REFINED

          SINGLE OR MULT INTEGRATION SCHEMES (INCL)

                    0 SINGLE

          INCREMENTS USED TO DOUBLE CRACK SIZE (NDUB)

                      USER SPECIFIED NDUB =    24


GEOMETRY AND MATERIAL                    SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ABB DESIGN)
 CRACK GROWTH INPUT

NUMBER OF DEGREES OF FREEDOM =  3

          INITIAL A-VALUES FOR EACH DEGREE OF FREEDOM

               CRACK LENGTH AI(1) =   .25000
               CRACK LENGTH AI(2) =   .50000
               CRACK LENGTH AI(3) =   .50000


          GEOMETRY FACTORS

             G(1)    4.0000          BODY WIDTH
             G(2)    .00000
             G(3)    .00000
             G(4)    .00000
             G(5)    .00000
             G(6)    .00000          X-COORD. TO CRACK CENTER (XC)
             G(7)    .00000          Y-COORD. TO CRACK CENTER (YC)
             G(8)    .00000          CRACK ORIENTATION ANGLE (PHI, DEGREES)

         DA/DN OPTION SELECTED:  6

              KIC =  140.00        FRACTURE TOUGHNESS

         THERE ARE SETS OF INPUT DATA FOR  5 R-RATIOS

         R-RATIO =  -1.0000           2 POINTS INPUT
              DELTA-K      DA/DN
            1.0000     1.99000E-10
            100.00     2.74700E-04

         R-RATIO =   .00000           2 POINTS INPUT
              DELTA-K      DA/DN
            1.0000     1.99000E-10
            100.00     2.74700E-04

         R-RATIO =   .10000           2 POINTS INPUT
              DELTA-K      DA/DN
            1.0000     2.21700E-10
            100.00     3.06000E-04
```

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: MJC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-3 of C-16

```
R-RATIO =   .50000          2 POINTS INPUT
     DELTA-K      DA/DN
    1.0000     3.57200E-10
    100.00     4.93100E-04

R-RATIO =   1.0000          2 POINTS INPUT
     DELTA-K      DA/DN
    1.0000     7.36900E-10
    100.00     1.01700E-03
```

LOAD TRANSIENTS: 3 TRANSIENT(S) IN PROBLEM

SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ABB DESIGN)

NUMBER	NAME	NUMBER OF CYCLES PER BLOCK	SPECIFIER	AGLD	IPSRD	IPLD	KAME	IWO	NPX	NPY
1	OPERATING STRESS	1.0000	1	1.0000	0	4	0	0	20	0

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	26.410
5.84000E-02	24.990
.12050	24.070
.18670	23.300
.25730	22.670
.33240	22.160
.41230	21.730
.49750	21.350
.58830	21.020
.68490	20.720
.78780	20.430
.89740	20.150
1.0142	19.890
1.2557	19.390
1.5166	18.910
1.7983	18.430
2.1026	17.950
2.4313	17.460
2.7863	16.980
21.360	6.7320

			2	.00000	3	0	0	0	0	0
2	DESIGN OVERSPEED	.00000	1	1.0000	0	4	0	0	20	0

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	27.600
5.84000E-02	26.650
.12050	26.000
.18670	25.450
.25730	24.990
.33240	24.600
.41230	24.260
.49750	23.960
.58830	23.680
.68490	23.420
.78780	23.170
.89740	22.920
1.0142	22.680
1.2557	22.210
1.5166	21.730
1.7983	21.260
2.1026	20.780
2.4313	20.300
2.7863	19.800
21.360	8.1470

			2	.00000	3	0	0	0	0	0

3 ACCIDENT STRESS .00000 1 1.0000 0 4 0 0 20 0

STRESS FUNCTION SIGMA(X)

X	SIGMA(X)
.00000	28.120
5.84000E-02	27.390
.12050	26.870
.18670	26.420
.25730	26.040
.33240	25.720
.41230	25.430
.49750	25.160
.58830	24.920
.68490	24.680
.78780	24.440
.89740	24.210
1.0142	23.990
1.2557	23.520
1.5166	23.060
1.7983	22.590
2.1026	22.120
2.4313	21.630
2.7863	21.110
21.360	8.8140

2 .00000 3 0 0 0 0 0

DETAILED OUTPUT FOR ALL LOAD TRANSIENT(S) AND CRACK DEGREE(S) OF FREEDOM

INTEGRATION BREAKUP * REFINED *

SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ABB DESIGN)

TRANSIENT NUMBER	DEGREE OF FREEDOM	CYCLES /BLOCK	KMAX	KMIN	KMEAN	DEL-K	R-RAT	TRANSIENT DA/DN (PER CYCLE)	DA/DN (PER BLOCK)	DOF CRACK SIZE	N
1	1	1.000	18.10	.00	9.05	18.10	.000	1.4441E-06	1.444E-06	.250	.0000
1	2	1.000	16.13	.00	8.06	16.13	.000	1.0137E-06	1.014E-06	.500	
1	3	1.000	16.13	.00	8.06	16.13	.000	1.0137E-06	1.014E-06	.500	
2	1	.0000	19.57	.00	9.79	19.57	.000	1.8376E-06			
2	2	.0000	17.26	.00	8.63	17.26	.000	1.2495E-06			
2	3	.0000	17.26	.00	8.63	17.26	.000	1.2495E-06			
3	1	.0000	20.24	.00	10.12	20.24	.000	2.0360E-06			
3	2	.0000	17.77	.00	8.89	17.77	.000	1.3661E-06			
3	3	.0000	17.77	.00	8.89	17.77	.000	1.3661E-06			
1	1	1.000	18.24	.00	9.12	18.24	.000	1.4794E-06	1.479E-06	.257	5011.
1	2	1.000	16.33	.00	8.16	16.33	.000	1.0533E-06	1.053E-06	.505	
1	3	1.000	16.33	.00	8.16	16.33	.000	1.0533E-06	1.053E-06	.505	
2	1	.0000	19.74	.00	9.87	19.74	.000	1.8867E-06			
2	2	.0000	17.49	.00	8.74	17.49	.000	1.3005E-06			
2	3	.0000	17.49	.00	8.74	17.49	.000	1.3005E-06			
3	1	.0000	20.42	.00	10.21	20.42	.000	2.0922E-06			
3	2	.0000	18.01	.00	9.00	18.01	.000	1.4228E-06			
3	3	.0000	18.01	.00	9.00	18.01	.000	1.4227E-06			
1	1	1.000	18.38	.00	9.19	18.38	.000	1.5157E-06	1.516E-06	.265	1.0046E+04
1	2	1.000	16.53	.00	8.27	16.53	.000	1.0946E-06	1.095E-06	.511	
1	3	1.000	16.53	.00	8.27	16.53	.000	1.0946E-06	1.095E-06	.511	
2	1	.0000	19.91	.00	9.96	19.91	.000	1.9371E-06			
2	2	.0000	17.72	.00	8.86	17.72	.000	1.3535E-06			
2	3	.0000	17.72	.00	8.86	17.72	.000	1.3535E-06			
3	1	.0000	20.60	.00	10.30	20.60	.000	2.1501E-06			
3	2	.0000	18.25	.00	9.12	18.25	.000	1.4817E-06			
3	3	.0000	18.25	.00	9.12	18.25	.000	1.4817E-06			
1	1	1.000	18.53	.00	9.26	18.53	.000	1.5528E-06	1.553E-06	.273	1.5105E+04
1	2	1.000	16.74	.00	8.37	16.74	.000	1.1371E-06	1.137E-06	.516	
1	3	1.000	16.74	.00	8.37	16.74	.000	1.1371E-06	1.137E-06	.516	
2	1	.0000	20.08	.00	10.04	20.08	.000	1.9888E-06			
2	2	.0000	17.95	.00	8.97	17.95	.000	1.4084E-06			
2	3	.0000	17.95	.00	8.97	17.95	.000	1.4084E-06			
3	1	.0000	20.78	.00	10.39	20.78	.000	2.2094E-06			
3	2	.0000	18.49	.00	9.24	18.49	.000	1.5429E-06			
3	3	.0000	18.49	.00	9.24	18.49	.000	1.5429E-06			
1	1	1.000	18.68	.00	9.34	18.68	.000	1.5909E-06	1.591E-06	.281	2.0187E+04
1	2	1.000	16.95	.00	8.47	16.95	.000	1.1812E-06	1.181E-06	.522	
1	3	1.000	16.95	.00	8.47	16.95	.000	1.1812E-06	1.181E-06	.522	
2	1	.0000	20.26	.00	10.13	20.26	.000	2.0420E-06			
2	2	.0000	18.18	.00	9.09	18.18	.000	1.4654E-06			
2	3	.0000	18.18	.00	9.09	18.18	.000	1.4654E-06			
3	1	.0000	20.97	.00	10.48	20.97	.000	2.2706E-06			
3	2	.0000	18.73	.00	9.37	18.73	.000	1.6064E-06			
3	3	.0000	18.73	.00	9.37	18.73	.000	1.6064E-06			

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-5 of C-16

1	1	1.000	18.82	.00	9.41	18.82	.000	1.6299E-06	1.630E-06	.289	2.5293E+04
1	2	1.000	17.16	.00	8.58	17.16	.000	1.2268E-06	1.227E-06	.528	
1	3	1.000	17.16	.00	8.58	17.16	.000	1.2268E-06	1.227E-06	.528	
2	1	.0000	20.43	.00	10.22	20.43	.000	2.0966E-06			
2	2	.0000	18.42	.00	9.21	18.42	.000	1.5244E-06			
2	3	.0000	18.42	.00	9.21	18.42	.000	1.5244E-06			
3	1	.0000	21.16	.00	10.58	21.16	.000	2.3334E-06			
3	2	.0000	18.98	.00	9.49	18.98	.000	1.6723E-06			
3	3	.0000	18.98	.00	9.49	18.98	.000	1.6723E-06			
1	1	1.000	18.97	.00	9.49	18.97	.000	1.6699E-06	1.670E-06	.297	3.0423E+04
1	2	1.000	17.37	.00	8.69	17.37	.000	1.2740E-06	1.274E-06	.535	
1	3	1.000	17.37	.00	8.69	17.37	.000	1.2740E-06	1.274E-06	.535	
2	1	.0000	20.61	.00	10.30	20.61	.000	2.1526E-06			
2	2	.0000	18.66	.00	9.33	18.66	.000	1.5857E-06			
2	3	.0000	18.66	.00	9.33	18.66	.000	1.5857E-06			
3	1	.0000	21.35	.00	10.67	21.35	.000	2.3981E-06			
3	2	.0000	19.23	.00	9.62	19.23	.000	1.7407E-06			
3	3	.0000	19.23	.00	9.62	19.23	.000	1.7407E-06			
1	1	1.000	19.12	.00	9.56	19.12	.000	1.7109E-06	1.711E-06	.306	3.5577E+04
1	2	1.000	17.59	.00	8.79	17.59	.000	1.3231E-06	1.323E-06	.541	
1	3	1.000	17.59	.00	8.79	17.59	.000	1.3231E-06	1.323E-06	.541	
2	1	.0000	20.79	.00	10.39	20.79	.000	2.2103E-06			
2	2	.0000	18.90	.00	9.45	18.90	.000	1.6495E-06			
2	3	.0000	18.90	.00	9.45	18.90	.000	1.6495E-06			
3	1	.0000	21.54	.00	10.77	21.54	.000	2.4646E-06			
3	2	.0000	19.48	.00	9.74	19.48	.000	1.8119E-06			
3	3	.0000	19.48	.00	9.74	19.48	.000	1.8119E-06			
1	1	1.000	19.28	.00	9.64	19.28	.000	1.7531E-06	1.753E-06	.315	4.0754E+04
1	2	1.000	17.80	.00	8.90	17.80	.000	1.3740E-06	1.374E-06	.548	
1	3	1.000	17.80	.00	8.90	17.80	.000	1.3740E-06	1.374E-06	.548	
2	1	.0000	20.97	.00	10.48	20.97	.000	2.2597E-06			
2	2	.0000	19.14	.00	9.57	19.14	.000	1.7156E-06			
2	3	.0000	19.14	.00	9.57	19.14	.000	1.7156E-06			
3	1	.0000	21.73	.00	10.87	21.73	.000	2.5332E-06			
3	2	.0000	19.74	.00	9.87	19.74	.000	1.8859E-06			
3	3	.0000	19.74	.00	9.87	19.74	.000	1.8859E-06			
1	1	1.000	19.43	.00	9.71	19.43	.000	1.7964E-06	1.796E-06	.324	4.5954E+04
1	2	1.000	18.02	.00	9.01	18.02	.000	1.4267E-06	1.427E-06	.556	
1	3	1.000	18.02	.00	9.01	18.02	.000	1.4267E-06	1.427E-06	.556	
2	1	.0000	21.15	.00	10.57	21.15	.000	2.1308E-06			
2	2	.0000	19.39	.00	9.69	19.39	.000	1.7842E-06			
2	3	.0000	19.39	.00	9.69	19.39	.000	1.7842E-06			
3	1	.0000	21.93	.00	10.96	21.93	.000	2.6039E-06			
3	2	.0000	20.00	.00	10.00	20.00	.000	1.9626E-06			
3	3	.0000	20.00	.00	10.00	20.00	.000	1.9626E-06			
1	1	1.000	19.58	.00	9.79	19.58	.000	1.8408E-06	1.841E-06	.334	5.1178E+04
1	2	1.000	18.25	.00	9.12	18.25	.000	1.4812E-06	1.481E-06	.563	
1	3	1.000	18.25	.00	9.12	18.25	.000	1.4812E-06	1.481E-06	.563	
2	1	.0000	21.33	.00	10.67	21.33	.000	2.3937E-06			
2	2	.0000	19.63	.00	9.82	19.63	.000	1.8554E-06			
2	3	.0000	19.63	.00	9.82	19.63	.000	1.8554E-06			
3	1	.0000	22.12	.00	11.06	22.12	.000	2.6767E-06			
3	2	.0000	20.26	.00	10.13	20.26	.000	2.0423E-06			
3	3	.0000	20.26	.00	10.13	20.26	.000	2.0423E-06			
1	1	1.000	19.74	.00	9.87	19.74	.000	1.8867E-06	1.887E-06	.343	5.6425E+04
1	2	1.000	18.47	.00	9.23	18.47	.000	1.5376E-06	1.538E-06	.571	
1	3	1.000	18.47	.00	9.23	18.47	.000	1.5376E-06	1.538E-06	.571	
2	1	.0000	21.52	.00	10.76	21.52	.000	2.4588E-06			
2	2	.0000	19.89	.00	9.94	19.89	.000	1.9291E-06			
2	3	.0000	19.89	.00	9.94	19.89	.000	1.9291E-06			
3	1	.0000	22.33	.00	11.16	22.33	.000	2.7521E-06			
3	2	.0000	20.52	.00	10.26	20.52	.000	2.1251E-06			
3	3	.0000	20.52	.00	10.26	20.52	.000	2.1251E-06			
1	1	1.000	19.90	.00	9.95	19.90	.000	1.9338E-06	1.934E-06	.354	6.1694E+04
1	2	1.000	18.69	.00	9.35	18.69	.000	1.5959E-06	1.596E-06	.579	
1	3	1.000	18.69	.00	9.35	18.69	.000	1.5959E-06	1.596E-06	.579	
2	1	.0000	21.71	.00	10.85	21.71	.000	2.5258E-06			
2	2	.0000	20.14	.00	10.07	20.14	.000	2.0058E-06			
2	3	.0000	20.14	.00	10.07	20.14	.000	2.0058E-06			
3	1	.0000	22.53	.00	11.26	22.53	.000	2.8299E-06			
3	2	.0000	20.79	.00	10.39	20.79	.000	2.2110E-06			
3	3	.0000	20.79	.00	10.39	20.79	.000	2.2110E-06			
1	1	1.000	20.06	.00	10.03	20.06	.000	1.9825E-06	1.983E-06	.364	6.6984E+04
1	2	1.000	18.92	.00	9.46	18.92	.000	1.6565E-06	1.656E-06	.588	
1	3	1.000	18.92	.00	9.46	18.92	.000	1.6565E-06	1.656E-06	.588	
2	1	.0000	21.90	.00	10.95	21.90	.000	2.5950E-06			
2	2	.0000	20.40	.00	10.20	20.40	.000	2.0853E-06			
2	3	.0000	20.40	.00	10.20	20.40	.000	2.0853E-06			
3	1	.0000	22.74	.00	11.37	22.74	.000	2.9103E-06			
3	2	.0000	21.06	.00	10.53	21.06	.000	2.3003E-06			
3	3	.0000	21.06	.00	10.53	21.06	.000	2.3003E-06			

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: [illegible]	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-6 of C-16

1	1	1.000	20.23	.00	10.11	20.23	.000	2.0326E-06	2.033E-06	.375	7.2296E+04
1	2	1.000	19.15	.00	9.58	19.15	.000	1.7191E-06	1.719E-06	.597	
1	3	1.000	19.15	.00	9.58	19.15	.000	1.7191E-06	1.719E-06	.597	
2	1	.0000	22.10	.00	11.05	22.10	.000	2.6665E-06			
2	2	.0000	20.66	.00	10.33	20.66	.000	2.1678E-06			
2	3	.0000	20.66	.00	10.33	20.66	.000	2.1678E-06			
3	1	.0000	22.94	.00	11.47	22.94	.000	2.9934E-06			
3	2	.0000	21.33	.00	10.67	21.33	.000	2.3930E-06			
3	3	.0000	21.33	.00	10.67	21.33	.000	2.3930E-06			
1	1	1.000	20.39	.00	10.20	20.39	.000	2.0845E-06	2.084E-06	.386	7.7628E+04
1	2	1.000	19.39	.00	9.69	19.39	.000	1.7840E-06	1.784E-06	.606	
1	3	1.000	19.39	.00	9.69	19.39	.000	1.7840E-06	1.784E-06	.606	
2	1	.0000	22.29	.00	11.15	22.29	.000	2.7406E-06			
2	2	.0000	20.92	.00	10.46	20.92	.000	2.2534E-06			
2	3	.0000	20.92	.00	10.46	20.92	.000	2.2534E-06			
3	1	.0000	23.16	.00	11.58	23.16	.000	3.0795E-06			
3	2	.0000	21.61	.00	10.80	21.61	.000	2.4893E-06			
3	3	.0000	21.61	.00	10.80	21.61	.000	2.4893E-06			
1	1	1.000	20.56	.00	10.28	20.56	.000	2.1379E-06	2.138E-06	.397	8.2979E+04
1	2	1.000	19.62	.00	9.81	19.62	.000	1.8510E-06	1.851E-06	.616	
1	3	1.000	19.62	.00	9.81	19.62	.000	1.8510E-06	1.851E-06	.616	
2	1	.0000	22.50	.00	11.25	22.50	.000	2.8170E-06			
2	2	.0000	21.18	.00	10.59	21.18	.000	2.3422E-06			
2	3	.0000	21.18	.00	10.59	21.18	.000	2.3422E-06			
3	1	.0000	23.37	.00	11.69	23.37	.000	3.1686E-06			
3	2	.0000	21.89	.00	10.94	21.89	.000	2.5893E-06			
3	3	.0000	21.89	.00	10.94	21.89	.000	2.5893E-06			
1	1	1.000	20.73	.00	10.37	20.73	.000	2.1933E-06	2.193E-06	.408	8.8349E+04
1	2	1.000	19.86	.00	9.93	19.86	.000	1.9208E-06	1.921E-06	.626	
1	3	1.000	19.86	.00	9.93	19.86	.000	1.9208E-06	1.921E-06	.626	
2	1	.0000	22.70	.00	11.35	22.70	.000	2.8964E-06			
2	2	.0000	21.45	.00	10.73	21.45	.000	2.4345E-06			
2	3	.0000	21.45	.00	10.73	21.45	.000	2.4345E-06			
3	1	.0000	23.59	.00	11.80	23.59	.000	3.2610E-06			
3	2	.0000	22.17	.00	11.08	22.17	.000	2.6933E-06			
3	3	.0000	22.17	.00	11.08	22.17	.000	2.6933E-06			
1	1	1.000	20.91	.00	10.45	20.91	.000	2.2504E-06	2.250E-06	.420	9.3736E+04
1	2	1.000	20.10	.00	10.05	20.10	.000	1.9929E-06	1.993E-06	.637	
1	3	1.000	20.10	.00	10.05	20.10	.000	1.9929E-06	1.993E-06	.637	
2	1	.0000	22.91	.00	11.45	22.91	.000	2.9785E-06			
2	2	.0000	21.72	.00	10.86	21.72	.000	2.5303E-06			
2	3	.0000	21.72	.00	10.86	21.72	.000	2.5303E-06			
3	1	.0000	23.82	.00	11.91	23.82	.000	3.3567E-06			
3	2	.0000	22.45	.00	11.23	22.45	.000	2.8013E-06			
3	3	.0000	22.45	.00	11.23	22.45	.000	2.8013E-06			
1	1	1.000	21.09	.00	10.54	21.09	.000	2.3092E-06	2.309E-06	.433	9.9140E+04
1	2	1.000	20.34	.00	10.17	20.34	.000	2.0674E-06	2.067E-06	.648	
1	3	1.000	20.34	.00	10.17	20.34	.000	2.0674E-06	2.067E-06	.648	
2	1	.0000	23.12	.00	11.56	23.12	.000	3.0633E-06			
2	2	.0000	22.00	.00	11.00	22.00	.000	2.6295E-06			
2	3	.0000	22.00	.00	11.00	22.00	.000	2.6295E-06			
3	1	.0000	24.04	.00	12.02	24.04	.000	3.4557E-06			
3	2	.0000	22.74	.00	11.37	22.74	.000	2.9134E-06			
3	3	.0000	22.74	.00	11.37	22.74	.000	2.9134E-06			
1	1	1.000	21.27	.00	10.63	21.27	.000	2.3706E-06	2.371E-06	.445	1.0456E+05
1	2	1.000	20.58	.00	10.29	20.58	.000	2.1446E-06	2.145E-06	.659	
1	3	1.000	20.58	.00	10.29	20.58	.000	2.1446E-06	2.145E-06	.659	
2	1	.0000	23.33	.00	11.67	23.33	.000	3.1516E-06			
2	2	.0000	22.27	.00	11.14	22.27	.000	2.7326E-06			
2	3	.0000	22.27	.00	11.14	22.27	.000	2.7326E-06			
3	1	.0000	24.27	.00	12.14	24.27	.000	3.5587E-06			
3	2	.0000	23.04	.00	11.52	23.04	.000	3.0300E-06			
3	3	.0000	23.04	.00	11.52	23.04	.000	3.0300E-06			
1	1	1.000	21.45	.00	10.72	21.45	.000	2.4341E-06	2.434E-06	.459	1.0999E+05
1	2	1.000	20.83	.00	10.42	20.83	.000	2.2248E-06	2.225E-06	.671	
1	3	1.000	20.83	.00	10.42	20.83	.000	2.2248E-06	2.225E-06	.671	
2	1	.0000	23.55	.00	11.78	23.55	.000	3.2432E-06			
2	2	.0000	22.55	.00	11.28	22.55	.000	2.8397E-06			
2	3	.0000	22.55	.00	11.28	22.55	.000	2.8397E-06			
3	1	.0000	24.51	.00	12.26	24.51	.000	3.6657E-06			
3	2	.0000	23.33	.00	11.67	23.33	.000	3.1512E-06			
3	3	.0000	23.33	.00	11.67	23.33	.000	3.1512E-06			
1	1	1.000	21.64	.00	10.82	21.64	.000	2.4996E-06	2.500E-06	.472	1.1544E+05
1	2	1.000	21.08	.00	10.54	21.08	.000	2.3075E-06	2.307E-06	.683	
1	3	1.000	21.08	.00	10.54	21.08	.000	2.3075E-06	2.307E-06	.683	
2	1	.0000	23.77	.00	11.89	23.77	.000	3.3381E-06			
2	2	.0000	22.84	.00	11.42	22.84	.000	2.9507E-06			
2	3	.0000	22.84	.00	11.42	22.84	.000	2.9507E-06			
3	1	.0000	24.75	.00	12.37	24.75	.000	3.7765E-06			
3	2	.0000	23.63	.00	11.82	23.63	.000	3.2769E-06			
3	3	.0000	23.63	.00	11.82	23.63	.000	3.2769E-06			

Calculation No.: AES-C-3865-2	Made by: RDA	Date: 2/16/00	Client: SCE
	Checked by: MJC	Date: 18 Feb 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-7 of C-16

1	1	1.000	21.83	.00	10.91	21.83	.000	2.5672E-06	2.567E-06	.486	1.2090E+05
1	2	1.000	21.33	.00	10.67	21.33	.000	2.3929E-06	2.393E-06	.696	
1	3	1.000	21.33	.00	10.67	21.33	.000	2.3929E-06	2.393E-06	.696	
2	1	.0000	24.00	.00	12.00	24.00	.000	3.4363E-06			
2	2	.0000	23.12	.00	11.56	23.12	.000	3.0657E-06			
2	3	.0000	23.12	.00	11.56	23.12	.000	3.0657E-06			
3	1	.0000	24.99	.00	12.50	24.99	.000	3.8914E-06			
3	2	.0000	23.93	.00	11.97	23.93	.000	3.4074E-06			
3	3	.0000	23.93	.00	11.97	23.93	.000	3.4074E-06			
1	1	1.000	22.02	.00	11.01	22.02	.000	2.6374E-06	2.637E-06	.500	1.2637E+05
1	2	1.000	21.59	.00	10.79	21.59	.000	2.4815E-06	2.482E-06	.709	
1	3	1.000	21.59	.00	10.79	21.59	.000	2.4816E-06	2.482E-06	.709	
2	1	.0000	24.23	.00	12.11	24.23	.000	3.5384E-06			
2	2	.0000	23.41	.00	11.71	23.41	.000	3.1852E-06			
2	3	.0000	23.41	.00	11.71	23.41	.000	3.1852E-06			
3	1	.0000	25.24	.00	12.62	25.24	.000	4.0109E-06			
3	2	.0000	24.24	.00	12.12	24.24	.000	3.5431E-06			
3	3	.0000	24.24	.00	12.12	24.24	.000	3.5431E-06			
1	1	1.000	22.21	.00	11.11	22.21	.000	2.7101E-06	2.710E-06	.515	1.3185E+05
1	2	1.000	21.84	.00	10.92	21.84	.000	2.5731E-06	2.573E-06	.723	
1	3	1.000	21.84	.00	10.92	21.84	.000	2.5731E-06	2.573E-06	.723	
2	1	.0000	24.46	.00	12.23	24.46	.000	3.6444E-06			
2	2	.0000	23.71	.00	11.85	23.71	.000	3.3091E-06			
2	3	.0000	23.71	.00	11.85	23.71	.000	3.3091E-06			
3	1	.0000	25.49	.00	12.75	25.49	.000	4.1350E-06			
3	2	.0000	24.55	.00	12.28	24.55	.000	3.6841E-06			
3	3	.0000	24.55	.00	12.28	24.55	.000	3.6841E-06			
1	1	1.000	22.41	.00	11.21	22.41	.000	2.7851E-06	2.785E-06	.530	1.3734E+05
1	2	1.000	22.10	.00	11.05	22.10	.000	2.6676E-06	2.668E-06	.738	
1	3	1.000	22.10	.00	11.05	22.10	.000	2.6676E-06	2.668E-06	.738	
2	1	.0000	24.70	.00	12.35	24.70	.000	3.7541E-06			
2	2	.0000	24.00	.00	12.00	24.00	.000	3.4375E-06			
2	3	.0000	24.00	.00	12.00	24.00	.000	3.4375E-06			
3	1	.0000	25.75	.00	12.87	25.75	.000	4.2637E-06			
3	2	.0000	24.86	.00	12.43	24.86	.000	3.8303E-06			
3	3	.0000	24.86	.00	12.43	24.86	.000	3.8303E-06			
1	1	1.000	22.61	.00	11.31	22.61	.000	2.8629E-06	2.863E-06	.545	1.4283E+05
1	2	1.000	22.36	.00	11.18	22.36	.000	2.7652E-06	2.765E-06	.753	
1	3	1.000	22.36	.00	11.18	22.36	.000	2.7652E-06	2.765E-06	.753	
2	1	.0000	24.94	.00	12.47	24.94	.000	3.8680E-06			
2	2	.0000	24.30	.00	12.15	24.30	.000	3.5707E-06			
2	3	.0000	24.30	.00	12.15	24.30	.000	3.5707E-06			
3	1	.0000	26.01	.00	13.00	26.01	.000	4.3976E-06			
3	2	.0000	25.18	.00	12.59	25.18	.000	3.9821E-06			
3	3	.0000	25.18	.00	12.59	25.18	.000	3.9821E-06			
1	1	1.000	22.82	.00	11.41	22.82	.000	2.9443E-06	2.944E-06	.561	1.4833E+05
1	2	1.000	22.63	.00	11.31	22.63	.000	2.8674E-06	2.867E-06	.768	
1	3	1.000	22.63	.00	11.31	22.63	.000	2.8674E-06	2.867E-06	.768	
2	1	.0000	25.19	.00	12.60	25.19	.000	3.9870E-06			
2	2	.0000	24.61	.00	12.30	24.61	.000	3.7098E-06			
2	3	.0000	24.61	.00	12.30	24.61	.000	3.7098E-06			
3	1	.0000	26.27	.00	13.14	26.27	.000	4.5373E-06			
3	2	.0000	25.50	.00	12.75	25.50	.000	4.1407E-06			
3	3	.0000	25.50	.00	12.75	25.50	.000	4.1407E-06			
1	1	1.000	23.03	.00	11.52	23.03	.000	3.0291E-06	3.029E-06	.578	1.5384E+05
1	2	1.000	22.90	.00	11.45	22.90	.000	2.9737E-06	2.974E-06	.784	
1	3	1.000	22.90	.00	11.45	22.90	.000	2.9737E-06	2.974E-06	.784	
2	1	.0000	25.44	.00	12.72	25.44	.000	4.1108E-06			
2	2	.0000	24.91	.00	12.46	24.91	.000	3.8545E-06			
2	3	.0000	24.91	.00	12.46	24.91	.000	3.8545E-06			
3	1	.0000	26.55	.00	13.27	26.55	.000	4.6829E-06			
3	2	.0000	25.83	.00	12.91	25.83	.000	4.3058E-06			
3	3	.0000	25.83	.00	12.91	25.83	.000	4.3058E-06			
1	1	1.000	23.25	.00	11.62	23.25	.000	3.1171E-06	3.117E-06	.595	1.5935E+05
1	2	1.000	23.17	.00	11.58	23.17	.000	3.0838E-06	3.084E-06	.801	
1	3	1.000	23.17	.00	11.58	23.17	.000	3.0839E-06	3.084E-06	.801	
2	1	.0000	25.70	.00	12.85	25.70	.000	4.2396E-06			
2	2	.0000	25.23	.00	12.61	25.23	.000	4.0050E-06			
2	3	.0000	25.23	.00	12.61	25.23	.000	4.0049E-06			
3	1	.0000	26.82	.00	13.41	26.82	.000	4.8343E-06			
3	2	.0000	26.16	.00	13.08	26.16	.000	4.4776E-06			
3	3	.0000	26.16	.00	13.08	26.16	.000	4.4776E-06			
1	1	1.000	23.47	.00	11.73	23.47	.000	3.2086E-06	3.209E-06	.612	1.6486E+05
1	2	1.000	23.44	.00	11.72	23.44	.000	3.1980E-06	3.198E-06	.818	
1	3	1.000	23.44	.00	11.72	23.44	.000	3.1979E-06	3.198E-06	.818	
2	1	.0000	25.96	.00	12.98	25.96	.000	4.3735E-06			
2	2	.0000	25.54	.00	12.77	25.54	.000	4.1611E-06			
2	3	.0000	25.54	.00	12.77	25.54	.000	4.1611E-06			
3	1	.0000	27.10	.00	13.55	27.10	.000	4.9918E-06			
3	2	.0000	26.50	.00	13.25	26.50	.000	4.6560E-06			
3	3	.0000	26.50	.00	13.25	26.50	.000	4.6560E-06			

Calculation No.: AES-C-3865-2	Made by:	Date: 2/16/00	Client: SCE
	Checked by:	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-8 of C-16

1	1	1.000	23.69	.00	11.85	23.69	.000	3.3040E-06	3.304E-06	.630	1.7036E+05
1	2	1.000	23.73	.00	11.86	23.73	.000	3.3170E-06	3.317E-06	.836	
1	3	1.000	23.73	.00	11.86	23.73	.000	3.3170E-06	3.317E-06	.836	
2	1	.0000	26.23	.00	13.11	26.23	.000	4.5131E-06			
2	2	.0000	25.86	.00	12.93	25.86	.000	4.3240E-06			
2	3	.0000	25.86	.00	12.93	25.86	.000	4.3240E-06			
3	1	.0000	27.39	.00	13.70	27.39	.000	5.1561E-06			
3	2	.0000	26.84	.00	13.42	26.84	.000	4.8422E-06			
3	3	.0000	26.84	.00	13.42	26.84	.000	4.8422E-06			
1	1	1.000	24.00	.00	12.00	24.00	.000	3.4344E-06	3.434E-06	.654	1.7757E+05
1	2	1.000	24.10	.00	12.05	24.10	.000	3.4798E-06	3.480E-06	.861	
1	3	1.000	24.10	.00	12.05	24.10	.000	3.4798E-06	3.480E-06	.861	
2	1	.0000	26.59	.00	13.29	26.59	.000	4.7047E-06			
2	2	.0000	26.29	.00	13.15	26.29	.000	4.5475E-06			
2	3	.0000	26.29	.00	13.15	26.29	.000	4.5475E-06			
3	1	.0000	27.78	.00	13.89	27.78	.000	5.3817E-06			
3	2	.0000	27.29	.00	13.65	27.29	.000	5.0980E-06			
3	3	.0000	27.29	.00	13.65	27.29	.000	5.0980E-06			
1	1	1.000	24.30	.00	12.15	24.30	.000	3.5683E-06	3.568E-06	.679	1.8465E+05
1	2	1.000	24.47	.00	12.23	24.47	.000	3.6461E-06	3.646E-06	.896	
1	3	1.000	24.47	.00	12.23	24.47	.000	3.6461E-06	3.646E-06	.896	
2	1	.0000	26.94	.00	13.47	26.94	.000	4.9018E-06			
2	2	.0000	26.72	.00	13.36	26.72	.000	4.7770E-06			
2	3	.0000	26.72	.00	13.36	26.72	.000	4.7770E-06			
3	1	.0000	28.16	.00	14.08	28.16	.000	5.6141E-06			
3	2	.0000	27.74	.00	13.87	27.74	.000	5.3611E-06			
3	3	.0000	27.74	.00	13.87	27.74	.000	5.3611E-06			
1	1	1.000	24.60	.00	12.30	24.60	.000	3.7058E-06	3.706E-06	.704	1.9161E+05
1	2	1.000	24.83	.00	12.42	24.83	.000	3.8168E-06	3.817E-06	.912	
1	3	1.000	24.83	.00	12.42	24.83	.000	3.8168E-06	3.817E-06	.912	
2	1	.0000	27.30	.00	13.65	27.30	.000	5.1051E-06			
2	2	.0000	27.14	.00	13.57	27.14	.000	5.0135E-06			
2	3	.0000	27.14	.00	13.57	27.14	.000	5.0135E-06			
3	1	.0000	28.55	.00	14.27	28.55	.000	5.8543E-06			
3	2	.0000	28.19	.00	14.10	28.19	.000	5.6329E-06			
3	3	.0000	28.19	.00	14.10	28.19	.000	5.6329E-06			
1	1	1.000	24.90	.00	12.45	24.90	.000	3.8487E-06	3.849E-06	.730	1.9845E+05
1	2	1.000	25.20	.00	12.60	25.20	.000	3.9935E-06	3.994E-06	.939	
1	3	1.000	25.20	.00	12.60	25.20	.000	3.9935E-06	3.994E-06	.939	
2	1	.0000	27.67	.00	13.83	27.67	.000	5.3164E-06			
2	2	.0000	27.57	.00	13.78	27.57	.000	5.2588E-06			
2	3	.0000	27.57	.00	13.78	27.57	.000	5.2588E-06			
3	1	.0000	28.94	.00	14.47	28.94	.000	6.1033E-06			
3	2	.0000	28.64	.00	14.32	28.64	.000	5.9146E-06			
3	3	.0000	28.64	.00	14.32	28.64	.000	5.9146E-06			
1	1	1.000	25.21	.00	12.60	25.21	.000	3.9965E-06	3.997E-06	.757	2.0518E+05
1	2	1.000	25.57	.00	12.79	25.57	.000	4.1757E-06	4.176E-06	.966	
1	3	1.000	25.57	.00	12.79	25.57	.000	4.1757E-06	4.176E-06	.966	
2	1	.0000	28.03	.00	14.02	28.03	.000	5.5351E-06			
2	2	.0000	27.99	.00	14.00	27.99	.000	5.5122E-06			
2	3	.0000	27.99	.00	14.00	27.99	.000	5.5122E-06			
3	1	.0000	29.33	.00	14.67	29.33	.000	6.3615E-06			
3	2	.0000	29.10	.00	14.55	29.10	.000	6.2062E-06			
3	3	.0000	29.10	.00	14.55	29.10	.000	6.2062E-06			
1	1	1.000	25.52	.00	12.76	25.52	.000	4.1501E-06	4.150E-06	.784	2.1181E+05
1	2	1.000	25.94	.00	12.97	25.94	.000	4.3651E-06	4.365E-06	.994	
1	3	1.000	25.94	.00	12.97	25.94	.000	4.3651E-06	4.365E-06	.994	
2	1	.0000	28.40	.00	14.20	28.40	.000	5.7624E-06			
2	2	.0000	28.42	.00	14.21	28.42	.000	5.7755E-06			
2	3	.0000	28.42	.00	14.21	28.42	.000	5.7755E-06			
3	1	.0000	29.73	.00	14.86	29.73	.000	6.6296E-06			
3	2	.0000	29.55	.00	14.78	29.55	.000	6.5091E-06			
3	3	.0000	29.55	.00	14.78	29.55	.000	6.5091E-06			
1	1	1.000	25.83	.00	12.92	25.83	.000	4.3080E-06	4.308E-06	.911	2.1834E+05
1	2	1.000	26.32	.00	13.16	26.32	.000	4.5596E-06	4.560E-06	1.02	
1	3	1.000	26.32	.00	13.16	26.32	.000	4.5596E-06	4.560E-06	1.02	
2	1	.0000	28.77	.00	14.39	28.77	.000	5.9968E-06			
2	2	.0000	28.85	.00	14.43	28.85	.000	6.0471E-06			
2	3	.0000	28.85	.00	14.43	28.85	.000	6.0471E-06			
3	1	.0000	30.13	.00	15.06	30.13	.000	6.9066E-06			
3	2	.0000	30.01	.00	15.00	30.01	.000	6.8222E-06			
3	3	.0000	30.01	.00	15.00	30.01	.000	6.8222E-06			
1	1	1.000	26.15	.00	13.07	26.15	.000	4.4705E-06	4.471E-06	.840	2.2478E+05
1	2	1.000	26.69	.00	13.34	26.69	.000	4.7595E-06	4.760E-06	1.05	
1	3	1.000	26.69	.00	13.34	26.69	.000	4.7595E-06	4.760E-06	1.05	
2	1	.0000	29.15	.00	14.57	29.15	.000	6.2191E-06			
2	2	.0000	29.28	.00	14.64	29.28	.000	6.3276E-06			
2	3	.0000	29.28	.00	14.64	29.28	.000	6.3276E-06			
3	1	.0000	30.53	.00	15.26	30.53	.000	7.1933E-06			
3	2	.0000	30.46	.00	15.23	30.46	.000	7.1461E-06			
3	3	.0000	30.46	.00	15.23	30.46	.000	7.1461E-06			

Calculation No.: AES-C-3865-2	Made by: [illegible]	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: [illegible]	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-9 of C-16

1	1	1.000	26.46	.00	13.23	26.46	.000	4.6383E-06	4.638E-06	.868	2.3112E+05
1	2	1.000	27.06	.00	13.53	27.06	.000	4.9655E-06	4.965E-06	1.08	
1	3	1.000	27.06	.00	13.53	27.06	.000	4.9654E-06	4.965E-06	1.08	
2	1	.0000	29.52	.00	14.76	29.52	.000	6.4898E-06			
2	2	.0000	29.71	.00	14.86	29.71	.000	6.6174E-06			
2	3	.0000	29.71	.00	14.86	29.71	.000	6.6174E-06			
3	1	.0000	30.93	.00	15.47	30.93	.000	7.4905E-06			
3	2	.0000	30.92	.00	15.46	30.92	.000	7.4814E-06			
3	3	.0000	30.92	.00	15.46	30.92	.000	7.4814E-06			
1	1	1.000	26.78	.00	13.39	26.78	.000	4.8124E-06	4.812E-06	.898	2.3739E+05
1	2	1.000	27.43	.00	13.71	27.43	.000	5.178SE-06	5.178E-06	1.12	
1	3	1.000	27.43	.00	13.71	27.43	.000	5.1785E-06	5.178E-06	1.12	
2	1	.0000	29.90	.00	14.95	29.90	.000	6.7500E-06			
2	2	.0000	30.14	.00	15.07	30.14	.000	6.9177E-06			
2	3	.0000	30.14	.00	15.07	30.14	.000	6.9177E-06			
3	1	.0000	31.34	.00	15.67	31.34	.000	7.7989E-06			
3	2	.0000	31.38	.00	15.69	31.38	.000	7.8290E-06			
3	3	.0000	31.38	.00	15.69	31.38	.000	7.8290E-06			
1	1	1.000	27.10	.00	13.55	27.10	.000	4.9922E-06	4.992E-06	.928	2.4357E+05
1	2	1.000	27.80	.00	13.90	27.80	.000	5.3982E-06	5.398E-06	1.15	
1	3	1.000	27.80	.00	13.90	27.80	.000	5.3982E-06	5.398E-06	1.15	
2	1	.0000	30.29	.00	15.14	30.29	.000	7.0193E-06			
2	2	.0000	30.58	.00	15.29	30.58	.000	7.2286E-06			
2	3	.0000	30.58	.00	15.29	30.58	.000	7.2287E-06			
3	1	.0000	31.76	.00	15.88	31.76	.000	8.1183E-06			
3	2	.0000	31.85	.00	15.92	31.85	.000	8.1893E-06			
3	3	.0000	31.85	.00	15.92	31.85	.000	8.1893E-06			
1	1	1.000	27.43	.00	13.71	27.43	.000	5.1781E-06	5.178E-06	.959	2.4968E+05
1	2	1.000	28.18	.00	14.09	28.18	.000	5.6251E-06	5.625E-06	1.18	
1	3	1.000	28.18	.00	14.09	28.18	.000	5.6251E-06	5.625E-06	1.18	
2	1	.0000	30.67	.00	15.34	30.67	.000	7.2983E-06			
2	2	.0000	31.01	.00	15.51	31.01	.000	7.5505E-06			
2	3	.0000	31.01	.00	15.51	31.01	.000	7.5505E-06			
3	1	.0000	32.17	.00	16.09	32.17	.000	8.4499E-06			
3	2	.0000	32.31	.00	16.16	32.31	.000	8.5626E-06			
3	3	.0000	32.31	.00	16.16	32.31	.000	8.5627E-06			
1	1	1.000	27.76	.00	13.88	27.76	.000	5.3704E-06	5.370E-06	.991	2.5571E+05
1	2	1.000	28.56	.00	14.28	28.56	.000	5.8611E-06	5.861E-06	1.22	
1	3	1.000	28.56	.00	14.28	28.56	.000	5.8611E-06	5.861E-06	1.22	
2	1	.0000	31.06	.00	15.53	31.06	.000	7.5873E-06			
2	2	.0000	31.46	.00	15.73	31.46	.000	7.8851E-06			
2	3	.0000	31.46	.00	15.73	31.46	.000	7.8851E-06			
3	1	.0000	32.59	.00	16.30	32.59	.000	8.7935E-06			
3	2	.0000	32.78	.00	16.39	32.78	.000	8.9508E-06			
3	3	.0000	32.78	.00	16.39	32.78	.000	8.9509E-06			
1	1	1.000	28.09	.00	14.04	28.09	.000	5.5699E-06	5.570E-06	1.02	2.6167E+05
1	2	1.000	28.94	.00	14.47	28.94	.000	6.1055E-06	6.105E-06	1.25	
1	3	1.000	28.94	.00	14.47	28.94	.000	6.1055E-06	6.105E-06	1.25	
2	1	.0000	31.46	.00	15.73	31.46	.000	7.8872E-06			
2	2	.0000	31.90	.00	15.95	31.90	.000	8.2321E-06			
2	3	.0000	31.90	.00	15.95	31.90	.000	8.2322E-06			
3	1	.0000	33.02	.00	16.51	33.02	.000	9.1501E-06			
3	2	.0000	33.26	.00	16.63	33.26	.000	9.3534E-06			
3	3	.0000	33.26	.00	16.63	33.26	.000	9.3534E-06			
1	1	1.000	28.42	.00	14.21	28.42	.000	5.7763E-06	5.776E-06	1.06	2.6756E+05
1	2	1.000	29.33	.00	14.66	29.33	.000	6.3578E-06	6.358E-06	1.29	
1	3	1.000	29.33	.00	14.66	29.33	.000	6.3578E-06	6.358E-06	1.29	
2	1	.0000	31.86	.00	15.93	31.86	.000	8.1980E-06			
2	2	.0000	32.35	.00	16.17	32.35	.000	8.5915E-06			
2	3	.0000	32.35	.00	16.17	32.35	.000	8.5915E-06			
3	1	.0000	33.45	.00	16.72	33.45	.000	9.5197E-06			
3	2	.0000	33.73	.00	16.87	33.73	.000	9.7706E-06			
3	3	.0000	33.73	.00	16.87	33.73	.000	9.7706E-06			
1	1	1.000	28.76	.00	14.38	28.76	.000	5.9901E-06	5.990E-06	1.09	2.7339E+05
1	2	1.000	29.71	.00	14.86	29.71	.000	6.6187E-06	6.619E-06	1.33	
1	3	1.000	29.71	.00	14.86	29.71	.000	6.6187E-06	6.619E-06	1.33	
2	1	.0000	32.26	.00	16.13	32.26	.000	8.5198E-06			
2	2	.0000	32.80	.00	16.40	32.80	.000	8.9635E-06			
2	3	.0000	32.80	.00	16.40	32.80	.000	8.9635E-06			
3	1	.0000	33.88	.00	16.94	33.88	.000	9.9027E-06			
3	2	.0000	34.21	.00	17.11	34.21	.000	1.0203E-05			
3	3	.0000	34.21	.00	17.11	34.21	.000	1.0203E-05			
1	1	1.000	29.10	.00	14.55	29.10	.000	6.2102E-06	6.210E-06	1.13	2.7915E+05
1	2	1.000	30.10	.00	15.05	30.10	.000	6.8874E-06	6.887E-06	1.37	
1	3	1.000	30.10	.00	15.05	30.10	.000	6.8874E-06	6.887E-06	1.37	
2	1	.0000	32.66	.00	16.33	12.66	.000	8.8524E-06			
2	2	.0000	33.25	.00	16.62	33.25	.000	9.3481E-06			
2	3	.0000	33.25	.00	16.62	33.25	.000	9.3481E-06			
3	1	.0000	34.32	.00	17.16	34.32	.000	1.0299E-05			
3	2	.0000	34.69	.00	17.35	34.69	.000	1.0652E-05			
3	3	.0000	34.69	.00	17.35	34.69	.000	1.0652E-05			

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 19 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-10 of C-16

1	1	1.000	29.44	.00	14.72	29.44	.000	6.4367E-06	6.437E-06	1.16	2.8485E+05
1	2	1.000	30.49	.00	15.24	30.49	.000	7.1637E-06	7.164E-06	1.41	
1	3	1.000	30.49	.00	15.24	30.49	.000	7.1637E-06	7.164E-06	1.41	
2	1	.0000	33.07	.00	16.54	33.07	.000	9.1958E-06			
2	2	.0000	33.70	.00	16.85	33.70	.000	9.7453E-06			
2	3	.0000	33.70	.00	16.85	33.70	.000	9.7453E-06			
3	1	.0000	34.75	.00	17.38	34.75	.000	1.0708E-05			
3	2	.0000	35.18	.00	17.59	35.18	.000	1.2115E-05			
3	3	.0000	35.18	.00	17.59	35.18	.000	1.2115E-05			
1	1	1.000	29.79	.00	14.89	29.79	.000	6.6711E-06	6.671E-06	1.20	2.9048E+05
1	2	1.000	30.88	.00	15.44	30.88	.000	7.4489E-06	7.449E-06	1.45	
1	3	1.000	30.88	.00	15.44	30.88	.000	7.4489E-06	7.449E-06	1.45	
2	1	.0000	33.48	.00	16.74	33.48	.000	9.5515E-06			
2	2	.0000	34.16	.00	17.08	34.16	.000	1.0156E-05			
2	3	.0000	34.16	.00	17.08	34.16	.000	1.0156E-05			
3	1	.0000	35.20	.00	17.60	35.20	.000	1.1133E-05			
3	2	.0000	35.67	.00	17.83	35.67	.000	1.1596E-05			
3	3	.0000	35.67	.00	17.83	35.67	.000	1.1596E-05			
1	1	1.000	30.14	.00	15.07	30.14	.000	6.9132E-06	6.913E-06	1.24	2.9607E+05
1	2	1.000	31.27	.00	15.64	31.27	.000	7.7438E-06	7.744E-06	1.49	
1	3	1.000	31.27	.00	15.64	31.27	.000	7.7438E-06	7.744E-06	1.49	
2	1	.0000	33.90	.00	16.95	33.90	.000	9.9199E-06			
2	2	.0000	34.62	.00	17.31	34.62	.000	1.0583E-05			
2	3	.0000	34.62	.00	17.31	34.62	.000	1.0583E-05			
3	1	.0000	35.64	.00	17.82	35.64	.000	1.1573E-05			
3	2	.0000	36.16	.00	18.08	36.16	.000	1.2094E-05			
3	3	.0000	36.16	.00	18.08	36.16	.000	1.2094E-05			
1	1	1.000	30.49	.00	15.24	30.49	.000	7.1627E-06	7.163E-06	1.28	3.0160E+05
1	2	1.000	31.67	.00	15.83	31.67	.000	8.0486E-06	8.049E-06	1.53	
1	3	1.000	31.67	.00	15.83	31.67	.000	8.0486E-06	8.049E-06	1.53	
2	1	.0000	34.32	.00	17.16	34.32	.000	1.0301E-05			
2	2	.0000	35.08	.00	17.54	35.08	.000	1.1025E-05			
2	3	.0000	35.08	.00	17.54	35.08	.000	1.1025E-05			
3	1	.0000	36.09	.00	18.05	36.09	.000	1.2027E-05			
3	2	.0000	36.66	.00	18.33	36.66	.000	1.2611E-05			
3	3	.0000	36.66	.00	18.33	36.66	.000	1.2611E-05			
1	1	1.000	30.84	.00	15.42	30.84	.000	7.4205E-06	7.420E-06	1.32	3.0707E+05
1	2	1.000	32.07	.00	16.03	32.07	.000	8.3641E-06	8.364E-06	1.58	
1	3	1.000	32.07	.00	16.03	32.07	.000	8.3641E-06	8.364E-06	1.58	
2	1	.0000	34.74	.00	17.37	34.74	.000	1.0694E-05			
2	2	.0000	35.55	.00	17.78	35.55	.000	1.1483E-05			
2	3	.0000	35.55	.00	17.78	35.55	.000	1.1483E-05			
3	1	.0000	36.55	.00	18.27	36.55	.000	1.2497E-05			
3	2	.0000	37.16	.00	18.58	37.16	.000	1.3147E-05			
3	3	.0000	37.16	.00	18.58	37.16	.000	1.3147E-05			
1	1	1.000	31.20	.00	15.60	31.20	.000	7.6884E-06	7.688E-06	1.36	3.1250E+05
1	2	1.000	32.47	.00	16.24	32.47	.000	8.6924E-06	8.692E-06	1.62	
1	3	1.000	32.47	.00	16.24	32.47	.000	8.6924E-06	8.692E-06	1.62	
2	1	.0000	35.17	.00	17.58	35.17	.000	1.1103E-05			
2	2	.0000	36.03	.00	18.01	36.03	.000	1.1959E-05			
2	3	.0000	36.03	.00	18.01	36.03	.000	1.1959E-05			
3	1	.0000	37.01	.00	18.50	37.01	.000	1.2985E-05			
3	2	.0000	37.66	.00	18.83	37.66	.000	1.3703E-05			
3	3	.0000	37.66	.00	18.83	37.66	.000	1.3703E-05			
1	1	1.000	31.56	.00	15.78	31.56	.000	7.9643E-06	7.964E-06	1.40	3.1787E+05
1	2	1.000	32.88	.00	16.44	32.88	.000	9.0305E-06	9.031E-06	1.67	
1	3	1.000	32.88	.00	16.44	32.88	.000	9.0305E-06	9.031E-06	1.67	
2	1	.0000	35.60	.00	17.80	35.60	.000	1.1525E-05			
2	2	.0000	36.50	.00	18.25	36.50	.000	1.2450E-05			
2	3	.0000	36.50	.00	18.25	36.50	.000	1.2450E-05			
3	1	.0000	37.47	.00	18.73	37.47	.000	1.3489E-05			
3	2	.0000	38.17	.00	19.08	38.17	.000	1.4280E-05			
3	3	.0000	38.17	.00	19.08	38.17	.000	1.4280E-05			
1	1	1.000	31.92	.00	15.96	31.92	.000	8.2491E-06	8.249E-06	1.44	3.2319E+05
1	2	1.000	33.29	.00	16.64	33.29	.000	9.3810E-06	9.381E-06	1.72	
1	3	1.000	33.29	.00	16.64	33.29	.000	9.3810E-06	9.381E-06	1.72	
2	1	.0000	36.03	.00	18.01	36.03	.000	1.1961E-05			
2	2	.0000	36.98	.00	18.49	36.98	.000	1.2960E-05			
2	3	.0000	36.98	.00	18.49	36.98	.000	1.2960E-05			
3	1	.0000	37.93	.00	18.97	37.93	.000	1.4012E-05			
3	2	.0000	38.68	.00	19.34	38.68	.000	1.4878E-05			
3	3	.0000	38.68	.00	19.34	38.68	.000	1.4878E-05			
1	1	1.000	32.29	.00	16.14	32.29	.000	8.5431E-06	8.543E-06	1.49	3.2846E+05
1	2	1.000	33.70	.00	16.85	33.70	.000	9.7453E-06	9.745E-06	1.77	
1	3	1.000	33.70	.00	16.85	33.70	.000	9.7453E-06	9.745E-06	1.77	
2	1	.0000	36.46	.00	18.23	36.46	.000	1.2411E-05			
2	2	.0000	37.47	.00	18.73	37.47	.000	1.3490E-05			
2	3	.0000	37.47	.00	18.73	37.47	.000	1.3490E-05			
3	1	.0000	38.40	.00	19.20	38.40	.000	1.4552E-05			
3	2	.0000	39.20	.00	19.60	39.20	.000	1.5499E-05			
3	3	.0000	39.20	.00	19.60	39.20	.000	1.5499E-05			

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-11 of C-16

1	1	1.000	32.66	.00	16.33	32.66	.000	8.8475E-06	8.848E-06	1.53	3.3169E+05
1	2	1.000	34.12	.00	17.06	34.12	.000	1.0123E-05	1.012E-05	1.82	
1	3	1.000	34.12	.00	17.06	34.12	.000	1.0123E-05	1.012E-05	1.82	
2	1	.0000	36.91	.00	18.45	36.91	.000	1.2877E-05			
2	2	.0000	37.96	.00	18.98	37.96	.000	1.4039E-05			
2	3	.0000	37.96	.00	18.98	37.96	.000	1.4039E-05			
3	1	.0000	38.88	.00	19.44	38.88	.000	1.5111E-05			
3	2	.0000	39.73	.00	19.86	39.73	.000	1.6143E-05			
3	3	.0000	39.73	.00	19.86	39.73	.000	1.6143E-05			
1	1	1.000	33.03	.00	16.52	33.03	.000	9.1614E-06	9.161E-06	1.58	3.3887E+05
1	2	1.000	34.54	.00	17.27	34.54	.000	1.0512E-05	1.051E-05	1.88	
1	3	1.000	34.54	.00	17.27	34.54	.000	1.0512E-05	1.051E-05	1.88	
2	1	.0000	37.35	.00	18.67	37.35	.000	1.3359E-05			
2	2	.0000	38.45	.00	19.23	38.45	.000	1.4607E-05			
2	3	.0000	38.45	.00	19.23	38.45	.000	1.4607E-05			
3	1	.0000	39.36	.00	19.68	39.36	.000	1.5689E-05			
3	2	.0000	40.25	.00	20.13	40.25	.000	1.6811E-05			
3	3	.0000	40.25	.00	20.13	40.25	.000	1.6811E-05			
1	1	1.000	33.41	.00	16.70	33.41	.000	9.4840E-06	9.484E-06	1.63	3.4400E+05
1	2	1.000	34.97	.00	17.48	34.97	.000	1.0912E-05	1.091E-05	1.93	
1	3	1.000	34.97	.00	17.48	34.97	.000	1.0912E-05	1.091E-05	1.93	
2	1	.0000	37.80	.00	18.90	37.80	.000	1.3856E-05			
2	2	.0000	38.95	.00	19.47	38.95	.000	1.5193E-05			
2	3	.0000	38.95	.00	19.47	38.95	.000	1.5193E-05			
3	1	.0000	39.84	.00	19.92	39.84	.000	1.6287E-05			
3	2	.0000	40.78	.00	20.39	40.78	.000	1.7500E-05			
3	3	.0000	40.78	.00	20.39	40.78	.000	1.7500E-05			
1	1	1.000	33.78	.00	16.89	33.78	.000	9.8159E-06	9.816E-06	1.68	3.4910E+05
1	2	1.000	35.39	.00	17.70	35.39	.000	1.1324E-05	1.132E-05	1.99	
1	3	1.000	35.39	.00	17.70	35.39	.000	1.1324E-05	1.132E-05	1.99	
2	1	.0000	38.25	.00	19.12	38.25	.000	1.4368E-05			
2	2	.0000	39.45	.00	19.72	39.45	.000	1.5797E-05			
2	3	.0000	39.45	.00	19.72	39.45	.000	1.5797E-05			
3	1	.0000	40.33	.00	20.16	40.33	.000	1.6904E-05			
3	2	.0000	41.32	.00	20.66	41.32	.000	1.8214E-05			
3	3	.0000	41.32	.00	20.66	41.32	.000	1.8214E-05			
1	1	1.000	34.16	.00	17.08	34.16	.000	1.0160E-05	1.016E-05	1.73	3.5415E+05
1	2	1.000	35.82	.00	17.91	35.82	.000	1.1753E-05	1.175E-05	2.05	
1	3	1.000	35.82	.00	17.91	35.82	.000	1.1753E-05	1.175E-05	2.05	
2	1	.0000	38.70	.00	19.35	38.70	.000	1.4898E-05			
2	2	.0000	39.95	.00	19.98	39.95	.000	1.6426E-05			
2	3	.0000	39.95	.00	19.98	39.95	.000	1.6426E-05			
3	1	.0000	40.82	.00	20.41	40.82	.000	1.7543E-05			
3	2	.0000	41.86	.00	20.93	41.86	.000	1.8956E-05			
3	3	.0000	41.86	.00	20.93	41.86	.000	1.8956E-05			
1	1	1.000	34.55	.00	17.27	34.55	.000	1.0514E-05	1.051E-05	1.78	3.5915E+05
1	2	1.000	36.26	.00	18.13	36.26	.000	1.2199E-05	1.220E-05	2.11	
1	3	1.000	36.26	.00	18.13	36.26	.000	1.2199E-05	1.220E-05	2.11	
2	1	.0000	39.16	.00	19.58	39.16	.000	1.5447E-05			
2	2	.0000	40.46	.00	20.23	40.46	.000	1.7079E-05			
2	3	.0000	40.46	.00	20.23	40.46	.000	1.7079E-05			
3	1	.0000	41.31	.00	20.65	41.31	.000	1.8203E-05			
3	2	.0000	42.40	.00	21.20	42.40	.000	1.9725E-05			
3	3	.0000	42.40	.00	21.20	42.40	.000	1.9725E-05			
1	1	1.000	34.93	.00	17.47	34.93	.000	1.0879E-05	1.088E-05	1.83	3.6412E+05
1	2	1.000	36.70	.00	18.35	36.70	.000	1.2657E-05	1.266E-05	2.17	
1	3	1.000	36.70	.00	18.35	36.70	.000	1.2657E-05	1.266E-05	2.17	
2	1	.0000	39.62	.00	19.81	39.62	.000	1.6012E-05			
2	2	.0000	40.97	.00	20.49	40.97	.000	1.7751E-05			
2	3	.0000	40.97	.00	20.49	40.97	.000	1.7751E-05			
3	1	.0000	41.81	.00	20.90	41.81	.000	1.8882E-05			
3	2	.0000	42.95	.00	21.48	42.95	.000	2.0518E-05			
3	3	.0000	42.95	.00	21.48	42.95	.000	2.0518E-05			
1	1	1.000	35.32	.00	17.66	35.32	.000	1.1254E-05	1.125E-05	1.89	3.6905E+05
1	2	1.000	37.14	.00	18.57	37.14	.000	1.3129E-05	1.313E-05	2.23	
1	3	1.000	37.14	.00	18.57	37.14	.000	1.3129E-05	1.313E-05	2.23	
2	1	.0000	40.08	.00	20.04	40.08	.000	1.6595E-05			
2	2	.0000	41.49	.00	20.75	41.49	.000	1.8449E-05			
2	3	.0000	41.49	.00	20.75	41.49	.000	1.8449E-05			
3	1	.0000	42.31	.00	21.15	42.31	.000	1.9586E-05			
3	2	.0000	43.51	.00	21.75	43.51	.000	2.1340E-05			
3	3	.0000	43.51	.00	21.75	43.51	.000	2.1340E-05			
1	1	1.000	35.71	.00	17.86	35.71	.000	1.1640E-05	1.164E-05	1.94	3.7394E+05
1	2	1.000	37.58	.00	18.79	37.58	.000	1.3615E-05	1.362E-05	2.30	
1	3	1.000	37.58	.00	18.79	37.58	.000	1.3615E-05	1.362E-05	2.30	
2	1	.0000	40.55	.00	20.28	40.55	.000	1.7196E-05			
2	2	.0000	42.01	.00	21.01	42.01	.000	1.9168E-05			
2	3	.0000	42.01	.00	21.01	42.01	.000	1.9168E-05			
3	1	.0000	42.81	.00	21.41	42.81	.000	2.0312E-05			
3	2	.0000	44.06	.00	22.03	44.06	.000	2.2189E-05			
3	3	.0000	44.06	.00	22.03	44.06	.000	2.2189E-05			

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-12 of C-16

1	1	1.000	36.10	.00	18.05	36.10	.000	1.2037E-05	1.204E-05	2.00	3.7880E+05
1	2	1.000	38.03	.00	19.01	38.03	.000	1.4116E-05	1.412E-05	2.36	
1	3	1.000	38.03	.00	19.01	38.03	.000	1.4116E-05	1.412E-05	2.36	
2	1	.0000	41.02	.00	20.51	41.02	.000	1.7815E-05			
2	2	.0000	42.53	.00	21.27	42.53	.000	1.9910E-05			
2	3	.0000	42.53	.00	21.27	42.53	.000	1.9910E-05			
3	1	.0000	43.32	.00	21.66	43.32	.000	2.1061E-05			
3	2	.0000	44.62	.00	22.31	44.62	.000	2.3068E-05			
3	3	.0000	44.62	.00	22.31	44.62	.000	2.3068E-05			
1	1	1.000	36.50	.00	18.25	36.50	.000	1.2446E-05	1.245E-05	2.06	3.8362E+05
1	2	1.000	38.47	.00	19.24	38.47	.000	1.4632E-05	1.463E-05	2.43	
1	3	1.000	38.47	.00	19.24	38.47	.000	1.4632E-05	1.463E-05	2.43	
2	1	.0000	41.50	.00	20.75	41.50	.000	1.8455E-05			
2	2	.0000	43.06	.00	21.53	43.06	.000	2.0678E-05			
2	3	.0000	43.06	.00	21.53	43.06	.000	2.0677E-05			
3	1	.0000	43.83	.00	21.92	43.83	.000	2.1834E-05			
3	2	.0000	45.19	.00	22.59	45.19	.000	2.3977E-05			
3	3	.0000	45.19	.00	22.59	45.19	.000	2.3977E-05			
1	1	1.000	36.89	.00	18.45	36.89	.000	1.2865E-05	1.286E-05	2.12	3.8841E+05
1	2	1.000	38.92	.00	19.46	38.92	.000	1.5165E-05	1.517E-05	2.51	
1	3	1.000	38.92	.00	19.46	38.92	.000	1.5165E-05	1.517E-05	2.51	
2	1	.0000	41.97	.00	20.99	41.97	.000	1.9113E-05			
2	2	.0000	43.59	.00	21.80	43.59	.000	2.1472E-05			
2	3	.0000	43.59	.00	21.80	43.59	.000	2.1472E-05			
3	1	.0000	44.35	.00	22.17	44.35	.000	2.2631E-05			
3	2	.0000	45.76	.00	22.88	45.76	.000	2.4917E-05			
3	3	.0000	45.76	.00	22.88	45.76	.000	2.4917E-05			
1	1	1.000	37.29	.00	18.65	37.29	.000	1.3296E-05	1.330E-05	2.18	3.9316E+05
1	2	1.000	39.38	.00	19.69	39.38	.000	1.5717E-05	1.572E-05	2.58	
1	3	1.000	39.38	.00	19.69	39.38	.000	1.5717E-05	1.572E-05	2.58	
2	1	.0000	42.45	.00	21.23	42.45	.000	1.9791E-05			
2	2	.0000	44.13	.00	22.07	44.13	.000	2.2294E-05			
2	3	.0000	44.13	.00	22.07	44.13	.000	2.2294E-05			
3	1	.0000	44.86	.00	22.43	44.86	.000	2.3454E-05			
3	2	.0000	46.33	.00	23.17	46.33	.000	2.5890E-05			
3	3	.0000	46.33	.00	23.17	46.33	.000	2.5890E-05			
1	1	1.000	37.69	.00	18.85	37.69	.000	1.3741E-05	1.374E-05	2.24	3.9788E+05
1	2	1.000	39.84	.00	19.92	39.84	.000	1.6285E-05	1.629E-05	2.65	
1	3	1.000	39.84	.00	19.92	39.84	.000	1.6285E-05	1.629E-05	2.65	
2	1	.0000	42.93	.00	21.47	42.93	.000	2.0492E-05			
2	2	.0000	44.67	.00	22.34	44.67	.000	2.3144E-05			
2	3	.0000	44.67	.00	22.34	44.67	.000	2.3144E-05			
3	1	.0000	45.39	.00	22.69	45.39	.000	2.4302E-05			
3	2	.0000	46.91	.00	23.46	46.91	.000	2.6895E-05			
3	3	.0000	46.91	.00	23.46	46.91	.000	2.6895E-05			
1	1	1.000	38.10	.00	19.05	38.10	.000	1.4196E-05	1.420E-05	2.31	4.0258E+05
1	2	1.000	40.30	.00	20.15	40.30	.000	1.6869E-05	1.687E-05	2.73	
1	3	1.000	40.30	.00	20.15	40.30	.000	1.6869E-05	1.687E-05	2.73	
2	1	.0000	43.42	.00	21.71	43.42	.000	2.1213E-05			
2	2	.0000	45.21	.00	22.61	45.21	.000	2.4020E-05			
2	3	.0000	45.21	.00	22.61	45.21	.000	2.4020E-05			
3	1	.0000	45.91	.00	22.96	45.91	.000	2.5175E-05			
3	2	.0000	47.49	.00	23.75	47.49	.000	2.7933E-05			
3	3	.0000	47.49	.00	23.75	47.49	.000	2.7933E-05			
1	1	1.000	38.50	.00	19.25	38.50	.000	1.4664E-05	1.466E-05	2.38	4.0724E+05
1	2	1.000	40.76	.00	20.38	40.76	.000	1.7471E-05	1.747E-05	2.81	
1	3	1.000	40.76	.00	20.38	40.76	.000	1.7471E-05	1.747E-05	2.81	
2	1	.0000	43.91	.00	21.96	43.91	.000	2.1955E-05			
2	2	.0000	45.76	.00	22.88	45.76	.000	2.4925E-05			
2	3	.0000	45.76	.00	22.88	45.76	.000	2.4925E-05			
3	1	.0000	46.44	.00	23.22	46.44	.000	2.6075E-05			
3	2	.0000	48.08	.00	24.04	48.08	.000	2.9007E-05			
3	3	.0000	48.08	.00	24.04	48.08	.000	2.9007E-05			
1	1	1.000	38.91	.00	19.45	38.91	.000	1.5143E-05	1.514E-05	2.45	4.1187E+05
1	2	1.000	41.23	.00	20.61	41.23	.000	1.8089E-05	1.809E-05	2.89	
1	3	1.000	41.23	.00	20.61	41.23	.000	1.8089E-05	1.809E-05	2.89	
2	1	.0000	44.40	.00	22.20	44.40	.000	2.2717E-05			
2	2	.0000	46.31	.00	23.16	46.31	.000	2.5856E-05			
2	3	.0000	46.31	.00	23.16	46.31	.000	2.5856E-05			
3	1	.0000	46.97	.00	23.49	46.97	.000	2.7001E-05			
3	2	.0000	48.67	.00	24.34	48.67	.000	3.0114E-05			
3	3	.0000	48.67	.00	24.34	48.67	.000	3.0114E-05			
1	1	1.000	39.31	.00	19.66	39.31	.000	1.5632E-05	1.563E-05	2.52	4.1648E+05
1	2	1.000	41.69	.00	20.84	41.69	.000	1.8721E-05	1.872E-05	2.98	
1	3	1.000	41.69	.00	20.84	41.69	.000	1.8721E-05	1.872E-05	2.98	
2	1	.0000	44.89	.00	22.45	44.89	.000	2.3500E-05			
2	2	.0000	46.87	.00	23.43	46.87	.000	2.6814E-05			
2	3	.0000	46.87	.00	23.43	46.87	.000	2.6814E-05			
3	1	.0000	47.50	.00	23.75	47.50	.000	2.7952E-05			
3	2	.0000	49.26	.00	24.63	49.26	.000	3.1256E-05			
3	3	.0000	49.26	.00	24.63	49.26	.000	3.1255E-05			

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-13 of C-16

1	1	1.000	39.72	.00	19.86	39.72	.000	1.6136E-05	1.614E-05	2.59	4.2107E+05
1	2	1.000	42.16	.00	21.08	42.16	.000	1.9377E-05	1.938E-05	3.07	
1	3	1.000	42.16	.00	21.08	42.16	.000	1.9377E-05	1.938E-05	3.07	
2	1	.0000	45.39	.00	22.69	45.39	.000	2.4305E-05			
2	2	.0000	47.42	.00	23.71	47.42	.000	2.7806E-05			
2	3	.0000	47.42	.00	23.71	47.42	.000	2.7806E-05			
3	1	.0000	48.04	.00	24.02	48.04	.000	2.8931E-05			
3	2	.0000	49.86	.00	24.93	49.86	.000	3.2439E-05			
3	3	.0000	49.86	.00	24.93	49.86	.000	3.2439E-05			
1	1	1.000	40.13	.00	20.06	40.13	.000	1.6653E-05	1.665E-05	2.67	4.2563E+05
1	2	1.000	42.63	.00	21.32	42.63	.000	2.0053E-05	2.005E-05	3.16	
1	3	1.000	42.63	.00	21.32	42.63	.000	2.0053E-05	2.005E-05	3.16	
2	1	.0000	45.89	.00	22.94	45.89	.000	2.5134E-05			
2	2	.0000	47.98	.00	23.99	47.98	.000	2.8830E-05			
2	3	.0000	47.99	.00	23.99	47.99	.000	2.8830E-05			
3	1	.0000	48.58	.00	24.29	48.58	.000	2.9940E-05			
3	2	.0000	50.47	.00	25.23	50.47	.000	3.3662E-05			
3	3	.0000	50.47	.00	25.23	50.47	.000	3.3662E-05			
1	1	1.000	40.54	.00	20.27	40.54	.000	1.7187E-05	1.719E-05	2.74	4.3016E+05
1	2	1.000	43.11	.00	21.56	43.11	.000	2.0752E-05	2.075E-05	3.25	
1	3	1.000	43.11	.00	21.56	43.11	.000	2.0752E-05	2.075E-05	3.25	
2	1	.0000	46.39	.00	23.19	46.39	.000	2.5988E-05			
2	2	.0000	48.55	.00	24.28	48.55	.000	2.9889E-05			
2	3	.0000	48.55	.00	24.28	48.55	.000	2.9890E-05			
3	1	.0000	49.12	.00	24.56	49.12	.000	3.0980E-05			
3	2	.0000	51.08	.00	25.54	51.08	.000	3.4929E-05			
3	3	.0000	51.08	.00	25.54	51.08	.000	3.4929E-05			
1	1	1.000	40.96	.00	20.48	40.96	.000	1.7734E-05	1.773E-05	2.82	4.3467E+05
1	2	1.000	43.59	.00	21.80	43.59	.000	2.1469E-05	2.147E-05	3.34	
1	3	1.000	43.59	.00	21.80	43.59	.000	2.1469E-05	2.147E-05	3.34	
2	1	.0000	46.89	.00	23.45	46.89	.000	2.6865E-05			
2	2	.0000	49.12	.00	24.56	49.12	.000	3.0979E-05			
2	3	.0000	49.12	.00	24.56	49.12	.000	3.0979E-05			
3	1	.0000	49.67	.00	24.83	49.67	.000	3.2049E-05			
3	2	.0000	51.69	.00	25.85	51.69	.000	3.6234E-05			
3	3	.0000	51.69	.00	25.85	51.69	.000	3.6234E-05			
1	1	1.000	41.38	.00	20.69	41.38	.000	1.8300E-05	1.830E-05	2.90	4.3916E+05
1	2	1.000	44.07	.00	22.04	44.07	.000	2.2203E-05	2.220E-05	3.44	
1	3	1.000	44.07	.00	22.04	44.07	.000	2.2203E-05	2.220E-05	3.44	
2	1	.0000	47.41	.00	23.70	47.41	.000	2.7775E-05			
2	2	.0000	49.69	.00	24.85	49.69	.000	3.2100E-05			
2	3	.0000	49.69	.00	24.85	49.69	.000	3.2100E-05			
3	1	.0000	50.22	.00	25.11	50.22	.000	3.3158E-05			
3	2	.0000	52.31	.00	26.16	52.31	.000	3.7580E-05			
3	3	.0000	52.31	.00	26.16	52.31	.000	3.7580E-05			
1	1	1.000	41.81	.00	20.91	41.81	.000	1.8889E-05	1.889E-05	2.98	4.4362E+05
1	2	1.000	44.56	.00	22.28	44.56	.000	2.2962E-05	2.296E-05	3.54	
1	3	1.000	44.56	.00	22.28	44.56	.000	2.2962E-05	2.296E-05	3.54	
2	1	.0000	47.92	.00	23.96	47.92	.000	2.8719E-05			
2	2	.0000	50.27	.00	25.14	50.27	.000	3.3258E-05			
2	3	.0000	50.27	.00	25.14	50.27	.000	3.3258E-05			
3	1	.0000	50.78	.00	25.39	50.78	.000	3.4309E-05			
3	2	.0000	52.93	.00	26.47	52.93	.000	3.8970E-05			
3	3	.0000	52.93	.00	26.47	52.93	.000	3.8970E-05			
1	1	1.000	42.25	.00	21.12	42.25	.000	1.9501E-05	1.950E-05	3.07	4.4807E+05
1	2	1.000	45.05	.00	22.52	45.05	.000	2.3751E-05	2.375E-05	3.65	
1	3	1.000	45.05	.00	22.52	45.05	.000	2.3751E-05	2.375E-05	3.65	
2	1	.0000	48.45	.00	24.23	48.45	.000	2.9698E-05			
2	2	.0000	50.86	.00	25.43	50.86	.000	3.4460E-05			
2	3	.0000	50.86	.00	25.43	50.86	.000	3.4460E-05			
3	1	.0000	51.35	.00	25.68	51.35	.000	3.5499E-05			
3	2	.0000	53.56	.00	26.78	53.56	.000	4.0406E-05			
3	3	.0000	53.56	.00	26.78	53.56	.000	4.0406E-05			
1	1	1.000	42.69	.00	21.35	42.69	.000	2.0141E-05	2.014E-05	3.16	4.5249E+05
1	2	1.000	45.55	.00	22.77	45.55	.000	2.4564E-05	2.456E-05	3.75	
1	3	1.000	45.55	.00	22.77	45.55	.000	2.4564E-05	2.456E-05	3.75	
2	1	.0000	48.99	.00	24.49	48.99	.000	3.0721E-05			
2	2	.0000	51.45	.00	25.72	51.45	.000	3.5702E-05			
2	3	.0000	51.45	.00	25.72	51.45	.000	3.5702E-05			
3	1	.0000	51.93	.00	25.96	51.93	.000	3.6741E-05			
3	2	.0000	54.19	.00	27.10	54.19	.000	4.1890E-05			
3	3	.0000	54.19	.00	27.10	54.19	.000	4.1890E-05			
1	1	1.000	43.15	.00	21.57	43.15	.000	2.0802E-05	2.080E-05	3.25	4.5690E+05
1	2	1.000	46.05	.00	23.02	46.05	.000	2.5400E-05	2.540E-05	3.86	
1	3	1.000	46.05	.00	23.02	46.05	.000	2.5400E-05	2.540E-05	3.86	
2	1	.0000	49.53	.00	24.77	49.53	.000	3.1778E-05			
2	2	.0000	52.04	.00	26.02	52.04	.000	3.6981E-05			
2	3	.0000	52.04	.00	26.02	52.04	.000	3.6981E-05			
3	1	.0000	52.51	.00	26.26	52.51	.000	3.8027E-05			
3	2	.0000	54.83	.00	27.42	54.83	.000	4.3421E-05			
3	3	.0000	54.83	.00	27.42	54.83	.000	4.3421E-05			

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
	Checked by: [illegible]	Date: 18 FEB 00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-14 of C-16

1	1	1.000	43.60	.00	21.80	43.60	.000	2.1487E-05	2.149E-05	3.34	4.6128E+05
1	2	1.000	46.55	.00	23.27	46.55	.000	2.6262E-05	2.626E-05	3.98	
1	3	1.000	46.55	.00	23.27	46.55	.000	2.6262E-05	2.626E-05	3.98	
2	1	.0000	50.08	.00	25.04	50.08	.000	3.2874E-05			
2	2	.0000	52.64	.00	26.32	52.64	.000	3.8305E-05			
2	3	.0000	52.64	.00	26.32	52.64	.000	3.8305E-05			
3	1	.0000	53.11	.00	26.55	53.11	.000	3.9358E-05			
3	2	.0000	55.48	.00	27.74	55.48	.000	4.5003E-05			
3	3	.0000	55.48	.00	27.74	55.48	.000	4.5003E-05			
1	1	1.000	44.07	.00	22.03	44.07	.000	2.2199E-05	2.220E-05	3.44	4.6564E+05
1	2	1.000	47.05	.00	23.53	47.05	.000	2.7148E-05	2.715E-05	4.09	
1	3	1.000	47.05	.00	23.53	47.05	.000	2.7148E-05	2.715E-05	4.09	
2	1	.0000	50.64	.00	25.32	50.64	.000	3.4014E-05			
2	2	.0000	53.24	.00	26.62	53.24	.000	3.9671E-05			
2	3	.0000	53.24	.00	26.62	53.24	.000	3.9671E-05			
3	1	.0000	53.71	.00	26.85	53.71	.000	4.0742E-05			
3	2	.0000	56.12	.00	28.06	56.12	.000	4.6639E-05			
3	3	.0000	56.12	.00	28.06	56.12	.000	4.6639E-05			
1	1	1.000	44.53	.00	22.27	44.53	.000	2.2927E-05	2.293E-05	3.53	4.6999E+05
1	2	1.000	47.56	.00	23.78	47.56	.000	2.8058E-05	2.806E-05	4.21	
1	3	1.000	47.56	.00	23.78	47.56	.000	2.8058E-05	2.806E-05	4.21	
2	1	.0000	51.20	.00	25.60	51.20	.000	3.5184E-05			
2	2	.0000	53.85	.00	26.93	53.85	.000	4.1079E-05			
2	3	.0000	53.85	.00	26.93	53.85	.000	4.1079E-05			
3	1	.0000	54.31	.00	27.16	54.31	.000	4.2164E-05			
3	2	.0000	56.78	.00	28.39	56.78	.000	4.8324E-05			
3	3	.0000	56.78	.00	28.39	56.78	.000	4.8324E-05			
1	1	1.000	45.01	.00	22.50	45.01	.000	2.3681E-05	2.368E-05	3.63	4.7432E+05
1	2	1.000	48.08	.00	24.04	48.08	.000	2.8997E-05	2.900E-05	4.34	
1	3	1.000	48.08	.00	24.04	48.08	.000	2.8997E-05	2.900E-05	4.34	
2	1	.0000	51.77	.00	25.88	51.77	.000	3.6393E-05			
2	2	.0000	54.46	.00	27.23	54.46	.000	4.2533E-05			
2	3	.0000	54.46	.00	27.23	54.46	.000	4.2533E-05			
3	1	.0000	54.92	.00	27.46	54.92	.000	4.3632E-05			
3	2	.0000	57.44	.00	28.72	57.44	.000	5.0065E-05			
3	3	.0000	57.44	.00	28.72	57.44	.000	5.0065E-05			
1	1	1.000	45.49	.00	22.75	45.49	.000	2.4476E-05	2.448E-05	3.74	4.7863E+05
1	2	1.000	48.60	.00	24.30	48.60	.000	2.9973E-05	2.997E-05	4.46	
1	3	1.000	48.60	.00	24.30	48.60	.000	2.9973E-05	2.997E-05	4.46	
2	1	.0000	52.35	.00	26.18	52.35	.000	3.7665E-05			
2	2	.0000	55.09	.00	27.54	55.09	.000	4.4046E-05			
2	3	.0000	55.09	.00	27.54	55.09	.000	4.4046E-05			
3	1	.0000	55.54	.00	27.77	55.54	.000	4.5175E-05			
3	2	.0000	58.10	.00	29.05	58.10	.000	5.1876E-05			
3	3	.0000	58.10	.00	29.05	58.10	.000	5.1876E-05			
1	1	1.000	45.98	.00	22.99	45.98	.000	2.5290E-05	2.529E-05	3.85	4.8292E+05
1	2	1.000	49.12	.00	24.56	49.12	.000	3.0977E-05	3.098E-05	4.60	
1	3	1.000	49.12	.00	24.56	49.12	.000	3.0977E-05	3.098E-05	4.60	
2	1	.0000	52.93	.00	26.47	52.93	.000	3.8969E-05			
2	2	.0000	55.72	.00	27.86	55.72	.000	4.5604E-05			
2	3	.0000	55.72	.00	27.86	55.72	.000	4.5604E-05			
3	1	.0000	56.17	.00	28.09	56.17	.000	4.6759E-05			
3	2	.0000	58.78	.00	29.39	58.78	.000	5.3746E-05			
3	3	.0000	58.78	.00	29.39	58.78	.000	5.3746E-05			
1	1	1.000	46.47	.00	23.23	46.47	.000	2.6125E-05	2.613E-05	3.96	4.8720E+05
1	2	1.000	49.65	.00	24.82	49.65	.000	3.2008E-05	3.201E-05	4.73	
1	3	1.000	49.65	.00	24.82	49.65	.000	3.2008E-05	3.201E-05	4.73	
2	1	.0000	53.52	.00	26.76	53.52	.000	4.0109E-05			
2	2	.0000	56.35	.00	28.17	56.35	.000	4.7209E-05			
2	3	.0000	56.35	.00	28.17	56.35	.000	4.7209E-05			
3	1	.0000	56.80	.00	28.40	56.80	.000	4.8391E-05			
3	2	.0000	59.46	.00	29.73	59.46	.000	5.5677E-05			
3	3	.0000	59.46	.00	29.73	59.46	.000	5.5677E-05			

NOTE: CRACK SIZE OF 1ST DOF WILL EXCEED BODY WIDTH, G(1), ON NEXT ITERATION. PROCESSING TERMINATED.

Calculation No.: AES-C-3865-2	Made by: RDC	Date: 2/16/00	Client: SCE
	Checked by: MTC	Date: 2/16/00	Project No.: AES 99123865-1Q
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-15 of C-16

REFINED BREAKUP

SCE RCP FLYWHEEL SAFE-LIFE EVALUATION (ABB DESIGN)

FATIGUE CRACK GROWTH ANALYSIS SUMMARY

CRACK DIMENSION(S) A(I)			MAXIMUM STRESS INTENSITY FACTOR(S) FOR WORST INPUT LOAD TRANSIENT KMAX			TOTAL CRACK GROWTH RATE(S) DADN(I)			NUMBER OF CYCLES OR BLOCKS TO GROW CRACK FROM INITIAL SIZE N
A1	A2	A3	K1	K2	K3	DADN1	DADN2	DADN3	N
.250	.500	.500	20.238	17.771	17.771	1.4441E-06	1.0137E-06	1.0137E-06	.0000
.257	.505	.505	20.418	18.008	18.008	1.4794E-06	1.0533E-06	1.0533E-06	5011.
.265	.511	.511	20.600	18.248	18.248	1.5157E-06	1.0946E-06	1.0946E-06	1.0046E+04
.273	.516	.516	20.784	18.490	18.490	1.5528E-06	1.1371E-06	1.1371E-06	1.5105E+04
.281	.522	.522	20.970	18.734	18.734	1.5909E-06	1.1812E-06	1.1812E-06	2.0187E+04
.289	.528	.528	21.157	18.981	18.981	1.6299E-06	1.2268E-06	1.2268E-06	2.5293E+04
.297	.535	.535	21.346	19.231	19.231	1.6699E-06	1.2740E-06	1.2740E-06	3.0423E+04
.306	.541	.541	21.537	19.484	19.484	1.7109E-06	1.3231E-06	1.3231E-06	3.5577E+04
.315	.548	.548	21.731	19.739	19.739	1.7531E-06	1.3740E-06	1.3740E-06	4.0754E+04
.324	.556	.556	21.926	19.997	19.997	1.7964E-06	1.4267E-06	1.4267E-06	4.5954E+04
.334	.563	.563	22.124	20.258	20.258	1.8408E-06	1.4812E-06	1.4812E-06	5.1178E+04
.343	.571	.571	22.325	20.522	20.522	1.8867E-06	1.5376E-06	1.5376E-06	5.6425E+04
.354	.579	.579	22.529	20.789	20.789	1.9338E-06	1.5959E-06	1.5959E-06	6.1694E+04
.364	.588	.588	22.735	21.059	21.059	1.9825E-06	1.6565E-06	1.6565E-06	6.6984E+04
.375	.597	.597	22.945	21.331	21.331	2.0326E-06	1.7191E-06	1.7191E-06	7.2296E+04
.386	.606	.606	23.158	21.607	21.607	2.0845E-06	1.7840E-06	1.7840E-06	7.7628E+04
.397	.616	.616	23.374	21.886	21.886	2.1379E-06	1.8510E-06	1.8510E-06	8.2979E+04
.408	.626	.626	23.594	22.169	22.169	2.1933E-06	1.9208E-06	1.9208E-06	8.8349E+04
.420	.637	.637	23.817	22.455	22.455	2.2504E-06	1.9929E-06	1.9929E-06	9.3736E+04
.433	.648	.648	24.044	22.743	22.743	2.3092E-06	2.0674E-06	2.0674E-06	9.9140E+04
.445	.659	.659	24.275	23.036	23.036	2.3706E-06	2.1446E-06	2.1446E-06	1.0456E+05
.459	.671	.671	24.510	23.332	23.332	2.4341E-06	2.2248E-06	2.2248E-06	1.0999E+05
.472	.683	.683	24.749	23.631	23.631	2.4996E-06	2.3075E-06	2.3075E-06	1.1544E+05
.486	.696	.696	24.992	23.934	23.934	2.5672E-06	2.3929E-06	2.3929E-06	1.2090E+05
.500	.709	.709	25.239	24.240	24.240	2.6374E-06	2.4815E-06	2.4816E-06	1.2637E+05
.515	.723	.723	25.491	24.550	24.550	2.7101E-06	2.5731E-06	2.5731E-06	1.3185E+05
.530	.738	.738	25.747	24.863	24.863	2.7851E-06	2.6676E-06	2.6676E-06	1.3734E+05
.545	.753	.753	26.008	25.180	25.180	2.8629E-06	2.7652E-06	2.7652E-06	1.4283E+05
.561	.768	.768	26.274	25.503	25.503	2.9443E-06	2.8674E-06	2.8674E-06	1.4833E+05
.578	.784	.784	26.546	25.830	25.830	3.0291E-06	2.9737E-06	2.9737E-06	1.5384E+05
.595	.801	.801	26.822	26.161	26.161	3.1171E-06	3.0838E-06	3.0839E-06	1.5935E+05
.612	.818	.818	27.104	26.496	26.496	3.2086E-06	3.1980E-06	3.1979E-06	1.6486E+05
.630	.836	.836	27.391	26.836	26.836	3.3040E-06	3.3170E-06	3.3170E-06	1.7036E+05
.654	.861	.861	27.776	27.290	27.290	3.4344E-06	3.4798E-06	3.4798E-06	1.7757E+05
.679	.886	.886	28.161	27.741	27.741	3.5683E-06	3.6461E-06	3.6461E-06	1.8465E+05
.704	.912	.912	28.548	28.192	28.192	3.7058E-06	3.8168E-06	3.8168E-06	1.9161E+05
.730	.939	.939	28.938	28.643	28.643	3.8487E-06	3.9935E-06	3.9935E-06	1.9845E+05
.757	.966	.966	29.331	29.096	29.096	3.9965E-06	4.1757E-06	4.1757E-06	2.0518E+05
.784	.994	.994	29.728	29.551	29.551	4.1501E-06	4.3651E-06	4.3651E-06	2.1181E+05
.811	1.023	1.023	30.127	30.007	30.007	4.3080E-06	4.5596E-06	4.5596E-06	2.1834E+05
.840	1.053	1.053	30.529	30.464	30.464	4.4705E-06	4.7595E-06	4.7595E-06	2.2478E+05
.868	1.084	1.084	30.934	30.922	30.922	4.6383E-06	4.9655E-06	4.9654E-06	2.3112E+05
.898	1.116	1.116	31.344	31.383	31.383	4.8124E-06	5.1785E-06	5.1785E-06	2.3739E+05
.928	1.149	1.149	31.756	31.846	31.846	4.9922E-06	5.3982E-06	5.3982E-06	2.4357E+05
.959	1.182	1.182	32.173	32.312	32.312	5.1781E-06	5.6251E-06	5.6251E-06	2.4966E+05
.991	1.217	1.217	32.593	32.782	32.782	5.3704E-06	5.8611E-06	5.8611E-06	2.5571E+05
1.024	1.253	1.253	33.018	33.255	33.255	5.5699E-06	6.1055E-06	6.1055E-06	2.6167E+05
1.057	1.289	1.289	33.447	33.731	33.731	5.7763E-06	6.3578E-06	6.3578E-06	2.6756E+05
1.092	1.327	1.327	33.879	34.211	34.211	5.9901E-06	6.6187E-06	6.6187E-06	2.7339E+05
1.127	1.366	1.366	34.315	34.693	34.693	6.2102E-06	6.8874E-06	6.8874E-06	2.7915E+05
1.163	1.406	1.406	34.754	35.178	35.178	6.4367E-06	7.1637E-06	7.1637E-06	2.8485E+05
1.200	1.447	1.447	35.197	35.667	35.667	6.6711E-06	7.4489E-06	7.4489E-06	2.9048E+05
1.238	1.490	1.490	35.643	36.159	36.159	6.9132E-06	7.7438E-06	7.7438E-06	2.9607E+05
1.276	1.533	1.533	36.093	36.655	36.655	7.1627E-06	8.0486E-06	8.0486E-06	3.0160E+05
1.316	1.578	1.578	36.547	37.155	37.155	7.4205E-06	8.3641E-06	8.3641E-06	3.0707E+05
1.357	1.625	1.625	37.005	37.660	37.660	7.6884E-06	8.6924E-06	8.6924E-06	3.1250E+05
1.399	1.672	1.672	37.468	38.169	38.169	7.9643E-06	9.0305E-06	9.0305E-06	3.1787E+05
1.443	1.721	1.721	37.934	38.683	38.683	8.2491E-06	9.3810E-06	9.3810E-06	3.2319E+05
1.487	1.772	1.772	38.405	39.202	39.202	8.5431E-06	9.7453E-06	9.7453E-06	3.2846E+05
1.532	1.824	1.824	38.879	39.725	39.725	8.8475E-06	1.0123E-05	1.0123E-05	3.3369E+05
1.579	1.877	1.877	39.358	40.253	40.253	9.1614E-06	1.0512E-05	1.0512E-05	3.3887E+05
1.627	1.932	1.932	39.840	40.784	40.784	9.4840E-06	1.0912E-05	1.0912E-05	3.4400E+05
1.676	1.989	1.989	40.325	41.318	41.318	9.8159E-06	1.1324E-05	1.1324E-05	3.4910E+05
1.726	2.047	2.047	40.816	41.859	41.859	1.0160E-05	1.1753E-05	1.1753E-05	3.5415E+05
1.778	2.107	2.107	41.310	42.404	42.404	1.0514E-05	1.2199E-05	1.2199E-05	3.5915E+05
1.831	2.169	2.169	41.806	42.953	42.953	1.0879E-05	1.2657E-05	1.2657E-05	3.6412E+05
1.886	2.232	2.232	42.307	43.505	43.505	1.1254E-05	1.3129E-05	1.3129E-05	3.6905E+05
1.942	2.298	2.298	42.811	44.062	44.062	1.1640E-05	1.3615E-05	1.3615E-05	3.7394E+05
1.999	2.365	2.365	43.319	44.623	44.623	1.2037E-05	1.4116E-05	1.4116E-05	3.7880E+05
2.058	2.434	2.434	43.832	45.188	45.188	1.2446E-05	1.4632E-05	1.4632E-05	3.8362E+05
2.119	2.506	2.506	44.346	45.758	45.758	1.2865E-05	1.5165E-05	1.5165E-05	3.8841E+05
2.181	2.579	2.579	44.865	46.333	46.333	1.3296E-05	1.5717E-05	1.5717E-05	3.9316E+05
2.245	2.655	2.655	45.387	46.911	46.911	1.3741E-05	1.6285E-05	1.6285E-05	3.9788E+05
2.310	2.732	2.732	45.912	47.493	47.493	1.4196E-05	1.6869E-05	1.6869E-05	4.0258E+05
2.378	2.812	2.812	46.440	48.080	48.080	1.4664E-05	1.7471E-05	1.7471E-05	4.0724E+05
2.447	2.895	2.895	46.971	48.671	48.671	1.5143E-05	1.8089E-05	1.8089E-05	4.1187E+05
2.518	2.980	2.980	47.504	49.264	49.264	1.5632E-05	1.8721E-05	1.8721E-05	4.1648E+05
2.591	3.067	3.067	48.040	49.864	49.864	1.6136E-05	1.9377E-05	1.9377E-05	4.2107E+05
2.665	3.157	3.157	48.579	50.469	50.469	1.6653E-05	2.0053E-05	2.0053E-05	4.2563E+05
2.742	3.249	3.249	49.122	51.080	51.080	1.7187E-05	2.0752E-05	2.0752E-05	4.3016E+05

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: C-16 of C-16

2.821	3.345	3.345	49.668	51.694	51.694	1.7734E-05	2.1469E-05	2.1469E-05	4.3467E+05
2.902	3.443	3.443	50.221	52.312	52.312	1.8300E-05	2.2203E-05	2.2203E-05	4.3916E+05
2.985	3.543	3.543	50.783	52.934	52.934	1.8889E-05	2.2962E-05	2.2962E-05	4.4362E+05
3.070	3.647	3.647	51.350	53.562	53.562	1.9501E-05	2.3751E-05	2.3751E-05	4.4807E+05
3.158	3.754	3.754	51.929	54.195	54.195	2.0141E-05	2.4564E-05	2.4564E-05	4.5249E+05
3.248	3.864	3.864	52.513	54.832	54.832	2.0802E-05	2.5400E-05	2.5400E-05	4.5690E+05
3.340	3.977	3.977	53.105	55.475	55.475	2.1487E-05	2.6262E-05	2.6262E-05	4.6128E+05
3.436	4.094	4.094	53.707	56.124	56.124	2.2199E-05	2.7148E-05	2.7148E-05	4.6564E+05
3.534	4.214	4.214	54.310	56.777	56.777	2.2927E-05	2.8058E-05	2.8058E-05	4.6999E+05
3.635	4.337	4.337	54.919	57.435	57.435	2.3681E-05	2.8997E-05	2.8997E-05	4.7432E+05
3.738	4.464	4.464	55.544	58.104	58.104	2.4476E-05	2.9973E-05	2.9973E-05	4.7863E+05
3.845	4.595	4.595	56.171	58.778	58.778	2.5290E-05	3.0977E-05	3.0977E-05	4.8292E+05
3.955	4.730	4.730	56.802	59.458	59.458	2.6125E-05	3.2008E-05	3.2008E-05	4.8720E+05

Calculation No.: AES-C-3865-2	Made by: RCA	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: MTC	Date: 02-16-00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: D-1 of D-3

Appendix D

FLYWHEEL INSPECTION SUMMARY FOR SONGS
(For Information Only)

Calculation No.: AES-C-3865-2	Made by: RCC	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: MTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: D-2 of D-3

Inspection Summary for San Onofre Units 2 and 3 RCP Flywheels

RCP Flywheel No.	Year Examined	Inspection Volume or Area	Examination Methods Used	Areas of Flaws/Cracks Identified
47062-1	1986	Bore & Keyway	Volumetric, UT	None
Unit-2	1987	Bore & Keyway	Volumetric, UT	None
	1991	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Bore & Keyway	Volumetric, UT	None
47062-2	1986	Bore & Keyway	Volumetric, UT	None
Unit-2	1987	Bore & Keyway	Volumetric, UT	None
	1991	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Bore & Keyway	Volumetric, UT	None
47062-3	1986	Bore & Keyway	Volumetric, UT	None
Unit-2	1987	Bore & Keyway	Volumetric, UT	None
	1991	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Bore & Keyway	Volumetric, UT	None
47062-4	1986	Bore & Keyway	Volumetric, UT	None
Unit-2	1987	Bore & Keyway	Volumetric, UT	None
See Note-2	1991	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Entire Flywheel	Magnetic Particle	None
47063-1	1987	Bore & Keyway	Volumetric, UT	None
Unit-3	1992	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Bore & Keyway	Volumetric, UT	None
47063-2	1987	Bore & Keyway	Volumetric, UT	None
Unit-3	1992	Bore & Keyway	Volumetric, UT	None
See Note-1	1993	Entire Flywheel	Volumetric, UT	None
	1995	Entire Flywheel	Magnetic Particle	None
47063-3	1987	Bore & Keyway	Volumetric, UT	None

Calculation No.: AES-C-3865-2	Made by: RRE	Date: 2/16/00	Client: SCE
Title: Safe-Life Evaluation and Inspection Interval Requirements for Reactor Coolant Pump Flywheel — SONGS, Units 2 and 3	Checked by: WTC	Date: 18 FEB 00	Project No.: AES 99123865-1Q
	Revision No.: 0	Document Control No.: I-3	Sheet No.: D-3 of D-3

Inspection Summary for San Onofre Units 2 and 3 RCP Flywheels

RCP Flywheel No.	Year Examined	Inspection Volume or Area	Examination Methods Used	Areas of Flaws/Cracks Identified
Unit-3	1992	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Bore & Keyway	Volumetric, UT	None
47063-4	1987	Bore & Keyway	Volumetric, UT	None
Unit-3	1992	Bore & Keyway	Volumetric, UT	None
	1993	Entire Flywheel	Volumetric, UT	None
	1997	Bore & Keyway	Volumetric, UT	None
1005005	1994	Entire Flywheel	Magnetic Particle	None
Unit-3	1995	Entire Flywheel	Volumetric, UT	None
See Note-1	1997	Bore	Volumetric, UT	None
1005141	1994	Entire Flywheel	Magnetic Particle	None
Unit-2	1995	Entire Flywheel	Volumetric, UT	None
See Note-2	1997	Bore	Volumetric, UT	None
Notes	1) Flywheel 47063-2 (with Bore & Keyway) was replaced by 1005005 (without Keyway) during Unit-3 RFO-8 and 47063-2 stored as a spare Flywheel.			
	2) Flywheel 47062-4 (with Bore & Keyway) was replaced by 1005141 (without Keyway) during Unit-2 RFO-9 and 47062-4 stored as a spare flywheel.			