ATTACHMENT K

Southern California Edison

Instrument Suitability Study

Emergency Operating Procedures

Phase II Report

Vol. I

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INTRODUCTION TO FINAL ISOPS II REPORTS

Volumes I, II, and III contain the final reports for Phases 2 of the Instrument Suitability Study (ISOPS) for Emergency Operating Procedures for Songs 2 & 3. The Instrument Use and Bases Tables for all eleven modules have been revised (Revision 01). All affected Engineering Limit Bases Documents have also been revised (next sequential revision).

Tab #1 contains a complete print out of all ISOPS II Phase 2 Priority One data. The report is arranged alphabetically by parameter. Note that the bases description contained in this report is a synopsis of the complete bases. The file number located below the parameter name refers to the associated Engineering Limit and Bases Document which contains the complete bases document. To locate an individual Engineering limit and Bases Document, find the parameter on the following list (next page) and go to the TAB for the associated module. The Engineering Limit and Bases Documents are located following the Instrument Use and Bases Table for the respective module.

Phase II Priority 1 Parameters plus those raised from lower priority

TAB	MODULE	PARAMETER
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4	2	COLD LEG HPSI FLOW CLOD LEG SI FLOW HOT AND COLD LEG HPSI FLOW HOT AND COLD LEG SI FLOW HOT LEG HPSI FLOW HPSI FLOW (TRAIN A/B) HPSI/LPSI FLOW SI FLOW
5	3	COLD LEG TEMP
6	4	CONTMT EMERG SUMP LEVEL CONTMT H/R RAD MONITORS CONTMT HUMIDITY CONTMT HYDROGEN CONC RWST LEVEL
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13	11	S/G PRESSURE

ABB COMBUSTION ENGINEERING
INSTRUMENT USE AND BASES TABLE COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

COMPREHENSIVE INSTRUMENT USE AND BASES REPORT

PREPARED BY: J.R. Congdon
Cognizant Engineer (Print Name)
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Cognizant Engineer (Signature) Date: 5/5/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER	Martin Greer	5/5/93
Name Independent Reviewer	Signature	Date

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)
Joseph R Congdon 5/5/93
Cognizant Engineering Manager (Signature) Date

RECORD OF REVISIONS

Rev	Date	Pages	Prepared by	Reviewed by	Approved by
00	05/07/93	ALL	J.R.Congdon	M. Greer	J.R.Congdon

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
AFW FLOW 009-OPS92-214	> 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify minimum required AFW flowrate for RCS Heat Removal (> 200 gpm to each S/G).
AFW FLOW 009-OPS92-214	NOT > 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To initiate starting alternate AFW pumps and controlling flow manually if flow to either S/G is NOT > 200 GPM.
AFW FLOW 009-OPS92-210	130 TO 150 GPM LL 70, UL 150	The lower limit is based on refilling the S/G feedring in a 5 min period. The upper limit is based on preventing feedring damage due to excessive refill flow to a drained feedring. 5 min duration is based on 2X the refill time for the 350 gal feedring.	To verify reduced AFW flow (130 GPM TO 150 GPM) is established to the isolated SG.
AFW FLOW 009-OPS92-214	ESTABLISHED 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify feedwater flowrate to the S/G after resetting EFAS.
AFW FLOW 009-OPS92-210	130 TO 150 GPM LL 70, UL 150	The lower limit is based on refilling the S/G feedring in a 5 min period. The upper limit is based on preventing feedring damage due to excessive refill flow to a drained feedring. 5 min duration is based on 2X the refill time for the 350 gal feedring.	To verify AFW flowrate between 130 gpm and 150 gpm (for 5 minutes) during restoration of feed to a S/G.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
AFW FLOW 009-OPS92-214	< 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
AFW FLOW 009-OPS92-214	> 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify > minimum required FW flow to at least one S/G to aid in promoting natural circulation.
AFW FLOW 009-OPS92-214	200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify minimum required AFW flowrate for RCS Heat Removal (> 200 gpm to each S/G).
CEA POSITION 009-OPS92-031	INSERTED EXCEPT 1 UL INSRTD EXCPT 1	This engineering limit was chosen because it is one of the General Design Criteria. It is also contained in the T.S. definition for shutdown margin and the LCO for reactivity control.	To determine if all but one CEAs are inserted as part of the verification of adequate reactivity control.
COLD LEG HPSI FLOW 009-OPS92-134	>300 GPM PER PUMP LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG HPSI FLOW 009-OPS92-128	FLOWS APPROX = NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value can be assigned to the engineering limit.	To verify that flow is equally distributed through all four cold leg injection lines during simultanious hot and cold leg injection.
COLD LEG HPSI FLOW 009-OPS92-131	REDUCE FLOW ~1/2 NONE	Since the step value is only "approximate", the assigning of an engineering limit is not appropriate. Engineering limits for minimum expected hot and cold leg HPSI flow rates and maximum allowable flow rate have been determined elsewhere.	To monitor reduction of cold leg injection (by approximatly 1/2), to establish required conditions for initiating simultainious hot and cold leg injection.
COLD LEG HPSI FLOW 009-OPS92-151	SUM >= MIN EXP NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
COLD LEG HPSI FLOW 009-OPS92-151	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequte HPSI flow during cold leg injection.
COLD LEG HPSI FLOW 009-OPS92-151	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for RCS Inventory Control.
COLD LEG HPSI FLOW 009-OPS92-134	> 300 GPM LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG HPSI FLOW 009-OPS92-151	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection.flow for RCS Pressure Control.
COLD LEG SI FLOW 009-OPS92-149	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequte HPSI flow during cold leg injection.
COLD LEG SI FLOW 009-OPS92-149	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate cold leg safety injection flow for RCS inventory Contol and RCS Pressure Control (SFSC)
COLD LEG SI FLOW 009-OPS92-149	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate SI flow during cold leg injection.
COLD LEG SI FLOW 009-OPS92-149	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flow for RCS Pressure Control.
COLD LEG SI FLOW 009-OPS92-149	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for core heat removal.
COLD LEG SI FLOW 009-OPS92-149	>= MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for core heat removal.
COLD LEG SI FLOW 009-OPS92-149	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate cold leg sefety injection flow for RCS Heat Removal (SFSC).

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG TEMP 009-OPS92-133	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify cold leg temperatures constant or decreasing as indication that single phase natural circulation is established.
COLD LEG TEMP 009-OPS92-177	> 500 deg F LL 488 deg F	488 deg F is based on maintaining core uplift forces within allowable limits.	To ensure less than four RCPs are operating when less than 500 deg F to prevent core lift.
COLD LEG TEMP 009-OPS92-158	> RCP NPSH CURVE NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To confirm available NPSH for operating the RCP(s).
COLD LEG TEMP 009-OPS92-133	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is not rising, in the verification of adequate natural circulation.
COLD LEG TEMP 009-OPS92-133	STABLE OR DEC NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify cold leg temperatures constant or decreasing as indication that single phase natural circulation is established.
COLD LEG TEMP 009-OPS92-157	< 500 deg F HL < 555 deg F	555 deg F is based on keeping cold leg temperature less than the saturation temperature for the lowest Main Steam Safety Valve lift setting pressure (1089 psia).	To ensure Tc of the least affected S/G is maintained less than Tsat to avoid lifting MSSVs on isolated S/G.
COLD LEG TEMP 009-OPS92-168	>=SDM REQUIREMENT PER CURVE	The limiting temperature is a function of the current boron concentration, the method used to calculate SDM, and the current plant physics condition.	To ensure RCS temperature is equal to or greater than the temperature required for shutdown margin based on last boron sample.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG TEMP 009-OPS92-158	COOLDOWN PLOT NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To monitor the cooldown rate of the plant.
COLD LEG TEMP 009-OPS92-133	STABLE OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine (by trending) if an ESDE is isolated.
COLD LEG TEMP 009-OPS92-133	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine, along with adequate S/G level, if Cold Leg Temperature requires exiting the LOFW EOI and entering the FR EOI.
COLD LEG TEMP 009-OPS92-159	> 300 deg F LL >287 degF(U-2)	The Technical Specifications require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287 deg F (Unit 2) or 267 deg F (Unit 3).	To indicate when to evaluate placing LTOP in service.
COLD LEG TEMP 009-OPS92-133	LWRG & NOT CNTRLD NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To monitor and correct for RCS overcooling.
COLD LEG TEMP 009-OPS92-166	ALL < 470 deg F HL < 494 deg F	Less that 494 deg F is based on engineering judgement. Restricting Cold Leg Temperature to < 494 deg F will prevent exceeding the design pressure (650 psi) for the intermediate pressure letdown piping. T sat for 650 PSIA is 494.89 deg F.	To verify criteria for letdown restoration is met (Tc < 470 F).

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG TEMP 009-OPS92-158	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify that RCS temperature is within P/T limits.
COLD LEG TEMP 009-OPS92-133	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if unisolated (least affected) SG is removing decay heat.
COLD LEG TEMP 009-OPS92-133	STABLE OR CONTRLD NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine (by trending) if an ESDE is isolated.
COLD LEG TEMP 009-OPS92-159	> 300 deg F LL >267 degF(U-3)	The Technical Specifications require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287 deg F (Unit 2) or 267 deg F (Unit 3).	To indicate when to evaluate placing LTOP in service.
COLD LEG TEMP (1A) 009-OPS92-165	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.
COLD LEG TEMP (1A) 009-OPS92-164	< S/G E-089 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG TEMP (1B) 009-OPS92-165	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.
COLD LEG TEMP (1B) 009-OPS92-164	< S/G E-089 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.
COLD LEG TEMP (2A) 009-OPS92-165	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.
COLD LEG TEMP (2A) 009-OPS92-164	< S/G E-088 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.
COLD LEG TEMP (2B) 009-OPS92-165	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
COLD LEG TEMP (2B) 009-OPS92-164	< S/G E-088 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.
CONTMT EMERG SUMP LEVEL 009-OPS92-037	> 18 FT 8 IN LL 18.359 FT	Based on ensuring that the level in the CONTMT EMERG SUMP will provide sufficient NPSH for the CS and HPSI pumps after shutting the RWST isolation valves. The limit is conservative based on assumed pump combinations, flow rates and head losses.	To determine if adequate level exists in the Containment Emergency Sump (e.g. 18 feet 8 inches) to supply the Containment Spray Pumps.
CONTMT EMERG SUMP LEVEL 009-OPS92-037	> 18 FT 8 IN LL 18.359 FT	Based on ensuring that the level in the CONTMT EMERG SUMP will provide sufficient NPSH for the CS and HPSI pumps after shutting the RWST isolation valves. The limit is conservative based on assumed pump combinations, flow rates and head losses.	To verify proper conditions exist prior to isolating the RWST following a RAS.
CONTMT EMERG SUMP LEVEL 009-OPS92-038	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify the emergency sump level increases as the RWST level decreases.
CONTMT EMERG SUMP LEVEL 009-OPS92-038	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify RWST is feeding SI, which is spilling onto the containment floor.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT EMERG SUMP LEVEL 009-OPS92-039	NORMAL NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if containment conditions indicate an event other than SGTR is in progress.
CONTMT EMERG SUMP LEVEL 009-OPS92-040	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify Containment Emergency Sump not rising and re-diagnose the event if it is.
CONTMT EMERG SUMP LEVEL 009-OPS92-041	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify conditions inside containment to be normal.
CONTMT EMERG SUMP LEVEL 009-OPS92-042	> 17 FT LL 18.359 FT	Based on ensuring that the level in the CONTMT EMERG SUMP will provide sufficient NPSH for the CS and HPSI pumps after shutting the RWST isolation valves. The limit is conservative based on assumed pump combinations, flow rates and head losses.	To ensure adequate ECCS inventory in the Containment Emergency Sump if RWST level is below the RAS setpoint.
CONTMT EMERG SUMP LEVEL 009-OPS92-038	RISES NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify the emergency sump level increases as the RWST level decreases.
CONTMT EMERG SUMP LEVEL 009-OPS92-040	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine that Containment Emergency Sump level is not rising as RWST level decreases and evaluate methods to maintain RWST level > 19%.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT H/R RAD MONITORS 009-OPS92-081	< 40 R/HR LL 20 R/HR	This limit is based on engineering judgement. In the event of a LOCA in containment, 20R/HR is > the expected dose rate, assuming 100% realease of maximum RCS activity. This would be indication that some fuel failure had occurred with the LOCA.	To evaluate initiating CSAS for iodine removal if containment High Range Area Radiation Monitor is NOT reading < 40R/HR.
CONTMT HUMIDITY 009-OPS92-091	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify conditions inside containment to be normal.
CONTMT HYDROGEN CONC 009-OPS92-055	< 0.5% LL 0% UL 4%	The LL is based on keeping the H2 concentration as low as possible by placing the H2 recombiners in service when it is first detected. The UL is based on ensuring that a H2 burn or explosion does not take place when the recombiner is placed in service.	To determine if the hydrogen recombiners need to be operating (H2 concentration > or = 0.5%).
CONTMT HYDROGEN CONC 009-OPS92-095	< 4% 4%	4% is based on the flammability limit of hydrogen in dry air. Energizing the recombiners when hydrogen concentration is <= 2% ensures that the hydrogen concentration will not reach 4%. 4% is also the limit at which the recombiners must be secured.	To determine if the present CG control success path is adequate (hydrogen < 4%) or a different one must be used.
CONTMT HYDROGEN CONC 009-OPS92-096	< 0.5% 0%	0% (actual) hydrogen is the normally expected concentation in containment. An event resulting in an increase in hydrogen concentration above the minimum detectible level (0.5%) is indication that an event other than a LOFW (i.e. LOCA) is occurring.	To confirm that an event other than an LOFW is not taking place.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT HYDROGEN CONC 009-OPS92-088	< 2% 3.5%	3.5% is based on a design requirment that a single train of hydrogen removal equipment will be able to remove hydrogen at a rate such that actuation of the system is not required until hydrogen is within 0.5% by volume of the flammability limit (4.0%).	To determine if use of the Hydrogen Recombiners is required to satisfy the present combustible gas (CG) control success path.
CONTMT HYDROGEN CONC 009-OPS92-097	< 2% 3.5%	3.5% is based on maintaining the containment hydrogen concentration below the flammability limit (4%). The Hydrogen Purge system is only used if the recombiners fail. In this case, starting to purge at 3.5% will maintain the hydrogen concentration < 4%.	To evaluate the need to continue hydrogen purge operation.
CONTMT HYDROGEN CONC 009-OPS92-062	< 4% < 4%	4% is based on the flammability limit of hydrogen in dry air. Energizing the recombiners when hydrogen concentration is <= 2% ensures that the hydrogen concentration will not reach 4%. 4% is also the limit at which the recombiners must be secured.	To determine if containment hydrogen concentration is low enough to permit energization of the hydrogen recombiners (< 4%).
CONTMT HYDROGEN CONC 009-OPS92-097	> 2% 3.5%	3.5% is based on maintaining the containment hydrogen concentration below the flammability limit (4%). The Hydrogen Purge system is only used if the recombiners fail. In this case, starting to purge at 3.5% will maintain the hydrogen concentration < 4%.	To evaluate the need to continue hydrogen purge operation.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT HYDROGEN CONC 009-OPS92-095	< 4% 4%	4% is based on the flammability limit of hydrogen in dry air. Energizing the recombiners when hydrogen concentration is <= 2% ensures that the hydrogen concentration will not reach 4%. 4% is also the limit at which the recombiners must be secured.	To determine if the hydrogen concentration requires the operator to go to the Functional Recovery EOI (>4%).
CONTMT HYDROGEN CONC 009-OPS92-095	< 4% 4%	4% is based on the flammability limit of hydrogen in dry air. Energizing the recombiners when hydrogen concentration is <= 2% ensures that the hydrogen concentration will not reach 4%. 4% is also the limit at which the recombiners must be secured.	To determine if hydrogen concentration requires the event to be re-diagnosed (>=4.0%).
CONTMT HYDROGEN CONC 009-OPS92-099	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the need for hydrogen purge of containment.
CONTMT HYDROGEN CONC 009-OPS92-097	< 4% 3.5%	3.5% is based on maintaining the containment hydrogen concentration below the flammability limit (4%). The Hydrogen Purge system is only used if the recombiners fail. In this case, starting to purge at 3.5% will maintain the hydrogen concentration < 4%.	To evaluate the need to continue hydrogen purge operation.
CONTMT HYDROGEN CONC 009-OPS92-097	< 2% 3.5%	3.5% is based on maintaining the containment hydrogen concentration below the flammability limit (4%). The Hydrogen Purge system is only used if the recombiners fail. In this case, starting to purge at 3.5% will maintain the hydrogen concentration < 4%.	To determine if use of the Hydrogen Purge System is required to satisfy the present CG control succes path.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-060	< 1.5 PSIG 1.5 PSIG	This value was selected to verify that contmt pressure remains below the upper limit for normal contmt pressure. 1.5 PSIG coincides with the upper limit for T.S. 3.6.1.4 LCO for contmt pressure, which along with CR alarms, defines normal contmt pressure	To verify expected post-trip containment pressure conditions.
CONTMT PRESSURE 009-OPS92-071	> 14 PSIG UL 14 PSIG	14 psig is based on the ESFAS trip value for the CSAS. The trip value was established based on the 20 psig setpoint used in the safety analysis, with a 6 psi channel accuracy factor included.	To verify CSAS actuation.
CONTMT PRESSURE 009-OPS92-063	> 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To verify CIAS actuation if containment pressure is >3.4 PSIG.
CONTMT PRESSURE 009-OPS92-063	> 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To verify CCAS actuation if containment pressure is >3.4 PSIG.
CONTMT PRESSURE 009-OPS92-072	< 14 PSIG UL 15 PSIG	15 PSIG is based on the T.S. ALLOWABLE VALUE for CSAS. The CS system may be secured, and the CSAS reset when contmt pressure is reduced to <=25% (15 PSIG) of design contmt pressure (60 psig). The fan coolers are then capable of further lowering pressure	To evaluate containment spray termination.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-071	< 14 PSIG UL 14 PSIG	14 psig is based on the ESFAS trip value for the CSAS. The trip value was established based on the 20 psig setpoint used in the safety analysis, with a 6 psi channel accuracy factor included.	To determine if CSAS has actuated or should have actuated.
CONTMT PRESSURE 009-OPS92-063	< 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To determine if containment pressure < CIAS setpoint or verify CIAS actuation if > setpoint.
CONTMT PRESSURE 009-OPS92-063	< 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To determine if containment pressure < SIAS setpoint or verify SIAS actuation if > setpoint.
CONTMT PRESSURE 009-OPS92-063	< 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To verify CIAS actuation if containment pressure is >3.4 PSIG.
CONTMT PRESSURE 009-OPS92-071	> 14 PSIG UL 14 PSIG	14 psig is based on the ESFAS trip value for the CSAS. The trip value was established based on the 20 psig setpoint used in the safety analysis, with a 6 psi channel accuracy factor included.	To determine if CSAS has actuated or should have actuated.
CONTMT PRESSURE 009-OPS92-063	> 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To determine if containment pressure < CIAS setpoint or verify CIAS actuation if > setpoint.
CONTMT PRESSURE 009-OPS92-064	INCREASING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To identify the type of event and location when Pressurizer Pressure is rapidly decreasing, using the "Break Identification Chart".

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-065	< 1.5 PSIG UL 1.5 PSIG	This pressure coincides with the T.S limit on containment pressure. It defines the upper limit for normal containment pressure. 1.5 psig is based on engineering judgement as the maximum pressure which will be observed with no energy release to contmt.	To determine if containment conditions indicate an event other than SGTR is in progress.
CONTMT PRESSURE 009-OPS92-071	< 14 PSIG NOT INC UL 14 PSIG	14 psig is based on the ESFAS trip value for the CSAS. The trip value was established based on the 20 psig setpoint used in the safety analysis, with a 6 psi channel accuracy factor included.	To verify Containment Pressure < 14 PSIG and not increasing and rediagnose the event if it is not.
CONTMT PRESSURE 009-OPS92-073	< CCW PRESSURE NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value can be assigned to the engineering limit.	To compare containment pressure with CCW pressure prior to, or after restoring CCW to the containment.
CONTMT PRESSURE 009-OPS92-060	< 1.5 PSIG 1.5 PSIG	This value was selected to verify that contmt pressure remains below the upper limit for normal contmt pressure. 1.5 PSIG coincides with the upper limit for T.S. 3.6.1.4 LCO for contmt pressure, which along with CR alarms, defines normal contmt pressure	To confirm that an event other than an LOFW is not taking place.
CONTMT PRESSURE 009-OPS92-115	< 3.4 PSIG Not yet available	Bases data not yet available.	To confirm that an event other than an LOFW is not taking place.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-061	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify conditions inside containment to be normal.
CONTMT PRESSURE 009-OPS92-060	< 1.5 PSIG 1.5 PSIG	This value was selected to verify that contmt pressure remains below the upper limit for normal contmt pressure. 1.5 PSIG coincides with the upper limit for T.S. 3.6.1.4 LCO for contmt pressure, which along with CR alarms, defines normal contmt pressure	To verify Containment Pressure < 1.5 PSIG and direct event re-diagnoses if it is not.
CONTMT PRESSURE 009-OPS92-106	< 3.4 PSIG 9.2 PSIG	The engineering limit is based on the maximum expected containment pressure during a SBO with a four hour duration. In this case, containment pressure increasing to > 9.2 PSIG is an indication that an event other than an SBO is occurring.	To determine if event re-diagnosis is required during performance of the SBO procedure.
CONTMT PRESSURE 009-OPS92-063	< 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To determine if containment pressure is less than the CIAS setpoint and determine the appropriate success path to be used.
CONTMT PRESSURE 009-OPS92-063	> 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To evaluate the need for manual containment isolation.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-071	< 14 PSIG UL 14 PSIG	14 psig is based on the ESFAS trip value for the CSAS. The trip value was established based on the 20 psig setpoint used in the safety analysis, with a 6 psi channel accuracy factor included.	To evaluate the need to initiate containment spray operation.
CONTMT PRESSURE 009-OPS92-079	> 14 PSIG N/A	Use of the Mini-Purge System to vent containment in the event that the CS system does not operate is no longer applicable to the EOIs. SCE has directed that ABB-CE need not address this issue in this study.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.
CONTMT PRESSURE 009-OPS92-079	RISING N/A	Use of the Mini-Purge System to vent containment in the event that the CS system does not operate is no longer applicable to the EOIs. SCE has directed that ABB-CE need not address this issue in this study.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.
CONTMT PRESSURE 009-OPS92-071	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the need to initiate containment spray operation.
CONTMT PRESSURE 009-OPS92-079	STABLE OR LOWRNG N/A	Use of the Mini-Purge System to vent containment in the event that the CS system does not operate is no longer applicable to the EOIs. SCE has directed that ABB-CE need not address this issue in this study.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-085	< 14 PSIG UL 14 PSIG	14 PSIG is determined to be the engineering limit because it coincides with the ESFAS trip value. 14 psig is sufficiently high to prevent inadvertent actuation of the CS system, but low enough to minimize starting delay time.	To indicate if containment spray (and/or emergency fans) should be operating based on containment pressure.
CONTMT PRESSURE 009-OPS92-074	< 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To verify expected post-trip containment pressure conditions.
CONTMT PRESSURE 009-OPS92-063	< 3.4 PSIG UL 3.4 PSIG	3.4 PSIG is coincident with and therefore based on the ESFAS trip value.	To evaluate the need for containment isolation.
CONTMT PRESSURE 009-OPS92-075	CONSTANT OR LOWER N/A	Use of the Mini-Purge System to vent containment in the event that the CS system does not operate is no longer applicable to the EOIs. SCE has directed that ABB-CE need not address this issue in this study.	To determine if the containment purge success path is performing adequately by observing containment pressure constant or lowering.
CONTMT PRESSURE 009-OPS92-076	STABLE OR LOWERIN NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if containment pressure is stable or lowering in order to allow continued use of the present success path, or direct the operator to a different success path.
CONTMT PRESSURE 009-OPS92-083	CONSTNT,STBL,LWRG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT PRESSURE 009-OPS92-071	< 14 PSIG UL 14 PSIG	14 psig is based on the ESFAS trip value for the CSAS. The trip value was established based on the 20 psig setpoint used in the safety analysis, with a 6 psi channel accuracy factor included.	To determine if event re-diagnosis is required.
CONTMT PRESSURE 009-OPS92-071	CONSTNT OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if containment pressure is constant or lowering and if it is not, to direct use of another success path.
CONTMT SPRAY FLOW 009-OPS92-090	> 1750 GPM 1750 GPM	1750 GPM is the value of CS flow assumed in the Containment Peak Pressure Analysis for the containment design basis accident. This value is the minimum acceptable value for a single train of CS. 1750 gpm CS + two containment Fan Coolers is acceptable.	To determine if containment spray flow is adequate to meet SFSC criteria (> 1750 gpm per train).
CONTMT SPRAY FLOW 009-OPS92-090	> 1750 GPM 1750 GPM	1750 GPM is the value of CS flow assumed in the Containment Peak Pressure Analysis for the containment design basis accident. This value is the minimum acceptable value for a single train of CS. 1750 gpm CS + two containment Fan Coolers is acceptable.	To determine if containment spray flow is adequate to meet the containment cooling requirements.
CONTMT SPRAY FLOW 009-OPS92-090	> 1750 GPM 1750 GPM	1750 GPM is the value of CS flow assumed in the Containment Peak Pressure Analysis for the containment design basis accident. This value is the minimum acceptable value for a single train of CS. 1750 gpm CS + two containment Fan Coolers is acceptable.	To verify that 50% of the required containment heat removal capability is being provided by one train of containment spray (> 1750 gpm).

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT TEMP 009-OPS92-092	< 120 deg F UL 120 deg F	120 deg F is based on engineering judgement as the max temp which will be observed without an energy release to the contmt. This value coincides with the contmt temp limit specified in T.S. 3.6.1.5 LCO.	To verify expected post-trip containment temperature conditions.
CONTMT TEMP 009-OPS92-173	< 215 deg F Not yet available	Bases data not yet available.	To determine if event re-diagnosis is required during performance of the SBO procedure.
CONTMT TEMP 009-OPS92-173	< 215 deg F Not yet available	Bases data not yet available.	To determine if CSAS has actuated or should have actuated.
CONTMT TEMP 009-OPS92-092	< 120 deg F UL 120 deg F	120 deg F is based on engineering judgement as the max temp which will be observed without an energy release to the contmt. This value coincides with the contmt temp limit specified in T.S. 3.6.1.5 LCO.	To determine if containment conditions indicate an event other than SGTR is in progress.
CONTMT TEMP 009-OPS92-148	< 145 deg F Not yet available	Bases data not yet available.	To confirm that an event other than an LOFW is not taking place.
CONTMT TEMP 009-OPS92-078	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify conditions inside containment to be normal.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT TEMP 009-OPS92-092	< 120 deg F UL 120 deg F.	120 deg F is based on engineering judgement as the max temp which will be observed without an energy release to the contmt. This value coincides with the contmt temp limit specified in T.S. 3.6.1.5 LCO.	To verify containment temperature < 120 deg F and direct event re-diagnoses if it is not.
CONTMT TEMP 009-OPS92-148	< 145 deg F Limit not entered	Bases data not yet available.	To determine if event re-diagnosis is required.
CONTMT TEMP 009-OPS92-148	< 145 deg F Not yet available	Bases data not yet available.	To determine if the success path in use (containment temperature < 145 F) is acceptable, or direct the operator to a different success path.
CONTMT TEMP 009-OPS92-173	< 215 deg F Not yet available	Bases data not yet available.	To evaluate the need to initiate containment spray operation.
CONTMT TEMP 009-OPS92-173	> 215 deg F Not yet available	Bases data not yet available.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.
CONTMT TEMP 009-OPS92-138	CONSTNT OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT TEMP 009-OPS92-073	CONSTNT OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if containment pressure is less than the CIAS setpoint and determine the appropriate success path to be used.
CONTMT TEMP 009-OPS92-138	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.
CONTMT TEMP 009-OPS92-138	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the need to initiate containment spray operation.
CONTMT TEMP 009-OPS92-138	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate the effectiveness of the present success path for control of containment temperature and pressure.
CONTMT TEMP 009-OPS92-073	< 145 deg F Not yet available	Bases data not yet available.	To verify expected post-trip containment temperature conditions.
CONTMT TEMP 009-OPS92-173	< 215 deg F Not yet available	Bases data not yet available.	To verify that CCAS is the appropriate success path (via containment temp < 215 F and stable) or direct the operator to a different success path.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
CONTMT TEMP 009-OPS92-079	CONSTANT OR LOWER N/A	Use of the Mini-Purge System to vent containment in the event that the CS system does not operate is no longer applicable to the EOIs. SCE has directed that ABB-CE need not address this issue in this study.	To determine if the containment purge success path is performing adequately by observing containment temperature constant or lowering.
CONTMT TEMP 009-OPS92-138	STABLE OR LOWERIN NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if containment temperature is stable or lowering in order to allow continued use of the present success path, or direct the operator to a different success path.
CONTMT TEMP 009-OPS92-173	STABLE OR LOWERIN NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that CCAS is the appropriate success path (via containment temp < 215 F and stable) or direct the operator to a different success path.
CONTMT TEMP 009-OPS92-092	< 120 deg F UL 120 deg F	120 deg F is based on engineering judgement as the max temp which will be observed without an energy release to the contmt. This value coincides with the contmt temp limit specified in T.S. 3.6.1.5 LCO.	To confirm that an event other than an LOFW is not taking place.
CONTMT TEMP 009-OPS92-173	< 215 deg F Limit not entered	Bases data not yet available.	To determine if event re-diagnosis is required.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT AND COLD LEG HPSI FLOW 009-OPS92-130	<=910GPM PER PUMP UL 1000 GPM	The engineering limit is based on not exceeding runout conditions for the HPSI pumps.	To verify operating HPSI pumps do not exceed run-out conditions (910 GPM) during simultaneous Hot/Cold Leg Injection.
HOT AND COLD LEG HPSI FLOW 009-OPS92-129	>450 GPM PER PUMP LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.
HOT AND COLD LEG SI FLOW 009-OPS92-139	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
HOT AND COLD LEG SI FLOW 009-OPS92-139	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate hot and cold leg safety injection flow for RCS Inventory Control and RCS Pressure Control (SFSC).
HOT AND COLD LEG SI FLOW 009-OPS92-139	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate cold leg safety injection flow for RCS Inventory Contol and RCS Pressure Control (SFSC)
HOT AND COLD LEG SI FLOW 009-OPS92-139	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for RCS Inventory Control.
HOT AND COLD LEG SI FLOW 009-OPS92-139	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flow for RCS Pressure Control.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT AND COLD LEG SI FLOW 009-OPS92-139	SUM >= MIN EXP NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for core heat removal.
HOT AND COLD LEG SI FLOW 009-OPS92-139	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate hot and cold leg safety injection flow for RCS Heat Removal (SFSC).
HOT AND COLD LEG SI FLOW 009-OPS92-137	>450 GPM PER PUMP LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.
HOT LEG HPSI FLOW 009-OPS92-135	SUM >= MIN EXP NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
HOT LEG HPSI FLOW 009-OPS92-135	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
HOT LEG TEMP 009-OPS92-147	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify hot leg temperatures constant or decreasing as indication that single phase natural circulation is established.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT LEG TEMP 009-OPS92-142	< 350 deg F UL < 350 deg F	When T ave is < 350 deg F the Tech Specs require only one ECCS subsystem to be operable. It is conservatively assumed that T hot = T ave. Therefore, the UL for disabling a HPSI pump to prevent challenging the LTOP relief is < 350 deg F.	To initiate reducing the number of available HPSI pumps to within the design capacity of the LTOP relief valve.
HOT LEG TEMP 009-OPS92-143	< 385 deg F UL 400 deg F	The Engineering limit is based on not exceeding the design temperature (400 deg F) of the Shutdown Cooling System.	To monitor cooldown and depressurization of the RCS to get on Shutdown Cooling (<385 deg F and <340 psia specified).
HOT LEG TEMP 009-OPS92-143	< 385 deg F UL 400 deg F	The Engineering limit is based on not exceeding the design temperature (400 deg F) of the Shutdown Cooling System.	To verify shutdown cooling entry conditions are met (T-hot <385 deg F, PZR pressure <340 psia).
HOT LEG TEMP 009-OPS92-163	< 580 deg F <583 degF & CNTLD	The engineering limit is based on the minimum MSSV setpoint plus the maximum loop delta T coincident with initiation of natural circulation following a reactor trip. Thus, the MSSVs should not cycle open and control of RCS temperature is maintained.	To verify the existance of adequate RCS heat removal via at least one S/G (T-hot < 580 deg F and controlled).
HOT LEG TEMP 009-OPS92-161	> 325 deg F LL >287 degF(U-2)	The Technical Specifications require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287 deg F (Unit 2) or 267 deg F (Unit 3).	To indicate when to evaluate placing LTOP in service.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT LEG TEMP 009-OPS92-147	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is not rising, in the verification of adequate natural circulation.
HOT LEG TEMP 009-OPS92-163	<580 &STBL OR DEC <583 degF & CNTLD	The engineering limit is based on the minimum MSSV setpoint plus the maximum loop delta T coincident with initiation of natural circulation following a reactor trip. Thus, the MSSVs should not cycle open and control of RCS temperature is maintained.	To verify the existance of adequate RCS heat removal via at least one S/G (T-hot < 580 deg F and controlled).
HOT LEG TEMP 009-OPS92-160	< 530 deg F UL 540 deg F	Based on the possible lift pressure of the lowest MSSV (1089 PSIA/555 deg F. Post S/G isolation, T hot in both loops is expected to rise about 15 deg F). T hot <540 deg F before isolation will ensure MSSVs will not open after subsequent temp increase.	To verify T Hot is < 530 deg F to minimize the possibility of lifting the Main Steam Stafty Valves (MSSVs) after isolating the affected S/G, thus minimizing the chance of an unmonitored release.
HOT LEG TEMP 009-OPS92-163	<580 degF & CNTLD <583 degF & CNTLD	The engineering limit is based on the minimum MSSV setpoint plus the maximum loop delta T coincident with initiation of natural circulation following a reactor trip. Thus, the MSSVs should not cycle open and control of RCS temperature is maintained.	To verify the existance of adequate RCS heat removal via at least one S/G (T-hot < 580 deg F and controlled).
HOT LEG TEMP 009-OPS92-160	< 530 deg F UL 540 deg F	Based on the possible lift pressure of the lowest MSSV (1089 PSIA/555 deg F. Post S/G isolation, T hot in both loops is expected to rise about 15 deg F). T hot <540 deg F before isolation will ensure MSSVs will not open after subsequent temp increase.	To determine when corresponding S/G pressure and RCS heat removal requirements are low enough to allow placing a gag on the Main Steam Safety Valve(s) (MSSVs).

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT LEG TEMP 009-OPS92-143	< 385 deg F UL 400 deg F	The Engineering limit is based on not exceeding the design temperature (400 deg F) of the Shutdown Cooling System.	To evaluate sufficiency of the shutdown cooling success path, the need to go to another heat removal method.
HOT LEG TEMP 009-OPS92-205	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify that RCS temperature is within P/T limits.
HOT LEG TEMP 009-OPS92-161	>325 deg F LL >267 degF(U-3)	The Technical Specifications require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287 deg F (Unit 2) or 267 deg F (Unit 3).	To indicate when to evaluate placing LTOP in service.
HOT LEG TEMP - COLD LEG TEMP 009-OPS92-186	< 10 deg F UL 10 deg F	The engineeering limit is based on engineering judgement. The value chosen is based on the maximum delta T expected following an uncomplicated reactor trip followed by cooldown with one S/G available and some allowance for other unavailable equipment.	To verify a small loop delta T (< 10 deg F) that would be expected following a relatively uncomplicated reactor trip, assuming RCPs are running.
HOT LEG TEMP - COLD LEG TEMP 009-OPS92-152	< 58 deg F UL 58.2 deg F	Based on full power delta T derived from design T hot at 100% power = 611.2 deg F and design T cold at 100% power = 553 deg F. Loop delta T less than full power delta T is one indication that single phase natural circulation is established.	To verify loop delta T is less than full power delta T (<58 deg F) when single phase natural circulation is established.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT LEG TEMP - COLD LEG TEMP 009-OPS92-186	< 10 deg F UL 10 deg F	The engineeering limit is based on engineering judgement. The value chosen is based on the maximum delta T expected following an uncomplicated reactor trip followed by cooldown with one S/G available and some allowance for other unavailable equipment.	To verify adequate (forced circulation) success path performance via Th - Tc < 10 deg F and not rising, T-avg < 555 deg F and not rising, etc.
HOT LEG TEMP - COLD LEG TEMP 009-OPS92-152	<58degF &NOT RSNG UL 58.2 deg F	Based on full power delta T derived from design T hot at 100% power = 611.2 deg F and design T cold at 100% power = 553 deg F. Loop delta T less than full power delta T is one indication that single phase natural circulation is established.	To verify adequate (natural circulation) success path performance via Th - Tc < 58 deg F and not rising, T-avg < 580 deg F and not rising, etc.
HOT LEG TEMP - COLD LEG TEMP 009-OPS92-186	<10degF &NOT RSNG UL 10 deg F	The engineeering limit is based on engineering judgement. The value chosen is based on the maximum delta T expected following an uncomplicated reactor trip followed by cooldown with one S/G available and some allowance for other unavailable equipment.	To verify adequate (forced circulation) success path performance via Th - Tc < 10 deg F and not rising, T-avg < 555 deg F and not rising, etc.
HOT LEG TEMP - REPCET 009-OPS92-185	16 deg F 0 deg F	The eng limit is based on CEN-152 which states that there should be no abnormal differences between T hot RTDs and the CETs when single phase nat circ flow is established in at least one loop. The hot leg RTDs should be approximately equal to the CETs.	To verify no abnormal diferences between Hot leg RTDs and CETs as indication that single phase natural circulation is established.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HOT LEG TEMP - REPCET 009-OPS92-185	< 16 deg F 0 deg F	The eng limit is based on CEN-152 which states that there should be no abnormal differences between T hot RTDs and the CETs when single phase nat circ flow is established in at least one loop. The hot leg RTDs should be approximately equal to the CETs.	To verify no abnormal diferences between Hot leg RTDs and CETs as indication that single phase natural circulation is established.
HOT LEG TEMP - REPCET 009-OPS92-185	<= 16 deg F 0 deg F	The eng limit is based on CEN-152 which states that there should be no abnormal differences between T hot RTDs and the CETs when single phase nat circ flow is established in at least one loop. The hot leg RTDs should be approximately equal to the CETs.	To verify no abnormal diferences between Hot leg RTDs and CETs as indication that single phase natural circulation is established.
HPSI FLOW (TRAIN A) 009-OPS92-141	<= 300 GPM LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To initiate corrective action to prevent HPSI pump damage resulting from pump operation with less than minimum required flow.
HPSI FLOW (TRAIN B) 009-OPS92-141	<= 300 GPM LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To initiate corrective action to prevent HPSI pump damage resulting from pump operation with less than minimum required flow.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
HPSI/LPSI FLOW 009-OPS92-155	> 40 GPM LL 40 GPM	T.S.3.1.1.1 requires that with SDM less than the required value, boration must be initiated and continued at greater than or equal to 40 gpm until the required SDM is restored. 40 gpm is based on the capacity of one Charging Pump.	To verify Emergency Boration is in progress to obtain adequate shutdown margin per Tech. Spec. requirements.
PZR LEVEL 009-OPS92-107	10% TO 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify expected post-trip RCS inventory response (PZR level = 10% to 70%).
PZR LEVEL 009-OPS92-109	> 30% & NOT LWRG LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify adequate RCS inventory control when checking HPSI Termination Criteria.
PZR LEVEL 009-OPS92-107	10% TO 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify charging and/or SI pumps are maintaining PZR level between 10% and 70%.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-110	30% TO 60% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To determine if PZR level is within the appropriate band for starting an RCP, without Reactor Vessel voiding and likely to remain there.
PZR LEVEL 009-OPS92-108	30% TO 60% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To verify PZR level is being controlled in the normal operating band of 30% to 60%.
PZR LEVEL 009-OPS92-111	> 70% UL 78%	78% is based on engineering judgement such that solid water operation is avoided, sufficient steam space is maintained, and spray response time and other uncetainties are accounted for. Also, it bounds the highest PZR levels observed in best est anal.	To remind operator that the maximum PZR level of 70% may be exceeded if necessary to maintaining 20 deg F saturation margin or to compensate for void collapse.
PZR LEVEL 009-OPS92-103	< 33% UL 59%	59% is based on ensuring that pressurizer water volume is within the T.S. limit. T.S. 3/4.4.3 requires that the pressurizer be OPERABLE with a water volume of <= 900 cubic feet, when in Modes 1, 2 and 3.	To evaluate the capability of the PZR to absorb the possible insurge when starting the first RCP after all RCPs have been tripped if Tsg > Tc.
PZR LEVEL 009-OPS92-112	< 60% UL 59%	59% is based on ensuring that pressurizer water volume is within the T.S. limit. T.S. 3/4.4.3 requires that the pressurizer be OPERABLE with a water volume of <= 900 cubic feet, when in Modes 1, 2 and 3.	To maintain PZR level below 60% while purging the VCT.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-112	< 60% UL 59%	59% is based on ensuring that pressurizer water volume is within the T.S. limit. T.S. 3/4.4.3 requires that the pressurizer be OPERABLE with a water volume of <= 900 cubic feet, when in Modes 1, 2 and 3.	To verify maximum desired Pressurizer Level during the raising of Core Exit Saturation Margin .
PZR LEVEL 009-OPS92-103	< 61% UL 59%	59% is based on ensuring that pressurizer water volume is within the T.S. limit. T.S. 3/4.4.3 requires that the pressurizer be OPERABLE with a water volume of <= 900 cubic feet, when in Modes 1, 2 and 3.	To evaluate the capability of the PZR to absorb the possible insurge when starting the first RCP after all RCPs have been tripped if Tsg > Tc.
PZR LEVEL 009-OPS92-110	> 30% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To determine if PZR level is within the appropriate band for starting an RCP, without Reactor Vessel voiding and likely to remain there.
PZR LEVEL 009-OPS92-051	> 30% & NOT LWRG LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify PZR level is above the heater low level cutoff (procedure specified value = 30%) and controlled.
PZR LEVEL 009-OPS92-109	>30% & CONTROLLED LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify adequate RCS inventory control when checking HPSI Termination Criteria.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-110	> 30% & NOT LWRG UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To determine if PZR level is within the appropriate band for starting an RCP, without Reactor Vessel voiding and likely to remain there.
PZR LEVEL 009-OPS92-070	41% LL 21%	The engineering limits for minimum PZR level are based on providing sufficient inventory to compensate for RCP restart void collapse with a known void in the reactor vessel. The engineering limit is calculated to prevent PZR heaters from uncovering.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
PZR LEVEL 009-OPS92-070	46% LL 41%	The engineering limits for minimum PZR level are based on providing sufficient inventory to compensate for RCP restart void collapse with a known void in the reactor vessel. The engineering limit is calculated to prevent PZR heaters from uncovering.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
PZR LEVEL 009-OPS92-070	62% LL 54%	The engineering limits for minimum PZR level are based on providing sufficient inventory to compensate for RCP restart void collapse with a known void in the reactor vessel. The engineering limit is calculated to prevent PZR heaters from uncovering.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-070	74% LL 68%	The engineering limits for minimum PZR level are based on providing sufficient inventory to compensate for RCP restart void collapse with a known void in the reactor vessel. The engineering limit is calculated to prevent PZR heaters from uncovering.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
PZR LEVEL 009-OPS92-070	87% LL 81%	The engineering limits for minimum PZR level are based on providing sufficient inventory to compensate for RCP restart void collapse with a known void in the reactor vessel. The engineering limit is calculated to prevent PZR heaters from uncovering.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
PZR LEVEL 009-OPS92-054	LWNG/RSNG - CHARG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if a void exists in the reactor vessel by observing PZR level behavior while using aux spray or charging to the loop.
PZR LEVEL 009-OPS92-049	LWNG/RSNG - SPRAY NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if a void exists in the reactor vessel by observing PZR level behavior while using aux spray or charging to the loop.
PZR LEVEL 009-OPS92-050	STABLE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-108	< 60% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To verify PZR level is being controlled in the normal operating band of 30% to 60%.
PZR LEVEL 009-OPS92-108	> 30% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To verify PZR level is being controlled in the normal operating band of 30% to 60%.
PZR LEVEL 009-OPS92-051	> 30% LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify maximum desired Pressurizer Level during the raising of Core Exit Saturation Margin .
PZR LEVEL 009-OPS92-052	STABLE OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
PZR LEVEL 009-OPS92-107	10% TO 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify that PZR level is in the appropriate band for the RCS Inventory Control SFSC, and direct event re-diagnosis if it is not.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-107	10% TO 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify charging and letdown are maintaining PZR level between 10% and 70%.
PZR LEVEL 009-OPS92-108	30% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To monitor corrected PZR level > 30% during PZR cooldown using the fill and drain method.
PZR LEVEL 009-OPS92-053	65% TO 70% UL 78%	78% is based on engineering judgement such that solid water operation is avoided, sufficient steam space is maintained, and spray response time and other uncetainties are accounted for. Also, it bounds the highest PZR levels observed in best est anal.	To maintain corrected PZR level within the appropriate range (65% - 70%) during PZR cooldown using the fill and drain method.
PZR LEVEL 009-OPS92-051	> 30% LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify desired Pressurizer Level during the raising of Core Exit Saturation Margin using PZR heaters.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-108	TREND 30% TO 60% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To verify PZR level is trending to the normal post-trip control band (30% to 60%).
PZR LEVEL 009-OPS92-108	TREND 30% TO 60% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To verify that PZR level is in the appropriate band for the RCS Inventory Control SFSC, and direct event re-diagnosis if it is not.
PZR LEVEL 009-OPS92-051	30% LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify that corrected PZR level is being maintained above the low level heater cutoff (30% specified).
PZR LEVEL 009-OPS92-051	>30% &STBL,RISING LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify PZR level is above the heater low level cutoff (procedure specified value = 30%) and controlled.
PZR LEVEL 009-OPS92-108	30% TO 60% UL 59% LL 21%	59% is based on ensuring that PZR water vol < T.S. 3/4.4.3 limit requiring that the PZR be OPERABLE with a water volume of <=900 cubic ft (Modes 1, 2 and 3). 21% is based on keeping the PZR heaters covered to preserve normal means of pressure control.	To verify the maintenance of normal post-trip PZR level control (30% to 60%).

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-107	< 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify charging and/or SI pumps are maintaining PZR level between 10% and 70%.
PZR LEVEL 009-OPS92-035	< 70% UL 78%	78% is based on engineering judgement such that solid water operation is avoided, sufficient steam space is maintained, and spray response time and other uncetainties are accounted for. Also, it bounds the highest PZR levels observed in best est anal.	To determine if the plant should be in "solid" pressure control operations, or whether the present success path can be utilized.
PZR LEVEL 009-OPS92-107	> 10% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify that the charging pumps are maintaining PZR level for RCS inventory control (>10%), to determine whether or not to stay with the present success path.
PZR LEVEL 009-OPS92-036	30% LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To allow PZR level to lower to assist in PZR pressure reduction during cooldown without further compromising pressure control capability.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-032	< 100% UL 100%	100% is based on engineering judgement. 100% indicated level is the maximum level that can be used to determine if solid plant operations should be used for pressure control. If PZR level is <100% then means other than solid plant ops may be used.	To determine if the plant should be in "solid" pressure control operations, or whether the present success path can be utilized.
PZR LEVEL 009-OPS92-033	< 70% UL 78%	78% is based on engineering judgement such that solid water operation is avoided, sufficient steam space is maintained, and spray response time and other uncetainties are accounted for. Also, it bounds the highest PZR levels observed in best est anal.	To determine if sprays can be used to control PZR pressure.
PZR LEVEL 009-OPS92-051	> 30% LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	Verify PZR level is above the heater low level cutoff.
PZR LEVEL 009-OPS92-109	>30% & STBL,RSNG LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify charging pump throttling criteria.
PZR LEVEL 009-OPS92-051	> 30% LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	To verify that corrected PZR level is being maintained above the low level heater cutoff (30% specified).

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-034	> 30% UL 42%	42% is based on preventing the shutdown cooling relief valve PSV-9349 from lifting when placing the SDC system in service.	To to ensure Shutdown Cooling System operational limit is met.
PZR LEVEL 009-OPS92-107	<= 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify charging and/or SI pumps are maintaining PZR level between 10% and 70%.
PZR LEVEL 009-OPS92-107	> 10 % UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To verify charging and/or SI pumps are maintaining PZR level between 10% and 70%.
PZR LEVEL 009-OPS92-109	>30% & CONTROLLED LL 21%	21% is based on the minimum pressurizer level required to keep the peripheral(outside) pressurizer heaters covered to prevent heater burn-out and maintain normal RCS pressure control.	Used as criteria for HPSI throttle/stop (CET sat margin > 20 deg F, RVLMS >= 82%).
PZR LEVEL 009-OPS92-140	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify SITs are injecting water.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR LEVEL 009-OPS92-107	> 70% UL 78% LL 2%	78% is based on engineering judgement to establish a limit that will avoid solid water operations and provide sufficient steam space to assure normal pressure control. 2% is intended to be theoretical minimum detectable level.	To compensate for void collapse.
PZR PRESSURE 009-OPS92-132	<= 500 PSIA 500 PSIA	The eng limit was selected because at RCS pressures >500 PSIA, indicated HPSI flow is expected to be very low and therefore inaccurate. >500 PSIA Hot and Cold Leg HPSI flows can not be accuratly adjusted and are not throttled. <500 PSIA they can be.	To verify adequate HPSI flow during hot and cold leg injection.
PZR PRESSURE 009-OPS92-132	> 500 PSIA 500 PSIA	The eng limit was selected because at RCS pressures >500 PSIA, indicated HPSI flow is expected to be very low and therefore inaccurate. >500 PSIA Hot and Cold Leg HPSI flows can not be accuratly adjusted and are not throttled. <500 PSIA they can be.	To aid in the selection of the appropriate lineup when initiating hot and cold leg injection.
PZR PRESSURE 009-OPS92-144	PER TABLE NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
PZR PRESSURE 009-OPS92-200	CNTLD 1740 - 2380 UL 2375, LL 1740	The upper limit is based on the High Pressurizer Pressure Reactor Trip setpoint. The lower limit is based on the Low Pressurizer Reactor Trip setpoint and the Safety Injection Actuation Signal (SIAS).	To verify expected post-trip reactor pressure response (PZR pressure between 1740 psia and 2380 psia).

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-208	TREND:2000-2275 UL 2300, LL 2200	The eng limits are based on the normal PZR pressure control band using sprays and heaters, including the backup heaters. If RCS pressure is being controlled by the PZR Pressure Control System, then pressure should be in or trending to the specified band.	To verify expected post-trip RCS pressure response (PZR pressure trending to between 2000 psia and 2275 psia).
PZR PRESSURE 009-OPS92-200	CNTRLD <2380 PSIA UL 2375, LL 1740	The upper limit is based on the High Pressurizer Pressure Reactor Trip setpoint. The lower limit is based on the Low Pressurizer Reactor Trip setpoint and the Safety Injection Actuation Signal (SIAS).	To verify that PZR pressure is controlled.
PZR PRESSURE 009-OPS92-162	< 1400 PSIA UL 1514.7 PSIA	The eng limit is based on the capacity of the intermediate pressure letdown relief valve which is equal to the capacity of one letdown control valve in the wide open position during normal operation.	To verify Pressurizer Pressure is < 1400 PSIA, which is a prerequisite for aligning both letdown flow control valves during a Cooldown/Depressurization.
PZR PRESSURE 009-OPS92-175	< 340 PSIA UL 376 PSIA	The eng limit is based on a permissive signal which prevents opening SDC suction line isolation valves until PZR pressure is <376 PSIA. This action is intended to prevent exceeding the design pressure of the SDC system.	To monitor cooldown and depressurization of the RCS to get on Shutdown Cooling (<385 deg F and <340 psia specified).
PZR PRESSURE 009-OPS92-175	< 340 PSIA UL 376 PSIA	The eng limit is based on a permissive signal which prevents opening SDC suction line isolation valves until PZR pressure is <376 PSIA. This action is intended to prevent exceeding the design pressure of the SDC system.	To verify shutdown cooling entry conditions are met (T-hot <385 deg F, PZR pressure <340 psia).

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-136	< 395 PSIA UL <400 LL >=300	To prevent an unwanted SIAS during forced cooldown. Tech. Specs. and FSAR state that the low pressure trip signal can not be bypassed until PZR Pressure <400 PSIA. Tech. Specs. also state that the lowest allowed trip setpoint is 300 PSIA.	To verify criteria for bypassing SIAS (395 psia).
PZR PRESSURE 009-OPS92-170	< 395 PSIA LL 370 PSIA	To prevent inadvertent discharge of the SIT water volume to the RCS followed by SIT Nitrogen cover gas entering the RCS. The Eng limit is based on the upper end of the SIT Nitrogen overpressure control band required to be established during a cooldown.	To verify that PZR pressure is < 395 to allow isolation of the SITs.
PZR PRESSURE 009-OPS92-183	< 395 PSIA UL 420.7 PSIA	The eng limit is based on the S.P. of the LTOP relief (406 +/- 10 psig). It is only applicable when LTOP is in service. The number of available HPSI pumps is reduced to one in order to ensure that the design capacity of the LTOP relief is not exceeded.	To initiate reducing the number of available HPSI pumps to within the design capacity of the LTOP relief valve.
PZR PRESSURE 009-OPS92-187	< 395 PSIA UL 400 PSIA	The eng limit is based on operational requirements contained in the "CVCS Charging and Letdown" operating instruction. No primary references to support a technical bases for the procedural requirements could be located.	To specify the setpoint to allow lowering the charging pump discharge dampener pressure to 200 psig.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-169	< 715 PSIA LL 655 PSIA	The eng limit is based on the highest allowed Nitrogen cover-pressure in the SITs. To prevent Nitrogen injection into RCS or overpressurization of the SDC system during RCS cooldown/depressurization, RCS pressure sould be maintained > SIT pressure.	To avoid inadvertent discharge of the SITs (below 650 psia).
PZR PRESSURE 009-OPS92-193	> 100 PSIA LL 165 PSIA	The eng limit is based on seal manufacturer requirement to provide at least 50 PSI RCS pressure for each stage of the RCP seals.	To verify PZR pressure is high enough (> 100 psia) to force RCS fluid through the seals prior to opening the RCP seal bleedoff path.
PZR PRESSURE 009-OPS92-167	> 200 PSIA & CONT UL 200 PSIA	The eng limit is based on the shutoff head of the LPSI pumps (200 PSIA). Operation of the LPSI pumps at RCS pressures above this value will not result in delivery.	To verify PZR pressure > the shutoff head of the LPSI pumps (200 psia stated) and controlled.
PZR PRESSURE 009-OPS92-194	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify that PZR Pressure is between the 20 deg F and 200 deg F Post Accident P/T limit curves.
PZR PRESSURE 009-OPS92-192	STOP LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To prevent void formation.
PZR PRESSURE 009-OPS92-172	< 1000 PSIA UL 1088 PSIA	The purpose of the engineering limit is to reduce the probability of a ruptured and isolated S/Gs MSSV(s) opening. It is based on the nominal setpoint for the lowest set MSSV (1100 psia +/-1%).	To determine during an SGTR if PZR pressure requires shifting from maintaining +/-50 psid (primary to secondary), to maintaining RCP NPSH and CET SAT Margin >20 F.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-172	< 1000 PSIA UL 1088 PSIA	The purpose of the engineering limit is to reduce the probability of a ruptured and isolated S/Gs MSSV(s) opening. It is based on the nominal setpoint for the lowest set MSSV (1100 psia +/-1%).	To verify PZR pressure is < 1000 psia to minimize the possiblity of lifting the Main Steam Safety Valves (MSSVs) on the isolated S/G.
PZR PRESSURE 009-OPS92-192	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify PZR pressure is reduced to within 50 psi of the isolated (ruptured) S/G pressure.
PZR PRESSURE 009-OPS92-170	< 395 PSIA LL 370 PSIA	To prevent inadvertent discharge of the SIT water volume to the RCS followed by SIT Nitrogen cover gas entering the RCS. The Eng limit is based on the upper end of the SIT Nitrogen overpressure control band required to be established during a cooldown.	To initiate action to isolate SITs to prevent inadvertent discharge.
PZR PRESSURE 009-OPS92-169	< 715 PSIA LL 655 PSIA	The eng limit is based on the highest allowed Nitrogen cover-pressure in the SITs. To prevent Nitrogen injection into RCS or overpressurization of the SDC system during RCS cooldown/depressurization, RCS pressure sould be maintained > SIT pressure.	To determine when to depressurize the SITs.
PZR PRESSURE 009-OPS92-195	<= 615 PSIA UL 615 PSIA	The engineering limit is based on the lowest pressure allowed in the SITs by the Technical Specifications. The specific limit for each tank which will result in flow to the RCS is dependent on the actual pressure in that tank.	To check PZR Pressure < 615 PSIA to ensure flow from SITs to RCS.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-203	< 250 PSIA UL 270 PSIA	The engineering limit is based on the shutoff head of the CS pumps which is 575 feet. This is equivalent to 255.26 psig (270 psia nominal).	To verify PZR pressure is below the shutoff head of the containment spray pumps (250 psia stated).
PZR PRESSURE 009-OPS92-162	> 1400 PSIA UL 1514.7 PSIA	The eng limit is based on the capacity of the intermediate pressure letdown relief valve which is equal to the capacity of one letdown control valve in the wide open position during normal operation.	To confirm that only one letdown flow control valve is unisolated (> 1400 psia).
PZR PRESSURE 009-OPS92-176	> 1430 PSIA LL 1361 PSIA	The eng limit is derived from CEN-268 which describes the strategy for tripping all four RCPs following a small break LOCA to avoid a degradation in core cooling. 1361 PSIA is based on results of a 3410 MWt plant best estimate analysis.	Used in the determination to trip all RCPs in the event of a LOCA.
PZR PRESSURE 009-OPS92-184	< 1500 PSIA UL 1493 PSIA	The engineering limit is based on the maximum HPSI pump shutoff head per pump specifications and does not account for any uncertainties.	To ensure PZR pressure is at or below the shutoff head of the HPSI pumps (procedure specified number is 1500 psia).
PZR PRESSURE 009-OPS92-167	< 200 PSIA UL 200 PSIA	The eng limit is based on the shutoff head of the LPSI pumps (200 PSIA). Operation of the LPSI pumps at RCS pressures above this value will not result in delivery.	To verify Pzr Pressure is less than the shutoff head of LPSI pumps to establish LPSI flow into RCS.
PZR PRESSURE 009-OPS92-192	ACCEP RATE OF CHG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if the rate of PZR pressure change is acceptable during PZR spray or heater operation.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-176	> 1430 PSIA LL 1361 PSIA	The eng limit is derived from CEN-268 which describes the strategy for tripping all four RCPs following a small break LOCA to avoid a degradation in core cooling. 1361 PSIA is based on results of a 3410 MWt plant best estimate analysis.	To determine if two RCPs must be stopped.
PZR PRESSURE 009-OPS92-189	< 1740 PSIA LL 1740 PSIA	The eng limit is based on the Safety Injection Actuation Signal (SIAS) and Pressurizer Pressure - Low trip setpoint. Uncertainties associated with the actuation function of the pressure channel are included, those associated with the indicator are not.	To ensure SIAS is actuated if PZR Pressure < 1740 PSIA.
PZR PRESSURE 009-OPS92-189	> 1740 PSIA LL 1740 PSIA	The eng limit is based on the Safety Injection Actuation Signal (SIAS) and Pressurizer Pressure - Low trip setpoint. Uncertainties associated with the actuation function of the pressure channel are included, those associated with the indicator are not.	To verify PZR Pressure is greater than the Low PZR Pressure trip setpoint and SIAS setpoint.
PZR PRESSURE 009-OPS92-172	> 1000 PSIA UL 1088 PSIA	The purpose of the engineering limit is to reduce the probability of a ruptured and isolated S/Gs MSSV(s) opening. It is based on the nominal setpoint for the lowest set MSSV (1100 psia +/-1%).	To determine during an SGTR (w/ T-hot <530 F and S/G Level rapidly trending >90%) if PZR press requires shifting from maintaining RCP NPSH & CET SAT Margin >20 F to maintaining S/G d/p +/-50 psid.
PZR PRESSURE 009-OPS92-192	STABLE OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-176	<= 1430 PSIA LL 1361 PSIA	The eng limit is derived from CEN-268 which describes the strategy for tripping all four RCPs following a small break LOCA to avoid a degradation in core cooling. 1361 PSIA is based on results of a 3410 MWt plant best estimate analysis.	To determine if at least one RCP in each loop must be stopped.
PZR PRESSURE 009-OPS92-192	STBL/RSNG & CNTRL NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that RCS pressure is controlled.
PZR PRESSURE 009-OPS92-192	RAPIDLY LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To identify the type of event and location when Pressurizer Pressure is rapidly decreasing, using the "Break Identification Chart".
PZR PRESSURE 009-OPS92-176	> 1430 PSIA LL 1361 PSIA	The eng limit is derived from CEN-268 which describes the strategy for tripping all four RCPs following a small break LOCA to avoid a degradation in core cooling. 1361 PSIA is based on results of a 3410 MWt plant best estimate analysis.	To verify the number of RCPs allowed to be running.
PZR PRESSURE 009-OPS92-194	> RCP NPSH CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To confirm available NPSH for operating the RCP(s).

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-122	<50 PSID RUPT S/G +/- 50 PSI of S/G	The eng limit is based on the maintaining the RCS pressure approx equal (+/-50 psi) to the isolated S/G pressure. This will minimize primary to secondary leakage and possible S/G overfill, as well as minimize RCS boron dilution by the secondary fluid.	To verify PZR pressure is reduced to within 50 psi of the isolated (ruptured) S/G pressure.
PZR PRESSURE 009-OPS92-122	> S/G PRESSURE +/- 50 PSI of S/G	The eng limit is based on the maintaining the RCS pressure approx equal (+/-50 psi) to the isolated S/G pressure. This will minimize primary to secondary leakage and possible S/G overfill, as well as minimize RCS boron dilution by the secondary fluid.	To ensure RCS pressure remains higher than ruptured S/G pressure in order to minimize RCS dilution due to backflow.
PZR PRESSURE 009-OPS92-122	PZR P < S/G P +/- 50 PSI of S/G	The eng limit is based on the maintaining the RCS pressure approx equal (+/-50 psi) to the isolated S/G pressure. This will minimize primary to secondary leakage and possible S/G overfill, as well as minimize RCS boron dilution by the secondary fluid.	To monitor lowering RCS Pressure to < S/G Pressure to restore the isolated S/G level to less than 80% NR.
PZR PRESSURE 009-OPS92-192	STABLE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To achieve control of CET Sat Margin by stabilizing pressurizer pressure and level.
PZR PRESSURE 009-OPS92-194	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To maintain saturation margin while performing controlled primary plant depressurization and cooldown.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS92-194	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To allow PZR level to lower to assist in PZR pressure reduction during cooldown without further compromising pressure control capability.
PZR PRESSURE 009-OPS92-194	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify that PZR pressure is within the post accident P/T limits to determine success path performance.
PZR PRESSURE 009-OPS92-192	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify expected RCS depressurization as S/G steaming and feeding continue.
PZR PRESSURE 009-OPS92-192	MAINTAINED NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that RCS pressure is controlled.
PZR PRESSURE 009-OPS92-122	+/- 50 PSI ISO SG +/- 50 PSI of S/G	The eng limit is based on the maintaining the RCS pressure approx equal (+/-50 psi) to the isolated S/G pressure. This will minimize primary to secondary leakage and possible S/G overfill, as well as minimize RCS boron dilution by the secondary fluid.	To verify PZR pressure is reduced to within 50 psi of the isolated (ruptured) S/G pressure.
PZR PRESSURE 009-OPS92-169	< 650 PSIA LL 655 PSIA	The eng limit is based on the highest allowed Nitrogen cover-pressure in the SITs. To prevent Nitrogen injection into RCS or overpressurization of the SDC system during RCS cooldown/depressurization, RCS pressure sould be maintained > SIT pressure.	To initiate action to lower SIT pressure to avoid inadvertant discharge to the RCS.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
PZR PRESSURE 009-OPS93-004	< 2275 PSIA & DEC UL 2275 PSIA	The engineering limit is based on the Pressurizer Pressure Control System (PPCS) signal for operation of the Pressurizer Sprays. Spray valves receive a signal to close when PZR pressure decreases below 2275 psia.	To ensure normal and auxiliary spray valves are closed.
REACTOR HEAD SAT MARGIN 009-OPS92-093	> 20 deg F LL 1 deg F	Saturation margins greater than 0 deg F equate to subcooled coolant (i.e. verification of level). Therefore, it can be inferred that the absence of subcooled coolant in the RV head is indicative of reactor vessel level less then 100%.	Used for alternate reactor vessel level indication.
REACTOR HEAD SAT MARGIN 009-OPS92-094	> 0 deg F LL 1 deg F	Saturation margins greater than 0 deg F equate to unsaturated (subcooled) coolant. Therefore 1 deg F is the lower engineering limit.	To check saturation margin in the reactor vessel head region is > 0 deg F to prevent void formation.
REACTOR POWER 009-OPS92-043	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To confirm that the reactor is under control.
REACTOR POWER 009-OPS92-043	STABLE/LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To confirm that the reactor is under control.
REACTOR POWER 009-OPS92-044	STABLE OR LWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify boron addition via decreasing reactor power indication.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR POWER 009-OPS92-045	<1E-4%& STBL,LWRG LWRG,STBL&<1E-4%	1E-4% power was chosen based on engineering judgement. 1E-4% is sufficiently below the point of adding heat to the RCS to permit operator response prior to significant heat addition for anticipated occurrences involving a return to criticality.	To confirm that the reactor is under control.
REACTOR POWER 009-OPS92-044	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify boron addition via decreasing reactor power indication.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-059	100% LL 100%	A lower limit of 100% is based on the physical location of the highest HJTCS sensor, which is 39 inches from the top of the RV Head. When the highest sensor is covered (i.e. 100% indicated level), no significant voiding exists in the RV Head region.	To ensure no substantial void formed in the head and evaluate charging requirements following an RCP restart.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-059	100% LL 100%	A lower limit of 100% is based on the physical location of the highest HJTCS sensor, which is 39 inches from the top of the RV Head. When the highest sensor is covered (i.e. 100% indicated level), no significant voiding exists in the RV Head region.	To determine if steps to collapse a void in the reactor vessel should be initiated.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-059	< 100% LL 100%	A lower limit of 100% is based on the physical location of the highest HJTCS sensor, which is 39 inches from the top of the RV Head. When the highest sensor is covered (i.e. 100% indicated level), no significant voiding exists in the RV Head region.	To determine if steps to collapse a void in the reactor vessel should be initiated.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-086	100% NONE	In developing the correlation between PZR level and RV level, the latter is the independent variable upon which the required PZR level depends. Therefore, no eng limits can be assigned. See File #009-OPS92-070 for the corresponding PZR lvl eng limits.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-058	< 100% NONE	RV level can be estimated using SMM and temp sensors in the RV and hot legs to draw a correlation to RV level. There is no eng limit for the correlation between these parameters since no specific operator action is included in the use statement.	Used for alternate reactor vessel level indication.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-059	100% LL 100%	A lower limit of 100% is based on the physical location of the highest HJTCS sensor, which is 39 inches from the top of the RV Head. When the highest sensor is covered (i.e. 100% indicated level), no significant voiding exists in the RV Head region.	To determine if pressurizer level needs to be raised prior to RCP restart to compensate for void collapse.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-056	RISING OR STABLE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify SITs are injecting water.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-086	48% NONE	In developing the correlation between PZR level and RV level, the latter is the independent variable upon which the required PZR level depends. Therefore, no eng limits can be assigned. See File #009-OPS92-070 for the corresponding PZR lvl eng limits.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-086	20% NONE	In developing the correlation between PZR level and RV level, the latter is the independent variable upon which the required PZR level depends. Therefore, no eng limits can be assigned. See File #009-OPS92-070 for the corresponding PZR lvl eng limits.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-086	0% NONE	In developing the correlation between PZR level and RV level, the latter is the independent variable upon which the required PZR level depends. Therefore, no eng limits can be assigned. See File #009-OPS92-070 for the corresponding PZR lvl eng limits.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
REACTOR VESSEL LEVEL (HEAD) 009-OPS92-057	< 100% UL 48%	The HJTCS provides descrete level indications depending on which of its 8 sensors (3 in the head) are uncovered. When sensor #1 is uncovered, the Reactor Vessel Level Monitoring System provides a reactor vessel head level indication of 48%.	To verify that a void exists in the reactor vessel prior to raising pressure to collapse the void.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-119	>= 82% LL 82%	Sensor #5 in the HJTCS is located at the top of the hot leg lip and indicates that the plenum level is >=82%. The engineering limit is based on the requirement to keep the RCS loops filled so that subcooled natural circulation may proceed normally.	To verify absence of voids in reactor vessel head and plenum region which could stop single phase natural circulation flow.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-127	>= 82% LL 82%	CEN-152 requires that the Reactor Vessel level be at least at the top of the hot leg nozzles in addition to > 30% level in the PZR to demonstrate that inventory control has been established prior to allowing HPSI flow to be throttled or stopped.	Used as criteria for HPSI throttle/stop (CET sat margin > 20 deg F, RVLMS >= 82%).
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-121	100% LL 100% (PLENUM)	Sensor #4 of the RVLMS is located approxomately 5 inches below the bottom of the UGSSP. If sensor #4 is covered, then the indicated Plenum level will be 100%. An indication of 100% plenum level indicates that the plenum is free of voids.	To ensure no void formed in the Plenum and evaluate charging requirements following an RCP restart.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-121	100% LL 100% (PLENUM)	Sensor #4 of the RVLMS is located approxomately 5 inches below the bottom of the UGSSP. If sensor #4 is covered, then the indicated Plenum level will be 100%. An indication of 100% plenum level indicates that the plenum is free of voids.	To determine if steps to collapse a void in the reactor vessel should be initiated.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-120	< 82% NONE	RV level can be estimated using SMM and temp sensors in the RV and hot legs to draw a correlation to RV level. There is no eng limit for the correlation between these parameters since no specific operator action is included in the use statement.	Used for alternate reactor vessel level indication.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-125	>= 82% LL 21%	Sensor #8 is the lowest sensor in the HJTCS and is located just above the fuel alignment plate. If sensor #8 is covered with water, the RVLMS will show that the level is >=21%. >=21% is positive indication that the core is covered.	To verify RCS inventory control Safety Function Status Checklist (SFSC) criteria are satisfied and the core remains covered.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-126	100% LL 82%	82% is based on a recommendation that the indicated reactor vessel level be at least 82% in the plenum, which corresponds to a level at the top of the hot legs, prior to entering shutdown cooling.	To verify appropriate Shutdown Cooling entry conditions (e.g. 20 deg F subcooling, RVLMS = 100%, etc.).
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-119	>= 82% LL 82%	Sensor #5 in the HJTCS is located at the top of the hot leg lip and indicates that the plenum level is >=82%. The engineering limit is based on the requirement to keep the RCS loops filled so that subcooled natural circulation may proceed normally.	To verify that reactor vessel level (plenum) is adequate to support single phase natural circulation (>= 82%).
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-120	>= 82% NONE	RV level can be estimated using SMM and temp sensors in the RV and hot legs to draw a correlation to RV level. There is no eng limit for the correlation between these parameters since no specific operator action is included in the use statement.	Used for alternate reactor vessel level indication.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-080	82% NONE	In developing the correlation between PZR level and RV level, the latter is the independent variable upon which the required PZR level depends. Therefore, no eng limits can be assigned. See File #009-OPS92-070 for the corresponding PZR lvl eng limits.	To verify that Pressurizer inventory is sufficient to compensate for RCP restart void collapse with a void indicated by the RVLMS.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-121	100% LL 100% (PLENUM)	Sensor #4 of the RVLMS is located approxomately 5 inches below the bottom of the UGSSP. If sensor #4 is covered, then the indicated Plenum level will be 100%. An indication of 100% plenum level indicates that the plenum is free of voids.	To determine if pressurizer level needs to be raised prior to RCP restart to compensate for void collapse.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-127	>= 82% LL 82%	CEN-152 requires that the Reactor Vessel level be at least at the top of the hot leg nozzles in addition to > 30% level in the PZR to demonstrate that inventory control has been established prior to allowing HPSI flow to be throttled or stopped.	To verify charging and/or SI pumps are maintaining Reactor Vessel level (plenum) >= 82%.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-125	>= 82% LL 21%	Sensor #8 is the lowest sensor in the HJTCS and is located just above the fuel alignment plate. If sensor #8 is covered with water, the RVLMS will show that the level is >=21%. >=21% is positive indication that the core is covered.	To determine whether or not to stay with the present success path (i.e. CET sat margin > 20 deg F, RVLMS plenum >= 82%).

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-125	>= 82% LL 21%	Sensor #8 is the lowest sensor in the HJTCS and is located just above the fuel alignment plate. If sensor #8 is covered with water, the RVLMS will show that the level is >=21%. >=21% is positive indication that the core is covered.	To evaluate the performance of the success path (i.e. CET sat margin > 20 deg F, RVLMS plenum >= 82%).
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-127	>= 82% LL 82%	CEN-152 requires that the Reactor Vessel level be at least at the top of the hot leg nozzles in addition to > 30% level in the PZR to demonstrate that inventory control has been established prior to allowing HPSI flow to be throttled or stopped.	To verify charging pump throttling criteria.
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-126	100% LL 82%	82% is based on a recommendation that the indicated reactor vessel level be at least 82% in the plenum, which corresponds to a level at the top of the hot legs, prior to entering shutdown cooling.	To verify shutdown cooling conditions are met (CET saturation margin > 20 deg F, RVLMS = 100%).
REACTOR VESSEL LEVEL (PLENUM) 009-OPS92-119	82% LL 82%	Sensor #5 in the HJTCS is located at the top of the hot leg lip and indicates that the plenum level is >=82%. The engineering limit is based on the requirement to keep the RCS loops filled so that subcooled natural circulation may proceed normally.	To determine when to inititate steps to collapse a void in the reactor vessel during a natural circulation cooldown while depressurizing to enter shutdown cooling.
REACTOR VESSEL UPPER HEAD TEMP 009-OPS92-123	100 deg F/HR UL 100 deg F/HR	The maximum cooldown rate for the RCS is 100 deg F/hr when RC cold leg temperature is greater than 145 deg F as defined by the Technical Specifications.	To ensure that the maximum cooldown rate for the Reactor Vessel Upper Head is not exceeded.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REPCET TEMP 009-OPS92-171	< 700 deg F <666 &STBL OR DEC	Based on maximum expected CET with core covered. CET should always be <666 deg F (based on PZR safety valve S.P.). If core uncovers, the upper core region becomes superheated and CET will increase rapidly to > T sat for the existing PZR pressure.	To verify RCS inventory control Safety Function Status Checklist (SFSC) criteria are satisfied and the core remains covered.
REPCET TEMP 009-OPS92-171	> 700 deg F <666 &STBL OR DEC	Based on maximum expected CET with core covered. CET should always be <666 deg F (based on PZR safety valve S.P.). If core uncovers, the upper core region becomes superheated and CET will increase rapidly to > T sat for the existing PZR pressure.	To determine if the operator should go to the Functional Recovery procedure.
REPCET TEMP 009-OPS92-171	< 600 deg F <666 &STBL OR DEC	Based on maximum expected CET with core covered. CET should always be <666 deg F (based on PZR safety valve S.P.). If core uncovers, the upper core region becomes superheated and CET will increase rapidly to > T sat for the existing PZR pressure.	To determine if two phase natural circulation is adequate based upon REPCET temperature < 600 deg F.
REPCET TEMP 009-OPS92-171	> 650 deg F <666 &STBL OR DEC	Based on maximum expected CET with core covered. CET should always be <666 deg F (based on PZR safety valve S.P.). If core uncovers, the upper core region becomes superheated and CET will increase rapidly to > T sat for the existing PZR pressure.	To determine if the operator should go to the Functional Recovery procedure.
REPCET TEMP 009-OPS92-145	STABLE OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine (by trending) if an ESDE is isolated.

Q.A. APPROVED TABLE

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
REPCET TEMP 009-OPS92-171	< 700 deg F <666 &STBL OR DEC	Based on maximum expected CET with core covered. CET should always be <666 deg F (based on PZR safety valve S.P.). If core uncovers, the upper core region becomes superheated and CET will increase rapidly to > T sat for the existing PZR pressure.	To determine if the "ECCS + S/G" success path performance is adequate based upon REPCET Temperature < 700 deg F.
REPCET TEMP 009-OPS92-145	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if unisolated (least affected) SG is removing decay heat.
REPCET TEMP 009-OPS92-145	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To evaluate sufficiency of the shutdown cooling success path, the need to go to another heat removal method.
REPCET TEMP 009-OPS92-145	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify core heat removal.
RWST LEVEL 009-OPS92-046	< 19% UL=26.8%,LL=11.0%	The UL ensures that sufficient volume is transferred from the RWST and that 20 min of volume remains in the RWST prior to RAS. The LL ensures that sufficient volume remains in RWST to prevent air entrainment during transfer from RWST to Contmt sump.	To verify RWST level < RAS accuation set point (19% specified in EOIs).

Q.A. APPROVED TABLE

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
RWST LEVEL 009-OPS92-046	> 19% UL=26.8%,LL=11.0%	The UL ensures that sufficient volume is transferred from the RWST and that 20 min of volume remains in the RWST prior to RAS. The LL ensures that sufficient volume remains in RWST to prevent air entrainment during transfer from RWST to Contmt sump.	To verify RWST level is above the RAS actuation setpoint (19% specified in EOIs).
RWST LEVEL 009-OPS92-047	> 2% LL >4.65%	The lower limit of > 4.65% is based on ensuring that the RWST has sufficient inventory to provide a source of water to the suction of the charging pumps. The level specified is expressed as a percent of tap to tap span.	To determine when charging pump suction should be transferred to another borated water source, or to determine that they should be stopped.
RWST LEVEL 009-OPS92-048	FALLING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify the emergency sump level increases as the RWST level decreases.
RWST LEVEL 009-OPS92-048	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify the emergency sump level increases as the RWST level decreases.
RWST LEVEL 009-OPS92-048	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that RWST level is falling.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
RWST LEVEL 009-OPS92-098	> 2% LL 0.26%	The lower limit is applied to ensure that adequate suction is maintained to ECCS pumps. The Engineering limit is based on the water level at the top of the ECCS suction nozzle in the RWST. This level equates to 0.26% of span.	To determine if RWST level is adequate when the ECCS pumps are alligned to take suction on the RWST.
RWST LEVEL 009-OPS92-100	> 6% LL 4.65% OF SPAN	The Eng Limit is based on having sufficient water in the RWST to provide suction to the SI and/or chg pumps. The water level at the top of the ECCS suction nozzle is 0.26% of span. The water level to the top of the CVCS suction line is 4.65% of span.	To determine when charging pump suction should be transferred to another borated water source, or to determine that they should be stopped.
RWST LEVEL 009-OPS92-100	> 6% LL 4.65% OF SPAN	The Eng Limit is based on having sufficient water in the RWST to provide suction to the SI and/or chg pumps. The water level at the top of the ECCS suction nozzle is 0.26% of span. The water level to the top of the CVCS suction line is 4.65% of span.	To verify RWST level is available (> 6%) as a water source for the charging pumps or ECCS pumps.
RWST LEVEL 009-OPS92-102	> 6% LL 0.26%	The lower limit is applied to ensure that adequate suction is maintained to ECCS pumps. The Engineering limit is based on the water level at the top of the ECCS suction nozzle in the RWST. This level equates to 0.26% of span.	To determine if it is necessary (at 6% level) to initiate makeup water to the RWST.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
RWST LEVEL 009-OPS92-101	> 19% LL 0.26%	The lower limit is applied to ensure that adequate suction is maintained to ECCS pumps. The Engineering limit is based on the water level at the top of the ECCS suction nozzle in the RWST. This level equates to 0.26% of span.	To determine if the RWST level is adequate to supply the containment spray pumps (> 19%).
RWST LEVEL 009-OPS92-100	> 6% LL 4.65% OF SPAN	The Eng Limit is based on having sufficient water in the RWST to provide suction to the SI and/or chg pumps. The water level at the top of the ECCS suction nozzle is 0.26% of span. The water level to the top of the CVCS suction line is 4.65% of span.	To determine the availability of alternate borated water sources.
RWST LEVEL 009-OPS92-101	MAINTAIN > 19% LL 0.26%	The lower limit is applied to ensure that adequate suction is maintained to ECCS pumps. The Engineering limit is based on the water level at the top of the ECCS suction nozzle in the RWST. This level equates to 0.26% of span.	To determine if the RWST level is adequate to supply the containment spray pumps (> 19%).
RWST LEVEL 009-OPS92-101	> 19% LL 0.26%	The lower limit is applied to ensure that adequate suction is maintained to ECCS pumps. The Engineering limit is based on the water level at the top of the ECCS suction nozzle in the RWST. This level equates to 0.26% of span.	To verify sufficient RWST level to start emergency boration with ECCS pumps.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G E-088 PRESSURE 009-OPS92-022	> 740 PSIA LOW LIM 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
S/G E-088 PRESSURE 009-OPS92-022	STABLE OR RISING LOW LIM 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
S/G E-089 PRESSURE 009-OPS92-022	> 740 PSIA LOW LIM 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
S/G E-089 PRESSURE 009-OPS92-022	STABLE OR RISING LOW LIM 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.

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PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS92-219	< 40% 43.3%	If EFAS has actuated and S/G level is < the LL of the normal op range, then the event can be considered a LOFW event. The eng limit for the LL is 43.3% which is based on not draining the feedring and preventing water hammer on reinitiation of feedflow.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
S/G LEVEL (NR) 009-OPS92-178	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine the affected S/G in the event of a MFW line rupture inside containment.
S/G LEVEL (NR) 009-OPS92-180	< 22% >= 20%	Based on the minimum allowable value for the Emergency Feedwater Actuation Signal (EFAS) as defined in the Technical Specifications. This level is a percentage of the distance between the lower tap and the upper tap of S/G NR level instrumentation.	To ensure EFAS actuation if SG level decreases below 22% (NR).
S/G LEVEL (NR) 009-OPS92-207	> 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To initiate action to stop feedwater flow to S/Gs if level >80% (NR).
S/G LEVEL (NR) 009-OPS92-211	< 90% <100%	Based on the desirability to make the S/G available for heat removal as soon as possible after the level drops below 100% and once any water present in the main steam lines is drained.	To provide guidance to lower high SG levels and reset MSIS.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS92-181	> 26% > 21%	The EFAS may be reset anytime that the steam generator level is > the trip setpoint. Therefore, the minimum EFAS reset level is > the minimum EFAS trip setpoint (>21%). This level is a percentage of the Narrow Range tap to tap span.	To evaluate if S/G level is high enough to reset EFAS.
S/G LEVEL (NR) 009-OPS92-207	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To verify both S/G levels are < 80% NR for adequate control of RCS heat removal.
S/G LEVEL (NR) 009-OPS92-215	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To take action (via controlling S/G levels) to enhance natural circulation.
S/G LEVEL (NR) 009-OPS92-207	40 TO 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To verify S/G level in the optimal band to provide adequate heat removal.
S/G LEVEL (NR) 009-OPS92-216	< 80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To maintain the isolated S/G level < 80% NR, in the event of a SGTR.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS92-212	< 40% 43.3%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To determine if AFW flow should be restored at a reduced rate to prevent feedring damage.
S/G LEVEL (NR) 009-OPS92-207	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To verify level in the isolated S/G is < 80% to provide adequate heat removal.
S/G LEVEL (NR) 009-OPS92-216	< 80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To monitor restoration of isolated S/G level to <80% following initiation of corrective action to do so.
S/G LEVEL (NR) 009-OPS92-217	< 90% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine during an SGTR (with T-hot <530 F and PZR press >1000 psia) if rapidly inc S/G level requires shifting from maintaining RCP NPSH and CET SAT Margin >20 F to reducing PZR Pres to +/-50 of S/G
S/G LEVEL (NR) 009-OPS92-212	> 40% 43.3.%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To initiate action to restore AFW flow to an isolated SG to maintain level within the normal operating band.

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SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

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REVISION: 00

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS92-218	>= 90% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To alert operators of consequences associated with direct water relief through ADVs of isolated S/G.
S/G LEVEL (NR) 009-OPS92-213	RAPID TREND > 90% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine during an SGTR (with T-hot <530 F and PZR press >1000 psia) if rapidly inc S/G level requires shifting from maintaining RCP NPSH and CET SAT Margin >20 F to reducing PZR Pres to +/-50 of S/G
S/G LEVEL (NR) 009-OPS92-178	CHANGING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify isolation of the most affected S/G.
S/G LEVEL (NR) 009-OPS92-215	40% TO 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To monitor S/G levels in the optimal band (40% - 80% NR) for adequate heat removal via single phase natural circulation.
S/G LEVEL (NR) 009-OPS92-215	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To monitor raising available S/G level to the maximum level < 80% NR if establishment of natural circulation can not be confirmed.

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS92-211	< 90% <100%	Based on the desirability to make the S/G available for heat removal as soon as possible after the level drops below 100% and once any water present in the main steam lines is drained.	To monitor lowering the affected S/G level to < 90 % NR.
S/G LEVEL (NR) 009-OPS92-218	< 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS direct use of the Functional Recovery procedure if at least one S/G is not < 100%
S/G LEVEL (NR) 009-OPS92-218	< 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS and direct initiation of S/G drain down procedures, if both S/Gs are not < 100%.
S/G LEVEL (NR) 009-OPS92-207	> 40% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To maintain S/G levels >40% NR to enable control of RCS heat removal.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS92-212	> 40% 43.3%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To determine if any AFW pumps need to be started or stopped.
S/G LEVEL (NR) 009-OPS92-218	< 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To verify both S/G levels < 100% and to evaluate initiation of MSIS if the levels are >=100%
S/G LEVEL (NR) 009-OPS92-212	< 40% 43.3%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To ensure AFW flow to any available S/G to restore and maintain level within the normal operating band.
S/G LEVEL (NR) 009-OPS92-216	> 80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To direct actions to be taken if the isolated affected S/G (in a SGTR event) has > 80% water level.
S/G LEVEL (NR) 009-OPS92-178	MONITOR NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (NR) 009-OPS93-003	< 90% < 100%	The eng limit is based on preventing the MS lines from filling with water. The upper S/G level taps are substantially below the top of the S/G. Therefore, level indication below the upper tap indicates that the MS lines are not being filled from the SG	To determine if actions need to be taken to prvent excessive water level in the affected S/G during cooldown of the RCS.
S/G LEVEL (NR) 009-OPS92-216	<80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To provide quidance to the operator regarding the point at which a decreasing steam generator level will no longer adequately remove heat and will cause the RCS to rapidly repressurize.
S/G LEVEL (NR) 009-OPS92-218	<= 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine if actions need to be taken to prvent excessive water level in the affected S/G during cooldown of the RCS.
S/G LEVEL (WR) 009-OPS92-182	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if any AFW pumps need to be started or stopped.
S/G LEVEL (WR) 009-OPS92-198	< 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (WR) 009-OPS92-198	> 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.
S/G LEVEL (WR) 009-OPS92-199	77% TO 92% UL 92.9%,LL 78.4%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To establish appropriate S/G level band when using a fill and drain procedure to eliminate voids in the S/G tubes.
S/G LEVEL (WR) 009-OPS92-206	> 50% LL 28%	Based on the minimum percentage (45) of S/G tube coverage required to provide for adequate primary to secondary heat transfer during natural circulation. This equates to an elevation of 153.1 inches above the tube sheet or 28% (WR).	To verify the availability of at least one S/G for RCS Heat Removal (specified minimum level = 50%).
S/G LEVEL (WR) 009-OPS92-198	< 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS direct use of the Functional Recovery procedure if at least one S/G is not < 100%

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G LEVEL (WR) 009-OPS92-198	< 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS and direct initiation of S/G drain down procedures, if both S/Gs are not < 100%.
S/G LEVEL (WR) 009-OPS93-002	10% 28%	The engineering limit is based on the min SG level required to sustaine adequate primary to secondary heat transfer during natural circulation which is 153.1 inches above the tube sheet or 28% (WR).	To provide quidance to the operator regarding the point at which a decreasing steam generator level will no longer adequately remove heat and will cause the RCS to rapidly repressurize.
S/G PRESSURE 009-OPS92-022	> 740 PSIA LOW LIM 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To verify expected post-trip S/G pressure response or to alert the operator that an over-cooling event is in progress and to initiate MSIS.
S/G PRESSURE 009-OPS92-023	APPROX 1000 PSIA U=1088,L=741 PSIA	The UL is based on the lowest lift pressure of the MSSVs, 1089 psia (1100 -1%). The LL is based on the MSIS Trip Setpoint, >=741 psia. The SBCS is designed to control S/G pressure at ~1000 psia. The UL & LL occur where automatic functions take over.	To ensure an operable SG for controlled heat removal by verifying SBCS operational and controlling at setpoint (1000 PSIA).

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G PRESSURE 009-OPS92-029	ABNORMALLY LOW LOW LIM 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To identify the type of event and location when Pressurizer Pressure is rapidly decreasing, using the "Break Identification Chart".
S/G PRESSURE 009-OPS92-066	< PZR PRESSURE S/G +/-50 PSI PZR	Keeping RCS pressure about equal to S/G pressure will 1) minimize RCS to S/G leak rate, 2) minimize the amount of unborated water flowing from the S/Gs to the RCS. Since it is difficult for the operator to maintain 0 psid, CEN-152 recommends +/-50 psid.	To ensure RCS pressure remains higher than ruptured S/G pressure in order to minimize RCS dilution due to backflow.
S/G PRESSURE 009-OPS92-028	<50 PSID PZR PRES S/G +/-50 PSI PZR	Keeping RCS pressure about equal to S/G pressure will 1) minimize RCS to S/G leak rate, 2) minimize the amount of unborated water flowing from the S/Gs to the RCS. Since it is difficult for the operator to maintain 0 psid, CEN-152 recommends +/-50 psid.	To verify PZR pressure is reduced to within 50 psi of the isolated (ruptured) S/G pressure.
S/G PRESSURE 009-OPS92-024	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify isolated S/G pressure decreases as plant cooldown continues.
S/G PRESSURE 009-OPS92-030	S/G P > PZR P S/G 50 PSI >PZR P	The operator is normally instructed to attempt to control S/G pressure about equal to PZR Pressure (+/-50 psid). If S/G overfill is probable, CE-NPSD-407 shows that -50 psid will not threaten the maintenance of adequate shutdown margin.	To monitor lowering RCS Pressure to < S/G Pressure to restore the isolated S/G level to less than 80% NR.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

Q.A. APPROVED TABLE

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Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G PRESSURE 009-OPS92-026	> 740 PSIA 741 PSIA	The lower engineering limit is based on the T.S. setpoint (s.p.) for MSIS and low S/G pressure trip s.p., >=741 psia. The T.S. s.p is based on the engineering analysis value and includes instrument uncertainty and response times.	To determine if S/G pressure is above the MSIS setpoint, or ensure MSIS is actuated.
S/G PRESSURE 009-OPS92-025	STABLE OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine (by trending) if an ESDE is isolated.
S/G PRESSURE 009-OPS92-068	< MFP DISCH S/G<MFP+26.88 PSI	Flow into S/G will occur whenever MFP disch > S/G pressure by an amount = elevation head. The elevation difference between the MFP and S/G feedring is 62 feet. 62 feet head = 26.88 PSI. Therefore, MFP must exceed S/G by > 26.88 PSI to have flow.	To verify MFW Pump operating and feeding S/G.
S/G PRESSURE 009-OPS92-027	APPROX 1100 PSIG 1089 - 1139 PSIA	Hi or Lo S/G pressure may be indicative of improperly operating MSSVs. Tech Specs allow operation with the 4 lowest lifting MSSVs isolated. The max lift setting of the #5 MSSV = 1128 +1% = 1139 psia. Lowest lifting MSSV = 1100 -1% = 1089 psia.	To verify the MSSVs are controlling S/G pressure in the event that S/G pressure can not be controlled using the ADVs.
S/G PRESSURE 009-OPS92-069	< 50 PSIA UL 69.76 PSIA	The engineering limit is based on the condensate transfer pump developing sufficient head greater than the combined resistance of steam generator pressure and the elevation difference between the feedwater spargers and the condensate storage tank level.	To permit use of alternate low pressure feedwater source.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
S/G PRESSURE 009-OPS92-116	< 500 PSIA 662.67 PSIA	The engineering limit is based on the condensate pump developing sufficient head to overcome the combined resistance from the steam generator pressure and the elevation difference between the feedwater spargers and the condensate hotwell level.	To permit use of alternate low pressure feedwater source.
S/G PRESSURE 009-OPS92-067	< COND PUMP DSCHG S/G<CP+26.88 PSI	Flow into S/G will occur whenever cond pump disch > S/G press by an amount = elev head. The elevation difference between cond pump and S/G feedring is 62 feet. 62 feet head = 26.88 PSI. Therefore, cond pump must exceed S/G by > 26.88 PSI to have flow.	To verify feedwater supply to S/Gs.
S/G PRESSURE 009-OPS92-220	> 100 PSIA > 60 PSIA	The FSAR states that the steam driven AFW pump can operate at a steam inlet pressure of as low as 60 psia. This engineering limit does not guarantee a minimum flow into the S/G, only that the turbine will operate.	To verify adequate steam supply pressure for operation of steam driven AFW pump.
S/G PRESSURE 009-OPS92-024	MONITOR NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify isolated S/G pressure decreases as plant cooldown continues.
SATURATION MARGIN 009-OPS92-117	> 20 deg F LL 1 deg F	Saturation margins greater than 0 deg F equate to subcooled coolant (i.e. verification of level). Therefore, it can be inferred that the absence of subcooled coolant in the hot legs is indicative of RV Plenum level being < 82%.	Used for alternate reactor vessel level indication.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN 009-OPS92-118	>160 degF & RISNG UL 200 deg F	This limit provides a convenient way to define acceptable combinations of low temperature and high pressure to avoid Pressurized Thermal Shock (PTS) the RCS. 200 deg F is based on existing plant thermal-hydraulic and fracture mechanics analyses.	To determine if RCS repressurization needs to be limited to prevent pressurized thermal shock (PTS).
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To ensure reactor coolant is in the desired state (> 20 deg F subcooled) to remove core heat.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To ensure RCS is > 20 deg F subcooled as indication that single phase natural circulation is established.
SATURATION MARGIN BY CET 009-OPS92-087	20 TO 200 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To ensure RCS pressure control by verifying Saturation Margin maintained between the minimum and maximum values (20 deg F and 200 deg F).

Q.A. APPROVED TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-084	< 160 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To verify CET Saturation Margin is less than 160 deg F and if not, to initiate corrective action to reduce it.
SATURATION MARGIN BY CET 009-OPS92-084	< 80 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To verify CET Saturation Margin is > 80 deg F, and if it is not, to initiate corrective action to raise it.
SATURATION MARGIN BY CET 009-OPS92-084	> 160 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To determine actions to be taken if saturation margin is > 160 deg F.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	Used as criteria for HPSI throttle/stop (CET sat margin > 20 deg F, RVLMS >= 82%).

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-084	> 80 deg F LL1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To verify CET Saturation Margin is > 80 deg F, and if it is not, to initiate corrective action to raise it.
SATURATION MARGIN BY CET 009-OPS92-087	< 200 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify that saturation margin is being maintained less than the 200 deg F concern for PTS.
SATURATION MARGIN BY CET 009-OPS92-084	< 80 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To determine actions to be taken if saturation margin is < 80 deg F.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify RCS inventory control Safety Function Status Checklist (SFSC) criteria are satisfied and the core remains covered.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-154	> 20 deg F LL 1 deg F	Saturation margins > 0 deg F equate to subccoled coolant (i.e. verification of level). Therefore, it can be inferred that the absence of subcooled coolant at the elevation of the CETs is indicative of the core being uncovered.	Used for alternate reactor vessel level indication.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify appropriate Shutdown Cooling entry conditions (e.g. 20 deg F subcooling, RVLMS = 100%, etc.).
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify CET saturation margin is >20 deg F to enhance natural circulation.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	When EDG is loaded, to direct overriding and energizing Class 1E Pressurizer Backup Heaters to maintain Core Exit Saturation Margin >20 deg F.
SATURATION MARGIN BY CET 009-OPS92-174	> RCP NPSH CURVE NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To confirm available NPSH for operating the RCP(s).

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-082	MAINTAIN NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To maintain saturation margin while performing controlled primary plant depressurization and cooldown.
SATURATION MARGIN BY CET 009-OPS92-084	20 TO 160 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To determine actions to be taken if saturation margin is not within the optimal band of 20 deg F to 160 deg F.
SATURATION MARGIN BY CET 009-OPS92-087	< 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To determine actions to be taken if saturation margin is < 20 deg F.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To maintain saturation margin while performing controlled primary plant depressurization and cooldown.
SATURATION MARGIN BY CET 009-OPS92-087	>= 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To maintain saturation margin while performing controlled primary plant depressurization and cooldown.

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-084	80 TO 160 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To determine actions to be taken if saturation margin is not within the optimal band of 80 deg F to 160 deg F.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	Used as the minimum indication that the core is covered with subcooled liquid.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To determine if saturation margin is being maintained above the minimum acceptable (>20 deg F) to determine if PZR heaters need to be energized during diesel generator loading operations.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To determine if the operator should go to the Functional Recovery procedure.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-084	80 TO 160 deg F LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To determine if Core Exit Saturation Margin is within the optimal band (80 - 160 deg F) specified.
SATURATION MARGIN BY CET 009-OPS92-087	< 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To determine if CET Sat Margin requires SIT makeup to the RCS (< 20 deg F specified).
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify charging and/or SI pumps are maintaining Core Exit Saturation Margin - greater than 20 deg F.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To maintain CET Saturation Margin > 20 deg F by operating AFW and available ADVs.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To determine whether or not to stay with the present success path (i.e. CET sat margin > 20 deg F, RVLMS plenum >= 82%).
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To evaluate the performance of the success path (i.e. CET sat margin > 20 deg F, RVLMS plenum >= 82%).
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify charging pump throttling criteria.
SATURATION MARGIN BY CET 009-OPS92-084	PER ATT 24 LL 1 UL 200 deg F	Saturation margins > 0 deg F equate to subcooled coolant. Therefore 1 deg F is the lower eng limit. The upper limit is based on avoiding PTS of the RCS. 80 F to 160 F is the optimal post-shutdown band and 20 F to 160 F is the optimal band during SGTR.	To evaluate the required trend for PZR pressure to determine subsequent course within the procedure.
SATURATION MARGIN BY CET 009-OPS92-082	STEADY OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To maintain saturation margin while performing controlled primary plant depressurization and cooldown.

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify adequate RCS heat removal.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify shutdown cooling conditions are met (CET saturation margin > 20 deg F, RVLMS = 100%).
SATURATION MARGIN BY CET 009-OPS92-082	STABLE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify proper core heat removal (via trending the parameter).
SATURATION MARGIN BY CET 009-OPS92-174	> RCP NPSH CURVE NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To maintain RCP NPSH for given temperature and pressure conditions.
SATURATION MARGIN BY CET 009-OPS92-087	> 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To verify saturation margin is above the minimum acceptable value during RCS void elimination.

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SATURATION MARGIN BY CET 009-OPS92-087	< 20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To alert operator not to initiate Degas or Letdown any time Core Exit Saturation Margin has lowered below 20 deg F while conducting a Cooldown/Depressuration evolution.
SATURATION MARGIN BY CET 009-OPS92-087	20 deg F LL 1 UL 200 deg F	Sat margins > 0 deg F equate to subcooled coolant. Therefore, only 1 deg F margin is needed to provide subcooled coolant in the RCS. 200 deg F is based on engineering judgement and existing plant analysis to avoid Pressurized Thermal Shock (PTS).	To determine during an SGTR (with T-hot <530 F and PZR press >1000 psia) if rapidly inc S/G level requires shifting from maintaining RCP NPSH and CET SAT Margin >20 F to reducing PZR Pres to +/-50 of S/G
SI FLOW 009-OPS92-156	LOWER NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.
SI FLOW 009-OPS92-156	RAISE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.
SI FLOW 009-OPS92-156	THROTTLE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.

Q.A. APPROVED TABLE

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

- By Parameter -

Q.A. APPROVED TABLE

PARAMETER/ DOCUMENT #	STEP VALUE/ ENG. LIMIT	BASES	USE
SI FLOW 009-OPS92-156	LOWER NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify HPSI flow decreases after throttling of HPSI.
STARTUP RATE 009-OPS92-124	NEGATIVE UL <0 DPM	A negative SUR is an indication that reactor power is decreasing and that the reactor is subcritical.	To verify reactivity control is established and the reactor is subcritical.
TOTAL FW FLOW 009-OPS92-213	> 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To determine if any AFW pumps need to be started or stopped.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: ISOPS - 009 - OPS93 - 005

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

#	Question	OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: CHECK LIST #1 NA

MARTIN GREER / Martin Greer 5/5/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
INSTRUMENT USE AND BASES TABLE COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

MODULE: 01 AFW FLOW
S/G LEVEL (NR)
S/G LEVEL (WR)
TOTAL FW FLOW

PREPARED BY: J. Flaherty
Cognizant Engineer (Print Name)
[signature]
Cognizant Engineer (Signature) Date: 4/26/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists N-9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)
[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

RECORD OF REVISIONS

Rev	Date	Pages	Prepared by	Reviewed by	Approved by
00	12/28/92	ALL	J. Flaherty	L. Wild	J.R.Congdon
01	04/26/93	ALL	J. Flaherty	M. Greer	J.R.Congdon

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	AFW FLOW	> 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify minimum required AFW flowrate for RCS Heat Removal (> 200 gpm to each S/G).
01	AFW FLOW	NOT > 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To initiate starting alternate AFW pumps and controlling flow manually if flow to either S/G is NOT > 200 GPM.
01	AFW FLOW	ESTABLISHED 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify feedwater flowrate to the S/G after resetting EFAS.
01	AFW FLOW	< 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
01	AFW FLOW	> 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify > minimum required FW flow to at least one S/G to aid in promoting natural circulation.

Q.A. APPROVED TABLE

Module #: 01

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	AFW FLOW	200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To verify minimum required AFW flowrate for RCS Heat Removal (> 200 gpm to each S/G).
02	AFW FLOW	130 TO 150 GPM LL 70, UL 150	The lower limit is based on refilling the S/G feedring in a 5 min period. The upper limit is based on preventing feedring damage due to excessive refill flow to a drained feedring. 5 min duration is based on 2X the refill time for the 350 gal feedring.	To verify reduced AFW flow (130 GPM TO 150 GPM) is established to the isolated SG.
02	AFW FLOW	130 TO 150 GPM LL 70, UL 150	The lower limit is based on refilling the S/G feedring in a 5 min period. The upper limit is based on preventing feedring damage due to excessive refill flow to a drained feedring. 5 min duration is based on 2X the refill time for the 350 gal feedring.	To verify AFW flowrate between 130 gpm and 150 gpm (for 5 minutes) during restoration of feed to a S/G.
01	S/G LEVEL (NR)	< 22% >= 20%	Based on the minimum allowable value for the Emergency Feedwater Actuation Signal (EFAS) as defined in the Technical Specifications. This level is a percentage of the distance between the lower tap and the upper tap of S/G NR level instrumentation.	To ensure EFAS actuation if SG level decreases below 22% (NR).

Q.A. APPROVED TABLE

Module #: 01

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
02	S/G LEVEL (NR)	> 26% > 21%	The EFAS may be reset anytime that the steam generator level is > the trip setpoint. Therefore, the minimum EFAS reset level is > the minimum EFAS trip setpoint (>21%). This level is a percentage of the Narrow Range tap to tap span.	To evaluate if S/G level is high enough to reset EFAS.
03	S/G LEVEL (NR)	> 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To initiate action to stop feedwater flow to S/Gs if level >80% (NR).
03	S/G LEVEL (NR)	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To verify both S/G levels are < 80% NR for adequate control of RCS heat removal.
03	S/G LEVEL (NR)	40 TO 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To verify S/G level in the optimal band to provide adequate heat removal.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

DATE: 04/27/93
REVISION: 01

Q.A. APPROVED TABLE

Module #: 01

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
03	S/G LEVEL (NR)	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To verify level in the isolated S/G is < 80% to provide adequate heat removal.
03	S/G LEVEL (NR)	> 40% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To maintain S/G levels >40% NR to enable control of RCS heat removal.
04	S/G LEVEL (NR)	< 40% 43.3%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To determine if AFW flow should be restored at a reduced rate to prevent feedring damage.
04	S/G LEVEL (NR)	> 40% 43.3.%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To initiate action to restore AFW flow to an isolated SG to maintain level within the normal operating band.

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
04	S/G LEVEL (NR)	> 40% 43.3%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To determine if any AFW pumps need to be started or stopped.
04	S/G LEVEL (NR)	< 40% 43.3%	The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining.	To ensure AFW flow to any available S/G to restore and maintain level within the normal operating band.
05	S/G LEVEL (NR)	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To take action (via controlling S/G levels) to enhance natural circulation.
05	S/G LEVEL (NR)	40% TO 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To monitor S/G levels in the optimal band (40% - 80% NR) for adequate heat removal via single phase natural circulation.

Q.A. APPROVED TABLE

Module #: 01

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
05	S/G LEVEL (NR)	< 80% UL 81.5% LL 43.3%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To monitor raising available S/G level to the maximum level < 80% NR if establishment of natural circulation can not be confirmed.
06	S/G LEVEL (NR)	< 90% <100%	Based on the desirability to make the S/G available for heat removal as soon as possible after the level drops below 100% and once any water present in the main steam lines is drained.	To provide guidance to lower high SG levels and reset MSIS.
06	S/G LEVEL (NR)	< 90% <100%	Based on the desirability to make the S/G available for heat removal as soon as possible after the level drops below 100% and once any water present in the main steam lines is drained.	To monitor lowering the affected S/G level to < 90 % NR.
07	S/G LEVEL (NR)	< 80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To maintain the isolated S/G level < 80% NR, in the event of a SGTR.
07	S/G LEVEL (NR)	< 80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To monitor restoration of isolated S/G level to <80% following initiation of corrective action to do so.

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
07	S/G LEVEL (NR)	> 80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To direct actions to be taken if the isolated affected S/G (in a SGTR event) has > 80% water level.
07	S/G LEVEL (NR)	<80% UL 100%	The UL is based on preventing S/G overfill which could result in carryover to the turbine or water reaching the MS lines.	To provide guidance to the operator regarding the point at which a decreasing steam generator level will no longer adequately remove heat and will cause the RCS to rapidly repressurize.
08	S/G LEVEL (NR)	< 90% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine during an SGTR (with T-hot <530 F and PZR press >1000 psia) if rapidly inc S/G level requires shifting from maintaining RCP NPSH and CET SAT Margin >20 F to reducing PZR Pres to +/-50 of S/G
08	S/G LEVEL (NR)	RAPID TREND > 90% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine during an SGTR (with T-hot <530 F and PZR press >1000 psia) if rapidly inc S/G level requires shifting from maintaining RCP NPSH and CET SAT Margin >20 F to reducing PZR Pres to +/-50 of S/G
09	S/G LEVEL (NR)	>= 90% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To alert operators of consequences associated with direct water relief through ADVs of isolated S/G.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

Q.A. APPROVED TABLE

Module #: 01

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
09	S/G LEVEL (NR)	< 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS direct use of the Functional Recovery procedure if at least one S/G is not < 100%
09	S/G LEVEL (NR)	< 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS and direct initiation of S/G drain down procedures, if both S/Gs are not < 100%.
09	S/G LEVEL (NR)	< 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To verify both S/G levels < 100% and to evaluate initiation of MSIS if the levels are >=100%
09	S/G LEVEL (NR)	<= 100% 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine if actions need to be taken to prvent excessive water level in the affected S/G during cooldown of the RCS.

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
10	S/G LEVEL (NR)	< 40% 43.3%	If EFAS has actuated and S/G level is < the LL of the normal op range, then the event can be considered a LOFW event. The eng limit for the LL is 43.3% which is based on not draining the feedring and preventing water hammer on reinitiation of feedflow.	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.
11	S/G LEVEL (NR)	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine the affected S/G in the event of a MFW line rupture inside containment.
11	S/G LEVEL (NR)	CHANGING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify isolation of the most affected S/G.
11	S/G LEVEL (NR)	MONITOR NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.
12	S/G LEVEL (NR)	< 90% < 100%	The eng limit is based on preventing the MS lines from filling with water. The upper S/G level taps are substantially below the top of the S/G. Therefore, level indication below the upper tap indicates that the MS lines are not being filled from the SG	To determine if actions need to be taken to prvent excessive water level in the affected S/G during cooldown of the RCS.

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	S/G LEVEL (WR)	< 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.
01	S/G LEVEL (WR)	> 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.
01	S/G LEVEL (WR)	< 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS direct use of the Functional Recovery procedure if at least one S/G is not < 100%
01	S/G LEVEL (WR)	< 100% UL 100%	Based on preventing S/G overfill and avoiding the associated undesirable consequences. The upper level tap is located well below the top of the S/G. Water level above of upper tap can not be observed, therefore, 100% of tap to tap span is the maximum.	To determine when to initiate MSIS and direct initiation of S/G drain down procedures, if both S/Gs are not < 100%.
02	S/G LEVEL (WR)	RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if any AFW pumps need to be started or stopped.

Q.A. APPROVED TABLE

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
03	S/G LEVEL (WR)	77% TO 92% UL 92.9%,LL 78.4%	Based on maintaining S/G tubes covered and controlling level in the normal operating band. Upper limit is based on maintaining S/G level below the "Can Deck". Lower limit is based on preventing the feedring from draining.	To establish appropriate S/G level band when using a fill and drain procedure to eliminate voids in the S/G tubes.
04	S/G LEVEL (WR)	> 50% LL 28%	Based on the minimum percentage (45) of S/G tube coverage required to provide for adequate primary to secondary heat transfer during natural circulation. This equates to an elevation of 153.1 inches above the tube sheet or 28% (WR).	To verify the availability of at least one S/G for RCS Heat Removal (specified minimum level = 50%).
05	S/G LEVEL (WR)	10% 28%	The engineering limit is based on the min SG level required to sustaine adequate primary to secondary heat transfer during natural circulation which is 153.1 inches above the tube sheet or 28% (WR).	To provide guidance to the operator regarding the point at which a decreasing steam generator level will no longer adequately remove heat and will cause the RCS to rapidly repressurize.
01	TOTAL FW FLOW	> 200 GPM 200 GPM PER S/G	Based on engineering judgement, supported by a hand calculation. 200 gpm per S/G is approximately equal to the required flow to maintain S/G level constant with 2% decay heat load.	To determine if any AFW pumps need to be started or stopped.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009- OPS92-150 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009- OPS-92-150 Rev. 01

	Item	OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________________

MARTIN GREEN / Martin Green 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 01 Engineering Limit and Bases

PARAMETER: AFW FLOW

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)
[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J. R. CONGDON
Cognizant Engineering Manager (Print Name)
[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 01

Parameter: AFW FLOW

Step Value(s):	**Use(s):**	
> 200 GPM	To verify minimum required AFW flowrate for RCS Heat Removal (> 200 gpm to each S/G).	rev. 01
Not > 200 GPM	To initiate starting alternate AFW pumps and controlling flow manually if flow to either S/G is not > 200 gpm.	
< 200 GPM	To confirm LOFW diagnosis in conjuncton with EFAS actuation and feedwater to both S/Gs less than the minimum required flow.	
> 200 GPM	To verify > minimum required FW flow to at least one S/G to aid in promoting natural circulation.	
200 GPM	To verify minimum required AFW flowrate for RCS Heat Removal (> 200 gpm to each S/G).	rev. 01
Established	To verify feedwater flowrate to the S/G after resetting EFAS.	

Engineering Limit(s):

Lower Limit: 200 GPM per Steam Generator

Bases for Engineering Limit(s):

The engineering limit is based on engineering judgement and is supported by Ref. 1. In addition, a hand calculation was performed to verify the conclusions of Ref. 1. Ref. 1 states that 200 gpm per steam generator will approximately equal the flow required to maintain steam generator level constant with 2% decay heat.

Feedwater flow in the diagnosis of the event is used in conjunction with level indication below the normal band and EFAS actuated. If EFAS has actuated and level is still below the normal band, then the feedwater flowrate should be greater than the minimum flowrate required to at least maintain level. Therefore, the engineering limit for confirming a LOFW event is 200 gpm per steam generator for the same reasons as stated above.

Assumptions:

1. The determination of 200 gpm does not include heat input into the RCS from the RCPs or sensible heat removal during an RCS cooldown.

| rev. 01

2. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 1

References:

1. Letter S-CE-7529, V.C. Hall to D. Nunn, Response to Auxiliary Feedwater System (AFWS) Automatic Flow Control Action Items, May 12, 1982.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009- OPS92-214

	Item	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?		✓
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-0P592-214 Rev 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________________

MARTIN GREER / Martin Greer 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 02 Engineering Limit and Bases

PARAMETER: AFW FLOW

PREPARED BY: John M. Flaherty | rev. 01
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 02

Parameter: AFW FLOW

Step Value(s):	**Use(s):**
130 TO 150 GPM	To verify reduced AFW flow (130 GPM TO 150 GPM) is established to the isolated SG. To verify AFW flowrate between 130 gpm and 150 gpm (for 5 minutes) during restoration of feed to a S/G.

Engineering Limit(s):

Lower limit = 70 gpm

Upper limit = 150 gpm

Bases for Engineering Limit(s):

The lower limit is based on refilling the steam generator feedring in a five minute period. From Reference 1, the feedring volume is 350 gallons. Therefore,

$$\frac{350\,gallons}{5\,minutes} = 70\,gpm$$

The purpose of the upper limit is to prevent feedring damage due to excessive refill flow to a drained feedring. Reference 1 gives the following bases to the 150 gpm value:

"There is no analytical correlation between feedwater flow rate and the conditions to preclude failure. Nor is it known what maximum flow rate could be tolerated without failure. A flow rate of 150 gpm has been recommended as a procedural limit based on the fact that no significant water hammer has been observed during testing or operation with flow rates of that order. Additionally, 150 gpm has been traditionally accepted as a flow limit by industry and the NRC for water hammer protection. The five minute duration of this limited flow is conservatively based on twice the refill time for the 350 gal. feedring."

Assumptions:

As stated in Reference 1, if refilling of portions of the main feedwater piping must be considered, the 5 minute refill time would have to be adjusted accordingly.

The engineering limits do not include any instrument uncertainties.

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

References:

1) S-PSA-402, AFWS Operation Guidance for San Onofre Units 2 and 3, September 3, 1981.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009 - 01592 - 210

	Item	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	✗
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	✗
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-0P592-210

	Question	OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________

MARTIN GREEN / Martin Green 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 01 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GRABR — Name, Independent Reviewer
[signature] — Signature
4/26/93 — Date

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) 4/22/93 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 01

Parameter: S/G LEVEL (NR)

Step Value(s):	Use(s):
< 22%	To ensure EFAS actuation if S/G level decreases below 22% (NR).

| rev. 01

Engineering Limit(s):

≥ 20%

Bases for Engineering Limit(s):

The Technical Specifications (Ref. 1 & 2) define the minimum allowable value for the Emergency Feedwater Actuation Signal (EFAS) as ≥ 20%. This level is a percentage of the distance between the lower tap and the upper tap of the narrow range steam generator level instrumentation. Therefore, the engineering limit for ensuring EFAS has actuated is ≥ 20%.

Assumptions:

| rev. 01

1. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, the references noted below are considered to be Secondary Design documents. Their use as reference documents for the engineering limit basis is assumed to be justified based on ensuring that the engineering limit is consistent with the current design basis and operating license.

   Ref: 1,2

References:

1. San Onofre 2 Technical Specifications, Amendment 94, Table 3.3-4.

2. San Onofre 3 Technical Specifications, Amendment 84, Table 3.3-4.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 609-0Ø592-180 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-0P592-180 Rev. 01

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________

MARTIN GREAR / Martin Green 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 02 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREEN [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: T.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 02

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**
> 26%	To evaluate if S/G level is high enough to reset EFAS.

| rev. 01

Engineering Limit(s):

> 21%

Bases for Engineering Limit(s):

The Emergency Feedwater Actuation System (EFAS) may be reset anytime that the steam generator level is greater than the trip setpoint. Therefore, the minimum EFAS reset level is greater than the minimum EFAS trip setpoint. The Technical Specifications (Ref. 1 & 2) define the minimum trip setpoint for the Emergency Feedwater Actuation System (EFAS) as ≥ 21%. This level is a percentage of the distance between the lower tap and the upper tap of the narrow range steam generator level instrumentation.

Assumptions:

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, the references noted below are considered to be Secondary Design documents. Their use as reference documents for the engineering limit basis is assumed to be justified based on ensuring that the engineering limit is consistent with the current design basis and operating license.

Ref: 1,2

References:

1. San Onofre 2 Technical Specifications, Amendment 94, Table 3.3-4.

2. San Onofre 3 Technical Specifications, Amendment 84, Table 3.3-4.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-68592-181 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-181 Rev. 01

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________________

MARTIN GREEN / Martin Green 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 03 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)
[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)
[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 03

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**
< 80%	To verify both S/G levels are < 80% NR for adequate control of RCS heat removal.
> 80%	To initiate action to stop feedwater flow to S/G's if level > 80%.
< 80%	To verify level in the isolated S/G is < 80% to provide adequate heat removal.
> 40%	To maintain S/G levels > 40% NR to enable control of RCS Heat Removal.
40% to 80%	To verify S/G levels in the optimal band to provide adequate heat removal.

Engineering Limit(s):

Upper Limit: 81.5%

Lower Limit: 43.3%

Bases for Engineering Limit(s):

The acceptance criteria for RCS heat removal success paths involving a steam generator require that at least one steam generator must have level within the normal operating band with feedwater available to maintain level, or level being restored to its normal band (Ref. 1). Based on these requirements, the engineering limits for these uses will be equal to the upper and lower engineering limits for normal operation.

During normal operation, the level must be maintained below the steam separators in order to maintain steam quality less than 2 percent. Steam quality greater than 2 percent can damage the turbine. Although the turbine is not used during accident conditions, it is still beneficial to minimize the amount of moisture carryover into the main steam lines. Therefore, the upper engineering limit is based on a steam generator level below the "can deck". Based on Ref. 2:

Upper Level Tap is 33.5 inches above the can deck
Tap-to-Tap Span is 180.844 inches
% span (level) = (180.844 - 33.5)/(180.844) = 81.5%

Ref. 3 describes the potential for damaging the feedring due to water hammer when the feedring has been drained. Although guidance is provided in the procedure to minimize this potential (Ref. 4), the lower engineering limit is based on preventing the potential for damage. Therefore, the lower engineering limit is based on preventing the feedring from draining. The information provided in Ref. 3 and 4 does not specify whether the feedring must be completely covered or partially covered in order to prevent water hammer damage. Therefore, it is conservatively assumed that the feedring must be completely covered. The top of the feedring, as a percentage of the steam generator level tap-to-tap span, is determined as follows (dimensions are from Ref. 2):

Feedring centerline is 72.344 inches above the lower tap
The inside diameter is 12 inches
Tap-to-Tap span is 180.844
% span = (72.344 + 6)/180.844 = 43.3%

Assumptions:

1. Configuration of Unit 2 and Unit 3 steam generators are identical.

2. The feedring must be completely covered in order to preclude water hammer damage.

3. The dimensions provided in Ref. 2 do not include thermal expansion of the vessel at elevated temperatures.

| rev. 01

4. The references noted below are assumed to be Secondary Design documents. This assumption is justified based on the fact that they describe strategies which have been reviewed and commented on by the NRC.

   Ref: 1

| rev. 01

5. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 3,4

References:

1. CEN-152, Rev. 03, Combustion Engineering Emergency Procedure Guidelines.

2. Dwg. E-234-590, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator, Rev. 04.

3. Letter S-PSA-412, R. S. Turk to F. Bevilacqua, SONGS Feedring, October 1, 1981.

4. Letter S-PSA-402, R. S. Turk to E. Guenther, AFWS Operational Guidance, September 3, 1981.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-0PS92-207 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

069-OPS92-207 Rev.01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________________

MARTIN GREER / Martin Greer 4/26/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 04 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/28/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 04

Parameter: S/G LEVEL (NR)

Step Value(s):	Use(s):
> 40%	To initiate action to restore AFW flow to an isolated S/G to maintain level within the normal operating band.
< 40%	To determine if AFW flow should be restored at a reduced rate to prevent feedring damage.
< 40%	To ensure AFW flow to any available S/G to restore and maintain level within the normal operating band.
> 40%	To determine if any AFW pumps need to be started or stopped.

Engineering Limit(s):

Lower Limit: 43.3%

Bases for Engineering Limit(s):

Ref. 1 describes the potential for damaging the feedring due to water hammer when the feedring has been drained. Although guidance is provided in the EOI to minimize this potential (Ref. 2), the lower engineering limit is chosen to ensure that the feedring is not damaged. The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining. The top of the feedring, as a percentage of the steam generator level tap-to-tap span, is determined as follows (dimensions from Ref.3):

Feedring centerline is 72.344 inches above the lower tap
The inside diameter is 12 inches
Tap-to-Tap span is 180.844
% span = (72.344 + 6)/180.844 = 43.3%

Assumptions:

1. Configuration of Unit 2 and Unit 3 steam generators are identical.

2. The feed ring must be completely covered in order to preclude possible water hammer.

3. The dimensions provided in Ref. 3 do not include thermal expansion of the vessel at elevated temperatures.

| rev. 01

4. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 1,2

References:

1. Letter S-PSA-412, R. S. Turk to F. Bevilacqua, SONGS Feedring, October 1, 1981.

2. Letter S-PSA-402, R. S. Turk to E. Guenther, AFWS Operational Guidance, September 3, 1981.

3. Dwg. E-234-590, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator, Rev. 04.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-212 Rev. 01

No.	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-0P592-212 Rev.01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks:

MARTIN GREER / Martin Greer 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 05 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 05

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**
40% to 80%	To monitor S/G levels in the optimal band (40% - 80% NR) for adequate heat removal via single phase natural circulation.
< 80%	To take action (via controlling S/G levels) to enhance natural circulation.
< 80%	To monitor raising available S/G level to the maximum level < 80% NR if establishment of natural circulation can not be confirmed.

Engineering Limit(s):

Upper Limit: 81.5%

Lower Limit: 43.3%

Bases for Engineering Limit(s):

The acceptance criteria for RCS heat removal success paths which involve the use of a steam generator require the availability of at least one steam generator with a steam flow path, level within the normal operating band and feedwater available to maintain level or level being restored (Ref. 1).

In order to ensure single phase natural circulation, the level in the unisolated steam generator(s) should be above the steam generator tubes to maximize the heat transfer area in the steam generator. Increasing steam generator level above this lower limit provides added assurance that the tubes are covered. However, increasing the level beyond the upper end of the normal operating range imposes several potential problems without substantially improving the potential for sustaining natural circulation.

Since the normal operating range envelopes the requirements to ensure natural circulation, the engineering limits for these uses will be equal to the upper and lower engineering limits for normal operation.

During normal operation, the level must be maintained below the steam separators in order to maintain adequate steam quality and prevent turbine damage. Although the turbine is not used during accident conditions, it is still beneficial to minimize the amount of moisture carryover into the main steam lines. Therefore, the upper engineering limit is based on maintaining the steam generator level below the "can deck". Based on Ref. 2:

Upper Level Tap is 33.5 inches above the can deck
Tap-to-Tap Span is 180.844 inches
% span (level) = (180.844 - 33.5)/(180.844) = 81.5%

Ref. 3 describes the potential for damaging the feedring due to water hammer when the feedring has been drained. Although guidance is provided in the EOI to minimize this potential (Ref. 4), the lower engineering limit is chosen to ensure that the feedring is not damaged. The engineering limit is based on preventing the feedring from draining by initiating feedwater flow before the level drops below the feedring. It is conservatively assumed that the feedring must be completely covered in order to prevent draining. The top of the feedring, as a percentage of the steam generator level tap-to-tap span, is determined as follows (dimensions from Ref. 2):

Feedring centerline is 72.344 inches above the lower tap
The inside diameter is 12 inches
Tap-to-Tap span is 180.844
% span = (72.344 + 6)/180.844 = 43.32%

Assumptions:

1. Configuration of Unit 2 and Unit 3 steam generators are identical.

2. The feed ring must be completely covered in order to preclude possible water hammer.

3. The dimensions provided in Ref. 2 do not include thermal expansion of the vessel at elevated temperatures.

| rev. 01

4. The references noted below are assumed to be Secondary Design documents. This assumption is justified based on the fact that they describe strategies which have been reviewed and commented on by the NRC.

   Ref: 1

| rev. 01

5. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 3,4

References:

1. CEN-152, Rev. 03, Combustion Engineering Emergency Procedure Guidelines.

2. Dwg. E-234-590, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator, Rev. 04.

3. Letter S-PSA-412, R. S. Turk to F. Bevilacqua, SONGS Feedring, October 1, 1981.

4. Letter S-PSA-402, R. S. Turk to E. Guenther, AFWS Operational Guidance, September 3, 1981.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OP592-215 Rev.01

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS82-215 Rev. 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______

MARTIN GREER / Martin Greer

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 06 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/22/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner	[signature]	12/22/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 12/23/92
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 06

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**
< 90%	To provide guidance to lower high S/G levels and reset MSIS.
< 90%	To monitor lowering the affected S/G level to < 90 % NR.

Engineering Limit(s):

< 100%

Bases for Engineering Limit(s):

The EOIs direct that a MSIS be manually initiated for high steam generator level conditions in order to minimize the amount of water that can flow into the main steam lines. It is desirable to prevent the main steam lines from filling for the following reasons: 1) pressure control in a solid steam generator is more difficult; 2) filling the main steam lines could damage the pipe supports due to the weight of the water; 3) an uncontrolled release of radioactive water could result if the MSSVs opened or the ADVs were opened.

As shown in Ref. 1, the upper taps of the steam generator level indicators are substantially below the top of the steam generator. Therefore, any indication of steam generator level less than 100% is an indication that a bubble is present in the steam generator and that the main steam lines are not being filled with water. Since, the operator may need the steam generator for RCS heat removal, the MSIS should be reset as soon as possible after the level drops below 100% and once any water present in the main steam lines is drained.

Assumptions:

1. The configuration of the Unit 2 and Unit 3 steam generators are assumed to be the same.

2. The dimensions provided in Ref. 1 do not include thermal expansion of the vessel at elevated temperatures.

References:

1. Dwg. E-234-590, Rev. 04, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 1 Group 6 S/G Level (NR) / 009-OPS92-211 / Rev. 00

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17. Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19. Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20. Are adequate identification requirements specified?		✓
21. Has an appropriate title page been used?	✓	
22. Are all pages sequentially numbered and marked with a valid number?	✓	
23. Is the presentation legible and reproducible?	✓	
24. Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25. Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: As marked on Document Comments sheet. Checklist 1 is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/22/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 07 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)
[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER	[signature]	4/26/93
Name Independent Reviewer	Signature	Date

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)
[signature]
Cognizant Engineering Manager (Signature) 4/27/93 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 07

Parameter: S/G LEVEL (NR)

Step Value(s):	Use(s):	
< 80%	To maintain the isolated S/G level < 80% NR, in the event of a SGTR.	rev. 01
> 80%	To direct actions to be taken if the isolated affected S/G (in a SGTR event) has > 80% water level.	
< 80%	To monitor restoration of isolated S/G level to < 80% following initiation of corrective action to do so.	
< 80%	To direct actions to be taken if the isolated affected S/G level is not < 80%.	rev. 01

Engineering Limit(s):

Upper Limit: 100% | rev. 01

Bases for Engineering Limit(s):

| rev. 01

It is desirable to prevent the steam generators from over filling, and subsequently the main steam lines from filling, for the following reasons: 1) pressure control in a solid steam generator is more difficult; 2) filling the main steam lines could damage the pipe supports due to the weight of the water; 3) an uncontrolled release of radioactive water could result if the MSSVs opened or the ADVs were opened. Therefore, operator action should be taken to prevent the main steam lines from filling. As shown in Ref. 1, the upper taps of the steam generator level indicators are substantially below the top of the steam generator. Therefore, it is possible to have an indication of ≥ 100% and still have a bubble in the steam generator. However, the operator has no means of determining the actual steam generator level when the level is above 100%. Therefore, operator actions to prevent water from filling the main steam lines or to minimize the consequences of water filling the main steam lines must be initiated prior to the level exceeding 100%.

Assumptions:

1. The configuration of the Unit 2 and Unit 3 steam generators are assumed to be the same.

2. The dimensions provided in Ref. 1 do not include thermal expansion of the vessel at elevated temperatures.

References:

1. Dwg. E-234-590, Rev. 04, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator

| rev. 01

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-2/6 Rev 01

	OK	N/A
1. Were the inputs correctly selected and incorporated into the design?		✓
2. Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3. Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4. Are the appropriate quality and quality assurance requirements specified?	✓	
5. Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6. Have applicable construction and operating experience been considered?		✓
7. Have the design interface requirements been satisfied?		✓
8. Was an appropriate design method used?		✓
9. Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10. Is the output (results and conclusions) reasonable compared to inputs?		✓
11. Are the specified parts, equipment, and processes suitable for the required application?		✓
12. Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13. Have adequate maintenance features and requirements been specified?		✓
14. Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15. Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16. Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-216 Rev. 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________

MARTIN GREER / Martin Greer   4/26/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 08 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/21/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner	[signature]	12/22/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) Date 12/22/92

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 08

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**
< 90%	To determine during an SGTR (with T-hot < 530°F and PZR press >1000 psia) if rapidly increasing S/G level requires shifting priority from maintaining RCP NPSH and CET SAT Margin > 20°F to reducing PZR Pressure to ±50 psi of S/G pressure.
Rapid Trend > 90%	To determine during an SGTR (with T-hot < 530°F and PZR press >1000 psia) if rapidly increasing S/G level requires shifting priority from maintaining RCP NPSH and CET SAT Margin > 20°F to reducing PZR Pressure to ±50 psi of S/G pressure.

Engineering Limit(s):

100%

Bases for Engineering Limit(s):

It is desirable to prevent the steam generators from over filling, and subsequently the main steam lines from filling, for the following reasons: 1) pressure control in a solid steam generator is more difficult; 2) filling the main steam lines could damage the pipe supports due to the weight of the water; 3) an uncontrolled release of radioactive water could result if the MSSVs opened or the ADVs were opened. To prevent the direct release of RCS water into the environment, operator action should be taken to prevent the main steam lines from filling. As shown in Ref. 1, the upper taps of the steam generator level indicators are substantially below the top of the steam generator. Therefore, it is possible to have an indication of ≥ 100% and still have a bubble in the steam generator. However, the operator has no means of determining the actual steam generator level when the level is above 100%. Therefore, operator actions to prevent water from filling the main steam lines or to minimize the consequences of water filling the main steam lines must be initiated prior to the level exceeding 100%.

Assumptions:

1. The configuration of the Unit 2 and Unit 3 steam generators are assumed to be the same.

2. The dimensions provided in Ref. 1 do not include thermal expansion of the vessel at elevated temperatures.

References:

1. Dwg. E-234-590, Rev. 04, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 1 Group 8 S/G Level (NR) / 009-OPS92-217/ Rev. 00 (initialed 4/28/93)

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-01592-2187 Rev. 0

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: As marked on Document Comments Sheet. Checklist 1 is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/22/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 09 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER — [signature] — 4/26/93
Name — Signature — Date
Independent Reviewer

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) 4/22/93
Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 09

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**	
≥ 90%	To alert operators of consequences associated with direct water relief through ADVs of isolated S/G.	rev. 01
< 100%	To determine when to initiate MSIS and go to the Functional Recovery EOI if at least one S/G is not < 100%	
< 100%	To determine when to initiate MSIS and perform S/G drain down procedures, if both S/Gs are not < 100%.	
< 100%	To verify both S/G levels < 100% and to evaluate initiation of MSIS if the levels are ≥ 100%.	
≤ 100%	To instruct the operator to maintain feeding and steaming control of the steam generator with level ≤ 100%.	rev. 01

Engineering Limit(s):

100%

Bases for Engineering Limit(s):

It is desirable to prevent the steam generators from over filling, and subsequently the main steam lines from filling, for the following reasons: 1) pressure control in a solid steam generator is more difficult; 2) filling the main steam lines could damage the pipe supports due to the weight of the water; 3) an uncontrolled release of radioactive water could result if the MSSVs opened or the ADVs were opened. Therefore, operator action should be taken to prevent the main lines from filling. As shown in Ref. 1, the upper taps of the steam generator level indicators are substantially below the top of the steam generator. Therefore, it is possible to have a level ≥ 100% (i.e., above the upper tap) and still have a bubble in the steam generator. However, the operator has no means of determining the actual steam generator level when the level is above 100%. Therefore, operator actions to prevent water from filling the main steam lines or to minimize the consequences of water filling the main steam lines must be initiated prior to the level exceeding 100%.

Assumptions:

1. The configuration of the Unit 2 and Unit 3 steam generators are assumed to be the same.

2. The dimensions provided in Ref. 1 do not include thermal expansion of the vessel at elevated temperatures.

References:

1. Dwg. E-234-590, Rev. 04, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: D09-OP592-218 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-08592-218 Rev.01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________________

MARTIN GREEN / Martin Green 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 10 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GRIER — [signature] — 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 10

Parameter: S/G E-088 LEVEL (NR)
S/G E-089 LEVEL (NR)

Step Value(s):	**Use(s):**
< 40%	To confirm LOFW diagnosis in conjunction with EFAS actuation and feedwater less than the minimum required flow.

Engineering Limit(s):

43.3%

Bases for Engineering Limit(s):

If EFAS has actuated and the steam generator level is less than the lower limit of the normal operating range, then feedwater flow should be greater than the minimum flowrate required to maintain level. If there is insufficient flow, then the event can be considered a LOFW event. Therefore, the engineering limit for this use is the lower engineering limit for the normal operating range.

Ref. 1 describes the potential for damaging the feedring due to water hammer when the feedring has been drained. Although guidance is provided in the procedure to minimize this potential (Ref. 2), the engineering limit for the normal operating range is based on preventing the potential for damage. The information provided in Ref. 1 and 2 does not specify whether the feedring must be completely covered or partially covered in order to prevent water hammer damage. Therefore, it is conservatively assumed that the feedring must be completely covered. The level at the top of the feedring, as a percentage of the steam generator level tap-to-tap span, is determined as follows (dimensions from Ref. 3):

Feedring centerline is 72.344 inches above the lower tap
The inside diameter is 12 inches
Tap-to-Tap span is 180.844
% span = (72.344 + 6)/180.844 = 43.3%

Assumptions:

1. Configuration of Unit 2 and Unit 3 steam generators are identical.

2. The feed ring must be completely covered in order to preclude possible water hammer.

3. The dimensions provided in Ref. 3 do not include thermal expansion of the vessel at elevated temperatures.

| rev. 01

4. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 1,2

References:

1. Letter S-PSA-412, R. S. Turk to F. Bevilacqua, SONGS Feedring, October 1, 1981.

2. Letter S-PSA-402, R. S. Turk to E. Guenther, AFWS Operational Guidance, September 3, 1981.

3. Dwg. E-234-590, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator, Rev. 04.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-2/9 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-219 Rev. 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ____________________

MARTIN GREER / Martin Greer 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 11 Engineering Limit and Bases

PARAMETER: S/G Level (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J. R. CONGDON
Cognizant Engineering Manager (Print Name)

[signature] 4/22/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 11

Parameter: S/G E-088 Level (NR)
S/G E-089 Level (NR)
S/G Level (NR)

Step Value(s):	**Use(s):**
LOWERING	To determine affected S/G in the event of a MFW line rupture inside containment.
CHANGING	To verify isolation of the most affected S/G. | rev. 01
MONITOR	To determine when to take action (with one S/G Level ≥ 100%) to reduce affected steam generator level.

Engineering Limit(s):

None.

Bases for Engineering Limit(s):

There are no associated engineering limits for the trending of parameters. Since no value is specified in the trend, no value will be assigned to the engineering limit. Usually, when an operator is instructed to trend an indication, the indication is used in conjunction with other parameters to corroborate the condition of a safety function. An operator is not required to perform a safety related action on the trending of a single parameter by itself in the EOIs. Where the trending of a parameter is combined with specified operating limits on that parameter, the values given for the operating limits are evaluated for their engineering limits.

Assumptions:

None.

References:

None.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-178 Rev 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-128 Rev. 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________

MARTIN GREER / Martin Greer 4/26/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 12 Engineering Limit and Bases

PARAMETER: S/G LEVEL (NR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/24/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER — Name, Independent Reviewer
[signature] — Signature
4/26/93 — Date

APPROVED BY: J. R. CONGDON
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) 4/27/93 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 05

Parameter: S/G LEVEL (NR)

Step Value(s):	**Use(s):**
< 90%	To determine if actions need to be taken to prevent excessive water level in the affected S/G during cooldown of the RCS.

Engineering Limit(s):

< 100%

Bases for Engineering Limit(s):

It is desirable to prevent the main steam lines from filling for the following reasons: 1) pressure control in a solid steam generator is more difficult; 2) filling the main steam lines could damage the pipe supports due to the weight of the water; 3) an uncontrolled release of radioactive water could result if the MSSVs opened or the ADVs were opened.

As shown in Ref. 1, the upper taps of the steam generator level indicators are substantially below the top of the steam generator. Therefore, any indication of steam generator level less than 100% is an indication that a bubble is present in the steam generator and that the main steam lines are not being filled with water. Since, the operator may need the steam generator for RCS heat removal, the MSIS should be reset as soon as possible after the level drops below 100% and once any water present in the main steam lines is drained.

Assumptions:

1. The configuration of the Unit 2 and Unit 3 steam generators are assumed to be the same.

2. The dimensions provided in Ref. 1 do not include thermal expansion of the vessel at elevated temperatures.

References:

1. Dwg. E-234-590, Rev. 04, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OP592-063 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-0PS92-003 Rev. 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________

MARTIN GREER   Martin Greer   4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 01 Engineering Limit and Bases

PARAMETER: S/G LEVEL (WR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/15/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

STEVEN C RYDER	[signature]	12/16/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) 12/21/92 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 01

Parameter: S/G LEVEL (WR)

Step Value(s):	**Use(s):**
< 100%	To determine when to initiate MSIS and direct the use of the Functional Recovery procedure if at least one S/G is not < 100%
< 100%	To determine when to initiate MSIS and direct initiation of S/G drain down procedures, if both S/Gs are not < 100%.
< 100%	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.
> 100%	To determine when to take action (with one S/G level > or = 100%) to reduce affected S/G level.

Engineering Limit(s):

100%

Bases for Engineering Limit(s):

It is desirable to prevent the steam generator from over filling, and subsequently the main steam lines from filling, for the following reasons: 1) pressure control in the solid steam generator is more difficult; 2) filling the main steam lines could damage the pipe supports due to the weight of the water; 3) an uncontrolled release of radioactive water could result if the

MSSVs opened or the ADVs were opened. Therefore, operator action should be taken to prevent the main steams lines from filling. As shown in Ref. 1, the upper tap of the steam generator level indicators is substantially below the top of the steam generator. Therefore, it is possible to have an indication of ≥ 100% and still have a bubble in the steam generator and the main steam lines not filled. However, the operator has no means of determining the actual steam generator level when the level is above 100%. Therefore, operator actions to prevent water from filling the main steam lines or to minimize the consequences of water filling the main steam lines must be initiated prior to the level exceeding 100%.

Assumptions:

1. The configuration of the Unit 2 and Unit 3 steam generators are assumed to be the same.

References:

1. Dwg. E-234-590, Rev. 04, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: ØØ9-OPS92-198 Rev. ØØ

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?	✓	
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

Document Number: ØØ9-OPS92-198 Rev. ØØ

Item	Question	OK	
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?		✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist 1 was not applicable to this review

STEVEN C RYDER / Steven C Ryder / 12/16/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 02 Engineering Limit and Bases

PARAMETER: S/G LEVEL (WR)

PREPARED BY: Will B. Dawes
Cognizant Engineer (Print Name)

Will B Dawes
Cognizant Engineer (Signature) Date: 11-25-92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner	Kenneth E. Faulkner	12/4/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

Joseph R Congdon
Cognizant Engineering Manager (Signature) 12/21/92 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 02

Parameter: S/G LEVEL (WR)

Step Value(s):	**Use(s):**
RISING	To determine if any AFW pumps need to be started or stopped.

Engineering Limit(s):

None.

Bases for Engineering Limit(s):

There are no associated engineering limits for the trending of parameters. Since no value is specified in the trend, no value will be assigned to the engineering limit. Usually, when an operator is instructed to trend an indication, the indication is used in conjunction with other parameters to corroborate the condition of a safety function. An operator is not required to perform a safety related action on the trending of a single parameter by itself in the EOIs. Where the trending of a parameter is combined with specified operating limits on that parameter, the values given for the operating limits are evaluated for their engineering limits.

Assumptions:

None.

References:

None.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 1 Group 2 S/G Level (WR) / 009-OPS92-182 / Rev. 00

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: None. Checklist 1 is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/4/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison   **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support   **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 03 Engineering Limit and Bases

PARAMETER: S/G LEVEL (WR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature)   Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER   [signature]   4/26/93
Name   Signature   Date
Independent Reviewer

APPROVED BY: J. R. CONGDON
Cognizant Engineering Manager (Print Name)

[signature]   4/27/93
Cognizant Engineering Manager (Signature)   Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 03

Parameter: S/G LEVEL (WR)

Step Value(s):	**Use(s):**
77% to 92%	To establish appropriate S/G level band when using a fill and drain procedure to eliminate voids in the S/G tubes.

Engineering Limit(s):

Upper Limit: 92.9%

Lower Limit: 78.4%

Bases for Engineering Limit(s):

The potential for a void in the steam generator tube is greater when the steam generator water level is below the top of the tubes, particularly when the steam generator pressure is greater than the RCS pressure. In order to maximize the heat transfer across the tubes, and thus help to collapse the void, the steam generator level must be above the tubes. In addition to collapsing the void, other considerations must be taken into account during accident situations including the integrity of the feedring and preventing main steam lines from filling. The normal operating band envelopes all these considerations and therefore, will be used for the engineering limits for this use.

During normal operation, the level must be maintained below the steam separators in order to maintain steam quality less than 2 percent. Steam quality greater than 2 percent can damage the turbine. Although the turbine is not used while the EOIs are being implemented, it is advantageous to the operators to minimize the moisture carryover into the steam lines during an accident. Therefore, the upper engineering limit is based on a steam generator level below the "can deck".

The Wide Range level indication can be determined by the following formula:

Rw = (L - 19.5)/4.77 (Ref. 1)

where Rw = wide range level indication
L = level of water above the tube sheet

The Can Deck is 462.625 inches above the tube sheet (Ref. 2) Therefore, the indication corresponding to a water level at the can deck is 92.9%

Ref. 3 describes the potential for damaging the feedring due to water hammer when the feedring has been drained. Although guidance is provided in the procedure to minimize this potential (Ref. 4), the lower engineering limit should be established which eliminates the potential of damaging the feedring. Therefore, the lower engineering limit is based on preventing the feedring from draining. The information provided in Ref. 3 and 4 does not specify whether the feedring must be completely covered or partially covered in order to prevent water hammer damage. Therefore, it is conservatively assumed that the feedring must be completely covered. The top of the feedring, as a percentage of the steam generator level tap-to-tap span, is determined as follows:

The feedring centerline is 387.625 above the tubesheet
The inside diameter of the feedring is 12 inches
Therefore, the level which guarantees the feedring is filled is 387.625 + 6 = 393.625 inches above the tube sheet

The corresponding level indication is 78.4%

Assumptions:

1. Configuration of Unit 2 and Unit 3 steam generators are identical.

2. The feed ring must be completely covered in order to preclude possible water hammer.

3. The dimensions provided in Ref. 2 do not include thermal expansion of the vessel at elevated temperatures.

| rev. 01

4. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 3,4

References:

1. Calc. S-PEC-379, S/G Wide Range and Narrow Range Level Correlation at Hot Standby, Rev. 0, April 28, 1982.

2. Dwg. E-234-590, General Arrangement and Assembly - Elevation, San Onofre II Steam Generator, Rev. 04.

3. Letter S-PSA-412, R. S. Turk to F. Bevilacqua, SONGS Feedring, October 1, 1981.

4. Letter S-PSA-402, R. S. Turk to E. Guenther, AFWS Operational Guidance, September 3, 1981.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-199 Rev. 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-199 Rev. 01

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?		✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________________

MARTIN GREER / Martin Greer 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 04 Engineering Limit and Bases

PARAMETER: S/G LEVEL (WR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

Cognizant Engineer (Signature) Date: 12/21/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

STEVEN C RYDER | | 12/22/92
Name | Signature | Date
Independent Reviewer

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

Cognizant Engineering Manager (Signature) 12/22/92 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 04

Parameter: S/G LEVEL (WR)

Step Value(s):	Use(s):
> 50%	To verify the availability of at least one S/G for RCS Heat Removal (specified minimum level = 50%)

Engineering Limit(s):

28%

Bases for Engineering Limit(s):

The minimum steam generator level required to provide for adequate primary to secondary heat transfer during natural circulation conditions is 153.1 inches above the tube sheet (Ref. 1). The Wide Range level indication can be determined by the following formula (Ref. 2):

$$Rw = (L - 19.5)/4.77$$

where Rw = wide range level indication
L = level of water above the tube sheet

$$Rw = 28\%$$

Therefore, the minimum level for sustaining sufficient primary to secondary heat transfer during natural circulation is 28%. If there is inadequate primary to secondary heat transfer, then the RCS is not being adequately cooled and the Heat Removal safety function is not being satisfied.

Assumptions:

1. The analysis performed in Ref. 1 specified a minimum level of 153.1 inches based on two steam generators available. It is assumed that the conclusions of Ref. 1 are conservative for natural circulation heat removal through one steam generator.

2. The scope of Ref. 1 is limited to Unit 2. However, since the units are essentially the same, it is assumed that the conclusions of Ref. 1 are valid for Unit 3.

3. The bases above does not account for the reduction of heat transfer area due to steam generator tube plugging.

References:

1. Calculation S-PEC-371, SONGS Tech Specs: Minimum Steam Generator Level, Rev. 0, December 15, 1981.

2. Calculation S-PEC-379, Rev. 0, S/G Wide Range and Narrow Range Level Correlation at Hot Standby, April 29, 1982.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: ØØ9-0PS92-2Ø6 Rev. ØØ

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?	✓	
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

Document Number: ØØ8-OR592-206 Rev. ØØ

		OK	N
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?		✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist 1 was not applicable to this review

STEVEN C RYDER / [signature] / 12/22/92

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 05 Engineering Limit and Bases

PARAMETER: S/G LEVEL (WR)

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/24/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 05

Parameter: S/G LEVEL (WR)

Step Value(s):

10%

Use(s):

To provide guidance to the operator regarding the point at which a decreasing steam generator level will no longer adequately remove heat and will cause the RCS to rapidly repressurize.

Engineering Limit(s):

28%

Bases for Engineering Limit(s):

The minimum steam generator level required to provide for adequate primary to secondary heat transfer during natural circulation conditions is 153.1 inches above the tube sheet (Ref. 1). The Wide Range level indication can be determined by the following formula (Ref. 2):

$$Rw = (L - 19.5)/4.77$$

where Rw = wide range level indication
L = level of water above the tube sheet

$$Rw = 28\%$$

Therefore, the minimum level for sustaining sufficient primary to secondary heat transfer during natural circulation is 28%. If there is inadequate primary to secondary heat transfer, then the RCS is not being adequately cooled. As a result, RCS temperature and pressure will begin to increase. The rate of pressure increase is dependent on the heat removal rate, which is dependent on the steam generator level. The point at which the pressure begins to increase "rapidly" is subjective. Therefore, engineering limit is the point at which the pressure increase is initiated.

Assumptions:

1. The analysis performed in Ref. 1 specified a minimum level of 153.1 inches based on two steam generators available. It is assumed that the conclusions of Ref. 1 are conservative for natural circulation heat removal through one steam generator.

2. The scope of Ref. 1 is limited to Unit 2. However, since the units are essentially the same, it is assumed that the conclusions of Ref. 1 are valid for Unit 3.

3. The bases above does not account for the reduction of heat transfer area due to steam generator tube plugging.

References:

1. Calculation S-PEC-371, SONGS Tech Specs: Minimum Steam Generator Level, Rev. 0, December 15, 1981.

2. Calculation S-PEC-379, Rev. 0, S/G Wide Range and Narrow Range Level Correlation at Hot Standby, April 29, 1982.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS93-002 Rev. 00

#	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OP593-002 Rev. 00

		OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______________________

MARTIN GREEN / Martin Green 4/26/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 01 Group 01 Engineering Limit and Bases

PARAMETER: TOTAL FW FLOW

PREPARED BY: John M. Flaherty
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/22/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 4 of QAM-101.

MARTIN GREER [signature] 4/26/93
Name Signature Date
Independent Reviewer

APPROVED BY: J. R. Longdon
Cognizant Engineering Manager (Print Name)

[signature] 4/27/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 01 **Group:** 01

Parameter: TOTAL FW FLOW

Step Value(s):	**Use(s):**
> 200 GPM	To determine if any AFW pumps need to be started or stopped.

Engineering Limit(s):

200 GPM per Steam Generator

Bases for Engineering Limit(s):

The engineering limit is based on engineering judgement and is supported by Ref. 1. In addition, a hand calculation was performed to verify the conclusions of Ref. 1. Ref. 1 states that 200 gpm per steam generator will approximately equal the flow required to maintain steam generator level constant with 2% decay heat.

Assumptions:

1. The determination of 200 gpm does not include heat input into the RCS from the RCPs or sensible heat removal during an RCS cooldown.

| rev. 01

2. In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

   Ref: 1

References:

1. Letter S-CE-7529, V.C. Hall to D. Nunn, Response to Auxiliary Feedwater System (AFWS) Automatic Flow Control Action Items, May 12, 1982.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OP592-213 Rev. 01

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-01592-213 Rev. 01

	Question	OK	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: ______

MARTIN GREER / Martin Greer 4/26/93

Independent Reviewer: Name/Signature/Date

EXHIBIT 3.10-1

ABB COMBUSTION ENGINEERING
INSTRUMENT USE AND BASES TABLE COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

MODULE: 02 Cold Leg HPSI Flow
Cold Leg SI Flow
Hot and Cold Leg HPSI Flow
Hot and Cold Leg SI Flow
Hot Leg HPSI Flow
HPSI Flow(Train A/B)
HPSI/LPSI Flow
SI Flow

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

Cognizant Engineer (Signature) Date: 4/3/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER
Name
Independent Reviewer

Signature

4/15/93
Date

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)

Cognizant Engineering Manager (Signature) 4/15/93 Date

RECORD OF REVISIONS

Rev	Date	Pages	Prepared by	Reviewed by	Approved by
00	12/07/92	ALL	G. Berntsen	K. Faulkner	J.R.Congdon
01	04/12/93	ALL	J. Congdon	M. Greer	J.R.Congdon

RP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	COLD LEG HPSI FLOW	>300 GPM PER PUMP LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.
01	COLD LEG HPSI FLOW	> 300 GPM LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.
02	COLD LEG HPSI FLOW	FLOWS APPROX = NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value can be assigned to the engineering limit.	To verify that flow is equally distributed through all four cold leg injection lines during simultanious hot and cold leg injection.
03	COLD LEG HPSI FLOW	REDUCE FLOW ~1/2 NONE	Since the step value is only "approximate", the assigning of an engineering limit is not appropriate. Engineering limits for minimum expected hot and cold leg HPSI flow rates and maximum allowable flow rate have been determined elsewhere.	To monitor reduction of cold leg injection (by approximatly 1/2), to establish required conditions for initiating simultainious hot and cold leg injection.
04	COLD LEG HPSI FLOW	SUM >= MIN EXP NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.

P	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
4	COLD LEG HPSI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequte HPSI flow during cold leg injection.
4	COLD LEG HPSI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for RCS Inventory Control.
4	COLD LEG HPSI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flow for RCS Pressure Control.
1	COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequte HPSI flow during cold leg injection.
1	COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate cold leg safety injection flow for RCS Inventory Contol and RCS Pressure Control (SFSC)
1	COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate SI flow during cold leg injection.
1	COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flow for RCS Pressure Control.
1	COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for core heat removal.

RP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
)1	COLD LEG SI FLOW	>= MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for core heat removal.
)1	COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate cold leg sefety injection flow for RCS Heat Removal (SFSC).
)1	HOT AND COLD LEG HPSI FLOW	<=910GPM PER PUMP UL 1000 GPM	The engineering limit is based on not exceeding runout conditions for the HPSI pumps.	To verify operating HPSI pumps do not exceed run-out conditions (910 GPM) during simultaneous Hot/Cold Leg Injection.
)2	HOT AND COLD LEG HPSI FLOW	>450 GPM PER PUMP LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.
)1	HOT AND COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
)1	HOT AND COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate hot and cold leg safety injection flow for RCS Inventory Control and RCS Pressure Control (SFSC).

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

DATE: 04/09/93
REVISION: 01

.A. APPROVED TABLE

Module #: 02

Q.A. APPROVED TABLE

RP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	HOT AND COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate cold leg safety injection flow for RCS Inventory Contol and RCS Pressure Control (SFSC)
01	HOT AND COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for RCS Inventory Control.
01	HOT AND COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flow for RCS Pressure Control.
01	HOT AND COLD LEG SI FLOW	SUM >= MIN EXP NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate safety injection flowrate for core heat removal.
01	HOT AND COLD LEG SI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate hot and cold leg safety injection flow for RCS Heat Removal (SFSC).
02	HOT AND COLD LEG SI FLOW	>450 GPM PER PUMP LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To verify flow through the operating HPSI pump is > minimum flow required to prevent pump damage.
01	HOT LEG HPSI FLOW	SUM >= MIN EXP NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.

RP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	HOT LEG HPSI FLOW	> MIN EXP FLOW NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify adequate HPSI flow during hot and cold leg injection.
01	HPSI FLOW (TRAIN A)	<= 300 GPM LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To initiate corrective action to prevent HPSI pump damage resulting from pump operation with less than minimum required flow.
01	HPSI FLOW (TRAIN B)	<= 300 GPM LL 30 GPM/PUMP	A minimum of 30 GPM flow is required through each HPSI pump to removed pump heat and avoid damage to the pump. Since there is no direct indication of flow through the pump, pump flow is determined using the injection header flowmeters.	To initiate corrective action to prevent HPSI pump damage resulting from pump operation with less than minimum required flow.
01	HPSI/LPSI FLOW	> 40 GPM LL 40 GPM	T.S.3.1.1.1 requires that with SDM less than the required value, boration must be inititated and continued at greater than or equal to 40 gpm until the required SDM is restored. 40 gpm is based on the capacity of one Charging Pump.	To verify Emergency Boration is in progress to obtain adequate shutdown margin per Tech. Spec. requirements.
01	SI FLOW	LOWER NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

A. APPROVED TABLE

Module #: 02

Q.A. APPROVED TABLE

P	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
1	SI FLOW	RAISE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.
1	SI FLOW	THROTTLE NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.
1	SI FLOW	LOWER NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify HPSI flow decreases after throttling of HPSI.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-01592-190 Rev Ø1

	Item	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?	✓	
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

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17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: This checklist is more suited to plant changes/modification.

MARTIN GREER
Martin Greer 4/15/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: COLD LEG HPSI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/3/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER [signature] 4/7/93
Name Signature Date
Independent Reviewer

APPROVED BY: JOSEPH R. CONGDON
Cognizant Engineering Manager (Print Name)

[signature] 4/9/93
Cognizant Engineering Manager (Signature) Date

**SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES**

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: COLD LEG HPSI FLOW

Step Value(s):	**Use(s):**
> 300 GPM PER PUMP > 300 GPM	To verify flow through an operating HPSI pump is greater than the minimum flow required to prevent pump damage.

Engineering Limit(s):

Lower limit = 30 gpm per pump

Bases for Engineering Limit(s):

From Reference 1, the minimum HPSI pump flowrate required to remove pump heat and avoid pump damage is 30 gpm.

Reference 1 also states that since there is no direct indication of flow through the pump, pump flow is determined using the injection header meters. There are four of these meters for cold leg injection and two for hot leg injection. At flowrates less than 75 gpm, the accuracy of the of each flow meter is undetermined. Therefore, for cold leg injection, if the total flowrate through the four indicators is greater than 300 gpm, the HPSI pump protection criterion is met. In Reference 1, the 300 gpm value is applicable to operation with either one or two HPSI pumps.

Assumptions:

The engineering limit contains no instrument inaccuracies.

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE.

Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

References:

1) SONGS Units 2&3 Emergency Procedure Technical Guidelines, Rev. 01, Page 5-44.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-134 Rev Ø1
ISOPSP2 - Mod 02, Ø01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?	✓	
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

Doc Title 009-OPS92-134 Rev 01

		OK	N
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?	✓	
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: Checklist designed for engineering design change/station modification

Martin Greer
Martin Greer 1/7/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 02 Engineering Limit and Bases

PARAMETER: COLD LEG HPSI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/3/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER — [signature] — 4/7/93
Name — Signature — Date
Independent Reviewer

APPROVED BY: JOSEPH R. CONGDON
Cognizant Engineering Manager (Print Name)

[signature] 4/9/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 02

Parameter: COLD LEG HPSI FLOW

Step Value(s):	**Use(s):**
FLOWS APPROX =	To verify flow through all cold leg injection points are balanced during simultaneous hot and cold leg injection.

Engineering Limit(s):

None

Bases for Engineering Limit(s):

There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value can be assigned to the engineering limit.

From Reference 1, the step value is used to ensure approximately equal flow injection to the four cold legs during simultaneous hot/cold leg injection. The EOI states that injection to both sides of the reactor vessel is used to prevent the precipitation of boric acid in the reactor vessel. It can, therefore, be inferred that it is desired to equalize the flow into the four cold leg injection points to enhance the uniform removal of fluid containing concentrated boric acid.

Assumptions:

The necessary degree of cold leg flow equalization is sufficiently broad as to obviate the specification of a step value. Therefore, the assigning of an engineering limit is not appropriate.

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

References:

| rev. 01

1) SONGS Units 2&3 Emergency Procedure Technical Guidelines, Rev. 01, Page 5-46.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-128 Rev Ø1
J3085 Phase 2 Mod 02, ~~[illegible]~~ Ø02 [illegible] 1/19/93

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?	✓	
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009 – OPS92-128 Rev 01

		OK
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?	
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?	
19.	Are adequate handling, storage, cleaning and shipping requirements specified?	
20.	Are adequate identification requirements specified?	
21.	Has an appropriate title page been used?	✓
22.	Are all pages sequentially numbered and marked with a valid number?	✓
23.	Is the presentation legible and reproducible?	✓
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓

Comments/Remarks: Checklist is more appropriate for design changes/plant modification. CHECKLIST #1 WAS considered and determined to be N/A.

MARTIN GREER / Martin Greer 4/7/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 03 Engineering Limit and Bases

PARAMETER: COLD LEG HPSI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/3/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREEN [signature] 4/7/93
Name Signature Date
Independent Reviewer

APPROVED BY: JOSEPH R Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/9/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 03

Parameter: COLD LEG HPSI FLOW

Step Value(s):	**Use(s):**
REDUCE FLOW TO APPROX ½.	To monitor reduction of cold leg injection (by approximately ½), to establish required conditions for initiating simultaneous hot leg injection.

Engineering Limit(s):

None

Bases for Engineering Limit(s):

From Reference 1, the step value is used in the Action/Expected Response for establishing and balancing simultaneous hot/cold leg flow. The operator reduces total cold leg flow by approximately one half in order to divert half of the total HPSI flow to the hot leg.

Since the step value is only "approximate", the assigning of an engineering limit is not appropriate. Specific values for minimum expected hot and cold leg HPSI flow rates and maximum allowable flow rate are given elsewhere in the step and are evaluated for their bases separately.

Assumptions:

The necessary degree of cold leg flow reduction is sufficiently broad as to obviate the specification of a precise step value or tolerance.

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE.

Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

References:

1) Emergency Operating Instruction SO23-12-3, Rev. 07, Loss of Coolant Accident, pages 78 to 80 of 116.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-0PS92-131 Rev 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?	✓	
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

Ø09-OPS92-131 Rev Ø1

		OK	
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		
20.	Are adequate identification requirements specified?		
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist is more suited to design change or plant modification
CHECK LIST #1 is N/A.

MARTIN GREER / Martin Greer 4/7/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 04 Engineering Limit and Bases

PARAMETER: COLD LEG HPSI FLOW

PREPARED BY: George P. Berntsen
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/3/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner — Name, Independent Reviewer
[signature] — Signature
12/4/92 — Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) 12/4/92 Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 04

Parameter: COLD LEG HPSI FLOW

Step Value(s):	Use(s):
> Minimum Expected Flow	To verify adequate HPSI flow during cold leg injection. To verify adequate safety injection flowrate for RCS Inventory Control. To verify adequate safety injection flow for RCS Pressure Control.
SUM >= Minimum Expected Flow	To verify adequate HPSI flow during hot and cold leg injection.

Engineering Limit(s):

Not Applicable (see bases)

Bases for Engineering Limit(s):

ABB-CE has been directed by SCE not to supply engineering limits for this curve. See Reference 1.

References:

1) E-Mail from P. Curry to W. Watson, 11/4/92.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 2 Group 4 Cold Leg HPSI Flow / 009-0PS9Z-151/Rev.00

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention. etc., adequately specified?		✓

Comments/Remarks: None. Checklist 1 is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/4/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: COLD LEG SI FLOW

PREPARED BY: George P. Berntsen
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/3/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner	[signature]	12/4/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Compton
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) Date 12/4/92

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: COLD LEG SI FLOW

Step Value(s):	**Use(s):**
>= Minimum Expected Flow	To verify adequate safety injection flow for core heat removal.
> Minimum Expected Flow	To verify adequate HPSI flow during cold leg injection.
	To verify adequate SI flow during cold leg injection.
	To verify adequate safety injection flow for RCS Pressure Control.
	To verify adequate cold leg safety injection flow for RCS inventory Contol and RCS Pressure Control (SFSC).
	To verify adequate safety injection flowrate for core heat removal.
	To verify adequate cold leg safety injection flow for RCS Heat Removal (SFSC).

Engineering Limit(s):

Not Applicable (see bases)

Bases for Engineering Limit(s):

ABB-CE has been directed by SCE not to supply engineering limits for this curve. See Reference 1.

References:

1) E-Mail from P. Curry to W. Watson, 11/4/92.

[2] From: PAUL CURRY at G48 11/4/92 2:32PM (1909 bytes. 36 ln)
To: BILL WATSON at AWS5
Subject: Minimum Expected Hot/Cold Leg Injection Curves.
-------------------------------- Message Contents --------------------------------

TREAT THIS ONE JUST LIKE MODULE #9... N/A THIS ONE.

Paul,

We have the same situation in Module # 02 that we had with the Post Accident P-T Limits curve of Module # 09. The SONGS Units 2 & 3 EOIs reference a graph titled "Minimum Expected HPSI Flowrates During Cold Leg Injection" and a table titled "Minimum Expected HPSI Flowrates During Hot/Cold Leg Injection".

As with the P-T Limits curve, the calculations for this curve and table have been superseded by new SONGS calculations which are not in our possession. The same two questions/options that arose with the P-T Limits Curve apply here:

1) Does SCE believe it is worth while having ABB-CE spend time backing out the instrument uncertainties from the present curve and then generate a new curve which does not include uncertainties?

2) Does SCE wish to have ABB-CE "N/A" this one and wait until the new curve which includes instrument uncertainties is generated by SCE?

Please provide us with an answer to this question as soon as possible. Also, note that if SCE chooses to have ABB-CE perform option #1 we will need the calculations that support this curve and table sent to us as soon as possible.

Thank you,
Joe Congdon

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 2 Group 1 Cold Leg SI Flow

No.	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: None. Checklist 1 is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/4/92
Independent Reviewer: Name/Signature/Date

[2] From: PAUL CURRY at G48 11/4/92 2:32PM (1909 bytes. 36 ln)
To: BILL WATSON at AWS5
Subject: Minimum Expected Hot/Cold Leg Injection Curves.
---------------------------- Message Contents ---------------------------------

TREAT THIS ONE JUST LIKE MODULE #9... N/A THIS ONE.

Paul,

We have the same situation in Module # 02 that we had with the Post Accident P-T Limits curve of Module # 09. The SONGS Units 2 & 3 EOIs reference a graph titled "Minimum Expected HPSI Flowrates During Cold Leg Injection" and a table titled "Minimum Expected HPSI Flowrates During Hot/Cold Leg Injection".

As with the P-T Limits curve, the calculations for this curve and table have been superseded by new SONGS calculations which are not in our possession. The same two questions/options that arose with the P-T Limits Curve apply here:

1) Does SCE believe it is worth while having ABB-CE spend time backing out the instrument uncertainties from the present curve and then generate a new curve which does not include uncertainties?

2) Does SCE wish to have ABB-CE "N/A" this one and wait until the new curve which includes instrument uncertainties is generated by SCE?

Please provide us with an answer to this question as soon as possible. Also, note that if SCE chooses to have ABB-CE perform option #1 we will need the calculations that support this curve and table sent to us as soon as possible.

Thank you,
Joe Congdon

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: HOT AND COLD LEG HPSI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

Joseph R Congdon
Cognizant Engineer (Signature) Date: 4/3/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER | Martin Greer | 4/7/93
Name | Signature | Date
Independent Reviewer

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

Joseph R Congdon 4/9/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: HOT AND COLD LEG HPSI FLOW

Step Value(s):	**Use(s):**
<= 910 GPM PER PUMP	To verify operating HPSI pumps do not exceed run-out conditions (910 GPM) during simultaneous Hot/Cold Leg Injection.

Engineering Limit(s):

Upper limit = 1000 gpm

Bases for Engineering Limit(s):

As stated in the SONGS 2&3 UFSAR (Reference 1), the maximum not-to-exceed flowrate (pump runout) for a HPSI pump is 1,000 gpm.

Assumptions:

No instrument uncertainties are accounted for in the engineering limit.

| rev. 01

In accordance with NES&L Quality Procedure S023-XXIV-7-15, the references noted below are considered to be Secondary Design documents. Their use as reference documents for the engineering limit basis is assumed to be justified based on ensuring that the engineering limit is consistent with the current design basis and operating license.

Ref: 1

References:

1) San Onofre 2 & 3 Updated FSAR, Table 6.3-2, Safety Injection System Components Parameters, Rev. 5, 2/89.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-130 Rev Ø1

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-01592-130 Rev Ø1

		OK
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?	
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?	
19.	Are adequate handling, storage, cleaning and shipping requirements specified?	
20.	Are adequate identification requirements specified?	✓
21.	Has an appropriate title page been used?	✓
22.	Are all pages sequentially numbered and marked with a valid number?	✓
23.	Is the presentation legible and reproducible?	✓
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓

Comments/Remarks: checklist is suited to design change/plant modification CHECK LIST #1 N/A.

MARTIN GREER Martin Greer 4/7/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 02 Engineering Limit and Bases

PARAMETER: HOT AND COLD LEG HPSI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/5/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

M. GREER [signature] 4/7/93
Name Signature Date
Independent Reviewer

APPROVED BY: Joseph R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/9/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 02

Parameter: HOT AND COLD LEG HPSI FLOW

Step Value(s):	**Use(s):**
> 450 GPM PER PUMP	To verify flow through an operating HPSI pump is greater than the minimum flow required to prevent pump damage.

Engineering Limit(s):

Lower limit = 30 gpm per pump

Bases for Engineering Limit(s):

From Reference 1, the minimum HPSI pump flowrate required to remove pump heat and avoid pump damage is 30 gpm.

Reference 1 also explains that since there is no direct indication of flow through the pump, pump flow is determined using the injection header meters. There are four of these meters for cold leg injection and two for hot leg injection. At flowrates less than 75 gpm, the accuracy of the of each flow meter is undetermined. Therefore, for simultaneous hot/cold leg injection, six flow meters are used, resulting in a recommended total flowrate value of 450 gpm. In Reference 1, the 450 gpm value is applicable to operation with either one or two HPSI pumps.

Assumptions:

The engineering limit contains no instrument inaccuracies.

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. | rev. 01

Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

References:

1) SONGS Units 2&3 Emergency Procedure Technical Guidelines, Rev. 01, Page 5-44.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: OD9-OPS92-129 Rev 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-129 Rev Ø1

		OK	N
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist suitable for design change or plant modification. Check List #1 is N/A

MARTIN GREER Martin Greer 4/7/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: HOT AND COLD LEG SI FLOW

PREPARED BY: George P. Berntsen
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/3/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner	[signature] Kenneth E. Faulkner	12/4/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

[signature] Joseph R. Congdon 12/4/92
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: HOT AND COLD LEG SI FLOW

Step Value(s):	**Use(s):**
SUM >= Minimum Expected Flow	To verify adequate safety injection flowrate for core heat removal.
> Minimum Expected Flow	To verify adequate HPSI flow during hot and cold leg injection.
	To verify adequate hot and cold leg safety injection flow for RCS Inventory Control and RCS Pressure Control (SFSC).
	To verify adequate cold leg safety injection flow for RCS inventory Control and RCS Pressure Control (SFSC).
	To verify adequate safety injection flowrate for RCS Inventory Control.
	To verify adequate safety injection flow for RCS Pressure Control.
	To verify adequate hot and cold leg safety injection flow for RCS Heat Removal (SFSC).

Engineering Limit(s):

Not Applicable (see bases)

Bases for Engineering Limit(s):

ABB-CE has been directed by SCE not to supply engineering limits for this curve. See Reference 1.

References:

1) E-Mail from P. Curry to W. Watson, 11/4/92.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 2 Group 1 Hot And Cold Leg SI Flow / 009-0PS9Z-139 / Rev. 00

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17. Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19. Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20. Are adequate identification requirements specified?		✓
21. Has an appropriate title page been used?	✓	
22. Are all pages sequentially numbered and marked with a valid number?	✓	
23. Is the presentation legible and reproducible?	✓	
24. Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25. Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: None. Checklist 1 is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/4/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 02 Engineering Limit and Bases

PARAMETER: HOT AND COLD LEG SI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

Joseph R Congdon
Cognizant Engineer (Signature) Date: 4/3/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER	Martin Greer	4/7/93
Name Independent Reviewer	Signature	Date

APPROVED BY: JOSEPH R. CONGDON
Cognizant Engineering Manager (Print Name)

Joseph R Congdon
Cognizant Engineering Manager (Signature) 4/4/93
Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 02

Parameter: HOT AND COLD LEG SI FLOW

Step Value(s):	**Use(s):**
> 450 GPM PER PUMP	To verify flow through an operating HPSI pump is greater than the minimum flow required to prevent pump damage.

Engineering Limit(s):

Lower limit = 30 gpm per pump

Bases for Engineering Limit(s):

From Reference 1, the minimum HPSI pump flowrate required to remove pump heat and avoid pump damage is 30 gpm.

Reference 1 also states that since there is no direct indication of flow through the pump, pump flow is determined using the injection header meters. There are four of these meters for cold leg injection and two for hot leg injection. At flowrates less than 75 gpm, the accuracy of the of each flow meter is undetermined. Therefore, for simultaneous hot/cold leg injection, six flow meters are used, resulting in a recommended total flowrate value of 450 gpm. In Reference 1, this value is applicable to operation with either one or two HPSI pumps.

Assumptions:

The engineering limit contains no instrument inaccuracies.

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, | rev. 01
documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE.

Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref:
References:

1) SONGS Units 2&3 Emergency Procedure Technical Guidelines, Rev. 01, Page 10-97.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable the Independent Reviewer shall include it in the rviewer's statement.

Document Title/Number/Revision: 009- OPS 92 - 137 Rev Ø1

	OK	N/A
1. Were the inputs correctly selected and incorporated into the design?	✓	
2. Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3. Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4. Are the appropriate quality and quality assurance requirements specified?	✓	
5. Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6. Have applicable construction and operating experience been considered?		✓
7. Have the design interface requirements been satisfied?		✓
8. Was an appropriate design method used?		✓
9. Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10. Is the output (results and conclusions) reasonable compared to inputs?	✓	
11. Are the specified parts, equipment, and processes suitable for the required application?		✓
12. Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13. Have adequate maintenance features and requirements been specified?		✓
14. Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15. Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16. Has the design properly considered radiation exposure to the public and plant personnel?		✓

609-OPS92-137 Rev Ø1

		OK	N
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist is suited for design change or plant modification. CHECKLIST #1 N/A.

MARTIN GREEN / Martin Green 4/7/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: HOT LEG HPSI FLOW

PREPARED BY: George P. Berntsen
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 12/3/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Kenneth E. Faulkner	[signature]	12/4/92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. A. Congdon
Cognizant Engineering Manager (Print Name)

[signature]
Cognizant Engineering Manager (Signature) Date 12/4/92

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: HOT LEG HPSI FLOW

Step Value(s):	**Use(s):**
SUM >= Minimum Expected Flow > Minimum Expected Flow	To verify adequate HPSI flow during hot and cold leg injection.

Engineering Limit(s):

Not Applicable (see bases)

Bases for Engineering Limit(s):

ABB-CE has been directed by SCE not to supply engineering limits for this curve. See Reference 1.

References:

1) E-Mail from P. Curry to W. Watson, 11/4/92.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Mod. 2 Group I Hot Leg HPSI Flow / 009-OPS92-135 / Rev. 00

Item	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention. etc., adequately specified?		✓

Comments/Remarks: None. Checklist I is N/A.

Kenneth E. Faulkner / Kenneth E. Faulkner / 12/4/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: HPSI FLOW (TRAIN A/TRAIN B)

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 4/9/93 (3 M 4/9/93)

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists ND 9 of QAM-101.

MARTIN GRIER [signature] 4/7/93
Name Signature Date
Independent Reviewer

APPROVED BY: JOSEPH R Congdon
Cognizant Engineering Manager (Print Name)

[signature] 4/9/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: HPSI FLOW (TRAIN A/TRAIN B)

Step Value(s):	**Use(s):**
<= 300 GPM	To initiate corrective action to prevent HPSI pump damage resulting from pump operation with less than minimum required flow.

Engineering Limit(s):

Lower limit = 30 gpm per pump

Bases for Engineering Limit(s):

From Reference 1, the minimum HPSI pump flowrate required to remove pump heat and avoid pump damage is 30 gpm per pump.

Reference 1 also states that since there is no direct indication of flow through the pump, pump flow is determined using the injection header meters. There are four of these meters for cold leg injection and two for hot leg injection. At flowrates less than 75 gpm, the accuracy of the of each flow meter is undetermined. Therefore, for cold leg injection, if the total flowrate through the four indicators is greater than 300 gpm, the HPSI pump protection criterion is met. In Reference 1, the 300 gpm value is applicable to operation with either one or two HPSI pumps.

Assumptions:

The engineering limit contains no instrument inaccuracies.

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE.

Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1 and 2

References:

1) SONGS Units 2&3 Emergency Procedure Technical Guidelines, Rev. 01, Page 5-44.

2) Emergency Operating Instruction SO23-12-9, Rev. 05, Functional Recovery - Heat Removal, page 309 of 448.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-141 Rev Ø1

	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-61592-141 Rev 01

		OK	NA
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklists is suited for design changes / plant modification. Check List #1 is N/A

MARTIN GREEN / Martin Green 4/7/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: HPSI/LPSI FLOW

PREPARED BY: Joseph R. Congdon
Cognizant Engineer (Print Name)

Joseph R. Congdon
Cognizant Engineer (Signature) Date: 4/5/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 009 of QAM-101.

Martin Green	Martin Green	4/7/93
Name Independent Reviewer	Signature	Date

APPROVED BY: Joseph R. Congdon
Cognizant Engineering Manager (Print Name)

Joseph R. Congdon 4/9/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: HPSI/LPSI FLOW

Step Value(s):	**Use(s):**
> 40 GPM	To verify Emergency Boration is in progress to obtain adequate shutdown margin per Tech. Spec. requirements.

Engineering Limit(s):

Lower Limit = 40 GPM

Bases for Engineering Limit(s):

From Reference 1, the step value is based on Technical Specification Limiting Condition for Operation 3.1.1.1 (References 2 and 3). References 2 and 3 specify that with shutdown margin less than the required value, boration must be initiated and continued at ≥ 40 gpm until the required shutdown margin is restored.

From Reference 4, the step value equates to the minimum boron addition rate. When accompanied by decreasing reactor power, the minimum boration assures reactor shutdown.

Assumptions:

Since the engineering limit is the minimum boration rate, it is inferred that it is based on the capacity of one charging pump, 44 gpm (Reference 5).

The 4 gpm difference between the engineering limit and the capacity of one charging pump may account for instrument uncertainty.

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, the references noted below are considered to be Secondary Design documents. | rev. 01

Their use as reference documents for the engineering limit basis is assumed to be justified based on ensuring that the engineering limit is consistent with the current design basis and operating license.

Ref: 2, 3 and 5

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

| rev. 01

The references noted below are assumed to be Secondary Design documents. This assumption is justified based on the fact that they describe strategies which have been reviewed and commented on by the NRC.

Ref: 4

References:

1) Operating Instruction SO23-14-9, Functional Recovery Procedure Deviation and Bases Document, Rev. 0, page 94 of 771.

2) SONGS Unit 2 Technical Specifications through Amendment 94.

3) SONGS Unit 3 Technical Specifications through Amendment 94.

4) CEN-152, Rev. 03, Combustion Engineering Emergency Procedure Guidelines, page 11-87.

5) San Onofre 2 & 3 Updated FSAR, page 15.4-22, Rev. 3, 2/87.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-155 Rev Ø1

No.	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?	✓	
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?	✓	
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-155 Rev-01

		OK	NA
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: checklist suitable for design change/ plant modification Checklist #1 is N/A

MARTIN GREER / Martin Greer 4/7/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 02 Group 01 Engineering Limit and Bases

PARAMETER: SI FLOW

PREPARED BY: George P. Berntsen
Cognizant Engineer (Print Name)

[signature]
Cognizant Engineer (Signature) Date: 11/19/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

STEVEN C RYDER [signature] 11/20/92
Name Signature Date
Independent Reviewer

APPROVED BY: J. R. CONGDON
Cognizant Engineering Manager (Print Name)

[signature] 12/2/92
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 02 **Group:** 01

Parameter: SI FLOW

Step Value(s):	**Use(s):**
LOWER RAISE THROTTLE	To verify that this parameter is adjusted correctly to control Core Exit Saturation Margin.
LOWER	To verify HPSI flow decreases after throttling of HPSI.

Engineering Limit(s):
None

Bases:
There are no associated engineering limits for the trending of parameters. Since no value is specified in the trend, no value will be assigned to the engineering limit. Usually, when an operator is instructed to trend an indication, the indication is used in conjunction with other parameters to corroborate the condition of a safety function. An operator is not required to perform a safety related action on the trending of a single parameter by itself in the EOIs. Where the trending of a single parameter is combined with specified operating limits on that parameter, the values given for the operating limits are evaluated for their engineering limits.

Assumptions:
None

References:
None

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: ØØ9-OP592-156 Rev. ØØ

	Item	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

Document No. ØØ9-OPS92-156 Rev. ØØ

		OK	N
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?		✓
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?		✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist 1 was not applicable to this review

STEVEN C RYDER / Steven C Ryder / 11/20/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
INSTRUMENT USE AND BASES TABLE COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

MODULE: 03 Cold Leg Temperature

PREPARED BY: P. Kramarchyk
Cognizant Engineer (Print Name)
Paul B Kramarchyk
Cognizant Engineer (Signature) Date: 4/16/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER — Martin Greer — 4/16/93
Name — Signature — Date
Independent Reviewer

APPROVED BY: J.R. Congdon
Cognizant Engineering Manager (Print Name)
Joseph R Congdon
Cognizant Engineering Manager (Signature) 4/28/93 Date

RECORD OF REVISIONS

Rev	Date	Pages	Prepared by	Reviewed by	Approved by
00	12/01/92	ALL	P. Kramarchyk	K. Faulkner	J.R.Congdon
01	04/16/93	4,5	P. Kramarchyk	M. Grier	J.R.Congdon

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

Module #: 03

NOT A Q.A. DOCUMENT

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	COLD LEG TEMP	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify cold leg temperatures constant or decreasing as indication that single phase natural circulation is established.
01	COLD LEG TEMP	NOT RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify that this parameter is not rising, in the verification of adequate natural circulation.
01	COLD LEG TEMP	STABLE OR DEC NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To verify cold leg temperatures constant or decreasing as indication that single phase natural circulation is established.
01	COLD LEG TEMP	STABLE OR RISING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine (by trending) if an ESDE is isolated.
01	COLD LEG TEMP	STABLE OR LOWRNG NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine, along with adequate S/G level, if Cold Leg Temperature requires exiting the LOFW EOI and entering the FR EOI.
01	COLD LEG TEMP	LWRG & NOT CNTRLD NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To monitor and correct for RCS overcooling.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

Module #: 03

NOT A Q.A. DOCUMENT

RP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
01	COLD LEG TEMP	LOWERING NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine if unisolated (least affected) SG is removing decay heat.
01	COLD LEG TEMP	STABLE OR CONTRLD NONE	There are no engineering limits for the trending or monitoring of parameters. Since no value is specified in the trend, no engineering limits apply.	To determine (by trending) if an ESDE is isolated.
2	COLD LEG TEMP	> 500 deg F LL 488 deg F	488 deg F is based on maintaining core uplift forces within allowable limits.	To ensure less than four RCPs are operating when less than 500 deg F to prevent core lift.
3	COLD LEG TEMP	> RCP NPSH CURVE NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To confirm available NPSH for operating the RCP(s).
3	COLD LEG TEMP	COOLDOWN PLOT NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To monitor the cooldown rate of the plant.
3	COLD LEG TEMP	>20<200 SM CURVES NOT APPLICABLE	ABB-CE has been directed by SCE not to supply engineering limits for this curve or table.	To verify that RCS temperature is within P/T limits.
	COLD LEG TEMP	< 500 deg F HL < 555 deg F	555 deg F is based on keeping cold leg temperature less than the saturation temperature for the lowest Main Steam Safety Valve lift setting pressure (1089 psia).	To ensure Tc of the least affected S/G is maintained less than Tsat to avoid lifting MSSVs on isolated S/G.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

Module #: 03

NOT A Q.A. DOCUMENT

RP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
05	COLD LEG TEMP	> 300 deg F LL >287 degF(U-2)	The Technical Specifications require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287 deg F (Unit 2) or 267 deg F (Unit 3).	To indicate when to evaluate placing LTOP in service.
05	COLD LEG TEMP	> 300 deg F LL >267 degF(U-3)	The Technical Specifications require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287 deg F (Unit 2) or 267 deg F (Unit 3).	To indicate when to evaluate placing LTOP in service.
06	COLD LEG TEMP	ALL < 470 deg F HL < 494 deg F	Less that 494 deg F is based on engineering judgement. Restricting Cold Leg Temperature to < 494 deg F will prevent exceeding the design pressure (650 psi) for the intermediate pressure letdown piping. T sat for 650 PSIA is 494.89 deg F.	To verify criteria for letdown restoration is met (Tc < 470 F).
07	COLD LEG TEMP (1A)	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T witl respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.
07	COLD LEG TEMP (1B)	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.

NOT A Q.A. DOCUMENT

GRP	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
07	COLD LEG TEMP (2A)	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.
07	COLD LEG TEMP (2B)	LOWEST LOOP TC NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To determine which cold leg has the lowest delta T with respect to S/G temperature (S/G temp - Tc), to determine which RCP should be started first.
08	COLD LEG TEMP (2A)	< S/G E-088 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.
08	COLD LEG TEMP (2B)	< S/G E-088 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.
08	COLD LEG TEMP (1A)	< S/G E-089 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.

SONGS 2/3 ISOP II PHASE II
INSTRUMENT USE AND BASES TABLE

T A Q.A. DOCUMENT

Module #: 03

NOT A Q.A. DOCUMENT

?	PARAMETER	STEP VALUE/ ENG. LIMIT	BASES	USE
3	COLD LEG TEMP (1B)	< S/G E-089 TEMP NONE	There are no associated engineering limits for the comparison of parameters. Since no value is specified in the comparison, no value will be assigned to the engineering limit.	To identify the most affected S/G.
?	COLD LEG TEMP	>=SDM REQUIREMENT PER CURVE	The limiting temperature is a function of the current boron concentration, the method used to calculate SDM, and the current plant physics condition.	To ensure RCS temperature is equal to or greater than the temperature required for shutdown margin based on last boron sample.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009- 01592- 188 Rev 01

No.	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?		✓
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17. Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19. Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20. Are adequate identification requirements specified?	✓	
21. Has an appropriate title page been used?	✓	
22. Are all pages sequentially numbered and marked with a valid number?	✓	
23. Is the presentation legible and reproducible?	✓	
24. Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25. Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: ______

MARTIN GREER / Martin Greer 4/16/93
Independent Reviewer: Name/Signature/Date

EXHIBIT 3.10-1

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 03 Group 01 Engineering Limit and Bases

PARAMETER: COLD LEG TEMPERATURE

PREPARED BY: Paul B. Kramarchyk
Cognizant Engineer (Print Name)
Paul B. Kramarchyk
Cognizant Engineer (Signature) Date: 11/17/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

Patrick J Fennell	Patrick J Fennell	11-17-92
Name Independent Reviewer	Signature	Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)
Joseph R Congdon
Cognizant Engineering Manager (Signature) Date 11/18/92

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 03 **Group:** 01

Parameter: COLD LEG TEMPERATURE

Step Value(s):	**Use(s):**
NOT RISING	To verify cold leg temperatures constant or decreasing as indication that single phase natural circulation is established.
NOT RISING	To verify that this parameter is not rising, in the verification of adequate natural circulation.
STABLE OR DECREASING	To verify cold leg temperatures constant or decreasing as indication that single phase natural circulation is established.
STABLE OR RISING	To determine (by trending) if an ESDE is isolated.
STABLE OR CONTROLLED	To determine (by trending) if an ESDE is isolated.
STABLE OR LOWERING	To determine, along with adequate S/G level, if Cold Leg Temperature requires exiting the LOFW EOI and entering the FR EOI.
LOWERING & NOT CONTROLLED	To monitor and correct for RCS overcooling.
LOWERING	To determine if unisolated (least affected) SG is removing decay heat.

Engineering Limit(s):
None

Bases for Engineering Limit(s):

There are no associated engineering limits for the trending of parameters. Since no value is specified in the trend, no value will be assigned to the engineering limit. Usually, when an operator is instructed to trend an indication, the indication is used in conjunction with other parameters to corroborate the condition of a safety function. An operator is not required to perform a safety related action on the trending of a single parameter by itself in the EOIs. Where the trending of a single parameter is combined with specified operating limits on that parameter, the values given for the operating limits are evaluated for their engineering limits.

Assumptions:
None

References:
None

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 ** (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: Module 03 Group 01 / 009-OPS92-133/00

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?		✓
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		
20.	Are adequate identification requirements specified?		
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?		✓
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: ** - checklist 1 was considered, but found to not be applicable

Independent Reviewer: Name/Signature/Date

Patrick J Fennell / Patrick J Fennell / 11-17-92

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 03 Group 02 Engineering Limit and Bases

PARAMETER: COLD LEG TEMPERATURE

PREPARED BY: Paul B. Kramarchyk
Cognizant Engineer (Print Name)

Paul B. Kramarchyk
Cognizant Engineer (Signature) Date: 4/16/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER Martin Greer 4/16/93
Name Signature Date
Independent Reviewer

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

Joseph R. Congdon 4/23/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 03 **Group:** 02

Parameter: COLD LEG TEMPERATURE

Step Value(s): Use(s):

| rev. 01

> 500°F To ensure less than four RCPs are operating when less than 500 °F to prevent core lift.

Engineering Limit(s):

Lower Limit = 488°F

Bases for Engineering Limit(s):

488°F is based on maintaining core uplift forces within allowable limits, per ref. 1.

Assumptions:

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXIV-7-15, documents that are not Primary or Secondary Design documents may be used as reference documents if justification is provided. The references noted below are formal engineering correspondence between the design principals (e.g., NSSS vendor architect, etc,) and SCE. Their use as reference material is justified when the basis for the engineering limit is "operational experience" or "engineering judgement", and no Primary or Secondary Design Document exists.

Ref: 1

References:

1) Letter S-FPE-050, Fuel Assembly Uplift Margin for SONGS, Kogan to Smith, May 31, 1990.

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009- OPS92-177 Rev 01

		OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?		✓
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?	✓	
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-177 Rev 1 / OK

17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: ____________________

____

____

____

MARTIN GREEN / Martin Green 4/16/93
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 03 Group 03 Engineering Limit and Bases

PARAMETER: COLD LEG TEMPERATURE

PREPARED BY: Paul B. Kramarchyk
Cognizant Engineer (Print Name)

Paul B. Kramarchyk
Cognizant Engineer (Signature) Date: 11/30/92

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists 9 of QAM-101.

STEVEN C RYDER
Name
Independent Reviewer

Steven C Ryder
Signature

11/30/92
Date

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)

Joseph R Congdon
Cognizant Engineering Manager (Signature) 11/30/92
Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 03 **Group:** 03

Parameter: COLD LEG TEMPERATURE

Step Value(s):	**Use(s):**
> RCP NPSH CURVE (POST ACCIDENT TEMPERATURE LIMITS)	To confirm available NPSH for operating the RCP(s).
>20 <200 SATURATION MARGIN CURVES (POST ACCIDENT TEMPERATURE LIMITS)	To verify that RCS temperature is within P/T limits.
COOLDOWN PLOT (Tcold VS. Time)	To monitor the cooldown rate of the plant.

Engineering Limit(s):

Not Applicable (see bases)

Bases for Engineering Limit(s):

ABB-CE has been directed by SCE not to supply engineering limits for these curves. See references 1 and 2.

Assumptions:
None

References:

1) Message, RCP NPSH CURVES, W. Watson to P. Curry, 10/30/92

2) Message, RCP NPSH CURVES, P. Curry to W. Watson, 11/2/92

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: ØØ9-OPS92-158 Rev. ØØ

	Item	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?	✓	
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?	✓	
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?	✓	
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?	✓	
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

Document No. ØØ9-OP992-158 Rev. ØØ

		OK	[illegible]
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		[illegible]
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		[illegible]
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		
20.	Are adequate identification requirements specified?		
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?		[illegible]
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?	✓	

Comments/Remarks: Checklist 1 was not applicable to this review

STEVEN C RYDER / Steven C Ryder / 11/30/92
Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 03 Group 04 Engineering Limit and Bases

PARAMETER: COLD LEG TEMPERATURE

PREPARED BY: Paul B. Kramarchyk
Cognizant Engineer (Print Name)
Paul B Kramarchyk
Cognizant Engineer (Signature) Date: 4/16/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREER — Martin Greer — 4/16/93
Name — Signature — Date
Independent Reviewer

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)
Joseph R Congdon
Cognizant Engineering Manager (Signature) 4/23/93
Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 03 **Group:** 04

Parameter: COLD LEG TEMPERATURE

Step Value(s): **Use(s):**

< 500 DEG F — To ensure Tc of the least affected S/G is maintained less than Tsat to avoid lifting MSSVs on isolated S/G.

Engineering Limit(s):

HIGH LIMIT less than 555°F

Bases for Engineering Limit(s):

555°F is based on keeping cold leg temperature less than the saturation temperature for the lowest Main Steam Safety Valve lift setting pressure (1089 psia per ref. 1&2, see table below).

CAUTION:
555°F does not provide allowance for instrument error or subsequent RCS heatup after the affected steam generator is isolated. Therefore, any factors that have a potential for raising cold leg temperature above 555°F must be considered before establishing an allowable operational value.

MAIN STEAM SAFETY LOWEST LIFT SETTING	SATURATION TEMPERATURE
1089 psia (1089 psia = 1100 psia minus 1% offset per SONGS T.S. ref. 1&2)	555°F Tsat (interpolated, ref. 3)

Assumptions:

In accordance with NES&L Quality Procedure SO23-XXVV-7-15, the references noted below are considered to be Secondary Design documents. Their use as reference documents for the engineering limit basis is assumed to be justified based on ensuring that the engineering limit is consistent with the current design basis and operating license. | rev. 01

Ref: 1, 2

References:

1) SONGS UNIT 2 Technical Specification, TURBINE CYCLE SAFETY VALVES, LCO 3.7.1.1 AMENDMENT NO. 94 | rev. 01

2) SONGS UNIT 3 Technical Specification, TURBINE CYCLE SAFETY VALVES, LCO 3.7.1.1 AMENDMENT NO. 84 | rev. 01

3) ABB STEAM TABLES SEVENTEENTH PRINTING

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009- OPS92 - 157

No.	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
2.	Is the material presented sufficiently detailed as to purpose, method, assumptions, references, and units?		✓
3.	Are the assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?		✓
4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
8.	Was an appropriate design method used?		✓
9.	Have the adjustment factors, uncertainties, and empirical correlations been correctly applied?		✓
10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
11.	Are the specified parts, equipment, and processes suitable for the required application?		✓
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?		✓
13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

		OK	N
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19.	Are adequate handling, storage, cleaning and shipping requirements specified?		✓
20.	Are adequate identification requirements specified?	✓	
21.	Has an appropriate title page been used?	✓	
22.	Are all pages sequentially numbered and marked with a valid number?	✓	
23.	Is the presentation legible and reproducible?	✓	
24.	Have all cross-outs or overstrikes in the documentation been initialed and dated by the author of the change?	✓	
25.	Are requirements for record preparation review, approval, retention, etc., adequately specified?		✓

Comments/Remarks: ______________________________

MARTIN GREER / Martin Greer 4/16/93

Independent Reviewer: Name/Signature/Date

ABB COMBUSTION ENGINEERING
ENGINEERING LIMIT DOCUMENT COVER SHEET

CLIENT: Southern California Edison **PLANT:** San Onofre 2&3

PROJECT: ISOPS II Support **C-E JOB NUMBER:** 2001216

DOCUMENT: Module 03 Group 05 Engineering Limit and Bases

PARAMETER: COLD LEG TEMPERATURE

PREPARED BY: Paul B. Kramarchyk
Cognizant Engineer (Print Name)
Paul B. Kramarchyk
Cognizant Engineer (Signature) Date: 4/16/93

VERIFICATION STATUS: COMPLETE
The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklists No 9 of QAM-101.

MARTIN GREEN Martin Green 4/16/93
Name Signature Date
Independent Reviewer

APPROVED BY: J. R. Congdon
Cognizant Engineering Manager (Print Name)
Joseph R. Congdon 4/28/93
Cognizant Engineering Manager (Signature) Date

SONGS 2&3 INSTRUMENT SUITABILITY STUDY
EMERGENCY OPERATING PROCEDURES

ENGINEERING LIMIT BASES DOCUMENT

Module: 03 **Group:** 05

Parameter: COLD LEG TEMPERATURE

Step Value(s): Use(s):

> 300°F To indicate when to evaluate placing LTOP in service. | rev. 01

Engineering Limit(s):

Lower Limit: > 287°F (Unit 2)

> 267°F (Unit 3)

Bases for Engineering Limit(s):

The Technical Specifications (ref. 1 & 2) require at least one overpressure protection system operable whenever cold leg temperature is less than or equal to 287°F (Unit 2) or 267°F (Unit 3). Therefore, the engineering limits are the minimum allowable cold leg temperatures at which the need for Low Temperature Overpressure Protection (LTOP) must be evaluated before proceeding with a cooldown. | rev. 01

Assumptions:

| rev. 01

In accordance with NES&L Quality Procedure SO23-XXVV-7-15, the references noted below are considered to be Secondary Design documents. Their use as reference documents for the engineering limit basis is assumed to be justified based on ensuring that the engineering limit is consistent with the current design basis and operating license.

Ref: 1, 2

References:

1) SONGS UNIT 2 Technical Specification, TURBINE CYCLE SAFETY VALVES, LCO 3.4.8.3.1 AMENDMENT NO. 94 | rev. 01

2) SONGS UNIT 3 Technical Specification, TURBINE CYCLE SAFETY VALVES, LCO 3.4.8.3.1 AMENDMENT NO. 84 | rev. 01

CHECKLIST NO. 9

REVIEW OF OTHER DESIGN DOCUMENTS

Checklist 1 (Exhibit 3.3-1 of QAP 3.3) shall be considered whenever this Checklist is used, and if applicable, the Independent Reviewer shall include it in the reviewer's statement.

Document Title/Number/Revision: 009-OPS92-159 Rev 01

No.	Question	OK	N/A
1.	Were the inputs correctly selected and incorporated into the design?		✓
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4.	Are the appropriate quality and quality assurance requirements specified?	✓	
5.	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?		✓
6.	Have applicable construction and operating experience been considered?		✓
7.	Have the design interface requirements been satisfied?		✓
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10.	Is the output (results and conclusions) reasonable compared to inputs?		✓
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13.	Have adequate maintenance features and requirements been specified?		✓
14.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		✓
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?		✓
16.	Has the design properly considered radiation exposure to the public and plant personnel?		✓

009-OPS92-159 Rev 01

17. Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		✓
18. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		✓
19. Are adequate handling, storage, cleaning and shipping requirements specified?		✓
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Comments/Remarks: ______________________________

MARTIN GREEN / Martin Green 4/16/93
Independent Reviewer: Name/Signature/Date