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TRM1 - TECHNICAL REQUIREMENTS MANUAL UNIT 1

REMOVE MANUAL TABLE OF CONTENTS DATE: 10/24/2005

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CATEGORY: DOCUMENTS TYPE: TRM1
ID: TEXT 3.2.1
REMOVE: REV:4

ADD: REV: 5

CATEGORY: DOCUMENTS TYPE: TRM1
ID: TEXT LOES
REMOVE: REV:22

ADD: REV: 23

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A001

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

Table Of Contents

Issue Date: 11/04/2005

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.3.1 0 11/18/2002
Title: INSTRUMENTATION RADIATION MONITORING INSTRUMENTATION

TEXT 3.3.2 0 11/18/2002
Title: INSTRUMENTATION SEISMIC MONITORING INSTRUMENTATION

TEXT 3.3.3 0 11/18/2002
Title: INSTRUMENTATION METEOROLOGICAL MONITORING INSTRUMENTATION

TEXT 3.3.4 1 07/06/2005
Title: INSTRUMENTATION TRM POST-ACCIDENT MONITORING INSTRUMENTATION

TEXT 3.3.5 0 11/18/2002
Title: INSTRUMENTATION THIS PAGE INTENTIONALLY LEFT BLANK

TEXT 3.3.6 2 10/19/2005
Title: INSTRUMENTATION TRM ISOLATION ACTUATION INSTRUMENTATION

TEXT 3.3.7 0 11/18/2002
Title: INSTRUMENTATION MAIN TURBINE OVERSPEED PROTECTION SYSTEM

TEXT 3.3.8 1 10/22/2003
Title: INSTRUMENTATION TRM RPS INSTRUMENTATION

TEXT 3.3.9 1 11/22/2004
Title: INSTRUMENTATION LPRM UPSCALE ALARM INSTRUMENTATION

TEXT 3.3.10 1 12/14/2004
Title: INSTRUMENTATION REACTOR RECIRCULATION PUMP MG SET STOPS

TEXT 3.3.11 1 10/22/2003
Title: INSTRUMENTATION MVP ISOLATION INSTRUMENTATION

TEXT 3.4.1 0 11/18/2002
Title: REACTOR COOLANT SYSTEM REACTOR COOLANT SYSTEM CHEMISTRY

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.4.2 0 11/18/2002
Title: REACTOR COOLANT SYSTEM STRUCTURAL INTEGRITY

TEXT 3.4.3 0 11/18/2002
Title: REACTOR COOLANT SYSTEM HIGH/LOW PRESSURE INTERFACE LEAKAGE MONITORS

TEXT 3.4.4 1 12/14/2004
Title: REACTOR COOLANT SYSTEM REACTOR RECIRCULATION FLOW AND ROD LINE LIMIT

TEXT 3.4.5 0 11/18/2002
Title: REACTOR COOLANT SYSTEM REACTOR VESSEL MATERIALS

TEXT 3.5.1 1 02/04/2005
Title: EMERGENCY CORE COOLING AND RCIC ADS MANUAL INHIBIT

TEXT 3.5.2 0 11/18/2002
Title: EMERGENCY CORE COOLING AND RCIC ECCS AND RCIC SYSTEM MONITORING INSTRUMENTATION

TEXT 3.5.3 0 11/18/2002
Title: EMERGENCY CORE COOLING AND RCIC LONG TERM NITROGEN SUPPLY TO ADS

TEXT 3.6.1 0 11/18/2002
Title: CONTAINMENT VENTING OR PURGING

TEXT 3.6.2 0 11/18/2002
Title: CONTAINMENT SUPPRESSION CHAMBER-TO-DRYWELL VACUUM BREAKER POSITION INDICATION

TEXT 3.6.3 0 11/18/2002
Title: CONTAINMENT SUPPRESSION POOL ALARM INSTRUMENTATION

TEXT 3.6.4 0 11/18/2002
Title: CONTAINMENT PRIMARY CONTAINMENT CLOSED SYSTEM BOUNDARIES

TEXT 3.7.1 0 11/18/2002
Title: PLANT SYSTEMS EMERGENCY SERVICE WATER SYSTEM (ESW) SHUTDOWN

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.7.2 0 11/18/2002
Title: PLANT SYSTEMS ULTIMATE HEAT SINK (UHS) AND GROUND WATER LEVEL

TEXT 3.7.3.1 0 11/18/2002
Title: PLANT SYSTEMS FIRE SUPPRESSION WATER SUPPLY SYSTEM

TEXT 3.7.3.2 1 08/24/2005
Title: PLANT SYSTEMS SPRAY AND SPRINKLER SYSTEMS

TEXT 3.7.3.3 2 08/18/2005
Title: PLANT SYSTEMS CO2 SYSTEMS

TEXT 3.7.3.4 0 11/18/2002
Title: PLANT SYSTEMS HALON SYSTEMS

TEXT 3.7.3.5 0 11/18/2002
Title: PLANT SYSTEMS FIRE HOSE STATIONS

TEXT 3.7.3.6 0 11/18/2002
Title: PLANT SYSTEMS YARD FIRE HYDRANTS AND HYDRANT HOSE HOUSES

TEXT 3.7.3.7 0 11/18/2002
Title: PLANT SYSTEMS FIRE RATED ASSEMBLIES

TEXT 3.7.3.8 4 09/08/2005
Title: PLANT SYSTEMS FIRE DETECTION INSTRUMENTATION

TEXT 3.7.4 0 11/18/2002
Title: PLANT SYSTEMS SOLID RADWASTE SYSTEM

TEXT 3.7.5.1 0 11/18/2002
Title: PLANT SYSTEMS MAIN CONDENSER OFFGAS HYDROGEN MONITOR

TEXT 3.7.5.2 0 11/18/2002
Title: PLANT SYSTEMS MAIN CONDENSER OFFGAS EXPLOSIVE GAS MIXTURE

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.7.5.3 0 11/18/2002
Title: PLANT SYSTEMS LIQUID HOLDUP TANKS

TEXT 3.7.6 1 03/01/2005
Title: PLANT SYSTEMS ESSW PUMPHOUSE VENTILATION

TEXT 3.7.7 0 11/18/2002
Title: PLANT SYSTEMS MAIN CONDENSER OFFGAS PRETREATMENT LOGARITHMIC RADIATION MONITORING

TEXT 3.7.8 1 12/14/2004
Title: PLANT SYSTEMS SNUBBERS

TEXT 3.7.9 0 11/18/2002
Title: PLANT SYSTEMS CONTROL STRUCTURE HVAC

TEXT 3.7.10 1 12/14/2004
Title: PLANT SYSTEMS SPENT FUEL STORAGE POOLS (SFSPS)

TEXT 3.8.1 1 02/04/2005
Title: ELECTRICAL POWER PRIMARY CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

TEXT 3.8.2.1 1 12/14/2004
Title: ELECTRICAL POWER MOTOR OPERATED VALVES (MOV) THERMAL OVERLOAD PROTECTION - CONTINUOUS

TEXT 3.8.2.2 2 12/14/2004
Title: ELECTRICAL POWER MOTOR OPERATED VALVES (MOV) THERMAL OVERLOAD PROTECTION - AUTOMATIC

TEXT 3.8.3 0 11/18/2002
Title: ELECTRICAL POWER DIESEL GENERATOR (DG) MAINTENANCE ACTIVITIES

TEXT 3.8.4 0 11/18/2002
Title: ELECTRICAL POWER 24 VDC ELECTRICAL POWER SUBSYSTEM

TEXT 3.8.5 0 11/18/2002
Title: ELECTRICAL POWER DEGRADED VOLTAGE PROTECTION

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.8.6 0 11/18/2002
Title: ELECTRICAL POWER EMERGENCY SWITCHGEAR ROOM COOLING

TEXT 3.9.1 0 11/18/2002
Title: REFUELING OPERATIONS DECAY TIME

TEXT 3.9.2 0 11/18/2002
Title: REFUELING OPERATIONS COMMUNICATIONS

TEXT 3.9.3 0 11/18/2002
Title: REFUELING OPERATIONS REFUELING PLATFORM

TEXT 3.10.1 0 11/18/2002
Title: MISCELLANEOUS SEAL SOURCE CONTAMINATION

TEXT 3.10.2 0 11/18/2002
Title: MISCELLANEOUS SHUTDOWN MARGIN TEST RPS INSTRUMENTATION

TEXT 3.10.3 0 11/18/2002
Title: MISCELLANEOUS INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

TEXT 3.10.4 0 11/18/2002
Title: MISCELLANEOUS LEADING EDGE FLOW METER (LEFM)

TEXT 3.11.1.1 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS LIQUID EFFLUENTS CONCENTRATION

TEXT 3.11.1.2 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS LIQUID EFFLUENTS DOSE

TEXT 3.11.1.3 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS LIQUID WASTE TREATMENT SYSTEM

TEXT 3.11.1.4 1 12/14/2004
Title: RADIOACTIVE EFFLUENTS LIQUID RADWASTE EFFLUENT MONITORING INSTRUMENTATION

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.11.1.5 1 12/14/2004
Title: RADIOACTIVE EFFLUENTS RADIOACTIVE LIQUID PROCESS MONITORING INSTRUMENTATION

TEXT 3.11.2.1 2 08/24/2005
Title: RADIOACTIVE EFFLUENTS DOSE RATE

TEXT 3.11.2.2 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS DOSE - NOBLE GASES

TEXT 3.11.2.3 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS DOSE - IODINE, TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM

TEXT 3.11.2.4 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS GASEOUS RADWASTE TREATMENT SYSTEM

TEXT 3.11.2.5 1 05/20/2005
Title: RADIOACTIVE EFFLUENTS VENTILATION EXHAUST TREATMENT SYSTEM

TEXT 3.11.2.6 2 12/14/2004
Title: RADIOACTIVE EFFLUENTS RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

TEXT 3.11.3 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS TOTAL DOSE

TEXT 3.11.4.1 1 12/14/2004
Title: RADIOACTIVE EFFLUENTS MONITORING PROGRAM

TEXT 3.11.4.2 1 12/14/2004
Title: RADIOACTIVE EFFLUENTS LAND USE CENSUS

TEXT 3.11.4.3 0 11/18/2002
Title: RADIOACTIVE EFFLUENTS INTERLABORATORY COMPARISON PROGRAM

TEXT 3.12.1 0 11/19/2002
Title: LOADS CONTROL PROGRAM CRANE TRAVEL-SPENT FUEL POOL STORAGE POOL

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 3.12.2 0 11/19/2002
Title: LOADS CONTROL PROGRAM HEAVY LOADS REQUIREMENTS

TEXT 3.12.3 0 11/19/2002
Title: LOADS CONTROL PROGRAM LIGHT LOADS REQUIREMENT

TEXT B3.0 0 11/19/2002
Title: APPLICABILITY BASES TECHNICAL REQUIREMENT FOR OPERATION (TRO) APPLICABILITY

TEXT B3.1.1 0 11/19/2002
Title: REACTIVITY CONTROL SYSTEMS BASES ANTICIPATED TRANSIENT WITHOUT SCRAM ALTERNATE ROD INJECTION (ATWS-ARI) INSTRUMENTATION

TEXT B3.1.2 0 11/19/2002
Title: REACTIVITY CONTROL SYSTEMS BASES CONTROL ROD DRIVE (CRD) HOUSING SUPPORT

TEXT B3.1.3 1 03/10/2005
Title: REACTIVITY CONTROL SYSTEMS BASES CONTROL ROD BLOCK INSTRUMENTATION

TEXT B3.1.4 0 11/19/2002
Title: REACTIVITY CONTROL SYSTEMS BASES CONTROL ROD SCRAM ACCUMULATORS INSTRUMENTATION AND CHECK VALVE

TEXT B3.2.1 0 11/19/2002
Title: CORE OPERATING LIMITS BASES CORE OPERATING LIMITS REPORT (COLR)

TEXT B3.3.1 0 11/19/2002
Title: INSTRUMENTATION BASES RADIATION MONITORING INSTRUMENTATION

TEXT B3.3.2 0 11/19/2002
Title: INSTRUMENTATION BASES SEISMIC MONITORING INSTRUMENTATION

TEXT B3.3.3 1 02/04/2005
Title: INSTRUMENTATION BASES METEOROLOGICAL MONITORING INSTRUMENTATION

TEXT B3.3.4 1 07/06/2005
Title: INSTRUMENTATION BASES TRM POST ACCIDENT MONITORING (PAM) INSTRUMENTATION

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT B3.3.5 0 11/19/2002
Title: INSTRUMENTATION BASES THIS PAGE INTENTIONALLY LEFT BLANK

TEXT B3.3.6 3 10/19/2005
Title: INSTRUMENTATION BASES TRM ISOLATION ACTUATION INSTRUMENTATION

TEXT B3.3.7 0 11/19/2002
Title: INSTRUMENTATION BASES MAIN TURBINE OVERSPEED PROTECTION SYSTEM

TEXT B3.3.8 1 10/22/2003
Title: INSTRUMENTATION BASES TRM REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

TEXT B3.3.9 1 11/22/2004
Title: INSTRUMENTATION BASES LPRM UPSCALE ALARM INSTRUMENTATION

TEXT B3.3.10 0 11/19/2002
Title: INSTRUMENTATION BASES REACTOR RECIRCULATION PUMP MG SET STOPS

TEXT B3.3.11 1 10/22/2003
Title: INSTRUMENTATION BASES MVP ISOLATION INSTRUMENTATION

TEXT B3.4.1 0 11/19/2002
Title: REACTOR COOLANT SYSTEM BASES REACTOR COOLANT SYSTEM CHEMISTRY

TEXT B3.4.2 0 11/19/2002
Title: REACTOR COOLANT SYSTEM BASES STRUCTURAL INTEGRITY

TEXT B3.4.3 0 11/19/2002
Title: REACTOR COOLANT SYSTEM BASES HIGH/LOW PRESSURE INTERFACE LEAKAGE MONITOR

TEXT B3.4.4 0 11/19/2002
Title: REACTOR COOLANT SYSTEM BASES REACTOR RECIRCULATION FLOW AND ROD LINE LIMIT

TEXT B3.4.5 0 11/19/2002
Title: REACTOR COOLANT SYSTEM BASES REACTOR VESSEL MATERIALS

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT B3.5.1 0 11/19/2002
Title: ECCS AND RCIC BASES ADS MANUAL INHIBIT

TEXT B3.5.2 0 11/19/2002
Title: ECCS AND RCIC BASES ECCS AND RCIC SYSTEM MONITORING INSTRUMENTATION

TEXT B3.5.3 0 11/19/2002
Title: ECCS AND RCIC BASES LONG TERM NITROGEN SUPPLY TO ADS

TEXT B3.6.1 0 11/19/2002
Title: CONTAINMENT BASES VENTING OR PURGING

TEXT B3.6.2 0 11/19/2002
Title: CONTAINMENT BASES SUPPRESSION CHAMBER-TO-DRYWELL VACUUM BREAKER POSITION INDICATION

TEXT B3.6.3 0 11/19/2002
Title: CONTAINMENT BASES SUPPRESSION POOL ALARM INSTRUMENTATION

TEXT B3.6.4 1 12/14/2004
Title: CONTAINMENT BASES PRIMARY CONTAINMENT CLOSED SYSTEM BOUNDARIES

TEXT B3.7.1 0 11/19/2002
Title: PLANT SYSTEMS BASES EMERGENCY SERVICE WATER SYSTEM (SHUTDOWN)

TEXT B3.7.2 0 11/19/2002
Title: PLANT SYSTEMS BASES ULTIMATE HEAT SINK (UHS) GROUND WATER LEVEL

TEXT B3.7.3.1 0 11/19/2002
Title: PLANT SYSTEMS BASES FIRE SUPPRESSION WATER SUPPLY SYSTEM

TEXT B3.7.3.2 1 08/24/2005
Title: PLANT SYSTEMS BASES SPRAY AND SPRINKLER SYSTEMS

TEXT B3.7.3.3 0 11/19/2002
Title: PLANT SYSTEMS BASES CO2 SYSTEMS

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT B3.7.3.4 0 11/19/2002
Title: PLANT SYSTEMS BASES HALON SYSTEMS

TEXT B3.7.3.5 0 11/19/2002
Title: PLANT SYSTEMS BASES FIRE HOSE STATIONS

TEXT B3.7.3.6 0 11/19/2002
Title: PLANT SYSTEMS BASES YARD FIRE HYDRANTS AND HYDRANT HOSE HOUSES

TEXT B3.7.3.7 0 11/19/2002
Title: PLANT SYSTEMS BASES FIRE RATED ASSEMBLIES

TEXT B3.7.3.8 1 01/12/2004
Title: PLANT SYSTEMS BASES FIRE DETECTION INSTRUMENTATION

TEXT B3.7.4 0 11/19/2002
Title: PLANT SYSTEMS BASES SOLID RADWASTE SYSTEM

TEXT B3.7.5.1 0 11/19/2002
Title: PLANT SYSTEMS BASES MAIN CONDENSER OFFGAS HYDROGEN MONITOR

TEXT B3.7.5.2 0 11/19/2002
Title: PLANT SYSTEMS BASES MAIN CONDENSER OFFGAS EXPLOSIVE GAS MIXTURE

TEXT B3.7.5.3 0 11/19/2002
Title: PLANT SYSTEMS BASES LIQUID HOLDUP TANKS

TEXT B3.7.6 1 03/01/2005
Title: PLANT SYSTEMS BASES ESSW PUMPHOUSE VENTILATION

TEXT B3.7.7 0 11/19/2002
Title: PLANT SYSTEMS BASES MAIN CONDENSER OFFGAS PRETREATMENT LOGARITHMIC RADIATION MONITORING INSTRUMENTATION

TEXT B3.7.8 1 12/14/2004
Title: PLANT SYSTEMS BASES SNUBBERS

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT B3.7.9 1 12/14/2004
Title: PLANT SYSTEMS BASES CONTROL STRUCTURE HVAC

TEXT B3.7.10 1 12/14/2004
Title: PLANT SYSTEMS BASES SPENT FUEL STORAGE POOLS

TEXT B3.8.1 1 02/04/2005
Title: ELECTRICAL POWER BASES PRIMARY CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

TEXT B3.8.2.1 0 11/19/2002
Title: ELECTRICAL POWER BASES MOTOR OPERATED VALVES (MOV) THERMAL OVERLOAD PROTECTION - CONTINUOUS

TEXT B3.8.2.2 1 09/17/2004
Title: ELECTRICAL POWER BASES MOTOR OPERATED VALVES (MOV) THERMAL OVERLOAD PROTECTION - AUTOMATIC

TEXT B3.8.3 0 11/19/2002
Title: ELECTRICAL POWER BASES DIESEL GENERATOR (DG) MAINTENANCE ACTIVITIES

TEXT B3.8.4 0 11/19/2002
Title: ELECTRICAL POWER BASES 24 VDC ELECTRICAL POWER SUBSYSTEM

TEXT B3.8.5 0 11/19/2002
Title: ELECTRICAL POWER BASES DEGRADED VOLTAGE PROTECTION

TEXT B3.8.6 1 02/04/2005
Title: ELECTRICAL POWER BASES EMERGENCY SWITCHGEAR ROOM COOLING

TEXT B3.9.1 0 11/19/2002
Title: REFUELING OPERATIONS BASES DECAY TIME

TEXT B3.9.2 0 11/19/2002
Title: REFUELING OPERATIONS BASES COMMUNICATIONS

TEXT B3.9.3 0 11/19/2002
Title: REFUELING OPERATIONS BASES REFUELING PLATFORM

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT B3.10.1 0 11/19/2002
Title: MISCELLANEOUS BASES SEALED SOURCE CONTAMINATION

TEXT B3.10.2 0 11/19/2002
Title: MISCELLANEOUS BASES SHUTDOWN MARGIN TEST RPS INSTRUMENTATION

TEXT B3.10.3 0 11/19/2002
Title: MISCELLANEOUS BASES INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

TEXT B3.10.4 0 11/19/2002
Title: MISCELLANEOUS BASES LEADING EDGE FLOW METER (LEFM)

TEXT B3.11.1.1 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES LIQUID EFFLUENTS CONCENTRATION

TEXT B3.11.1.2 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES LIQUID EFFLUENTS DOSE

TEXT B3.11.1.3 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES LIQUID WASTE TREATMENT SYSTEM

TEXT B3.11.1.4 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES LIQUID RADWASTE EFFLUENT MONITORING INSTRUMENTATION

TEXT B3.11.1.5 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES RADIOACTIVE LIQUID PROCESS MONITORING INSTRUMENTATION

TEXT B3.11.2.1 1 12/14/2004
Title: RADIOACTIVE EFFLUENTS BASES DOSE RATE

TEXT B3.11.2.2 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES DOSE - NOBLE GASES

TEXT B3.11.2.3 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES DOSE - IODINE, TRITIUM, AND RADIONUCLIDES IN PARTICULATES FORM

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT B3.11.2.4 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES GASEOUS RADWASTE TREATMENT SYSTEM

TEXT B3.11.2.5 3 05/20/2005
Title: RADIOACTIVE EFFLUENTS BASES VENTILATION EXHAUST TREATMENT SYSTEM

TEXT B3.11.2.6 1 01/27/2004
Title: RADIOACTIVE EFFLUENTS BASES RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

TEXT B3.11.3 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES TOTAL DOSE

TEXT B3.11.4.1 1 12/14/2004
Title: RADIOACTIVE EFFLUENTS BASES MONITORING PROGRAM

TEXT B3.11.4.2 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES LAND USE CENSUS

TEXT B3.11.4.3 0 11/19/2002
Title: RADIOACTIVE EFFLUENTS BASES INTERLABORATORY COMPARISON PROGRAM

TEXT B3.12.1 0 11/19/2002
Title: LOADS CONTROL PROGRAM BASES CRANE TRAVEL-SPENT FUEL STORAGE POOL

TEXT B3.12.2 0 11/19/2002
Title: LOADS CONTROL PROGRAM BASES HEAVY LOADS REQUIREMENTS

TEXT B3.12.3 0 11/19/2002
Title: LOADS CONTROL PROGRAM BASES LIGHT LOADS REQUIREMENTS

TEXT 4.1 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS ORGANIZATION

TEXT 4.2 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS REPORTABLE EVENT ACTION

Manual Name: TRM1

Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

TEXT 4.3 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS SAFETY LIMIT VIOLATION

TEXT 4.4 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS PROCEDURES & PROGRAMS

TEXT 4.5 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS REPORTING REQUIREMENTS

TEXT 4.6 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS RADIATION PROTECTION PROGRAM

TEXT 4.7 0 08/31/1998
Title: ADMINISTRATIVE CONTROLS TRAINING

TRM1 text LOES
10/27/05

3.2 Core Operating Limits Report (COLR)

3.2.1 Core Operating Limits Report (COLR)

TRO 3.2.1 The Core Operating Limits specified in the attached COLR shall be met.

APPLICABILITY: Specified in the referenced Technical Specifications.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Core Operating Limits not met.	A.1 Perform action(s) described in referenced Technical Specification.	Specified in referenced Technical Specifications.

TECHNICAL REQUIREMENT SURVEILLANCE

SURVEILLANCE	FREQUENCY
----------NOTE---------- No associated Surveillances. Surveillances are implemented in the applicable Technical Specifications. ----------	N/A

Susquehanna SES
Unit 1 Cycle 14A

CORE OPERATING LIMITS REPORT

Nuclear Fuels
Engineering

October 2005

CORE OPERATING LIMITS REPORT
REVISION DESCRIPTION INDEX

Rev. No.	Affected Sections	Description/Purpose of Revision
0	ALL	Issuance of this COLR is in support of Unit 1 Cycle 14A operation.

SUSQUEHANNA STEAM ELECTRIC STATION
Unit 1 Cycle 14A
CORE OPERATING LIMITS REPORT

Table of Contents

1.0 INTRODUCTION

This CORE OPERATING LIMITS REPORT (COLR) for Susquehanna Unit 1 Cycle 14A is prepared in accordance with the requirements of Susquehanna Unit 1, Technical Specification 5.6.5. As required by Technical Specifications 5.6.5, core shutdown margin, the core operating limits, APRM setpoints, and OPRM setpoints presented herein were developed using NRC-approved methods and are established such that all applicable limits of the plant safety analysis are met.

2.0 DEFINITIONS

Terms used in this COLR but not defined in Section 1.0 of the Technical Specifications or Section 1.1 of the Technical Requirements Manual are provided below.

2.1 The AVERAGE BUNDLE EXPOSURE shall be equal to the total energy produced by the bundle divided by the total initial weight of uranium in the fuel bundle.

2.2 The AVERAGE PLANAR EXPOSURE at a specified height shall be equal to the total energy produced per unit length at the specified height divided by the total initial weight of uranium per unit length at that height.

2.3 The FRACTION OF LIMITING POWER DENSITY (FLPD) shall be the LHGR existing at a given height divided by the applicable LHGR for APRM Setpoint Limit for that bundle type.

2.4 The FRACTION OF RATED THERMAL POWER (FRTP) shall be the measured THERMAL POWER divided by the RATED THERMAL POWER.

2.5 FDLRX is the ratio of the maximum LHGR calculated by the core monitoring system for each fuel bundle divided by the LHGR limit for the applicable fuel bundle type.

2.6 MFLCPR is the ratio of the applicable MCPR operating limit for the applicable fuel bundle type divided by the MCPR calculated by the core monitoring system for each fuel bundle.

2.7 MAPRAT is the ratio of the maximum APLHGR calculated by the core monitoring system for each fuel bundle divided by the APLGHR limit for the applicable fuel bundle type.

2.8 FDLRC is the ratio of the maximum LHGR calculated by the core monitoring system for each fuel bundle divided by the LHGR for APRM Setpoint Limit for the applicable fuel bundle type.

2.9 OPRM is the Oscillation Power Range Monitor. The Oscillation Power Range Monitor (OPRM) will reliably detect and suppress anticipated stability related power oscillations while providing a high degree of confidence that the MCPR safety limit is not violated

2.10 N_P is the OPRM setpoint for the number of consecutive confirmations of oscillation half-cycles that will be considered evidence of a stability related power oscillation.

2.11 S_P is the OPRM trip setpoint for the peak to average OPRM signal.

2.12 F_P is the core flow below which the OPRM RPS trip is activated.

3.0 SHUTDOWN MARGIN

3.1 Technical Specification Reference

Technical Specification 3.1.1

3.2 Description

The SHUTDOWN MARGIN shall be equal to or greater than:

a) 0.38% Δk/k with the highest worth rod analytically determined

OR

b) 0.28% Δk/k with the highest worth rod determined by test

Since core reactivity will vary during the cycle as a function of fuel depletion and poison burnup, Beginning of Cycle (BOC) SHUTDOWN MARGIN (SDM) tests must also account for changes in core reactivity during the cycle. Therefore, the SDM measured at BOC must be equal to or greater than the applicable requirement from either 3.2.a or 3.2.b plus an adder, "R." The adder, "R," is the difference between the calculated value of maximum core reactivity (that is, minimum SDM) during the operating cycle and the calculated BOC core reactivity. If the value of "R" is zero (that is, BOC is the most reactive point in the cycle) no correction to the BOC measured value is required.

The SHUTDOWN MARGIN limits provided in 3.2a and 3.2b are applicable in MODES 1, 2, 3, 4, and 5. This includes core shuffling.

4.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

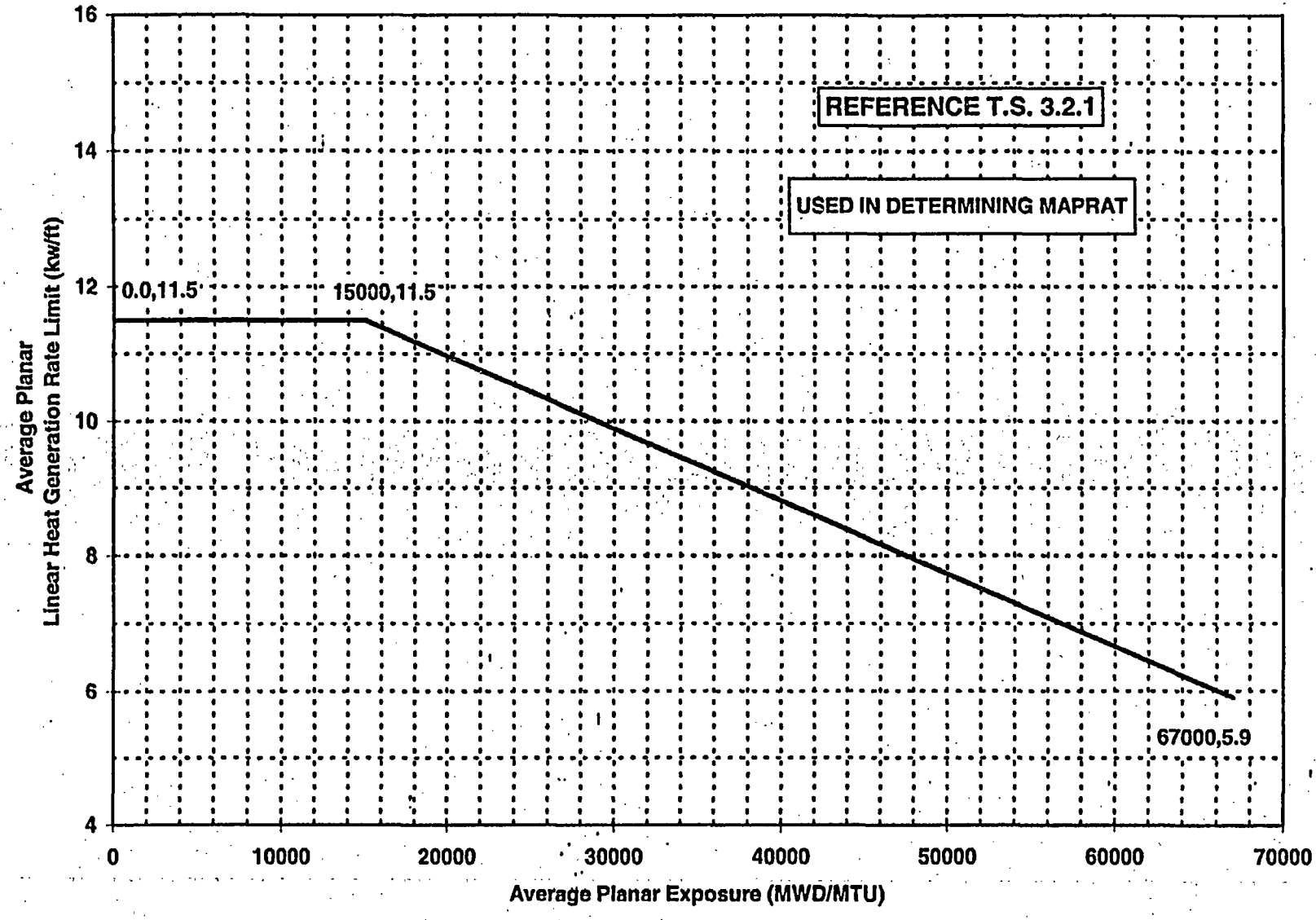
4.1 Technical Specification Reference

Technical Specification 3.2.1

4.2 Description

The APLHGRs for ATRIUM™-10 fuel shall not exceed the limit shown in Figure 4.2-1.

The APLHGR limits in Figure 4.2-1 are valid for Main Turbine Bypass Operable and Inoperable and EOC-RPT Operable and Inoperable in Two Loop operation. The APLHGR limits for Single Loop operation are provided in Section 8.0.



AVERAGE PLANAR LINEAR HEAT GENERATION RATE LIMIT VERSUS
AVERAGE PLANAR EXPOSURE TWO LOOP OPERATION
ATRIUM™-10 FUEL
FIGURE 4.2-1

5.0 MINIMUM CRITICAL POWER RATIO (MCPR)

5.1 Technical Specification Reference

Technical Specification 3.2.2, 3.7.6, and 3.3.4.1

5.2 Description

The MCPR limit is specified as a function of core power, core flow, average scram insertion time per Section 5.3 and plant equipment operability status. The MCPR limits for all fuel types (ATRIUM™-10) shall be the greater of the Flow-Dependent or the Power-Dependent MCPR, depending on the applicable equipment operability status.

a) EOC-RPT and Main Turbine Bypass Operable

Figure 5.2-1: Flow-Dependent MCPR value determined from BOC to EOC

Figure 5.2-2: Power-Dependent MCPR value determined from BOC to EOC

b) Main Turbine Bypass Inoperable / EOC-RPT Operable

Figure 5.2-3: Flow-Dependent MCPR value determined from BOC to EOC

Figure 5.2-4: Power-Dependent MCPR value determined from BOC to EOC

c) EOC-RPT Inoperable / Main Turbine Bypass Operable

Figure 5.2-5: Flow-Dependent MCPR value determined from BOC to EOC

Figure 5.2-6: Power-Dependent MCPR value determined from BOC to EOC

The MCPR limits in Figures 5.2-1 through 5.2-6 are valid for Two Loop operation.

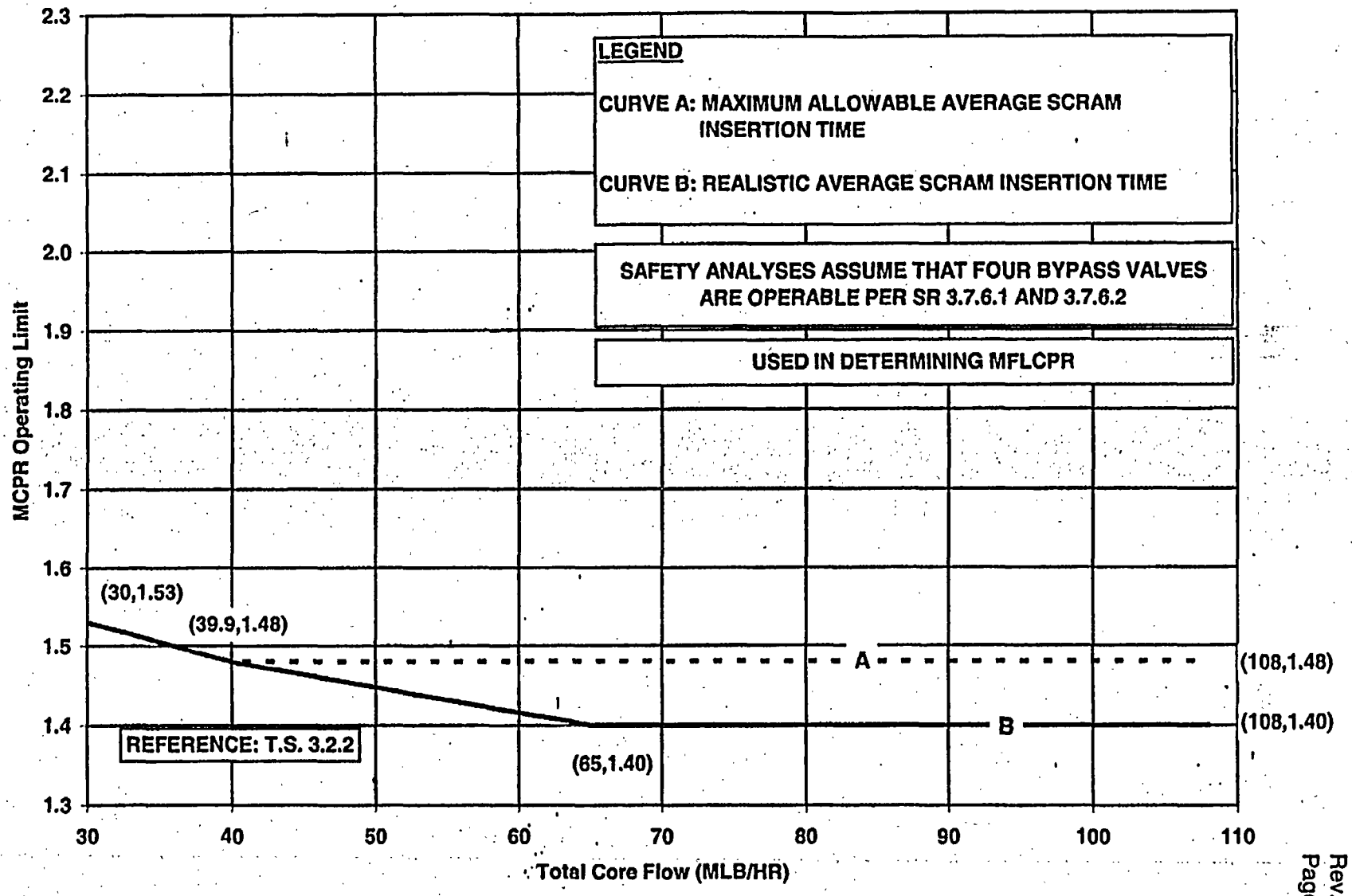
The MCPR limits for Single Loop operation are provided in Section 8.0.

5.3 Average Scram Time Fraction

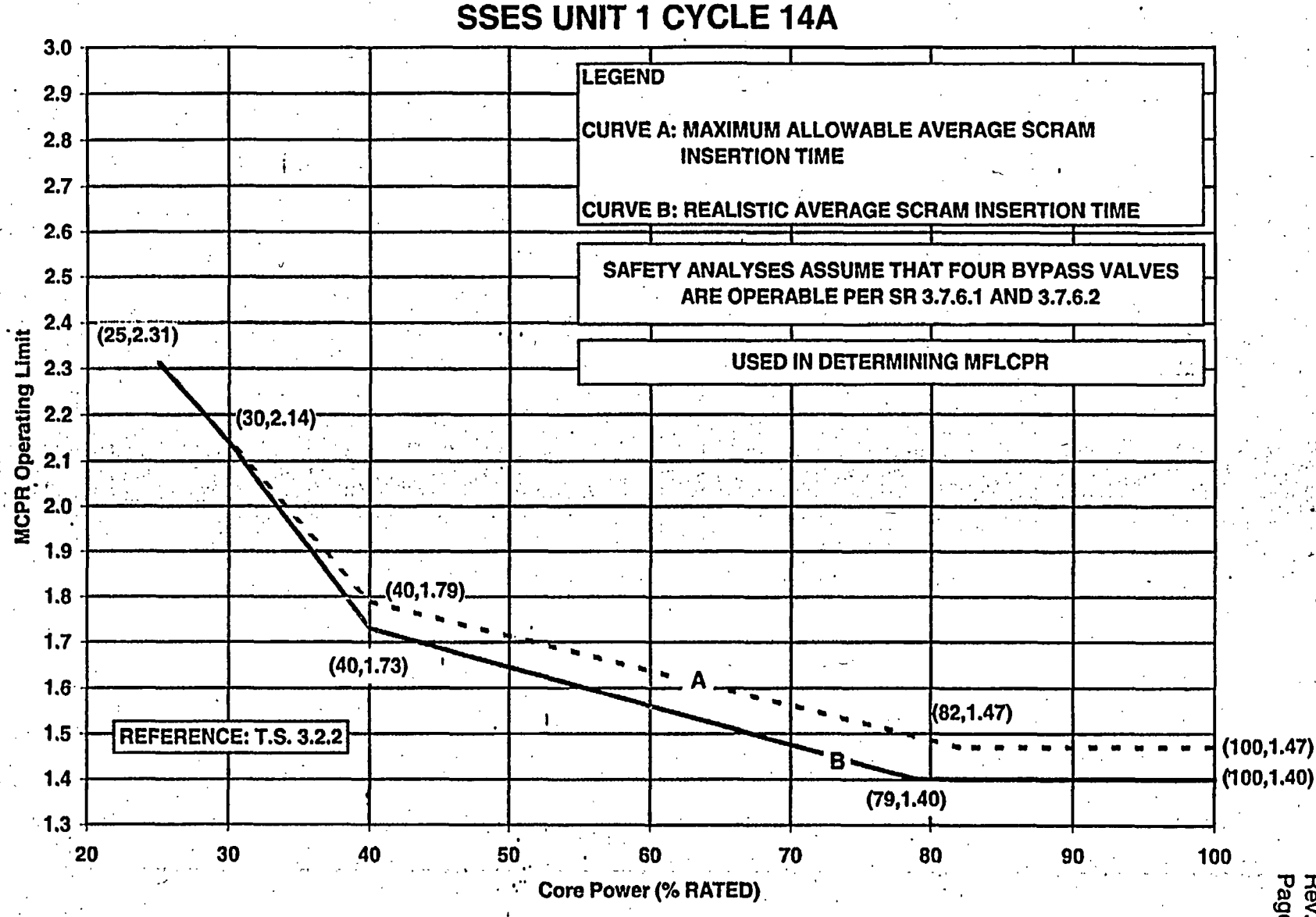
Table 5.3-1 provides the relationship between average scram time to control rod position and scram time fraction. The evaluation of scram insertion time data, as it relates to the attached table should be performed per Reactor Engineering procedures.

EOC-RPT and Main Turbine Bypass Operable

SSES UNIT 1 CYCLE 14A

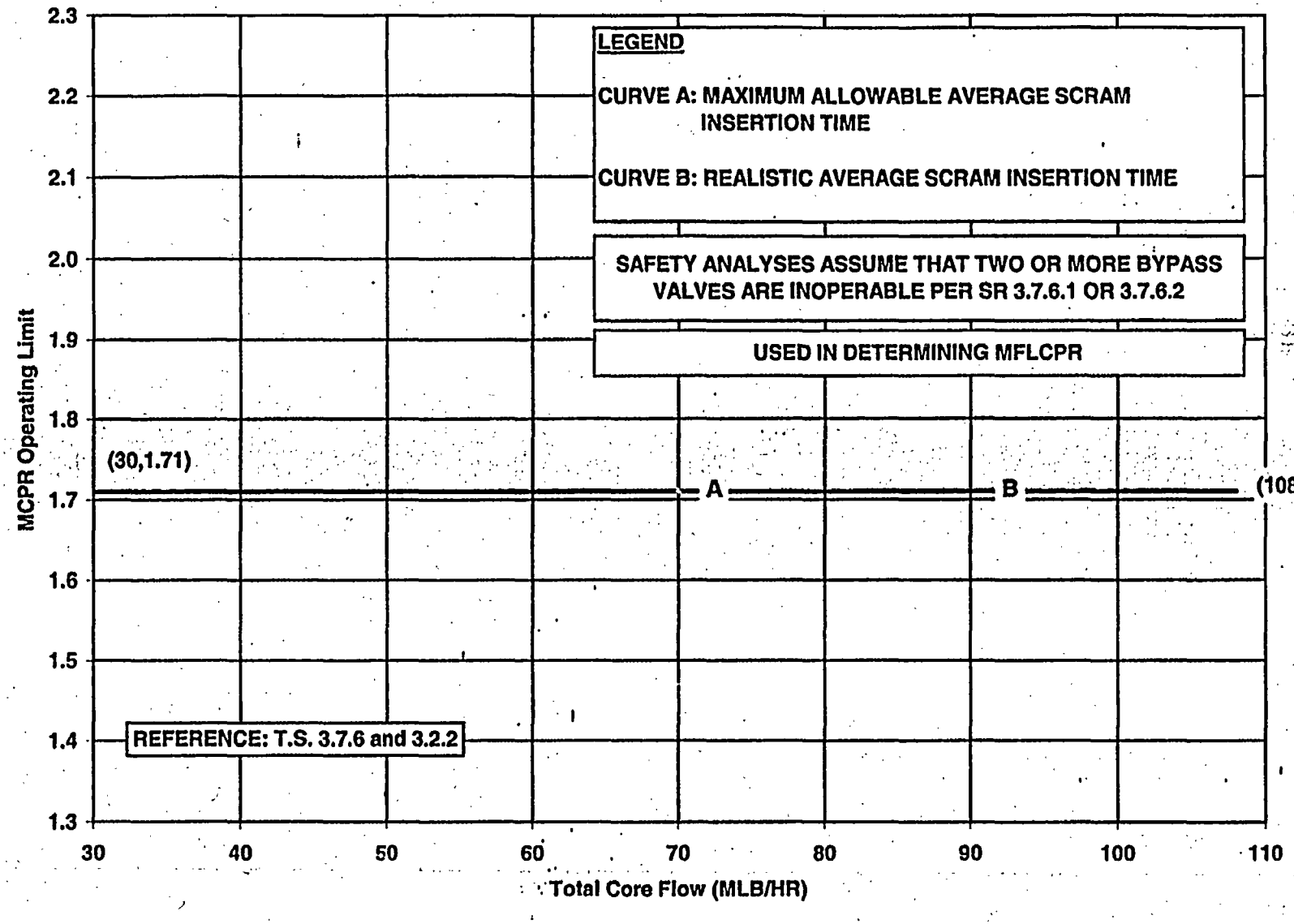


MCPR OPERATING LIMIT VERSUS TOTAL CORE FLOW
EOC-RPT AND MAIN TURBINE BYPASS OPERABLE
TWO LOOP OPERATION (BOC TO EOC)
FIGURE 5.2-1



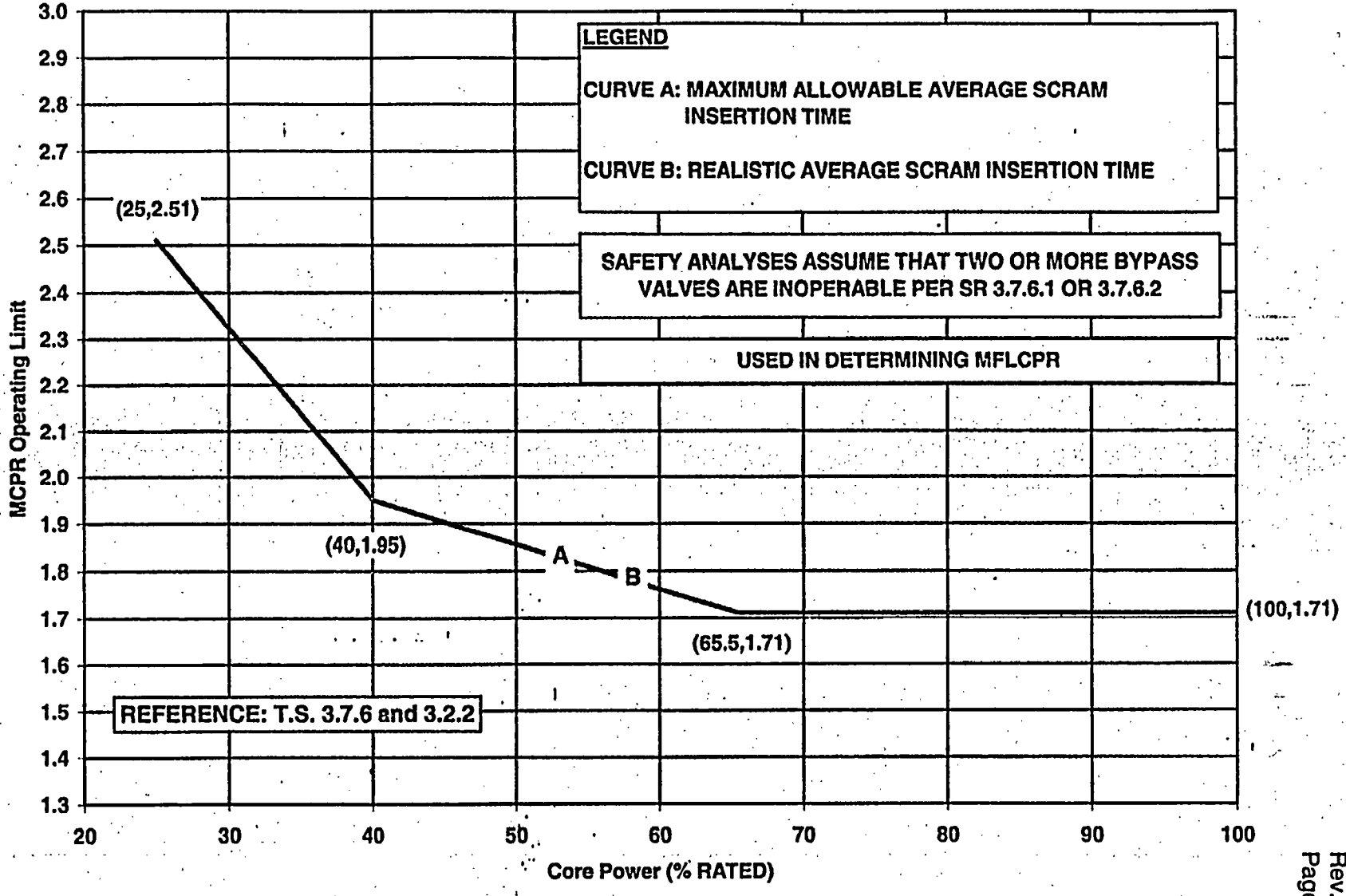
MCPR OPERATING LIMIT VERSUS CORE POWER
EOC-RPT AND MAIN TURBINE BYPASS OPERABLE
TWO LOOP OPERATION (BOC TO EOC)
FIGURE 5.2-2

Main Turbine Bypass Inoperable / EOC-RPT Operable



MCPR OPERATING LIMIT VERSUS TOTAL CORE FLOW
MAIN TURBINE BYPASS INOPERABLE / EOC-RPT OPERABLE
TWO LOOP OPERATION (BOC TO EOC)
FIGURE 5.2-3

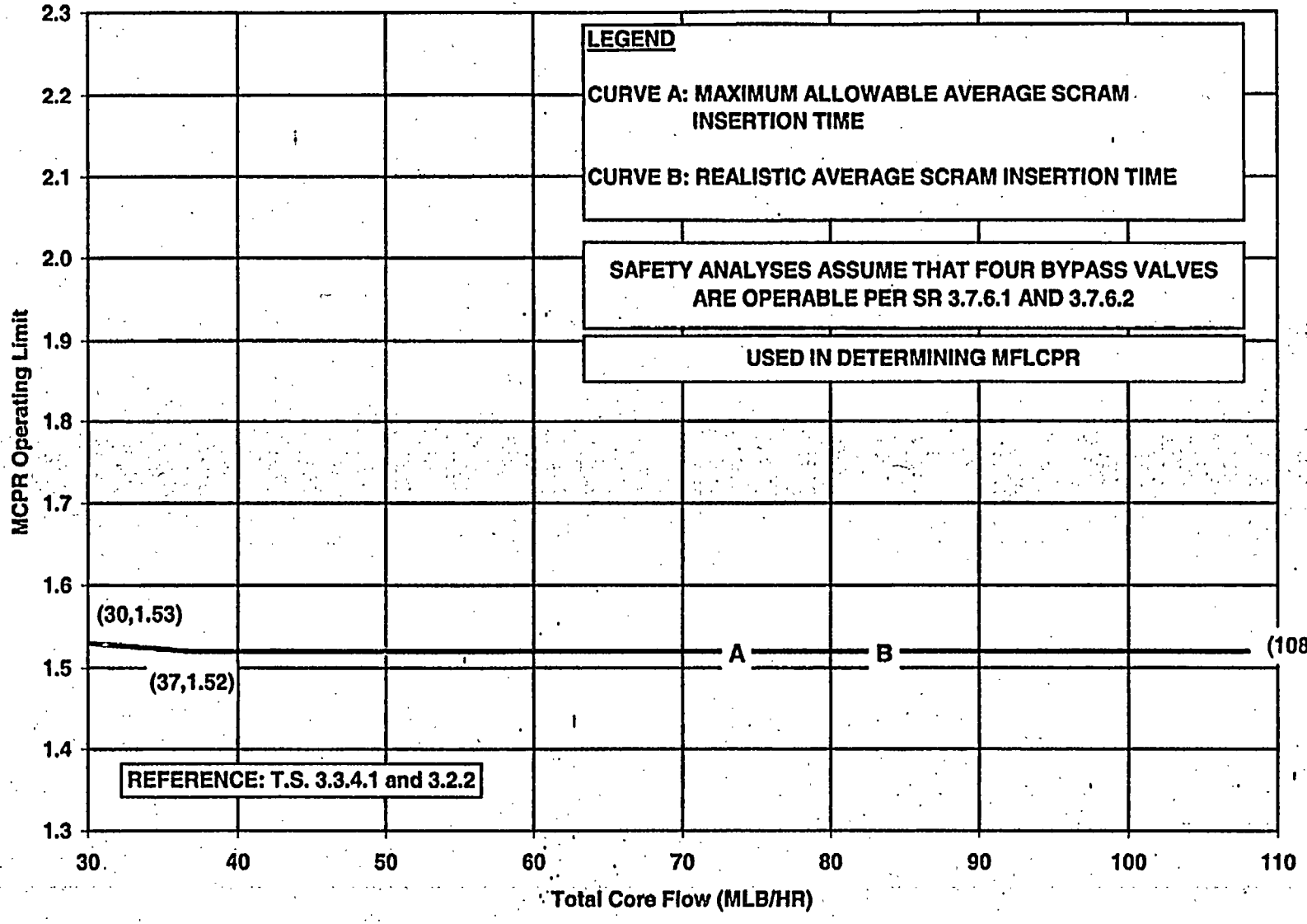
SSES UNIT 1 CYCLE 14A



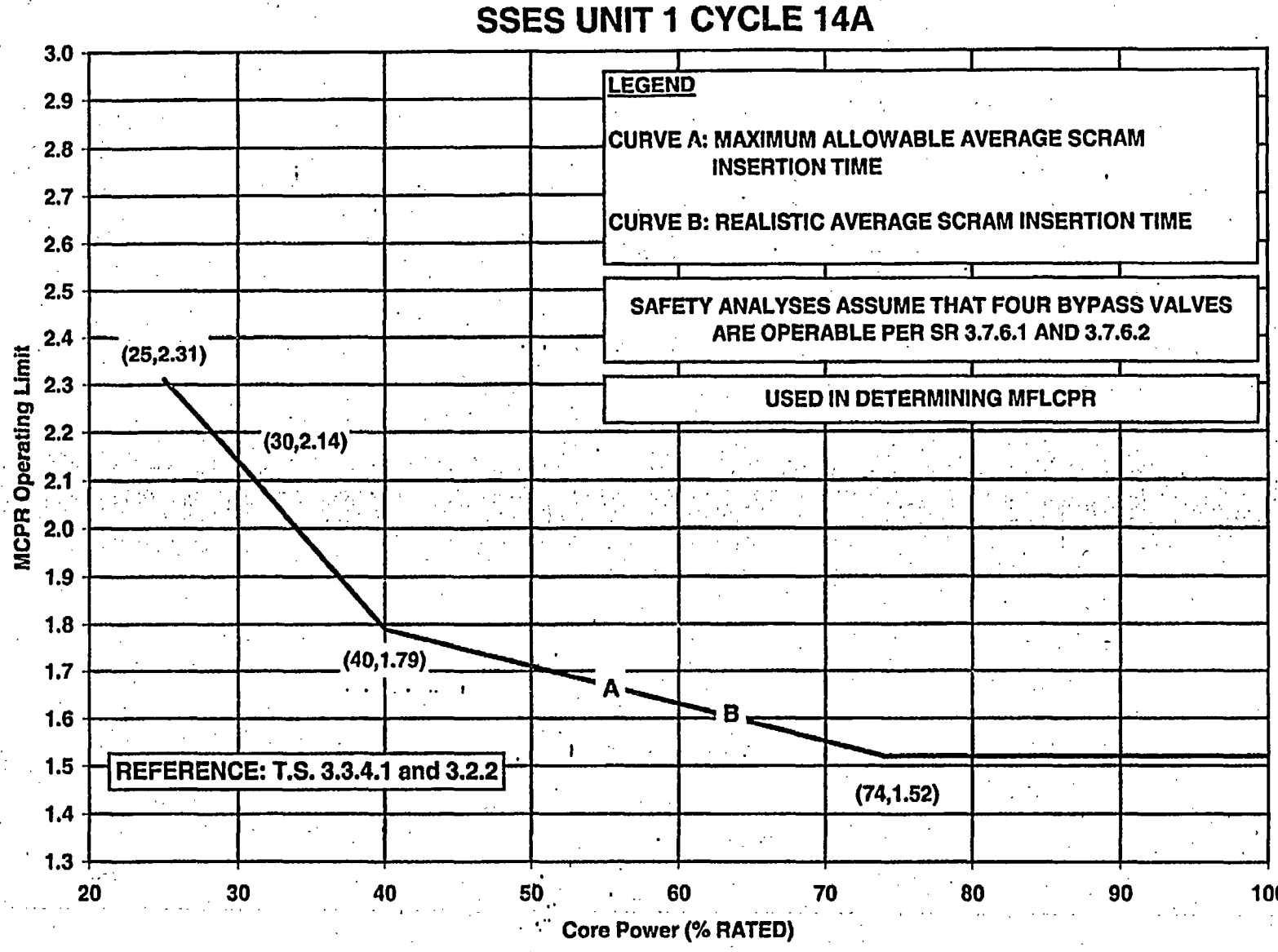
MCPR OPERATING LIMIT VERSUS CORE POWER
MAIN TURBINE BYPASS INOPERABLE / EOC-RPT OPERABLE
TWO LOOP OPERATION (BOC to EOC)
FIGURE 5.2-4

EOC-RPT Inoperable / Main Turbine Bypass Operable

SSES UNIT 1 CYCLE 14A



MCPR OPERATING LIMIT VERSUS TOTAL CORE FLOW
EOC-RPT INOPERABLE / MAIN TURBINE BYPASS OPERABLE
TWO LOOP OPERATION (BOC TO EOC)
FIGURE 5.2-5



MCPR OPERATING LIMIT VERSUS CORE POWER
EOC-RPT INOPERABLE / MAIN TURBINE BYPASS OPERABLE
TWO LOOP OPERATION (BOC to EOC)
FIGURE 5.2-6

Table 5.3-1

Average Scram Time Fraction Table For Use With Scram Time Dependent MCPR Operating Limits

Control Rod Position	Average Scram Time to Position (seconds)					
45	0.470	0.480	0.490	0.500	0.510	0.520
39	0.630	0.676	0.722	0.768	0.814	0.860
25	1.500	1.582	1.664	1.746	1.828	1.910
5	2.700	2.848	2.996	3.144	3.292	3.440
Scram Time Fraction	0.000	0.200	0.400	0.600	0.800	1.000
Average Scram Insertion Time	Realistic					Maximum Allowable

6.0 LINEAR HEAT GENERATION RATE (LHGR)

6.1 Technical Specification Reference

Technical Specification 3.2.3 and 3.7.6

6.2 Description

The LHGR limits are specified below as a function of Main Turbine Bypass operability for each fuel type as follows:

Main Turbine Bypass Operable

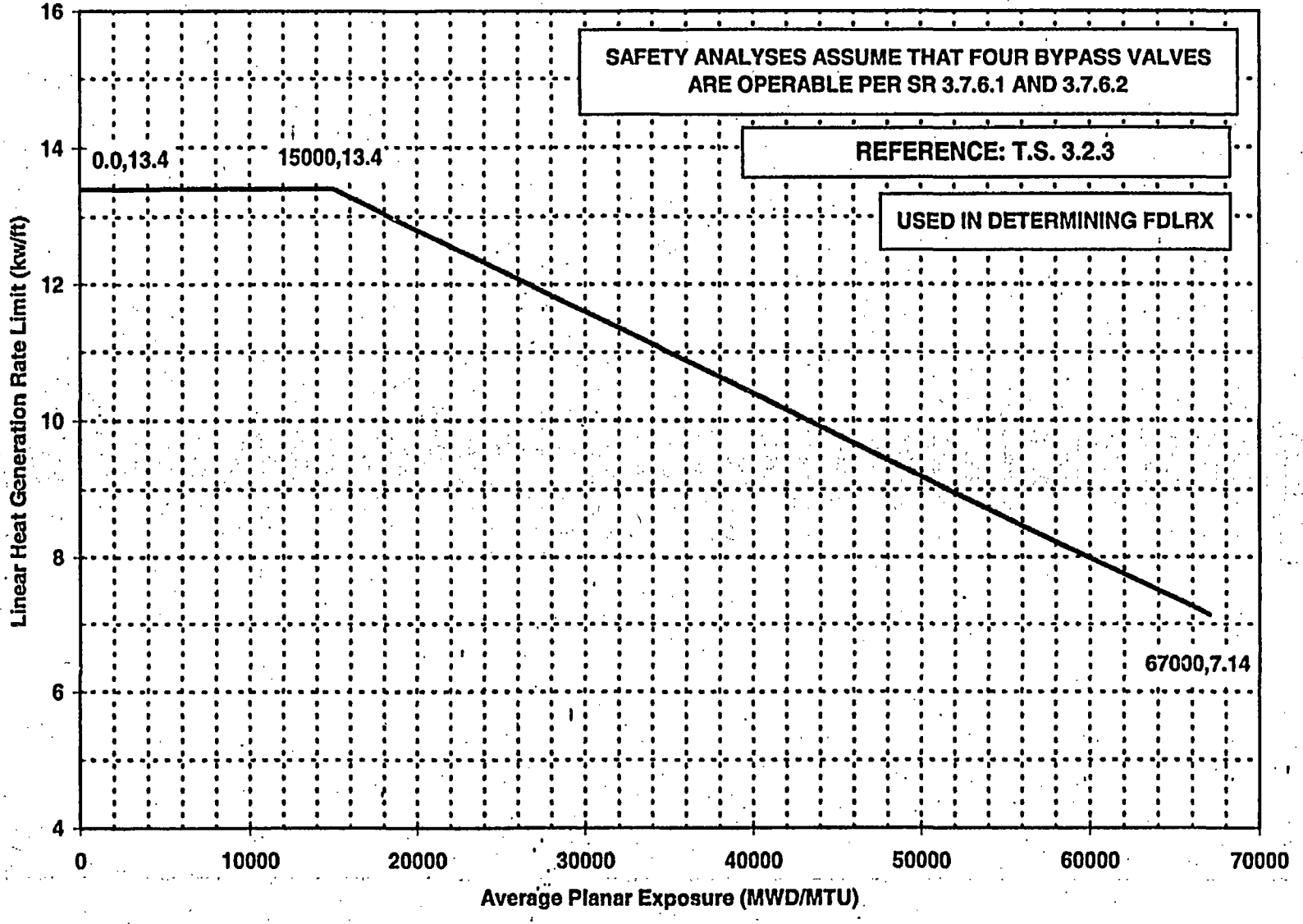
The LHGR for ATRIUM™-10 fuel shall not exceed the LHGR limit determined from Figure 6.2-1.

Main Turbine Bypass Inoperable

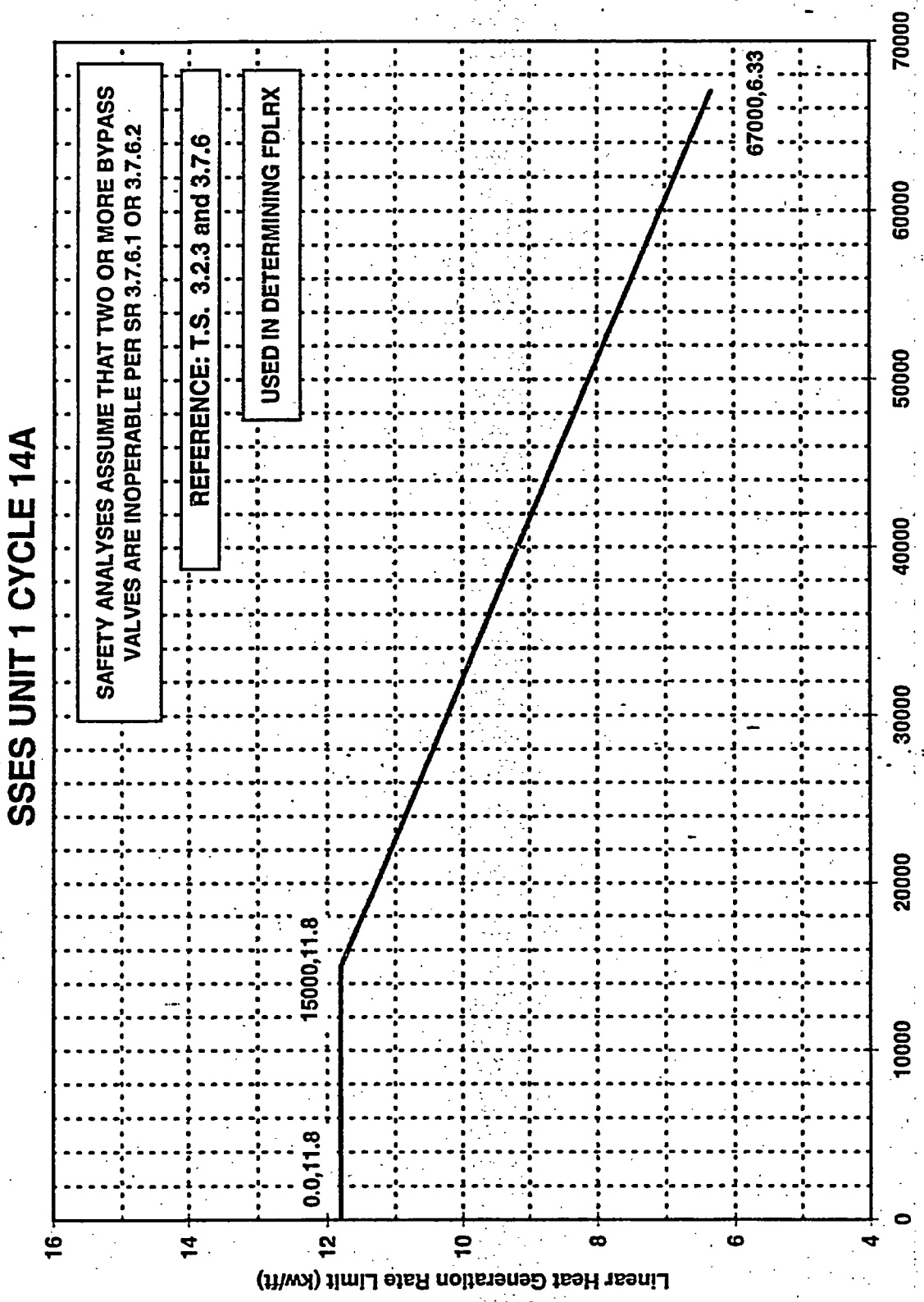
The LHGR for ATRIUM™-10 fuel shall not exceed the LHGR limit determined from Figure 6.2-2.

The LHGR limits in Figures 6.2-1 and 6.2-2 are valid for Two Loop and Single Loop operation.

SSES UNIT 1 CYCLE 14A



LINEAR HEAT GENERATION RATE LIMIT VERSUS AVERAGE PLANAR EXPOSURE
MAIN TURBINE BYPASS OPERABLE
ATRIUM™-10 FUEL
FIGURE 6.2-1



LINEAR HEAT GENERATION RATE LIMIT VERSUS AVERAGE PLANAR EXPOSURE
MAIN TURBINE BYPASS INOPERABLE
ATRIUM™-10 FUEL
FIGURE 6.2-2

7.0 AVERAGE POWER RANGE MONITOR (APRM) GAIN AND SETPOINTS

7.1 Technical Specification Reference

Technical Specification 3.2.4 and 3.3.1.1

7.2 Description

The APRM flow biased simulated thermal power-upscale scram trip setpoint (S) and flow biased neutron flux-upscale control rod block trip setpoint (S_{RB}) shall be established as specified in Table 7.2-1 and Table 7.2-2, including any adjustments per Technical Specification LCO 3.2.4.

Technical Specification LCO 3.2.4 provides an option to adjust the APRM setpoints when MFLPD is greater than FRACTION OF RATED THERMAL POWER (FRTP). The adjustment applies to both the APRM flow biased simulated thermal power-upscale scram trip setpoint and flow biased neutron flux-upscale control rod block trip setpoint for Two Loop and Single Loop operation. The APRM setpoints for Specification 3.2.4 are established in Tables 7.2-1 and 7.2-2.

Table 7.2-1
APRM Setpoint for
Two Loop Operation

Trip Setpoint	Allowable Value
$S \leq (0.58W + 59\%)\ T$	$S \leq (0.58W + 62\%)\ T$[1]
$S_{RB} \leq (0.58W + 50\%)\ T$	$S_{RB} \leq (0.58W + 53\%)\ T$

Table 7.2-2
APRM Setpoint for
Single Loop Operation

Trip Setpoint	Allowable Value
$S \leq (0.58W + 54\%)\ T$	$S \leq (0.58W + 57\%)\ T$[1]
$S_{RB} \leq (0.58W + 45\%)\ T$	$S_{RB} \leq (0.58W + 48\%)\ T$

where: S and S_{RB} are in percent of RATED THERMAL POWER

W = Loop recirculation flow as a percentage of the loop recirculation flow which produces a core flow of 100 million lbs/hr

T = Lowest value of the ratio of FRTP divided by the MFLPD.[2] The FLPD is the actual LHGR divided by the applicable LHGR limit for APRM Setpoints. The LHGR limit for APRM setpoints for ATRIUM™-10 fuel shall be taken from Figure 7.2-1.

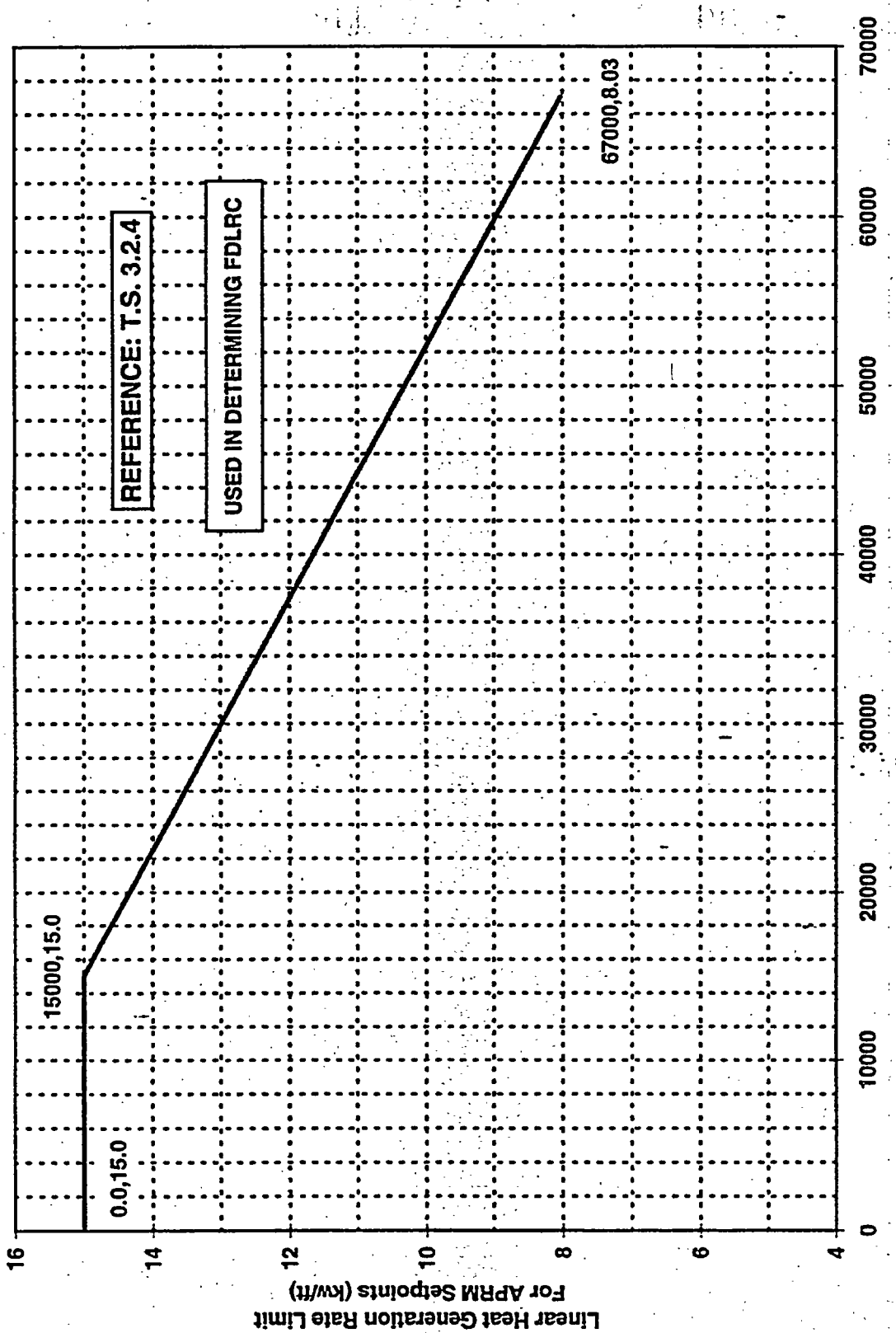
The LHGR for APRM setpoint limits in Figure 7.2-1 are valid for Main Turbine Bypass Operable and Inoperable and EOC-RPT Operable and Inoperable for both Two and Single Loop operation.

For calculated T-values greater than 1.0, a ratio of 1.0 is used in the above equations.

[1] APRM flow biased simulated thermal power-upscale scram allowable value in this table is equal to the value established in Technical Specification 3.3.1.1.

[2] For the calculation of T, the value of MFLPD shall be the maximum value of FDLRC.

SSES UNIT 1 CYCLE 14A



LINEAR HEAT GENERATION RATE LIMIT FOR APRM SETPOINTS VERSUS AVERAGE PLANAR EXPOSURE
ATRIUM™-10 FUEL
FIGURE 7.2-1

8.0 RECIRCULATION LOOPS - SINGLE LOOP OPERATION

8.1 Technical Specification Reference

Technical Specification 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.3.4.1, 3.4.1, and 3.7.6

8.2 Description

APLHGR

The APLHGR limit for ATRIUM™-10 fuel shall be equal to the APLHGR Limit from Figure 8.2-1.

The APLHGR limits in Figure 8.2-1 are valid for Main Turbine Bypass Operable and Inoperable and EOC-RPT Operable and Inoperable in Single Loop operation.

Minimum Critical Power Ratio Limit

The MCPR limit is specified as a function of core power, core flow, and plant equipment operability status. The MCPR limit for all fuel types (ATRIUM™-10) shall be the greater of:

a) Flow-Dependent MCPR value determined from Figure 8.2-2

OR

b) The Power-Dependent MCPR value determined from one of the following figures, as appropriate:

Figure 8.2-3 : EOC-RPT and Main Turbine Bypass Operable from BOC to EOC

Figure 8.2-4 : Main Turbine Bypass Inoperable / EOC-RPT Operable from BOC to EOC

Figure 8.2-5 : EOC-RPT Inoperable / Main Turbine Bypass Operable from BOC to EOC

The MCPR limits in Figures 8.2-2 through 8.2-5 are valid only for Single Loop operation.

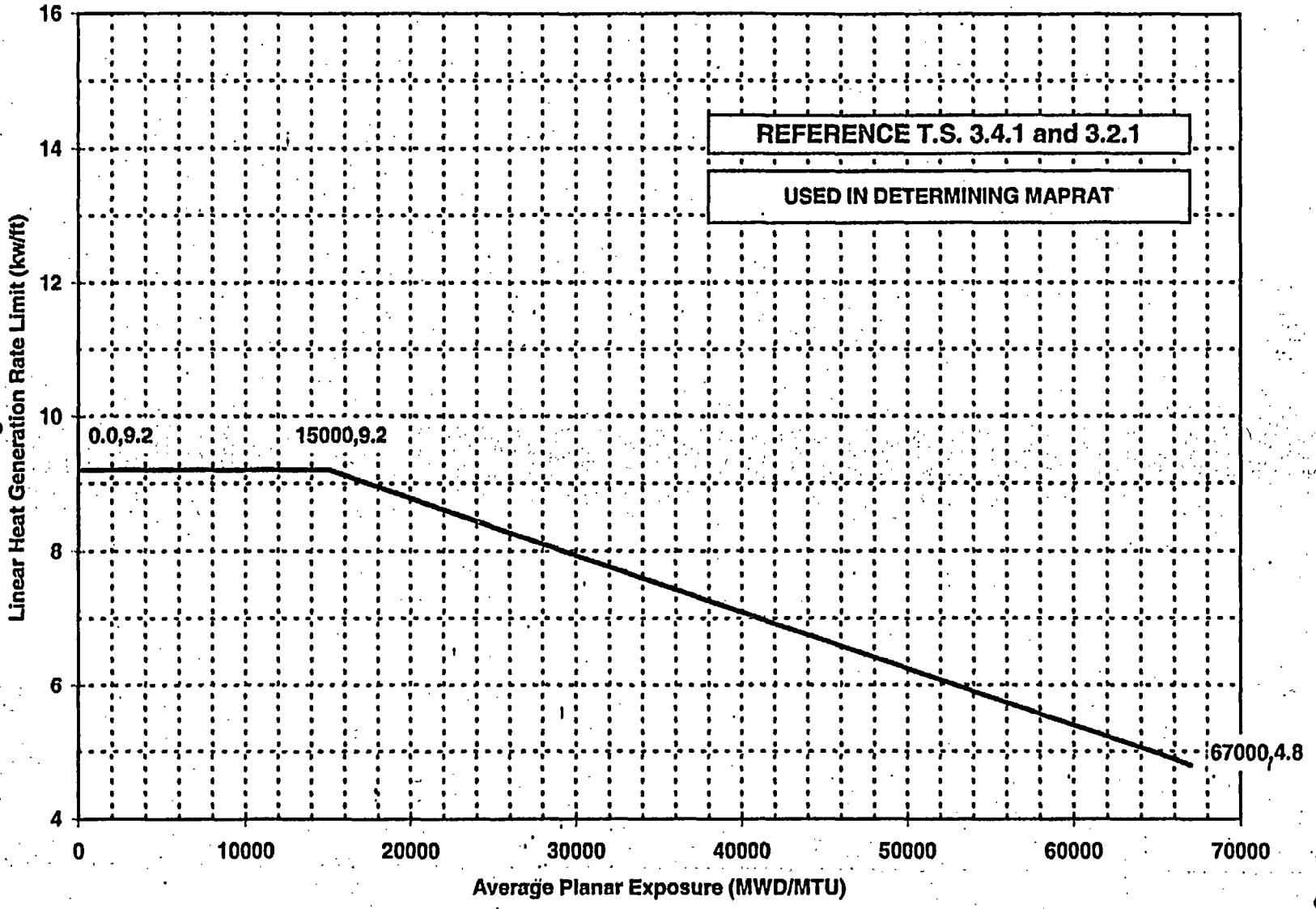
Linear Heat Generation Rate Limit

The LHGR limits for Single Loop Operation are defined in Section 6.0.

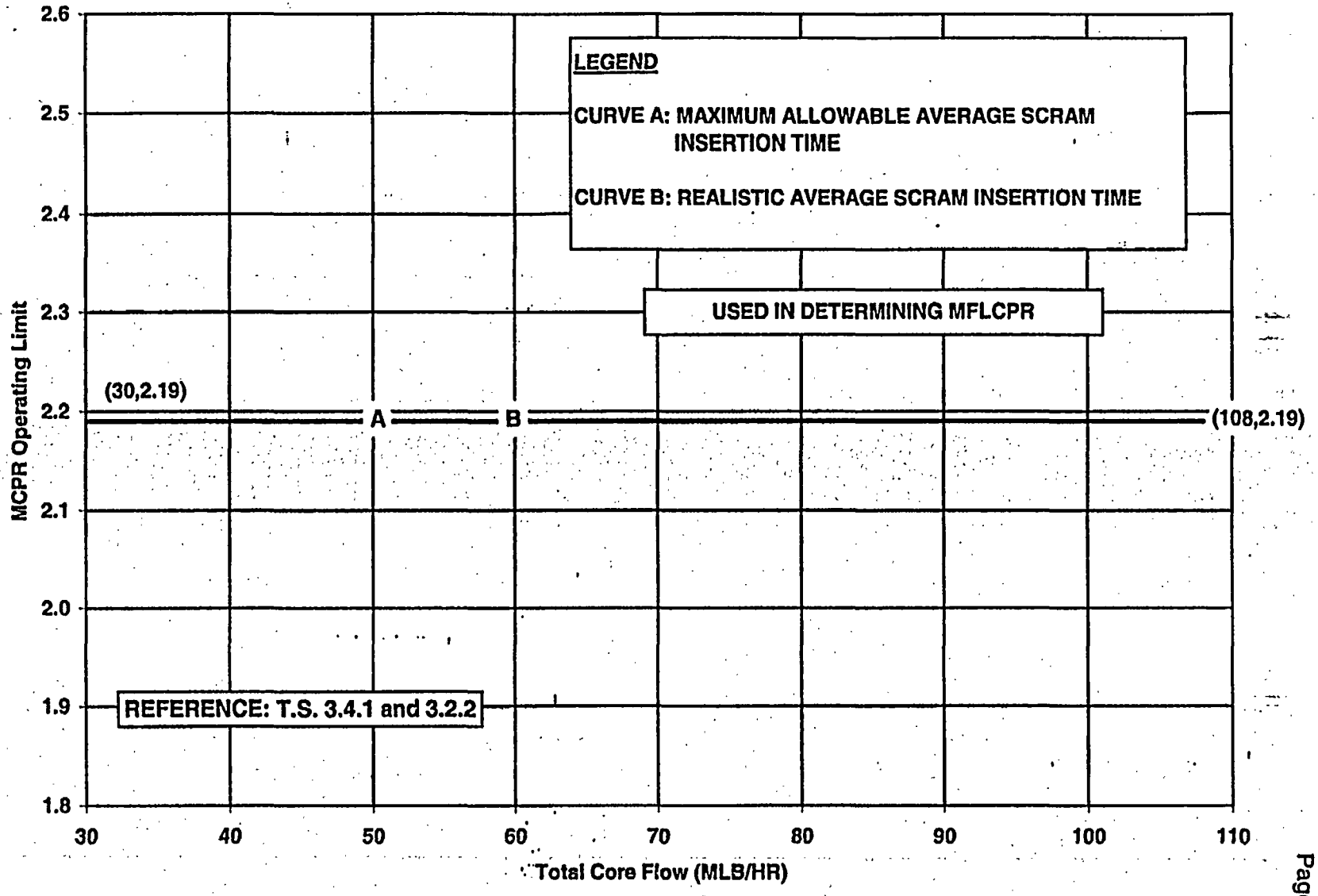
Average Power Range Monitor (APRM) Gain And Setpoints

APRM setpoints and the LHGR limit for APRM setpoints for Single Loop operation are defined in Section 7.0.

SSES UNIT 1 CYCLE 14A

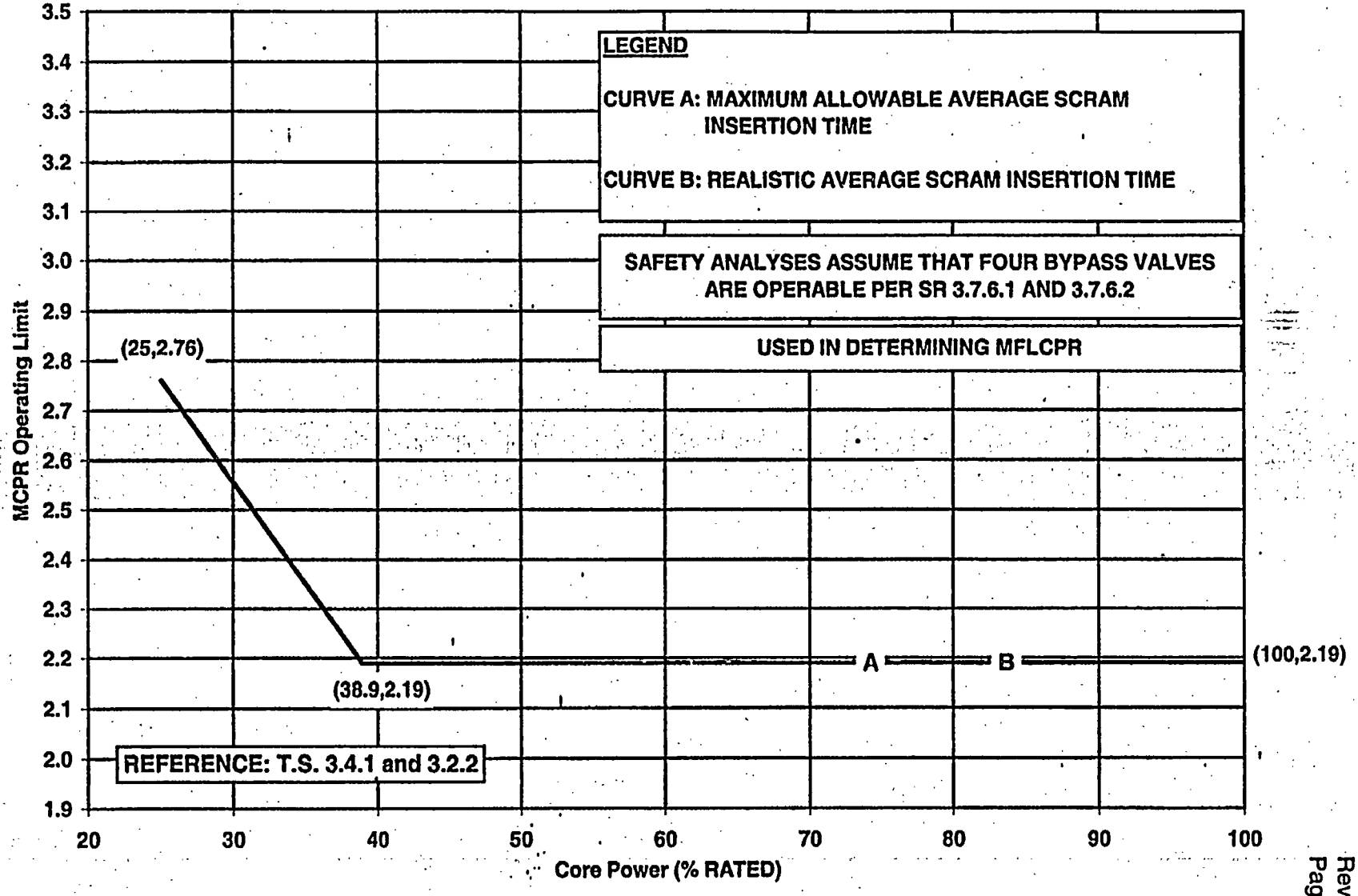


AVERAGE PLANAR LINEAR HEAT GENERATION RATE LIMIT VERSUS AVERAGE PLANAR EXPOSURE
SINGLE LOOP OPERATION
ATRIUM™-10 FUEL
FIGURE 8.2-1

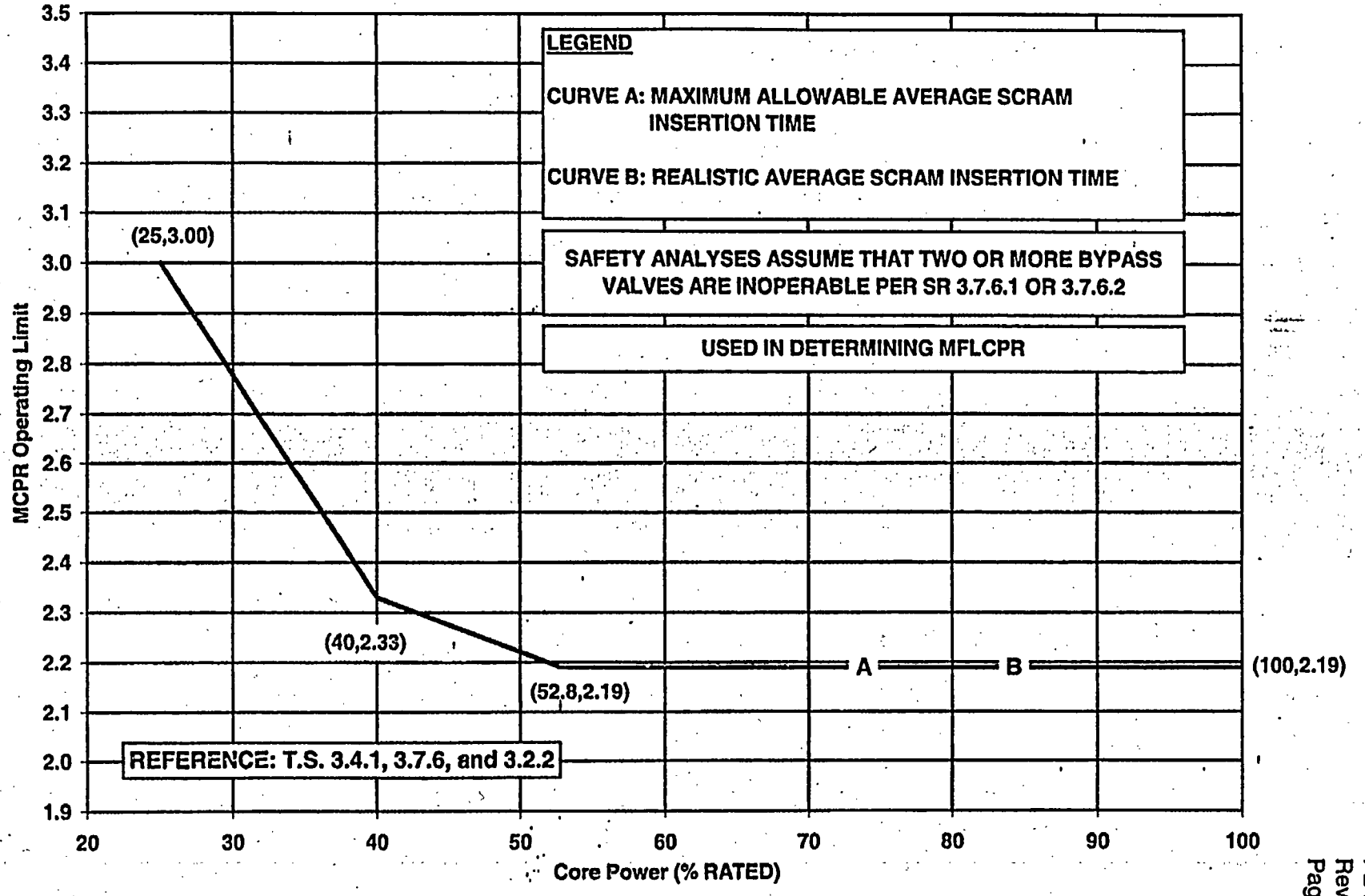


MCPR OPERATING LIMIT VERSUS TOTAL CORE FLOW
SINGLE LOOP OPERATION (BOC to EOC)
FIGURE 8.2-2

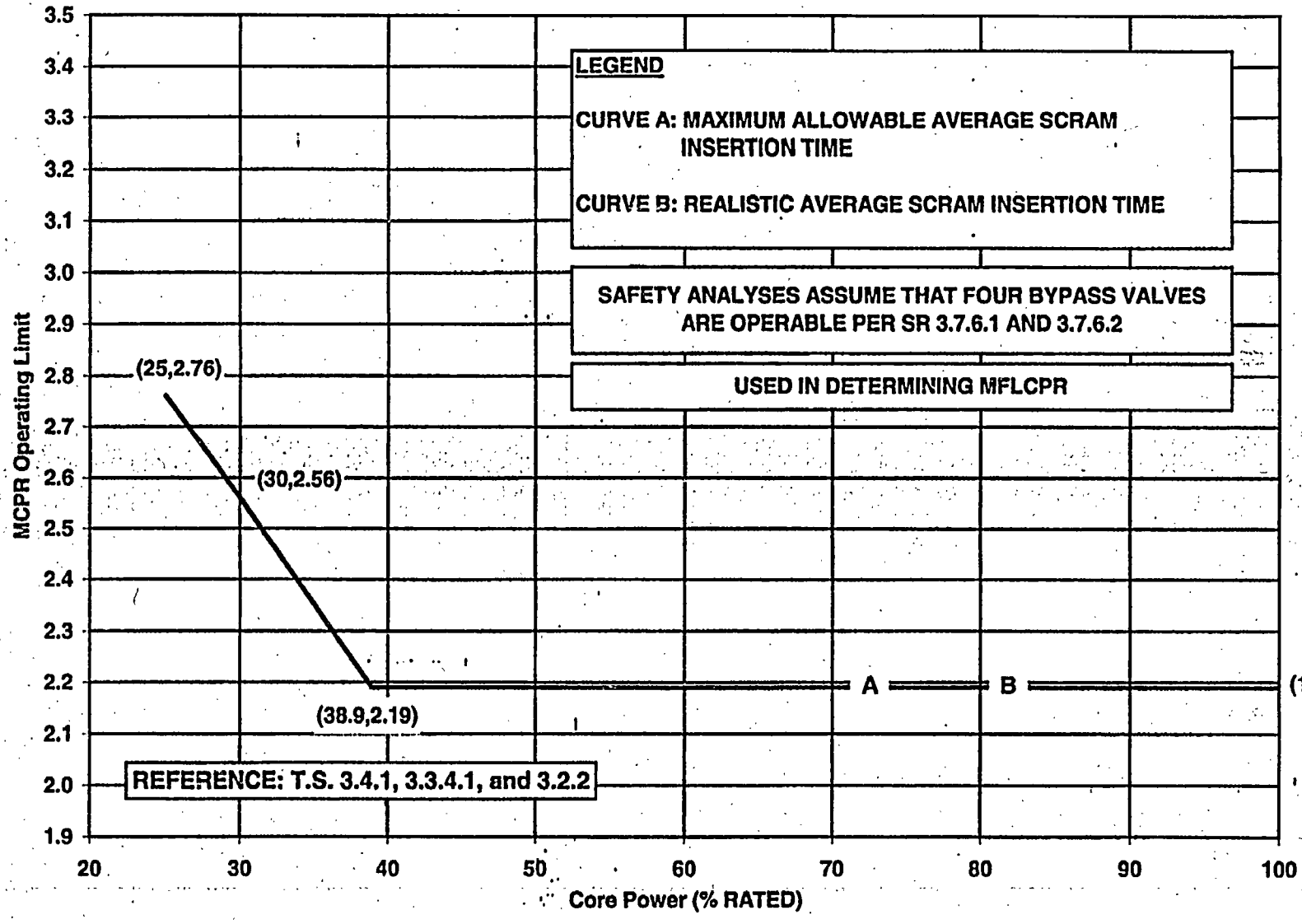
SSES UNIT 1 CYCLE 14A



MCPR OPERATING LIMIT VERSUS CORE POWER
EOC-RPT AND MAIN TURBINE BYPASS OPERABLE
SINGLE LOOP OPERATION (BOC to EOC)
FIGURE 8.2-3



MCPR OPERATING LIMIT VERSUS CORE POWER
MAIN TURBINE BYPASS INOPERABLE / EOC-RPT OPERABLE
SINGLE LOOP OPERATION (BOC to EOC)
FIGURE 8.2-4



MCPR OPERATING LIMIT VERSUS CORE POWER
EOC-RPT INOPERABLE / MAIN TURBINE BYPASS OPERABLE
SINGLE LOOP OPERATION (BOC to EOC)
FIGURE 8.2-5

9.0 POWER / FLOW MAP

9.1 Technical Specification Reference

Technical Specification 3.3.1.3

9.2 Description

Monitor reactor conditions to maintain THERMAL POWER / core flow outside of Stability Regions I and II of the Power / Flow map, Figure 9.1.

If the OPRM Instrumentation is OPERABLE per TS 3.3.1.3, Region I of the Power / Flow map is considered an immediate exit region.

If the OPRM Instrumentation is inoperable per TS 3.3.1.3, Region I of the Power / Flow map is considered an immediate scram region.

Region II of the Power / Flow map is considered an immediate exit region regardless of the operability of the OPRM Instrumentation.

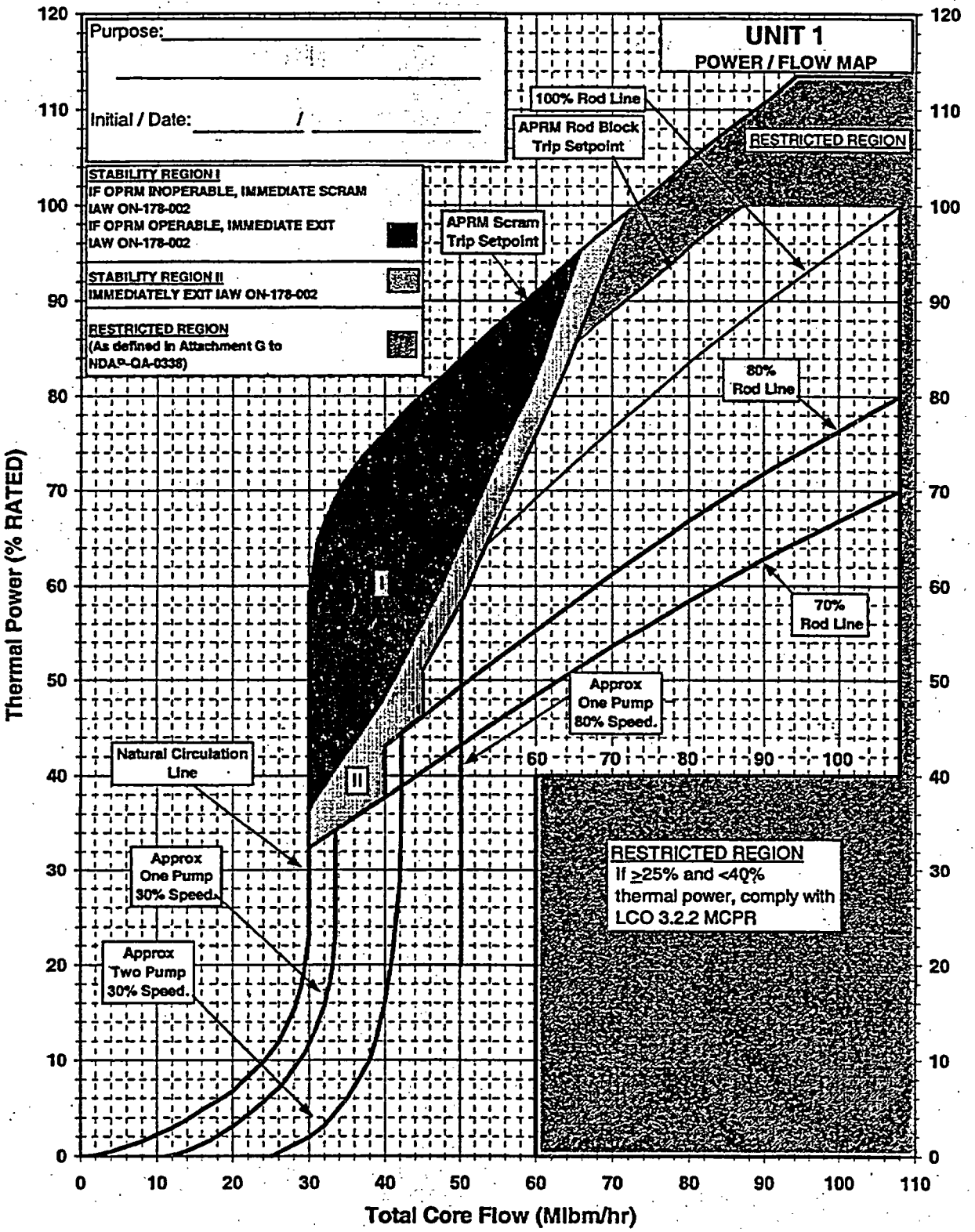


Figure 9.1
Power / Flow Map

10.0 OPRM SETPOINTS

10.1 Technical Specification Reference

Technical Specification 3.3.1.3

10.2 - Description

Setpoints for the OPRM Instrumentation are established that will reliably detect and suppress anticipated stability related power oscillations while providing a high degree of confidence that the MCPR Safety limit is not violated. The setpoints are described in Section 1.0 and are listed below:

S_P = 1.11

N_P = 14

F_P Defined in TS SR 3.3.1.3.5

11.0 REFERENCES

11.1 The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. PL-NF-90-001-A, "Application of Reactor Analysis Methods for BWR Design and Analysis," July 1992.

2. PL-NF-90-001, Supplement 1-A, "Application of Reactor Analysis Methods for BWR Design and Analysis: Loss of Feedwater Heating Changes and Use of RETRAN MOD 5.1," August 1995.

3. PL-NF-90-001, Supplement 2-A, "Application of Reactor Analysis Methods for BWR Design and Analysis: CASMO-3G Code and ANFB Critical Power Correlation," July 1996.

4. PL-NF-90-001, Supplement 3-A, "Application of Reactor Analysis Methods for BWR Design and Analysis: Application Enhancements," March 2001.

5. XN-NF-80-19(A), Volume 1, and Volume 1 Supplements 1 and 2 (March 1983), and Volume 1 Supplement 3 (November 1990), "Exxon Nuclear Methodology for Boiling Water Reactors: Neutronic Methods for Design and Analysis," Exxon Nuclear Company, Inc.

6. XN-NF-80-19(P)(A), Volumes 2, 2A, 2B, and 2C "Exxon Nuclear Methodology for Boiling Water Reactors: EXEM BWR ECCS Evaluation Model," September 1982.

7. XN-NF-80-19(P)(A), Volume 3 Revision 2 "Exxon Nuclear Methodology for Boiling Water Reactors Thermex: Thermal Limits Methodology Summary Description," January 1987.

8. XN-NF-80-19(P)(A), Volume 4, Revision 1, "Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology to BWR Reloads," Exxon Nuclear Company, Inc. June 1986.

9. XN-NF-85-67(P)(A), Revision 1, "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel," Exxon Nuclear Company, Inc., September 1986.

10. ANF-524(P)(A), Revision 2 and Supplement 1, Revision 2, "Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors," November 1990.

11. NE-092-001A, Revision 1, "Licensing Topical Report for Power Uprate With Increased Core Flow," Pennsylvania Power & Light Company, December 1992 and NRC SER (November 30, 1993).

12. ANF-89-98(P)(A) Revision 1 and Revision 1 Supplement 1, "Generic Mechanical Design Criteria for BWR Fuel Designs," Advanced Nuclear Fuels Corporation, May 1995.

13. ANF-91-048(P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR Evaluation Model," January 1993.

14. XN-NF-79-71(P)(A) Revision 2, Supplements 1, 2, and 3, "Exxon Nuclear Plant Transient Methodology for Boiling Water Reactors," March 1986.

15. EMF-1997(P)(A) Revision 0, "ANFB-10 Critical Power Correlation," July 1998, and EMF-1997(P)(A) Supplement 1 Revision 0, "ANFB-10 Critical Power Correlation : High Local Peaking Results," July 1998.

16. Caldon, Inc., "TOPICAL REPORT: Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM$^{\checkmark TM}$ System," Engineering Report - 80P, March 1997.

17. Caldon, Inc., "Supplement to Topical Report ER-80P: Basis for a Power Uprate with the LEFM$^{\checkmark TM}$ or LEFM CheckPlus^{TM} System," Revision 0, Engineering Report ER-160P, May 2000.

18. EMF-85-74(P)(A), "RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model," Revision 0, Supplements 1 and 2, February 1998.

19. EMF-2158(P)(A), Revision 0, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/Microburn-B2," Siemens Power Corporation, October 1999.

20. EMF-CC-074(P)(A), Volume 4, Revision 0, "BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2," November 1999.

21. NEDO-32465-A, "BWROG Reactor Core Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications," August 1996.

3.3 Instrumentation

3.3.2 Seismic Monitoring Instrumentation

TRO 3.3.2 The seismic monitoring instrumentation shown in Table 3.3.2-1 shall be OPERABLE.

APPLICABILITY: At all times

ACTIONS

NOTE

1. Separate condition entry is allowed for each monitor or event.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more of the above required seismic monitoring instruments inoperable.	A.1 Restore seismic monitoring instrument to OPERABLE status	30 days OR At next outage with containment entry, not to exceed the next refueling outage for inaccessible containment component.
B. Instrument channels actuated during a seismic event greater than or equal to 0.05g.	B.1 Initiate action to retrieve all data from actuated instruments and to determine magnitude of the vibratory ground motion. AND B.2 Restore each affected instrument channel to OPERABLE status. AND B.3 Perform CHANNEL CALIBRATION for each affected instrument channel	Immediately 24 hours 5 days

TECHNICAL REQUIREMENT SURVEILLANCE

NOTE

1. Refer to Table 3.3.2-1 to determine which TRSs apply for each Seismic Monitoring Channel.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours.

SURVEILLANCE		FREQUENCY
TRS 3.3.2.1	Perform CHANNEL FUNCTIONAL TEST	184 days
TRS 3.3.2.2	Perform CHANNEL CALIBRATION	24 months

TABLE 3.3.2-1
SEISMIC MONITORING INSTRUMENTATION

INSTRUMENTS AND SENSOR LOCATIONS	MINIMUM MEASUREMENT RANGE	MINIMUM INSTRUMENTS OPERABLE	TEST REQUIREMENTS
1. Triaxial Accelerometers and Triggers			
a. Reactor Equipment, Unit 1	-0.25 to +0.25g	1	TRS 3.3.2.1 TRS 3.3.2.2
b. Reactor Bldg. Floor (RHR), Unit 1	-0.25 to +0.25g	1	TRS 3.3.2.1 TRS 3.3.2.2
c. ESSW Pumphouse Floor	-0.25 to +0.25g	1	TRS 3.3.2.1 TRS 3.3.2.2
d. Containment Foundation, Unit 1	-0.25 to +0.25g	1	TRS 3.3.2.1 TRS 3.3.2.2
e. Containment Structure, Unit 1	-0.25 to +0.25g	1	TRS 3.3.2.1 TRS 3.3.2.2
f. Containment Foundation, Unit 2	-0.25 to +0.25g	1	TRS 3.3.2.1 TRS 3.3.2.2
2. Peak Accelerographs			
a. Reactor Equipment, Unit 2	-0.5 to +0.5g	1	TRS 3.3.2.2
b. Reactor Piping, Unit 2	-0.5 to +0.5g	1	TRS 3.3.2.2
c. RHR Pump Room, Unit 2	-0.5 to +0.5g	1	TRS 3.3.2.2
3. Response-Spectrum Analyzer[a]/Recorders[b]	1.0 to 32 Hz	1	TRS 3.3.2.1

[a] One Instrument: on-line capability, with control room annunciation for triggered channels; off-line capability for all channels.

[b] Receive signals from respective accelerometers.