GE Nuclear Energy

General Electric Company
175 Curtner Avenue, San Jose, CA 95125

April 26, 1993

Docket No. STN 52-001

Chet Poslusny, Senior Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of the Nuclear Reactor Regulation

Subject: Submittal Supporting Accelerated ABWR Review Schedule - **DFSER Confirmatory Items 7.2.5-1 and 7.2.5-2**

Dear Chet:

Enclosed is a replacement markup to my letter dated April 23, 1993 which addressed DFSER Confirmatory Items 7.2.1-5 and 7.2.5-2.

Please provide a copy of this transmittal to Jim Stewart.

Sincerely,

Jack Fox

Jack Fox
Advanced Reactor Programs

cc: Norman Fletcher (DOE)
Bernie Genetti (GE)
Bob Strong (GE)

JF93-110

7.2 REACTOR PROTECTION (TRIP) SYSTEM - (RPS) INSTRUMENTATION AND CONTROLS

7.2.1 Description

7.2.1.1 System Description

7.2.1.1.1 RPS Identification

The reactor protection system (RPS) is the overall complex of instrument channels, trip logics, trip actuators and scram logic circuitry that initiate rapid insertion of control rods (scram) to shut down the reactor. The RPS also establishes reactor operating modes and provides status and control signals to other systems and annunciators. To accomplish its overall function, the RPS interfaces with the essential multiplexing system, neutron monitoring system, process radiation monitoring system, control rod drive system, rod control and information system, reactor recirculation control system, performance monitoring system, nuclear boiler system and other plant systems and equipment. These interfaces are discussed in detail in the following subsections. The RPS IED is provided as Figure 7.2-9. The RPS IBD is provided as Figure 7.2-10.

7.2.1.1.2 RPS Classification

The RPS is classified as Safety Class 2, Seismic Category 1, and Quality Group B (electric Safety Class 1E) per Regulatory Guide 1.26 and meets the requirements of 10CFR50.55a(h).

7.2.1.1.3 Power Sources

The RPS utilizes three types of power:

CNFM 7.2.5-1

(1) 120 VAC - taken from the four, divisional safety system logic and control (SSLC) power supply buses discussed Section 8.3. Each bus supplies power for one division of RPS logic. Two of the four buses also provide 120 VAC power through the two divisions of RPS scram logic circuitry to the "A" and "B" solenoids of the scram hydraulic control units (HCU's) of the Control Rod Drive System.

(2) 125 VDC - taken from two of the four, divisional SSLC battery buses discussed in Section 8.3. Each bus provides 125 VDC power through one of the two divisions of RPS scram logic circuitry to the solenoid of one of the two air header dump valves of the Control Rod Drive System.

SSLC power sources are shown in Figure 7.2-1. Scram and air header dump power distribution is shown in Figure 7.2-8.

7.2.1.1.4 RPS Equipment Design

The RPS is designed to provide reliable single-failure-proof capability to automatically or manually initiate a reactor scram while maintaining protection against unnecessary scrams resulting from single failures. This is accomplished through the combination of fail-safe equipment design and redundant two-out-of-four logic arrangement. All equipment within the RPS is designed to fail into a trip initiating state on loss of power or input signal. In conjunction with this, trip initiating logic signals to and within the RPS are asserted low whereas trip bypass logic signals and trip bypass permissive logic signals are asserted high.

7.2.1.1.4.1 General RPS Equipment

The RPS equipment is divided into four redundant divisions of sensor (instrument) channels, trip logics and trip actuators, and two divisions of manual scram controls and scram logic circuitry. The sensor channels, divisions of trip logics, divisions of trip actuators and associated portions of the divisions of scram logic circuitry together constitute the RPS scram and air header dump (back-up scram) automatic initiation logic. The divisions of manual scram controls and associated portions of the divisions of scram logic circuitry together constitute the RPS scram and air header dump manual initiation logic. The automatic and manual scram initiation logics are independent of each other. RPS equipment arrangement is shown in Figure 7.2-2.

(1) Sensor Channels

Equipment within a sensor channel includes primarily sensors (transducers or switches), multiplexers and digital trip modules (DTM's). The sensors within each channel monitor plant variables discussed in Section 7.2.1.1.4.2 and send either analog or discrete output to remote multiplexer units (RMS's) within the associated division of essential multiplexing system (EMS). Each division of EMS performs analog to digital

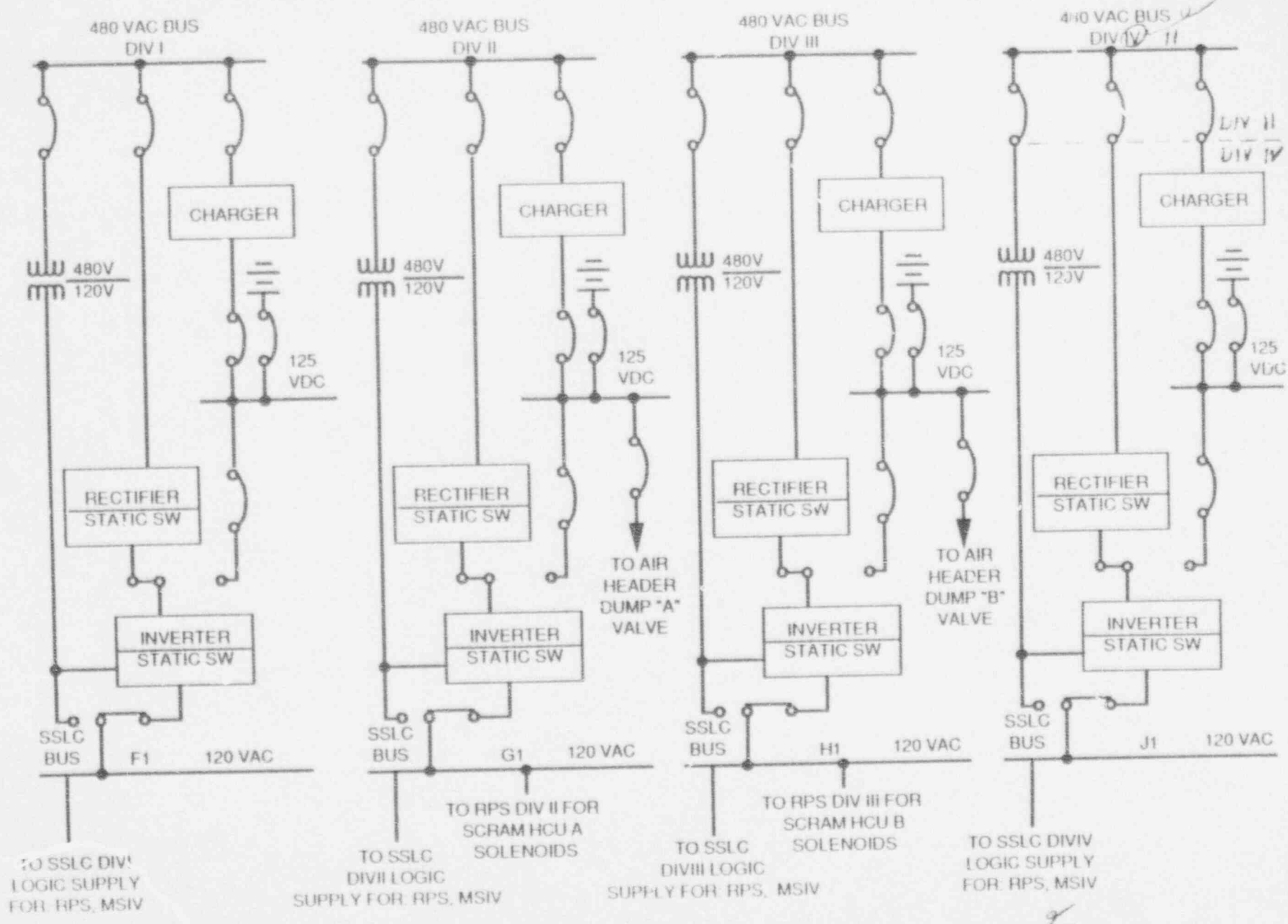

Figure 7.2-1 ABWR SSLC CONTROL POWER SCHEME (SEE ALSO FIGURE 8.3-1)

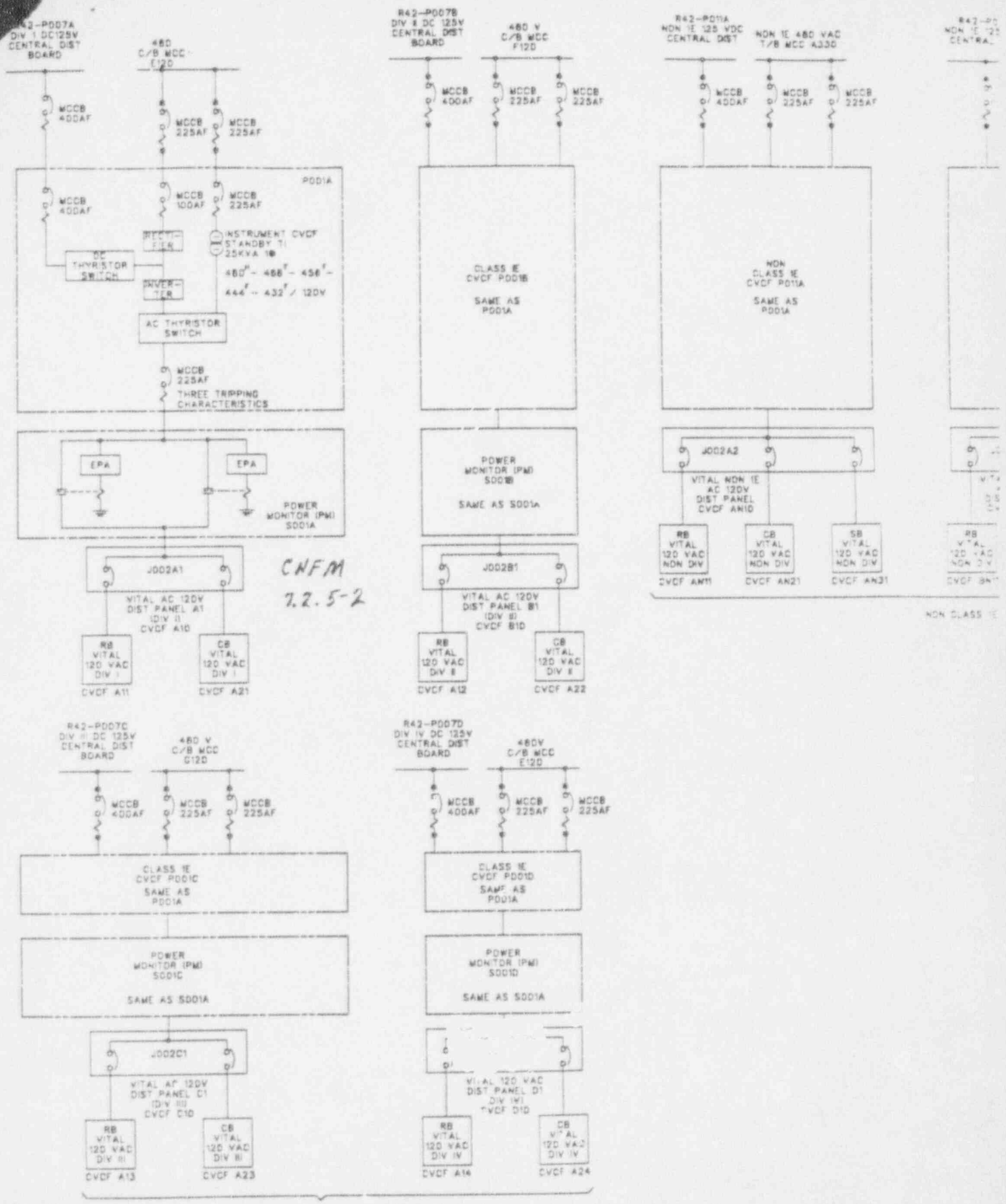
R42-P007A
DIV I DC125V
CENTRAL DIST
BOARD
480
C/B MCC
E12D
MCCB
400AF
MCCB
225AF
MCCB
225AF
P001A
MCCB
400AF
MCCB
100AF
MCCB
225AF
RECTI-
FIER
INSTRUMENT CVCF
STANDBY TI
25KVA 1Φ
480" - 468' - 456' -
444' - 432' / 120V
DC
THYRISTOR
SWITCH
INVER-
TER
AC THYRISTOR
SWITCH
MCCB
225AF
THREE TRIPPING
CHARACTERISTICS
EPA
EPA
POWER
MONITOR (PM)
S001A
J002A1
VITAL AC 120V
DIST PANEL A1
(DIV I)
CVCF A10
RB
VITAL
120 VAC
DIV I
CVCF A11
CB
VITAL
120 VAC
DIV I
CVCF A21
CNFM
7.2.5-2
R42-P007B
DIV II DC 125V
CENTRAL DIST
BOARD
480 V
C/B MCC
F12D
MCCB
400AF
MCCB
225AF
MCCB
225AF
CLASS 1E
CVCF P001B
SAME AS
P001A
POWER
MONITOR (PM)
S001B
SAME AS S001A
J002B1
VITAL AC 120V
DIST PANEL B1
(DIV II)
CVCF B1D
RB
VITAL
120 VAC
DIV II
CVCF A12
CB
VITAL
120 VAC
DIV II
CVCF A22
R42-P011A
NON 1E 125 VDC
CENTRAL DIST
NON 1E 480 VAC
T/B MCC A33D
MCCB
400AF
MCCB
225AF
MCCB
225AF
NON
CLASS 1E
CVCF P011A
SAME AS
P001A
J002A2
VITAL NON 1E
AC 120V
DIST PANEL
CVCF AN1D
RB
VITAL
120 VAC
NON DIV
CVCF AN11
CB
VITAL
120 VAC
NON DIV
CVCF AN21
SB
VITAL
120 VAC
NON DIV
CVCF AN31
NON CLASS 1E
R42-P007C
DIV III DC 125V
CENTRAL DIST
BOARD
480 V
C/B MCC
G12D
MCCB
400AF
MCCB
225AF
MCCB
225AF
CLASS 1E
CVCF P001C
SAME AS
P001A
POWER
MONITOR (PM)
S001C
SAME AS S001A
J002C1
VITAL AC 120V
DIST PANEL C1
(DIV III)
CVCF C1D
RB
VITAL
120 VAC
DIV III
CVCF A13
CB
VITAL
120 VAC
DIV III
CVCF A23
R42-P007D
DIV IV DC 125V
CENTRAL DIST
BOARD
480V
C/B MCC
E12D
MCCB
400AF
MCCB
225AF
MCCB
225AF
CLASS 1E
CVCF P001D
SAME AS
P001A
POWER
MONITOR (PM)
S001D
SAME AS S001A
VITAL 120 VAC
DIST PANEL D1
DIV IV)
CVCF D1D
RB
VITAL
120 VAC
DIV IV
CVCF A14
CB
VITAL
120 VAC
DIV IV
CVCF A24
CLASS 1E VITAL AC POWER SUPPLY
CONSTANT VOLTAGE CONSTANT FREQUENCY POWER SUPPLY

Figure 8.3-

ABWR CHAPTER 7 DFSER ISSUES
.DO ROADMAP7 .REPORT FORM ROADMAP7 TO PRINT

DFSER ITEM NUMBER	DFSER BULLET STATEMENT	SSAR REFERENCE	GE RESPONSE
7.2.5-1 CONF	SSAR Chapter 8 and the corresponding SER section discuss the plant station power. For the SSLC, the power is supplied by four independent and separate Class 1E, 120 Vac sources, which are each backed up with a Class 1E, 125 Vdc battery source through an invertor. Divisions 1 and 4 are supplied from the same 480 Vac source, as indicated by SSAR Figure 8.3-6. GE must revise SSAR Figure 7.2-1 to reflect the power supply design, since that figure incorrectly shows a fourth division of 480 Vac power. GE has committed to revising Chapter 7 of the SSAR to reflect the electrical distribution as described in Chapter 8 of the SSAR. This is confirmatory Item 7.2.5-1.	Figure 7.2-1	Figure 7.2-1 has been modified as marked in the attached. Note that the division which feeds Division IV is now Division II, rather than Division I. This change was made because the HVAC which supplies the Division IV battery room is Division II.
7.2.5-2 CONF	The ITAAC and DAC for the EPAs must include a verification that the wiring to the solenoid valves is sized so that normal voltage drop in the cables will not result in insufficient voltage being supplied to the solenoid coils. the ITAAC and DAC also must include a verification that the neutral leads of the scram pilot solenoid valve coil windings are configured so that credible faults (such as hot shorts) will not prevent the valves from performing their safety function. GE has verbally committed to include the EPAs in the ABWR design. These issues are Confirmatory Item 7.2.5-2.	FIGURE 8.3-3, SH. 1	The EPAs are included in the design, as shown on Figure 8.3-3, Amendment 23.