6.1 ENGINEERED SAFETY FEATURE MATERIALS

The materials used in the SSES engineered safety feature (ESF) systems have been selected on the basis of an engineering review and evaluation for compatibility with:

a) The normal and accident service conditions of the ESF system

b) The normal and accident environmental conditions associated with the ESF system

c) The maximum expected normal and accident radiation levels to which the ESF will be subjected

d) Other materials to preclude material interactions that could potentially impair the operation of the ESF systems.

The materials selected for the ESF systems are expected to function satisfactorily in their intended service without adverse effects on the service, performance, or operation of any ESF.

6.1.1 METALLIC MATERIALS

In general, metallic materials used in ESF systems comply with the material specifications of Section II of the ASME B&PV Code. Pressure retaining materials of the ESF systems comply with the quality requirements of their applicable quality group classification and ASME B&PV Code, Section III classification. Adherence to these requirements ensures materials of the highest quality for the ESF systems. Where it is not possible to adhere to the ASME material specifications, metallic materials have been selected in compliance with other nationally recognized standards, eg, ASTM, where practicable, or chosen in compliance with current industry practice.

6.1.1.1 Materials Selection and Fabrication

Metallic materials in ESF systems have been designed for a service life of 40 years, with due consideration of the effects of the service conditions upon the properties of the material, as required by Section III of the ASME B&PV Code, Articles NB-2160, NC-2160, and ND-2160. Since the affected systems must perform for the period of extended operation, aging of equipment is managed to ensure it continues to perform its intended function.

Pressure retaining components have been designed with appropriate corrosion allowances, considering the service conditions to which the material will be applied in

accordance with the general requirements of Section III of the ASME B&PV Code, Articles NB-3120, NC-3120, and ND-3120.

The metallic materials of the ESF systems have been evaluated for their compatibility with core and containment spray solutions. No radiolytic or pyrolytic decomposition of ESF material will occur during accident conditions, and the integrity of the containment or function of any other ESF will not be affected by the action of core or containment spray solutions. Core and containment sprays use high purity water that meets the limits of Table 3.11-7.

Material specifications for the principle pressure retaining ferritic, austenitic, and nonferrous metals in each ESF system are listed in Tables 6.1-1a and 6.1-1b. Materials that would be exposed to the core cooling water and containment sprays in the event of a LOCA are identified in these tables. Sensitization of austenitic stainless steel is prevented by the following actions:

a) Design specifications call for ASME material which is to be supplied in the solution annealed unsensitized condition.

b) Design specifications prohibit the use of materials that have been exposed to sensitizing temperatures in the range of 800 to 1500°F unless subsequently solution annealed and water quenched.

In addition, design specifications for austenitic stainless steel components require that the material be cleaned using halide free cleaning solutions and that special care be exercised in fabrication, shipment, storage, and construction to avoid contaminants.

Cold-worked austenitic stainless steels with yield strengths greater than 90,000 psi are not used in ESF systems. Therefore, there are no compatibility problems with core cooling water or the containment sprays.

Reflective metallic insulation, Min-K insulation, phenolic foam insulation and small amounts of fibrous insulation are used inside the primary containment. Metallic reflective thermal insulation, phenolic foam insulation and fiberglass wool thermal insulation (outside 7 pipe diameters from postulated HELB locations) are used inside the primary containment. To avoid the possibility of chloride induced stress corrosion cracking in austenitic stainless steel, design specifications on the nonmetallic insulation require that it conform to the requirements of Regulatory Guide 1.36, (2/73). This includes not only non-metallic insulation in direct contact with austenitic stainless steel, but also situations where leachate from non-metallic insulation components could contaminate austenitic stainless steel components.

Regulatory Guide 1.31, is complied with to the extent specified in Section 3.13, to avoid fissuring in austenitic stainless steel welds that are part of the engineered safety features.

6.1.1.1.1 NSSS Material Specifications

Table 5.2-4 lists the principal pressure retaining materials and the appropriate material specifications for the reactor coolant pressure boundary components.

6.1.1.1.2 Compatibility of NSSS Construction Materials with Core Cooling Water and Containment Sprays

Subsection 5.2.3.2.3 discusses compatibility of the reactor coolant with materials of construction exposed to the reactor coolant. These same materials of construction are found in the engineered safety feature components.

6.1.1.1.3 NSSS Controls for Austenitic Stainless Steel

a) Control of the use of Sensitized Stainless Steel.

Controls to avoid severe sensitization are discussed in Subsection 5.2.3.4.1.1.

b) Process Controls to Minimize Exposure to Contaminants.

Process controls for austenitic stainless steel are discussed in Subsection 5.2.3.4.1.2.

c) Use of Cold Worked Austentic Stainless Steel.

Austenitic stainless steel with a yield strength greater than 90,000 psi was not used in ESF systems.

d) Avoidance of Hot Cracking of Stainless Steel.

Process controls to avoid hot cracking are discussed in Subsection 5.2.3.4.2.1.

6.1.1.2 Composition, Compatibility, and Stability of Containment and Core Spray Coolants

The HPCI system is supplied from either the condensate storage tank or the suppression pool. The core spray and LPCI are supplied from the suppression pool only. Water in both of these sources is high purity water that meets the limits of Table 3.11-7. No corrosion inhibitors or other additives are present in either source.

The containment spray uses the suppression pool as its source of supply. No radiolytic or pyrolytic decomposition of ESF materials are induced by the containment sprays. The

containment sprays will not cause stress-corrosion cracking in austenitic stainless steel during a LOCA.

6.1.2 ORGANIC MATERIALS

Protective Coatings, both organic and inorganic, are used on items in containment as stated in Tables 6.1-1b and 6.1-2. All of these materials that are used as coatings on or are part of equipment have been evaluated with regard to the expected service conditions and have been found to have no potential for adversely affecting service, performance, or operation. No radiolytic or pyrolytic decomposition or interaction with other ESF materials will result from the use of these coatings.

Much of the equipment in containment is coated with zinc, either as galvanizing or by a paint comprising inorganic zinc compounds. The total amount of zinc and estimated total area of zinc coating is shown in Table 6.2-13. The remainder is primarily red oxide primer or epoxy.

Qualified coatings are expected to remain intact following a DBA. Unqualified coatings are assumed to fail and produce post-LOCA debris in the form of particulate or flakes.

The effect of the paint debris on ECCS pump suction strainer blockage has been evaluated to have no safety impact on suction strainer operation.

For Core Spray and RHR, conservative amounts of paint are assumed to be transported to the suppression pool immediately after LOCA, despite evidence that coating failure will not occur until between 6 and 96 hours into the postulated event. This paint, excluding a portion of flakes that will settle to the bottom of the suppression pool, is assumed to be filtered by the strainers and is accounted for in the calculation of strainer pressure drop as described in Sections 6.3.2.2.3 and 6.3.2.2.4.

For HPCI (and RCIC), the events for which HPCI (and RCIC) will operate are not expected to produce significant coating debris. Furthermore, such events will not result in flows from drywell to wetwell that will be high enough to transport significant coating debris to the suppression pool.

The current quantities of qualified and unqualified paint in the Unit 1 and 2 containments, as inventoried in 1994, are provided in Table 6.1-3.

Most of the NSSS equipment was ordered prior to issuance of Regulatory Guide 1.54 so the requirements of that guide were not imposed. However, the coatings were among the first to be qualified under ANSI N101.2 for DBA, radiation, etc., in nuclear applications. Of the paint used on NSSS equipment within containment, less than 12 Kg was not qualified to ANSI N101.2, not including the paint tightly covered with insulation.

The coating on the drywell liner and structural steel within the drywell was qualified in accordance with ANSI N101.2 and applied in accordance with Regulatory Guide 1.54.

In addition both containments were constructed with significant amounts (52,000 sq. ft. - Unit 1 and 46,100 sq. ft. - Unit 2) of unqualified inorganic zinc paint applied to the pipe supports and hangers, non-NSSS equipment, and ductwork. Approximately, 42,100 sq. ft. in each unit was DBA qualifiable paint, however, it was applied without the proper documentation and in accordance with a non-Q procedure. Another 4,000 sq. ft. in each unit was applied to galvanized duct work and is not DBA qualifiable. In addition, Unit 1 contains 5,900 sq. ft. of unqualified inorganic zinc applied to surfaces in the suppression pool.

In order to reduce the quantity of non-Q paint, an in-situ DBA test was conducted on representative samples of the 42,100 sq. ft. of qualifiable paint in each drywell. The testing resulted in an approximate 90% reduction of non-Q, qualifiable inorganic zinc. The Unit 1 test description and results are provided in Advanced Corrosion Engineering report, LOCA Simulation Testing of Specimens Representing Drywell Hanger Steel Painted with Carbo-Zinc 11 Unit 1 SSES, dated 11/30/93. The Unit 2 test description and results are provided in Advanced Corrosion Engineering report, LOCA simulation Testing of Specimens Representing Drywell Hanger Steel Painted with Inorganic Zinc Unit 2 SSES, dated 9/5/94.

The remaining 10,600 sq. ft. of the non-Q inorganic zinc in Unit 1 and the 6,150 sq. ft. in Unit 2, when subjected to LOCA conditions, is assumed to fail as particulate.

The 4,000 sq. ft. of non-Q inorganic zinc applied to the galvanized ductwork in each unit is assumed to fail in flake form following a LOCA.

The second type of unqualified coating found in the Susquehanna containments is red oxide primer. There is approximately 3000 sq. ft. of it in each wetwell and 3000 sq. ft. in each drywell. The red oxide applied to the wetwell surfaces is likely to remain intact following a DBA LOCA. Testing has shown that 240°F temperature is required to achieve coating failure. At Susquehanna, wetwell vapor phase temperatures only reach around 210°F following a LOCA.

The 3000 sq. ft. applied to drywell piping is assumed to fail in flake form following a LOCA.

In addition to the unqualified paint identified above, small quantities of inorganic zinc and/or epoxy were added to the containments in the form of touch-ups and modifications of systems and components. Walkdowns and inspections of both containments has determined the touch-ups and additions to be minimal (see Table 6.1-3).

6.1.3 POST ACCIDENT CHEMISTRY

Not applicable to BWR plants.

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TABLE 6.1-1a

NSSS SUPPLIED ENGINEERED SAFETY FEATURES COMPONENT MATERIALS

COMPONENT	FORM	MATERIAL	SPECIFICATION (ASTM/ASME)
RHR Heat Exchanger			
Shell, Head, and Channel	Plate	Carbon Steel	A516 Gr. 70
Tube Sheet	Forging	Carbon Steel	A350 Gr. LF2
Tubes	Tube	Copper-Nickel	SB395 Alloy 715
Flanges and Nozzles	Forging	Carbon Steel	A105 Gr. 2 and A350 Gr. LF2
Bolts	Bar	Alloy Steel	A193 Gr. B7
Nuts	Bar	Alloy Steel	A194 Gr. 7
RHR and CS Pumps			
Shell Plates and Dished Head	Plate	Carbon Steel	A516 Gr. 70
Shell Aligning Ring	Forging	Carbon Steel	A350 Gr. LF2
Shell Ribs	Plate	Carbon Steel	A516 Gr. 70
Discharge Head Flanges	Plate	Carbon Steel	A516 Gr. 70
	Forging	Carbon Steel	A350 Gr. LF2
Discharge Head Elbow	Piping Fitting	Carbon Steel	A234 Gr. WPB
Discharge Head Plates	Plate	Carbon Steel	A516 Gr. 70
Discharge Head Bar	Piping Fitting	Carbon Steel	A350 Gr. LF2
Discharge Head Pipe	Pipe, Plate	Carbon Steel	A333 Gr. 6, A516 Gr. 70
Cap Screws	Bar	Alloy Steel	A193 Gr. B7
Nuts	Bar	Alloy Steel	A194 Gr. 7
HPCI Main Pump and Booster Pump			
Case, Top and Bottom	Castings	Carbon Steel	A216 Gr. WCB
Seal Flange	Forging	Alloy Steel	A182 Gr. F6
Balance Line (Main Pump Only)	Piping	Carbon Steel	A106 Gr. B
Welding Bosses (Vents and Drains)	Forging	Carbon Steel	A181 Gr. II
Studs, Case and Seal Flange	Bar	Alloy Steel	A193 Gr. B7, A193 Gr. B6
Nuts, Case and Seal Flange	Bar	Alloy Steel	A194 Gr. 7
Interconnecting Piping	Piping	Carbon Steel	A106 Gr. B
Interconnecting Piping Fittings	Forging	Carbon Steel	A234 Gr. WPB, A181 Gr. II
Interconnecting Piping Bolts and Nuts	Bar	Alloy Steel	A193 Gr. B7, A194 Gr. 7
Standby Liquid Control Pumps			
Fluid Cylinder	Forging	Stainless Steel	A182 Gr. F304
Cylinder Head Cover, Discharge Valve Cover, and Stuffing Box Flange Plate	Plate	Carbon Steel	A285 Gr. C
Cylinder Head Extension, Discharge Valve Stop, and Stuffing Box	Shapes	Stainless Steel	A479 Type 304
Stuffing Box Gland	Bar	17-4PH (H1075)	A461 Gr. 630
Plunger	Bar	17-4PH (H1075)	A461 Gr. 630
Suction Flange		Stainless Steel	A182 Gr.F304L
Discharge Flange	Forging	Stainless Steel	A182 Gr. F304L
Pipe Nipples – Suction and Discharge Flange Nipples	Pipe	Stainless Steel	A312 Gr. TP304L
Studs	Bar	Alloy Steel	A193 Gr. B7
Nuts	Bar	Alloy Steel	A194 Gr. 7
Standby Liquid Control Explosive Valves			
Body, Inlet Fittings and Trigger Body	Shapes	Stainless Steel	A479 Type 304
Flange	Forging	Stainless Steel	A182 Gr. F304
Cap Screws	Bar	Stainless Steel	A193 Gr. B8

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TABLE 6.1-1a

NSSS SUPPLIED ENGINEERED SAFETY FEATURES COMPONENT MATERIALS

COMPONENT	FORM	MATERIAL	SPECIFICATION (ASTM/ASME)
Standby Liquid Storage Tank			
TankShell, Top Plate, Bottom Plate, Bottom Ring	Plate	Stainless Steel	A240 Type 304
Nozzles			
Fittings	Forging	Stainless Steel	A182 Gr. F304, F316
Pipe	Plate	Stainless Steel	A312 Type 304
Plate	Plate	Stainless Steel	A240 Type 316L
Welds	N/A	Stainless Steel	SFA 5.4, SFA 5.9
Main Steam Isolation Valves			
Body	Casting	Carbon Steel	A216 Gr. WCB
Bonnet and Poppet	Forging	Carbon Steel	A105 Gr. 2
Stem	Bar	Stainless Steel	A276 Type 410
		17-4PH	SA564 Type 630 (H1100)
Studs	Bar	Alloy Steel	A193 Gr. B7, SA540 Gr.B23 Class 5
Nuts	Bar	Carbon Steel	A194 Gr. 2H
Nuts, Superbolt Nuts		Alloy Steel	SA194 Gr. 7
Superbolt Nut Jack Bolt		Alloy Steel	SA540-B21 Class 1
Pipe	Smls Pipe	Carbon Steel	A106 Gr. B
Drain Boss	Forging	Carbon Steel	A105 Gr. 2
Main Steam Safety Relief Valves			
Body and Bonnet	Forging	Carbon Steel	A105 Gr. 2
Disc Holder	Forging	Inconel 718	ASM 5662B
Disc Insert	Shape	Alloy Steel	SA637 Gr. 718
Spindle Point	Bar	17-4PH (H1075)	A564 Type 630
		17-4PH(H1150)	A564 Type 630
Spindle Ball	Shape	Stellite	Stellite #6
		Stainless Steel	A276 Type 440C
Nozzle	Forging	Stainless Steel	A182 F316
Spring	Bar	Alloy Steel	A304-66 Gr. 4161 H
Spring Washers (Top & Bottom)	Forging	Carbon Steel	A105 Gr. 2
Adjusting Bolt	Bar	Alloy Steel	A193 Gr. B6
Adjusting Bolt Button	Bar	Alloy Steel	A193 Gr. B6
Thrust Bearing Adapter	Bar	Alloy Steel	A193 Gr. B6
Studs	Bar	Alloy Steel	A193 Gr. B7
Nuts	Bar	Carbon Steel	A194 Gr. 2H
Superbolt Nut		Alloy Steel	SA194 Gr. 7
Superbolt Nut Jack Bolt		Alloy Steel	SA540-B21 Class 1
Control Rod Velocity Limiter	(Section 4.2)		
Main Steam Flow Restrictor			
Upstream part	Casting	Stainless Steel	A351 Gr. CF8
Downstream part	Casting	Carbon Steel	A216 Gr. WCB
Control Rod Drive Housing Support System (1) Structural Support Steel (See Section 4.5.3)	Structural Steel	Carbon Steel	ATSM A36

(1) Component/materials that would be exposed to core cooling water and containment sprays in the event of a LOCA.

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Table 6.1-1b

ENGINEERING SAFETY FEATURES MATERIALS

Item	Commercial Name	Chemical Composition (Metallic)	Chemical (Organic)
1	Primary Containment	(15)(17)	
2	Secondary Containment (See Reactor Building Recirculation System and Standby Gas Treatment System)		
3	Containment Isolation System Containment Isolation Valves	(See-Table 6.1-1a)	
4	Containment Combustible Gas Control		
	a) Primary Containment Ventilation System (only safety-related drywell unit cooler fans, CRD area ventilation fans and associated safety-related ductwork)	(11)(12)(17)	
	b) Containment Atmosphere Control	(2)(17)	
5	Containment Heat Removal		
	a) Containment Spray Cooling (CSC) Mode of RHR System (Equipment See Table 6.1-1a)	(1)(17)	
	b) Suppression Pool Cooling (SPC) Mode of RHR System (Equipment See Table 6.1-1a)	(1)(17)	
6	HPCI (Equipment See Table 6.1-1a)	(1)	(3)(5)(6)
7	Core Spray (Equipment See Table 6.1-1a)	(1)(2)(17)	(3)(5)(6)
8	LPCI (Equipment See Table 6.1-1a)	(1)(2)(17)	(3)(5)
9	Auto Depressurization System(MSRV See Table 6.1-1a)	(1)(17)	(3)(6)
10	Standby Gas Treatment System	(10)(12)(13)(14)	
11	Reactor Building Recirculation System	(9)(13)(12)	
12	Habitability System Control Structure HVAC systems which service the Habitability envelope, including Control Room HVAC, Control Strucure HVAC, Computer HVAC, CSEOASS, Battery Room Exhaust, Kitchen and Toilet Exhaust	(8)(10)(12)(13)	
13	Main Steam Isolation Valve Leakage Isolated Condenser Treatment Method (ICTM)	(1)(17)	

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Table 6.1-1b

ENGINEERING SAFETY FEATURES MATERIALS

Size - 26"≥	
Pipe:	SA-155 KC-70 Class I welded
Fittings:	SA-234 WPBW
Flanges:	SA-181 II SA-105
Valves:	SA-105 SA-216 WCB
Nuts:	SA-194 Gr 2H JA-194 Gr 7
Bolts:	SA-193 Gr B7
Size - 24"≤	
Pipe:	SA-106 Gr B Seamless
Fittings:	SA-234 WPB SA-105 (2” and smaller)
Flanges:	SA-181 II SA-105
Valves:	SA-105 SA-216 WCB
Nuts:	SA-194 Gr 2H SA-194 Gr 7
Bolts:	SA-193 Gr B7

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Table 6.1-1b

ENGINEERING SAFETY FEATURES MATERIALS

Size - All	
Pipe:	SA-358 Gr 304 Class 1 Welded
	SA-358 Gr 304 Class 1 Welded (0.030 Carbon Max)
	SA-376 TP 304
	SA-312 TP 304
	SA-312 TP 304L (0.030 Carbon Max)
Fittings:	SA-403 WP304W
	SA-403 304W (0.030 Carbon Max)
	SA-403 304 (0.030 Carbon Max)
	SA-403 304L (0.030 Carbon Max)
	SA-182 Gr F3046 (0.030 Carbon Max)
Flanges:	SA-182 Gr F316
	SA-182 Gr F316 (0.030 Carbon Max)
	SA-182 Gr F316L (0.030 Carbon Max)
Valves:	SA-351 Gr
	CF8M
	CF8
	SA-351 Gr.
	SA-182 F316 (2" & smaller)
Nuts:	SA-194 Gr 2H
	SA-194Gr 7
Bolts:	SA-193 Gr B7

(1) Carbon steel systems per ASME II, Part A, as follows:

(2) Stainless steel systems per ASME II, Part A, as follows:
(Refer to Figure 6.1-1)

(3) Insulation materials are as listed below:
- a) Fiberglass wool (minimal use inside containment)
- b) Stainless steel all metal reflective
- c) Needled glass fiber encapsulated in aluminum bonded fiberglass cloth fabric (outside containment only)
- d) Phenolic foam insulation (RBCW piping only)
- e) Min-k insulation (restricted to pipe whip restraints when used in containment)

(4) Unless specified otherwise, gaskets are typically of the spiral-wound metalic type with nonmetalic filler (per ASME B16.5-1996, Annex E, Group Number 1.

Table 6.1-1b

ENGINEERING SAFETY FEATURES MATERIALS

(5) Valve gland packings typically are graphite packings meeting PP&L Technical Specification M-1434.

(6) Uninsulated carbon steel piping inside the primary containment is coated as follows:

a) Drywell

1)	MSRV discharge lines - (where not insulated)	part inorganic zinc part red oxide part uncoated
2)	Water lines to unit coolers -	red oxide
3)	Drywell spray header -	red oxide

b) Wetwell

1)	MSRV discharge lines -	uncoated
2)	Wetwell spray header -	red oxide

(7) Intentionally left blank

(8) Fans (Centrifugal)
SA-515 GR-55, AISI-C-1045, A-569, A-366, A-568, ASME-SA285 GrC

(9) Fans (Vane Axial)
Housing ASTM A283, ASTM A36-75
Hub and Blades Cast Aluminum A356 (ASTM B108), A365-40E(ASTM B26)

(10) Filter Housings
A-36, A-53B, A-105, A-240TP304, 554 MT 304, A-276TP304, A-283, A-569

(11) Containment Coolers Fans (Safety Related)
Fan - A-283, AISI-420, Cast Iron, 17-4Ph
Housing - A-570D, A123-73, Unit 2 housing painted with Carbozinc II in lieu of galvanizing, insulation ultralite (glass fibers)

(12) Ductwork Construction
(Or Engineer Approved Equal)
Material for ductwork - ASTM A446 Grade B, ASTM 527 or ASTM 526
Structural steel shapes, plates, and bars - ASTM A36 with galvanizing per ASTM A123-73
Bolts, nuts, and washers - ASTM A307 with galvanizing per ASTM A153 or zinc plated per ASTM B633 or A164 Type RS (discontinued)
Structural tubing – (duct supports) ASTM A501 or A500 Grade B
Cadmium plating of bolts, nuts, and washers - ASTM A165 type TS

(13) Damper Construction
Carbon Steel Sheet Metal for damper - ASTM, A526 or A527 with A525G-90 coating designation

Table 6.1-1b

ENGINEERING SAFETY FEATURES MATERIALS

Steel rod, bar, and shaft - ASTM A108, A29, AISI 1008/1018, AISI M1020 with A123 coating designation or Cadmium coating per ASTM A165 Type OS
Stainless Steel Sheet Metal for Damper - ASTM A167 Type 304
Stainless Steel rod, bar and shaft – ASTM A276 TP304, A582 TP303 Carbon Steel
Structural Shapes – A36 with G90 coating

(14) SGTS Centrifugal Fans
Housing ASTM A283, ASTM A36
Hub and Blades ASTM A48, ASTM A242

(15) Primary Containment
Liner Plate ASTM A285 Grade A, ASME SA516 Grade 60 or 70
Penetration assemblies (electrical and piping), locks, hatches, and other materials approved for use, ASME SA516, Grade 60 or 70 normalized, ASME SA537, Grade B, SA193 B7, SA194 Gr 7, SA350 LF2, SA182 F304, SA 182 F316, SA541 Class 1, SA234, WPB, SA479 TP304, SA105 Gr 11, SA333 Gr 1 or 6

(16) Primary Containment Isolation Valves
SA216 Gr WCB
SA105 Gr 11
SA182 Gr F304L, F316, F316L
SA351 CF3, CF3M, CF8, CF8M
SA352 Grade LCB
SA515 Gr 70
SA240 Gr 304, 316
SA516 Gr 55
SA181 Gr 11
SA182 Gr F22

(17) Components/materials that would be exposed to core cooling water and containment sprays in the event of a LOCA.

Table 6.1-2

CONTAINMENT COMPONENTS – COATING SCHEDULE

Category	Item/Type/ Description	Coated		Uncoated		Generic Type (Notes 1, 2)	Film Thickness (Mils)	General Comments
		Q Coating	Mfr. Std. Coat	Stls	Galv.			
Carbon Steel Liner Plate	Containment – Dome	X				Inorganic zinc	2-4 or 5-10	Coating repairs may be done with two coats of phenolic epoxy to a thickness of 8-12 mils on the dome and 10-16 mils on the drywell walls, or one coat of epoxy at 5-10 mils, (PP&L Spec C1051).
	Drywell – Walls	X				Inorganic zinc or Inorganic zinc w/epoxy topcoat	2-4	
	Drywell – Floor	X				Inorganic zinc w/ epoxy topcoat	10-16	
	Suppression Pool-Walls	X				Inorganic zinc	4-5	
	Suppression Pool-Floor	X				Inorganic zinc	4-5	
	Drywell Wainscot - Wall	X				Inorganic zinc w/ epoxy topcoat	7-11	Coating repairs may be done with two coats of epoxy to a thickness of 8-12 mils, or one coat at 5-10 mils, (PP&L Spec C1051).

Table 6.1-2

CONTAINMENT COMPONENTS – COATING SCHEDULE

Category	Item/Type/ Description	Coated		Uncoated		Generic Type (Notes 1, 2)	Film Thickness (Mils)	General Comments
		Q Coating	Mfr. Std. Coat	Stls	Galv.			
Structural Steel	Diaphragm Support Columns in Suppression Pool	X				Inorganic zinc	4-5	
	Heavy Support Steel	X				Inorganic zinc or epoxy	2-4 or 5-10	
	Miscellaneous Steel	X	or		X	Inorganic zinc or epoxy	2-4 or 5-10	
	Handrails & Gratings				X			
	Exposed Surface of steel inserts	X				Inorganic zinc or epoxy	2-4 or 5-10	
	Hatches (Equipment & Personnel)	X				Inorganic zinc	2-4 in drywell 4-5 in Suppression Pool	
Carbon steel Pipe, Hangers and Valves	Insulated Piping		X			Red oxide/ Mill Varnish	> 2	Coating on insulated pipe is not accessible to sump
	Uninsulated Piping		X	or	X	Inorganic zinc or Red oxide	2-4	Surfaces exposed in Rad Zones IV &
	Pipe Hangers	X or	X	or	X	Inorganic zinc or epoxy	2-4 or 5-10	require protection & shall have specified
	Valves & Valves Operators		X					surface preparation and inorganic zinc coating in the shop

Table 6.1-2

CONTAINMENT COMPONENTS – COATING SCHEDULE

Category	Item/Type/ Description	Coated		Uncoated		Generic Type (Notes 1, 2)	Film Thickness (Mils)	General Comments
		Q Coating	Mfr. Std. Coat	Stls	Galv.			
Equipment	Pumps	X	X	or	X	Inorganic zinc	2-4	
	Fans & Fan Housings (Carbon Steel)	X				Inorganic zinc	2-4	Applied to surfaces exposed to spray or insulated
	HVAC Ducts		X	or	X	Inorganic zinc	2-4	
	Hydrogen Recombiners			X				
	Containment Coolers				X			
	Heat Exchangers		X					
Electrical	Motors	X or	X			Inorganic zinc	2-4	
	Connection Boxes	X	or		X	Inorganic zinc	2-4	Large items with non-Q Coating – Recoat in field.
	Control Panels, Instrument Panels		X			Alkyd, urethane	1-2	
	Raceways, Cable Trays			X				
Concrete	RPV Concrete Pedestal	X				Epoxy Surfacer & Topcoat	1/8" surfacer & 4-20 mil topcoat	See Note (2)

(1) Generic coating systems acceptable for containment use have been selected from suppliers who are prequalified to project standards and test criteria. Systems other than those listed are acceptable for specific units based on analysis of requirements.

(2) Concrete coatings shall be limited to minimum area required for decontamination purposes.

(3) Exposed areas of coatings are listed in Table 6.2-13.

TABLE 6.1-3

Inventory of Qualified and Unqualified Containment Coatings

Unit 1 Drywell	Ft^2
1. Qualified Coatings	
a. A-29[2] Inorganic Zinc	16,200
Epoxy Topcoat	16,900
b. C-63 Inorganic Zinc	15,900
c. M-27 & M-204 Epoxy Topcoat	7,400
d. A-50 Epoxy Concrete Surfacer	4,000
e. G-4 Inorganic Zinc with In-situ DBA Qualification	37,400[3]
Total	97,800
2. Unqualified Coatings	
a. G-4 Inorganic Zinc	4,700[3]
b. G-4 Red Oxide	3,000[3]
c. Inorganic Zinc Touch-up of Galvanized Ductwork	4,000[3]
Total	11,700
Unit 1 Suppression Pool	
1. Qualified Coatings	
a. A-57 Inorganic Zinc	34,900
Total	34,900
2. Unqualified	
a. G-4 Inorganic Zinc	5,900
b. G-4 Red Oxide	3,000[3]
Total	8,900
Total Qualified - Unit 1	132,700
Total Unqualified - Unit 1	20,600

TABLE 6.1-3

Inventory of Qualified and Unqualified Containment Coatings

Unit 2 Drywell	Ft^2
1. Qualified Coatings	
a. A-29 Inorganic Zinc	16,200
Epoxy Topcoat	16,900
b. C-63 Inorganic Zinc	15,900
c. M-27 & M-204 Epoxy Topcoat	7,400
d. A-50 Epoxy Concrete Surfacer	4,000
e. G-4 Inorganic Zinc with In-situ DBA Qualification	35,950[3]
Total	96,350
2. Unqualified	
a. G-4 Inorganic Zinc	6,150
b. G-4 Red Oxide	3,000[3]
c. Inorganic Zinc Touch-up of Galvanized Ductwork	4,000[3]
Total	13,150
Unit 2 Suppression Pool	
1. Qualified Coatings	
a. A-57 Inorganic Zinc	34,900
Total	34,900
2. Unqualified	
a. G-4 Red Oxide	3,000[3]
Total	3,000
Total Qualified - Unit 2	131,250
Total Unqualified - Unit 2	16,150

[1] In addition to the quantities of qualified coatings, listed below, small quantities of qualified epoxy paint has been added via touchups and modifications.

[2] The specification numbers listed adjacent to each type of coating (i.e., G-4, A-57, etc.) indicate the Bechtel specification used to apply the coatings.

[3] The reported quantities indicate adjustments from the original Bechtel estimates and those previously reported in the FSAR. These numbers are based on walkdowns of the drywell and suppression pool and the results of the in-situ LOCA Simulation Testing of inorganic zinc.