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STANDARD SPECIFICATION
DBA TEST PROCEDURE AND ACCEPTANCE CRITERIA

1.0 DESCRIPTION

1.1 This standard test provides a procedure for evaluating the performance of the coating system at the anticipated conditions that occur within the reactor containment during and after a Design Basis Accident (DBA).

1.2 The Procedure includes:

1.2.1 Preparation of test specimens

1.2.2 Application and cure of coatings

1.2.3 Test methods and procedures

1.2.4 Criteria for acceptance

1.2.5 Documentation of Test Results

2.0 PREPARATION OF TEST SPECIMENS

2.1 Preparation of Steel Specimens:

2.1.1 Panels: The minimum size for carbon steel panel shall be 2 by 4 inches by 1/8 inch thick with rounded edges and corners. Larger sizes may be used where feasible. The steel for each specimen shall meet the requirements of ASTM A36, "Standard Specifications for Structural Steel".

2.1.2 Surface Preparation: Surface preparation shall be according to SSPC-SP10 with a profile between 1S70 and 2S70 (approximately 1.0 to 2.0 mils) as read on a Keane-Tator Profile Comparator Disc. Each coating shall be evaluated over sand blasted, grit and shot blasted surfaces.

2.1.3 Coated carbon steel specimens shall be scribed to base metal with a straight edge and a suitable sharp pointed tool (such as a diamond stylus). The scribe should be a diagonal line approximately equal in length to two-thirds of the diagonal length of the panel but not extending closer than 1/2 inch from the corners. Care must be taken to ensure that the scribe penetrates completely through the coating to the base metal substrate.

2.2 Preparation of Concrete Specimens:

2.2.1 Concrete Composition

Cement, ASTM C150, Type II, Low alkali, blend 4 cements of Type II

Gravel, ASTM C33, size 3/8 inch

Sand, ASTM C33

Water reducing admixture, ASTM C494

Air entraining admixture, ASTM C260

Pozzolans, ASTM C608

Water - Demineralized or distilled water

2.2.2 Concrete Proportions

Cement, 7 sacks per cubic yard

Sand-Gravel ratio, 55 sand, 45 gravel by volume

Pozzolans, to 15 percent replacement of cement

Air entraining admixture, 4 - 7 percent

Water reducing admixture, as per manufacturer's instructions

Water, to produce a 3 inch slump

2.2.3 Preparation of Test Specimen: Make and cure the specimen according to ASTM C192. The face to be tested shall be composed to the form to simulate

2/10/76	Revised			
4/10/75	Updated and Revised			
1/28/75	Issued as Standard			
No.	DATE	REVISIONS	BY	CHK
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poured walls and the wood troweled surfaces: Broom finish top surface to simulate floors. No test face shall be saw cut. When applicable, concrete curing agents compatible with the coating system shall be used.

2.2.4 Panels: The minimum size for concrete panels shall be 2 by 4 inches by 2 inches thick. Larger sizes may be used where feasible.

2.2.5 Curing Time: Before concrete specimens are coated, they shall be cured a minimum of 28 days in accordance with ACI 301, "Specifications for Structural Concrete for Buildings." If a concrete curing primer is used, it must be applied on the concrete within 24 hours after removal of the forms.

3.0 APPLICATION AND CURE OF COATINGS

3.1 All specimens except those made of concrete shall be coated completely with the entire coating system. The concrete specimens shall be coated in an identical fashion except that the top end may be left uncoated. This procedure allows moisture and gases to escape and thus eliminates blistering by effects not related to the test.

3.2 All applications shall be in accordance with the coating manufacturer's latest published instructions for the system. Care shall be taken to apply the materials so that the characteristics of the systems are similar to the coatings applied on a full scale structure.

3.3 Coatings must be applied at the minimum and maximum film thickness on concrete and sandblasted surfaces and at an average film thickness on shot and grit blasted surfaces.

3.4 Sandblasting, acid etching and sacking of concrete surface is not allowed.

3.5 All specimens shall be marked for identification.

3.6 All coatings or coating systems shall be cured at ambient temperature. No elevated temperature curing is allowed.

4.0 TEST METHODS AND EQUIPMENT

4.1 The DBA Tests are to be performed by Bechtel approved independent laboratories.

4.2 The test apparatus shall be capable of performing a controlled DBA test for seven consecutive days at the specified temperature and pressure (Table 1 & 2), and spray solution (Table 3).

4.2.1 The apparatus shall be capable of providing and maintaining a temperature of 340 F at a pressure of 70 PSI by utilizing a combination of steam and dry heat.

4.2.2 Venting is allowed during heat-up to maintain a pressure not exceeding 70 PSI.

4.2.3 The solution, as per Table 3, shall be withdrawn from a separate container and introduced into the upper portion of the test chamber through spray nozzles at a rate to obtain a pressure drop of 1.7 pounds per second. The initial temperature of the solution shall be between 70 and 90 degrees F. The spray solution is to be introduced into the test chamber as indicated on the time/pressure curve given in Table 2. The solution from the first pressure drop shall be discarded prior to the second pressure drop. Fresh solution is to be used to obtain the second pressure drop.

4.2.4 The chamber shall be constructed so as to allow test specimens to be exposed to total immersion, and spray. Test specimens for non-immersion service shall be exposed in the upper spray section of the chamber and test specimens for immersion service shall be tested by total immersion in the lower wet section of the chamber.

4.2.5 The apparatus must be equipped with a 7 Day Temperature and Pressure Recorders.

4.2.6 The test equipment shall be constructed of materials that are corrosion resistant to the test solutions used.

5.0 IRRADIATION TEST PANELS

5.1 Two sets of two specimens of each coating (or system) shall be tested.

One set shall be exposed to a radiation level of 1×10^9 before exposure to the DBA evaluation and one set shall be air dried as specified.

6.0 CRITERIA FOR ACCEPTANCE

6.1 The test specimen shall be evaluated within 2 hours after removal from the test chamber for the following defects: flaking, delamination, peeling, blistering, chalking and undercutting of the scribe. The defects shall be dealt with as follows:

6.1.1 Flaking: ASTM D772, "Evaluating Degree of Resistance to Flaking (Scaling) of Exterior Paints," Part 21, American Society for Testing and Materials, Philadelphia, Pennsylvania 19103: Flaking shall not be permitted.

6.1.2 Delamination, Peeling and Undercutting of Scribe: Neither delamination, peeling nor undercutting of the scribe shall be permitted.

6.1.3 Blistering: ASTM-P714, "Evaluating Degree of Blistering of Panels". No blistering is allowed.

6.1.4 Chalking: ASTM D659, "Standard Method of Evaluating Degree of Resistance to Chalking of Exterior Paints," Part 21, American Society of Testing and Materials, Philadelphia, Pennsylvania 19103: Heavy chalking shall not be permitted.

6.1.5 Softening and Tackiness: Neither softening or tackiness of the coating shall be permitted.

6.1.6 Any other changes in coating properties which will render the coating system nonfunctional will be cause for rejection.

7.0 DOCUMENTATION OF TEST RESULTS

7.1 The manufacturer shall submit the following documents for approval:

7.1.1 Product Identification:

Product Name _____ Product Number _____

Generic Description _____

Weight Per Gallon	Part A	Range From	To
	Part B	Range From	To
	Part C	Range From	To

Viscosity (list method)	Part A -	Range From	To
	Part B -	Range From	To
	Part C -	Range From	To

Total Solids	Part A -	% Weight	% Volume
	Part B -	% Weight	% Volume
	Part C -	% Weight	% Volume

Flash Point D-93-73 ASTM	Part A	-	deg. F
	Part B	-	deg. F
	Part C	-	deg. F
	Mixed Components	-	deg. F

Mixing Ratio	Part A	By Weight	By Volume
	Part B	By Weight	By Volume
	Part C	By Weight	By Volume

Recoat Time	At 40 deg. F	Full Cure Time	at	F
	At 50 deg. F		at	F
	At 70 deg. F		at	F
	At 90 deg. F		at	F

Service Temperature Limits	Maximum	F Wet	F Dry
	Minimum	F Wet	F Dry

Storage Life _____ Months Pot Life - at 50 F _____ 70 F _____ 90 F _____

Compressive strength ASTM C-579-68	7 days at 73 deg. F	_____
Tensile strength ASTM C-307-61	7 days at 73 deg. F	_____
Modulus of Elasticity ASTM C-580-74	7 days at 73 deg. F	_____
Flexural strength ASMT C-580-74	7 days at 73 deg. F	_____
Initial set time ASTM C-308-71	at 73 deg. F	_____

7.1.2 Sample Preparation Documentation:

Substrate: Steel, Concrete, or Other

Surface Preparation: (Describe)

Coating System: (Describe each coat specifically
- film thickness, Batch No., etc.).

Curing Conditions: Time, Temp.

7.1.3 All test reports on tests performed by independent laboratory.

7.1.4 All temperature and pressure recording charts from automatic recording instruments.

7.1.5 A color photograph in which the test specimen appears in the same size as the actual test specimen.

8.0 RETENTION OF RECORDS AND SPECIMENS

8.1 The test specimen shall be retained and be made available for observation until an approval by Bechtel is granted.

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PROTECTIVE COATING QUALIFICATION CONDITIONS
INSIDE CONTAINMENT

BWR/PWR CONTAINMENT TEMPERATURE

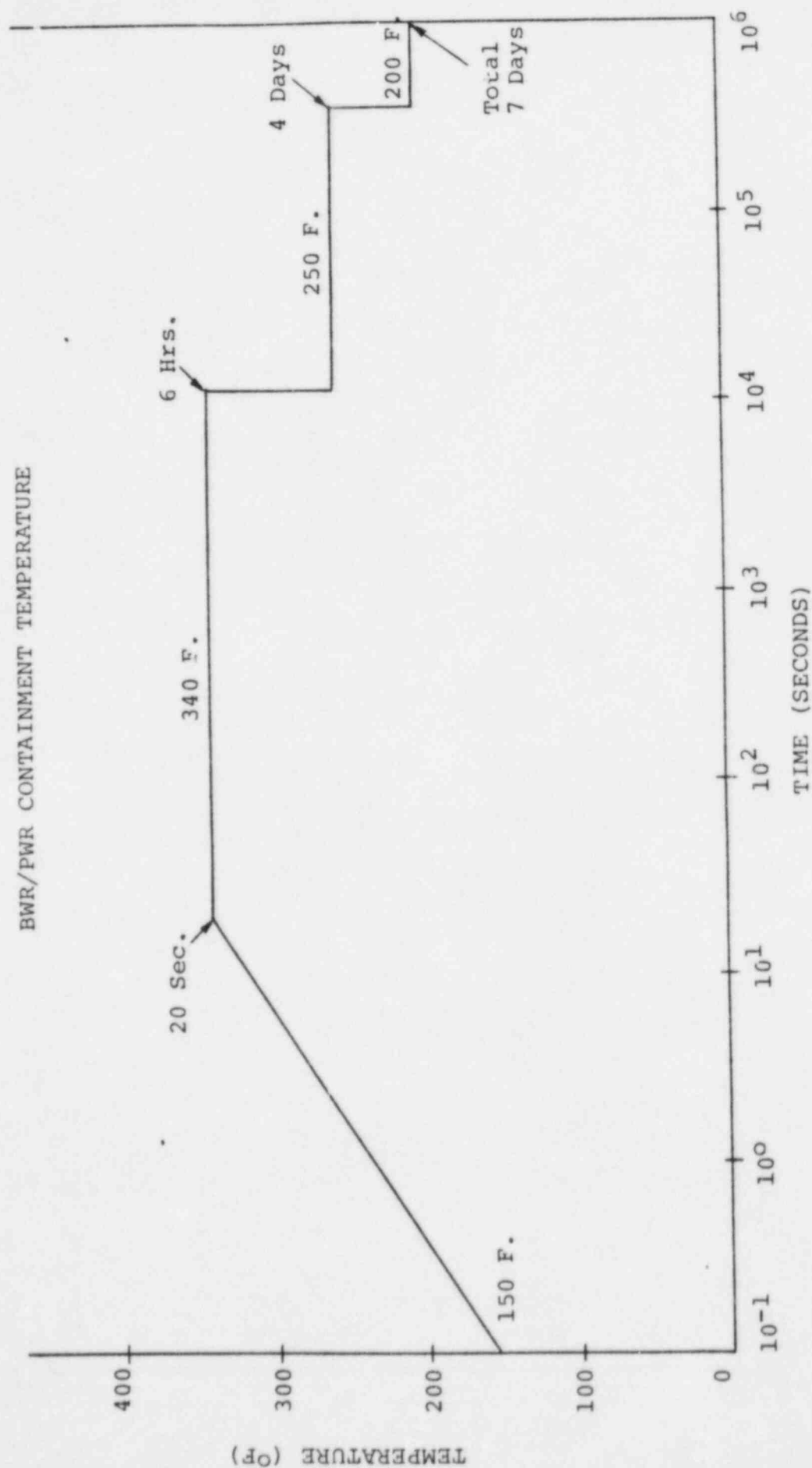
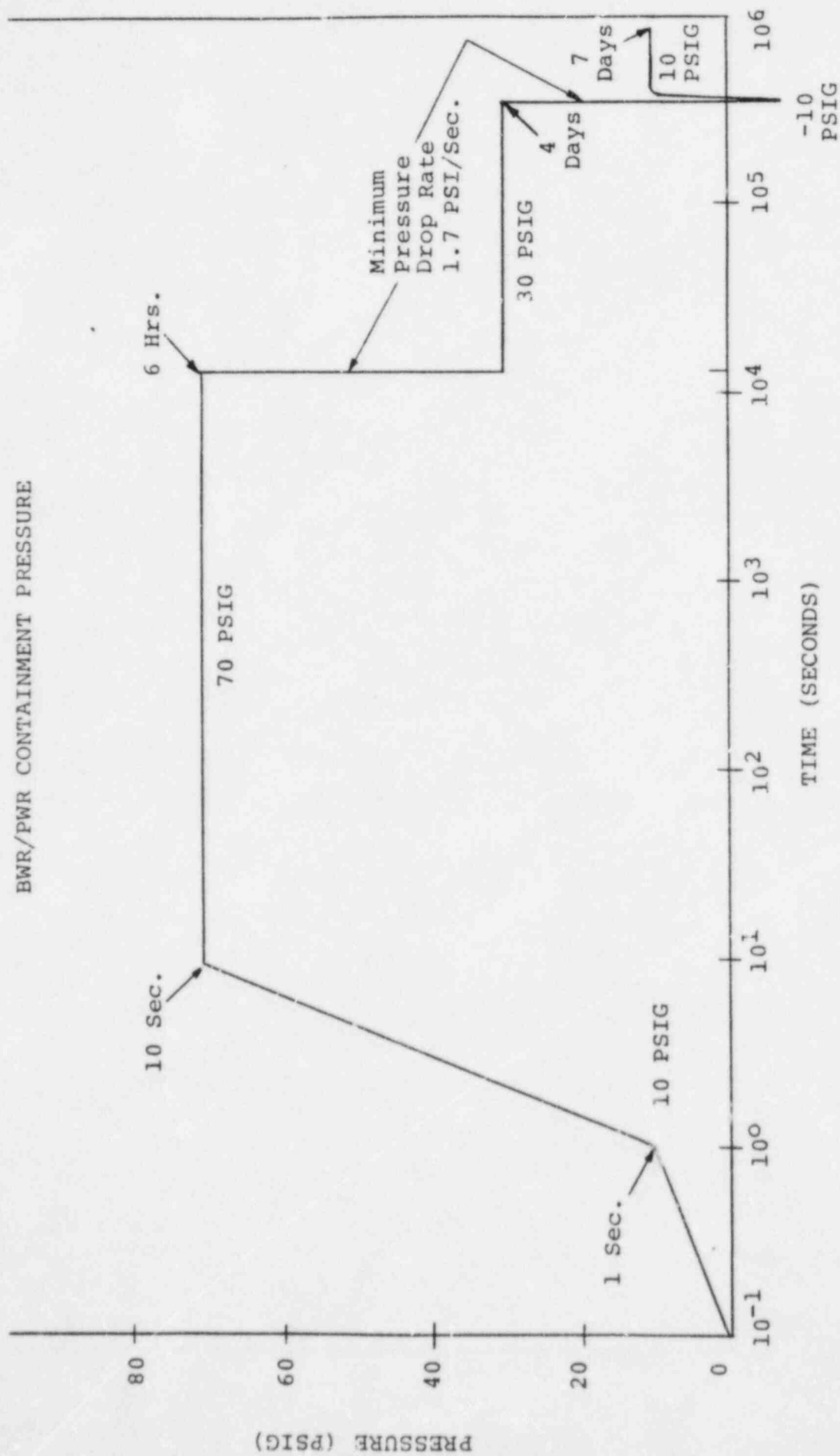


Table 1

PROTECTIVE COATING QUALIFICATION CONDITIONS
INSIDE CONTAINMENT

BWR/PWR CONTAINMENT PRESSURE



TIME (SECONDS)

Table 2

TABLE 3

TEST SOLUTION FOR DBA EVALUATION

0.28 molar H(3)BO(3) (3000 ppm Boron) Boric Acid

0.064 molar Na(2)S(2)O(3) Sodium Thiosulphate

NaOH adjust to a pH of 9.5 at 77 deg. F (about 0.59 percent)

Dissolve chemicals, on a one-liter basis, in the following order:

1. 600 ml distilled water
2. H(3)BO(3) (17 grams)
3. Na(2)S(2)O(3) (16 grams)
4. Add remainder of water to volume of one liter
5. Add solid NaOH to make a pH of 9.5 at 77 deg. F. (6 grams)