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The surface temperature shall be a minimum of 5° above the dew point.

- b) Verify abrasive acceptability (if used) by obtaining a sample of the abrasive to be used. The abrasive shall be verified to be dry by feel with no grease, oil or deleterious materials. Particle size must be sufficient to achieve a minimum of 1 mil surface profile.
- c) Verify acceptability of blast cleaning equipment (if used) prior to use by:
 - 1. Verifying that water separators are installed in the air supply system and that separators have been drained of accumulated water and drains left partially open.
 - 2. Air supply contamination shall be checked at the nozzle prior to use by exposing a sheet of white paper or cloth to the blast of air (no sand) for approximately 30 seconds. The paper or cloth shall be examined for evidence of contamination (oil, water, foreign matter, etc.). No evidence of contamination is acceptable.
- d) Verify that the blasted or power tooled surface has been brushed or vacuumed to the extent required for final surface inspection. The adjacent areas shall be cleaned to the extent necessary to avoid contamination during subsequent coating applications.
- e) Verify acceptability of the blast cleaned or power tooled surfaces by performing the following inspections:
 - 1. Absence of Foreign Matter -- A visual inspection shall be performed to determine that all oil and grease, dirt, millscale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for light shadows, very slight streaks or slight discolorations caused by rust stains, mill scale, oxides, or slight, tight residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all residues, and the remainder shall be limited to light discolorations as mentioned above.

NOTE:

In addition to the 5 percent of tight residue of paint or coating which is permissible (above), shadows or tightly adhering residues of CZ-11 may remain (without limit) in the profile of the previously prepared substrate.

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The surface temperature shall be a minimum of 5° above the dew point.

- b) Verify abrasive acceptability (if used) by obtaining a sample of the abrasive to be used. The abrasive shall be verified to be dry by feel with no grease, oil or deleterious materials. Particle size must be sufficient to achieve a minimum of 1 mil surface profile.
- c) Verify acceptability of blast cleaning equipment (if used) prior to use by:
 - 1. Verifying that water separators are installed in the air supply system and that separators have been drained of accumulated water and drains left partially open.
 - 2. Air supply contamination shall be checked at the nozzle prior to use by exposing a sheet of white paper or cloth to the blast of air (no sand) for approximately 30 seconds. The paper or cloth shall be examined for evidence of contamination (oil, water, foreign matter, etc.). No evidence of contamination is acceptable.
- d) Verify that the blasted or power tooled surface has been brushed or vacuumed to the extent required for final surface inspection. The adjacent areas shall be cleaned to the extent necessary to avoid contamination during subsequent coating applications.
- e) Verify acceptability of the blast cleaned or power tooled surfaces by performing the following inspections:
 - 1. Absence of Foreign Matter -- A visual inspection shall be performed to determine that all oil and grease, dirt, millscale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for light shadows, very slight streaks or slight discolorations caused by rust stains, mill scale, oxides, or slight, tight residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all residues, and the remainder shall be limited to light discolorations as mentioned above.

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2. Removal of Sharp Projections -- A reinspection for sharp projections that were not blended (rounded) during blast cleaning or power tooling shall be performed.

Weld splatter on structural steel shall be removed by either grinding or sand blasting. However, if the weld splatter should remain after the above operation, the weld splatter will be acceptable.

Sharp projections are not acceptable.

Protrusions and peaks shall be ground to a rounded contour.

NOTE: Any mechanical surface preparation other than sandblasting or hand or power tooling of sharp edges or weld spatter will require a visual welding inspector's acceptance of the work performed.

3. Anchor Pattern Depth -- The anchor pattern depth of the blasted surface shall be inspected at random locations using a Keane-Tator Surface Profile Comparator (model 373) or equivalent.

The anchor pattern depth for a blasted surface shall be a minimum of 1.0 mils.

Surfaces that have been power tooled with "3M Clean-N-Strip", 80 grit or coarser "flapper wheels", sanding discs, "roto peans" or equivalent provide acceptable surface profile.

No maximum profile will be specified, providing that correct millage and surface uniformity requirements can be obtained after primer application.

- f) Verify applicator qualifications per Section 3.3.1.
g) Verify air supply acceptability per Section 3.3.4.

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4. When coating materials are mixed/thinned in locations other than the field, the inspector verifying the mixing operation shall fill out the Paint Mixing Slip, Attachment 5. The inspector performing the pre-application inspection shall record the information from the Paint Mixing Slip on the Inspection Report, Attachment 3. The Paint Mixing Slip need not be retained.

- i) Verify that primer is applied and pot life is not exceeded in accordance with Reference 1-B and 1-C. If a brush technique is used, the inspector shall verify that a short bristle brush is used and rebrushing is avoided.

NOTE: Coating interface shall be in accordance with paragraph 4.4.3.0 of Reference 1-B. Dry film thickness in the area of interface shall be in accordance with Reference 1-B and associated special coatings procedures as applicable.

- j) Verify that hose length is less than 75 feet.

3.2.3 Primer Touch-up Repair (Primer Damage Does Not Extend to Steel Surface)

The coating inspector shall conduct the following inspections for primer touch-up repair operations when the damage is within the primer coat and sandblasting to the steel substrate is not required.

- a) Verify surface is abraded lightly then wiped clean per Reference 1-B and 1-C.
b) Perform inspections (e) through (j) in paragraph 3.2.2.

3.2.4 Repair of Primer by Recoating

The coating inspector shall conduct the following inspections for primer recoating repair. Only two (2) overcoats shall be applied.

- a) Verify that the surface has been solvent cleaned or cleansed in accordance with Reference 1-B and 1-C. A clean white cloth shall be used to check primed surface cleanliness. Contamination, other than rust (red) and zinc oxide (white) stains, is unacceptable and require further cleaning.
b) Perform inspections (e) through (j) in Section 3.2.2.

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- b) For all areas of liner plate which do not have adequate documentation, the Inspector shall perform an Adhesion (patch) test. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure.

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:

1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 7.0 mils for CZ-II and 8.5 mils for Carboline 191 or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of unacceptable runs/sags.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.
3. Over Spray - Must be removed before overcoating.
4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.

- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer

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Inspector DFT gage Model III/IE, or equivalent, shall be used. Separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

Dry Film Thickness shall be as follows (See Note 4):

	Min. (mils)	Max. (mils)
Carboline 191 spot test	1.6	8.5
CZ-II spot test	1.5	7.0
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	6.0
Carboline 191 average DFT	2.0	7.0

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: Five spot tests shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, the following shall apply:

Area Sq. Ft.	No. Spots
100-80	5
80-50	4
50-10	3
10-3	2
3-0	1

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement per Reference 1-B and 1-C.

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NOTE 4: In the event that any spot is found to be outside of the acceptable thickness range, three additional spots shall be taken at approximately 6 inches from the failing spot and spaced radially at approximately 120 degree intervals to determine the extent of the unacceptable area. Dimensions and locations of unacceptable areas and results of additional testing shall be documented on the IR.

In the event that the average of the area is unacceptable due to unacceptable spot readings, the unacceptable spots shall be isolated as described above. Additional spot readings shall be taken equal to the number of unacceptable spot readings and the average recalculated. Results of these additional readings shall be documented in the "Remarks" area of the IR. If the recalculated average is acceptable, the IR shall be so marked with an explanation in "Remarks" stating that "average recalculated - now acceptable", or wording to that effect. If the recalculated average is unacceptable, the unacceptable spots shall be isolated (as described above) and the above re-averaging process repeated.

3.2 PRIMER REPAIRS

3.2.1 Sags and Runs

Sags and runs over 7.0 mils DFT for CZ-II and over 8.5 mils DFT for Carboline 191 may be abraded by sanding or aluminum screening. If surface is acceptable per Section 3.1, document such on Attachment 3. If surface is unacceptable refer to Section 3.2.2 or 3.2.3 as applicable.

3.2.2 Primer Touch-up Repair (Primer Damaged to Steel Surface)

The coating inspector shall conduct the following inspections to document primer touch-up repair operations when the damage is to the steel surface and spot sandblasting or power tool abrading is required for surface preparation.

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a) Ambient Conditions

The inspector shall determine air temperature, surface temperature, relative humidity and dew point of substrate structures. A calibrated non-mercury filled dry bulb thermometer or calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination. A calibrated non-mercury wet bulb thermometer or a calibrated humidity recorder (Bristol 4069TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperatures using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, WB No. 235. When dry bulb readings are greater than 100°F, the dew point should be determined using the 100°F dry bulb reading, and relative humidity shall be determined by subtracting wet bulb from the surface temperature or ambient temperature, whichever is greater. If the dry bulb thermometer exceeds 100°F, the instrument shall be returned to the calibration lab for recalibration. The surface temperature shall be determined by placing a calibrated surface temperature thermometer (Omega-Amprobe fast temp. range of 10°-250°F) in contact with the substrate surface until the temperature reading stabilizes.

Final surface preparation shall not begin unless the temperature of the surface is a minimum of 5° above the dew point.

Normal conditions of ambient and surface temperature for application of primer shall be as follows:

	<u>Ambient Temp. (°F)</u>	<u>Surface Temp. (°F)</u>
Dimetcote 6	40-120	40-130
Carbozinc 11	40-95	40-110
Carboline 191	50-120	50-120

Coating material (if thinned) shall be thinned in accordance with Reference 1-B or 1-C.

Humidity values may vary from 10% to 95%; however, primer shall not be applied to a wet or damp surface.

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h) 1. Coating Materials Identification

The inspector shall inspect the coating material containers prior to mixing contents for product identification and verify that all materials are correct for coating application.

Approved materials are:

CZ-11

Carbo Zinc base (gray or green)

Carbo Zinc filler

Carboline #21 or 33 Thinner

Dimetcote

Dimetcote 6 base

Dimetcote filler

Amercoat #65 or 101 thinner

Carboline 191

Carboline 191 primer

Carboline 191 catalyst

Carboline #15 thinner

He shall also verify that each component container is identified by batch number and that the shelf life has not expired. Carbo Zinc 11 base and Carboline 191 has a shelf life of 12 months. Carbo Zinc filler and Dimetcote 6 base and filler have a shelf life of 24 months.

2. Mixing Operations

An inspector shall witness each mixing/thinning operation. The inspector shall verify that mixing operations are performed in accordance with Reference 1-A and 1-B.

3. Thinning Operation

An inspector shall verify that primer thinning complies with thinning requirements established in References 1-A and 1-B.

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Contamination is unacceptable. All contamination must be removed per Reference 1-B or 1-C prior to finish coating.

Rust (red) and zinc oxide (white) stains are acceptable provided all loose particles have been removed (as evidenced by existence of no stain on cloth) from the coated surface by approved cleaning operations. Phenoline Thinner or Xylol are approved cleaners for seal coat. Thinner wiping is not recommended for Dimetcoat primer. Use Carboline #33 cleaner for CZ11 Primer and #15 thinner for Carboline 191 primer.

3.3.4 Air Supply Acceptability

The Inspector shall inspect the air supply system (pressure pots and spray guns) for the existence of suitable filters/traps/separators.

The effectiveness of these items shall be verified by placing a clean piece of cheesecloth (or white fabric) over the exit of the air lines and allowing air to flow for 30 seconds minimum. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.5 Finish Coat Mixing Operations

3.3.5.1 Prior to mixing, the inspector shall verify that each component is identified by batch numbers and that the 24 month shelf life has not been exceeded.

3.3.5.2 The inspector shall verify that mixing/thinner operations are performed in accordance with References 1-B and 1-C. Thinning may be done up to two quarts of Phenoline Thinner per gallon of Phenoline 305.

3.3.5.3 The inspector shall verify that the pot life has not expired per References 1-B and 1-C.

3.3.5.4. When coating materials are mixed/thinned in locations other than the field, the inspector verifying the mixing operation shall fill out the Paint Mixing Slip, Attachment 5. The inspector performing the pre-application inspection shall record the information from the Paint Mixing Slip on the Inspection Report, Attachment 1. The Paint Mixing Slip need not be retained.

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3.6.2 Visual Defects Inspection

The Inspector shall perform a visual inspection of the cured finish coated substrate surface in accordance with the following:

- a) Runs/sags - Runs or sags in which the DFT of the total coating system is 15.0 mils or less thick, which show no evidence of mudcracking, are acceptable. Those greater than 15.0 mils shall be repaired in accordance with Reference 1-B or 1-C.
- b) Skips/ damaged areas/ dry spray/ over spray/ gross discontinuities such as holidays, voids, and bubbles are not acceptable.
- c) Pinholes - acceptable to the extent allowed by Attachment 2.
- d) Contamination - Embedded foreign materials unacceptable.

3.6.3 Dry Film Thickness (DFT)

The Inspector shall perform a DFT of the cured coating system (See Note 1). A calibrated 0-25 Elcometer Inspector DFT Gage Model III/1E, or equivalent, shall be used. Separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from an edge or a hole shall be avoided where possible.

The average DFT of the total coating system shall be a minimum of 6.0 mils and a maximum of 13.0 mils. The spot test DFT of the total coating system shall be a minimum of 6.0 mils and a maximum of 15.0 mils (See Note 4).

The finish coated system shall exhibit full "hiding" properties of the primecoat.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

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NOTE 2: Five spot tests shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, the following shall apply:

Area Sq. Ft.	No. Spots
100-80	5
80-50	4
50-10	3
10-3	2
3-0	1

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities such as handrails, gratings, stairs, sway struts, etc. shall be exempt from DFT measurement (See DCA 11421).

NOTE 4: In the event that any spot is found to be outside of the acceptable thickness range, three additional spots shall be taken at approximately 6 inches from the failing spot and spaced radially at approximately 120 degree intervals to determine the extent of the unacceptable area. Dimensions and locations of unacceptable areas and results of additional testing shall be documented on the IR.

In the event that the average of the area is unacceptable due to unacceptable spot readings, the unacceptable spots shall be isolated as described above. Additional spot readings shall be taken equal to the number of unacceptable spot readings and the average recalculated. Results of these additional readings shall be documented in the "Remarks" area of the IR. If the recalculated average is acceptable, the IR shall be so marked with an explanation in "Remarks" stating that "average recalculated - now acceptable", or wording to that effect. If the recalculated average is unacceptable, the unacceptable spots shall be isolated (as described above) and the above re-averaging process repeated.

NOTE 5: PCR's from previous DFT inspections that are satisfactory per current requirements of DCA 12145 R.3, do not require additional DFT inspections provided no additional coatings have been applied to the area.

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- b) Dimensions in relationship to azimuths, column lines, reactor centerline or other components of known location.
- c) Quadrant, compartment, cavity or room in which inspection is located.
- d) Unit number.
- e) Relation of surface to cardinal directions (i.e., North, South, etc.).

3.9 NONCONFORMANCES

Nonconforming conditions shall be reported on an IR in accordance with CP-QP-18.0.

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- b) For all areas of liner plate which do not have adequate documentation, the Inspector shall perform an Adhesion (patch) test. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure.

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.

- d) Perform a visual inspection of the primed surface in accordance with the following:

1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 7.0 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 7.0 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.

3. Over Spray - Must be removed before overcoating.

4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.

- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer

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shall be performed immediately prior to turnover of each area within the containment building and should be coordinated with Area Management. In addition, finish coated containment liner surfaces shall be visually reinspected in accordance with Paragraph 3.6.2 immediately prior to turnover of each containment area.

3.6.1 Finish Coat Cure

The QC Inspector may perform a final acceptance inspection after a minimum topcoat cure of 24 hours or minimum cure for recoat as stated in Reference 1-B or 1-C, Section 4.4.21 Paragraph 4, which ever is greater. A calibrated non-mercury filled dry bulb thermometer, a calibrated temperature recorder, or local weather station may be used.

3.6.2 Visual Defects Inspection

The Inspector shall perform a visual inspection of the cured finish coated substrate surface in accordance with the following:

- a) Runs/sags - Runs or sags in which the DFT of the total coating system is 15.0 mils or less thick, which show no evidence of mudcracking, are acceptable. Those greater than 15.0 mils shall be repaired in accordance with Reference 1-B or 1-C.
- b) Skips/ damaged areas/ dry spray/ over spray/ gross discontinuities such as holidays, voids, and bubbles are not acceptable.
- c) Pinholes - acceptable to the extent allowed by Attachment 2.
- d) Contamination - Embedded foreign materials unacceptable.

3.6.3 Dry Film Thickness (DFT)

The Inspector shall perform a DFT of the cured coating system. A calibrated 0-25 Elcometer Inspector DFT Gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from an edge or a hole shall be avoided where possible.

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INSPECTION OF STEEL SUBSTRATE PRIMER REPAIR AND SEAL AND FINISH COAT APPLICATION AND REPAIR	PREPARED BY:	<i>Harry C. Williams</i>	<i>8/8/83</i>	DATE
	APPROVED BY:	<i>[Signature]</i>	<i>8/8/83</i>	DATE
	APPROVED BY:	<i>[Signature]</i>	<i>8/8/83</i>	DATE

1.0 REFERENCES

- 1-A QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"
- 1-B CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-C CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-D CP-QP-18.0, "Inspection Reports"
- 1-E QI-QP-11.4-22, "QC Verification of Protective Coatings Unique Identification Number Verification"
- 1-F CP-QP-15.0, "Tagging System"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0 INSTRUCTION

Visual inspection of painted surfaces as addressed by this instruction shall be made at approximately an arms length from the surface being inspected. The area of inspection shall be adequately lighted during the inspection activity. Adequate lighting is defined as the minimum light produced by a two (2) cell battery flashlight.

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3.1 INSPECTION OF PRIMER

3.1.1 Primer Inspections Prior to Application of Seal or Finish Coat

- a) QC shall verify that construction has identified each piece with a unique number in accordance with References 1-A, 1-B and 1-C. The QC Inspector shall maintain a Protective Coating Unique Identification Number Log, Attachment 1 for all protective coatings application on all steel designated for use in the Reactor Building. Subsequent subdivision of coating steel in the field or shop shall be witnessed by QC in accordance with Reference 1-E.

NOTE:

A. Unique number may be assigned to a lot of material to be prime coated at the same time. For example, six pieces steel to be coated at same time may all have same unique number.

B. Liner plate is excluded from QP numbers.

Equipment which is identified with permanent plant identification number need not be identified with a Protective Coatings unique identification number.

- b) For all areas of liner plate which do not have adequate documentation, the Inspector shall perform an Adhesion (patch) test. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure.

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:

1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.
3. Over Spray - Must be removed before overcoating.
4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.

- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

Dry Film Thickness shall be as follows:

	Min. (mils)	Max. (mils)
CZ-II spot test	1.5	5.5
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	4.5

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high

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The average DFT of the total coating system shall be a minimum of 6.0 mils and a maximum of 13.0 mils. The spot test DFT of the total coating system shall be a minimum of 6.0 mils and a maximum of 15.0 mils.

The finish coated system shall exhibit full "hiding" properties of the primecoat.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc. shall be exempt from DFT measurement (See DCA 11421).

NOTE 4: PCR's from previous DFT inspections that are satisfactory per current requirements of DCA 12145 R.3, do not require additional DFT inspections provided no additional coatings have been applied to the area.

3.6.4 Continuity Inspection

The Inspector shall test the continuity of the cured finish coat using a Tinker and Rasor Model M1 (67.5 volt) holiday detector. 100% of the finish coated surface area shall be tested.

The applied film should contain only a minor number of points of discontinuity. No more than two points of discontinuity should occur within an area having a radius of 6 inches as measured from a point of discontinuity (pinholes). No more than 40% of the total number of allowable points of discontinuity should occur within any one area equal to 25% of the total area being coated. The total number of pinhole discontinuities allowed is defined in Attachment 2. No gross discontinuities are allowed.

3.6.5 Documentation of Finish Coat/Seal Coat Acceptance Inspections

Results of inspections described in Sections 3.6 shall be documented on an Inspection Report (IR), Attachment 4, in

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accordance with this instruction, shadows or tight residues of primer which may remain in the profile of the previously prepared substrate is acceptable.

2. Removal of Sharp Projections -- A reinspection for sharp projections that were not blended (rounded) during blast cleaning or power tooling shall be performed.

Weld splatter on structural steel shall be removed by either grinding or sand blasting. However, if the weld splatter should remain after the above operation, the weld splatter will be acceptable.

Sharp projections are not acceptable.

Protrusions and peaks shall be ground to a rounded contour.

NOTE: Any mechanical surface preparation other than sandblasting or hand or power tooling of sharp edges or weld spatter will require a visual welding inspector's acceptance of the work performed.

3. Anchor Pattern Depth -- The anchor pattern depth of the blasted surface shall be inspected at random locations using a Keane-Tator Surface Profile Comparator (model 373) or equivalent.

The anchor pattern depth for a blasted surface shall be a minimum of 1.0 mils.

Surfaces that have been power tooled with "3M Clean-N-Strip", 80 grit or coarser "flapper wheels", sanding discs, "roto peans" or equivalent provide acceptable surface profile.

No maximum profile will be specified, providing that correct millage and surface uniformity requirements can be obtained after primer application.

- f) Verify applicator qualifications per Section 3.3.1.
- g) Verify air supply acceptability per Section 3.3.4.
- h) 1. Coating Materials Identification

The inspector shall inspect the coating material containers prior to mixing contents for product

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- b) For all areas of liner plate which do not have adequate documentation, the Inspector shall perform an Adhesion (patch) test. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure.

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:
1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 6.0 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 6.0 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.
3. Over Spray - Must be removed before overcoating.
4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.

- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer

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INSPECTION OF STEEL
SUBSTRATE PRIMER
REPAIR AND SEAL AND
FINISH COAT APPLICATION
AND REPAIR

PREPARED BY:

APPROVED BY:

APPROVED BY:

7/29/83

DATE

7/29/83

DATE

7/29/83

DATE

1.0

REFERENCES

1-A

QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"

1-B

CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"

1-C

CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"

1-D

CP-QP-18.0, "Inspection Reports"

1-E

QI-QP-11.4-22, "QC Verification of Protective Coatings Unique Identification Number Verification"

1-F

CP-QP-15.0, "Tagging System"

2.0

GENERAL

2.1

PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0

INSTRUCTION

3.1

INSPECTION OF PRIMER

3.1.1

Primer Inspections Prior to Application of Seal or Finish Coat

- a) QC shall verify that construction has identified each piece with a unique number in accordance with References 1-A, 1-B and 1-C. The QC Inspector shall maintain a

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Protective Coating Unique Identification Number Log, Attachment 1 for all protective coatings application on all steel designated for use in the Reactor Building. Subsequent subdivision of coating steel in the field or shop shall be witnessed by QC in accordance with Reference 1-E.

NOTE:

- A. Unique number may be assigned to a lot of material to be prime coated at the same time. For example, six pieces steel to be coated at same time may all have same unique number.
- B. Liner plate is excluded from QP numbers.

Equipment which is identified with permanent plant identification number need not be identified with a Protective Coatings unique identification number.

- b) For all prime coated items which do not exhibit a Protective Coatings Unique Identification Number (QP Number) the Inspector shall perform an Adhesion (Patch) Test. If adequate documentation exists the above is not applicable. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure. (See Notes 1 and 2 below.)

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

VOID

Prime coated items which are acceptable shall be stamped with a "QP" number by Construction. The QC Inspector shall maintain a protective coatings unique identification number log for all protective coatings applications per this section.

Primer repairs, if required, shall be performed in accordance with Section 3.2.

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NOTE 1: Any item, which due to their size or configuration will not accomodate testing with an Elcometer 106 Adhesion Tester, shall not be subject to adhesion testing.

NOTE 2: For items with total exposed surface area of 10 square feet or less - each adhesion test shall consist of only one dolly tested to failure.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:

- 1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

- 2. Dry Spray - Must be removed by screening or abrading before overcoating.
- 3. Over Spray - Must be removed before overcoating.
- 4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

- 5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.

- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel,

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INSPECTION OF STEEL SUBSTRATE PRIMER REPAIR AND SEAL AND FINISH COAT APPLICATION AND REPAIR	PREPARED BY: <u>Chambers</u>	<u>2/28/83</u>
	APPROVED BY: <u>W.E. [Signature]</u>	<u>2/23/83</u>
	APPROVED BY: <u>CT [Signature]</u>	<u>3/1/83</u>

1.0 REFERENCES

- 1-A QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"
- 1-B CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-C CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-D CP-QP-18.0, "Inspection Reports"
- 1-E QI-QP-11.4-22, "QC Verification of Protective Coatings Unique Identification Number Verification"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0 INSTRUCTION

3.1 INSPECTION OF PRIMER

3.1.1 Primer Inspections Prior to Application of Seal or Finish Coat

- a) QC shall verify that construction has identified each piece with a unique number in accordance with References 1-A, 1-B and 1-C. The QC Inspector shall maintain a Protective Coating Unique Identification Number Log, Attachment 1 for all protective coatings application on all steel designated for use in the Reactor Building. Subsequent subdivision of coating steel in the field or shop shall be witnessed by QC in accordance with Reference 1-E.

HISTORICAL FILE

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NOTE:

A. Unique number may be assigned to a lot of material to be prime coated at the same time. For example, six pieces steel to be coated at same time may all have same unique number.

B. Liner plate is excluded from QP numbers.

Equipment which is identified with permanent plant identification number need not be identified with a Protective Coatings unique identification number. The term "Equipment" is not to include pipe hangers, cable tray hangers, conduit supports, or structural steel. They will all have Protective Coating unique identification numbers assigned.

- b) For all prime coated items which do not exhibit a Protective Coatings Unique Identification Number (QP Number) the Inspector shall perform an Adhesion (Patch) Test. If adequate documentation exists the above is not applicable. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure. (See Notes 1 and 2 below.)

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

Prime coated items which are acceptable shall be stamped with a "QP" number by Construction. The QC Inspector shall maintain a protective coatings unique identification number log for all protective coatings applications per this section.

Primer repairs, if required, shall be performed in accordance with Section 3.2.

NOTE 1: Any item, which due to their size or configuration will not accomodate testing with an Elcometer 106 Adhesion Tester, shall not be subject to adhesion testing.

VOID

NOTE 2: For items with total exposed surface area of 10 square feet or less - each adhesion test shall consist of only one dolly tested to failure.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:

- 1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

- 2. Dry Spray - Must be removed by screening or abrading before overcoating.
- 3. Over Spray - Must be removed before overcoating.
- 4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

- 5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.

- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

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Dry Film Thickness shall be as follows:

	Min. (mils)	Max. (mils)
CZ-II spot test	1.5	5.5
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	4.5

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement per Reference 1-B and 1-C.

3.2 PRIMER REPAIRS

3.2.1 Sags and Runs Over 5.5 Mils DFT

Sags and runs over 5.5 mils DFT may be abraded by sanding or aluminum screening. If surface is acceptable per Section 3.1, document such on Attachment 3. If surface is unacceptable refer to Section 3.2.2 or 3.2.3 as applicable.

3.2.2 Primer Touch-up Repair (Primer Damaged to Steel Surface)

The coating inspector shall conduct the following inspections to document primer touch-up repair operations when the damage is to the steel surface and spot sandblasting or power tool abrading is required for surface preparation.

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a) Ambient Conditions

The inspector shall determine air temperature, surface temperature, relative humidity and dew point of substrate structures. A calibrated non-mercury filled dry bulb thermometer or calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination. A calibrated non-mercury wet bulb thermometer or a calibrated humidity recorder (Bristol 4069TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperatures using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, WB No. 235. When dry bulb readings are greater than 100°F, the dew point and relative humidity should be determined using the 100°F reading. The surface temperature shall be determined by placing a calibrated surface temperature thermometer (Omega-Amprobe fast temp. range of 10°-250°F) in contact with the substrate surface until the temperature reading stabilizes.

Final surface preparation shall not begin unless the temperature of the surface is a minimum of 5° above the dew point.

Normal conditions of ambient and surface temperature for application of primer shall be as follows:

	<u>Ambient Temp. (°F)</u>	<u>Surface Temp. (°F)</u>
Dimetcote 6	40-120	40-130
Carbozinc 11	40-95	40-110

In no case shall Carboline and Ameron limits be exceeded (0°-130°F ambient and 0°-200°F surface temperatures). Coating material (if thinned) shall be thinned in accordance with Reference 1-B or 1-C.

Humidity values may vary from 10% to 95%; however, primer shall not be applied to a wet or damp surface.

The surface temperature shall be a minimum of 5° above the dew point.

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- b) Verify abrasive acceptability (if used) by obtaining a sample of the abrasive to be used. The abrasive shall be verified to be dry by feel with no grease, oil or deleterious materials. Particle size must be sufficient to achieve a minimum of 1 mil surface profile.
- c) Verify acceptability of blast cleaning equipment (if used) prior to use by:
 - 1. Verifying that water separators are installed in the air supply system and that separators have been drained of accumulated water and drains left partially open.
 - 2. Air supply contamination shall be checked at the nozzle prior to use by exposing a sheet of white paper or cloth to the blast of air (no sand) for approximately 30 seconds. The paper or cloth shall be examined for evidence of contamination (oil, water, foreign matter, etc.). No evidence of contamination is acceptable.
- d) Verify that the blasted or power tooled surface has been brushed or vacuumed to the extent required for final surface inspection. The adjacent areas shall be cleaned to the extent necessary to avoid contamination during subsequent coating applications.
- e) Verify acceptability of the blast cleaned or power tooled surfaces by performing the following inspections:
 - 1. Absence of Foreign Matter -- A visual inspection shall be performed to determine that all oil and grease, dirt, millscale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for light shadows, very slight streaks or slight discolorations caused by rust stains, mill scale, oxides, or slight, tight residues of paint or coating that may remain. At least 35 percent of each square inch of surface area shall be free of all residues, and the remainder shall be limited to light discolorations as mentioned above.

NOTE: If coating removal is required from an area or item which has been coated in accordance with this instruction, shadows or tight residues of primer which may remain in the profile of the previously prepared substrate is acceptable.

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2. Removal of Sharp Projections -- A reinspection for sharp projections that were not blended (rounded) during blast cleaning or power tooling shall be performed.

Weld splatter on structural steel shall be removed by either grinding or sand blasting. However, if the weld splatter should remain after the above operation, the weld splatter will be acceptable.

Sharp projections are not acceptable.

Protrusions and peaks shall be ground to a rounded contour.

NOTE: Any mechanical surface preparation other than sandblasting or hand or power tooling of sharp edges or weld spatter will require a visual welding inspector's acceptance of the work performed.

3. Anchor Pattern Depth -- The anchor pattern depth of the blasted surface shall be inspected at random locations using a Keane-Tator Surface Profile Comparator (model 373) or equivalent. A power tooled surface shall be inspected with use of either a roughness gage and/or equivalent.

The anchor pattern depth for a blasted or power tooled surface shall be a minimum of 1.0 mils.

No maximum profile will be specified, providing that correct millage and surface uniformity requirements can be obtained after primer application.

- f) Verify applicator qualifications per Section 3.3.1.
- g) Verify air supply acceptability per Section 3.3.4.
- h) 1. Coating Materials Identification

The inspector shall inspect the coating material containers prior to mixing contents for product identification and verify that all materials are correct for coating application.

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Approved materials are:

CZ-11	Dimetcote
Carbo Zinc base (gray or green)	Dimetcote 6 base
Carbo Zinc filler	Dimetcote filler
Carboline #21 or 33 Thinner	Amercoat #65 or 101 Thinner

He shall also verify that each component container is identified by batch number and that the shelf life has not expired. Carbo Zinc 11 base has a shelf life of 12 months. Carbo Zinc filler and Dimetcote 6 base and filler have a shelf life of 24 months.

2. Mixing Operations

An inspector shall witness each mixing/thinning operation. The inspector shall verify that mixing operations are performed in accordance with Reference 1-A and 1-B.

3. Thinning Operation

An inspector shall verify that primer thinning complies with thinning requirements established in References 1-A and 1-B.

4. When coating materials are mixed/thinned in locations other than the field, the inspector verifying the mixing operation shall fill out the Paint Mixing Slip, Attachment 5. The inspector performing the pre-application inspection shall record the information from the Paint Mixing Slip on the Inspection Report, Attachment 3. The Paint Mixing Slip need not be retained.

- i) Verify that primer is applied and pot life is not exceeded in accordance with Reference 1-B and 1-C. If a brush technique is used, the inspector shall verify that a short bristle brush is used and rebrushing is avoided.
- j) Verify that hose length is less than 75 feet.

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FOR INFORMATION ONLY

The permissible range of surface and ambient temperature for application of finish coat shall be 50-120°F.

Maximum values of relative humidity shall be 85%.

The surface temperature shall be a minimum of 5°F above the dew point.

3.3.3 Coated Surface Acceptability

The Inspector shall visually reinspect the previously coated surface just prior to finish coat application for evidence of contamination (oil, grease, foreign matter) and stains.

Contamination is unacceptable. All contamination must be removed per Reference 1-B or 1-C prior to finish coating.

Rust (red) and zinc oxide (white) stains are acceptable provided all loose particles have been removed (as evidenced by existence of no stain on cloth) from the coated surface by approved cleaning operations. Phenoline Thinner or Xylol are approved cleaners for seal coat. Thinner wiping is not recommended for Dimetcoat primer. Use Carboline #33 cleaner for CZ11 Primer.

3.3.4 Air Supply Acceptability

The Inspector shall inspect the air supply system (pressure pots and spray guns) for the existence of suitable filters/traps/separators.

The effectiveness of these items shall be verified by placing a clean piece of cheesecloth (or white fabric) over the exit of the air lines and allowing air to flow for 30 seconds minimum. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.5 Finish Coat Mixing Operations

3.3.5.1 Prior to mixing, the inspector shall verify that each component is identified by batch numbers and that the 24 month shelf life has not been exceeded.

3.3.5.2 The inspector shall verify that mixing/thinner operations are performed in accordance with References 1-B and 1-C. Thinning may be done up to two quarts of Phenoline Thinner per gallon of Phenoline 305.

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3.3.5.3 The inspector shall verify that the pot life has not expired per References 1-B and 1-C.

3.3.5.4. When coating materials are mixed/thinned in locations other than the field, the inspector verifying the mixing operation shall fill out the Paint Mixing Slip, Attachment 5. The inspector performing the pre-application inspection shall record the information from the Paint Mixing Slip on the Inspection Report, Attachment 1. The Paint Mixing Slip need not be retained.

3.4 SURVEILLANCE OF SEAL OR FINISH COAT APPLICATION

The Inspector shall verify that hose length is less than 75 feet. If a brush technique is used, the inspector shall verify that a short bristle brush is used and rebrushing is avoided.

The inspector shall also verify that the seal coat (if present) is solvent wiped with Phenoline 305 thinner or Xylol prior to finish coat application.

3.5 DOCUMENTATION OF PRIMER INSPECTION AND FINISH COAT PRE-APPLICATION/APPLICATION INSPECTIONS

Results of inspections described in Sections 3.1, 3.3, and 3.4 shall be documented on an Inspection Report (IR), Attachment 1, in accordance with Reference 1-C. The completed IR shall be forwarded to the PPRV for retention.

NOTE 1: All items within the scope of each inspection which are determined by the Inspector to be satisfactory may be documented on a single IR.

3.6 FINISH COAT FINAL ACCEPTANCE INSPECTION

The inspector shall perform a final acceptance inspection of each finish coated item in accordance with Paragraphs 3.6.1 through 3.6.5. For finish coated containment liner

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INSPECTION OF STEEL
SUBSTRATE PRIMER
REPAIR AND SEAL AND
FINISH COAT APPLICATION
AND REPAIR

PREPARED BY: Sheryl Williams

9/2/82

APPROVED BY: W. E. Lutz

9/2/82

APPROVED BY: D. B. C. Smith

9/7/82

DATE

1.0 REFERENCES

- 1-A QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"
- 1-B CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-C CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-D CP-QP-18.0, "Inspection Reports"
- 1-E QI-QP-11.4-22, "QC Verification of Protective Coatings Unique Identification Number Verification"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0 INSTRUCTION

3.1 INSPECTION OF PRIMER

3.1.1 Primer Inspections Prior to Application of Seal or Finish Coat

- a) QC shall verify that construction has identified each piece with a unique number in accordance with References 1-A, 1-B and 1-C. The QC Inspector shall maintain a Protective Coating Unique Identification Number Log, Attachment 1 for all protective coatings application on all steel designated for use in the Reactor Building. Subsequent subdivision of coating steel in the field or shop shall be witnessed by QC in accordance with Reference 1-E.

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NOTE:

A. Unique number may be assigned to a lot of material to be prime coated at the same time. For example, six pieces steel to be coated at same time may all have same unique number.

B. Linear plate is excluded from QP numbers.

Equipment which is identified with permanent plant identification number need not be identified with a Protective Coatings unique identification number. The term "Equipment" is not to include pipe hangers, cable tray hangers, conduit supports, or structural steel. They will all have Protective Coating unique identification numbers assigned.

- b) For all prime coated items which do not exhibit a Protective Coatings Unique Identification Number (QP Number) the Inspector shall perform an Adhesion (Patch) Test. If adequate documentation exists the above is not applicable. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure. (See Notes 1 and 2 below.)

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

Primer repairs, if required, shall be performed in accordance with Section 3.2.

NOTE 1: Any item, which due to their size or configuration will not accomodate testing with an Elcometer 106 Adhesion Tester, shall not be subject to adhesion testing.

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NOTE 2: For items with total exposed surface area of 10 square feet or less - each adhesion test shall consist of only one dolly tested to failure.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:
 - 1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

- 2. Dry Spray - Must be removed by screening or abrading before overcoating.
- 3. Over Spray - Must be removed before overcoating.
- 4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

- 5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.
- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

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NOTE 2: For items with total exposed surface area of 10 square feet or less - each adhesion test shall consist of only one dolly tested to failure.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- d) Perform a visual inspection of the primed surface in accordance with the following:
 - 1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

 - 2. Dry Spray - Must be removed by screening or abrading before overcoating.
 - 3. Over Spray - Must be removed before overcoating.
 - 4. Contamination
 - Oil and grease - unacceptable
 - Embedded foreign materials - unacceptable
 - Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.
 - 5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.
- e) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

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INSPECTION OF STEEL
SUBSTRATE PRIMER
REPAIR AND SEAL AND
FINISH COAT APPLICATION
AND REPAIR

PREPARED BY:

Henry D. Williams

6/7/82
DATE

APPROVED BY:

W. E. [Signature]

6/9/82
DATE

APPROVED BY:

C. T. [Signature]

6/9/82
DATE

BE SCOT

1.0 REFERENCES

- 1-A QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"
- 1-B CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-C CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-D CP-QP-18.0, "Inspection Reports"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0 INSTRUCTION

3.1 INSPECTION OF PRIMER

3.1.1 Primer Inspections Prior to Application of Seal or Finish Coat

- a) After blasting power tool and prior to prime coat application, QC shall verify that construction has identified each piece with a unique number in accordance with References 1-A and 1-B. The QC Inspector shall maintain a Protective Coatings Unique Identification Number Log, Attachment 1 for all protective coatings

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application on all steel designated for use in the Reactor Building. Subsequent subdivision of coating steel in the field or shop shall be witnessed by QC in accordance with Reference 1-C.

NOTE:

- A. Unique number may be assigned to a lot of material to be prime coated at the same time. For example, six pieces steel to be coated at same time may all have same unique number.
- B. Linear plate is excluded from QP numbers.

Equipment which is identified with permanent plant identification number need not be identified with a Protective Coatings unique Identification Number. The term "Equipment" is not to include pipe hangers, cable tray hangers, conduit supports, or structural steel. They will all have Protective Coating unique Identification Numbers assigned.

- b) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- c) Perform a visual inspection of the primed surface in accordance with the following:
 - 1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

- 2. Dry Spray - Must be removed by screening or abrading before overcoating.
- 3. Over Spray - Must be removed before overcoating.
- 4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains

VOID

are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/damaged areas/gross discontinuities such as holidays or voids - unacceptable.
- c) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

Dry Film Thickness shall be as follows:

	Min. (mils)	Max. (mils)
CZ-II spot test	1.5	5.5
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	4.5

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement. (See DCA 11421)

- d) For all prime coated items which do not exhibit a Protective Coatings Unique Identification Number (QP Number) the Inspector shall perform an Adhesion (Patch) Test. If adequate documentation exists the above is not applicable. A calibrated Elcometer 106 Adhesion Tester

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shall be used to verify that the minimum acceptable tensile of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure. (See Notes 1 and 2 below.)

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

Primer repairs, if required, shall be performed in accordance with Section 3.2.

NOTE 1: Any item, which due to their size or configuration will not accomodate testing with an Elcometer 106 Adhesion Tester, shall not be subject to adhesion testing.

NOTE 2: For items with total exposed surface area of 10 square feet or less - each adhesion test shall consist of only one dolly tested to failure.

3.2 PRIMER REPAIRS

3.2.1 Sags and Runs Over 5.5 Mils DFT

Sags and runs over 5.5 mils DFT may be abraded by sanding or aluminum screening. If surface is acceptable per Section 3.1, document such on Attachment 3. If surface is unacceptable refer to Section 3.2.2 or 3.2.3 as applicable.

3.2.2 Primer Touch-up Repair (Primer Damaged to Steel Surface)

The coating inspector shall conduct the following inspections to document primer touch-up repair operations when the damage is to the steel surface and spot sandblasting or power tool abrading is required for surface preparation.

- a) Verify abrasive acceptability (if used) by obtaining a sample of the abrasive to be used. The abrasive shall be verified to be dry by feel. Particle size must be sufficient to achieve a minimum of 1 mil surface profile. All contamination is unacceptable.

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b) Verify acceptability of blast cleaning equipment (if used) prior to use by:

1. Verifying that water separators are installed in the air supply system and that separators have been drained of accumulated water and drains left partially open.
2. Air supply contamination shall be checked at the nozzle prior to use by exposing a sheet of white paper or cloth to the blast of air (no sand) for approximately 30 seconds. The paper or cloth shall be examined for evidence of contamination (oil, water, foreign matter, etc.). No evidence of contamination is acceptable.

c) Verify that the blasted or power tooled surface has been brushed or vacuumed to the extent required for final surface inspection. The adjacent areas shall be cleaned to the extent necessary to avoid contamination during subsequent coating applications.

d) Verify acceptability of the blast cleaned or power tooled surfaces by performing the following inspections:

1. Absence of Foreign Matter -- A visual inspection shall be performed to determine that all oil and grease, dirt, millscale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for light shadows, very slight streaks or slight discolorations caused by rust stains, mill scale, oxides, or slight, tight residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all residues, and the remainder shall be limited to light discolorations as mentioned above.

NOTE: If coating removal is required from an area or item which has been coated in accordance with this instruction, shadows or tight residues of primer which may remain in the profile of the previously prepared substrate is acceptable.

2. Removal of Sharp Projections -- A reinspection for sharp projections that were not blended (rounded) during blast cleaning or power tooling shall be performed.

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Weld splatter on structural steel shall be removed by either grinding or sand blasting. However, if the weld splatter should remain after the above operation, the weld splatter will be acceptable.

Sharp projections are not acceptable.

Protrusions and peaks shall be ground to a rounded contour.

NOTE: Any mechanical surface preparation other than sandblasting or hand or power tooling of sharp edges or weld spatter will require a visual welding inspector's acceptance of the work performed.

3. Anchor Pattern Depth -- The anchor pattern depth of the blasted surface shall be inspected at random locations using a Keane-Tator Surface Profile Comparator (model 373) or equivalent. A power tooled surface shall be inspected with use of either a roughness gage and/or equivalent.

The anchor pattern depth for a blasted or power tooled surface shall be a minimum of 1.0 mils.

No maximum profile will be specified, providing that correct millage and surface uniformity requirements can be obtained after primer application.

- e) Verify applicator qualifications per Section 3.3.1.
- f) Verify ambient conditions per Section 3.3.2.
- g) Verify air supply acceptability per Section 3.3.4.
- h) Verify that mixing operations are per Reference 1-B or 1-C. The inspector shall record batch number of materials used. Additionally, the inspector shall verify that the shelf life has not been exceeded.
- i) Verify that primer is applied in accordance with Reference 1-B and 1-C and pot life is not exceeded. If a brush technique is used, the inspector shall verify that a short bristle brush is used and rebrushing is avoided.

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3.7.5 Repair of Pinholes and Discontinuities, and/or Overcoating

- a) Verify all loose particles are removed and area is solvent wiped.
- b) Perform inspections described in 3.7.2 (c).

3.7.6 Documentation of Repairs

All repairs shall be documented on an Inspection Report, Attachment 1. Repairs involving application of primer will be documented on Attachment 3.

3.8 MAPPING OF LARGE AREAS

For large areas (such as reactor containment liner plate) which have received coatings prior to 10/23/81 (Issuance date of Rev. 5 of this procedure), a unique number shall be assigned to the original inspection checklist. This number will be transferred to the area on a map drawing to provide traceability to the original checklist. For any coatings applied after 10/23/81, the IR number shall be transferred to the area on the map drawing.

The map drawing shall be maintained by the QC Supervisor, or his designee, until the entire surface has been coated, at which time, the completed map shall be transmitted to the Permanent Plant Records Vault.

NOTE 1: Separate maps shall be maintained for the prime, seal and finish coats.

NOTE 2: If the coated area applicable to a given IR is irregular in shape, a sketch should be attached to the IR to indicate the extent of the area inspected.

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NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement. (See DCA 11421)

- d) For all prime coated items which do not exhibit a Protective Coatings Unique Identification Number (QP Number) the Inspector shall perform an Adhesion (Patch) Test. A calibrated Elcometer 106 Adhesion Tester shall be used to verify that the minimum acceptable tensile strength of adhesion to the steel substrate has been attained. Each test shall consist of three individual dollies tested to failure. (See Notes 1 and 2 below.)

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

Primer repairs, if required, shall be performed in accordance with Section 3.2.

NOTE 1: Any item, which due to their size or configuration will not accomodate testing with an Elcometer 106 Adhesion Tester, shall not be subject to adhesion testing.

TUQ-1274

TEXAS UTILITIES GENERATING COMPANY

OFFICE MEMORANDUM

To History File QI-QP-11.4-5, Rev. 9

Glen Rose, Texas

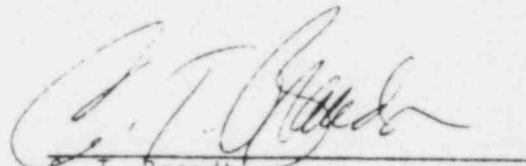
May 20, 1982

Subject

Intent of QI-QP-11.4-5, para. 3.1.1 (d)

The intent of subject paragraph was to require an adhesion test only for surfaces which do not have acceptable documentation to substantiate the acceptability of the existing primer coat. It is not, nor never was, the intent to require that an adhesion test be performed on areas with acceptable primer just because a QP number was not present. It was never the intent to stamp QP numbers on the containment liner, for example.

The misleading statement will be corrected in Revision 10.



C. T. Brandt
Mechanical/Civil QA/QC Supv.

CTB/lrs

cc: R. G. Tolson
N. Britton
W. Avery
R. Wallace
B. Lockamy

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INSPECTION OF STEEL
SUBSTRATE PRIMER
REPAIR AND SEAL AND
FINISH COAT APPLICATION
AND REPAIR

PREPARED BY:

APPROVED BY:

APPROVED BY:

DATE

DATE

DATE

1.0

REFERENCES

1-A

QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"

1-B

CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"

1-C

CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"

1-D

CP-QP-18.0, "Inspection Reports"

2.0

GENERAL

2.1

PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0

INSTRUCTION

3.1

INSPECTION OF PRIMER

3.1.1

Primer Inspections Prior to Application of Seal or Finish Coat

- a) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.
- b) Perform a visual inspection of the primed surface in accordance with the following:

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1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.
3. Overspray - Must be removed before overcoating.
4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/holidays - unacceptable.

- c) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

Dry Film Thickness shall be as follows:

	Min. (mils)	Max. (mils)
CZ-II spot test	1.5	5.5
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	4.5

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NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement. (See DCA 11421)

- d) For all prime coated items which do not exhibit a Protective Coating Unique Identification Number (QP Number) the Inspector shall perform an Adhesion (Patch) Test. A calibrated Elcometer 106 Adhesion Tester shall be used to measure the tensile strength of adhesion to the steel substrate. Each test shall consist of three individual dollies tested to failure.

Criteria: The minimum acceptable strength per dolly shall be 200 psi. If any one of the three dollies should test below the minimum acceptable strength, the prime coat shall be removed to the steel substrate over the entire item.

Primer repairs, if required, shall be performed in accordance with Section 3.2.

3.2 PRIMER REPAIRS

3.2.1 Sags and Runs Over 5.5 Mils DFT

Sags and runs over 5.5 mils DFT may be abraded by sanding or aluminum screening. If surface is acceptable per Section 3.1, document such on Attachment 3. If surface is unacceptable refer to Section 3.2.2 or 3.2.3 as applicable.

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The inspector shall also verify that the seal coat (if present) is solvent wiped with Phenoline 305 thinner or Xylol prior to finish coat application.

3.5 DOCUMENTATION OF PRIMER INSPECTION AND FINISH COAT
PRE-APPLICATION/APPLICATION INSPECTIONS

Results of inspections described in Sections 3.1, 3.3, and 3.4 shall be documented on an Inspection Report (IR), Attachment 1, in accordance with Reference 1-D. The completed IR shall be forwarded to the PPRV for retention.

NOTE 1: All items within the scope of each inspection which are determined by the Inspector to be satisfactory may be documented on a single IR.

3.6 FINISH COAT FINAL ACCEPTANCE INSPECTION

The inspector shall perform a final acceptance inspection of each finish coated item in accordance with Paragraphs 3.6.1 through 3.6.5. For finish coated containment liner plate surfaces, the final acceptance inspection shall be performed at the completion of the curing period. For all other finish coated items, the final acceptance inspection shall be performed immediately prior to turnover of each area within the containment building and should be coordinated with Area Management. In addition, finish coated containment liner surfaces shall be visually reinspected in accordance with Paragraph 3.6.2 immediately prior to turnover of each containment area.

3.6.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the Inspector shall verify that the finish coat has fully cured in accordance with the required final curing time/temperature relationships indicated in References 1-B or 1-C. A calibrated non-mercury filled dry bulb thermometer, a calibrated temperature recorder, or local weather station data may be used.

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3.6.2 Visual Defects Inspection

The Inspector shall perform a visual inspection of the cured finish coated substrate surface in accordance with the following:

- a) Runs/sags - Runs or sags in which the DFT of the total coating system is 11.5 mils or less thick, which show no evidence of mudcracking, are acceptable. Those greater than 11.5 mils shall be repaired in accordance with Reference 1-B or 1-C.
- b) Skips/damaged areas/gross discontinuities such as holidays, voids, and bubbles are not acceptable.
- c) Pinholes - acceptable to the extent allowed by Attachment 2.
- d) Contamination - Embedded foreign materials unacceptable.

3.6.3 Dry Film Thickness (DFT)

The Inspector shall perform a DFT of the cured coating system. A calibrated 0-25 Elcometer Inspector DFT Gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible.

The average DFT of the total coating system shall be a minimum of 7.0 mils and a maximum of 11.0 mils. The spot test DFT of the total coating system shall be a minimum of 7.0 mils and a maximum of 11.5 mils.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

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NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities such as handrails, gratings, stairs, sway struts, etc. shall be exempt from DFT measurement (See DCA 11421).

3.6.4 Continuity Inspection

The Inspector shall test the continuity of the cured finish coat using a Tinker and Razor Model M1 (67.5 volt) holiday detector. 100% of the finish coated surface area shall be tested.

The applied film should contain only a minor number of points of discontinuity. No more than two points of discontinuity should occur within an area having a radius of 6 inches as measured from a point of discontinuity (pinholes). No more than 40% of the total number of allowable points of discontinuity should occur within any one area equal to 25% of the total area being coated. The total number of pinhole discontinuities allowed is defined in Attachment 2. No gross discontinuities are allowed.

3.6.5 Documentation of Finish Coat/Seal Coat Acceptance Inspections

Results of inspections described in Sections 3.6 shall be documented on an inspection report (IR), Attachment 4, in accordance with Reference 1-D. The completed IR shall be forwarded to the PPRV for retention.

NOTE 1: All items within the scope of each inspection per Paragraph 3.6 which are determined by the Inspector to be satisfactory may be documented on a single IR.

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Attachment 1

COMANCHE PEAK STEAM ELECTRIC STATION

INSPECTION REPORT

ITEM DESCRIPTION PROTECTIVE COATINGS		CERTIFICATION NO.	SYSTEM / STRUCTURE DESIGNATION	
SPEC. NO. AS-31	REV.	REF. TO CCC. & REV. & CHANGE NO. QI-QP-11.4-5, Rev.	MEASURE OR TEST EQUIP. IDENT. NO.	
<input type="checkbox"/> IN PROCESS INSPECTION	<input type="checkbox"/> PRE-INSTALLATION VERIFICATION	<input type="checkbox"/> INSTALLATION INSPECTION	<input type="checkbox"/> FINAL INSPECTION	<input type="checkbox"/> PRE-TEST INSPECTION
UNSP. RESULTS				
<input type="checkbox"/> INSPECTION COMPLETED, ALL APPLICABLE ITEMS SATISFACTORY				
<input type="checkbox"/> INSPECTION COMPLETED, UNSAT. FACTORY ITEMS LISTED BELOW				
ITEM NO.	INSPECTION ATTRIBUTES			QC INSPECTOR DATE
	SEAL COAT	FINISH COAT		
	ORIGINAL	REPAIR		
1.	Verify Primer Cure per para. 3.1.1.a.			
2.	Perform Visual Inspection of Primed Surface per para. 3.1.1.b.			
3.	Perform DFT of Primer Coat per para. 3.1.1.c (For multiple items indicate Min. Spot, Max. Spot and Average DFT for each item in "Remarks").			
	RECORD: Minimum Spot Test:			
	Maximum Spot Test:			
	Average DFT:			
4.	Perform Adhesion Test per para. 3.1.1.d if primed item does not exhibit QP No.			
	RECORD: Adhesion Test strength in PSI			
	Dolly #1	Dolly #2	Dolly #3	
5.	Record all Protective Coatings Unique QP & ID No.'s: (For multiple items indicate in "Remarks" with corresponding DFT readings from Item #3 above.)			
6.	Ambient conditions checked per para. 3.3.2 prior to coating application and record below:			
	DATE:	TIME:	WET BULB TEMP:	
	DRY BULB TEMP:	RELATIVE HUMIDITY:		
	DEW POINT:	SURFACE TEMP:		
7.	Perform Visual Inspection of previously coated surface per para. 3.3.3.			
8.	Verify surface preparation acceptable per 30 or 30A			
9.	Verify air supply acceptable per para. 3.3.4.			
10.	Verify mixing operations are per CCP-30 or 30A and para. 3.3.5			
(Continued on Next Sheet)				

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ATTACHMENT 1

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COMANCHE PEAK STEAM ELECTRIC STATION
INSPECTION REPORTSHEET 1 OF 2
NL

ITEM DESCRIPTION		CERTIFICATION NO.	SYSTEM / STRUCTURE DESIGNATION
PROTECTIVE COATINGS			
SPEC. NO.	REV.	REF. TO SPEC. & REV. & CHANGE NO.	MEASURE OR TEST EQUIP. IDENT. NO.
AS-31		QI-QP-11.4-5, Rev.	
<input type="checkbox"/> IN PROCESS INSPECTION <input type="checkbox"/> PRE-INSTALLATION VERIFICATION <input type="checkbox"/> INSTALLATION INSPECTION <input type="checkbox"/> FINAL INSPECTION <input type="checkbox"/> PRE-TEST INSPECTION			
INSPECTION RESULTS			
<input type="checkbox"/> INSPECTION COMPLETED, ALL APPLICABLE ITEMS SATISFACTORY			
<input type="checkbox"/> INSPECTION COMPLETED, UNSATISFACTORY ITEMS LISTED BELOW			
ITEM NO.	INSPECTION ATTRIBUTES		QC INSPECTOR DATE
	SEAL COAT <input type="checkbox"/>	FINISH COAT <input type="checkbox"/>	
	ORIGINAL <input type="checkbox"/>	REPAIR <input type="checkbox"/>	
1.	Perform DFT of Primer Coat per Para. 3.1.5		
	RECORD: Minimum Soot Test:		
	Maximum Soot Test:		
	Average DFT:		
2.	Record all Protective Coatings Unique I.D. No.'s:		
3.	Ambient conditions checked per Para. 3.3.2 prior to coating application and record below:		
	DATE:	TIME:	WET BULB TEMP:
	DRY BULB TEMP:	RELATIVE HUMIDITY:	
	DEW POINT:	SURFACE TEMP:	
4.	Perform Visual Inspection of previously coated surface per Para. 3.3.3		
5.	Verify surface preparation acceptable per CCP-30 or 30A		
6.	Verify air supply acceptable per Para. 3.3.4		
7.	Verify mixing operations are per CCP-30 or 30A and Paragraph 3.3.5		
8.	Coating material product identification:		
	RECORD BATCH NUMBERS:		
	PART A:		
	PART B:		
	THINNER:		
	TIME MIXED:		
9.	Verify that shelf life of coating materials has not expired.		
10.	Verify that pot life is not exceeded.		

(Continued on Next Sheet...)

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INSPECTION OF STEEL
SUBSTRATE PRIMER
REPAIR AND SEAL AND
FINISH COAT APPLICATION
AND REPAIR

PREPARED BY:

R. A. Cummings Jr.

12/2/81

DATE

APPROVED BY:

C. T. Hester

12/2/81

DATE

APPROVED BY:

A. Tolson

12/2/81

DATE

FOR INFORMATION ONLY

1.0 REFERENCES

- 1-A QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"
- 1-B CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-C CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-D CP-QP-18.0, "Inspection Reports"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

The purpose of this instruction is to outline methods utilized by Quality Control personnel in inspection of primer repair and seal and finish coat application and repair.

3.0 INSTRUCTION

3.1 INSPECTION OF PRIMER

Prior to application of a seal or finish coat, the QC Inspector shall perform the following inspections:

- a) Perform a visual inspection of the primed surface in accordance with the following:

*corrected 8/17/81
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12/7/81*

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1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.
3. Overspray - Must be removed before overcoating.
4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/holidays - unacceptable.

- b) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

Dry Film Thickness shall be as follows:

	Min. (mils)	Max. (mils)
CZ-II spot test	1.5	5.5
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	4.5

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NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement. (See DCA 11421)

Primer repairs, if required, shall be performed in accordance with Section 3.2.

- c) Verify the primer has cured required amount of time per Reference 1-B or 1-C, as applicable.

3.2 PRIMER REPAIRS

3.2.1 Sags and Runs Over 5.5 Mils DFT

Sags and runs over 5.5 mils DFT may be abraded by sanding or aluminum screening. If surface is acceptable per Section 3.1, document such on Attachment 3. If surface is unacceptable refer to Section 3.2.2 or 3.2.3 as applicable.

3.2.2 Primer Touch-up Repair (Primer Damaged to Steel Surface)

The coating inspector shall conduct the following inspections to document primer touch-up repair operations when the damage is to the steel surface and spot sandblasting is required for surface preparation.

- a) Verify abrasive acceptability by obtaining a sample of the abrasive to be used. The abrasive shall be verified

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to be dry by feel. Particle size must be sufficient to achieve a minimum of 1 mil surface profile. All contamination is unacceptable.

b) Verify acceptability of blast cleaning equipment prior to use by:

1. Verifying that water separators are installed in the air supply system and that separators have been drained of accumulated water and drains left partially open.
2. Air supply contamination shall be checked at the nozzle prior to use by exposing a sheet of white paper or cloth to the blast of air (no sand) for approximately 30 seconds. The paper or cloth shall be examined for evidence of contamination (oil, water, foreign matter, etc.). No evidence of contamination is acceptable.

c) Verify that the blasted surface has been brushed or vacuumed to the extent required for final surface inspection. The adjacent areas shall be cleaned to the extent necessary to avoid contamination during subsequent coating applications.

d) Verify acceptability of the blast cleaned or power tooled surfaces by performing the following inspections:

1. Absence of Foreign Matter -- A visual inspection shall be performed to determine removal of foreign matter from the surface.

The surface, when viewed without magnification, shall be free of all oil, grease, visible mill scale, rust, corrosion products, oxides, paint, or any foreign matter, except for light shadows, slight streaks, or slight discolorations caused by rust stain, mill scale oxides, or slight, tight residues of paint.

2. Removal of Sharp Projections -- A reinspection for sharp projections that were not blended (rounded) during blast cleaning or power tooling shall be performed.

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Sharp projections (including weld spatter) are not acceptable.

Protrusions and peaks shall be ground to a rounded contour.

NOTE: Any mechanical surface preparation other than sandblasting or hand or power tooling of sharp edges or weld spatter will require a B&R NDE visual inspector's acceptance of the work performed.

3. Anchor Pattern Depth -- The anchor pattern depth of the blasted or power tooled surface shall be inspected at random locations using a Keane-Tator Surface Profile Comparator (model 373) or equivalent. A power tooled surface shall be inspected with use of either a roughness gage and/or comparator plate which has been approved by the coating manufacturer.

The anchor pattern depth for a blasted or power tooled surface shall be a minimum of 1.0 mils.

No maximum profile will be specified, providing that correct millage and surface uniformity requirements can be obtained after primer application.

- e) Verify applicator qualifications per Section 3.3.1.
- f) Verify ambient conditions per Section 3.3.2.
- g) Verify air supply acceptability per Section 3.3.4.
- h) Verify that mixing operations are per Reference 1-B or 1-C. The inspector shall record batch number of materials used. Additionally, the inspector shall verify that the shelf life has not been exceeded.
- i) Verify that primer is applied in accordance with Reference 1-B and 1-C and pot life is not exceeded.
- j) Visually inspect per Section 3.1(a).

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k) Perform dry film thickness measurement per Section 3.1(b).

l) Verify primer cure per Section 3.1(c).

3.2.3

Primer Touch-up Repair (Primer Damage Does Not Extend to Steel Surface)

The coating inspector shall conduct the following inspections for primer touch-up repair operations when the damage is within the primer coat and sandblasting to the steel substrate is not required.

a) Verify surface is abraded lightly then wiped clean per Reference 1-B and 1-C.

b) Perform inspections (e) through (l) in paragraph 3.2.2.

3.2.4

Repair of Primer by Recoating

The coating inspector shall conduct the following inspections for primer recoating repair. Only two (2) overcoats shall be applied.

a) Verify that the surface has been solvent cleaned or cleansed in accordance with Reference 1-A and 1-B. A clean white cloth shall be used to check primed surface cleanliness. Contamination, other than rust (red) and zinc oxide (white) stains, is unacceptable and require further cleaning.

b) Perform inspections (e) through (l) in Section 3.2.2.

3.2.5

Documentation of Primer Repair Inspections

All inspections required by Section 3.2 shall be documented on an IR, Attachment 3, in accordance with Reference 1-D.

NOTE: If the repair is of an item which is fabricated out of several pieces of steel bearing different QP numbers, all QP numbers will be recorded in the "Remarks" section of the IR.

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3.3 PRE-APPLICATION INSPECTIONS

The QC inspector shall verify the following items prior to applying coatings:

3.3.1 QUALIFICATIONS

The Inspector shall verify (by Qualification Record or list of qualification records in QA File) that the coating applicators on each shift are qualified for safety-related coating work.

3.3.2 Ambient Conditions

The Inspector shall determine substrate surface temperature, air temperature, relative humidity and dew point in the area of the item to be coated. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperatures using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W. B. No. 235. The surface temperature thermometer (Omega-Amprobe-Fastemp, 10-250°F range or equivalent) shall be placed in contact with the surface to be coated. The thermometer probe shall remain in contact with the substrate surface until the temperature reading stabilizes.

The permissible range of surface and ambient temperature for application of finish coat shall be 50-120°F.

Maximum values of relative humidity shall be 85%.

The surface temperature shall be a minimum of 5°F above the dew point.

3.3.3 Coated Surface Acceptability

The Inspector shall visually reinspect the previously coated surface just prior to finish coat application for evidence of contamination (oil, grease, foreign matter) and stains.

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Contamination is unacceptable. All contamination must be removed per Reference 1-A or 1-B prior to finish coating.

Rust (red) and zinc oxide (white) stains are acceptable provided all loose particles have been removed (as evidenced by existence of no stain on cloth) from the primer surface by approved cleaning operations. Carboline #33 is approved cleaner for carbo zinc primer. Phenoline Thinner or Xylol are approved cleaners for seal coat. Thinner wiping is not recommended for Dimetcoat primer.

3.3.4 Air Supply Acceptability

The Inspector shall inspect the air supply system (pressure pots and spray guns) for the existence of suitable filters/traps/separators.

The effectiveness of these items shall be verified by placing a clean piece of cheesecloth (or white fabric) over the exit of the air lines and allowing air to flow for 30 seconds minimum. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.5 Mixing Operations

3.3.5.1 Materials

The inspector shall verify that Phenoline 305 Finish Coat, Parts A (base) and B (catalyst) are used and their respective batch numbers are recorded. In addition, the inspector shall verify that the shelf life (24 months) has not been exceeded.

3.3.5.2 Mixing/Thinning

The inspector shall witness each mixing/thinning operation and shall verify that it is in accordance with requirements of Reference 1-B and 1-C. Thinning may be done up to two quarts of Phenoline thinner per gallon of Phenoline 305. Pot life shall be per Reference 1-B or 1-C (as applicable).

3.4 SURVEILLANCE OF SEAL OR FINISH COAT APPLICATION

The Inspector shall verify that hose length is less than 75 feet. If a brush technique is used, the inspector shall verify that a short bristle brush is used and rebrushing is avoided.

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The inspector shall also verify that the seal coat (if present) is solvent wiped with Phenoline 305 thinner or Xylol prior to finish coat application.

3.5 FINISH COAT POST APPLICATION OPERATIONS

3.5.1 Visual Defects Inspection

The Inspector shall perform a visual inspection of the finish coated substrate surface in accordance with the following:

- a) Runs/sags - Runs or sags in which the DFT of the total coating system is 11.5 mils or less thick, which show no evidence of evidence of mudcracking, are acceptable. Those greater than 11.5 mils shall be repaired in accordance with Reference 1-B or 1-C.
- b) Skips/damaged areas/gross discontinuities such as holidays, voids, and bubbles are not acceptable.
- c) Pinholes - acceptable to the extent allowed by Attachment 2.
- d) Contamination - Embedded foreign materials unacceptable.

3.5.2 Finish Coat Cure

The Inspector shall monitor the ambient temperature and humidity after the finish coat is applied (including touch-up). A calibrated non-mercury filled wet/dry bulb thermometer, a calibrated temperature/humidity recorder, or local weather station data may be used.

The inspector shall verify that the finish coat has cured the time described in References 1-B and 1-C before performing dry film thickness determination and continuity checks, and final acceptance.

3.5.3 Dry Film Thickness (DFT)

The Inspector shall perform a DFT of the cured coating system. A calibrated 0-25 Elcometer Inspector DFT Gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in

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the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible.

The average DFT of the total coating system shall be a minimum of 7.0 mils and a maximum of 11.0 mils. The spot test DFT of the total coating system shall be a minimum of 7.0 mils and a maximum of 11.5 mils.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities such as handrails, gratings, stairs, sway struts, etc. shall be exempt from DFT measurement (See DCA 11421).

3.5.4 Continuity Inspection

The Inspector shall test the continuity of the cured finish coat using a Tinker and Razor Model M1 (67.5 volt) holiday detector. 100% of the finish coated surface area shall be tested.

The applied film should contain only a minor number of points of discontinuity. No more than two points of discontinuity should occur within an area having a radius of 6 inches as measured from a point of discontinuity (pinholes). No more than 40% of the total number of allowable points of discontinuity should occur within any one area equal to 25% of the total area being coated. The total number of pinhole discontinuities allowed is defined in Attachment 2. No gross discontinuities are allowed.

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3.6 DOCUMENTATION

Results of inspections described in Sections 3.2, 3.3, 3.4 and 3.5 shall be documented on an inspection report (IR), Attachment 1, in accordance with Reference 1-D. The completed IR shall be forwarded to the PPRV for retention.

3.7 REPAIRS

3.7.1 Repairs of Runs and Sags

The QC inspector shall verify that the area is abraded until the DFT of the total coating system is within 7.0 and 11.5 mils, and examined for cracks.

The presence or absence of cracks shall dictate the type of repair required per Reference 1-B or 1-C.

3.7.2 Repair of Minor Defects

The QC inspector shall perform the following inspection when repairing minor defects (as defined by Reference 1-B or 1-C.):

- a) Verify that the damaged area is blasted or abraded and any exposed steel is ground per Reference 1-B or 1-C.
- b) Verify damaged area is solvent wiped in accordance with Reference 1-B or 1-C.
- c) Perform inspections described in 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5, 3.4 and 3.5.

3.7.3 Repair of Major Defects

The QC inspector shall verify the following for repair of major defects (as defined by Reference 1-B or 1-C):

- a) Verify area is abraded or spot blasted per Reference 1-B or 1-C.
- b) Perform inspections in Section 3.2.2.
- c) Perform inspections in Section 3.7.2(c).

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3.7.4 Repair of Embedded Foreign Particles

The QC inspector shall verify that embedded foreign particles are removed and recoated per Section 3.7.5.

3.7.5 Repair of Pinholes and Discontinuities, and/or Overcoating

- a) Verify all loose particles are removed and area is solvent wiped.
- b) Perform inspections described in 3.7.2 (c).

3.7.6 Documentation of Repairs

All repairs shall be documented on an Inspection Report, Attachment 1. Repairs involving application of primer will be documented on Attachment 1, Reference 1-A.

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ATTACHMENT 1

COMANCHE PEAK STEAM ELECTRIC STATION
INSPECTION REPORT

ITEM DESCRIPTION		CERTIFICATION NO.	SYSTEM / STRUCTURE DESIGNATION	
PROTECTIVE COATINGS				
SPEC. NO.	REV.	REF. QP, QCC & REV. & CHANGE NO.	MEASURE OR TEST EQUIP. CERT. NO.	
AS-31		QI-QP-11.4-5, Rev.		
<input type="checkbox"/> IN PROCESS INSPECTION	<input type="checkbox"/> PRE-INSTALLATION VERIFICATION	<input type="checkbox"/> INSTALLATION INSPECTION	<input type="checkbox"/> FINAL INSPECTION	<input type="checkbox"/> PRE-TEST INSPECTION
INSPECTION RESULTS				
<input type="checkbox"/> INSPECTION COMPLETED, ALL APPLICABLE ITEMS SATISFACTORY				
<input type="checkbox"/> INSPECTION COMPLETED, UNSATISFACTORY ITEMS LISTED BELOW				
ITEM NO.	INSPECTION ATTRIBUTES			QC INSPECTOR DATE
	SEAL COAT <input type="checkbox"/>	FINISH COAT <input type="checkbox"/>		
	ORIGINAL <input type="checkbox"/>	REPAIR <input type="checkbox"/>		
1.	Perform DFT of Primer Coat per Para. 3.1.b			
	RECORD: Minimum Soot Test:			
	Maximum Soot Test:			
	Average DFT:			
2.	Record all Protective Coatings Unique I.D. No.'s:			
3.	Ambient conditions checked per Para. 3.3.2 prior to coating application and record below:			
	DATE:	TIME:	WET BULB TEMP:	
	DRY BULB TEMP:	RELATIVE HUMIDITY:		
	DEW POINT:	SURFACE TEMP:		
4.	Perform Visual Inspection of previously coated surface per Para. 3.3.3			
5.	Verify surface preparation acceptable per CCP-30 or 30A.			
6.	Verify air supply acceptable per Para. 3.3.4.			
7.	Verify mixing operations are per CCP-30 or 30A and Paragraph 3.3.5.			
8.	Coating material product identification:			
	RECORD BATCH NUMBERS:			
	PART A:			
	PART B:			
	THINNER:			
	TIME MIXED:			
9.	Verify that shelf life of coating materials has not expired.			
10.	Verify that pot life is not exceeded.			

(Continued on Next Sheet...)

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CPSES

INSTRUCTION
NUMBER

REVISION

ISSUE
DATE

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ATTACHMENT 1 (Continued)

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COMANCHE PEAK STEAM ELECTRIC STATION
INSPECTION REPORT

(SUPPLEMENTAL)

ITEM NO.	INSPECTION ATTRIBUTES	DATE	SIGNATURE
11.	Verify qualification of applicator per Para. 3.3.1 List Applicators:		
12.	Verify hose length is less than 75 feet.		
13.	Perform visual inspection of coated surface per Para. 3.5.1.		
14.	Verify curing is per CCP-30 or CCP-30A and Para. 3.5.2.		
15.	Perform DFT on coated surface (Finish Coat only) as per Para. 3.5.3. Coating System Spot Test Minimum: Coating System Spot Test Maximum: Average DFT Coating System:		
16.	Perform continuity inspection (Finish Coat only) per Para. 3.5.4.		
REMARKS: (DWGS, SPECS, ETC.)			
RELATED NCR NO.	I.R. CLOSED	DATE	SIGNATURE
			QC INSPECTOR

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ATTACHMENT 2

TOTAL NUMBER OF ALLOWABLE POINTS OF DISCONTINUITY

SURFACE AREA BEING COATED (SQ. FT.)	COND. "C" COMMERCIALY CONTINUOUS
10	5
10-50	10
50-100	20
100-500	30
500-1000	50
1000-5000	75

Gross Discontinuities - None Allowed.

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ATTACHMENT 3

COMANCHE PEAK STEAM ELECTRIC STATION

INSPECTION REPORT

SHEET 1 OF 2
NO.

ITEM DESCRIPTION		IDENTIFICATION NO.		SYSTEM/STRUCTURE DESIGNATION	
PROTECTIVE COATINGS					
SPEC. NO.	REV.	REF. TO SPEC. & REV. & CHANGE NO.	MEASURE OR TEST EQUIP. IDENT. NO.		
AS-31		QI-QP-11.4-5, Rev.			
<input type="checkbox"/> IN PROCESS INSPECTION <input type="checkbox"/> PRE-INSTALLATION VERIFICATION <input type="checkbox"/> INSTALLATION INSPECTION <input type="checkbox"/> FINAL INSPECTION <input type="checkbox"/> PRE-TEST INSPECTION					
INSPECTION RESULTS					
<input type="checkbox"/> INSPECTION COMPLETED, ALL APPLICABLE ITEMS SATISFACTORY					
<input type="checkbox"/> INSPECTION COMPLETED, UNSATISFACTORY ITEMS LISTED BELOW					
ITEM NO.		PRIMER REPAIRS		QC INSPECTOR DATE	
		INSPECTION ATTRIBUTES		DATE SIGNATURE	
1.	For repair of tags and runs over 5.5 mils DFT, perform				
	DFT of Primer Coat in areas which have been sanded or				
	screened per Para. 3.2.1.				
	RECORD: Minimum Spot Test:				
	Maximum Spot Test:				
	Average DFT:				
2.	Abrasive acceptable per Para. 3.2.2.a.				
3.	Separators installed, drained, and drains left				
	partially open.				
4.	Air supply free of contamination				
5.	Blasted surface and profile:				
	a. Blasted surface and surrounding areas cleaned per				
	Para. 3.2.2.c.				
	b. Surface free of foreign matter incl. grease & oil.				
	c. Sharp (non-rounded) projections removed.				
	d. Anchor pattern depth 1.0 mil, minimum.				
	e. Surface lightly abraded per Para. 3.2.3				
	f. Surface wiped clean per Para. 3.2.3 or 3.2.4				
	(Repairs Only)				
6.	Unique Number stamped on piece(s). Record Unique				
	Number(s) in "Remarks" below.				
7.	Ambient conditions checked per Para. 3.3.2 prior to				
	primer application and record below: DATE:				
	TIME: WET BULB TEMP.: DRY BULB TEMP.:				
	RELATIVE HUMIDITY: DEW POINT: SURF. TEMP.:				
8.	Substrate surface free of contaminants and less than				
	24 hours elapsed since blasting.				
9.	Trap, filter or separator installed per Para. 3.3.4				
10.	Air supply free of contamination.				
(Continued on Sheet 2...)					

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(SUPPLEMENTAL)

- TUGCO CA

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INSPECTION OF STEEL SUBSTRATE SEAL AND FINISH COAT APPLICATION AND REPAIR	PREPARED BY:	<i>RA Cunningham Jr</i>	<i>11/18/81</i>	DATE
	APPROVED BY:	<i>W. H. Hulse</i>	<i>11/18/81</i>	DATE
	APPROVED BY:	<i>B. C. Scott</i>	<i>11/18/81</i>	DATE

- 1.0 REFERENCES **FOR INFORMATION ONLY**
- 1-A QI-QP-11.4-1, "Inspection of Steel Substrate Surface Preparation and Primer Application and Repair"
- 1-B CCP-30, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-C CCP-30A, "Coating Steel Substrates Inside Reactor Buildings and Radiation Areas"
- 1-D CP-QP-18.0, "Inspection Reports"

2.0 GENERAL

3.0 INSTRUCTION

3.1 SEAL COAT APPLICATION

3.1.1 Pre-application Inspection

The QC inspector shall verify the following:

- Applicators are qualified per paragraph 3.2.
- Primed surface is acceptable per paragraph 3.3.2 immediately prior to seal coat application.
- Air supply is acceptable per paragraph 3.3.3.
- Mixing operations are acceptable per paragraph 3.3.4.
- Primer surface is visually examined in accordance with the following:

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1. Runs/sags - A DFT measurement shall be made with the Elcometer DFT gage. Runs/sags 5.5 mils or less thick (DFT) which show no evidence of mudcracking (See NOTE) are acceptable. Refer to References 1-B and 1-C for repair of runs/sags exceeding 5.5 mils.

NOTE: Mudcracking is defined as irregular cracking as in a dried mud puddle.

2. Dry Spray - Must be removed by screening or abrading before overcoating.
3. Overspray - Must be removed before overcoating.
4. Contamination

Oil and grease - unacceptable

Embedded foreign materials - unacceptable

Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed prior to application of finish coat.

5. Skips/holidays - unacceptable.

Primer repairs shall be made per Reference 1-A except visual acceptance criteria shall be per above.

- f) The inspector shall perform a DFT inspection of the cured primer film. A calibrated 0-25 Elcometer Inspector DFT gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible. (See Note 3)

Dry Film Thickness shall be as follows:

	Min. (mils)	Max. (mils)
CZ-II spot test	1.5	5.5
D6 spot test	1.5	5.5
D6 average DFT	2.0	5.0
CZ-II average DFT	2.0	4.5

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NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities, such as handrails, gratings, stairs, sway struts, etc., shall be exempt from dry film thickness measurement. (See DCA 11421)

- g) Provide traceability to primer application records by recording all Protective Coatings Unique Identification Numbers ("QP" Numbers) on Inspection Report (IR), Attachment 1.

3.1.2 Seal Coat Application

The QC inspector shall verify the seal coat is applied per paragraph 3.4.

3.1.3 Visual Inspection

The QC inspector shall perform a visual inspection of the seal coat in accordance with paragraph 3.5.1.

3.1.4 Seal Coat Cure

The QC inspector shall monitor ambient curing conditions to assure curing is performed in accordance with Reference 1-B and 1-C.

3.1.5 Documentation

Results of inspections of seal coat application shall be documented on an Inspection Report (IR), Attachment 1, in accordance with Reference 1-D.

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3.2 QUALIFICATIONS

The Inspector shall verify (by Qualification Record or list of qualification records in QA File) that the coating applicators on each shift are qualified for safety-related coating work.

3.3 PRE-APPLICATION OPERATIONS

3.3.1 Ambient Conditions

The Inspector shall determine substrate surface temperature, air temperature, relative humidity and dew point in the area of the item to be coated. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperatures using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W. B. No. 235. The surface temperature thermometer (Omega-Amprobe-Fastemp, 10-250°F range or equivalent) shall be placed in contact with the surface to be coated. The thermometer probe shall remain in contact with the substrate surface until the temperature reading stabilizes.

The permissible range of surface and ambient temperature for application of finish coat shall be 50-120°F.

Maximum values of relative humidity shall be 85%.

The surface temperature shall be a minimum of 5°F above the dew point.

3.3.2 Coated Surface Acceptability

The Inspector shall visually reinspect the previously coated surface just prior to finish coat application for evidence of contamination (oil, grease, foreign matter) and stains.

Contamination is unacceptable. All contamination must be removed per Reference 1-A or 1-B prior to finish coating.

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Rust (red) and zinc oxide (white) stains are acceptable provided all loose particles have been removed (as evidenced by existence of no stain on cloth) from the primer surface by approved cleaning operations. Carholine #33 is approved cleaner for carbo zinc primer. Phenoline Thinner or Xylol are approved cleaners for seal coat. Thinner wiping is not recommended for Dimetcoat primer.

3.3.3 Air Supply Acceptability

The Inspector shall inspect the air supply system (pressure pots and spray guns) for the existence of suitable filters/traps/separators.

The effectiveness of these items shall be verified by placing a clean piece of cheesecloth (or white fabric) over the exit of the air lines and allowing air to flow for 30 seconds minimum. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.4 Mixing Operations

3.3.4.1 Materials

The inspector shall verify that Phenoline 305 Finish Coat, Parts A (base) and B (catalyst) are used and their respective batch numbers are recorded. In addition, the inspector shall verify that the shelf life (24 months) has not been exceeded.

3.3.4.2 Mixing/Thinning

The inspector shall witness each mixing/thinning operation and shall verify that it is in accordance with requirements of Reference 1-B and 1-C. Thinning may be done up to two quarts of Phenoline thinner per gallon of Phenoline 305. Pot life shall be as shown on Attachment 1.

3.4 SURVEILLANCE OF FINISH COAT APPLICATION

The Inspector shall verify that hose length is less than 75 feet. If a brush technique is used, the inspector shall verify that a short bristle brush is used and rebrushing is avoided.

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The inspector shall also verify that the seal coat (if present) is solvent wiped with Phenoline 305 thinner or Xylol prior to finish coat application.

3.5 FINISH COAT POST APPLICATION OPERATIONS

3.5.1 Visual Defects Inspection

The Inspector shall perform a visual inspection of the finish coated substrate surface in accordance with the following:

- a) Runs/sags - Runs or sags 4.5 mils or less thick (DFT) which show no evidence of mudcracking, are acceptable. Those greater than 4.5 mils thick shall be repaired in accordance with Reference 1-B or 1-C.
- b) Skips/damaged areas/gross discontinuities such as holidays, voids, and bubbles are not acceptable.
- c) Pinholes - acceptable to the extent allowed by Attachment 2.
- d) Contamination - Embedded foreign materials unacceptable.

3.5.2 Finish Coat Cure

The Inspector shall monitor the ambient temperature and humidity after the finish coat is applied (including touch-up). A calibrated non-mercury filled wet/dry bulb thermometer, a calibrated temperature/humidity recorder, or local weather station data may be used.

The inspector shall verify that the finish coat has cured the time described in References 1-B and 1-C before performing dry film thickness determination and continuity checks, and final acceptance.

3.5.3 Dry Film Thickness (DFT)

The Inspector shall perform a DFT of the cured coating system. A calibrated 0-25 Elcometer Inspector DFT Gage Model III/1E, or equivalent, shall be used. A minimum of five separate spot measurements (See Note 1) spaced evenly over the structure (See Note 2) shall be taken. Since the magnetic gage is sensitive to geometric discontinuities in

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the steel, measurements less than 1 inch from the edge or a hole shall be avoided where possible.

The average DFT of the finish coat will be determined by subtracting the average DFT of the primer coat from the average DFT of the total coating system in the same area. The average DFT of the total coating system shall be a minimum of 7.0 mils and a maximum of 11.0 mils. The spot test DFT of the total coating system shall be a minimum of 7.0 mils and a maximum of 11.5 mils.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The probe should be moved a short distance for each gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take an average of these three gage readings as one spot measurement.

NOTE 2: For small areas of coating, 5 separate spot measurements shall be taken. For larger areas, 5 spot measurements shall be taken for every 100 square feet of coating.

NOTE 3: Items with appreciable surface curvature and other geometrical discontinuities such as handrails, gratings, stairs, sway struts, etc. shall be exempt from DFT measurement (See DCA 11421).

3.5.4 Continuity Inspection

The Inspector shall test the continuity of the cured finish coat using a Tinker and Razor Model M1 (67.5 volt) holiday detector. 100% of the finish coated surface area shall be tested.

The applied film should contain only a minor number of points of discontinuity. No more than two points of discontinuity should occur within an area having a radius of 6 inches as measured from a point of discontinuity (pinholes). No more than 40% of the total number of allowable points of discontinuity should occur within any one area equal to 25% of the total area being coated. The total number of pinhole discontinuities allowed is defined in Attachment 2. No gross discontinuities are allowed.

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3.6 DOCUMENTATION

Results of inspections described in Sections 3.2, 3.3, 3.4 and 3.5 shall be documented on an inspection report (IR), Attachment 1, in accordance with Reference 1-D. The completed IR shall be forwarded to the PPRV for retention.

3.7 REPAIRS

3.7.1 Repairs of Runs and Sags

The QC inspector shall verify that the area is abraded until the DFT of Phenoline 305 is within 1.9 - 4.5 mils, and examined for cracks.

The presence or absence of cracks shall dictate the type of repair required per Reference 1-B or 1-C.

3.7.2 Repair of Minor Defects

The QC inspector shall perform the following inspection when repairing minor defects (as defined by Reference 1-B or 1-C.):

- Verify that the damaged area is blasted or abraded and any exposed steel is ground per Reference 1-B or 1-C.
- Verify damaged area is solvent wiped in accordance with Reference 1-B or 1-C.
- Perform inspections described in 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.4 and 3.5.

3.7.3 Repair of Major Defects

The QC inspector shall verify the following for repair of major defects (as defined by Reference 1-B or 1-C):

- Verify area is abraded or spot blasted per Reference 1-B or 1-C.
- Verify applicator qualification per Section 3.2.
- Verify ambient conditions per Section 3.3.1.
- Verify air supply acceptability per Section 3.3.3.

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- e) Verify mixing operations per Section 3.3.4.
- f) Verify primer application per Reference 1-A, 1-B or 1-C.
- g) Visually inspect primer per Section 3.1.1 (e).
- h) Verify primer cure per Reference 1-A.
- i) Perform DFT measurement in accordance with Section 3.1.1 (f).
- j) Perform inspections described in 3.7.2 (c).

3.7.4 Repair of Embedded Foreign Particles

The QC inspector shall verify that embedded foreign particles are removed and recoated per Section 3.7.5.

3.7.5 Repair of Pinholes and Discontinuities, and/or Overcoating

- a) Verify all loose particles are removed and area is solvent wiped.
- b) Perform inspections described in 3.7.2 (c).

3.7.6 Documentation of Repairs

All repairs shall be documented on an Inspection Report, Attachment 1. Repairs involving application of primer will be documented on Attachment 1, Reference 1-A.

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ATTACHMENT 1

COMANCHE PEAK STEAM ELECTRIC STATION

INSPECTION REPORT

SHEET 1 OF 2

ITEM DESCRIPTION		CERTIFICATION NO.	SYSTEM / STRUCTURE DESIGNATION	
PROTECTIVE COATINGS				
SPEC. NO.	REV.	REF. D. CCC & REV. & CHANGE NO.	MEASURE OR TEST EQUIP. IDENT. NO.	
AS-31		QI-QP-11.4-5, Rev.		
<input type="checkbox"/> IN PROCESS INSPECTION	<input type="checkbox"/> PRE-INSTALLATION VERIFICATION	<input type="checkbox"/> INSTALLATION INSPECTION	<input type="checkbox"/> FINAL INSPECTION	<input type="checkbox"/> PRE-TEST INSPECTION
INSPECTION RESULTS				
<input type="checkbox"/> INSPECTION COMPLETED, ALL APPLICABLE ITEMS SATISFACTORY				
<input type="checkbox"/> INSPECTION COMPLETED, UNSATISFACTORY ITEMS LISTED BELOW				
ITEM NO.	INSPECTION ATTRIBUTES			QC INSPECTOR
	SEAL COAT	FINISH COAT	DATE	SIGNATURE
	ORIGINAL	REPAIR		
1.	Perform DFT of Primer Coat per Para. 3.1.1.F			
	RECORD: Minimum Spot Test:			
	Maximum Spot Test:			
	Average DFT:			
2.	Record all Protective Coatings Unique I.D. No.'s:			
3.	Ambient conditions checked per Para. 3.3.1 prior to coating application and record below:			
	DATE:	TIME:	WET BULB TEMP:	
	DRY BULB TEMP:	RELATIVE HUMIDITY:		
	DEW POINT:	SURFACE TEMP:		
4.	Perform Visual Inspection of previously coated surface per Para. 3.3.2 or Para. 3.1.1.			
5.	Verify surface preparation acceptable per CCP-30 or 30A.			
6.	Verify air supply acceptable per Para. 3.3.3.			
7.	Verify mixing operations are per CCP-30 or 30A and Paragraph 3.3.4.			
8.	Coating material product identification:			
	RECORD BATCH NUMBERS:			
	PART A:			
	PART B:			
	THINNER:			
	TIME MIXED:			
9.	Verify that shelf life of coating materials has not expired.			
10.	Verify that pot life is not exceeded.			

(Continued on Next Sheet...)

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ATTACHMENT 1 (Continued)

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COMANCHE PEAK STEAM ELECTRIC STATION
INSPECTION REPORT

(SUPPLEMENTAL)

ITEM NO.	INSPECTION ATTRIBUTES	DATE	SIGNATURE
11.	Verify qualification of applicator per Para. 3.2. List Applicators:		
12.	Verify hose length is less than 75 feet.		
13.	Perform visual inspection of coated surface per Para. 3.5.1.		
14.	Verify curing is per CCP-30 or CCP-30A and Para. 3.5.2.		
15.	Perform DFT on coated surface (Finish Coat only) as per Para. 3.5.3. Coating System Spot Test Minimum: Coating System Spot Test Maximum: Average DFT Coating System:		
16.	Perform continuity inspection (Finish Coat only) per Para. 3.5.4.		
REMARKS: (DWGS, SPECS, ETC.)			
RELATED NCR NO.	IR CLOSED	DATE	SIGNATURE
			QC INSPECTOR

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ATTACHMENT 2

TOTAL NUMBER OF ALLOWABLE POINTS OF DISCONTINUITY

SURFACE AREA BEING COATED (SQ. FT.)	COND. "C" COMMERCIALY CONTINUOUS
10	5
10-50	10
50-100	20
100-500	30
500-1000	50
1000-5000	75

Gross Discontinuities - None Allowed.

CPSES NRC TRT

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HISTORICAL [EXCERPTS]

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