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5

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INSPECTION OF CONCRETE
SUBSTRATE SURFACE
PREPARATION AND COATINGS
APPLICATION AND REPAIR

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1.0 REFERENCES

FOR INFORMATION ONLY

- 1-A Gibbs and Hill Specification 2323-AS-31, "Protective Coatings"
- 1-B QI-QP-11.4-28, "Protective Coatings Inspection Travelers"
- 1-C CP-QP-16.0, "Nonconformances"

2.0 GENERAL

HISTORICAL FILE

2.1 PURPOSE AND SCOPE

This instruction shall describe the methods used by Quality Control personnel while performing inspections of application of coatings on a concrete substrate inside the Reactor Containment Building, Unit 1.

3.0 INSTRUCTIONS

Visual inspection of surfaces as addressed by this instruction shall be made at approximately an arm's 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) D-cell battery flashlight.

Visual aids fabricated on site and approved by Quality Assurance and Engineering may be used by Inspectors as an aid in the performance of their inspections.

For definitions reference Attachment 6.

If a conflict arises between the requirements of this procedure and the requirements of the site specification, Ref. 1-A, the requirements of the site specification shall prevail.

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3.1 SURFACE PREPARATION

Under normal conditions, the concrete surface shall be allowed to cure a minimum of 28 days prior to application of protective coatings. However, if the coatings are to be applied to pour backs, grouting, or patching to which NUTEC 10 has been applied as a curing compound, coating application may be performed after a minimum of 6 days has elapsed from NUTEC 10 application time. Repaired abandoned Hilti bolt holes, tie holes, unacceptable spalled concrete, grout under base plates which have 3 square feet or less of exposed grouted surface to be coated, may be coated if Nutec 10 is applied as a curing compound and the Nutec 10 has cured in accordance with Section 3.1.1.7. Abandoned Hilti Bolt holes and tie holes may be coated after initial setting of the patch if no curing membrane is used. If other curing methods are utilized for cosmetic patches or grout under base plates as stated above, coating shall not proceed until 7 days cure has elapsed.

3.1.1 Application of NUTEC 10 Curing Compound (if applicable)

- 3.1.1.1 The QC Inspector shall verify that the green concrete has been cleaned.
- 3.1.1.2 The QC Inspector shall verify the coating applicator is qualified per Section 3.3.5.
- 3.1.1.3 The QC Inspector shall verify that NUTEC 10 is not applied under inclement conditions and that the surface temperatures are above 50°F. Ambient condition shall be verified per Section 3.3.1. Areas of visible moisture or standing water are unacceptable (Reference Attachment 6).
- 3.1.1.4 NUTEC 10 shall be mixed per Paragraph 3.2. The NUTEC 10 has a pot life of (1) one hour at 75°F. If the NUTEC 10 gives the appearance of crawling and does not penetrate the concrete, the material shall be removed from the concrete by solvent and a clean cloth. All the expired material shall be discarded.
- 3.1.1.5 Pot life above is the recommended time and should be utilized as a guideline for coating time, actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

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3.1.1.6 The QC Inspector shall verify that the NUTEC 10 air supply shall be in accordance with Section 3.3.3. NUTEC 10 may be applied by brush or roller.

3.1.1.7 Cure times for Nutec 10 is as follows:

ST - 50°F - 69°F -- 72 hours
70°F - 89°F -- 24 hours
90°F and above 18 hours

3.1.2 Preblast Cleaning Operations

Prior to surface preparation, the QC inspector shall visually examine the surface to be water blasted for heavy deposits of oil and grease. Any heavy oil or grease deposits shall be removed.

The QC inspector shall also verify that any detrimental surface irregularities such as projections, fins or ridges are removed.

NOTE: The preblast visual inspection is required only when surface preparation is by one of the following methods:

- Water blasting
- Water blasting with sand injection
- Dry sandblasting
- Bush hammering

3.1.3 Methods of Surface Preparation

Water blasting, water blasting with sand injection, acid etching, sand blasting, and power tooling are all acceptable methods of surface preparation. If NUTEC 10 curing membrane has been applied and gives a "glossy" appearance, the NUTEC 10 shall be abraded to remove the glossy appearance.

If chemical cleaning is performed on the concrete substrate, the QC Inspector shall verify that the surface is flushed clean with water.

3.1.4 Post Surface Preparation Operations

After surface preparation, the QC inspector shall visually examine the surface to verify the following:

- The surface shall be free of construction dust, laitance, and loose deposits, and all adjacent areas cleaned to avoid contamination.

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- b) All holes greater than 1/2 inch in depth or greater than 2" diameter and cracks greater than 1/32" width are repaired prior to surfacer application.
- c) All sharp projections removed.
- d) Markings (ink, pencil, chalk, felt tip marker, etc.) solvent wiped.
- e) Marking paint removed.
- f) Objects protruding from surface are ground or cut smooth until object is flush.
- g) All loosely adhering embedded objects are removed.
- h) Embedded steel objects less than 4 square inches shall be power tool roughened and solvent wiped.
- i) Metal objects larger than 4 square inches are primed.
- j) Surface is free of grease, oil, and nonapproved curing membranes.

3.2 MIXING OPERATIONS

3.2.1 Materials

A QC inspector shall verify on Attachment 5 that the shelf life has not expired.

3.2.2 Mixing/Thinning

An inspector shall witness all mixing/thinning operations Per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

3.3 SURFACER APPLICATION

The coating system will consist of a surfacer Nutec 11S, touch-up with Nutec 11 surfacer as required and a finish coat of Nutec 1201. In areas where the concrete surface to be coated exhibits only minor amounts of "bug holes" and surface imperfections, Nutec 11 and Nutec 1201 may be used without the use of Nutec 11S as primary surfacer.

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3.3.1 Ambient Conditions

The inspector shall monitor the ambient conditions being recorded on the Environmental Log (Attachment 4) at the "paint distribution point" inside Reactor Unit I. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069 TH or equivalent) shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder (Bristol 4069 TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperature using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W.B. 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 (note in Remarks Section). The surface temperature shall be determined by placing a calibrated Range 0-250°F thermometer or equivalent in contact with the surface to be coated. The thermometer probe shall remain in contact with the surface until the temperature reading stabilizes.

Minimum and maximum values of surface and ambient temperatures shall be 50°F and 100°F respectively. Infrequent dips in temperature to 40°F is permissible during application and/or cure; however, the elapsed time the temperature is below 50°F shall be added to the cure time. Application of the coating shall not begin unless the surface temperature is 5°F above the dew point.

Humidity may vary as high as 100%; however, free standing water shall be removed. Coating application over a damp surface is permissible. Under no conditions shall NUTEC 11S or Nutec 11 be applied to a surface containing free standing water. (Reference Attachment 6).

3.3.1.1 Documentation of Environmental Conditions

- a. The Inspector assigned to the "paint distribution point" in the Reactor Building shall, as a minimum, take a complete set of readings (air temperature, relative humidity, dew point and surface temperature) on each floor elevation at least three (3) times each shift (preferably, the beginning, mid point, and just prior to the end of each shift). More readings may be taken when necessary (i.e., noticeable change in air temperature, request by field inspector to take readings in a specific area, etc.).

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- b. The Inspector at the "paint distribution point" shall document these readings on Attachment 4 as follows:
 1. The Inspector shall fill in the applicable information as delineated on the form, except for the "Report No.". (The Report No. will be filled in by the Paper Flow Group when they assign numbers, prior to transmitting to the QA vault.)
 2. Upon completion of the shift, the inspector shall turn all of the Environmental Log Sheets for that shift into the lead inspector(s).
- c. The lead inspector(s) shall review the log sheets for completeness and correctness, sign and date the "QC Review" block, obtain copies for QC reference and transmit the originals to the Paper Flow Group.
- d. If at any time the inspector determines readings which do not comply with the parameters set forth in this procedure, he shall proceed in the following manner:
 1. Immediately take an additional set of readings in the immediate area of the first set of unacceptable readings and record them on the Environmental Log.
 2. If the additional set of readings are acceptable, take a third set of readings for referee purposes and record them. If the referee set of readings are acceptable, then the area in question is acceptable but should be closely monitored with readings as necessary.
 3. If the additional set of readings is unacceptable and/or the referee set of readings is unacceptable, the inspector is to notify the coatings inspectors in the areas affected so that coating work may be stopped at that time. Coating work shall not continue until the ambient conditions resume an acceptable status.
 4. When unacceptable ambient conditions occur and are verified by Step 3 above, the Inspector shall document it on a Nonconformance Report (NCR) in accordance with Reference 1-C, and adequately identify the affected areas/elevations.

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3.3.2 Surface Acceptability

The QC inspector shall visually examine the substrate surface immediately prior to surfacer application to verify that it is free of contamination (dust, laitance, loose deposits and markings).

3.3.3 Air Supply Acceptability

The inspector shall inspect the air supply system for suitable filters/traps/separators. The effectiveness of these items shall be verified by exposing a piece of white cloth to a blast of air for approximately 30 seconds. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.4 Pot Life

The QC inspector shall verify that the pot life as shown in Attachment 2 is not exceeded.

3.3.5 Qualification of Applicator(s)

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

3.3.6 Dry Film Thickness

The QC inspector shall determine the DFT of the applied surfacer by taking wet film thickness spot measurements and multiplying each reading by the % volume solids (taking in account any thinner used). A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, Refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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

Thickness of Nutec 11S may vary between 10 and 35 mils. Nutec 11 may vary between 3 - 20 mils. (See Attachment 3 for method of determining percent volume solids.)

NOTE 3: Tack free times shall be as follows:

Temperature °F	#11	#11S
50 - 59	6 hrs.	8 hrs.
60 - 79	4 hrs.	6 hrs.
80 - 99	2 hrs.	4 hrs.
100	1 hr.	2 hrs.

Temperature °F	Full Cure 11, 11S
50 - 59	10 days
60 - 69	8 days
70 - 79	7 days
80 - 89	6 days
90 - 100	5 days

3.3.7 Monitoring of Surfacer Application

Monitor the surfaces where NUTEC 11S or Nutec 11 is being applied to assure that it is not being applied to a surface containing free standing water. (Application of 11S over a damp surface is permissible.) Reference Attachment 6. Verify that the pot life as stated in Paragraph 3.3.4 is not exceeded.

3.3.8 Surfacer Repair Work

3.3.8.1 Repair of Runs and Sags

Runs and sags which show no evidence of mudcracking shall be abraded flush with the surrounding surface. If after

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abrading, surfacer is unsatisfactory due to mudcracking remove unsatisfactory coating to substrate and reapply the surfacer. If after abrading the surfacer is satisfactory, no further repair is necessary.

3.3.8.2 Repair of Contamination

Contamination shall be removed by abrading. If unsatisfactory coating still exists, then the area shall be repaired in accordance with Section 3.3.8.3.

NOTE: Rust stains residue, not necessarily the stain, shall be removed with bristle brush and water or Imperial Thinner #DL-54.

3.3.8.3 Repairs When Touch Up or Recoating is Necessary

For repairs that require either touch up or recoating with NUTEC 11S, NUTEC 11 or NUTEC 1201, the QC inspector shall:

- a) Verify ambient conditions are acceptable per Section 3.3.1.
- b) Verify the surface has been prepared in accordance with Sec. 3.3.8.2 and is free from loose and foreign materials as per Section 3.1.4 and/or Paragraph 3.5.6.
- c) Verify acceptable materials are used, and shelf life is not exceeded.
- d) Verify that NUTEC 11S, NUTEC 11 or NUTEC 1201 is mixed/thinned in accordance with Section 3.2.
- e) Verify pot life is not exceeded per Attachment 2.
- f) Verify qualification of applicator(s) per Section 3.3.5.
- g) Visually inspect per Section 3.4.2.1.
- h) Verify that curing is in accordance with Section 3.4.2.2.
- i) Verify dry film thickness in the repair area is in accordance with the following millage requirements:

NUTEC 11S	10 - 35 mils
NUTEC 11	3 - 20 mils
NUTEC 1201	3 - 16 mils

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NOTE 1: See Section 3.3.6 and Attachment 3 for DFT calculation using Wet Film Thickness measurement and percent volume solids.

3.3.8.4 In-process repairs shall be documented on the Traveler in accordance with Reference 1-8, (Attachment 1) showing their status and/or completion.

3.4 FINISH COAT PREAPPLICATION

3.4.1 Preapplication Inspection

3.4.1.1 Ambient Conditions

Prior to finish coat application, the QC inspector shall determine ambient conditions in accordance with Section 3.3.1.

3.4.2 Surfacer Post Application Operation

3.4.2.1 Visual Defects Inspection

The inspector shall perform a visual inspection of the surfacer coat NUTEC 11S and NUTEC 11 prior to the finish coat application for the following defects:

- a) Runs and sags which show no evidence of mudcracking shall be abraded down to adjoining coating thickness.
- b) Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed from NUTEC 11S or NUTEC 11 surfaces prior to application of finish coat.
- c) Damaged areas, skips, dry spray, holidays, blisters, bubbling, mudcracking, oil and grease, contamination are all unacceptable and shall be removed and repaired in accordance with the applicable subsection of 3.3.8.

NOTE: Hairline cracks appearing in concrete coatings after application are acceptable provided coatings show no loss of adhesion.

3.4.2.2 Surfacer Cure

The inspector shall monitor ambient temperature after the surfacer is applied to determine when cure is adequate for

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finish coating operations to commence. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination.

Curing time shall be as follows:

<u>Temperature 0°F</u>	<u>Curing Time Before Topcoating with 1201</u>
50-59	72 hrs.
60-69	48 hrs.
70-79	24 hrs.
80-89	18 hrs.
90-100	12 hrs.

Temperature durations below 50°F will be added to the cure time on an hour for hour basis.

NUTEC 11S may be touched up or recoated with #11 or #11S as soon as the initial coat has dried such that the paint shall not adhere to the thumb when downward pressure is exerted on the paint film while turning a 90° angle. (This does not refer to the two pass application method.)

3.4.3 Mixing Operations

3.4.3.1 Materials

The QC Inspector shall verify on Attachment 5 that shelf has not expired.

3.4.3.2 Mixing/Thinning

An Inspector shall witness all mixing/thinning operations per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

3.5 FINISH COAT APPLICATION

3.5.1 Air Supply Acceptability

The QC inspector shall verify the air supply is acceptable per Section 3.3.3.

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3.5.2 Qualification of Applicator(s)

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

3.5.3 Pot Life

The QC inspector shall verify that the pot life of NUTEC 1201 has not been exceeded. Pot life is shown on Attachment 2.

3.5.4 Dry Film Thickness

The inspector shall determine the DFT of the applied finish coat by taking wet film thickness spot measurements and multiplying each reading by the % volume solids. A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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 spot test areas, Ref. Sec. 3.3.6 Note 2.

(See Attachment 3 for method of determining percent volume solids.)

3.5.5 Monitoring of Finish Coat Application

- a. During application of finish coat, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, previous coat (surfacers) cleaned with solvent and finish coat reapplied.
- b. If applicable, the inspector shall monitor that the hose length does not exceed 75 feet.

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- c. Monitor the cure time for recoat of NUTEC 1201. Recoating time of NUTEC 1201 is 24 hours.

The total DFT of NUTEC 1201, recoat and existing coat shall not exceed 16 mils.

3.5.6 Finish Coat Repairs

For repairs in the NUTEC 1201 Finish Coat, the QC Inspector shall verify the following:

- a) The inspector shall determine the DFT of the existing coated surface (prior to recoating) by either, or one of the two following methods.

- 1) Using the DFT readings acquired during the backfit documentation.
- 2) The scratch test of the NUTEC 1201 finish coat shall be performed using a Mark II Tooke Inspection Gage equipped with a 2x tip. Five separate readings spaced randomly over each finish coated area of 100 square feet shall be taken. For areas less than 100 square feet, Note 2 of Section 3.3.6 shall apply.

- b) Repairs of Runs/Sags

Runs/sags showing evidence of mudcracking shall be removed. Runs or sags which exhibit no other coating defect shall be abraded to the thickness of adjoining coatings.

- 1) Verify that all loose particles and foreign particles are removed from surface.
- 2) Verify that the surface is solvent wiped.
- 3) Perform inspections in Sections 3.2, 3.4.1, 3.5, and 3.6.

- c) Repair of Scratches and/or Damaged Areas

Any scratches or damaged areas shall be abraded until loosely adherent particles are removed. The following minimum coating requirements shall be maintained for damages extending to concrete:

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Damage 1/2" or less regardless of length - no additional surfacer required prior to topcoat.

Damage greater than 1/2" in width - normal coating system required.

When performing surfacer and/or topcoat repair work, and the damaged area is 2 sq/ in. or less in size, or the damage is a scratch 1/4 in. width or less, regardless of length, substantiating or recording wet film thickness or the damaged area repair shall not be required.

NOTE: Hairline cracks appearing in concrete coatings after application are acceptable provided coatings show no loss of adhesion.

d) Repair of Contamination

The QC inspector shall verify that contamination is removed by abrading and the surface recoated. The inspector shall perform inspections delineated in Sections 3.2, 3.4.1, 3.5 and 3.6.

e) Repair of Pinholes and Small Discontinuities

- 1) Verify all loose particles are removed and area is solvent wiped.
- 2) Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. The inspections in Section 3.2, 3.4.1, 3.5 and 3.6 still apply.

f) Repair of Dry Spray

Repair of dry spray identifiable by visual inspection defined within this procedure shall be removed. (A minor amount of adherent dry spray is acceptable on the final finish coat.)

- 1) Verify all loose particles are removed.
- 2) Verify coating film thickness is still within allowable range.

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- 3) If film thickness is not within allowable range perform inspections in Sec. 3.2, 3.4.1, 3.5 and 3.6.

g) Repair of Excessive Orange Peel

- 1) Verify the affected area is abraded and solvent wiped.
- 2) Verify the affected area is refinished and perform the inspections delineated in Section 3.2, 3.4.1, 3.5 and 3.6 if required.

h) Repair of Gloss and Color Nonuniformity

- 1) Verify the affected area is solvent wiped.
- 2) Verify the affected area is recoated without exceeding the maximum film thickness and perform inspections in Sections 3.2, 3.4.1, 3.5 and 3.6.
- 3) Top coated areas which have been abraded for various reasons (i.e., runs, sags, high millage, etc.) and are within acceptable procedural thickness, following repairs, do not require recoating for gloss enhancing.
- 4) For small repair areas such as pinholes, color and gloss uniformity is not required, provided the coating is smooth and continuous.

NOTE 1: If present, the tie in interface between concrete coatings and steel coatings shall be visually inspected during the finish coat final acceptance of both coating systems.

NOTE 2: (If applicable) coating interface - at coating interface for finish and or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interface the interface of the coating of systems shall be a maximum of 1½ inch in width. Within the interface area overlapping of any materials or systems is acceptable.

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NOTE 3: Repair and touch-up - For repair and/or touch-up purposes, Nutec #11S or #11 surfacer may be placed over the initial system as required to complete the required repair or touch-up. Roughen the topcoat, if present, by sanding, or stoning prior to applying repair surfacer.

3.5.6.1 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

3.6 FINISH COAT FINAL ACCEPTANCE INSPECTION PRIOR TO AREA TURNOVER

A final visual inspection in accordance with the following subsections shall be performed on exposed finish coated concrete substrates.

3.6.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the inspector shall verify that the finish coat has cured for the minimum of 24 hours.

3.6.2 Finish Coat Continuity Inspection

The QC Inspector shall visually inspect the continuity of the finish coat. The maximum number of permissible pinholes is shown on Attachment 3. No more than 2 points of discontinuity shall occur within an area having a radius of six inches (using a point of discontinuity as the center of the circle). No more than 40% of the total number of allowable points of discontinuity shall occur within any one area equal to 25% of the total area. The pinholes that are beyond the acceptance of Attachment 3 shall be repaired in accordance with Section 3.5.6.

3.6.3 Visual Examination

The QC inspector shall visually examine the finish coated surface for the following defects:

- a) Runs and sags which show no evidence of mudcracking are acceptable. Unacceptable runs and sags will be repaired in accordance with Section 3.5.6.
- b) At the time of the final inspection, pinholes and small discontinuities may be repaired with no later reinspection required of these areas.

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c) Skips, holidays, color and gloss nonuniformity, excessive orange peel, dry spray, damaged areas, blisters, bubbles, and fish eyes will be repaired in accordance with Section 3.5.6.

d) Contamination is unacceptable. Area must be repaired per Section 3.5.6.

3.7 NONCONFORMANCES

3.7.1 Unacceptable conditions which are not readily repaired or corrected per the approved procedures shall be documented as unsatisfactory on the inspection traveler.

3.7.2 Nonconforming conditions such as coating failure due to loss of adhesion or indeterminate/unacceptable conditions which cannot be repaired or corrected as per existing procedures shall be documented on a Nonconformance Report (NCR) in accordance with Reference 1-C. The NCR number shall be referenced on the inspection traveler, if applicable.

3.8 DOCUMENTATION (REFER TO ATTACHMENT 1)

3.8.1 All inspections required by this procedure shall be recorded in the inspection attributes on the back of the travelers (Attachment 1). Preparation and processing of the traveler shall be per Reference 1-8.

3.8.2 When the inspections required by Sections 3.1 through 3.2.2 have been satisfactorily completed, Step 1 shall be signed and dated by the inspector.

3.8.3 When the inspections required by Sections 3.3 through 3.3.7.2 have been satisfactorily completed, Step 2 (for NUTEC 11S) or Step 4 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

3.8.4 When the inspections required by Sections 3.3.8 through 3.4.2.2 have been satisfactorily completed, Step 3 (for NUTEC 11S) or Step 5 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

3.8.5 When the inspections required by Sections 3.5 through 3.5.5 have been satisfactorily completed, Step 6 shall be signed and dated by the inspector.

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3.8.6 When the inspections required by Sections 3.5.6 through 3.6.3 have been satisfactorily completed, Step 7 shall be signed and dated by the inspector.

3.9 CLARIFICATION

3.9.1 Repair of Mechanical Damage to Completed Items

3.9.2 Areas that have been completed, inspected, accepted and traveler package closed which incur major damage at a later date may be repaired, inspected and documented on Attachment 8, "Concrete Protective Coating Inspection Repair Traveler". Otherwise, the minor areas of mechanical damage, which occur after completion of an area, will be repaired during the final protective coatings walkdown Reference CP-EI-4.0-51.

3.10 INACCESSIBLE/LIMITED ACCESS AREAS

If questions arise concerning inaccessible or limited access areas per (Reference 1-A) nondeleterious embedded foreign material in the final finish coat, the above condition(s) will be evaluated by the Project Civil Engineer or designee. Clarification and acceptance of the above stated condition(s) shall be so denoted by signature of the Engineer with date and comments as required, in the comments section of the applicable step.

3.11 ATTACHMENTS

3.11.1 Attachment 1, "Concrete Protective Coating Inspection Traveler"

3.11.2 Attachment 2, "Shelf and Pot Life Reference Sheet"

3.11.3 Attachment 3, "Allowed Points of Discontinuity Table" and "DFT Determination"

3.11.4 Attachment 4, "Environmental Log Sheet"

3.11.5 Attachment 5, "Paint Mix Slip"

3.11.6 Attachment 6, "Definitions"

3.11.7 Attachment 7, "Preparation of Coating Materials"

3.11.8 Attachment 7A, "Table for Partial Mixing of NUTEC 11S"

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3.11.9 Attachment 78, "Table for Partial Mixes of NUTEC 1201"

3.11.10 Attachment 8, "Concrete Protective Coating Repair Traveler"

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ATTACHMENT 1

CONCRETE PROTECTIVE COATING INSPECTION TRAVELER	
WORK PKG. #	PCI TRAVELER #
ELEVATION:	ITEM # / DESCRIPTION
REF. DWGS.	
PREPARED BY:	DATE
STEP 1	<p>SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION.</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 2	<p>NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE.</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 3	<p>NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES.</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 4	<p>NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE.</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 5	<p>NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES.</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 6	<p>NUTEC QOI TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE.</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 7	<p>FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27</p> <p>INSPECTOR _____ DATE _____</p> <p>COMMENTS _____</p>
STEP 8	<p>COMPLETION OF INSPECTION TRAVELER VERIFIED.</p> <p>QC REVIEW _____ DATE _____</p> <p>COMMENTS _____</p>
NOTES	<p>1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S)</p> <p>2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S)</p> <p>3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG.</p> <p>4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.</p>

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ATTACHMENT 1 (Continued)

PROTECTIVE COATING INSPECTION TRAVELER SUPPORTING DOCUMENTATION

ATTACHMENT 2

SHELF AND POT LIFE REFERENCE SHEET

Material

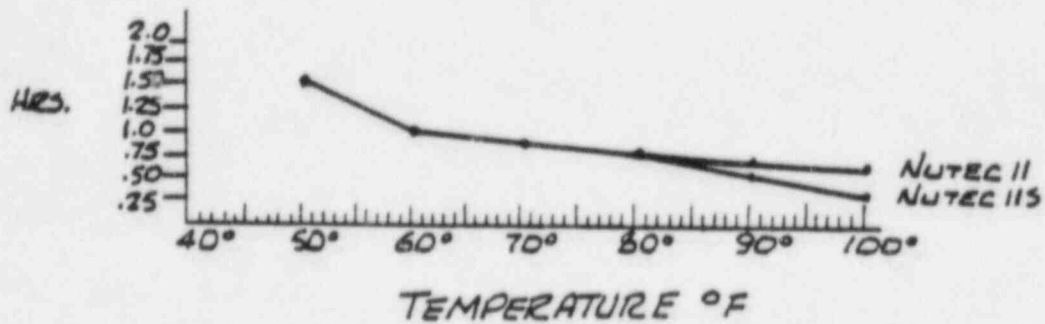
Shelf Life

Nutec 11 Base & Curing Agent
Nutec 11S Base & Curing Agent
Nutec 1201 Base & Curing Agent
Thinners and Sand Filler

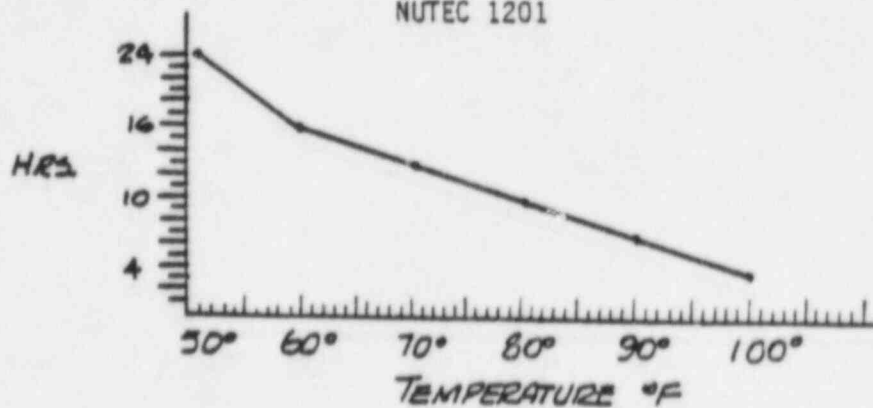
12 months
12 months
12 months
Unlimited

POT LIFE

NUTEC 11 AND NUTEC 11S



NUTEC 1201



INDUCTION TIMES FOR NUTEC 1201

Temp. (°F)

50-59
60-69
70-79
80-90
90-100

45 min.
30 min.
20 min.
10 min.
None

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ATTACHMENT 3

PART I Allowed Points of Discontinuity Table

<u>Surface Area (sq. ft.)</u>	<u>Total Allowable Number of Points of Discontinuity</u>
Up to 10	1
10-50	2
50-100	5
100-500	10
500-1000	15
1000-5000	25

No gross discontinuities are acceptable.

PART II Dry Film Thickness Determination Using Wet Film Thickness Readings and the Percentage (%) Volume Solids

Percent volume solids for unthinned concrete coatings are as follows:

NUTEC 11	-	78%
NUTEC 11S	-	88%
NUTEC 1201	-	54%

EXAMPLE: 11 mils WFT X 54% = 5.94 mils DFT

For thinned mixes:

$$\% \text{ Volume Solids} = \frac{\text{Volume of unthinned coating}}{\text{Volume of unthinned coating} + \text{Volume thinner}} \times$$

% Volume Solids (unthinned)

NOTE: In above equation, volume must be expressed in the same unit of measure.

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ATTACHMENT 5

PAINT MIX SLIP

Report No. _____

Bldg. _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&TE #'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&TE #'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&TE #'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

QC REVIEW & ACCEPTANCE

signature

date

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ATTACHMENT 6

DEFINITIONS

Color and Gloss Nonuniformity: A milky haze or mist in the finish of a recently applied coating.

Contaminant: A foreign substance, inadvertently added to a coating or found on the substrate that adversely affects the application, adhesion, curing and/or subsequent performance of the applied coating.

Dry Spray: A dry powdery primer or finish coat readily removed by light sanding with either sandpaper or a wire screen. A minor amount of adherent dry spray is acceptable on the final finish coat.

Feathering: An area that is roughened and tapered to obtain a smooth and continuous surface with an existing damaged coating.

Fisheyes: Small openings ("fish eyes") in wet film exposing old surface or previous coat.

Free Standing Water: May be identified by:

- Reduced viscosity of the surfacer during application, and excessive sagging from bug holes.
- Wet rings around bug holes.
- Visible signs of surface water.
- Running hand over the surface resulting in moisture on the hand.
- Product instability resulting in white streaks.
- Failure of the surfacer to adhere to the substrate during the squeegeeing or troweling process.

Full Hiding: The coating provides sufficient coverage so that the preceding coat is not readily visible with an unaided eye.

Holiday: A pinhole, skip, discontinuity or void in coating film.

Laitance: A fine, whitish accumulation on concrete surfaces. It consists mainly of cement particles that were carried by water rising to the surface of freshly placed concrete. The resulting concrete surface is unsuitable for proper adhesion or bond of subsequent fillers or protective coatings.

Monitor: Conformance verification by physically observing a task being performed on a periodic or random basis.

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Mudcracking: Irregular cracking as in a dried mud puddle.

Orange Peel: Dents in the surface resembling orange skin. A moderate amount is acceptable.

Over Spray: A deflected spray mist that settles on dry or partially dry coated surfaces.

Pinholes: Minor discontinuities in coating which expose primer or substrate.

Verify: Confirm or make certain.

Visual: To examine with an unaided eye (correctional eye glasses or contact lens are acceptable).

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ATTACHMENT 7

PREPARATION OF COATING MATERIALS

Surfacer Coat

The surfacer, NUTEC 11S, is packaged in a three component kit consisting of a base, curing agent, and filler. The base and curing agent shall be thoroughly mixed first. If necessary, box the mixture to assure that all the base and cure has been used. The filler shall then be slowly added under constant agitation and mixed until a smooth blend is achieved. The patching material, NUTEC 11, is prepared the same way. Partial mixes for NUTEC 11S shall be in accordance with Attachment 7A. No provision is given for partial mixes of NUTEC 11.

Finish Coat

The finish coat, NUTEC 1201, is a two component epoxy topcoat consisting of a base and cure. These shall be thoroughly mixed under constant agitation until a homogenous blend is achieved. Partial mixes of NUTEC 1201 shall be in accordance with Attachment 7B. Minimum induction times shall be as per Attachment 2.

SEALER/CURING COMPOUND

The sealer/curing compound, NUTEC 10, is normally a two component material consisting of a base and a curing agent. If applying to surfaces below 60° F, a third component accelerator may be used. Slowly mix by power agitation or by hand the entire volume of the cure component with the entire volume of the base component. If an accelerator is used, add the premeasured portion to the base-cure mixture and agitate slowly. Avoid rapid agitation which may result in air entrapment. Thinning may be performed by adding from 10-40% by volume #DL-56 solvent. Do not vary mixing proportions.

ATTACHMENT 7A

TABLE FOR PARTIAL MIXING OF NUTEC 11s

	NUTEC 11s							
	BASE		CURE		FILLER		PERMISSIBLE THINNER	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	pts.	oz.
0 Gal. - 1 Qt.		10.6	0	6.3	3	0	0	1.6
0 Gal. - 2 Qt.	1	5.1	0	12.6	6	0	0	3.2
0 Gal. - 3 Qt.	1	15.7	1	3	9	0	0	4.8
1 Gal. - 0 Qt.	2	10.2	1	9.3	12	0	0	6.4
1 Gal. - 1 Qt.	3	4.8	1	15.6	15	0	0	8
1 Gal. - 2 Qt.	3	15.4	2	5.9	18	0	0	9.6
1 Gal. - 3 Qt.	4	9.9	2	12.2	21	0	0	11.2
2 Gal. - 0 Qt.	5	4.5	3	2.6	24	0	0	12.8
2 Gal. - 1 Qt.	5	15.0	3	3.9	27	0	0	14.4
2 Gal. - 2 Qt.	6	9.6	3	15.2	30	0	0	16
2 Gal. - 3 Qt.	7	4.2	4	5.5	33	0	1	1.6
3 Gal. - 0 Qt.	7	14.7	4	11.8	36	0	1	3.2
3 Gal. - 1 Qt.	8	9.3	5	2.2	39	0	1	4.8
3 Gal. - 2 Qt.	9	3.8	5	8.5	42	0	1	6.4
3 Gal. - 3 Qt.	9	14	5	14.8	45	0	1	8
4 Gal. - 0 Qt.	10	9	6	5.1	48	0	1	9.6
4 Gal. - 1 Qt.	11	3.5	6	11.4	51	0	1	11.2
4 Gal. - 2 Qt.	11	14.1	7	1.8	54	0	1	12.8
4 Gal. - 3 Qt.	12	8.6	7	8.1	57	0	1	14.4
5 Gal. - 0 Qt.	13	3.2	7	14.4	60	0	2	0

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ATTACHMENT 7B

TABLE FOR PARTIAL MIXES OF NUTEC #1201

		Base		Cure		Maximum Permissible Thinner	
Gal.	Qts.	lbs.	oz.	lbs.	oz.	qts.	oz.
0	1	2	96	0	6.4	0	9.6
0	2	5	3.2	0	12.8	0	19.2
0	3	5	14.4	1	3.2	0	28.8
1	0	10	8	1	8	1	6.4
1	1	13	1.6	1	14.4	1	16
1	2	15	11.2	2	4.8	1	25.6
1	3	18	4.8	2	11.2	2	3.2
2	0	20	14.4	3	1.6	2	12.8
2	1	23	3	3	0	2	22.4
2	2	26	3.2	3	14.4	3	0
2	3	23	12.8	4	3.2	3	9.6
3	0	31	6.4	4	9.6	3	19.2
3	1	34	0	5	0	3	28.8
3	2	36	9.6	5	6.4	4	6.4
3	3	39	3.2	5	12.8	4	16
4	0	41	12.8	6	3.2	4	25.6
4	1	44	8	6	8	5	3.2
4	2	47	0	6	14.4	5	12.0
4	3	49	11.2	7	14.2	5	22.4
5	0	52	4.8	7	11.2	6	0

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ATTACHMENT 8

CONCRETE PROTECTIVE COATING INSPECTION REPAIR TRAVELER

WORK PROJ. # _____		SUPPLEMENTAL TO PCI TRAVELER # _____	
ELEVATION: _____		ITEM # / DESCRIPTION _____	
REF. DWGS. _____			
PREPARED BY: _____		DATE _____ SHT. _____ OF _____	
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 2	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 3	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 4	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 5	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 6	NUTEC QOI TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____		
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____		
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.		

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INSPECTION OF CONCRETE
SUBSTRATE SURFACE
PREPARATION AND COATINGS
APPLICATION AND REPAIR

PREPARED BY:

Fred Dimban

6-12-84
DATE

APPROVED BY:

Neill Britton

6-12-84
DATE

APPROVED BY:

Lisa Biefeldt

6-12-84
DATE

1.0 REFERENCES

- 1-A Gibbs and Hill Specification 2323-AS-31, "Protective Coatings"
1-B QI-QP-11.4-28, "Protective Coatings Inspection Travelers"
1-C CP-QP-16.0, "Nonconformances"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

This instruction shall describe the methods used by Quality Control personnel while performing inspections of application of coatings on a concrete substrate inside the Reactor Containment Building, Unit 1.

3.0 INSTRUCTIONS

Visual inspection of surfaces as addressed by this instruction shall be made at approximately an arm's 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) D-cell battery flashlight.

Visual aids fabricated on site and approved by Quality Assurance and Engineering may be used by Inspectors as an aid in the performance of their inspections.

For definitions reference Attachment 6.

If a conflict arises between the requirements of this procedure and the requirements of the site specification, Ref. 1-A, the requirements of the site specification shall prevail.

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3.1 SURFACE PREPARATION

Under normal conditions, the concrete surface shall be allowed to cure a minimum of 28 days prior to application of protective coatings. However, if the coatings are to be applied to pour backs, grouting, or patching to which NUTEC 10 has been applied as a curing compound, coating application may be performed after a minimum of 6 days has elapsed from NUTEC 10 application time. Repaired abandoned Hilti bolt holes, tie holes, unacceptable spalled concrete, grout under base plates which have 3 square feet or less of exposed grouted surface to be coated, may be coated after curing for 48 hours.

3.1.1 Application of NUTEC 10 Curing Compound (if applicable)

3.1.1.1 The QC Inspector shall verify that the green concrete has been cleaned.

3.1.1.2 The QC Inspector shall verify that NUTEC 10 is not applied under inclement conditions and that the surface temperatures are above 50°F. Areas of visible moisture or standing water are unacceptable (Reference Attachment 6).

3.1.1.3 NUTEC 10 shall be mixed per Paragraph 3.2. The NUTEC 10 has a pot life of (1) one hour at 75°F. If the NUTEC 10 gives the appearance of crawling and does not penetrate the concrete, the material shall be removed from the concrete by solvent and a clean cloth. All the expired material shall be discarded.

Pot life above is the recommended time and should be utilized as a guideline for coating time. actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

3.1.1.4 The QC Inspector shall verify that the NUTEC 10 air supply shall be in accordance with Section 3.3.3. NUTEC 10 may be applied by brush or roller.

3.1.2 Preblast Cleaning Operations

Prior to surface preparation, the QC inspector shall visually examine the surface to be water blasted for heavy deposits of oil and grease. Any heavy oil or grease deposits shall be removed.

The QC inspector shall also verify that any detrimental surface irregularities such as projections, fins or ridges are removed.

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NOTE: The preblast visual inspection is required only when surface preparation is by one of the following methods:

- a. Water blasting
- b. Water blasting with sand injection
- c. Dry sandblasting
- d. Bush hammering

3.1.3 Methods of Surface Preparation

Water blasting, water blasting with sand injection, acid etching, sand blasting, and power tooling are all acceptable methods of surface preparation. If NUTEC 10 curing membrane has been applied and gives a "glossy" appearance, the NUTEC 10 shall be abraded to remove the glossy appearance.

If chemical cleaning is performed on the concrete substrate, the QC Inspector shall verify that the surface is flushed clean with water.

3.1.4 Post Surface Preparation Operations

After surface preparation, the QC inspector shall visually examine the surface to verify the following:

- a) The surface shall be free of construction dust, laitance, and loose deposits, and all adjacent areas cleaned to avoid contamination.
- b) All holes greater than 1/2 inch in depth or greater than 2" diameter and cracks greater than 1/32" width are repaired prior to surfacer application.
- c) All sharp projections removed.
- d) Markings (ink, pencil, chalk, felt tip marker, etc.) solvent wiped.
- e) Marking paint removed.
- f) Objects protruding from surface are ground or cut smooth until object is flush.
- g) All loosely adhering embedded objects are removed.
- h) Embedded steel objects less than 4 square inches shall be power tool roughened and solvent wiped.

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- i) Metal objects larger than 4 square inches are primed.
- j) Surface is free of grease, oil, and nonapproved curing membranes.

3.2 MIXING OPERATIONS

3.2.1 Materials

A QC inspector shall verify on Attachment 5 that the shelf life has not expired.

3.2.2 Mixing/Thinning

An inspector shall witness all mixing/thinning operations Per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

3.3 SURFACER APPLICATION

3.3.1 Ambient Conditions

The inspector shall monitor the ambient conditions being recorded on the Environmental Log (Attachment 4) at the "paint distribution point" inside Reactor Unit I. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069 TH or equivalent) shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder (Bristol 4069 TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperature using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W.B. 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 (note in Remarks Section). The surface temperature shall be determined by placing a calibrated Range 0-250°F thermometer or equivalent in contact with the surface to be coated. The thermometer probe shall remain in contact with the surface until the temperature reading stabilizes.

Minimum and maximum values of surface and ambient temperatures shall be 50°F and 100°F respectively. Infrequent dips in temperature to 40°F is permissible during application and/or cure; however, the elapsed time the temperature is below 50°F shall be added to the cure time. Application of the coating shall not begin unless the surface temperature is 5°F above the dew point.

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Humidity may vary as high as 100%; however, free standing water shall be removed. Coating application over a damp surface is permissible. Under no conditions shall NUTEC 11S be applied to a surface containing free standing water. (Reference Attachment 6).

3.3.1.1 Documentation of Environmental Conditions

- a. The Inspector assigned to the "paint distribution point" in the Reactor Building shall, as a minimum, take a complete set of readings (air temperature, relative humidity, dew point and surface temperature) on each floor elevation at least three (3) times each shift (preferably, the beginning, mid point, and just prior to the end of each shift). More readings may be taken when necessary (i.e., noticeable change in air temperature, request by field inspector to take readings in a specific area, etc.).
- b. The Inspector at the "paint distribution point" shall document these readings on Attachment 4 as follows:
 1. The Inspector shall fill in the applicable information as delineated on the form, except for the "Report No.". (The Report No. will be filled in by the Paper Flow Group when they assign numbers, prior to transmitting to the QA vault.)
 2. Upon completion of the shift, the inspector shall turn all of the Environmental Log Sheets for that shift into the lead inspector(s).
- c. The lead inspector(s) shall review the log sheets for completeness and correctness, sign and date the "QC Review" block, obtain copies for QC reference and transmit the originals to the Paper Flow Group.
- d. If at any time the inspector determines readings which do not comply with the parameters set forth in this procedure, he shall proceed in the following manner:
 1. Immediately take an additional set of readings in the immediate area of the first set of unacceptable readings and record them on the Environmental Log.

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2. If the additional set of readings are acceptable, take a third set of readings for referee purposes and record them. If the referee set of readings are acceptable, then the area in question is acceptable but should be closely monitored with readings as necessary.
3. If the additional set of readings is unacceptable and/or the referee set of readings is unacceptable, the inspector is to notify the coatings inspectors in the areas affected so that coating work may be stopped at that time. Coating work shall not continue until the ambient conditions resume an acceptable status.
4. When unacceptable ambient conditions occur and are verified by Step 3 above, the Inspector shall document it on a Nonconformance Report (NCR) in accordance with Reference 1-C, and adequately identify the affected areas/elevations.

3.3.2 Surface Acceptability

The QC inspector shall visually examine the substrate surface immediately prior to surfacer application to verify that it is free of contamination (dust, laitance, loose deposits and markings).

3.3.3 Air Supply Acceptability

The inspector shall inspect the air supply system for suitable filters/traps/separators. The effectiveness of these items shall be verified by exposing a piece of white cloth to a blast of air for approximately 30 seconds. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.4 Pot Life

The QC inspector shall verify that the pot life as shown in Attachment 2 is not exceeded.

3.3.5 Qualification of Applicator(s)

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

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3.3.6 Dry Film Thickness

The QC inspector shall determine the DFT of the applied surfacer by taking wet film thickness spot measurements and multiplying each reading by the % volume solids (taking in account any thinner used). A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, Refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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

Thickness of surfacer may vary between 10 and 35 mils. (See Attachment 3 for method of determining percent volume solids.)

NOTE 3: Tack free times shall be as follows:

<u>Temperature °F</u>	<u>#11</u>	<u>#11S</u>
50 - 59	6 hrs.	8 hrs.
60 - 79	4 hrs.	6 hrs.
80 - 99	2 hrs.	4 hrs.
100	1 hr.	2 hrs.

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Temperature °F

Full Cure 11, 11S

50 - 59	10 days
60 - 69	8 days
70 - 79	7 days
80 - 89	6 days
90 - 100	5 days

3.3.7 Monitoring of Surfacer Application

Monitor the surfaces where NUTEC 11S is being applied to assure that it is not being applied to a surface containing free standing water. (Application of 11S over a damp surface is permissible.) Reference Attachment 6. Verify that the pot life as stated in Paragraph 3.3.4 is not exceeded.

3.3.8 Surfacer Repair Work

3.3.8.1 Repair of Runs and Sags

Runs and sags which show no evidence of mudcracking shall be abraded flush with the surrounding surface. If after abrading, surfacer is unsatisfactory due to mudcracking remove unsatisfactory coating to substrate and reapply the surfacer. If after abrading the surfacer is satisfactory, no further repair is necessary.

3.3.8.2 Repair of Contamination

Contamination shall be removed by abrading. If unsatisfactory coating still exists, then the area shall be repaired in accordance with Section 3.3.8.3.

NOTE: Rust stains residue, not necessarily the stain, shall be removed with bristle brush and water or Imperial Thinner #DL-54.

3.3.8.3 Repairs When Touch Up or Recoating is Necessary

For repairs that require either touch up or recoating with NUTEC 11S, NUTEC 11 or NUTEC 1201, the QC inspector shall:

- a) Verify ambient conditions are acceptable per Section 3.3.1.
- b) Verify the surface has been prepared in accordance with Sec. 3.3.8.2 and is free from loose and foreign materials as per Section 3.1.4 and/or Paragraph 3.5.6.

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- c) Verify acceptable materials are used, and shelf life is not exceeded.
- d) Verify that NUTEC 11S, NUTEC 11 or NUTEC 1201 is mixed/thinned in accordance with Section 3.2.
- e) Verify pot life is not exceeded per Attachment 2.
- f) Verify qualification of applicator(s) per Section 3.3.5.
- g) Visually inspect per Section 3.4.2.1.
- h) Verify that curing is in accordance with Section 3.4.2.2.
- i) Verify dry film thickness in the repair area is in accordance with the following millage requirements:

NUTEC 11S	10 - 35 mils
NUTEC 11	3 - 20 mils
NUTEC 1201	3 - 16 mils

NOTE 1: See Section 3.3.6 and Attachment 3 for DFT calculation using Wet Film Thickness measurement and percent volume solids.

3.3.8.4 In-process repairs shall be documented on the Traveler in accordance with Reference 1-8, (Attachment 1) showing their status and/or completion.

3.4 FINISH COAT PREAPPLICATION

3.4.1 Preapplication Inspection

3.4.1.1 Ambient Conditions

Prior to finish coat application, the QC inspector shall determine ambient conditions in accordance with Section 3.3.1.

3.4.2 Surfacer Post Application Operation

3.4.2.1 Visual Defects Inspection

The inspector shall perform a visual inspection of the surfacer coat NUTEC 11S and NUTEC 11 prior to the finish coat application for the following defects:

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- a) Runs and sags which show no evidence of mudcracking shall be abraded down to adjoining coating thickness.
- b) Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed from NUTEC 11S or NUTEC 11 surfaces prior to application of finish coat.
- c) Damaged areas, skips, dry spray, holidays, blisters, bubbling, mudcracking, oil and grease, contamination are all unacceptable and shall be removed and repaired in accordance with the applicable subsection of 3.3.8.

3.4.2.2 Surfacers Cure

The inspector shall monitor ambient temperature after the surfacer is applied to determine when cure is adequate for finish coating operations to commence. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination.

Curing time shall be as follows:

<u>Temperature 0°F</u>	<u>Curing Time Before Topcoating with 1201</u>
50-59	72 hrs.
60-69	48 hrs.
70-79	24 hrs.
80-89	18 hrs.
90-100	12 hrs.

Temperature durations below 50°F will be added to the cure time on an hour for hour basis.

NUTEC 11S may be touched up or recoated with #11 or #11S as soon as the initial coat has dried such that the paint shall not adhere to the thumb when downward pressure is exerted on the paint film while turning a 90° angle. (This does not refer to the two pass application method.)

3.4.3 Mixing Operations

3.4.3.1 Materials

The QC Inspector shall verify on Attachment 5 that shelf has not expired.

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3.4.3.2 Mixing/Thinning

An Inspector shall witness all mixing/thinning operations per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

3.5 FINISH COAT APPLICATION

3.5.1 Air Supply Acceptability

The QC inspector shall verify the air supply is acceptable per Section 3.3.3.

3.5.2 Qualification of Applicator(s)

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

3.5.3 Pot Life

The QC inspector shall verify that the pot life of NUTEC 1201 has not been exceeded. Pot life is shown on Attachment 2.

3.5.4 Dry Film Thickness

The inspector shall determine the DFT of the applied finish coat by taking wet film thickness spot measurements and multiplying each reading by the % volume solids. A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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 spot test areas, Ref. Sec. 3.3.6 Note 2.

(See Attachment 3 for method of determining percent volume solids.)

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3.5.5 - Monitoring of Finish Coat Application

- a. During application of finish coat, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, previous coat (surfacers) cleaned with solvent and finish coat reapplied.
- b. If applicable, the inspector shall monitor that the hose length does not exceed 75 feet.
- c. Monitor the cure time for recoat of NUTEC 1201. Recoating time of NUTEC 1201 is 24 hours.

The total DFT of NUTEC 1201, recoat and existing coat shall not exceed 16 mils.

3.5.6 Finish Coat Repairs

For repairs in the NUTEC 1201 Finish Coat, the QC Inspector shall verify the following:

- a) The inspector shall determine the DFT of the existing coated surface (prior to recoating) by either, or one of the two following methods.
 - 1) Using the DFT readings acquired during the backfit documentation.
 - 2) The scratch test of the NUTEC 1201 finish coat shall be performed using a Mark II Tooke Inspection Gage equipped with a 2x tip. Five separate readings spaced randomly over each finish coated area of 100 square feet shall be taken. For areas less than 100 square feet, Note 2 of Section 3.3.6 shall apply.

b) Repairs of Runs/Sags

Runs/sags showing evidence of mudcracking shall be removed. Runs or sags which exhibit no other coating defect shall be abraded to the thickness of adjoining coatings.

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- 1) Verify that all loose particles and foreign particles are removed from surface.
- 2) Verify that the surface is solvent wiped.
- 3) Perform inspections in Sections 3.2, 3.4.1, 3.5, and 3.6.

c) Repair of Scratches and/or Damaged Areas

Any scratches or damaged areas shall be abraded until loosely adherent particles are removed. The following minimum coating requirements shall be maintained for damages extending to concrete:

Damage 1/2" or less regardless of length - no additional surfacer required prior to topcoat.

Damage greater than 1/2" to 2" in width, regardless of length - Nutec 11 surfacer prior to topcoat application.

Damage greater than 2" in width - normal coating system required.

When performing surfacer and/or topcoat repair work, and the damaged area is 2 sq/ in. or less in size, or the damage is a scratch 1/4 in. width or less, regardless of length, substantiating or recording wet film thickness or the damaged area repair shall not be required.

d) Repair of Contamination

The QC inspector shall verify that contamination is removed by abrading and the surface recoated. The inspector shall perform inspections delineated in Sections 3.2, 3.4.1, 3.5 and 3.6.

e) Repair of Pinholes and Small Discontinuities

- 1) Verify all loose particles are removed and area is solvent wiped.
- 2) Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. The inspections in Section 3.2, 3.4.1, 3.5 and 3.6 still apply.

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f) Repair of Dry Spray

Repair of dry spray identifiable by visual inspection defined within this procedure shall be removed. (A minor amount of adherent dry spray is acceptable on the final finish coat.)

- 1) Verify all loose particles are removed.
- 2) Verify coating film thickness is still within allowable range.
- 3) If film thickness is not within allowable range perform inspections in Sec. 3.2, 3.4.1, 3.5 and 3.6.

g) Repair of Excessive Orange Peel

- 1) Verify the affected area is abraded and solvent wiped.
- 2) Verify the affected area is refinished and perform the inspections delineated in Section 3.2, 3.4.1, 3.5 and 3.6 if required.

h) Repair of Gloss and Color Nonuniformity

- 1) Verify the affected area is solvent wiped.
- 2) Verify the affected area is recoated without exceeding the maximum film thickness and perform inspections in Sections 3.2, 3.4.1, 3.5 and 3.6.
- 3) Top coated areas which have been abraded for various reasons (i.e., runs, sags, high millage, etc.) and are within acceptable procedural thickness, following repairs, do not require recoating for gloss enhancing.
- 4) For small repair areas such as pinholes, color and gloss uniformity is not required, provided the coating is smooth and continuous.

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NOTE 1: If present, the tie in interface between concrete coatings and steel coatings shall be visually inspected during the finish coat final acceptance of both coating systems.

NOTE 2: (If applicable) coating interface - at coating interface for finish and or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interface the interface of the coating of systems shall be a maximum of approximately 1½ inch in width. Within the interface area overlapping of any materials or systems is acceptable.

NOTE 3: Repair and touch-up - For repair and/or touch-up purposes, Nutec #11S or #11 surfacer may be placed over the initial system as required to complete the required repair or touch-up. Roughen the topcoat, if present, by sanding, or stoning prior to applying repair surfacer.

3.5.6.1 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

3.6 FINISH COAT FINAL ACCEPTANCE INSPECTION PRIOR TO AREA TURNOVER

A final visual inspection in accordance with the following subsections shall be performed on exposed finish coated concrete substrates.

3.6.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the inspector shall verify that the finish coat has cured for the minimum of 24 hours.

3.6.2 Finish Coat Continuity Inspection

The QC Inspector shall visually inspect the continuity of the finish coat. The maximum number of permissible pinholes is shown on Attachment 3. No more than 2 points of discontinuity shall occur within an area having a radius of six inches (using a point of discontinuity as the center of the circle). No more than 40% of the total number of allowable points of discontinuity shall occur within any one area equal to 25% of the total area. The pinholes that are beyond the acceptance of Attachment 3 shall be repaired in accordance with Section 3.5.6.

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3.6.3 Visual Examination

The QC inspector shall visually examine the finish coated surface for the following defects:

- a) Runs and sags which show no evidence of mudcracking are acceptable. Unacceptable runs and sags will be repaired in accordance with Section 3.5.6.
- b) At the time of the final inspection, pinholes and small discontinuities may be repaired with no later reinspection required of these areas.
- c) Skips, holidays, color and gloss nonuniformity, excessive orange peel, dry spray, damaged areas, blisters, bubbles, and fish eyes will be repaired in accordance with Section 3.5.6.
- d) Contamination is unacceptable. Area must be repaired per Section 3.5.6.

3.7 NONCONFORMANCES

3.7.1 Unacceptable conditions which are not readily repaired or corrected per the approved procedures shall be documented as unsatisfactory on the inspection traveler.

3.7.2 Nonconforming conditions such as coating failure due to loss of adhesion or indeterminate/unacceptable conditions which cannot be repaired or corrected as per existing procedures shall be documented on a Nonconformance Report (NCR) in accordance with Reference 1-C. The NCR number shall be referenced on the inspection traveler, if applicable.

3.8 DOCUMENTATION (REFER TO ATTACHMENT 1)

3.8.1 All inspections required by this procedure shall be recorded in the inspection attributes on the back of the travelers (Attachment 1). Preparation and processing of the traveler shall be per Reference 1-8.

3.8.2 When the inspections required by Sections 3.1 through 3.2.2 have been satisfactorily completed, Step 1 shall be signed and dated by the inspector.

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3.8.3 When the inspections required by Sections 3.3 through 3.3.7.2 have been satisfactorily completed, Step 2 (for NUTEC 11S) or Step 4 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

3.8.4 When the inspections required by Sections 3.3.8 through 3.4.2.2 have been satisfactorily completed, Step 3 (for NUTEC 11S) or Step 5 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

3.8.5 When the inspections required by Sections 3.5 through 3.5.5 have been satisfactorily completed, Step 6 shall be signed and dated by the inspector.

3.8.6 When the inspections required by Sections 3.5.6 through 3.6.3 have been satisfactorily completed, Step 7 shall be signed and dated by the inspector.

3.9 CLARIFICATION

3.9.1 Repair of Mechanical Damage to Completed Items

3.9.2 Areas that have been completed, inspected, accepted and traveler package closed which incur major damage at a later date may be repaired, inspected and documented on Attachment 8, "Concrete Protective Coating Inspection Repair Traveler". Otherwise, the minor areas of mechanical damage, which occur after completion of an area, will be repaired during the final protective coatings walkdown Reference CP-EI-4.0-51.

3.10 INACCESSIBLE/LIMITED ACCESS AREAS

If questions arise concerning (1) inaccessible or limited access areas per (Reference 1-A) (2) nondeleterious embedded foreign material in the final finish coat, or, (3) minor stress cracks in concrete appearing in concrete coatings after application, the above condition(s) will be evaluated by the Project Civil Engineer or designee. Clarification and acceptance of the above stated condition(s) shall be so denoted by signature of the Engineer with date and comments as required, in the comments section of the applicable step.

3.11 ATTACHMENTS

3.11.1 Attachment 1, "Concrete Protective Coating Inspection Traveler"

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- 3.11.2 Attachment 2, "Shelf and Pot Life Reference Sheet"
- 3.11.3 Attachment 3, "Allowed Points of Discontinuity Table" and "DFT Determination"
- 3.11.4 Attachment 4, "Environmental Log Sheet"
- 3.11.5 Attachment 5, "Paint Mix Slip"
- 3.11.6 Attachment 6, "Definitions"
- 3.11.7 Attachment 7, "Preparation of Coating Materials"
- 3.11.8 Attachment 7A, "Table for Partial Mixing of NUTEC 11S"
- 3.11.9 Attachment 7B, "Table for Partial Mixes of NUTEC 1201"
- 3.11.10 Attachment 8, "Concrete Protective Coating Repair Traveler"

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ATTACHMENT 1

CONCRETE PROTECTIVE COATING INSPECTION TRAVELER	
WORK POS. NO. _____	PCI TRAVELER NO. _____
ELEVATION: _____	ITEM NO / DESCRIPTION _____
REF. DWGS. _____	
PREPARED BY: _____	DATE _____
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC QOI TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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PROTECTIVE COATING INSPECTION TRAVELER SUPPORTING DOCUMENTATION

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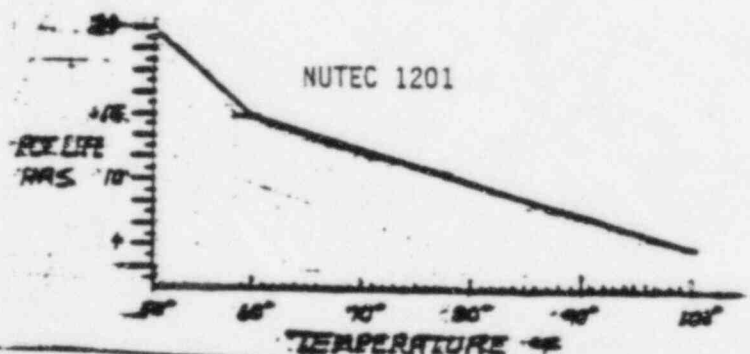
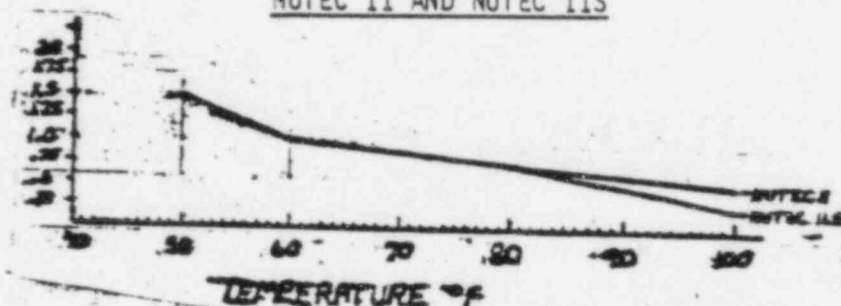
ATTACHMENT 2

SHELF AND POT LIFE REFERENCE SHEET

<u>Material</u>	<u>Shelf Life</u>
Nutec 11 Base & Curing Agent	12 months
Nutec 11S Base & Curing Agent	12 months
Nutec 1201 Base & Curing Agent	12 months
Thinners and Sand Filler	Unlimited

POT LIFE

NUTEC 11 AND NUTEC 11S



Pot lives shown above is the recommended time and should be utilized as a guideline for coating time, actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

INDUCTION TIMES FOR NUTEC 1201

<u>Temp. (°F)</u>	
50-59	45 min.
60-69	30 min.
70-79	20 min.
80-90	10 min.
90-100	None

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ATTACHMENT 3

PART I Allowed Points of Discontinuity Table

<u>Surface Area (sq. ft.)</u>	<u>Total Allowable Number of Points of Discontinuity</u>
Up to 10	1
10-50	2
50-100	5
100-500	10
500-1000	15
1000-5000	25

No gross discontinuities are acceptable.

PART II Dry Film Thickness Determination Using Wet Film Thickness Readings and the Percentage (%) Volume Solids

Percent volume solids for unthinned concrete coatings are as follows:

NUTEC 11	-	78%
NUTEC 11S	-	88%
NUTEC 1201	-	54%

EXAMPLE: 11 mils WFT X 54% = 5.94 mils DFT

For thinned mixes:

$$\% \text{ Volume Solids} = \frac{\text{Volume of unthinned coating}}{\text{Volume of unthinned coating} + \text{Volume thinner}} \times \text{\% Volume Solids (unthinned)}$$

NOTE: In above equation, volume must be expressed in the same unit of measure.

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ATTACHMENT 5

PAINT MIX SLIP

Report No. _____

Bldg. _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&T # 'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&T # 'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&T # 'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

QC REVIEW & ACCEPTANCE _____
signature _____ date _____

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ATTACHMENT 6

DEFINITIONS

Color and Gloss Nonuniformity: A milky haze or mist in the finish of a recently applied coating.

Contaminant: A foreign substance, inadvertently added to a coating or found on the substrate that adversely affects the application, adhesion, curing and/or subsequent performance of the applied coating.

Dry Spray: A dry powdery primer or finish coat readily removed by light sanding with either sandpaper or a wire screen. A minor amount of adherent dry spray is acceptable on the final finish coat.

Feathering: An area that is roughened and tapered to obtain a smooth and continuous surface with an existing damaged coating.

Fisheyes: Small openings ("fish eyes") in wet film exposing old surface or previous coat.

Free Standing Water: May be identified by:

- Reduced viscosity of the surfacer during application, and excessive sagging from bug holes.
- Wet rings around bug holes.
- Visible signs of surface water.
- Running hand over the surface resulting in moisture on the hand.
- Product instability resulting in white streaks.
- Failure of the surfacer to adhere to the substrate during the squeegeeing or troweling process.

Full Hiding: The coating provides sufficient coverage so that the preceding coat is not readily visible with an unaided eye.

Holiday: A pinhole, skip, discontinuity or void in coating film.

Laitance: A fine, whitish accumulation on concrete surfaces. It consists mainly of cement particles that were carried by water rising to the surface of freshly placed concrete. The resulting concrete surface is unsuitable for proper adhesion or bond of subsequent fillers or protective coatings.

Monitor: Conformance verification by physically observing a task being performed on a periodic or random basis.

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Mudcracking: Irregular cracking as in a dried mud puddle.

Orange Peel: Dents in the surface resembling orange skin. A moderate amount is acceptable.

Over Spray: A deflected spray mist that settles on dry or partially dry coated surfaces.

Pinholes: Minor discontinuities in coating which expose primer or substrate.

Verify: Confirm or make certain.

Visual: To examine with an unaided eye (correctional eye glasses or contact lens are acceptable).

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ATTACHMENT 7

PREPARATION OF COATING MATERIALS

Surfacer Coat

The surfacer, NUTEC 11S, is packaged in a three component kit consisting of a base, curing agent, and filler. The base and curing agent shall be thoroughly mixed first. If necessary, box the mixture to assure that all the base and cure has been used. The filler shall then be slowly added under constant agitation and mixed until a smooth blend is achieved. The patching material, NUTEC 11, is prepared the same way. Partial mixes for NUTEC 11S shall be in accordance with Attachment 7A. No provision is given for partial mixes of NUTEC 11.

Finish Coat

The finish coat, NUTEC 1201, is a two component epoxy topcoat consisting of a base and cure. These shall be thoroughly mixed under constant agitation until a homogenous blend is achieved. Partial mixes of NUTEC 1201 shall be in accordance with Attachment 7B. Minimum induction times shall be as per Attachment 2.

SEALER/CURING COMPOUND

The sealer/curing compound, NUTEC 10, is normally a two component material consisting of a base and a curing agent. If applying to surfaces below 60° F, a third component accelerator may be used. Slowly mix by power agitation or by hand the entire volume of the cure component with the entire volume of the base component. If an accelerator is used, add the premeasured portion to the base-cure mixture and agitate slowly. Avoid rapid agitation which may result in air entrapment. Thinning may be performed by adding from 10-40% by volume #DL-56 solvent. Do not vary mixing proportions.

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ATTACHMENT 7B
TABLE FOR PARITAL MIXES OF NUTEC #1201

		Base		Cure		Maximum Permissible Thinner	
Gal.	Qts.	lbs.	oz.	lbs.	oz.	qts.	oz.
0	1	2	96	0	6.4	0	9.6
0	2	5	3.2	0	12.8	0	19.2
0	3	5	14.4	1	3.2	0	23.0
1	0	10	8	1	8	1	6.4
1	1	13	1.6	1	14.4	1	16
1	2	15	11.2	2	4.8	1	25.6
1	3	18	4.8	2	11.2	2	3.2
2	0	20	14.4	3	1.6	2	12.0
2	1	23	3	3	0	2	22.4
2	2	26	3.2	3	14.4	3	0
2	3	23	12.8	4	3.2	3	9.6
3	0	31	6.4	4	9.6	3	19.2
3	1	34	0	5	0	3	28.8
3	2	36	9.6	5	6.4	4	6.4
3	3	39	3.2	5	12.0	4	16
4	0	41	12.0	6	3.2	4	25.6
4	1	44	8	5	8	5	3.2
4	2	47	0	6	14.4	5	12.0
4	3	49	11.2	7	14.2	5	22.4
5	0	52	4.8	7	11.2	6	0

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ATTACHMENT 8

CONCRETE PROTECTIVE COATING INSPECTION REPORT	
WORK PROGRAM _____	SUPPLEMENTAL TO PCI TRAVELER # _____
ELEVATION _____	ITEM # / DESCRIPTION _____
REF DWGS _____	
PREPARED BY: _____	DATE _____ SHT _____ OF _____
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC II TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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PROTECTIVE COATING INSPECTION REPAIR TRAVELER SUPPORTING DOCUMENTATION

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INSPECTION OF CONCRETE SUBSTRATE SURFACE PREPARATION AND COATINGS APPLICATION AND REPAIR		PREPARED BY: <u>Fred Dunbar</u>		<u>6-4-84</u> DATE	
		APPROVED BY: <u>Neill Britto</u>		<u>6-4-84</u> DATE	
		APPROVED BY: <u>M.P. Cize</u>		<u>6-4-84</u> DATE	
1.0	REFERENCES				
1-A	Gibbs and Hill Specification 2323-AS-31, "Protective Coatings"				
1-B	QI-QP-11.4-28, "Protective Coatings Inspection Travelers"				
1-C	CP-QP-16.0, "Nonconformances"				
2.0	<u>GENERAL</u>				
2.1	PURPOSE AND SCOPE				
	This instruction shall describe the methods used by Quality Control personnel while performing inspections of application of coatings on a concrete substrate inside the Reactor Containment Building, Unit 1.				
3.0	<u>INSTRUCTIONS</u>				
	Visual inspection of surfaces as addressed by this instruction shall be made at approximately an arm's 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) D-cell battery flashlight.				
	Visual aids fabricated on site and approved by Quality Assurance and Engineering may be used by Inspectors as an aid in the performance of their inspections.				
	For definitions reference Attachment 6.				
	If a conflict arises between the requirements of this procedure and the requirements of the site specification, Ref. 1-A, the requirements of the site specification shall prevail.				

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3.1 SURFACE PREPARATION

Under normal conditions, the concrete surface shall be allowed to cure a minimum of 28 days prior to application of protective coatings. However, if the coatings are to be applied to pour backs, grouting, or patching to which NUTEC 10 has been applied as a curing compound, coating application may be performed after a minimum of 6 days has elapsed from NUTEC 10 application time. Repaired abandoned Hilti bolt holes, tie holes, unacceptable spalled concrete, grout under base plates which have 3 square feet or less of exposed grouted surface to be coated, may be coated after curing for 48 hours.

3.1.1 Application of NUTEC 10 Curing Compound (if applicable)

3.1.1.1 The QC Inspector shall verify that the green concrete has been cleaned.

3.1.1.2 The QC Inspector shall verify that NUTEC 10 is not applied under inclement conditions and that the surface temperatures are above 50°F. Areas of visible moisture or standing water are unacceptable (Reference Attachment 6).

3.1.1.3 NUTEC 10 shall be mixed per Paragraph 3.2. The NUTEC 10 has a pot life of (1) one hour at 75°F. If the NUTEC 10 gives the appearance of crawling and does not penetrate the concrete, the material shall be removed from the concrete by solvent and a clean cloth. All the expired material shall be discarded.

Pot life above is the recommended time and should be utilized as a guideline for coating time, actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

3.1.1.4 The QC Inspector shall verify that the NUTEC 10 air supply shall be in accordance with Section 3.3.3. NUTEC 10 may be applied by brush or roller.

3.1.2 Preblast Cleaning Operations

Prior to surface preparation, the QC inspector shall visually examine the surface to be water blasted for heavy deposits of oil and grease. Any heavy oil or grease deposits shall be removed.

The QC inspector shall also verify that any detrimental surface irregularities such as projections, fins or ridges are removed.

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NOTE: The preblast visual inspection is required only when surface preparation is by one of the following methods:

- Water blasting
- Water blasting with sand injection
- Dry sandblasting
- Bush hammering

3.1.3 Methods of Surface Preparation

Water blasting, water blasting with sand injection, acid etching, sand blasting, and power tooling are all acceptable methods of surface preparation. If NUTEC 10 curing membrane has been applied and gives a "glossy" appearance, the NUTEC 10 shall be abraded to remove the glossy appearance.

If chemical cleaning is performed on the concrete substrate, the QC Inspector shall verify that the surface is flushed clean with water.

3.1.4 Post Surface Preparation Operations

After surface preparation, the QC inspector shall visually examine the surface to verify the following:

- The surface shall be free of construction dust, laitance, and loose deposits, and all adjacent areas cleaned to avoid contamination.
- All holes greater than 1/2 inch in depth or greater than 2" diameter and cracks greater than 1/32" width are repaired prior to surfacer application.
- All sharp projections removed.
- Markings (ink, pencil, chalk, felt tip marker, etc.) solvent wiped.
- Marking paint removed.
- Objects protruding from surface are ground or cut smooth until object is flush.
- All loosely adhering embedded objects are removed.
- Embedded steel objects less than 4 square inches shall be power tool roughened and solvent wiped.

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- i) Metal objects larger than 4 square inches are primed.
- j) Surface is free of grease, oil, and nonapproved curing membranes.

3.2 MIXING OPERATIONS

3.2.1 Materials

A QC inspector shall verify on Attachment 5 that the shelf life has not expired.

3.2.2 Mixing/Thinning

An inspector shall witness all mixing/thinning operations Per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

3.3 SURFACER APPLICATION

3.3.1 Ambient Conditions

The inspector shall monitor the ambient conditions being recorded on the Environmental Log (Attachment 4) at the "paint distribution point" inside Reactor Unit I. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069 TH or equivalent) shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder (Bristol 4069 TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperature using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W.B. 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 (note in Remarks Section). The surface temperature shall be determined by placing a calibrated Range 0-250°F thermometer or equivalent in contact with the surface to be coated. The thermometer probe shall remain in contact with the surface until the temperature reading stabilizes.

Minimum and maximum values of surface and ambient temperatures shall be 50°F and 100°F respectively. Infrequent dips in temperature to 40°F is permissible during application and/or cure; however, the elapsed time the temperature is below 50°F shall be added to the cure time. Application of the coating shall not begin unless the surface temperature is 5°F above the dew point.

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Humidity may vary as high as 100%; however, free standing water shall be removed. Coating application over a damp surface is permissible. Under no conditions shall NUTEC 11S be applied to a surface containing free standing water. (Reference Attachment 6).

3.3.1.1 Documentation of Environmental Conditions

- a. The Inspector assigned to the "paint distribution point" in the Reactor Building shall, as a minimum, take a complete set of readings (air temperature, relative humidity, dew point and surface temperature) on each floor elevation at least three (3) times each shift (preferably, the beginning, mid point, and just prior to the end of each shift). More readings may be taken when necessary (i.e., noticeable change in air temperature, request by field inspector to take readings in a specific area, etc.).
- b. The Inspector at the "paint distribution point" shall document these readings on Attachment 4 as follows:
 1. The Inspector shall fill in the applicable information as delineated on the form, except for the "Report No.". (The Report No. will be filled in by the Paper Flow Group when they assign numbers, prior to transmitting to the QA vault.)
 2. Upon completion of the shift, the inspector shall turn all of the Environmental Log Sheets for that shift into the lead inspector(s).
- c. The lead inspector(s) shall review the log sheets for completeness and correctness, sign and date the "QC Review" block, obtain copies for QC reference and transmit the originals to the Paper Flow Group.
- d. If at any time the inspector determines readings which do not comply with the parameters set forth in this procedure, he shall proceed in the following manner:
 1. Immediately take an additional set of readings in the immediate area of the first set of unacceptable readings and record them on the Environmental Log.

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2. If the additional set of readings are acceptable, take a third set of readings for referee purposes and record them. If the referee set of readings are acceptable, then the area in question is acceptable but should be closely monitored with readings as necessary.
3. If the additional set of readings is unacceptable and/or the referee set of readings is unacceptable, the inspector is to notify the coatings inspectors in the areas affected so that coating work may be stopped at that time. Coating work shall not continue until the ambient conditions resume an acceptable status.
4. When unacceptable ambient conditions occur and are verified by Step 3 above, the Inspector shall document it on a Nonconformance Report (NCR) in accordance with Reference 1-C, and adequately identify the affected areas/elevations.

3.3.2 Surface Acceptability

The QC inspector shall visually examine the substrate surface immediately prior to surfacer application to verify that it is free of contamination (dust, laitance, loose deposits and markings).

3.3.3 Air Supply Acceptability

The inspector shall inspect the air supply system for suitable filters/traps/separators. The effectiveness of these items shall be verified by exposing a piece of white cloth to a blast of air for approximately 30 seconds. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

3.3.4 Pot Life

The QC inspector shall verify that the pot life as shown in Attachment 2 is not exceeded.

3.3.5 Qualification of Applicator(s)

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

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3.3.6 Dry Film Thickness

The QC inspector shall determine the DFT of the applied surfacer by taking wet film thickness spot measurements and multiplying each reading by the % volume solids (taking in account any thinner used). A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, Refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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

Thickness of surfacer may vary between 10 and 35 mils. (See Attachment 3 for method of determining percent volume solids.)

NOTE 3: Tack free times shall be as follows:

<u>Temperature °F</u>	<u>#11</u>	<u>#11S</u>
50 - 59	6 hrs.	8 hrs.
60 - 79	4 hrs.	6 hrs.
80 - 99	2 hrs.	4 hrs.
100	1 hr.	2 hrs.

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Temperature °F

Full Cure 11, 11S

50 - 59	10 days
60 - 69	8 days
70 - 79	7 days
80 - 89	6 days
90 - 100	5 days

3.3.7 Monitoring of Surfacer Application

Monitor the surfaces where NUTEC 11S is being applied to assure that it is not being applied to a surface containing free standing water. (Application of 11S over a damp surface is permissible.) Reference Attachment 6. Verify that the pot life as stated in Paragraph 3.3.4 is not exceeded.

3.3.8 Surfacer Repair Work

3.3.8.1 Repair of Runs and Sags

Runs and sags which show no evidence of mudcracking shall be abraded flush with the surrounding surface. If after abrading, surfacer is unsatisfactory due to mudcracking remove unsatisfactory coating to substrate and reapply the surfacer. If after abrading the surfacer is satisfactory, no further repair is necessary.

3.3.8.2 Repair of Contamination

Contamination shall be removed by abrading. If unsatisfactory coating still exists, then the area shall be repaired in accordance with Section 3.3.8.3.

NOTE: Rust stains residue, not necessarily the stain, shall be removed with bristle brush and water or Imperial Thinner #DL-54.

3.3.8.3 Repairs When Touch Up or Recoating is Necessary

For repairs that require either touch up or recoating with NUTEC 11S, NUTEC 11 or NUTEC 1201, the QC inspector shall:

- a) Verify ambient conditions are acceptable per Section 3.3.1.
- b) Verify the surface has been prepared in accordance with Sec. 3.3.8.2 and is free from loose and foreign materials as per Section 3.1.4 and/or Paragraph 3.5.6.

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- c) Verify acceptable materials are used, and shelf life is not exceeded.
- d) Verify that NUTEC 11S, NUTEC 11 or NUTEC 1201 is mixed/thinned in accordance with Section 3.2.
- e) Verify pot life is not exceeded per Attachment 2.
- f) Verify qualification of applicator(s) per Section 3.3.5.
- g) Visually inspect per Section 3.4.2.1.
- h) Verify that curing is in accordance with Section 3.4.2.2.
- i) Verify dry film thickness in the repair area is in accordance with the following millage requirements:

NUTEC 11S	10 - 35 mils
NUTEC 11	3 - 20 mils
NUTEC 1201	3 - 16 mils

NOTE 1: See Section 3.3.6 and Attachment 3 for DFT calculation using Wet Film Thickness measurement and percent volume solids.

- 3.3.8.4 In-process repairs shall be documented on the Traveler in accordance with Reference 1-8, (Attachment 1) showing their status and/or completion.

3.4 FINISH COAT PREAPPLICATION

3.4.1 Preapplication Inspection

3.4.1.1 Ambient Conditions

Prior to finish coat application, the QC inspector shall determine ambient conditions in accordance with Section 3.3.1.

3.4.2 Surfacer Post Application Operation

3.4.2.1 Visual Defects Inspection

The inspector shall perform a visual inspection of the surfacer coat NUTEC 11S and NUTEC 11 prior to the finish coat application for the following defects:

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- a) Runs and sags which show no evidence of mudcracking shall be abraded down to adjoining coating thickness.
- b) Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed from NUTEC 11S or NUTEC 11 surfaces prior to application of finish coat.
- c) Damaged areas, skips, dry spray, holidays, blisters, bubbling, mudcracking, oil and grease, contamination are all unacceptable and shall be removed and repaired in accordance with the applicable subsection of 3.3.8.

3.4.2.2 Surfacer Cure

The inspector shall monitor ambient temperature after the surfacer is applied to determine when cure is adequate for finish coating operations to commence. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination.

Curing time shall be as follows:

<u>Temperature 0°F</u>	<u>Curing Time Before Topcoating with 1201</u>
50-59	72 hrs.
60-69	48 hrs.
70-79	24 hrs.
80-89	18 hrs.
90-100	12 hrs.

Temperature durations below 50°F will be added to the cure time on an hour for hour basis.

NUTEC 11S may be touched up or recoated with #11 or #11S as soon as the initial coat has dried such that the paint shall not adhere to the thumb when downward pressure is exerted on the paint film while turning a 90° angle. (This does not refer to the two pass application method.)

3.4.3 Mixing Operations

3.4.3.1 Materials

The QC Inspector shall verify on Attachment 5 that shelf has not expired.

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3.4.3.2 Mixing/Thinning

An Inspector shall witness all mixing/thinning operations per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

3.5 FINISH COAT APPLICATION

3.5.1 Air Supply Acceptability

The QC inspector shall verify the air supply is acceptable per Section 3.3.3.

3.5.2 Qualification of Applicator(s)

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

3.5.3 Pot Life

The QC inspector shall verify that the pot life of NUTEC 1201 has not been exceeded. Pot life is shown on Attachment 2.

3.5.4 Dry Film Thickness

The inspector shall determine the DFT of the applied finish coat by taking wet film thickness spot measurements and multiplying each reading by the % volume solids. A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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 spot test areas, Ref. Sec. 3.3.6 Note 2.

(See Attachment 3 for method of determining percent volume solids.)

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3.5.5 Monitoring of Finish Coat Application

- a. During application of finish coat, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, previous coat (surfacers) cleaned with solvent and finish coat reapplied.
- b. If applicable, the inspector shall monitor that the hose length does not exceed 75 feet.
- c. Monitor the cure time for recoat of NUTEC 1201. Recoating time of NUTEC 1201 is 24 hours.

The total DFT of NUTEC 1201, recoat and existing coat shall not exceed 16 mils.

3.5.6 Finish Coat Repairs

For repairs in the NUTEC 1201 Finish Coat, the QC Inspector shall verify the following:

- a) The inspector shall determine the DFT of the existing coated surface (prior to recoating) by either, or one of the two following methods.
 - 1) Using the DFT readings acquired during the backfit documentation.
 - 2) The scratch test of the NUTEC 1201 finish coat shall be performed using a Mark II Tooke Inspection Gage equipped with a 2x tip. Five separate readings spaced randomly over each finish coated area of 100 square feet shall be taken. For areas less than 100 square feet, Note 2 of Section 3.3.6 shall apply.
- b) Repairs of Runs/Sags

Runs/sags showing evidence of mudcracking shall be removed. Runs or sags which exhibit no other coating defect shall be abraded to the thickness of adjoining coatings.

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- 1) Verify that all loose particles and foreign particles are removed from surface.
- 2) Verify that the surface is solvent wiped.
- 3) Perform inspections in Sections 3.2, 3.4.1, 3.5, and 3.6.

c) Repair of Scratches and/or Damaged Areas

Any scratches or damaged areas shall be abraded until loosely adherent particles are removed. The following minimum coating requirements shall be maintained for damages extending to concrete:

Damage 1/2" or less regardless of length - no additional surfacer required prior to topcoat.

Damage greater than 1/2" to 2" in width, regardless of length - Nutec 11 surfacer prior to topcoat application.

Damage greater than 2" in width - normal coating system required.

When performing surfacer and/or topcoat repair work, and the damaged area is 2 sq/ in. or less in size, or the damage is a scratch 1/4 in. width or less, regardless of length, substantiating or recording wet film thickness or the damaged area repair shall not be required.

d) Repair of Contamination

The QC inspector shall verify that contamination is removed by abrading and the surface recoated. The inspector shall perform inspections delineated in Sections 3.2, 3.4.1, 3.5 and 3.6.

e) Repair of Pinholes and Small Discontinuities

- 1) Verify all loose particles are removed and area is solvent wiped.
- 2) Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. The inspections in Section 3.2, 3.4.1, 3.5 and 3.6 still apply.

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f) Repair of Dry Spray

Repair of dry spray identifiable by visual inspection defined within this procedure shall be removed. (A minor amount of adherent dry spray is acceptable on the final finish coat.)

- 1) Verify all loose particles are removed.
- 2) Verify coating film thickness is still within allowable range.
- 3) If film thickness is not within allowable range perform inspections in Sec. 3.2, 3.4.1, 3.5 and 3.6.

g) Repair of Excessive Orange Peel

- 1) Verify the affected area is abraded and solvent wiped.
- 2) Verify the affected area is refinished and perform the inspections delineated in Section 3.2, 3.4.1, 3.5 and 3.6 if required.

h). Repair of Gloss and Color Nonuniformity

- 1) Verify the affected area is solvent wiped.
- 2) Verify the affected area is recoated without exceeding the maximum film thickness and perform inspections in Sections 3.2, 3.4.1, 3.5 and 3.6.
- 3) Top coated areas which have been abraded for various reasons (i.e., runs, sags, high millage, etc.) and are within acceptable procedural thickness, following repairs, do not require recoating for gloss enhancing.
- 4) For small repair areas such as pinholes, color and gloss uniformity is not required, provided the coating is smooth and continuous.

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NOTE 1: If present, the tie in interface between concrete coatings and steel coatings shall be visually inspected during the finish coat final acceptance of both coating systems.

NOTE 2: (If applicable) coating interface - at coating interface for finish and or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interface the interface of the coating of systems shall be a maximum of approximately 1½ inch in width. Within the interface area overlapping of any materials or systems is acceptable.

NOTE 3: Repair and touch-up - For repair and/or touch-up purposes, Nutec #11S or #11 surfacer may be placed over the initial system as required to complete the required repair or touch-up. Roughen the topcoat, if present, by sanding, or stoning prior to applying repair surfacer.

3.5.6.1 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

3.6 FINISH COAT FINAL ACCEPTANCE INSPECTION PRIOR TO AREA TURNOVER

A final visual inspection in accordance with the following subsections shall be performed on exposed finish coated concrete substrates.

3.6.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the inspector shall verify that the finish coat has cured for the minimum of 24 hours.

3.6.2 Finish Coat Continuity Inspection

The QC Inspector shall visually inspect the continuity of the finish coat. The maximum number of permissible pinholes is shown on Attachment 3. No more than 2 points of discontinuity shall occur within an area having a radius of six inches (using a point of discontinuity as the center of the circle). No more than 40% of the total number of allowable points of discontinuity shall occur within any one area equal to 25% of the total area. The pinholes that are beyond the acceptance of Attachment 3 shall be repaired in accordance with Section 3.5.6.

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3.6.3 Visual Examination

The QC inspector shall visually examine the finish coated surface for the following defects:

- a) Runs and sags which show no evidence of mudcracking are acceptable. Unacceptable runs and sags will be repaired in accordance with Section 3.5.6.
- b) At the time of the final inspection, pinholes and small discontinuities may be repaired with no later reinspection required of these areas.
- c) Skips, holidays, color and gloss nonuniformity, excessive orange peel, dry spray, damaged areas, blisters, bubbles, and fish eyes will be repaired in accordance with Section 3.5.6.
- d) Contamination is unacceptable. Area must be repaired per Section 3.5.6.

3.7 NONCONFORMANCES

3.7.1 Unacceptable conditions which are not readily repaired or corrected per the approved procedures shall be documented as unsatisfactory on the inspection traveler.

3.7.2 Nonconforming conditions such as coating failure due to loss of adhesion or indeterminate/unacceptable conditions which cannot be repaired or corrected as per existing procedures shall be documented on a Nonconformance Report (NCR) in accordance with Reference 1-C. The NCR number shall be referenced on the inspection traveler, if applicable.

3.8 DOCUMENTATION (REFER TO ATTACHMENT 1)

3.8.1 All inspections required by this procedure shall be recorded in the inspection attributes on the back of the travelers (Attachment 1). Preparation and processing of the traveler shall be per Reference 1-8.

3.8.2 When the inspections required by Sections 3.1 through 3.2.2 have been satisfactorily completed, Step 1 shall be signed and dated by the inspector.

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3.8.3 When the inspections required by Sections 3.3 through 3.3.7.2 have been satisfactorily completed, Step 2 (for NUTEC 11S) or Step 4 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

3.8.4 When the inspections required by Sections 3.3.8 through 3.4.2.2 have been satisfactorily completed, Step 3 (for NUTEC 11S) or Step 5 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

3.8.5 When the inspections required by Sections 3.5 through 3.5.5 have been satisfactorily completed, Step 6 shall be signed and dated by the inspector.

3.8.6 When the inspections required by Sections 3.5.6 through 3.6.3 have been satisfactorily completed, Step 7 shall be signed and dated by the inspector.

3.9 CLARIFICATION

3.9.1 Repair of Mechanical Damage to Completed Items

3.9.2 Areas that have been completed, inspected, accepted and traveler package closed which incur major damage at a later date may be repaired, inspected and documented on Attachment 8, "Concrete Protective Coating Inspection Repair Traveler". Otherwise, the minor areas of mechanical damage, which occur after completion of an area, will be repaired during the final protective coatings walkdown, Reference CP-EI-4.0-51.

3.10 INACCESSIBLE/LIMITED ACCESS AREAS

If questions arise concerning inaccessible or limited access areas per (Reference 1-A) and/or nondeleterious embedded foreign material in the final finish coat, the above condition(s) will be evaluated by the Project Civil Engineer or designee. Clarification and acceptance of the above stated condition(s) shall be so denoted by signature of the engineer with date and comments as required, in the comments section of the applicable step.

3.11 ATTACHMENTS

3.11.1 Attachment 1, "Concrete Protective Coating Inspection Traveler"

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- 3.11.2 Attachment 2, "Shelf and Pot Life Reference Sheet"
- 3.11.3 Attachment 3, "Allowed Points of Discontinuity Table" and "DFT Determination"
- 3.11.4 Attachment 4, "Environmental Log Sheet"
- 3.11.5 Attachment 5, "Paint Mix Slip"
- 3.11.6 Attachment 6, "Definitions"
- 3.11.7 Attachment 7, "Preparation of Coating Materials"
- 3.11.8 Attachment 7A, "Table for Partial Mixing of NUTEC 11S"
- 3.11.9 Attachment 7B, "Table for Partial Mixes of NUTEC 1201"
- 3.11.10 Attachment 8, "Concrete Protective Coating Repair Traveler"

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ATTACHMENT 1

CONCRETE PROTECTIVE COATING INSPECTION TRAVELER	
WORK PROJ. #	PCI TRAVELER #
ELEVATION	ITEM # / DESCRIPTION
REF. DWGS.	
PREPARED BY:	DATE
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC QOI TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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PROTECTIVE COATING INSPECTION TRAVELER SUPPORTING DOCUMENTATION[illegible]

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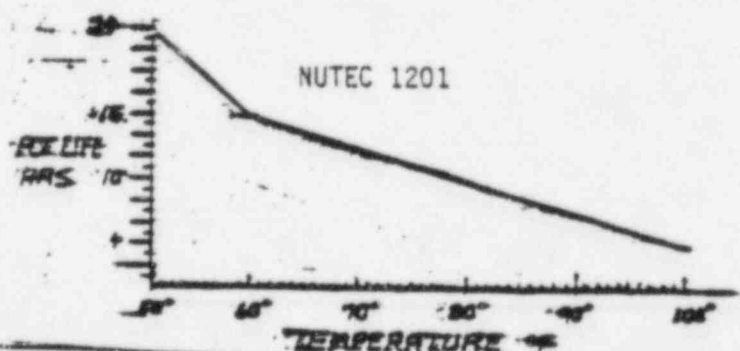
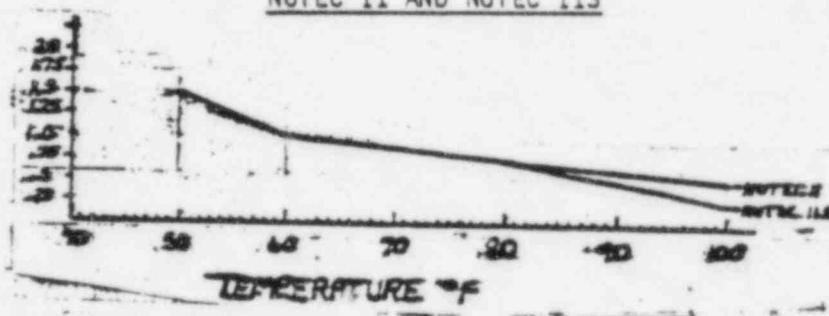
ATTACHMENT 2

SHELF AND POT LIFE REFERENCE SHEET

<u>Material</u>	<u>Shelf Life</u>
Nutec 11 Base & Curing Agent	12 months
Nutec 11S Base & Curing Agent	12 months
Nutec 1201 Base & Curing Agent	12 months
Thinners and Sand Filler	Unlimited

POT LIFE

NUTEC 11 AND NUTEC 11S



Pot lives shown above is the recommended time and should be utilized as a guideline for coating time, actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

INDUCTION TIMES FOR NUTEC 1201

<u>Temp. (°F)</u>	
50-59	45 min.
60-69	30 min.
70-79	20 min.
80-90	10 min.
90-100	None

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ATTACHMENT 3

PART I Allowed Points of Discontinuity Table

<u>Surface Area (sq. ft.)</u>	<u>Total Allowable Number of Points of Discontinuity</u>
Up to 10	1
10-50	2
50-100	5
100-500	10
500-1000	15
1000-5000	25

No gross discontinuities are acceptable.

PART II Dry Film Thickness Determination Using Wet Film Thickness Readings and the Percentage (%) Volume Solids

Percent volume solids for unthinned concrete coatings are as follows:

NUTEC 11	-	78%
NUTEC 11S	-	88%
NUTEC 1201	-	54%

EXAMPLE: 11 mils WFT X 54% = 5.94 mils DFT

For thinned mixes:

$$\% \text{ Volume Solids} = \frac{\text{Volume of unthinned coating}}{\text{Volume of unthinned coating} + \text{Volume thinner}} \times \%$$

% Volume Solids (unthinned)

NOTE: In above equation, volume must be expressed in the same unit of measure.

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ATTACHMENT 5

PAINT MIX SLIP

Report No. _____

Bldg. _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
 MIX NUMBER _____ ELEVATION _____
 MATERIAL _____ GAL. MIXED _____
 SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&E #'S _____
 DATE & TIME MIXED _____ BASE _____
 CURING AGENT _____ FILLER _____ THINNER _____
 ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
 MIX NUMBER _____ ELEVATION _____
 MATERIAL _____ GAL. MIXED _____
 SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&E #'S _____
 DATE & TIME MIXED _____ BASE _____
 CURING AGENT _____ FILLER _____ THINNER _____
 ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
 MIX NUMBER _____ ELEVATION _____
 MATERIAL _____ GAL. MIXED _____
 SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&E #'S _____
 DATE & TIME MIXED _____ BASE _____
 CURING AGENT _____ FILLER _____ THINNER _____
 ACCEPTED BY _____

QC REVIEW & ACCEPTANCE _____
 signature _____ date _____

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ATTACHMENT 6

DEFINITIONS

Color and Gloss Nonuniformity: A milky haze or mist in the finish of a recently applied coating.

Contaminant: A foreign substance, inadvertently added to a coating or found on the substrate that adversely affects the application, adhesion, curing and/or subsequent performance of the applied coating.

Dry Spray: A dry powdery primer or finish coat readily removed by light sanding with either sandpaper or a wire screen. A minor amount of adherent dry spray is acceptable on the final finish coat.

Feathering: An area that is roughened and tapered to obtain a smooth and continuous surface with an existing damaged coating.

Fisheyes: Small openings ("fish eyes") in wet film exposing old surface or previous coat.

Free Standing Water: May be identified by:

- a. Reduced viscosity of the surfacer during application, and excessive sagging from bug holes.
- b. Wet rings around bug holes.
- c. Visible signs of surface water.
- d. Running hand over the surface resulting in moisture on the hand.
- e. Product instability resulting in white streaks.
- f. Failure of the surfacer to adhere to the substrate during the squeegeeing or troweling process.

Full Hiding: The coating provides sufficient coverage so that the preceding coat is not readily visible with an unaided eye.

Holiday: A pinhole, skip, discontinuity or void in coating film.

Laitance: A fine, whitish accumulation on concrete surfaces. It consists mainly of cement particles that were carried by water rising to the surface of freshly placed concrete. The resulting concrete surface is unsuitable for proper adhesion or bond of subsequent fillers or protective coatings.

Monitor: Conformance verification by physically observing a task being performed on a periodic or random basis.

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Mudcracking: Irregular cracking as in a dried mud puddle.

Orange Peel: Dents in the surface resembling orange skin. A moderate amount is acceptable.

Over Spray: A deflected spray mist that settles on dry or partially dry coated surfaces.

Pinholes: Minor discontinuities in coating which expose primer or substrate.

Verify: Confirm or make certain.

Visual: To examine with an unaided eye (correctional eye glasses or contact lens are acceptable).

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ATTACHMENT 7

PREPARATION OF COATING MATERIALS

Surfacer Coat

The surfacer, NUTEC 11S, is packaged in a three component kit consisting of a base, curing agent, and filler. The base and curing agent shall be thoroughly mixed first. If necessary, box the mixture to assure that all the base and cure has been used. The filler shall then be slowly added under constant agitation and mixed until a smooth blend is achieved. The patching material, NUTEC 11, is prepared the same way. Partial mixes for NUTEC 11S shall be in accordance with Attachment 7A. No provision is given for partial mixes of NUTEC 11.

Finish Coat

The finish coat, NUTEC 1201, is a two component epoxy topcoat consisting of a base and cure. These shall be thoroughly mixed under constant agitation until a homogenous blend is achieved. Partial mixes of NUTEC 1201 shall be in accordance with Attachment 7B. Minimum induction times shall be as per Attachment 2.

SEALER/CURING COMPOUND

The sealer/curing compound, NUTEC 10, is normally a two component material consisting of a base and a curing agent. If applying to surfaces below 60° F, a third component accelerator may be used. Slowly mix by power agitation or by hand the entire volume of the cure component with the entire volume of the base component. If an accelerator is used, add the premeasured portion to the base-cure mixture and agitate slowly. Avoid rapid agitation which may result in air entrapment. Thinning may be performed by adding from 10-40% by volume #DL-56 solvent. Do not vary mixing proportions.

NUTRITION 175

TUGCO QA

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ATTACHMENT 7B
TABLE FOR PARITAL MIXES OF NUTEC #1201

		Base		Cure		Maximum Permissible Thinner	
Gal.	Qts.	lbs.	oz.	lbs.	oz.	qts.	oz.
0	1	2	96	0	6.4	0	9.6
0	2	5	3.2	0	12.8	0	19.2
0	3	5	14.4	1	3.2	0	23.0
1	0	10	8	1	8	1	6.4
1	1	13	1.6	1	14.4	1	16
1	2	15	11.2	2	4.8	1	25.6
1	3	18	4.8	2	11.2	2	3.2
2	0	20	14.4	3	1.6	2	12.0
2	1	23	3	3	0	2	22.4
2	2	26	3.2	3	14.4	3	0
2	3	23	12.8	4	3.2	3	9.6
3	0	31	6.4	4	9.6	3	19.2
3	1	34	0	5	0	3	28.8
3	2	36	9.6	5	6.4	4	6.4
3	3	39	3.2	5	12.8	4	16
4	0	41	12.3	6	3.2	4	25.6
4	1	44	8	5	8	5	3.2
4	2	47	0	6	14.4	5	12.0
4	3	49	11.2	7	14.4	5	22.4
5	0	52	4.8	7	11.2	6	0

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ATTACHMENT 8

CONCRETE PROTECTIVE COATING INSPECTION REPORT	
WORK PKG. # _____	SUPPLEMENTAL TO PCI TRAVELER # _____
ELEVATION _____	ITEM # / DESCRIPTION _____
REF. DWGS. _____	
PREPARED BY: _____	DATE _____ SHT _____ OF _____
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC 115 APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC 115 SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC 115 SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC 115 SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC 115 SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC 115 TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC 115 APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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INSPECTION OF CONCRETE SUBSTRATE SURFACE PREPARATION AND COATINGS APPLICATION AND REPAIR	PREPARED BY: <u>Eud Dunbar</u>		<u>3-4-84</u> DATE	
	APPROVED BY: <u>W. J. Mason</u>		<u>3-4-84</u> DATE	
	APPROVED BY: <u>W. J. Mason</u>		<u>3/4/84</u> DATE	

HISTORICAL FILE

1.0 GENERAL

1.1 PURPOSE AND SCOPE

This instruction shall describe the methods used by Quality Control personnel while performing inspections of application of coatings on a concrete substrate inside the Reactor Containment Building, Unit 1.

2.0 INSTRUCTIONS

Visual inspection of surfaces as addressed by this instruction shall be made at approximately an arm's 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) D-cell battery flashlight. Flashlight shall be held perpendicular to the surface during visual inspection.

Visual aids fabricated on site and approved by Quality Assurance and Engineering may be used by Inspectors as an aid in the performance of their inspections.

For definitions reference Attachment 6.

If a conflict arises between the requirements of this procedure and the requirements of the site specification, the requirements of the site specification shall prevail.

2.1 APPLICATION OF NUTEC 10 CURING COMPOUND (IF APPLICABLE)

2.1.1 The QC Inspector shall verify that the green concrete has been cleaned.

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2.1.2 The QC Inspector shall verify that NUTEC 10 is not applied under inclement conditions and that the surface temperatures are above 50°F. Areas of visible moisture or standing water are unacceptable.

2.1.3 NUTEC 10 shall be mixed per Paragraph 2.3. The NUTEC 10 has a pot life of (1) one hour at 75°F. If the NUTEC 10 gives the appearance of a crawling and does not penetrate the concrete, the material shall be removed from the concrete by solvent and a clean cloth. All the expired material shall be discarded.

Pot life above is the recommended time and should be utilized as a guideline for coating time, actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

2.2.1 Preblast Cleaning Operations

Prior to surface preparation, the QC inspector shall visually examine the surface to be water blasted for heavy deposits of oil and grease. Any heavy oil or grease deposits shall be removed.

The QC inspector shall also verify that any detrimental surface irregularities such as projections, fins or ridges are removed.

NOTE: The preblast visual inspection is required only when surface preparation is by one of the following methods:

- a. Water blasting
- b. Water blasting with sand injection
- c. Dry sandblasting
- d. Bush hammering

2.2.2 Surface Preparation

2.2.2.1 Methods of Surface Preparation

Water blasting, water blasting with sand injection, acid etching, sand blasting, and power tooling are all acceptable methods of surface preparation. If NUTEC 10 curing membrane has been applied and gives a "glossy" appearance, the NUTEC 10 shall be abraded to remove the glossy appearance.

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In the event TSP is used, the QC Inspector shall verify that the area is flushed with clean water.

NOTE: Under normal conditions, the concrete surface shall be allowed to cure a minimum of 28 days prior to application of protective coatings. However, if the coatings are to be applied to pour backs, grouting, or patching to which NUTEC 10 has been applied as a curing compound, coating may be performed after a minimum of 6 days has elapsed from NUTEC 10 application time. Repaired abandoned hilit bolt holes, tie holes, unacceptable spalled concrete, grout under base plates which have 3 square feet or less of exposed grouted surface to be coated, may be coated after 48 hours cure.

2.2.2.2 Post Surface Preparation Operations

After surface preparation, the QC inspector shall visually examine the surface to verify the following:

- a) The surface shall be free of construction dust, laitance, and loose deposits, and all adjacent areas cleaned to avoid contamination.
- b) All holes greater than 1/2 inch in depth or greater than 2" diameter and cracks greater than 1/32" are repaired prior to surfacer application.
- c) All sharp projections removed.
- d) Markings (ink, pencil, chalk, felt tip marker, etc.) solvent wiped.
- e) Marking paint removed.
- f) Objects protruding from surface are ground or cut smooth until object is flush.
- g) All loosely adhering embedded objects are removed.
- h) Embedded steel objects shall be power tool roughened and solvent wiped.
- i) Metal objects larger than 4 square inches are primed.
- j) Surface is free of grease, oil, and deleterious curing membranes.

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2.3 MIXING OPERATIONS

2.3.1 Materials

A QC inspector shall verify on Attachment 5 that the shelf life has not expired.

2.3.2 Mixing/Thinning

An inspector shall witness all mixing/thinning operations Per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

2.4 SURFACER APPLICATION

2.4.1 Ambient Conditions

The inspector shall monitor the ambient conditions being recorded on the Environmental Log (Attachment 4) at the "paint distribution point" inside Reactor Unit I. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069 TH or equivalent) shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder (Bristol 4069 TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperature using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W.B. 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 (note in Remarks Section). The surface temperature shall be determined by placing a calibrated Range 0-110°F thermometer or equivalent in contact with the surface to be coated. The thermometer probe shall remain in contact with the surface until the temperature reading stabilizes.

Minimum and maximum values of surface and ambient temperatures shall be 50°F and 100°F respectively. Infrequent dips in temperature to 40°F is permissible during application and/or cure; however, the elapsed time the temperature is below 50°F shall be added to the cure time. Application of the coating shall not begin unless the surface temperature is 5°F above the dew point. Pot life shall be as stated in Attachment 2.

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Humidity may vary as high as 100%; however, free standing water shall be removed. Coating application over a damp surface is permissible. Under no conditions shall NUTEC 11S be applied to a surface containing free standing water.

2.4.1.1 Documentation of Environmental Conditions

- a. The Inspector assigned to the "paint distribution point" in the Reactor Building shall, as a minimum, take a complete set of readings (air temperature, relative humidity, dew point and surface temperature) on each floor elevation at least three (3) times each shift (preferably, the beginning, mid point, and just prior to the end of each shift). More readings may be taken when necessary (i.e., noticeable change in air temperature, request by field inspector to take readings in a specific area, etc.).
- b. The Inspector at the "paint distribution point" shall document these readings on Attachment 4 as follows:
 1. One (1) Environmental Log Sheet (Attachment 4) shall be completed for all readings taken on one (1) floor elevation or specific area in a given shift.
 2. The Inspector shall fill in the applicable information as delineated on the form, except for the "Report No.". (The Report No. will be filled in by the Paper Flow Group when they assign numbers, prior to transmitting to the QA vault.)
 3. Upon completion of the shift, the inspector shall turn all of the Environmental Log Sheets for that shift into the lead inspector(s).
- c. The lead inspector(s) shall review the log sheets for completeness and correctness, sign and date the "QC Review" block, obtain copies for QC reference and transmit the originals to the Paper Flow Group.
- d. If at any time the inspector determines readings which do not comply with the parameters set forth in this procedure, he shall proceed in the following manner:

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1. Immediately take an additional set of readings in the immediate area of the first set of unacceptable readings and record them on the Environmental Log.
2. If the additional set of readings are acceptable, take a third set of readings for referee purposes and record them. If the referee set of readings are acceptable, then the area in question is acceptable but should be closely monitored with readings as necessary.
3. If the additional set of readings is unacceptable and/or the referee set of readings is unacceptable, the inspector is to notify the coatings inspectors in the areas affected so that coating work may be stopped at that time. Coating work shall not continue until the ambient conditions resume an acceptable status.
4. When unacceptable ambient conditions occur and are verified by Step 3 above, the Inspector shall document it on a Nonconformance Report (NCR) in accordance with CP-QP-16.0 and adequately identify the affected areas/elevations.

2.4.2 Surface Acceptability

The QC inspector shall visually examine the substrate surface immediately prior to surfacer application to verify that it is free of contamination (dust, laitance, loose deposits and markings).

2.4.3 Air Supply Acceptability

The inspector shall inspect the air supply system for suitable filters/traps/separators. The effectiveness of these items shall be verified by exposing a piece of white cloth to a blast of air for approximately 30 seconds. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

2.4.4 Pot Life

The QC inspector shall verify that the pot life as shown in Attachment 2 is not exceeded.

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2.4.5 Qualification of Applicator(s)

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

2.4.6 Dry Film Thickness

The QC inspector shall determine the DFT of the applied surfacer by taking wet film thickness spot measurements and multiplying each reading by the % volume solids (taking in account any thinner used). A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, Refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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

Thickness of surfacer may vary between 10 and 35 mils. (See Attachment 3 for method of determining percent volume solids.)

NOTE 3: Tack free times shall be as follows:

<u>Temperature °F</u>	<u>#11</u>	<u>#11S</u>
50 - 59	6 hrs.	8 hrs.
60 - 79	4 hrs.	6 hrs.
80 - 99	2 hrs.	4 hrs.
100	1 hr.	2 hrs.

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Temperature °F

Full Cure 11, 11S

50 - 59	10 days
60 - 69	8 days
70 - 79	7 days
80 - 89	6 days
90 - 100	5 days

2.4.7 Monitoring of Surfacer Application

2.4.7.1 During application of the surfacer, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, surface cleaned with solvent and surfacer reapplied.

2.4.7.2 Monitor the surfaces where NUTEC 11S is being applied to assure that it is not being applied to a surface containing free standing water. (Application of 11S over a damp surface is permissible.)

2.4.8 Surfacer Repair Work

2.4.8.1 Repair of Runs and Sags

Runs and sags which show no evidence of mudcracking shall be abraded flush with the surrounding surface. If after abrading, surfacer is unsatisfactory due to mudcracking or loss of adhesion, remove unsatisfactory coating to substrate and reapply the surfacer. If after abrading the surfacer is satisfactory, no further repair is necessary.

2.4.8.2 Repair of Contamination

Contamination shall be removed by abrading. If unsatisfactory coating still exists, then the area shall be repaired in accordance with Section 2.4.8.3.

NOTE: Rust stains residue, not necessarily the stain, shall be removed with bristle brush and water or Imperial Thinner #DL-54.

2.4.8.3 Repairs When Touch Up or Recoating is Necessary

For repairs that require either touch up or recoating with NUTEC 11S, NUTEC 11 or NUTEC 1201, the QC inspector shall:

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- a) Verify ambient conditions are acceptable per Section 2.4.1.
- b) Verify the surface has been prepared in accordance with Sec. 2.4.8.2 and is free from loose and foreign materials as per Section 2.2.2.2 and/or Paragraph 2.6.
- c) Verify acceptable materials are used, and shelf life is not exceeded.
- d) Verify that NUTEC 11S, NUTEC 11 or NUTEC 1201 is mixed/thinned in accordance with Section 2.3.
- e) Verify pot life is not exceeded per Attachment 2.
- f) Verify qualification of applicator(s) per Section 2.4.5.
- g) Visually inspect per Section 2.5.2.1.
- h) Verify that curing is in accordance with Section 2.5.2.2.
- i) Verify dry film thickness in the repair area is in accordance with the following millage requirements:

NUTEC 11S	10 - 35 mils
NUTEC 11	3 - 20 mils
NUTEC 1201	3 - 16 mils

NOTE 1: See Section 2.4.6 and Attachment 3 for DFT calculation using Wet Film Thickness measurement and percent volume solids.

2.4.8.4 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

2.5 FINISH COAT PREAPPLICATION

2.5.1 Preapplication Inspection

2.5.1.1 Ambient Conditions

Prior to finish coat application, the QC inspector shall determine ambient conditions in accordance with Section 2.4.1.

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2.5.2 Surfacer Post Application Operation

2.5.2.1 Visual Defects Inspection

The inspector shall perform a visual inspection of the surfacer coat NUTEC 11S and NUTEC 11 prior to the finish coat application for the following defects:

- a) Runs and sags shall be abraded down to adjoining coating thickness.
- b) Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed from NUTEC 11S or NUTEC 11 surfaces prior to application of finish coat.
- c) Damaged areas, skips, dry spray, holidays, blisters, bubbling, fisheyes, mudcracking, oil and grease, contamination and excessive orange peel are all unacceptable and shall be repaired in accordance with the applicable subsection of 2.6.

2.5.2.2 Surfacer Cure

The inspector shall monitor ambient temperature after the surfacer is applied to determine when cure is adequate for topcoating operations to commence. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination.

Curing time shall be as follows:

<u>Temperature 0°F</u>	<u>Curing Time Before Topcoating with 1201</u>
50-59	72 hrs.
60-69	48 hrs.
70-79	24 hrs.
80-89	18 hrs.
90-100	12 hrs.

Temperature durations below 50°F will be added to the cure time on an hour for hour basis.

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NUTEC 11S may be touched up or recoated with #11 or #11S as soon as the initial coat has dried such that the paint shall not adhere to the thumb when downward pressure is exerted on the paint film while turning a 90° angle. (This does not refer to the two pass application method.)

2.5.3 Finish Coat Application

2.5.3.1 Air Supply Acceptability

The QC inspector shall verify the air supply is acceptable per Section 2.4.3.

2.5.3.2 Qualification of Applicator(s)

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

2.5.3.3 Pot Life

The QC inspector shall verify that the pot life of NUTEC 1201 has not been exceeded. Pot life is shown on Attachment 2.

2.5.3.4 Dry Film Thickness

The inspector shall determine the DFT of the applied finish coat by taking wet film thickness spot measurements and multiplying each reading by the % volume solids. A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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 spot test areas, Ref. Sec. 2.4.6 Note 2.

(See Attachment 3 for method of determining percent volume solids.)

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2.5.3.5 Monitoring of Finish Coat Application

- a. During application of finish coat, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, previous coat (surfacers) cleaned with solvent and finish coat reapplied.
- b. If applicable, the inspector shall monitor that the hose length does not exceed 75 feet.
- c. Monitor the cure time for recoat of NUTEC 1201. Recoating time of NUTEC 1201 is 24 hours.

The total DFT of NUTEC 1201, recoat and existing coat shall not exceed 16 mils.

2.6 FINISH COAT REPAIRS

For repairs in the NUTEC 1201 Finish Coat, the QC Inspector shall verify the following:

- a) The inspector shall determine the DFT of the existing coated surface (prior to recoating) by either, or one of the two following methods.
 - 1) Using the DFT readings acquired during the backfit documentation.
 - 2) The scratch test of the REACTIC 1201 finish coat shall be performed using a Mark II Tooke Inspection Gage equipped with a 2x tip. Five separate readings spaced randomly over each finish coated area of 100 square feet shall be taken. For areas less than 100 square feet, Note 2 of Section 2.4.6 shall apply.

b) Repairs of Runs/Sags

Runs/sags showing evidence of cracking shall be removed. Runs or sags which exhibit no other coating defect shall be abraded to the thickness of adjoining coatings.

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- 1) Verify that all loose particles and foreign particles are removed from surface.
- 2) Verify that the surface is solvent wiped.
- 3) Perform inspections in Sections 2.3, 2.5.1, 2.5.3 and 2.7.3.

c) Repair of Scratches and/or Damages

Any scratches or damaged areas shall be abraded until loosely adherent particles are removed. The following minimum coating requirements shall be maintained for damages extending to concrete:

Damage 1/2" or less regardless of length - no additional surfacer required prior to topcoat.

Damage greater than 1/2" to 2" in width, regardless of length - Nutec 11 surfacer prior to topcoat application.

Damage greater than 2" in width - normal coating system required.

When performing surfacer and/or topcoat repair work, and the damaged area is 2 sq/ in. or less in size, or the damage is a scratch 1/4 in. width or less, regardless of length, substantiating or recording wet film thickness or the damaged area repair shall not be required.

d) Repair of Contamination

The QC inspector shall verify that contamination is removed by abrading and the surface recoated. The inspector shall perform inspections delineated in Sections 2.3, 2.5.1, 2.5.3 and 2.7.3.

e) Repair of Pinholes and Small Discontinuities

- 1) Verify all loose particles are removed and area is solvent wiped.
- 2) Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. The inspections in Section 2.3, 2.5.1, 2.5.3.2 and 2.5.3.3 still apply.

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f) Repair of Dry Spray

Repair of dry spray identifiable by visual inspection defined within this procedure shall be removed. (A minor amount of adherent dry spray is acceptable on the final finish coat.)

- 1) Verify all loose particles are removed.
- 2) Verify coating film thickness is still within allowable range.
- 3) If film thickness is not within allowable range perform inspections in Sec. 2.3, 2.5.1, 2.5.3 and 2.7.3.

g) Repair of Excessive Orange Peel

- 1) Verify the affected area is abraded and solvent wiped.
- 2) Verify the affected area is refinished and perform the inspections delineated in Section 2.3, 2.5.1, 2.5.3 and 2.7.3 if required.

h) Repair of Gloss and Color Nonuniformity

- 1) Verify the affected area is solvent wiped.
- 2) Verify the affected area is recoated without exceeding the maximum film thickness and perform inspections in Sections 2.3, 2.5.1, 2.5.3 and 2.7.3.
- 3) Top coated areas which have been abraded for various reasons (i.e., runs, sags, high millage, etc.) and are within acceptable procedural thickness, following repairs, do not require recoating for gloss enhancing.
- 4) For small repair areas such as pinholes, gloss and gloss uniformity is not required, provided the coating is smooth and continuous.

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NOTE 1: The tie in interface between concrete coatings and steel coatings shall be visually inspected during the finish coat final acceptance of both coating systems.

NOTE 2: (If applicable) coating interface - at coating interface for finish and or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interface the interface of the coating of systems shall be a maximum of approximately 1½ inch in width. Within the interface area overlapping of any materials or systems is acceptable.

NOTE 3: Repair and touch-up - For repair and/or touch-up purposes, Nutec #11S or #11 surfacer may be placed over the initial system as required to complete the required repair or touch-up.

NOTE 4: Roughen the topcoat, if present, by sanding, or stoning prior to applying repair surfacer.

2.6.1 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

2.7 FINISH COAT FINAL ACCEPTANCE INSPECTION PRIOR TO AREA TURNOVER

A final visual inspection in accordance with the following subsections shall be performed on exposed finish coated concrete substrates.

2.7.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the inspector shall verify that the finish coat has cured for the minimum of 24 hours.

2.7.2 Finish Coat Continuity Inspection

The QC Inspector shall visually inspect the continuity of the finish coat. The maximum number of permissible pinholes is shown on Attachment 3. No more than 2 points of discontinuity shall occur within an area having a radius of six inches (using a point of discontinuity as the center of the circle). No more than 40% of the total number of allowable points of discontinuity shall occur within any one area equal to 25% of the total area. The pinholes that are beyond the acceptance of Attachment 3 shall be repaired in accordance with Section 2.6.

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2.7.3 Visual Examination

The QC inspector shall visually examine the finish coated surface for the following defects:

- a) Runs and sags which show no evidence of mudcracking are acceptable. Unacceptable runs and sags will be repaired in accordance with Section 2.6.
- b) At the time of the final inspection, pinholes and small discontinuities may be repaired with no later reinspection required of these areas.
- c) Skips, holidays, color and gloss nonuniformity, excessive orange peel, dry spray, damaged areas, blisters, bubbles, and fish eyes will be repaired in accordance with Section 2.6.
- d) Contamination is unacceptable. Area must be repaired per Section 2.6.

2.8 NONCONFORMANCES

2.8.1 Unacceptable conditions which are not readily repaired or corrected per the approved procedures shall be documented as unsatisfactory on the inspection traveler.

2.8.2 Nonconforming conditions such as coating failure due to loss of adhesion or indeterminate/unacceptable conditions which cannot be repaired or corrected as per existing procedures shall be documented on a Nonconformance Report (NCR) in accordance with CP-QP-16.0. The NCR number shall be referenced on the inspection traveler, if applicable.

2.9 DOCUMENTATION (REFER TO ATTACHMENT 1)

2.9.1 All inspections required by this procedure shall be recorded in the inspection attributes on the back of the travelers (Attachment 1). Preparation and processing of the traveler shall be per QI-QP-11.4-28.

2.9.2 When the inspections required by Sections 2.1 through 2.2.2.2 have been satisfactorily completed, Step 1 shall be signed and dated by the inspector.

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2.9.3 When the inspections required by Sections 2.3.1 through 2.4.7.2 have been satisfactorily completed, Step 2 (for NUTEC 11S) or Step 4 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

2.9.4 When the inspections required by Sections 2.4.8 through 2.5.2.2 have been satisfactorily completed, Step 3 (for NUTEC 11S) or Step 5 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

2.9.5 When the inspections required by Sections 2.5.3 through 2.5.3.5 have been satisfactorily completed, Step 6 shall be signed and dated by the inspector.

2.9.6 When the inspections required by Sections 2.6 through 2.7.3 have been satisfactorily completed, Step 7 shall be signed and dated by the inspector.

3.0 CLARIFICATION

3.1 REPAIR OF MECHANICAL DAMAGE TO COMPLETED ITEMS

3.1.1 Areas that have been completed, inspected, accepted and traveler package closed which incur major damage at a later date may be repaired, inspected and documented on Attachment 8, "Concrete Protective Coating Inspection Repair Traveler". Otherwise, the minor areas of mechanical damage, which occur after completion of an area, will be repaired during the final protective coatings walkdown.

3.2 EXCLUSION AREAS

3.2.1 Clarification/Definition

3.2.1.1 Areas which are scheduled to be painted but due to limited or no access are not possible to be painted at the present time and are beyond the control of protective coatings craft or quality control.

3.2.1.2 Building Management and/or the Paper Flow Group (PFG) shall determine the legitimacy of excluding an area.

3.2.2 Areas which are determined as exclusions shall be so noted on the original traveler and a new traveler will be generated by PFG to encompass the exclusion(s).

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3.3 INACCESSIBLE/LIMITED ACCESS AREAS

3.3.1 Clarification/Definition

3.3.1.1 Areas where, due to permanent installation configuration, a dry film thickness (DFT) gauge cannot be properly engaged.

3.3.2 These areas shall be visually inspected to verify that the primer is applied and the finish coat is applied over the primer. No other inspection is required.

4.0 ATTACHMENTS

4.1 Attachment 1, "Concrete Protective Coating Inspection Traveler"

4.2 Attachment 2, "Shelf and Pot Life Reference Sheet"

4.3 Attachment 3, "Allowed Points of Discontinuity Table" and "DFT Determination"

4.4 Attachment 4, "Environmental Log Sheet"

4.5 Attachment 5, "Paint Mix Slip"

4.6 Attachment 6, "Definitions"

4.7 Attachment 7, "Preparation of Coating Materials"

4.8 Attachment 7A, "Table for Partial Mixing of NUTEC 11S"

4.9 Attachment 7B, "Table for Partial Mixes of NUTEC 1201"

4.10 Attachment 8, "Concrete Protective Coating Repair Traveler"

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ATTACHMENT 1

CONCRETE PROTECTIVE COATING INSPECTION TRAVELER	
WORK Pkg. # _____	PCI TRAVELER # _____
ELEVATION: _____	ITEM # / DESCRIPTION _____
REF. DWGS. _____	
PREPARED BY: _____	DATE _____
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC 1201 TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC 10 APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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ATTACHMENT 2

SHELF AND POT LIFE REFERENCE SHEET

Material

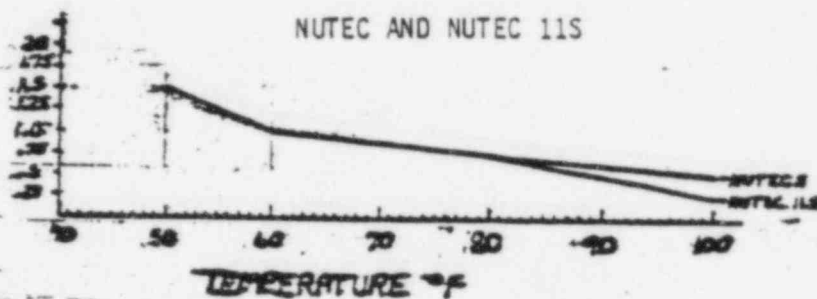
Nutec 11 Base & Curing Agent
Nutec 11S Base & Curing Agent
Nutec 1201 Base & Curing Agent
Thinners and Sand Filler

Shelf Life

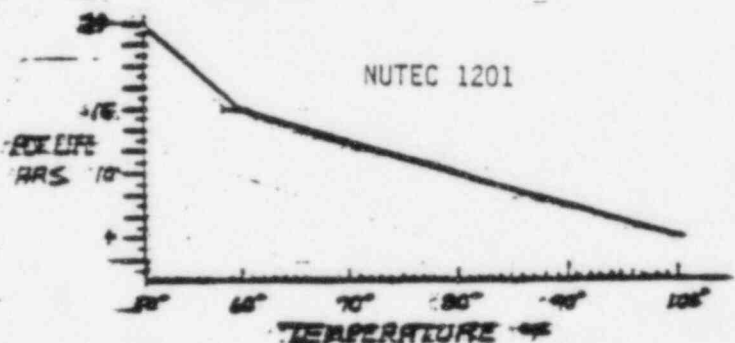
12 months
12 months
12 months
Unlimited

POT LIFE

NUTEC AND NUTEC 11S



NUTEC 1201



Pot-lives shown above is the recommended time and should be utilized as a guideline for coating time, actual pot life is determined by the applicability of the coating. This applies to thinned and unthinned coatings.

INDUCTION TIMES FOR NUTEC 1201

Temp. (°F)

50-59	45 min.
60-69	30 min.
70-79	20 min.
80-90	10 min.
90-100	None

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ATTACHMENT 3

PART I Allowed Points of Discontinuity Table

<u>Surface Area (sq. ft.)</u>	<u>Total Allowable Number of Points of Discontinuity</u>
Up to 10	1
10-50	2
50-100	5
100-500	10
500-1000	15
1000-5000	25

No gross discontinuities are acceptable.

PART II Dry Film Thickness Determination Using Wet Film Thickness Readings and the Percentage (%) Volume Solids

Percent volume solids for unthinned concrete coatings are as follows:

NUTEC 11	-	78%
NUTEC 11S	-	88%
NUTEC 1201	-	54%

EXAMPLE: 11 mils WFT X 54% = 5.94 mils DFT

For thinned mixes:

$$\% \text{ Volume Solids} = \frac{\text{Volume of unthinned coating}}{\text{Volume of unthinned coating} + \text{Volume thinner}} \times \%$$

$$\% \text{ Volume Solids (unthinned)}$$

NOTE: In above equation, volume must be expressed in the same unit of measure.

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ATTACHMENT 5

PAINT MIX SLIP

Report No. _____

Bldg. _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&T # 'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&T # 'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
MIX NUMBER _____ ELEVATION _____
MATERIAL _____ GAL. MIXED _____
SHELF LIFE ACCEPTABLE: YES _____ NO _____ M&T # 'S _____
DATE & TIME MIXED _____ BASE _____
CURING AGENT _____ FILLER _____ THINNER _____
ACCEPTED BY _____

QC REVIEW & ACCEPTANCE _____
signature _____ date _____

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ATTACHMENT 6

DEFINITIONS

Color and Gloss Nonuniformity: A milky haze or mist in the finish of a recently applied coating.

Contaminant: A foreign substance, inadvertently added to a coating or found on the substrate that adversely affects the application, adhesion, curing and/or subsequent performance of the applied coating.

Dry Spray: A dry powdery primer or finish coat readily removed by light sanding with either sandpaper or a wire screen. A minor amount of adherent dry spray is acceptable on the final finish coat.

Feathering: An area that is roughened and tapered to obtain a smooth and continuous surface with an existing damaged coating.

Fisheyes: Small openings ("fish eyes") in wet film exposing old surface or previous coat.

Full Hiding: The coating provides sufficient coverage so that the preceding coat is not readily visible with an unaided eye.

Holiday: A pinhole, skip, discontinuity or void in coating film.

Inaccessible Areas: Areas where a DFT gauge cannot be properly engaged. In these areas, the inspector shall verify that primer is present and finish coat is applied on the primer. No other inspection required.

Monitor: Conformance verification by physically observing a task being performed on a periodic or random basis.

Mudcracking: Irregular cracking as in a dried mud puddle (applicable to inorganic zinc primers).

Orange Peel: Dents in the surface resembling orange skin. A moderate amount is acceptable.

Over Spray: A deflected spray mist that settles on dry or partially dry coated surfaces.

Verify: Confirm or make certain.

Visual: To examine with an unaided eye (correctional eye glasses or contact lens are acceptable).

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ATTACHMENT 7

PREPARATION OF COATING MATERIALS

Surfacer Coat

The surfacer, NUTEC 11S, is packaged in a three component kit consisting of a base, curing agent, and filler. The base and curing agent shall be thoroughly mixed first. If necessary, box the mixture to assure that all the base and cure has been used. The filler shall then be slowly added under constant agitation and mixed until a smooth blend is achieved. The patching material, NUTEC 11, is prepared the same way. Partial mixes for NUTEC 11S shall be in accordance with Attachment 7A.

Finish Coat

The finish coat, NUTEC 1201, is a two component epoxy topcoat consisting of a base and cure. These shall be thoroughly mixed under constant agitation until a homogenous blend is achieved. Partial mixes of NUTEC 1201 shall be in accordance with Attachment 7B. Minimum induction times shall be as per Attachment 2.

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ATTACHMENT 7B
TABLE FOR PARTIAL MIXES OF NUTEC #1201

		Base		Cure		Maximum Permissible Thinner	
Gal.	Qts.	lbs.	oz.	lbs.	oz.	qts.	oz.
0	1	2	96	0	6.4	0	9.6
0	2	5	3.2	0	12.8	0	19.2
0	3	5	14.4	1	3.2	0	23.0
1	0	10	8	1	8	1	6.4
1	1	13	1.6	1	14.4	1	16
1	2	15	11.2	2	4.8	1	25.6
1	3	18	4.8	2	11.2	2	3.2
2	0	20	14.4	3	1.6	2	12.0
2	1	23	3	3	0	2	22.4
2	2	26	3.2	3	14.4	3	0
2	3	23	12.8	4	3.2	3	9.6
3	0	31	5.4	4	9.6	3	19.2
3	1	34	0	5	0	3	28.8
3	2	36	9.6	5	6.4	4	6.4
3	3	39	3.2	5	12.0	4	16
4	0	41	12.3	6	3.2	4	25.6
4	1	44	8	6	8	5	3.2
4	2	47	0	6	14.4	5	12.0
4	3	49	11.2	7	14.0	5	22.4
5	0	52	4.8	7	11.2	6	0

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ATTACHMENT 8

CONCRETE PROTECTIVE COATING INSPECTION REPORT	
WORK PKG. #	SUPPLEMENTAL TO PCI TRAVELER #
ELEVATION	ITEM # / DESCRIPTION
RER DWGS.	
PREPARED BY:	DATE _____ SHT _____ OF _____
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC 115 APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC 115 SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC 115 SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC 11 SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC 11 SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC 201 TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC 10 APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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INSPECTION OF CONCRETE SUBSTRATE SURFACE PREPARATION AND COATINGS APPLICATION AND REPAIR	PREPARED BY: <u>K. WILKINSON</u>	<u>2/16/84</u>	DATE	
	APPROVED BY: <u>H. D. VANDERGRIFT</u>	<u>2-17-84</u>	DATE	
	APPROVED BY: <u>B. C. DENT</u>	<u>2-20-84</u>	DATE	

FOR INFORMATION ONLY

1.0 GENERAL

1.1 PURPOSE AND SCOPE

HISTORICAL FILE

This instruction shall describe the methods used by Quality Control personnel while performing inspections of application of coatings on a concrete substrate inside the Reactor Containment Building, Unit 1.

2.0 INSTRUCTIONS

Visual inspection of surfaces as addressed by this instruction shall be made at approximately an arm's 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) D-cell battery flashlight. Flashlight shall be held perpendicular to the surface during visual inspection.

Visual aids fabricated on site and approved by Quality Assurance and Engineering may be used by Inspectors as an aid in the performance of their inspections.

For definitions reference Attachment 6.

2.1 APPLICATION OF NUTEC 10 CURING COMPOUND (IF APPLICABLE)

2.1.1 The QC Inspector shall verify that the green concrete has been cleaned.

2.1.2 The QC Inspector shall verify that NUTEC 10 is not applied under inclement conditions and that the surface temperatures are above 50°F. Areas of visible moisture or standing water are unacceptable.

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2.1.3 NUTEC 10 shall be mixed per Paragraph 2.3. The NUTEC 10 has a pot life of (1) one hour at 75°F. If the NUTEC 10 gives the appearance of a crawl and does not penetrate the concrete, the material shall be removed from the concrete by solvent and a clean cloth. All the expired material shall be discarded and the equipment shall be cleaned.

2.1.4 The QC Inspector shall verify that during application of NUTEC 10, areas with sags, surface irregularities or excessive buildup shall be removed with solvent and a clean cloth.

2.2.1 Preblast Cleaning Operations

Prior to surface preparation, the QC inspector shall visually examine the surface to be water blasted for heavy deposits of oil and grease. Any heavy oil or grease deposits shall be removed.

The QC inspector shall also verify that any detrimental surface irregularities such as projections, fins or ridges shall be removed by bush hammering, hand or power tooling, grinding, or stoning.

NOTE 1: The preblast visual inspection is required only when surface preparation is by one of the following methods:

- a. Water blasting
- b. Water blasting with sand injection
- c. Dry sandblasting
- d. Bush hammering

2.2.2 Surface Preparation

2.2.2.1 Methods of Surface Preparation

Water blasting, water blasting with sand injection, acid etching, sand blasting, and power tooling are all acceptable methods of surface preparation. If NUTEC 10 curing membrane has been applied and gives a "glossy" appearance, the surface shall be abraded without completely removing the NUTEC 10 prior to application of the surfacer.

In the event TSP is used, the QC Inspector shall verify that the area is flushed with clean water.

2.2.2.2 Post Blasting Operations

After surface preparation, the QC inspector shall visually examine the surface to verify the following:

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- a) The surface shall be free of construction dust, laitance, and loose deposits, and all adjacent areas cleaned to avoid contamination.
- b) All holes greater than 1/2 inch in depth are repaired with dry pack or epoxy grout.
- c) All sharp projections removed.
- d) Markings (ink, pencil, chalk, felt tip marker, etc.) solvent wiped.
- e) Marking paint removed.
- f) Objects protruding from surface are ground or cut smooth until object is flush.
- g) All loosely adhering embedded objects are removed.
- h) Smooth embedded objects such as plastic or steel roughened. Metal objects are power tool cleaned and solvent wiped.
- i) Metal objects larger than 4 square inches are primed.
- j) Surface is free of grease, oil, and deleterious curing membranes.

2.3 MIXING OPERATIONS

2.3.1 Materials

A QC inspector shall verify on Attachment 5 that the shelf life has not expired.

2.3.2 Mixing/Thinning

An inspector shall witness all mixing/thinning operations Per Attachment 7. Induction times for finish mixes are shown in Attachment 2.

2.4 SURFACER APPLICATION

2.4.1 Ambient Conditions

The inspector shall monitor the ambient conditions being recorded on the Environmental Log (Attachment 4) at the "paint distribution point" inside Reactor Unit I. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069 TH or

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equivalent) shall be used for air temperature determination. A calibrated non-mercury filled wet bulb thermometer or a calibrated humidity recorder (Bristol 4069 TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperature using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W.B. 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 (note in Remarks Section). The surface temperature shall be determined by placing a calibrated Range 0-110°F thermometer or equivalent in contact with the surface to be coated. The thermometer probe shall remain in contact with the surface until the temperature reading stabilizes.

Minimum and maximum values of surface and ambient temperatures shall be 50°F and 100°F respectively. Infrequent dips in temperature to 40°F is permissible during application and/or cure; however, the elapsed time the temperature is below 50°F shall be added to the cure time. Application of the coating shall not begin unless the surface temperature is 5°F above the dew point. Pot life shall be as stated in Attachment 2.

Humidity may vary as high as 100%; however, free standing water shall be removed. Coating application over a damp surface is permissible. Under no conditions shall NUTEC 11S be applied to a surface containing free standing water.

2.4.1.1 Documentation of Environmental Conditions

- a. The Inspector assigned to the "paint distribution point" in the Reactor Building shall, as a minimum, take a complete set of readings (air temperature, relative humidity, dew point and surface temperature) on each floor elevation at least three (3) times each shift (preferably, the beginning, mid point, and just prior to the end of each shift). More readings may be taken when necessary (i.e., noticeable change in air temperature, request by field inspector to take readings in a specific area, etc.).
- b. The Inspector at the "paint distribution point" shall document these readings on Attachment 4 as follows:

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1. One (1) Environmental Log Sheet (Attachment 4) shall be completed for all readings taken on one (1) floor elevation or specific area in a given shift.
2. The Inspector shall fill in the applicable information as delineated on the form, except for the "Report No.". (The Report No. will be filled in by the Paper Flow Group when they assign numbers, prior to transmitting to the QA vault.)
3. Upon completion of the shift, the inspector shall turn all of the Environmental Log Sheets for that shift into the lead inspector(s).
- c. The lead inspector(s) shall review the log sheets for completeness and correctness, sign and date the "QC Review" block, obtain copies for QC reference and transmit the originals to the Paper Flow Group.
- d. If at any time the inspector determines readings which do not comply with the parameters set forth in this procedure, he shall proceed in the following manner:
 1. Immediately take an additional set of readings in the immediate area of the first set of unacceptable readings and record them on the Environmental Log.
 2. If the additional set of readings are acceptable, take a third set of readings for referee purposes and record them. If the referee set of readings are acceptable, then the area in question is acceptable but should be closely monitored with readings as necessary.
 3. If the additional set of readings is unacceptable and/or the referee set of readings is unacceptable, the inspector is to notify the coatings inspectors in the areas affected so that coating work may be stopped at that time. Coating work shall not continue until the ambient conditions resume an acceptable status.
 4. When unacceptable ambient conditions occur and are verified by Step 3 above, the Inspector shall document it on a Nonconformance Report (NCR) in accordance with CP-QP-16.0 and adequately identify the affected areas/elevations.

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2.4.2 Surface Acceptability

The QC inspector shall visually examine the substrate surface immediately prior to surfacer application to verify that it is free of contamination (dust, laitance, loose deposits and markings).

2.4.3 Air Supply Acceptability

The inspector shall inspect the air supply system for suitable filters/traps/separators. The effectiveness of these items shall be verified by exposing a piece of white cloth to a blast of air for approximately 30 seconds. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

2.4.4 Pot Life

The QC inspector shall verify that the pot life as shown in Attachment 2 is not exceeded.

2.4.5 Qualification of Applicator(s)

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

2.4.6 Dry Film Thickness

The QC inspector shall determine the DFT of the applied surfacer by taking wet film thickness spot measurements and multiplying each reading by the % volume solids (taking in account any thinner used). A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, Refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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

Thickness of surfacer may vary between 10 and 35 mils. (See Attachment 3 for method of determining percent volume solids.)

NOTE 3: Tack free times shall be as follows:

Temperature °F	#11	#11S
50 - 59	6 hrs.	8 hrs.
60 - 79	4 hrs.	6 hrs.
80 - 99	2 hrs.	4 hrs.
100	1 hr.	2 hrs.

NUTEC 11S may be touched up with #11S or #11 as soon as it has set to touch. #11S and #11 may be subjected to personnel foot traffic after 24 hours cure and lay down of material after full cure.

Temperature °F	Full Cure 11, 11S
50 - 59	10 days
60 - 69	8 days
70 - 79	7 days
80 - 89	6 days
90 - 100	5 days

2.4.7 Monitoring of Surfacers Application

- 2.4.7.1 During application of the surfacer, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, surface cleaned with solvent and surfacer reapplied.

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2.4.7.2 Monitor the surfaces where NUTEC 11S is being applied to assure that it is not being applied to a surface containing free standing water. (Application of 11S over a damp surface is permissible.)

2.4.8 Surfacer Repair Work

2.4.8.1 Repair of Runs and Sags

Runs and sags which show evidence of mudcracking shall be abraded flush with the surrounding surface. If after abrading, surfacer is unsatisfactory due to mudcracking or loss of adhesion, remove unsatisfactory coating to substrate and reapply the surfacer. If after abrading the surfacer is satisfactory, no further repair is necessary.

2.4.8.2 Repair of Contamination

Contamination shall be removed by abrading. If unsatisfactory coating still exists, then the area shall be repaired in accordance with Section 2.4.8.3.

NOTE: Rust stains residue, not necessarily the stain, shall be removed with bristle brush and water or Imperial Thinner #DL-54.

2.4.8.3 Repairs When Touch Up or Recoating is Necessary

For repairs that require either touch up or recoating with NUTEC 11S, NUTEC 11 or NUTEC 1201, the QC inspector shall:

- a) Verify ambient conditions are acceptable per Section 2.4.1.
- b) Verify the surface has been prepared in accordance with Sec. 2.4.8.2 and is free from loose and foreign materials as per Section 2.2.2.2 and/or Paragraph 2.6.
- c) Verify acceptable materials are used, and shelf life is not exceeded.
- d) Verify that NUTEC 11S, NUTEC 11 or NUTEC 1201 is mixed/thinned in accordance with Section 2.3.
- e) Verify pot life is not exceeded per Attachment 2.
- f) Verify qualification of applicator(s) per Section 2.4.5.

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- g) Visually inspect per Section 2.5.2.1.
- h) Verify that curing is in accordance with Section 2.5.2.2.
- i) Verify dry film thickness in the repair area is in accordance with the following millage requirements:

NUTEC 11S	10 - 35 mils
NUTEC 11	3 - 20 mils
NUTEC 1201	3 - 16 mils

NOTE 1: See Section 2.4.6 and Attachment 3 for DFT calculation using Wet Film Thickness measurement and percent volume solids.

- 2.4.8.4 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

2.5 FINISH COAT APPLICATION

2.5.1 Preapplication Inspection

2.5.1.1 Ambient Conditions

Prior to finish coat application, the QC inspector shall determine ambient conditions in accordance with Section 2.4.1.

2.5.2 Surfacer Post Application Operation

2.5.2.1 Visual Defects Inspection

The inspector shall perform a visual inspection of the surfacer coat NUTEC 11S and NUTEC 11 prior to the finish coat application for the following defects:

- a) Runs or sags which show no evidence of mudcracking are acceptable. Those that do must be repaired in accordance with Section 2.6 (b).
- b) Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed from NUTEC 11S or NUTEC 11 surfaces prior to application of finish coat.

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- c) Damaged areas, skips, dry spray, holidays, blisters, bubbling, fisheyes, mudcracking, oil and grease, contamination and excessive orange peel are all unacceptable and shall be repaired in accordance with the applicable subsection of 2.5.

2.5.2.2 Surfacer Cure

The inspector shall monitor ambient temperature after the surfacer is applied to determine when cure is adequate for topcoating operations to commence. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069TH or equivalent) shall be used for air temperature determination.

Curing time shall be as follows:

<u>Temperature 0°F</u>	<u>Curing Time Before Topcoating with 1201</u>
50-59	72 hrs.
60-69	48 hrs.
70-79	24 hrs.
80-89	18 hrs.
90-100	12 hrs.

Temperature durations below 50°F will be added to the cure time on an hour for hour basis.

NUTEC 11S may be touched up or recoated with #11 or #11S as soon as the initial coat has dried such that the paint shall not adhere to the thumb when downward pressure is exerted on the paint film while turning a 90° angle. (This does not refer to the two pass application method.)

2.5.3 Finish Coat Application

2.5.3.1 Air Supply Acceptability

The QC inspector shall verify the air supply is acceptable per Section 2.4.3.

2.5.3.2 Qualification of Applicator(s)

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

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2.5.3.3 Pot Life

The QC inspector shall verify that the pot life of NUTEC 1201 has not been exceeded. Pot life is shown on Attachment 2.

2.5.3.4 Dry Film Thickness

The inspector shall determine the DFT of the applied finish coat by taking wet film thickness spot measurements and multiplying each reading by the % volume solids. A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area shall be taken for every 100 square feet of coated surface. For areas less than 100 square feet, refer to Note 2 below.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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 spot test areas, Ref. Sec. 2.4.6 Note 2.

(See Attachment 3 for method of determining percent volume solids.)

2.5.3.5 Monitoring of Finish Coat Application

- a. During application of finish coat, the inspector shall monitor the wet film to assure no fish eyes appear. If fish eyes occur, the inspector shall notify the paint foreman of their presence. Fish eyes should be removed while the coating is still wet, previous coat (surfacers) cleaned with solvent and finish coat reapplied.
- b. If applicable, the inspector shall monitor that the hose length does not exceed 75 feet.
- c. Monitor the cure time for recoat of NUTEC 1201. Recoating time of NUTEC 1201 is 24 hours.

The total DFT of NUTEC 1201, recoat and existing coat shall not exceed 16 mils.

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2.6 FINISH COAT REPAIRS

For repairs in the NUTEC 1201 Finish Coat, the QC Inspector shall verify the following:

- a) The inspector shall determine the DFT of the existing coated surface (prior to recoating) by either, or one of the two following methods.

- 1) Using the DFT readings acquired during the backfit documentation.
- 2) The scratch test of the REACTIC 1201 finish coat shall be performed using a Mark II Tooke Inspection Gage equipped with a 2x tip. Five separate readings spaced randomly over each finish coated area of 100 square feet shall be taken. For areas less than 100 square feet, Note 2 of Section 2.4.6 shall apply.

b) Repairs of Runs/Sags

Runs/sags which show no evidence of mudcracking or loss of adhesion are acceptable. Runs/sags to the contrary shall be abraded to thickness of the surrounding coating and repaired per Steps 1 through 3 below.

- 1) Verify that all loose particles and foreign particles are removed from surface.
- 2) Verify that the surface is solvent wiped.
- 3) Perform inspections in Sections 2.3, 2.5.1, 2.5.3 and 2.7.3.

c) Repair of Minor Defects

The QC inspector shall perform the following inspection when repairing minor defects:

- 1) Verify that the damaged area is blasted or abraded until all loosely adherent particles are removed.
- 2) Verify damaged area is solvent wiped.
- 3) Perform inspections described in Sec. 2.5.1, 2.5.3 and 2.7.3.

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4) For defects extending to the concrete surface, no additional surfacer need be applied prior to finish coat. (See Notes at end of section.

5) Touchup of minor defects may be done at the time of final inspection without later reinspection.

d) Repair of Major Defects

The QC Inspector shall perform the following inspection when repairing major defects:

1) Verify that the damaged area is blasted or abraded until all loosely adherent particles are removed.

2) Verify the area is solvent wiped.

3) Perform the inspections delineated in Sections 2.5.1, 2.5.3 and 2.7.3.

4) For defects extending to the concrete surface, additional surfacer shall be applied prior to finish coat. (See Notes at end of section.)

e) Repair of Contamination

The QC inspector shall verify that contamination is removed by abrading and the surface recoated. The inspector shall perform inspections delineated in Sections 2.3, 2.5.1, 2.5.3 and 2.7.3.

f) Repair of Pinholes and Small Discontinuities

1) Verify all loose particles are removed and area is solvent wiped.

2) Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. The inspections in Section 2.3, 2.5.1, 2.5.3.2 and 2.5.3.3 still apply.

g) Repair of Dry Spray

Repair of dry spray and/or overspray identifiable by visual inspection defined within this procedure shall be removed. (A minor amount of adherent dry spray is acceptable on the final finish coat.)

1) Verify all loose particles are removed.

2) Verify coating film thickness is still within allowable range.

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- 3) If film thickness is not within allowable range perform inspections in Sec. 2.3, 2.5.1, 2.5.3 and 2.7.3.

h) Repair of Excessive Orange Peel

- 1) Verify the affected area is abraded and solvent wiped.
- 2) Verify the affected area is refinished and perform the inspections delineated in Section 2.3, 2.5.1, 2.5.3 and 2.7.3.

i) Repair of Gloss and Color Nonuniformity

- 1) Verify the affected area is solvent wiped.
- 2) Verify the affected area is recoated without exceeding the maximum film thickness and perform inspections in Sections 2.3, 2.5.1, 2.5.3 and 2.7.3.
- 3) Top coated areas which have been abraded for various reasons (i.e., runs, sags, high millage, etc.) and are within acceptable procedural thickness, following repairs, do not require recoating for gloss enhancing.
- 4) For small repair areas such as pinholes, gloss and gloss uniformity is not required, provided the coating is smooth and continuous.

NOTE: The tie in interface between concrete coatings and steel coatings shall be visually inspected during the finish coat final acceptance of both coating systems.

NOTE: (If applicable) coating interface - at coating interface for finish and or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interface the interface of the coating of systems shall be a maximum of approximately 1½ inch in width. Within the interface area overlapping of any materials or systems is acceptable.

NOTE: For repair and/or touch-up purposes, Imperial coatings may be applied in the following sequential order: 11S/1201/11S/1201 or 11S/1201/11/1201.

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NOTE: Repair of scratches and/or damages - Any scratches or damaged areas shall be abraded until loosely adherent particles are removed. The following minimum coating requirements shall be maintained for damages extending to concrete:

Damage 1/2" or less regardless of length - no additional surfacer required prior to topcoat.

Damage greater than 1/2" to 2" in width, regardless of length - Nutec 11 surfacer prior to topcoat application.

Damage greater than 2" in width - normal coating system required.

When performing surfacer and/or topcoat repair work, and the damaged area is 2 sq. in. or less in size, or the damage is a scratch 1/4 in. in width or less, regardless of length, substantiating or recording wet film thickness on the damaged area repair shall not be required.

2.6.1 In-process repairs shall be documented on the Traveler (Attachment 1) showing their status and/or completion.

2.7 FINISH COAT FINAL ACCEPTANCE INSPECTION PRIOR TO AREA TURNOVER

A final visual inspection in accordance with the following subsections shall be performed on exposed finish coated concrete substrates.

2.7.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the inspector shall verify that the finish coat has cured for the minimum of 24 hours.

2.7.2 Finish Coat Continuity Inspection

The QC inspector shall visually inspect the continuity of the finish coat after a minimum cure of 24 hours. The maximum number of permissible pinholes is shown on Attachment 3. No more than 2 points of discontinuity shall occur within an area having a radius of six inches (using a point of discontinuity as the center of the circle). No more than 40% of the total number of allowable points of discontinuity shall occur within any one area equal to 25% of the total area. The pinholes that are beyond the acceptance of Attachment 3 shall be repaired in accordance with Section 2.6.

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2.7.3 Visual Examination

The QC inspector shall visually examine the finish coated surface for the following defects:

- a) Runs and sags which show no evidence of mudcracking are acceptable. Unacceptable runs and sags will be repaired in accordance with Section 2.6.
- b) At the time of the final inspection, pinholes and small discontinuities may be repaired with no later reinspection required of these areas.
- c) Skips, holidays, color and gloss nonuniformity, excessive orange peel, dry spray, damaged areas, blisters, bubbles, and fish eyes will be repaired in accordance with Section 2.6.
- d) Contamination is unacceptable. Area must be repaired per Section 2.6.
- e) Any approved primer and/or finish coat spatter adjacent to embeds or base plates is acceptable.

2.8 NONCONFORMANCES

2.8.1 Unacceptable conditions which are not readily repaired or corrected per the approved procedures shall be documented as unsatisfactory on the inspection traveler.

2.8.2 Nonconforming conditions such as coating failure due to loss of adhesion or indeterminate/unacceptable conditions which cannot be repaired or corrected as per existing procedures shall be documented on a Nonconformance Report (NCR) in accordance with CP-QP-16.0. The NCR number shall be referenced on the inspection traveler, if applicable.

2.9 DOCUMENTATION (REFER TO ATTACHMENT 1)

2.9.1 All inspections required by this procedure shall be recorded in the inspection attributes on the back of the travelers (Attachment 1). Preparation and processing of the traveler shall be per QI-QP-11.4-28.

2.9.2 When the inspections required by Sections 2.1 through 2.2.2.2 have been satisfactorily completed, Step 1 shall be signed and dated by the inspector.

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2.9.3 When the inspections required by Sections 2.3.1 through 2.4.7.2 have been satisfactorily completed, Step 2 (for NUTEC 11S) or Step 4 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

2.9.4 When the inspections required by Sections 2.4.8 through 2.5.2.2 have been satisfactorily completed, Step 3 (for NUTEC 11S) or Step 5 (for NUTEC 11) shall be signed and dated by the inspector and the other Step marked not applicable (N/A), initialled and dated.

2.9.5 When the inspections required by Sections 2.5.3 through 2.5.3.5 have been satisfactorily completed, Step 6 shall be signed and dated by the inspector.

2.9.6 When the inspections required by Sections 2.6 through 2.7.3 have been satisfactorily completed, Step 7 shall be signed and dated by the inspector.

3.0 CLARIFICATION

3.1 REPAIR OF MECHANICAL DAMAGE TO COMPLETED ITEMS

3.1.1 Areas that have been completed, inspected, accepted and traveler package closed which incur major damage at a later date may be repaired, inspected and documented on Attachment 8, "Concrete Protective Coating Inspection Repair Traveler". Otherwise, the minor areas of mechanical damage, which occur after completion of an area, will be repaired during the final protective coatings walkdown.

3.2 EXCLUSION AREAS

3.2.1 Clarification/Definition

3.2.1.1 Areas which are scheduled to be painted but due to limited or no access are not possible to be painted at the present time and are beyond the control of protective coatings craft or quality control.

3.2.1.2 Building Management and/or the Paper Flow Group (PFG) shall determine the legitimacy of excluding an area.

3.2.2 Areas which are determined as exclusions shall be so noted on the original traveler and a new traveler will be generated by PFG to encompass the exclusion(s).

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3.3 INACCESSIBLE/LIMITED ACCESS AREAS

3.3.1 Clarification/Definition

3.3.1.1 Areas where, due to permanent installation configuration, a dry film thickness (DFT) gauge cannot be properly engaged.

3.3.2 These areas shall be visually inspected to verify that the primer is applied and the finish coat is applied over the primer. No other inspection is required.

4.0 ATTACHMENTS

4.1 Attachment 1, "Concrete Protective Coating Inspection Traveler"

4.2 Attachment 2, "Shelf and Pot Life Reference Sheet"

4.3 Attachment 3, "Allowed Points of Discontinuity Table" and "DFT Determination"

4.4 Attachment 4, "Environmental Log Sheet"

4.5 Attachment 5, "Paint Mix Slip"

4.6 Attachment 6, "Definitions"

4.7 Attachment 7, "Preparation of Coating Materials"

4.8 Attachment 7A, "Table for Partial Mixing of NUTEC 11S"

4.9 Attachment 7B, "Table for Partial Mixes of NUTEC 1201"

4.10 Attachment 8, "Concrete Protective Coating Repair Traveler"

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ATTACHMENT 1

CONCRETE PROTECTIVE COATING INSPECTION TRAVELER	
WORK Pkg. #	PCI TRAVELER #
ELEVATION	ITEM # / DESCRIPTION
REF. DWGS.	
PREPARED BY:	DATE
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC 113 APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC 113 SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC 113 SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC 113 SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC 113 SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC 1201 TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC 10 APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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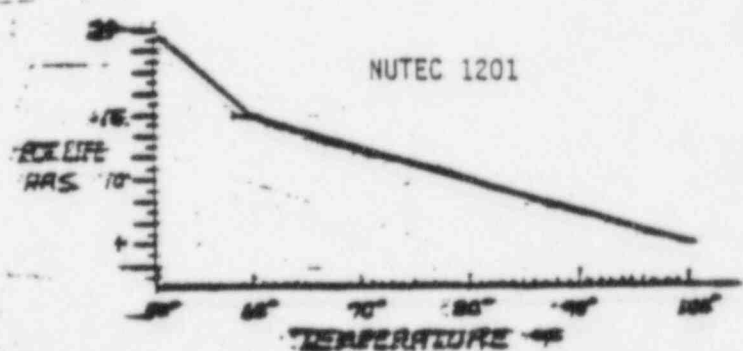
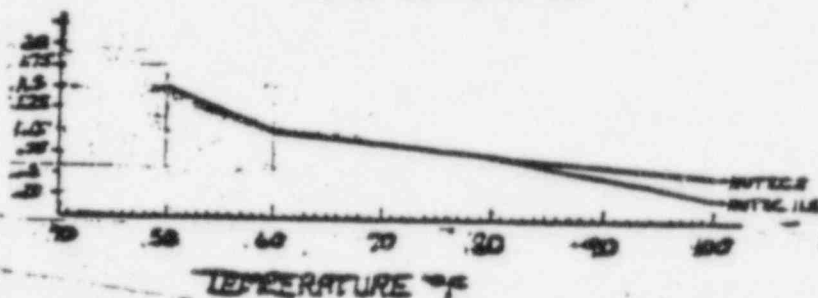
ATTACHMENT 2

SHELF AND POT LIFE REFERENCE SHEET

<u>Material</u>	<u>Shelf Life</u>
Nutec 11 Base & Curing Agent	12 months
Nutec 11S Base & Curing Agent	12 months
Nutec 1201 Base & Curing Agent	12 months
Thinners and Sand Filler	Unlimited

POT LIFE

NUTEC AND NUTEC 11S



INDUCTION TIMES FOR NUTEC 1201

<u>Temp. (°F)</u>	
50-59	45 min.
60-69	30 min.
70-79	20 min.
80-90	10 min.
90-100	None

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ATTACHMENT 3

PART I Allowed Points of Discontinuity Table

<u>Surface Area (sq. ft.)</u>	<u>Total Allowable Number of Points of Discontinuity</u>
Up to 10	1
10-50	2
50-100	5
100-500	10
500-1000	15
1000-5000	25

No gross discontinuities are acceptable.

PART II Dry Film Thickness Determination Using Wet Film Thickness Readings and the Percentage (%) Volume Solids

Percent volume solids for unthinned concrete coatings are as follows:

NUTEC 11	-	78%
NUTEC 11S	-	88%
NUTEC 1201	-	54%

EXAMPLE: 11 mils WFT X 54% = 5.94 mils DFT

For thinned mixes:

$$\% \text{ Volume Solids} = \frac{\text{Volume of unthinned coating}}{\text{Volume of unthinned coating} + \text{Volume thinner}} \times \text{\% Volume Solids (unthinned)}$$

NOTE: In above equation, volume must be expressed in the same unit of measure.

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ATTACHMENT 5

PAINT MIX SLIP

Report No. _____

Bldg. _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
 MIX NUMBER _____ ELEVATION _____
 MATERIAL _____ GAL. MIXED _____
 SHELF LIFE ACCEPTABLE: YES _____ NO _____ H&T # 'S _____
 DATE & TIME MIXED _____ BASE _____
 CURING AGENT _____ FILLER _____ THINNER _____
 ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
 MIX NUMBER _____ ELEVATION _____
 MATERIAL _____ GAL. MIXED _____
 SHELF LIFE ACCEPTABLE: YES _____ NO _____ H&T # 'S _____
 DATE & TIME MIXED _____ BASE _____
 CURING AGENT _____ FILLER _____ THINNER _____
 ACCEPTED BY _____

DATE _____ POT LIFE _____ SHIFT _____ TIME _____
 MIX NUMBER _____ ELEVATION _____
 MATERIAL _____ GAL. MIXED _____
 SHELF LIFE ACCEPTABLE: YES _____ NO _____ H&T # 'S _____
 DATE & TIME MIXED _____ BASE _____
 CURING AGENT _____ FILLER _____ THINNER _____
 ACCEPTED BY _____

QC REVIEW & ACCEPTANCE _____
 signature _____ date _____

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ATTACHMENT 6

DEFINITIONS

Color and Gloss Nonuniformity: A milky haze or mist in the finish of a recently applied coating.

Contaminant: A foreign substance, inadvertently added to a coating or found on the substrate that adversely affects the application, adhesion, curing and/or subsequent performance of the applied coating.

Dry Spray: A dry powdery primer or finish coat readily removed by light sanding with either sandpaper or a wire screen. A minor amount of adherent dry spray is acceptable on the final finish coat.

Feathering: An area that is roughened and tapered to obtain a smooth and continuous surface with an existing damaged coating.

Fisheyes: Small openings ("fish eyes") in wet film exposing old surface or previous coat.

Full Hiding: The coating provides sufficient coverage so that the preceding coat is not readily visible with an unaided eye.

Holiday: A pinhole, skip, discontinuity or void in coating film.

Inaccessible Areas: Areas where a DFT gauge cannot be properly engaged. In these areas, the inspector shall verify that primer is present and finish coat is applied on the primer. No other inspection required.

Major Defect: Defined as an area, either circular or linear, in which a 1/2" diameter circle could be inscribed at any point or along the entire length.

Minor Defect: Defined as an area, either circular or linear, in which a 1/2" diameter circle could not be completely inscribed at any point along the entire length.

Monitor: Conformance verification by physically observing a task being performed on a periodic or random basis.

Mudcracking: Irregular cracking as in a dried mud puddle (applicable to inorganic zinc primers).

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ATTACHMENT 6 (Continued)

Orange Peel: Dents in the surface resembling orange skin. A moderate amount is acceptable.

Over Spray: A deflected spray mist that settles on dry or partially dry coated surfaces.

Verify: Confirm or make certain.

Visual: To examine with an unaided eye (correctional eye glasses or contact lens are acceptable).

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ATTACHMENT 7

PREPARATION OF COATING MATERIALS

Surface Coat

The surfacer, NUTEC 11S, is packaged in a three component kit consisting of a base, curing agent, and filler. The base and curing agent shall be thoroughly mixed first. If necessary, box the mixture to assure that all the base and cure has been used. The filler shall then be slowly added under constant agitation and mixed until a smooth blend is achieved. The patching material, NUTEC 11, is prepared the same way. Partial mixes for NUTEC 11S shall be in accordance with Attachment 7A.

Finish Coat

The finish coat, NUTEC 1201, is a two component epoxy topcoat consisting of a base and cure. These shall be thoroughly mixed under constant agitation until a homogenous blend is achieved. Partial mixes of NUTEC 1201 shall be in accordance with Attachment 7B. Minimum induction times shall be as per Attachment 2.

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NUTS 115

TUGCO CA

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ATTACHMENT 7B
TABLE FOR PARITAL MIXES OF NUTEC #1201

		Base		Cure		Maximum Permissible Thinner	
Gal.	Qts.	lbs.	oz.	lbs.	oz.	qts.	oz.
0	1	2	96	0	6.4	0	9.6
0	2	5	3.2	0	12.8	0	19.2
0	3	5	14.4	1	3.2	0	20.0
1	0	10	8	1	8	1	6.4
1	1	13	1.6	1	14.4	1	16
1	2	15	11.2	2	4.8	1	25.6
1	3	16	4.8	2	11.2	2	3.2
2	0	20	14.4	3	1.6	2	12.0
2	1	23	3	3	0	2	22.4
2	2	26	3.2	3	14.4	3	0
2	3	23	12.8	4	3.2	3	9.6
3	0	31	6.4	4	9.6	3	19.2
3	1	34	0	5	0	3	28.8
3	2	36	9.6	5	6.4	4	6.4
3	3	39	3.2	6	12.0	4	16
4	0	41	12.0	6	3.2	4	25.6
4	1	44	8	6	0	5	3.2
4	2	47	0	6	14.4	5	12.0
4	3	49	11.2	7	14.2	5	22.4
5	0	52	4.8	7	11.2	6	0

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ATTACHMENT 8

CONCRETE PROTECTIVE COATING INSPECTION REPORT	
WORK PKG. NO. _____	SUPPLEMENTAL TO PCI TRAVELER # _____
ELEVATION _____	ITEM # / DESCRIPTION _____
REF. DWGS. _____	
PREPARED BY: _____	DATE _____ SHT. _____ OF _____
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC II SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC II SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC II'S TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG. 4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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INSPECTION OF CONCRETE SUBSTRATE SURFACE PREPARATION AND COATINGS APPLICATION AND REPAIR	PREPARED BY: <u>[Signature]</u>	<u>12-29-83</u> DATE
	APPROVED BY: <u>[Signature]</u>	<u>12-29-83</u> DATE
	APPROVED BY: <u>[Signature]</u>	<u>12/29/83</u> DATE

1.0 GENERAL

1.1 PURPOSE AND SCOPE

FOR INFORMATION ONLY

This instruction shall describe the methods used by Quality Control personnel while performing inspections of application of coatings on a concrete substrate inside the Reactor Containment Buildings, Unit 1.

2.0 INSTRUCTIONS

Application of 11, 11S and 1201 shall be per Sections 3.1 through 3.6, 3.8 and 3.9 and application of NUTEC 10 shall be per Section 3.7.

Visual inspection of surfaces as addressed by this instruction shall be made at approximately an arm's 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. Flashlight shall be held perpendicular to the surface during visual inspection.

If applicable, backfit shall be performed per QI-QP-11.4-23. Document in the comments section of the traveler, Attachment 1.

2.1 SURFACE PREPARATION

The concrete surface shall be cured a minimum of 28 days prior to application of protective coatings. If the concrete surface is cured with NUTEC 10, coating may be performed after a minimum of 6 days after application of NUTEC 10.

Tie holes, abandoned hilti bolt holes, and grout under base plates which have 3 square feet or less of exposed surface to be coated, which have been repaired may be coated after a 48 hour cure.

HISTORICAL FILE

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2.1.1 Preblast Cleaning Operations

Prior to surface preparation, the QC inspector shall visually examine the surface to be water blasted for heavy deposits of oil and grease. Any heavy oil or grease deposits shall be removed.

The QC inspector shall also verify that any detrimental surface irregularities such as projections, fins, or ridges shall be removed by bush hammering, hand or power tooling, grinding, or stoning.

NOTE 1: The preblast visual inspection is required only when surface preparation is by one of the following methods:

- a. Water blasting
- b. Water blasting with sand injection
- c. Dry sandblasting
- d. Bush hammering

2.1.2 Surface Preparation

2.1.2.1 Methods of Surface Preparation

Water blasting, water blasting with sand injection, acid etching, sand blasting, and power tooling are all acceptable methods of surface preparation. If NUTEC 10 curing membrane has been applied and gives a "glossy" appearance, the surface shall be abraded without completely removing the NUTEC 10 prior to application of the surfacer.

In the event TSP is used, the QC Inspector shall verify that the area is flushed with clean water.

2.1.2.2 Post Blasting Operations

After surface preparation, the QC inspector shall visually examine the surface to verify the following:

- a) The surface shall be free of construction dust, laitance, and loose deposits, and all adjacent areas cleaned to avoid contamination.
- b) All holes greater than 1/2 inch in depth are repaired with dry pack or epoxy grout.

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- c) All sharp projections removed.
- d) Markings (ink, pencil, chalk, felt tip marker, etc.) solvent wiped.
- e) Marking paint removed.
- f) Objects protruding from surface are ground or cut smooth until object is flush.
- g) All loosely adhering embedded objects are removed.
- h) Smooth embedded objects such as plastic or steel roughened. Metal objects are power tool cleaned and solvent wiped.
- i) Metal objects larger than 4 square inches are primed.
- j) Surface is free of grease, oil, and deleterious curing membranes.
- k) Verify completion of traveler (Attachment 1) Step 1.

2.2 MIXING OPERATIONS

2.2.1 Materials

A QC inspector shall verify on Attachment 6 that the shelf life has not expired.

2.2.2 Mixing/Thinning

An inspector shall witness all mixing/thinning operations Per Attachment 6. Induction times for finish mixes are shown in Attachment 2.

2.3 SURFACER APPLICATION

2.3.1 Ambient Conditions

The inspector shall determine against the environmental sheet (Attachment 5) air temperature, relative humidity, dew point, and surface temperature of concrete substrate. A calibrated non-mercury filled dry bulb thermometer or a calibrated temperature recorder (Bristol 4069 TH or equivalent) shall be used for air temperature determination. A calibrated

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non-mercury filled wet bulb thermometer or a calibrated humidity recorder (Bristol 4069 TH or equivalent) shall be used to determine relative humidity. The dew point shall be determined by the difference in dry and wet bulb temperature using the U.S. Department of Commerce Weather Bureau Psychrometric Tables, W.B. 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 (note in Remarks Section). The surface temperature shall be determined by placing a calibrated Range 0-110°F thermometer or equivalent in contact with the surface to be coated. The thermometer probe shall remain in contact with the surface until the temperature reading stabilizes.

Minimum and maximum values of surface and ambient temperatures shall be 50°F and 100°F respectively. Infrequent dips in temperature to 40°F is permissible during application and/or cure; however, the elapsed time the temperature is below 50°F shall be added to the cure time. Application of the coating shall not begin unless the surface temperature is 5°F above the dew point. Pot life shall be as stated in Attachment 2.

Humidity may vary as high as 100%; however, free standing water shall be removed. Coating application over a damp surface is permissible. Under no conditions shall NUTEC 115 be applied to a surface containing free standing water.

2.3.2 Surface Acceptability

The QC inspector shall visually examine the substrate surface immediately prior to surfacer application to verify that it is free of contamination (dust, laitance, loose deposits and markings).

2.3.3 Air Supply Acceptability

The inspector shall inspect the air supply system for suitable filters/traps/separators. The effectiveness of these items shall be verified by exposing a piece of white cloth to a blast of air for approximately 30 seconds. The cloth shall show no evidence of moisture, oil or foreign matter when examined.

2.3.4 Pot Life

The QC inspector shall verify that the pot life as shown in Attachment 2 is not exceeded.

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2.3.5 Qualification of Applicator(s)

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

2.3.6 Dry Film Thickness

The QC inspector shall determine the DFT of the applied surfacer by taking wet film thickness spot measurements and multiplying each reading by the % volume solids (taking in account any thinner used). A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area (See Note 2) shall be taken.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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

Thickness of surfacer may vary between 10 and 35 mils. (See Attachment 4 for method of determining percent volume solids.)

(Verify on Traveler (Attachment 1) Step 2.

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2.3.7 Surfacer Repair Work

2.3.7.1 Repair of Runs and Sags

Runs and sags which show evidence of mudcracking shall be abraded flush with the surrounding surface. If after abrading, surfacer is unsatisfactory due to mudcracking or loss of adhesion, remove unsatisfactory coating to substrate and reapply the surfacer. If after abrading the surfacer is satisfactory, no further repair is necessary.

2.3.7.2 Repair of Contamination

Contamination shall be removed by abrading. If unsatisfactory coating still exist, then the area shall be repaired in accordance with Section 2.3.7.3.

NOTE: Rust stains residue, not necessarily the stain, shall be removed with bristle brush and water or Imperial Thinner #DL-54.

2.3.7.3 Repairs When Touch Up or Recoating is Necessary

For repairs that require either touch up or recoating with NUTEC 11S, NUTEC 11 or NUTEC 1201, the QC inspector shall:

- Verify ambient conditions are acceptable per Section 2.3.1.
- Verify the surface has been prepared in accordance with Sec. 2.3.7.2 and is free from loose and foreign materials as per Section 2.1.2.2 and/or Paragraph 2.5.
- Verify acceptable materials are used, and shelf life is not exceeded.
- Verify that NUTEC 11S, NUTEC 11 or NUTEC 1201 is mixed/thinned in accordance with Section 2.2.
- Verify pot life is not exceeded per Attachment 2.
- Verify qualification of applicator(s) per Section 2.3.5.
- Visually inspect per Section 2.4.2.1.
- Verify that curing is in accordance with Section 2.4.2.2.

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- 1) Verify dry film thickness in the repair area is in accordance with the following millage requirements:

NUTEC 11S	10 - 35 mils
NUTEC 11	3 - 20 mils
NUTEC 1201	3 - 16 mils

NOTE 1: See Section 2.3.6 and Attachment 4 for DFT calculation using Wet Film Thickness measurement and percent volume solids.

2.4 FINISH COAT APPLICATION

2.4.1 Preapplication Inspection

2.4.1.1 Ambient Conditions

Prior to finish coat application, the QC inspector shall determine ambient conditions in accordance with Section 2.3.1.

2.4.2 Surfacer Post Application Operation

2.4.2.1 Visual Defects Inspection

The inspector shall perform a visual inspection of the surfacer coat NUTEC 11S and NUTEC 11 prior to the finish coat application for the following defects:

- Runs or sags which show no evidence of mudcracking are acceptable.
- Stains - rust (red) and zinc oxide (white) stains are acceptable provided loose particles are removed from NUTEC 11S or NUTEC 11 surfaces prior to application of finish coat.
- Damaged areas, skips, holidays, blisters, bubbling, fisheyes, mudcracking, oil and grease, and contamination are all unacceptable.

Contamination is not allowed.

Verify on Traveler (Attachment 1) Step 5.

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2.4.2.2 Surfacers Cure

The inspector shall monitor ambient temperature after the surfacer is applied to determine when cure is adequate for topcoating operations to commence. A calibrated non-mercury filled dry bulb thermometer, calibrated temperature recorder.

Curing time shall be as follows:

<u>Temperature 0°F</u>	<u>Curing Time Before Topcoating with 1201</u>
50-59	72 hrs.
60-69	48 hrs.
70-79	24 hrs.
80-89	18 hrs.
90-100	12 hrs.

Temperature durations below 50°F will be added to the cure time on an hour for hour basis.

NUTEC 11S may be touched up or recoated with #11 or #11S as soon as the initial coat has dried such that the paint shall not adhere to the thumb when downward pressure is exerted on the paint film while turning a 90° angle. (This does not refer to the two pass application method.)

2.4.3 Finish Top Application

2.4.3.1 Air Supply Acceptability

The QC inspector shall verify the air supply is acceptable per Section 2.3.3.

2.4.3.2 Qualification of Applicator(s)

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

2.4.3.3 Pot Life

The QC inspector shall verify that the pot life of NUTEC 1201 has not been exceeded. Pot life is shown on Attachment 2.

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2.4.3.4 Dry Film Thickness

The inspector shall determine the DFT of the applied finish coat by taking wet film thickness spot measurements and multiplying each reading by the % volume solids. A minimum of five (5) separate spot wet film thickness (WFT) measurements (See Note 1) spaced evenly over the coated area (See Note 2) shall be taken.

NOTE 1: A spot measurement is a series of three measurements in the same general area. The WFT gage 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 spot test areas, Ref. Sec. 2.3.6 Note 2.

(See Attachment 4 for method of determining percent volume solids.)

The total DFT of NUTEC 1201, recoat and existing coat shall not exceed 16 mils.

Verify on Traveler (Attachment 1) Step 6.

2.5 FINISH COAT REPAIRS

For repairs in the NUTEC 1201 Finish Coat, the QC Inspector shall verify the following:

- a) The inspector shall determine the DFT of the existing coated surface (prior to recoating) by either, or one of the two following methods.
 - 1) Using the DFT readings acquired during the backfit documentation.
 - 2) The scratch test of the REACTIC 1201 finish coat shall be performed using a Mark II Tooke Inspection Gage equipped with a 2x tip. Five separate readings spaced randomly over each finish coated area of 100 square feet or less shall be taken.

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NOTE: Tooke tests are not required to be performed on areas on concrete which have not been finish coated with REACTIC 1201.

- b) Verify that the surface is prepared.
- c) Verify that runs and sags which show evidence of mudcracking are abraded flush with the surrounding surface. If after abrading the finish coat is still unsatisfactory, verify that unsatisfactory coating is removed to the substrate and repaired per Steps (c) through (j) below.
- d) Verify that all loose particles and foreign particles are removed from surface.
- e) Verify that the surface is solvent wiped.
- f) Verify that NUTEC 1201 is mixed/thinned per Section 2.2.
- g) Verify air supply acceptability per Section 2.4.2.3.
- h) Verify that pot life is not exceeded per Section 2.4.3.1.
- i) Verify applicator(s) qualification per Section 2.4.2.4.
- j) Verify cure time for recoat. Recoating time for NUTEC 1201 is 24 hours.
- k) Verify dry film thickness of the recoat per Section 2.4.3.2.

NOTE: The tie in interface between concrete coatings and steel coatings shall be visually inspected during the finish coat final acceptance of both coating systems.

NOTE: (If applicable) coating interface - at coating interface for finish and or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interface the interface of the coating of systems shall be a maximum of approximately 1½ inch in width. Within the interface area overlapping of any materials or systems is acceptable.

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2.6 FINISH COAT FINAL ACCEPTANCE INSPECTION PRIOR TO AREA

Immediately prior to turnover of each a final inspection in accordance with the following shall be performed on exposed finish coat substrates.

2.6.1 Finish Coat Cure

Prior to performing finish coat final acceptance inspections, the inspector shall verify that the finish coat has cured for the minimum of 24 hours.

2.6.2 Finish Coat Continuity Inspection

The QC inspector shall visually inspect the continuity of the finish coat after a minimum cure of 24 hours. The maximum number of permissible pinholes is shown on Attachment 3. No more than 2 points of discontinuity shall occur within an area having a radius of six inches (using a point of discontinuity as the center of the circle). No more than 40% of the total number of allowable points of discontinuity shall occur within any one area equal to 25% of the total area. The pinholes that are beyond the acceptance of Attachment 3 shall be repaired in accordance with Section 2.5 and 2.6.3.6.

2.6.3 Visual Examination

The QC inspector shall visually examine the finish coated surface for the following defects:

- a) Runs and sags which show no evidence of mudcracking are acceptable. Unacceptable runs and sags will be repaired in accordance with Section 2.5.
- b) At the time of the final inspection, pinholes and small discontinuities may be repaired with no reinspection required of these areas.
- c) Skips, holidays, damaged areas, blisters, bubbles, and fish eyes will be repaired in accordance with Section 2.5.
- d) Contamination detrimental to the coating film is unacceptable. Area must be repaired per Section 2.5.

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- e) Any approved primer and/or finish coat spatter adjacent to embeds or base plates is acceptable.

Verify on Traveler (Attachment 1) Step 7.

2.7 APPLICATION OF NUTEC 10 CURING COMPOUND

- 2.7.1 The QC Inspector shall verify that the green concrete has been cleaned.

- 2.7.2 The QC Inspector shall verify that NUTEC 10 is not applied under inclement conditions and that the surface temperatures are above 50°F. Areas of visible moisture or standing water are unacceptable.

- 2.7.3 NUTEC 10 shall be mixed per Paragraph 2.2. The NUTEC 10 has a pot life of (1) one hour at 75°F. If the NUTEC 10 gives the appearance of a crawl and does not penetrate the concrete, the material shall be removed from the concrete by solvent and a clean cloth. All the expired material shall be discarded and the equipment shall be cleaned.

- 2.7.4 The QC Inspector shall verify that during application of NUTEC 10, areas with sags, surface irregularities or excessive buildup shall be removed with solvent and a clean cloth.

2.8 NONCONFORMANCES

Unacceptable conditions shall be reported on the Traveler, except for coating failure due to loss of adhesion, which shall be reported on an NCR in accordance with CP-QP-16.0.

2.9 INSPECTION REPORTS

All inspections required by this procedure shall be received on the Coating Traveler Attachment 4. Preparation and processing of the traveler shall be per QI-QP-11.4-28.

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ATTACHMENT 1

CONCRETE PROTECTIVE COATING INSPECTION TRAVELER	
WORK PCKG. #	PCI TRAVELER #
ELEVATION	ITEM # / DESCRIPTION
REF. DWGS.	
PREPARED BY:	DATE
STEP 1	SURFACE PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR NUTEC II'S APPLICATION. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 2	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 3	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 4	NUTEC II'S SURFACER APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 5	NUTEC II'S SURFACER PREPARATION INSPECTED AND FOUND ACCEPTABLE PER QI-QP 11.4-27 AND RELEASED FOR FURTHER COATING ACTIVITIES. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 6	NUTEC II'S TOPCOAT APPLICATION VERIFIED AND INSPECTED IN ACCORDANCE WITH QI-QP 11.4-27 AND FOUND ACCEPTABLE. INSPECTOR _____ DATE _____ COMMENTS _____
STEP 7	FINISH COAT INSPECTED FOR FINAL ACCEPTANCE AND FOUND ACCEPTABLE IN ACCORDANCE WITH QI-QP 11.4-27 INSPECTOR _____ DATE _____ COMMENTS _____
STEP 8	COMPLETION OF INSPECTION TRAVELER VERIFIED. QC REVIEW _____ DATE _____ COMMENTS _____
NOTES	1) DOCUMENT INSPECTION ATTRIBUTES ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 2) DOCUMENT REPAIRS AND ATTRIBUTES, IF REQUIRED, ON ATTACHED SUPPORTING DOCUMENTATION SHEET(S) 3) FOR ENVIRONMENTAL CONDITIONS REFERENCE THE ENVIRONMENTAL LOG 4) DOCUMENT NUTEC II APPLICATION ON ATTACHED SUPPORTING DOCUMENTATION SHEET.

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ATTACHMENT 1.
(Cont.)

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ATTACHMENT 2

Material

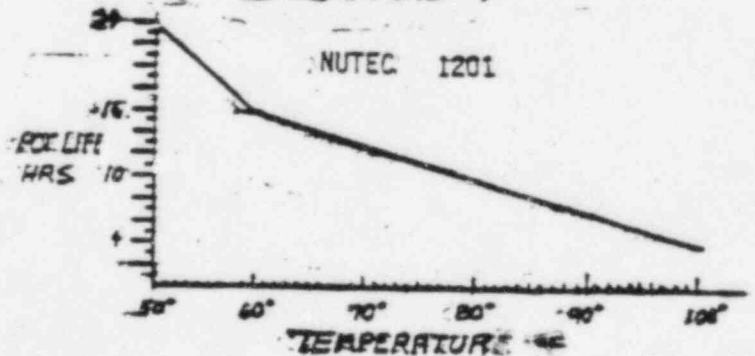
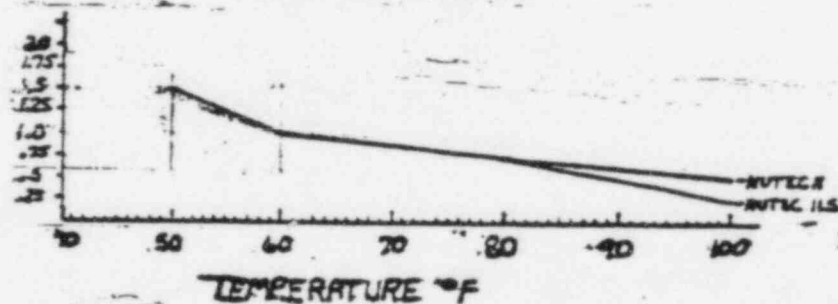
Nutec 11 Base & Curing Agent
 Nutec 11S Base & Curing Agent
 Nutec 1201 Base & Curing Agent
 Thinners and Sand Filler

Shelf Life

12 months
 12 months
 12 months
 Unlimited

POT LIFE

NUTEC AND NUTEC 11S



INDUCTION TIMES FOR NUTEC 1201

Temp. (°F)

50-59	45 min.
60-69	30 min.
70-79	20 min.
80-90	10 min.
91-100	None

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ATTACHMENT 3

<u>Surface Area (sq. ft.)</u>	<u>Total Allowable Number of Points of Discontinuity</u>
Up to 10	1
10-50	2
50-100	5
100-500	10
500-1000	15
1000-5000	25

No gross discontinuities are acceptable.

ATTACHMENT 4

Percent volume solids for unthinned concrete coatings are as follows:

NUTEC 11	-	78%
NUTEC 11S	-	88%
NUTEC 1201	-	54%

EXAMPLE: 11 mils WFT X 54% = 5.94 mils DFT

For thinned mixes:

$$\% \text{ Volume Solids} = \frac{\text{Volume of unthinned coating}}{\text{Volume of unthinned coating} + \text{Volume thinner}} \times$$

$$\% \text{ Volume Solids (unthinned)}$$

NOTE: In above equation, volume must be expressed in the same unit of measure.

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ATTACHMENT 5

PAINT MIX SLIP

Date _____ Pot Life _____ Shift _____
Mix Number _____ Elevation _____
Material _____ Gal. Mixed _____
Shelf Life Acceptable: Yes _____ No _____ Base _____
Comments _____ M&TE #'s _____
Curing Agent _____ Filler _____ Thinner _____
Accepted By: _____

Date _____ Pot Life _____ Shift _____
Mix Number _____ Elevation _____
Material _____ Gal. Mixed _____
Shelf Life Acceptable: Yes _____ No _____ Base _____
Comments _____ M&TE #'s _____
Curing Agent _____ Filler _____ Thinner _____
Accepted By: _____

Date _____ Pot Life _____ Shift _____
Mix Number _____ Elevation _____
Material _____ Gal. Mixed _____
Shelf Life Acceptable: Yes _____ No _____ Base _____
Comments _____ M&TE #'s _____
Curing Agent _____ Filler _____ Thinner _____
Accepted By: _____

Date _____ Pot Life _____ Shift _____
Mix Number _____ Elevation _____
Material _____ Gal. Mixed _____
Shelf Life Acceptable: Yes _____ No _____ Base _____
Comments _____ M&TE #'s _____
Curing Agent _____ Filler _____ Thinner _____
Accepted By: _____

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HISTORICAL

(CONCRETE COATINGS INSPECTION

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