July 16, 1976

REVISION 3, August 25, 1977

ICN-1

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

CONSTRUCTION PROCEDURE

35-II95-CCP-30

COATING CONTAINMENT LINERS

VOID

APPROVED BY:

M. E. Hogg

Project Engineer

APPROVED BY:

H. C. Dodd, Jr.

Construction Project Manager

PREPARED BY:

D. G. Sutton

Civil Engineer

REVIEWED BY:

P. L. Bussolini

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

VOID

ADMIN INDEXED

MAIL EPCH

DIST TO: FROM:

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PDR FOIA
GARDE85-59 PDR

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 1

This notice applies to Construction Procedure No. 35-1195-CCP-30, Revision 3.

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued ( )
Only as follows:

Change the procedure as follows: Add to Section 1.1.1 ...this procedure may also be used for coating the personnel air lock.

Add to Section 1.2.1 ...The scope of this procedure also, includes the personnel air lock.

Reason for change: To permit coating of the personnel air lock.

This change approved by:

9/23/77
Department Head

Quality Assurance

Reviewed By:

Kelly Williams
Procedures & Reports

9-23-77
Date

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 16. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	Revision 3	August 25, 1977
2 through 16	Revision 3	August 25, 1977

NOTE

This document has been completely retyped for convenience in issuing Revision 3. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 3.

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer's requirements.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 containment liners as specified in Reference 1.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. Surface preparation for the prime coat shall start prior to interior concrete placement above elevation 805-feet 6-inches. The prime coat shall then be applied to approximately elevation 836-feet - finish coating shall be applied in areas inaccessible due to interior concrete. After liner erection has reached approximately elevation 970-feet, painting operations will begin again and proceed downward to approximately elevation 836-feet. Thereafter, the remaining liner plates shall be prime coated prior to erection with the exception of the upper dome section, which shall be completely coated prior to setting place. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Surface preparation of the seal coat prior to finish coating shall consist of solvent wiping if exposed longer than 30 days. Finish coating shall be applied when convenient prior to completion of the unit. Generally, sequence of operations shall be as outlined above any necessary deviations in the sequence shall be due to unanticipated later developments.

2. DEFINITIONS OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS

2.2.1 (NONE)

2.3 SYMBOLS

2.3.1 (NONE)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by Carboline in the use of their product as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 2. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department Representative who will be present to monitor and enforce safety during blasting, solvent cleaning, and coating application.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The Painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include surface profile comparators, holiday detectors, thermometers, wet and dry film guages, and a psychrometer for measuring relative humidity. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. The Superintendent in charge of painting, or his representative, shall assure that all necessary forms are completed by the appropriate personnel. After completion, each form shall be forwarded to the Brown & Root Quality Control Department for filing and distribution to the various parties as listed on the distribution section.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure ACP-3. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours is acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary stroage in the field; due to limited shelf-life this shall be done on a "first-in", "first-out" basis. At the time of issuance Attachment 1 shall be used to verify the issuance of paint from each individual batch. After materials have been partially used from an individual container, the same container cannot be resealed and and returned to "Q" storage area. Containers opened and partially used in the "Q" paint storage area may be resealed and the contents used for later "Q" painting. The contents from partially used containers will not be reused after a period of one week has elapsed from date of initial opening.

4. PROCEDURE FOR COATING LINER

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP1, "Solvent Cleaning", and sand blasted with silica sand in accordance with SSPC-SP10, "Near White Blast Cleaning", to achieve a 1-3 mil profile. After sand blasting, the surface to be primed shall be air blasted to remove all sand and foreign materials. This shall be done until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If rust forms after blast cleaning, the surface shall be "shower blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows. Overblast the liner plate to white metal approximately 12" - 18" beyond the point which will receive primer. Drop back approximately 12" - 18" on the primer when applying the seal-coat.

4.1.2 Removal of Weld Spatter and Other Minor Surface Imperfections Not To Exceed .031" - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SP-3. In areas where grinding is required, this will be witnessed by a Brown & Root QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date. All edges, protrusions, and peaks shall be ground smooth to a rounded contour; as a guide 1/8-inch radius of the contour may be used.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting and then solvent wiping the area prior to replacing the primer.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number, October 76-N, except recoating mixes (refer to Section 4.4.1.2). Primer coat shall be grey.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be white. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, (except recoating mixes - refer to Section 4.4.1.4).

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 50 feet. Equipment pressure shall be regulated to conform to manufacturer's instruction. The primer shall be allowed to dry tack free (1/2 hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F, respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temperature range of 0° - 200°F. Under other than normal conditions, it may be advisable to use more thinner to reduce dry spray. If surface temperature is above 85°F, it is advisable to use between 1 pint and 2 quarts Carboline Thinner #33 per gallon Carbo Zinc 11. In no case shall Carboline limits be exceeded.

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

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regualted pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

Temperature with over 50% R.H.	Curing Time Before Topcoating
0°F.	7 days
40°F.	24 hours
60°F.	16 hours
80°F.	8 hours
100°F.	6 hours

If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray after allowing at least one hour cure after application. This shall be done as often as required using clean water having a ph range of 6 to 8. If used, a filter system will be installed in order to assure proper cleanliness of the curing water.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.0 - 4.5 mils total DFT. (Only one overcoat shall be applied.) The primed surface shall not be recoated until cured per Section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, a blast to white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin - October 76-N

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Repair of Embedded Foreign Particles - Embedded foreign particles shall be removed by abrading and recoated as outlined in Section 4.4.1.2.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry until it is tack-free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50 - 120 degrees F. However, when surface temperatures are outside the range of 60 - 85 degrees F. or ambient temperature outside 65 - 85 degrees F., it is permissible to use up to two quarts of Phenoline Thinner per gallon kit of Phenoline 305. The amount of thinner used under these conditions (1 1/2 pints-2 quarts) shall be that which gives the best workable mix under the given temperature conditions, i.e., usually advantagious to use more thinner at lower temperature.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90 degrees F. or 18 hours at 75 degrees F. and 50% R.H. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free time at 75 degrees and 50% R.H. is 9 hours.

7. Full cure is achieved in 7 days at 75 degrees F. and 50% R.H.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer; if no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75 degrees F. or 12 hours @ 90 degrees F. has elapsed.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer, Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged. Thickness shall be as required for the pertinent coating. If damage extends to metal, damaged area will be blast cleaned and repaired.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.5 TESTING

4.5.1 All testing as performed by the B&R Foremen, General Foremen or their Representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Control Department. After coating system cure, final inspection, and resolution of all discrepancies is completed. The QC Inspector shall document the final acceptance by completing and signing the final acceptance record.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Warehousing Record
2. Painter Qualification Record
3. Coating Applicator's Coating Record

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision, and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be used by Painting Dept. when issuing paint)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature o F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Q.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record - Containment Liner

GENERAL DATA

Date _____ Report No. _____ Unit No. _____ Shift No. _____

TECHNICAL DATA

Applicator _____ Inspector _____

Location of Work _____

Type of Coating RIME ____ INT.COAT ____ FIN.COAT ____ Surface Prep. _____

Coating Batch Numbers Description _____

Comp. A. _____

Comp. B. _____

Thinner _____

Coating Equipment Spray gun type _____

Fluid tip type _____

Air cap type _____

Spray pot type _____

Moisture Separator Used & Type _____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Paint Supt.
Q.C. Department
Civil Eng.

Brown & Root, Inc.

35-1195
01-26-77

INTEROFFICE MEMO

IM-7376

TO: Distribution DATE: January 26, 1977

FROM: W. H. Hench

SUBJECT: Construction Procedure 35-1195-CCP-30, Rev. 2
"Coating Containment Liners"

Subject procedure revision is transmitted herewith for review, to verify the changes mutually agreed upon in previous informal meetings between QA, Construction Engineering, and the Paint Department. Response in five days from receipt is requested.

Thank you.

W. H. Hench
Procedures & Reports

WHH/og
Attachments:

cc:
H. C. Dodd, Jr.
W. E. Childress, Jr.
G. W. McGee
D. G. Sutton
W. E. McFarland
P. L. Bussolini

July 16, 1976

REVISION 2, January 20, 1977

Job 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure

35-1195-CCP-30

COATING CONTAINMENT LINERS

VOID

APPROVED BY:

W. E. Childress, Jr.

Project Engineer

APPROVED BY:

H. C. Dodd, Jr.

Construction Project Manager

PREPARED BY:

George McBee for

D. G. Sutton

Civil Engineer

REVIEWED BY:

P. L. Bussolini

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 22. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	Revision 2	January 20, 1977
2 through 22	Revision 2	January 20, 1977

NOTE

This document has been completely revised for convenience in issuing Revision 2. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 2.

Brown & Root, Inc.

CONSTRUCTION PROCEDURE DRAFT
Review/Comment Sheet

Document No. 35-1195-CCP-30 Date: 07-16-76
Prepared By D. G. Sutton Date: 12-20-77
Revision 2 Date: 12-20-77
Reviewed By _____ Date: _____

COMMENTS	Corrective Action (This column to be filled in by Procedures and Reports section)

Comments Acknowledged By _____ Date _____

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer' requirements.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 containment liners as specified in Reference 1.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. Surface preparation for the prime coat shall start prior to interior concrete placement above elevation 805'6". The prime coat shall then be applied to approximately elevation 836' - finish coating shall be applied in areas inaccessible due to interior concrete. After liner erection has reached approximately elevation 970', painting operations will begin again and proceed downward to approximately elevation 836'. Thereafter, the remaining liner plates shall be prime coated prior to erection with the exception of the upper dome section which shall be completely coated prior to setting in place. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Pheonline 305 thinned in accordance with Section 4.4.2.5 shall be applied over the prime coat. Finish coating shall be applied when convenient prior to completion of the unit. Generally, sequence of operations shall be as outlined above' any necessary deviations in the sequence shall be due to unanticipated later developments.

2. DEFINITION OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS AND SYMBOLS

2.2.1 (None.)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and/or demonstrated ability. In addition, each painter shall have been instructed by carboline in the use of their product as consistent with carboline's training procedures which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 5. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department Representative who will be present to monitor and enforce blasting, solvent cleaning, and coating application.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting foremen and general foremen shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include surface profile comparators, holiday detectors, thermometers, wet and dry film gauges, and a psychrometer for measuring relative humidity. Viscosity measuring devices will not be used. Surface temperature shall be obtianed by attaching a thermometer having an accuracy of $\pm$ 5°F to the surface to be coated. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness. Dry film gauges will be used as a further check on coating thickness after the coating has dried sufficiently - in accordance with SSPC-PA2-73T.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. The Superintendent in charge of painting, or his representative, shall assure that all necessary forms are completed by the appropriate personnel. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution section. Since the values of application conditions such as temperature and humidity vary continuously during the work period, it

would be impossible to list all values; instead, readings will be taken at the time work is started. These readings will be used until it becomes obvious that new readings are needed due to a marked change in conditions or it becomes evident that a maximum/minimum limit is approaching, such as temperature. In all cases, the most recent values will be listed at the time of completion of each form.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary shipping and receiving documentation. General receiving procedures shall be in accordance with B&R construction procedure ACP-3. It shall then be segregated from "Non-Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours is acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field; due to limited shelf-life this shall be done on a "first-in", first-out" basis. At the time of issuance, Attachment 1 shall be used to verify the issuance of paint from each individual batch. After materials have been partially used from an individual container, then same container cannot be re-sealed and returned to "Q" storage area. Containers opened and partially used in the "Q" paint storage area may be resealed and the contents used for later "Q" painting.

4. PROCEDURE FOR COATING LINER

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5°F above the dew point.If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-1 "Solvent Cleaning" and sand blasted with silica sand in accordance with SSPC-5 "White Metal Blast Cleaning", to achieve a 1-2 mil profile. After sand blasting, the surface to be primed shall be air blasted to remove all

sand and foreign materials. This shall be done until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If rust forms after blast cleaning, the surface shall be "shower-blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. During or upon completion of blast cleaning, a form similar to Attachment 4 shall be completed.

4.1.2 Removal of Weld Spatter and other minor surface imperfections not to exceed .010" - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SP-3. In areas where grinding is required, this will be witnessed by a B&R QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed of any oil or grease. This shall be accomplished by use of a manuafacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the carbo-zinc 11 primer is exposed, oil and grease will be removed by sand blasting and then solvent wiping the area prior to replacing the primer.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number 175, except recoating mixes-refer to Section 4.4.1.3. Primer coat shall be grey. A form similar to Attachment 2 shall be completed when preparing materials.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be white. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, except recoating mixes - refer to 4.4.2.5. Documentation shall be recorded on a form similar to Attachment 2.

4.4. APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 50 feet. Equipment pressure shall be regulated to conform to manufacturer's instructions. The primer shall be allowed to dry tack free (1/2 hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40 - 95° F and 40 - 110° F, respectively; however, under certain conditions, these values may be exceeded, if authorized in writing by Brown & Root Civil Engineer. In no case shall carboline limits be exceeded.

2. Humidity values may vary from 0 to 95% however, coating shall not be applied to a wet or damp surface.

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5. mils respectively.

4. A double regulated pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

25 - 50% R.H.		Over 50% R.H.
24 - 48 Hours	0 - 40°F	16 - 24 Hours
24 - 48 Hours	40 - 60°F	12 - 16 Hours
24 - 48 Hours	60 - 85°F	8 - 12 Hours
12 - 24 Hours	85 - 100°F	6 - 8 Hours

4.4.1.2 A form similar to Attachment 6 will be completed each time coating material is applied. Any necessary touch-up will be recorded on a form similar to Attachment 3.

4.4.1.3 Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.0 - 4.5 mils total DFT. (Only one overcoat shall be applied). The primed surface shall not be recoated until cured per Section 4.4.1.1.6.

4.4.1.4 Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, a blast to white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.5 Brush touch-up painting shall be done on prime and finish coats in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) bulletin 175.
2. Carboline Product Data Sheet (Carbo Zinc 11) bullentin 875. Brush touch-up allowed on areas one square foot or less.

4.4.2 FINISH COAT

4.4.2.1 Finsh coating shall be applied using the same or similar type of equipment as used for the prime coat. Weld seams shall be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon Phenoline 305. The material shall be allowed to dry until it is tack-free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "B". Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50 - 120° F.
2. Minimum and maximum values of relative humidty shall be 0% and 85%, respectively.
3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5. mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.
4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.
5. Recoating shall be performed within 3 hours or after full cure.
6. Tack free time @ 75°F/50% R.H. is 9 hours.

4.4.2.2 Application information will be recorded on a form similar to Attachment 7. Touch-up will be recorded on a form similar to Attachment 3.

4.4.2.3 Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer; if no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities.

4.4.2.4 Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75°F or 12 hours @ 90°F has elapsed.

4.4.2.5 Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon of Phenoline 305 applied at approximately 1-2 mils DFT. See Section 4.4.2.4 for recoating time.

4.4.2.6 Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer, Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged. Thickness shall be as required for the pertinent coating. If damage extends to metal, damaged area will be blast cleaned and repaired.

4.4.2.7 Finish Coat:

1. Carboline Application Instructions (Phenoline 305) bullentin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) bulletin 473. Brush touch up and complete application is allowed with no area restrictions.

4.5 TESTING

4.5.1 All testing as performed by the B&R Foremen, General Foremen or their Representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Assurance Department.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Warehousing Record
2. Coating Materials - Applicator's Product Identity Record
3. Coating Applicator's Field Touch-Up and Coating Record

3a. Containment Liner -Developed Drawing

4. Containment Applicator's Surface Preparation Record - Steel

4a. Containment Liner - Developed Drawing

5. Painter Qualification Record
6. Coating Applicator's Coating Record

Sa. Containment Liner - Developed Drawing

7. General Flow Chart

5.2 QC Hold Points*

1. After solvent cleaning and prior to sandblasting
2. Before sandblasting (check air supply and ambient conditions)
3. After sandblasting is complete
4. Prior to mixing coating materials (material acceptability)
5. Before material application (check ambient conditions and paint air supply system for contamination)
6. Primer visual dry film thickness and cure before application of topcoat
7. Sealcoat/Finish Coat - Verify primer surface, ambient conditions, and air supply are acceptable prior to painting

* The point beyond which work cannot proceed prior to authorization by the Quality Control Representative.

5.3 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. ANSI N101.4 - 1972 "Quality Assurance for Protective Coatings Applied to Nuclear Facilities"
3. Steel Structures Paint Council, Vol. 2, Second Edition
4. Carboline Corporation "Application Instructions", Bulletin Number 175 and 775; data sheets 875 and 473, Latest Revision
5. DC/DD 188 and 193

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be used by Painting Dept. when issuing paint)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature o F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Dispatch Control Center
Q.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Applicator's Product Identity Record

(Recipient to Complete at Time of Receipt From Storage Area)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Generic Type _____

* BATCH NUMBERS

Component A _____
Component B _____
Thinner _____

COLOR

_____
_____

Specified Thinner _____

MIXING RATIO

By Volume ☐
By Volume ☐

Mix Time _____
Expiration Time _____

Component A _____ parts
Component B _____ parts
Thinner _____ parts

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Field Touch-Up Record

(Complete at time of Touch-Up by Applicator/Foreman)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____
Unit 1 ____ Unit 2 ____

TECHNICAL DATA

Coating Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Condition of Coated Steel Prior to Field Coating _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____ %

Temperature, Ambient _____°F., Surface _____°F. Dew Point _____°F

Surface Preparation Method _____

Touch-Up & Coating Method & Equipment _____

Primer: Product Identity _____ Batch No(s) _____

Topcoat(s):Product Identity _____ Batch No(s) _____

Primer DFT, Mils _____ Topcoat DFT, Mils _____

Remarks _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Pain. Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 3A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 4 Sheet 1 of 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Surface Preparation Record - Steel
(To be completed by Applicator and Foreman at time of Surface Preparation)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Applicator(s) _____

Type of Surface & Exact Location (use attached drawing) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____oF., Surface _____oF. Dew Point _____oF

1. Original Condition of Surface:
   Prime Coated _____ _____

   Other _____

2. Method of Field Preparation _____

   SSPC Specification SP-5 _____ ___

3. Type and Size of Abrasive Specified Silica Sand _____

   Type and Size of Abrasive Used Clemtex #3 _____

**4. Anchor Pattern Specified 1-2 _____ Mils

*5. Were Water Traps & Separators Used? _____

   Were They Effective? _____

* QC Verification Required Before Sandblasting
** QC Verification Required After Sandblasting

Continued on Sheet 2

ATTACHMENT 4 Sheet 2 of 2

TECHNICAL DATA

(Continued)

* 6. How were Contaminants Removed? _____

7. Was the Surface Dusted or Vacuumed as a Final Step? _____

How Quickly was Primer Applied? _____

What Primer was Used? Carbo-Zinc 11

8. Additional Comments _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

* QC Verification Required Before Sandblasting
** QC Verification Required After Sandblasting

ATTACHMENT 4A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 5

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supv.
Document Control Center
Q.C. Department

ATTACHMENT 6 Sheet 1 of 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record

(To be completed by Applicator at time of Coating Application)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Coating: Applicator _____ Foreman _____ Inspector _____

Location of Work This Shift (Use attached drawing - include batch numbers in each area) _____

*Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F., Dew Point _____°F

Substrate

Type: Concrete _____ Masonry _____ Steel _____ Other _____

Defects Noted (Describe) _____

*Was All Deleterious Material Removed Prior to Coating? _____

Date/Time: Immediate Surface Preparation Completed _____

*Coating Begun _____

* QC Verification Required Before Coating Application

Continued on Sheet 2

ATTACHMENT 6 Sheet 2 of 3

TECHNICAL DATA

(Continued)

Coating Material	Primer	Interm. Coat	Topcoat
Type:	Inorganic Zinc	Modified Phenolic	Modified Phenolic
Product Numbers	Carbo Zinc 11	Phenoline 305	Phenoline 305
Batch Numbers (This Shift)	_____	_____	_____
Quantity Used, Gallons (This Shift)	_____	_____	_____
Reducer Used & Quantity (This Shift)	_____	_____	_____

Coating Equipment

Type Spray Gun Used _____ Fluid Tip _____ Air Cap _____

Paint Pot Pressure _____ Atomization Pressure _____

*Were Traps & Separators Used? (Describe) _____

_____

Other Application Methods (Describe) _____

_____

Ventilating, Cooling and Heating Technique Used (Describe) _____

_____

* QC Verification Required Before Application

Continued on Sheet 3

ATTACHMENT 6 Sheet 3 of 3

TECHNICAL DATA

(Continued)

Coating Application

Specified DFT, Mils: Primer 2-4.5 Interm. Coat _____ Top Coat 2.5-5.5

Measured DFT, Mils (Min. & Max.):

Primer _____ Intermediate Coat _____ Topcoat _____

Measuring Instrument Used (Describe) _____

Was Substrate Dry Before Applying Primer? _____

Time Between Coats: Specified _____ Actual _____

*Was Each Previous Coat Dry Before Applying Subsequent Coat? _____

Coating Deviations	Primer	Interm. Coat	Topcoat
**Any Imperfections Noted (Describe, including area location)	_____	_____	_____
**Were All Areas of Low Film Build Recoated Satisfactorily?	_____	_____	_____

Remarks and Recommendations _____

_____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department
Civil Engineering

* QC Verification Required Before Applying Coating
** QC Verification Required Before Final Acceptance

ATTACHMENT 6A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

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G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

July 16, 1976

REVISION 2, March 31, 1977

Job 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure

35-1195-CCP-30

COATING CONTAINMENT LINERS

VOID

APPROVED BY:

W. E. Childress, Jr.

Project Engineer

APPROVED BY:

H. C. Dodd, Jr.

Construction Project Manager

PREPARED BY:

D.G. Sutton

Civil Engineer

P.L. Bussolini

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

VOID

56-237

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 1

This notice applies to Construction Procedure No. 35-1195- CCP-30 , Revision 2 .

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued (X)
Only as follows:

Change the procedure as follows:

Add to Section 4.1.1

When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows. Overblast the liner plate to white metal approximately 12" - 18" beyond the point which will receive primer. Drop back approximately 12" - 18" on the primer when applying the seal-coat.

ARMS INDEXED	
DCN: TCICN / 35-1195-CCP-30 / 2	
MSC: EPC / 2	
DI: 22844 TO: ERI —	FROM: ERI —

Reason for change:
To add provision for coating interfaces.

This change approved by:

for W. E. Childress Jr. — Department Head

for Peter L. Bussolini — Quality Assurance

Reviewed By:

W. H. Heach — Procedures & Reports

April 19, 1977 — Date

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 25. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	Revision 2	March 31, 1977
2 through 25	Revision 2	March 31, 1977

NOTE

This document has been completely revised for convenience in issuing Revision 2. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 2.

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer' requirements.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 containment liners as specified in Reference 1.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. Surface preparation for the prime coat shall start prior to interior concrete placement above elevation 805'6". The prime coat shall then be applied to approximately elevation 836' - finish coating shall be applied in areas inaccessible due to interior concrete. After liner erection has reached approximately elevation 970', painting operations will begin again and proceed downward to approximately elevation 836'. Thereafter, the remaining liner plates shall be prime coated prior to erection with the exception of the upper dome section, which shall be completely coated prior to setting in place. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Pheonline 305, thinned in accordance with Section 4.4.2.5, may be applied over the prime coat. After application, no thickness or continuity testing shall be required. Surface preparation of the seal coat prior to finish coating shall consist of solvent wiping if exposed longer than 30 days. Finish coating shall be applied when convenient prior to completion of the unit. Generally, sequence of operations shall be as outlined above-any necessary deviations in the sequence shall be due to unanticipated later developments.

2. DEFINITIONS OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS AND SYMBOLS

2.2.1 (NONE)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by Carboline in the use of their product as consistent with Carboline's training procedures, which includes both classroom isntruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 5. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department Representative who will be present to monitor and enforce safety during blasting, solvent cleaning, and coating application.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting foremen and general foremen shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include surface profile comparators, holiday detectors, thermometers, wet and dry film gauges, and a psychrometer for measuring relative humidity. Viscosity measuring devices will not be used. Surface temperature shall be obtained by attaching a thermometer to the surface to be coated. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness. Dry film gauges will be used as a further check on coating thickness after the coating has dried sufficiently - in accordance with SSPC-PA2-73T.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. The Superintendent in charge of painting, or his representative, shall assure that all necessary forms are completed by the appropriate personnel. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution section. Since the values of application conditions, such as temperature and humidity, vary continously during the work period, it

would be impossible to list all values; instead, readings will be taken at the time work is started. These readings will be used until it becomes obvious that new readings are needed due to a marked change in conditions, or it becomes evident that a maximum/minimum limit is approaching, such as temperature. In all cases, the most recent values will be listed at the time of completion of each form.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with B&R construction procedure ACP-3. It shall then be segregated from "Non-Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours is acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field; due to limited shelf-life this shall be done on a "first-in", first-out" basis. At the time of issuance, Attachment 1 shall be used to verify the issuance of paint from each individual batch. After materials have been partially used from an individual container, then same container cannot be re-sealed and returned to "Q" storage area. Containers opened and partially used in the "Q" paint storage area may be resealed and the contents used for later "Q" painting. The contents from partially used containers will not be reused after a period of one week has elapsed from date of initial opening.

4. PROCEDURE FOR COATING LINER

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP1, "Solvent Cleaning", and sand blasted with silica sand in accordance with SSPC-SP5, "White Metal Blast Cleaning", to achieve a 1-2 mil profile. After sand blasting, the surface to be primed shall be air blasted to remove all

sand and foreign materials. This shall be done until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If rust forms after blast cleaning, the surface shall be "shower-blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. During or upon completion of blast cleaning, a form similar to Attachment 4 shall be completed.

.031" GAS 4/1/77

4.1.2 Removal Of Weld Spatter And Other Minor Surface Imperfections Not To Exceed .010" - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SP-3. In areas where grinding is required, this will be witnessed by a B&R QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed of any oil or grease. This shall be accomplished by use of a manuafacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting and then solvent wiping the area prior to replacing the primer.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number 175, except recoating mixes-refer to Section 4.4.1.3. Primer coat shall be grey. A form similar to Attachment 2 shall be completed when preparing materials.

OCTOBER 76-N

GAS 4/1/77

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be white. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, (except recoating mixes - refer to 4.4.2.5). Documentation shall be recorded on a form similar to Attachment 2.

4.4. APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 50 feet. Equipment pressure shall be regulated to conform to manufacturer's instructions. The primer shall be allowed to dry tack free (1/2 hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40 - 95° F and 40 - 110° F, respectively; however, under certain conditions, these values may be exceeded, if authorized in writing by Brown & Root Civil Engineer. In no case shall Carboline limits be exceeded.

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

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5. mils respectively.

4. A double regulated pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

SJS 4/1/77

Temperature with over 50% R.H.	Curing Time BEFORE TOPCOAT
0°F.	7 days
40°F.	24 hours
60°F.	16 hours
80°F.	8 hours
100°F.	6 hours

If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray after allowing at least one hour cure after application. This shall be done as often as required using clean water having a ph range of 6 to 8. If used, a filter system will be installed in order to assure proper cleanliness of the curing water.

4.4.1.2 A form similar to Attachment 6 will be completed each time coating material is applied. Any necessary touch-up will be recorded on a form sililar to Attachment 3.

4.4.1.3 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.0 - 4.5 mils total DFT. (Only one overcoat shall be applied). The primed surface shall not be recoated until cured per Specification 4.4.1.1.6.

4.4.1.4 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5. mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, a blast to white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.5 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin 178 — OCTOBER 76-N SJS 4/1/77
2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin 875. Brush touch-up allowed on areas one square foot or less.

4.4.1.6 Repair of Embedded Foreign Particles - Embedded foreign particles shall be removed by abrading and recoated as outlined in Section 4.4.1.3.

4.4.2 FINISH COAT

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry until it is tack-free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50 -120 degrees F. However, when surface temperatures are outside the range of 60 - 85 degrees F. or ambient temperature outside 65 - 85 degrees F., it is permissible to use up to two quarts of Phenoline Thinner per gallon kit of Phenoline 305. The amount of thinner used under these conditions (1½ pints-2 quarts) shall be that which gives the best workable mix under the given temperature conditions, i.e., usually advantagious to use more thinner at lower temperatures.
2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.
3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shalll be 1.9 and 6.5 mils respectively.
4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.
5. Recoating time of Phenoline 305 is 12 hours at 90 degrees F. or 18 hours @ 75 degrees F. and 50% R.H. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.
6. Tack free time @ 75 degrees and 50% R.H. is 9 hours.
7. Full cure is achieved in 7 days @ 75 degrees F. and 50% R.H.

4.4.2.2 Application information will be recorded on a form similar to Attachment. 6. Touch-up will be recorded on a form similar to Att. 3.

4.4.2.3 Repair of Runs and Sags_ - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer; if no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.5).

4.4.2.4 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75 degrees F. or 12 hours @ 90 degrees F. has elapsed.

4.4.2.5 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. See Section 4.4.2.4 for recoating time.

4.4.2.6 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer, Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Pehnoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged. Thickness shall be as required for the pertinent coating. If damage extends to metal, damaged area will be blast cleaned and repaired.

4.4.2.7 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.5 TESTING

4.5.1 All testing as performed by the B&R Foremen, General Foremen or their Representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Assurance Department. After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Warehousing Record
2. Coating Materials - Applicator's Product Identity Record
3. Coating Applicator's Field Touch-Up and Coating Record
3a. Containment Liner -Developed Drawing
4. Coating Applicator's Surface Preparation Record - Steel
4a. Containment Liner - Developed Drawing
5. Painter Qualification Record
6. Coating Applicator's Coating Record
6a. Containment Liner - Developed Drawing
7. General Flow Chart

5.2 QC Hold Points*

1. After solvent cleaning and prior to sandblasting
2. Before sandblasting (check air supply and ambient conditions)
3. After sandblasting is complete
4. Prior to mixing coating materials (material acceptability)
5. Before primer application (check ambient conditions and paint air supply system for contamination)
6. Primer visual dry film thickness and cure before application of topcoat
7. Sealcoat/Finish Coat - Verify primer surface, ambient conditions, and air supply are acceptable prior to painting

* The point beyond which work cannot proceed prior to authorization by the Quality Control Representative. Authorization shall consist of initialing the hold points as identified on the attachments.

5.3 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. ANSI N101.4 - 1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities"
3. Steel Structures Paint Council, Volume 2, Second Edition
4. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775; data sheets October 76 -N Revision, and 473, Latest Revision.
5. DC/DD 188 and 193
6. FI/CR 118 and 58

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be used by Painting Dept. when issuing paint)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature o F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Applicator's Product Identity Record

(Recipient to Complete at Time of Receipt From Storage Area)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

_____

_____

TECHNICAL DATA

Coating Manufacturer _____ _____

Product Name & Number _____

Generic Type _____

* BATCH NUMBERS COLOR

Component A _____ _____
Component B _____ _____
Thinner _____

Specified Thinner _____

MIXING RATIO

By Volume Mix Time _____
By Weight Expiration Time _____

Component A _____ parts
Component B _____ parts
Thinner _____ parts

Signature/Title _____

Distribution: Paint Supt.
Document Control Center
QC Department

* QC Verification Required Before Mixing

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Field Touch-Up Record

(Complete at time of Touch-Up by Applicator/Foreman)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

TECHNICAL DATA

Coating Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Condition of Coated Steel Prior to Field Coating _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____ %

Temperature, Ambient _____°F., Surface _____°F. Dew Point _____°F

Surface Preparation Method _____

Touch-Up & Coating Method & Equipment _____

Primer: Product Identity _____ Batch No(s) _____

Topcoat(s):Product Identity _____ Batch No(s) _____

Primer DFT, Mils _____ Topcoat DFT, Mils _____

Remarks _____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 3A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 4 Sheet 1 of 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Surface Preparation Record - Steel
(To be completed by Applicator and Foreman at time of Surface Preparation)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Applicator(s) _____

Type of Surface & Exact Location (use attached drawing) _____

*Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____oF., Surface _____oF. Dew Point _____oF

1. Original Condition of Surface:
   Prime Coated _____

   Other _____

2. Method of Field Preparation _____

   SSPC Specification SP-5

3. Type and Size of Abrasive Specified Silica Sand

   Type and Size of Abrasive Used Clemtex #3

**4. Anchor Pattern Specified 1-2 Mils

*5. Were Water Traps & Separators Used? _____

   Were They Effective? _____

* QC Verification Required Before Sandblasting
** QC Verification Required After Sandblasting

Continued on Sheet 2

ATTACHMENT 4 Sheet 2 of 2

TECHNICAL DATA

(Continued)

* 6. How were Contaminants Removed? _____

7. Was the Surface Dusted or Vacuumed as a Final Step? _____

How Quickly was Primer Applied? _____

What Primer was Used? Carbo-Zinc 11

8. Additional Comments _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

* QC Verification Required Before Sandblasting
** QC Verification Required After Sandblasting

ATTACHMENT 4A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 5

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 6

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record

(To be completed by Applicator at time of Coating Application)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Coating: Applicator _____ Foreman _____ Inspector _____

Location of Work This Shift (use attached drawing) _____

*Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F., Dew Point _____°F

Substrate

Type: Concrete _____ Masonry _____ Steel _____ Other _____

Defects Noted (Describe) _____

*Was All Deleterious Material Removed Prior to Coating? _____

Date/Time: Immediate Surface Preparation Completed _____

*Coating Begun _____

* QC Verification Required Before Coating Application

Continued on Sheet 2

ATTACHMENT 6 Sheet 2 of 3

TECHNICAL DATA

(Continued)

Coating Material	Primer	Interm. Coat	Topcoat
Type:	Inorganic Zinc	Modified Phenolic	Modified Phenolic
Product Numbers	Carbo Zinc 11	Phenoline 305	Phenoline 305
Batch Numbers (This Shift)	_____	_____	_____
Quantity Used, Gallons (This Shift)	_____	_____	_____
Reducer Used & Quantity (This Shift)	_____	_____	_____

Coating Equipment

Type Spray Gun Used _____ Fluid Tip ____ Air Cap ____

Paint Pot Pressure _____ Atomization Pressure _____

*Were Traps & Separators Used? (Describe) _____

_____

Other Application Methods (Describe) _____

_____

Ventilating, Cooling and Heating Technique Used (Describe) _____

_____

* QC Verification Required Before Application

Continued on Sheet 3

ATTACHMENT 6 Sheet 3 of 3

TECHNICAL DATA

(Continued)

Coating Application

Specified DFT, Mils: Primer 2-4.5 Interm. Coat _____ Top Coat 2.5-5.5

Measured DFT, Mils (Min. & Max.):

Primer _____ Intermediate Coat _____ Topcoat _____

Measuring Instrument Used (Describe) _____

Was Substrate Dry Before Applying Primer? _____

Time Between Coats: Specified _____ Actual _____

*Was Each Previous Coat Dry Before Applying Subsequent Coat? _____

Coating Deviations	Primer	Interm. Coat	Topcoat
**Any Imperfections Noted (Describe, including area location)	_____	_____	_____
**Were All Areas of Low Film Build Recoated Satisfactorily?	_____	_____	_____

Remarks and Recommendations _____

_____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department
Civil Engineering

* QC Verification Required Before Applying Coating
** QC Verification Required Before Final Acceptance

ATTACHMENT 6A

DUMMY SHEET

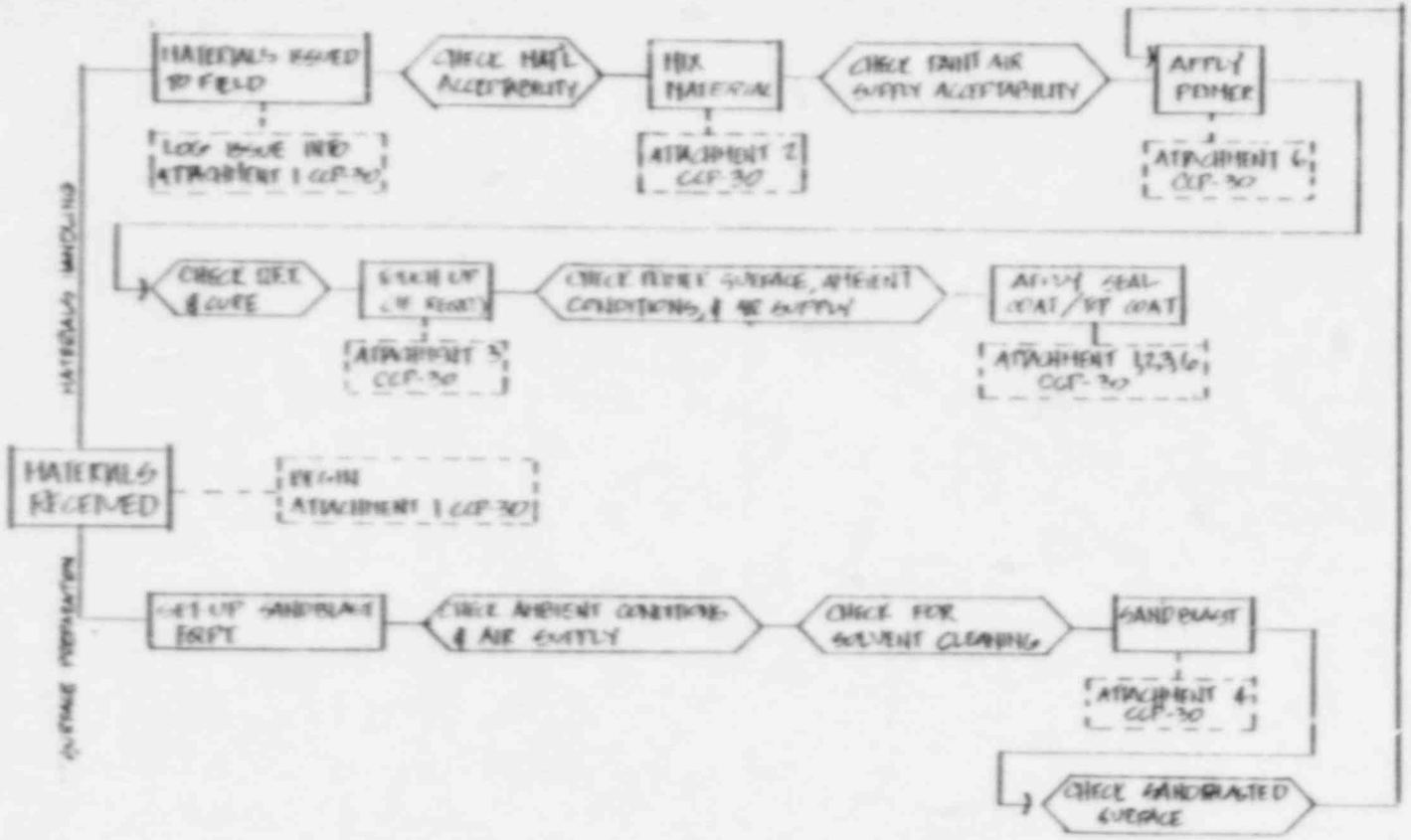
(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing reference for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 7



GENERAL FLOW CHART CCP-30

BAR CONSTRUCTION OPERATION

QA/QC OPERATION "HOLD POINT"

July 16, 1976

REVISION 1, September 20, 1976

Job 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure

35-1195-CCP-30

VOID

VOID

COATING CONTAINMENT LINERS

APPROVED BY:

W. E. Childress, Jr.

Project Engineer

APPROVED BY:

H. C. Dodd, Jr.

Construction Project Manager

PREPARED BY:

D. G. Sutton

Civil Engineer

REVIEWED BY:

P. L. Bussolini

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 3

This notice applies to Construction Procedure No. 35-1195-CCP-30, Revision 1.

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued (X)
Only as follows:

Change the procedure as follows: See attached page No. 2

Reason for change: Incorporation of CEI's 6, 7, 8, and 9 into CCP-30.

This change approved by:

W.E. Childers
Department Head

Peter L. Bussolini
Quality Assurance

Reviewed By:

M.H. Kench
Procedures & Reports

December 2, 1976
Date

Add Paragraph 4.4.1.3, Recoating of Carbo Zinc 11 Primer

Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.5-5 mils total DFT. (Only one overcoat shall be applied).

Add Paragraph 4.4.1.4, Repair of Sags and Runs

Sags or runs in excess of 6 mils will be abraded with an aluminum screen or sandpaper to 2.5 to 6 mils. Sags or runs 6 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, a blast to white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

Add Paragraph 4.4.2.3, Repair of Runs and Sags

Runs or sags will be abraded until the DFT of the Phenoline 305 is within 2.4-5 mils. If cracks are visible, then runs and sags will be removed to primer; if no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities.

Add Paragraph 4.4.2.4, Repair of Embedded Foreign Particles

Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities.

Add Paragraph 4.4.2.5, Repair of Pinholes and Discontinuities

Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon of Phenoline 305 applied at approximately 1-2 mils DFT.

Add Paragraph 4.4.2.6, Repair of Scratches and Damaged Areas

Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer, Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged. Thickness shall be as required for the pertinent coating. If damage extends to metal, damaged area will be blast cleaned and repaired.

Reason for Change: See first page.

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 2

This notice applies to Construction Procedure No. 35-1195-CCP-30, Revision 1.

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued (X)
Only as follows:

Change the procedure as follows: Add section 1.3.2 - Brush touch-up painting shall be done on prime and finish coats in accordance with the following: Prime Coat: 1). Carboline Application Instructions (Carbo Zinc II) bulletin 175. 2). Carboline Product Data Sheet (Carbo Zinc II) bulletin 875. Brush touch up allowed on areas one square foot or less.

Finish Coat: 1). Carboline Application Instructions (Phenoline 305) bulletin 367. 2). Carboline Product Data Sheet (Phenoline 305 Primer & Finish) bulletin 473. Brush touch up and complete application is allowed with no area restrictions.

Reason for change: To avoid costly set up time for spray painting.

This change approved by:

W. E. Chilbrey Jr.
Department Head

Peter L. Bussolini
Quality Assurance

Reviewed By:

R. Kerch 10-14-72
Procedures & Reports

Oct 21 72
Date

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 1

This notice applies to Construction Procedure No. 35-1195-CCP-30, Revision 1.

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued (X)
Only as follows:

AND OTHER MINOR TYPE IMPROVEMENTS NOT REQUIRING STOP WORK

Change the procedure as follows: Add Paragraph 4.1.2, Removal of Weld Spatter. WES

If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SP-3. In areas where grinding is required, this will be witnessed by a B&R QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date.

Reason for change: The procedure does not address removal of weld spatter

This change approved by:

Willard E. Childers Jr.
Department Head

REC Peter L. Bussolini
Quality Assurance

Reviewed By:

Procedures & Reports

9-24-76
Date

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 21. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	1	September 20, 1976
2 through 21	1	September 20, 1976

NOTE

This document has been completely revised for convenience in issuing Revision 1. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 1.

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer' requirements.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 containment liners as specified in Reference 1.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. Surface preparation for the prime coat shall start prior to interior concrete placement above elevation 805'6". The prime coat shall then be applied to approximately elevation 836' - finish coating shall be applied in areas inaccessible due to interior concrete. After liner erection has reached approximately elevation 970', painting operations will begin again and proceed downward to approximately elevation 836'. Thereafter, the remaining liner plates shall be prime coated prior to erection with the exception of the upper dome section which shall be completely coated prior to setting in place. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Phenoline 305 shall be applied over the prime coat. Finish coating shall be applied when convenient prior to completion of the unit. Generally, sequence of operations shall be as outlined above; any necessary deviations in the sequence shall be due to unanticipated later developments.

2. DEFINITION OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS AND SYMBOLS

2.2.1 (None.)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and/or demonstrated ability. This shall be verified by completing a form similar to Attachment 5. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort.

3.2. Safety Requirement

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department Representative who will be present to monitor and enforce blasting, solvent cleaning, and coating application.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting foremen and general foremen shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include holiday detectors, thermometers, wet and dry film gauges, and a psychrometer for measuring relative humidity. Viscosity measuring devices will not be used. Surface temperature shall be obtained by attaching a thermometer having an accuracy of $\pm 5^{o}F$ to the surface to be coated. Wet film gauges will be randomly used during coating application as an aid to field personnel. Dry film gauges will be used as a further check on coating thickness after the coating has dried sufficiently - in accordance with SSPC-PA2-73T.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. The superintendent in charge of painting, or his representative, shall assure that all necessary forms are completed by the appropriate personnel, with the exception of those forms to be completed by the Brown & Root Quality Assurance Department. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution section. Since the values of application conditions such as temperature and humidity vary continuously during the work period, it would be impossible to list all values; instead, readings will be taken at the time work is started.

These readings will be used until it becomes obvious that new readings are needed due to a marked change in conditions or it becomes evident that a maximum/minimum limit is approaching, such as temperature. In all cases, the most recent values will be listed at the time of completion of each form.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC representative accepting shipment shall be responsible for completing all necessary shipping and receiving documentation. General receiving procedures shall be in accordance with B&R construction procedure ACP-3. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 40° - 110° F. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field; due to limited shelf-life this shall be done on a "first-in, first-out" basis. At the time of issuance, Attachment 1 shall be used to verify the issuance of paint from each individual batch. After materials have been partially used from an individual container, then same container cannot be re-sealed and returned to "Q" storage area.

4. PROCEDURE FOR COATING LINER

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5° F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-1 "Solvent Cleaning" and sand blasted in accordance with SSPS-5 "White Metal Blast Cleaning". After sand blasting, the surface to be primed shall be air blasted to remove all sand and foreign materials. This shall be done until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. Generally, the amount of blast cleaned surface shall be limited to that which can be coated within an 8-hour period; however, if rust forms after blast cleaning, the surface shall be "shower-blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. During or upon completion of blast cleaning, a form similar to Attachment 4 shall be completed.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the carbo zinc 11 primer is exposed, oil and grease will be removed by sand blasting and then solvent wiping the area prior to replacing the primer.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number 175. Primer coat shall be grey. A form similar to Attachment 2 shall be completed when preparing materials.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be white. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473. Documentation shall be recorded on a form similar to Attachment 2.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 50 feet. Equipment pressure shall be regulated to conform to manufacturer's instructions. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40 - 95° F and 40 - 110°F, respectively; however, under certain conditions, these values may be exceeded, if authorization in writing by Brown & Root Civil Engineer. In no case shall Gibbs & Hill Specification SS-14 limits be exceeded.

2. Humidity values may vary from 0 to 100%; however, coating shall not be applied to a wet or damp surface.

3. Thickness of prime coat shall be a minimum of 3 mils and a maximum of 5 mils.

4. A double regulated pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

25 - 50% R.H.		Over 50% R.H.
24 - 48 Hours	0 - 40° F	16 - 24 Hours
24 - 48 Hours	40 - 60° F	12 - 16 Hours
24 - 48 Hours	60 - 85° F	8 - 12 Hours
12 - 24 Hours	85 - 100°F	6 - 8 Hours

4.4.1.2 A form similar to Attachment 6 will be completed each time coating material is applied. Any necessary touch-up will be recorded on a form similar to Attachment 3.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. The material shall be allowed to dry until it is tack-free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "B". Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The premissible range of temperature shall be 45 - 100° F.
2. Minimum and maximum values of relative humidity shall be 25% and 95%, respectively.
3. Thickness of coating shall be minimum of 3 mils and a maximum of 5 mils.
4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

4.4.2.2 Application information will be recorded on a form similar to Attachment 7. Touch-up will be recorded on a form similar to Attachment 3.

4.5 TESTING

4.5.1 All testing as performed by the B&R foremen, general foremen or their representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Assurance Department.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Warehousing Record
2. Coating Materials - Applicator's Product Identity Record
3. Coating Applicator's Field Touch-Up and Coating Record
3a. Containment Liner - Developed Drawing
4. Containment Applicator's Surface Preparation Record - Steel
4a. Containment Liner - Developed Drawing
5. Painter Qualification Record
6. Coating Applicator's Coating Record
6a. Containment Liner - Developed Drawing

5.2 QC Hold Points*

1. After solvent cleaning and prior to sandblasting
2. Before sandblasting (check air supply and ambient conditions)
3. After sandblasting is complete
4. Prior to mixing coating materials (material acceptability)
5. Before material application (check paint air supply system for contamination)
6. Primer visual dry film thickness and cure before application of topcoat
7. Topcoat - Verify primer surface, ambient conditions, and air supply are acceptable prior to painting

* The point beyond which work cannot proceed prior to authorization by the Quality Control Representative.

5.3 REFERENCES

1. Gibbs & Hill Specification SS-14 "Containment Steel Liner", Latest Revision
2. ANSI N101.4 - 1972 "Quality Assurance for Protective Coatings Applied to Nuclear Facilities"
3. Steel Structures Paint Council, Vol.2, Second Edition
4. Carboline Corporation "Application Instructuions:, Bullentin Number 175 and 367; data sheets 875 and 473, Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be used by Painting Dept. when issuing paint)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer Carboline

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature ° F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Document Control Center
O.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Applicator's Product Identity Record

(Recipient to Complete at time of Receipt From Storage Area)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____
Unit 1 ____ Unit 2 ____

TECHNICAL DATA

Coating Manufacturer Carboline

Product Name & Number _____

Generic Type _____

Batch Number _____

Color, Visual _____

Mixing Ratio:
By Volume _____ Parts _____ Component _____

Specified Thinner _____

Signature/Title _____

Distribution: Paint Supt.
Document Control Center
O.C. Department

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Field Touch-Up Record

(Complete at time of Touch-Up by Applicator/Foreman)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

_____ _____

_____

TECHNICAL DATA

Coating Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Condition of Coated Steel Prior to Field Coating _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____ %

Temperature, Ambient _____ °F., Surface _____ °F. Dew Point _____ °F

Surface Preparation Method _____

Touch-Up & Coating Method & Equipment _____

Primer: Product Identity _____ Batch No(s) _____

Topcoat(s):Product Identity _____ Batch No(s) _____

Primer DFT, Mils _____ Topcoat DFT, Mils _____

Remarks _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 3A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 4

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Surface Preparation Record - Steel
(To be completed by Applicator and Foreman at time of Surface Preparation)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Applicator (S) _____

Type of Surface & Exact Location (use attached drawing) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F. Dew Point _____°F

1. Original Condition of Surface:
   Prime Coated _____

   Other _____

2. Method of Field Preparation _____

   SSPC Specification SP-5

3. Type and Size of Abrasive Specified Silica Sand

   Type and Size of Abrasive Used Clemtex #3

4. Anchor Pattern Specified 1-2 Mils

5. Were Water Traps & Separators Used? _____

   Were They Effective? _____

Continued on Sheet 2

ATTACHMENT 4
(Sheet 2 of 2)

TECHNICAL DATA

Continued

6. How were Contaminants Removed? _____

7. Was the Surface Dusted or Vacuumed as a Final Step? _____

How Quickly was Primer Applied? _____

What Primer was Used? Carbo Zinc 11

8. Additional Comments _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 4A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 5

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 6

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record

(To be completed by Applicator at time of Coating Application)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Coating: Applicator _____ Foreman _____ Inspector _____

Location of Work This Shift (Use attached drawing - include batch numbers in each area) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F., Dew Point _____°F

Substrate

Type: Steel _____ Primer _____

Defects Noted (Describe) _____

Was All Deleterious Material Removed Prior to Coating? _____

Date/Time: Immediate Surface Preparation Completed _____

Coating Begun _____

Continued on Sheet 2

ATTACHMENT 6
(Sheet 2 of 3)

TECHNICAL DATA

Continued

Coating Material	Primer	Interm. Coat	Topcoat
Type:	Inorganic Zinc	Modified Phenolic	Modified Phenolic
Product Numbers	Carbo Zinc 11	Phenoline 305	Phenoline 305
Batch Numbers (This Shift)	_____	_____	_____
Quantity Used, Gallons (This Shift)	_____	_____	_____
Reducer Used & Quantity (This Shift)	_____	_____	_____

Coating Equipment

Type Spray Gun Used _____ Fluid Tip _____ Air Cap _____

Paint Pot Pressure _____ Atomization Pressure _____

Were Traps & Separators Used? (Describe) _____

_____

Other Application Methods (Describe) _____

_____

Ventilating, Cooling and Heating Technique Used (Describe) _____

_____

Continued on Sheet 3

ATTACHMENT 6
(Sheet 3 of 3)

TECHNICAL DATA
Continued

Coating Application

Specified DFT, Mils: Primer 3-5 Interm. Coat _____ Top Coat 3-5

Measured DFT, Mils (Min. & Max.):

Primer _____ Intermediate Coat _____ Topcoat _____

Measuring Instrument Used (Describe) _____

Was Substrate Dry Before Applying Primer? _____

Time Between Coats: Specified _____ Actual _____

Was Each Previous Coat Dry Before Applying Subsequent Coat? _____

Coating Deviations	Primer	Interm. Coat	Topcoat
Any Imperfections Noted (Describe, including area location)	_____	_____	_____
Were All Areas of Low Film Build Recoated Satisfactorily?	_____	_____	_____

Remarks and Recommendations _____

_____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 6A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

Brown & Root, Inc.

INTEROFFICE MEMO

VOID

IM- 5654

TO: J. E. Fitzsimons

DATE: 9-17-76

FROM: W. H. Hench

SUBJECT: Job 35-1195, CPSES
Construction Procedure 35-1195- CCP-30 REVISION "0"

Please take the following action on subject document:

VOID

☑ Distribute

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W. H. Hench

W. H. Hench
Procedures and Reports

WHH/

cc:

July 16, 1976

REVISION 0

Job 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure

35-1195-CCP-30

COATING CONTAINMENT LINER

VOID

APPROVED BY:

W. E. Childress, Jr.

Project Engineer

APPROVED BY:

H. C. Dodd, Jr.

Construction Project Manager

PREPARED BY:

VOID

D. G. Sutton

Civil Engineer

REVIEWED BY:

P. L. Bussolini

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 21. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	0	July 16, 1976
2 through 21	0	July 16, 1976

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer' requirements.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 containment liners as specified in Reference 1.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. Surface preparation for the prime coat shall start prior to interior concrete placement above elevation 805'6". The prime coat shall then be applied to approximately elevation 836' - finish coating shall be applied in areas inaccessible due to interior concrete. After liner erection has reached approximately elevation 970', painting operations will begin again and proceed downward to approximately elevation 836'. Thereafter, the remaining liner plates shall be prime coated prior to erection with the exception of the upper dome section which shall be completely coated prior to setting in place. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Phenoline 305 shall be applied over the prime coat. Finish coating shall be applied when convenient prior to completion of the unit.

2. DEFINITION OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS AND SYMBOLS

2.2.1 (None.)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and/or demonstrated ability. This shall be verified by completing a form similar to Attachment 5. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting foremen and general foremen shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include thermometers, wet and dry film gauges, and a hygrometer for measuring relative humidity. Surface temperature shall be obtained by attaching a thermometer having an accuracy of $\pm 5^{o}$ to the surface to be coated. Wet film gauges will be randomly used during coating application as an aid to field personnel. Dry film gauges will be used as a further check on coating thickness after the coating has dried sufficiently.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. The superintendent in charge of painting, or his representative, shall assure that all necessary forms are completed by the appropriate personnel, with the exception of those forms to be completed by the Brown & Root Quality Assurance Department. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution section.

Since the values of application conditions such as temperature and humidity vary continuously during the work period, it would be impossible to list all values; instead, readings will be taken at the time work is started. These readings will be used until it becomes obvious that new readings are needed due to a marked change in conditions or it becomes evident that a maximum/minimum limit is approaching, such as temperature. In all cases, the most recent values will be listed at the time of completion of each form.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storing - Upon receipt of a shipment of coating materials, the B&R QC representative accepting shipment shall be responsible for completing all necessary shipping and receiving documentation. It shall then be stored in the paint storage building where temperatures will be maintained between 40 - 110° F. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field. At the time of issuance, Attachment 1 shall be used to verify the issuance of paint from each individual batch.

4. PROCEDURE FOR COATING LINER

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - If needed, the surface to be primed shall be cleaned of any heavy oil or grease deposits in accordance with SSPC-1 "Solvent Cleaning" and sand blasted in accordance with SSPC-5 "White Metal Blast Cleaning". After sand blasting, the surface to be primed shall be air blasted to remove all sand and foreign materials. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If any rust forms after blast cleaning, the surface shall be "shower-blast" cleaned before painting. During or upon completion of blast cleaning, a form similar to Attachment 4 shall be completed.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by use of a manuafacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the carbo zinc 11 primer is exposed, oil and grease will be removed by sand blasting and then solvent wiping the area prior to replacing the primer.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. The mixture shall then be strained through a 30-mesh screen. Thinning shall be as recommended by the latest revision of Carboline Publication Number 175. Primer coat shall be grey. A form similar to Attachment 2 shall be completed when preparing materials.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be white. Documentation shall be recorded on a form similar to Attachment 2.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots. Equipment pressure shall be regulated to conform to manufacturer's instructions. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40 - 95° F and 40 - 110° F, respectively; however, under certain conditions, these values may be exceeded, if authorized in writing by Brown & Root Civil Engineer. In no case shall Gibbs & Hill specification SS-14 limits be exceeded.

2. Humidity values may vary from 0 to 100%; however, coating shall not be applied to a wet or damp surface.

3. Thickness of prime coat shall be a minimum of 3 mils and a maximum of 5 mils.

4. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

25 - 50% R.H.		Over 50% R.H.
24 - 48 Hours	0 - 40° F	16 - 24 Hours
24 - 48 Hours	40 - 60° F	12 - 16 Hours
24 - 48 Hours	60 - 85° F	8 - 12 Hours
12 - 24 Hours	85 - 100°F	6 - 8 Hours

4.4.1.2 A form similar to Attachment 6 will be completed each time coating material is applied. Any necessary touch-up will be recorded on a form similar to Attachment 3.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. The following application parameters shall govern:

1. The permissible range of temperature shall be 45 - 100° F.

2. Minimum and maximum values of relative humidity shall be 25% and 95%, respectively.

3. Thickness of coating shall be a minimum of 3 mils and a maximum of 5 mils.

4.4.2.2 Application information will be recorded on a form similar to Attachment 6. Touch-up will be recorded on a form similar to Attachment 3.

4.5 TESTING

4.5.1 All testing as performed by the B&R foremen, general foremen or their representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Assurance Department.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Warehousing Record
2. Coating Materials - Applicator's Product Identity Record
3. Coating Applicator's Field Touch-Up and Coating Record

3a. Containment Liner - Developed Drawing

4. Containment Applicator's Surface Preparation Record - Steel

4a. Containment Liner - Developed Drawing

5. Painter Qualification Record
6. Coating Applicator's Coating Record

6a. Containment Liner - Developed Drawing

5.2 REFERENCES

1. Gibbs & Hill Specification SS-14 "Containment Steel Liner", Latest Revision
2. ANSI N101.4 - 1972 "Quality Assurance for Protective Coatings Applied to Nuclear Facilities"
3. Steel Structures Paint Council, Vol. 2, Second Edition
4. Carboline Corporation "Application Instructions", Bulletin Number 175 and 367; data sheets 875 and 473, Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be used by Painting Dept. when issuing paint)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature ° F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Applicator's Product Identity Record

(Recipient to Complete at time of Receipt From Storage Area)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

_____

_____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Generic Type _____

Batch Number _____

Color, Visual _____

Mixing Ratio:
By Volume _____ Parts _____ Component _____

Specified Thinner _____

Signature/Title _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Field Touch-Up Record

(Complete at time of Touch-Up by Applicator/Foreman)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

_____

_____

TECHNICAL DATA

Coating Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Condition of Coated Steel Prior to Field Coating _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____ %

Temperature, Ambient _____ °F., Surface _____ °F. Dew Point _____ °F

Surface Preparation Method _____

Touch-Up & Coating Method & Equipment _____

Primer: Product Identity _____ Batch No(s) _____

Topcoat(s):Product Identity _____ Batch No(s) _____

Primer DFT, Mils _____ Topcoat DFT, Mils _____

Remarks _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 3A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 4

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Surface Preparation Record - Steel
(To be completed by Applicator and Foreman at time of Surface Preparation)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F. Dew Point _____°F

1. Original Condition of Surface:
   Prime Coated _____

   Other _____

2. Method of Field Preparation _____

   SSPC Specification _____

3. Type and Size of Abrasive Specified _____

   Type and Size of Abrasive Used _____

4. Anchor Pattern Specified _____ Mils

5. Were Water Traps & Separators Used? _____

   Were They Effective? _____

Continued on Sheet 2

ATTACHMENT 4
(Sheet 2 of 2)

TECHNICAL DATA

Continued

6. How were Contaminants Removed? _____

7. Was the Surface Dusted or Vacuumed as a Final Step? _____

   How Quickly was Primer Applied? _____

   What Primer was Used? _____

8. Additional Comments _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
O.C. Department
Civil Engineering

ATTACHMENT 4A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2323-S1(S2)-0511
G&H 2323-S1(S2)-0514

ATTACHMENT 5

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 6

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record

(To be completed by Applicator at time of Coating Application)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Coating: Applicator _____ Foreman _____ Inspector _____

Location of Work This Shift (Use attached drawing - include batch numbers in each area) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F., Dew Point _____°F

Substrate

Type: Concrete _____ Masonry _____ Steel _____ Other _____

Defects Noted (Describe) _____

Was All Deleterious Material Removed Prior to Coating? _____

Date/Time: Immediate Surface Preparation Completed _____

Coating Begun _____

Continued on Sheet 2

ATTACHMENT 6
(Sheet 2 of 3)

TECHNICAL DATA

Continued

Coating Material	Primer	Interm. Coat	Topcoat
Type:	_____	_____	_____
Product Numbers	_____	_____	_____
Batch Numbers (This Shift)	_____	_____	_____
Quantity Used, Gallons (This Shift)	_____	_____	_____
Reducer Used & Quantity (This Shift)	_____	_____	_____

Coating Equipment

Type Spray Gun Used _____ Fluid Tip _____ Air Cap _____

Paint Pot Pressure _____ Atomization Pressure _____

Were Traps & Separators Used? (Describe) _____

_____

Other Application Methods (Describe) _____

_____

Ventilating, Cooling and Heating Technique Used (Describe) _____

_____

Continued on Sheet 3

ATTACHMENT 6
(Sheet 3 of 3)

TECHNICAL DATA
Continued

Coating Application

Specified DFT, Mils: Primer 3-5 Interm. Coat _____ Top Coat 3-5

Measured DFT, Mils (Min. & Max.):

Primer _____ Intermediate Coat _____ Topcoat _____

Measuring Instrument Used (Describe) _____

Was Substrate Dry Before Applying Primer? _____

Time Between Coats: Specified _____ Actual _____

Was Each Previous Coat Dry Before Applying Subsequent Coat? _____

Coating Deviations	Primer	Interm. Coat	Topcoat
Any Imperfections Noted (Describe, including area location)	_____	_____	_____
Were All Areas of Low Film Build Recoated Satisfactorily?	_____	_____	_____

Remarks and Recommendations _____

_____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Painting Supt.
Document Control Center
O.C. Department
Civil Engineering

ATTACHMENT 6A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

NOTE

This sheet is to be provided by B&R Construction Engineering. It is for marking or noting work location coordinates in terms of degrees azimuth and elevation. The drawing references for this sheet are:

G&H 2.23-S1(S2)-0511
G&H 23.3-S1(S2)-0514

CPSES NRC TRT
SSER - COATINGS 4
WORK PACKAGE
VOL IV of XIII

CCP-30

FOIA-85-59
A/70

02/10/76
35-1195

Brown & Root, Inc.

INTEROFFICE MEMO

IM-2981

TO: Distribution February 10, 1976

FROM: W.H. Hench

SUBJECT: Review Draft, Construction Procedure 35-1195[redacted]Rev. 0, "Coating Containment Liners".

Subject procedure is attached for review and comment. Please return comments, if any, on the comment sheet provided. Response within ten (10) working days is requested.

W.H. Hench
Procedures and Reports

WHH/dcs

Distribution
cc:
H.C. Dodd, Jr
C.E. Bonin
W.E. Childress, Jr.
G.W. McGee
D. Sutton
W.A. McFarland
T. Howard
P.L. Bussolini

Bechtel

CONSTRUCTION PROCEDURE DRAFT
Review/Comment Sheet

Document No. 35-1195-CCP-30
Prepared By D. G. Sutton
Revision 0
Reviewed By

Date: February 9, 1976
Date:
Date: February 9, 1976
Date:

COMMENTS	Corrective Action (This column to be filled in by Procedures and Reports section)
	VOID

Comments Acknowledged By _____ Date _____

February 9, 1976

REVISION 0

REVIEW DRAFT

Job 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure

35-1195-CCP-30

COATING CONTAINMENT LINERS

VOID

APPROVED BY:	APPROVED BY:
W. E. Childress, Jr.	H. C. Dodd, Jr.
Project Engineer	Construction Project Manager
PREPARED BY:	REVIEWED BY:
D. G. Sutton	P. L. Bussolini
Civil Engineer	Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 22. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	0	February 9, 1976
2 through 22	0	February 9, 1976

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer' requirements.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 containment liners as specified in Reference 1.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc II with a finish coat of Phenoline 305. Surface preparation for the prime coat shall start after approximately three complete rings of liner above elevation 805'-6" have been placed. Thereafter, painting shall lag approximately three rings behind liner placement, depending upon the amount of interference with erection of the liner. In order to minimize damage to the finish coat of Phenoline 305, it will not be applied until near completion of the unit.

2. DEFINITIONS OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS AND SYMBOLS

2.2.1 (NONE)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and/or demonstrated ability. This shall be verified by completing a form similar to Attachment 6. This form shall be executed by the B&R Paint Superintendent or his representative.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting foremen and general foremen shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include thermometers, wet and dry film gauges, and a hygrometer for measuring relative humidity. Surface temperature shall be obtained by taping a thermometer to the surface to be coated and waiting until the temperature has stabilized before recording. Wet film gauges will be randomly used during coating application as an aid to field personnel. Dry film gauges will be used as a further check on coating thickness after the coating has dried sufficiently.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. After completion, one (1) copy of each form shall be given to the parties as listed on the distribution section. The superintendent in charge of painting shall assure that all necessary forms are completed by the appropriate personnel, with the exception of those forms to be completed by the Brown & Root Quality Assurance Department.

Since the values of application conditions such as temperature and humidity vary continuously during the work period, it would be impossible to list all values; instead, readings will be taken at the time work is started. These readings will be used until it becomes obvious that new readings are needed due to a marked change in conditions or it becomes evident that a maximum/minimum limit is approaching, such as temperature. In all cases, the most recent values will be listed at the time of completion of each form.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storing - Upon receipt of a shipment of coating materials, the B&R QC representative accepting shipment shall complete a form similar to Attachment 1. It shall then be stored where temperatures will be maintained between 40 - 110^0 F.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field. At the time of issuance, Attachment 2 shall be filled out by the B&R QC representative making issuance.

4. PROCEDURE FOR COATING LINER

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - If needed, the surface to be primed shall be cleaned of any heavy oil or grease deposits in accordance with SSPC-1 "Solvent Cleaning" and sand blasted in accordance with SSPC-5 "White Metal Blast Cleaning". After sand blasting, the surface to be primed shall be air blasted to remove all sand and foreign materials. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If any rust forms after blast cleaning, the surface shall be "shower-blast" cleaned before painting. Upon or before completion of blast cleaning, a form similar to Attachment 5 shall be completed.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 The only surface preparation required for the finish coat shall be the removal, if needed, of any oil or grease with a manufacturer recommended cleanser or cleansing method. This preparation shall also include any other areas where the need for cleaning is obvious. Upon or before completion of preparation, a form similar to Attachment 5 shall be completed.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc II, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. The mixture shall then be strained through a 30-mesh screen. Thinning shall be as recommended by technical bulletin number 175. A form similar to Attachment 3 shall be completed when preparing materials.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst. Documentation shall be recorded on a form similar to Attachment 3.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots. Equipment pressure shall be regulated to conform to manufacturer's instructions. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40 - 95° F and 40 - 110° F, respectively; however, under certain conditions, these values may be exceeded, but in no case shall the manufacturer's maximum and minimum limits be exceeded, as per Carboline Publication Number 175.

2. Humidity values may vary from 0 to 100%; however, coating shall not be applied to a wet or damp surface.

3. Thickness of prime coat shall be a minimum of 3 mils per Reference 1.

4. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

25 - 50% R.H.		Over 50% R.H.
24 - 48 Hours	0 - 40° F	16 - 24 Hours
24 - 48 Hours	40 - 60° F	12 - 16 Hours
24 - 48 Hours	60 - 85° F	8 - 12 Hours
12 - 24 Hours	85 - 100°F	6 - 8 Hours

4.4.1.2 A form similar to Attachment 7 will be completed each time coating material is applied. Any necessary touch-up will be recorded on a form similar to Attachment 4.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. The following application parameters shall govern:

1. The permissible range of temperature shall be 45 - 100° F.

2. Minimum and maximum values of relative humidity shall be 25% and 95%, respectively.

3. Thickness of coating shall be a minimum of 3 mils per Reference 2.

4.4.2.2 Application information will be recorded on a form similar to Attachment 7. Touch-up will be recorded on a form similar to Attachment 4.

4.5 TESTING

4.5.1 All testing as performed by the B&R foremen, general foremen or their representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Assurance Department.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Shipping and Receiving Record
2. Coating Materials - Warehousing Record
3. Coating Materials - Applicator's Product Identity Record
4. Coating Applicator's Field Touch-Up and Coating Record

4a. Containment Liner - Developed Drawing

5. Coating Applicator's Surface Preparation Record - Steel

5a. Containment Liner - Developed Drawing

6. Painter Qualification Record
7. Coating Applicator's Coating Record.

7a. Containment Liner - Developed Drawing

5.2 REFERENCES

1. Gibbs & Hill Specification SS-14 "Containment Steel Liner", Latest Revision.
2. ANSI N101.4 - 1972 "Quality Assurance for Protective Coatings Applied to Nuclear Facilities".
3. Steel Structures Paint Council, Vol. 2, Second Edition.
4. Carboline Corporation "Application Instructions", Bulletin Number 175 and 367

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Shipping and Receiving Record

(To be Completed by B&R QC Receiving Dept.)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name and Number _____

Batch Number(s) _____

Quantity Shipped (Each Batch) _____

Date Shipped _____

Shipped Via _____

Date Received _____

Quantity Received (Each Batch) _____

Storage Area _____

Damage Report _____

_____

_____

Signature/Title _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be Completed by B&R QC For Each Batch)

GENERAL DATA

Date _____ Report No. ____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature °F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Applicator's Product Identity Record

(Recipient to Complete at time of Receipt From Storage Area)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Generic Type _____

Batch Number _____

Color, Visual _____

Mixing Ratio:
By Volume _____ Parts _____ Component _____

Specified Thinner _____

Signature/Title _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department

ATTACHMENT 4

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Field Touch-Up Record

(Complete at time of Touch-Up by Applicator/Foreman)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____
Unit 1 _____ Unit 2 _____

TECHNICAL DATA

Coating Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Condition of Coated Steel Prior to Field Coating _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____ %

Temperature, Ambient _____ °F., Surface _____ °F. Dew Point _____ °F

Surface Preparation Method _____

Touch-Up & Coating Method & Equipment _____

Primer: Product Identity _____ Batch No(s) _____

Topcoat(s):Product Identity _____ Batch No(s) _____

Primer DFT, Mils _____ Topcoat DFT, Mils _____

Remarks _____

_____

Applicator's Signature/Title _____
Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 4A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

ATTACHMENT 5
(Sheet 1 of 2)

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Surface Preparation Record - Steel
(To be completed by Applicator and Foreman at time of Surface Preparation)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Applicator _____

Type of Surface & Exact Location (use attached drawing) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F. Dew Point _____°F

1. Original Condition of Surface:
   Prime Coated _____

   Other _____

2. Method of Field Preparation _____

   SSPC Specification _____

3. Type and Size of Abrasive Specified _____

   Type and Size of Abrasive Used _____

4. Anchor Pattern Specified _____ Mils

5. Were Water Traps & Separators Used? _____

   Were They Effective? _____

Continued on Sheet 2

ATTACHMENT 5
(Sheet 2 of 2)

TECHNICAL DATA

Continued

6. How were Contaminants Removed? _____

7. Was the Surface Dusted or Vacuumed as a Final Step? _____

   How Quickly was Primer Applied? _____

   What Primer was Used? _____

8. Additional Comments _____

_____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Paint Supt.
Document Control Center
Q.C. Department
Civil Engineering

ATTACHMENT 5A

DUMMY SHEET

(CONTAINMENT LINER DEVELOPED DRAWING)

ATTACHMENT 6

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Document Control Center
Q.C. Department

ATTACHMENT 7
(Sheet 1 of 3)

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record

(To be completed by Applicator at time of Coating Application)

GENERAL DATA

Date _____ Report No. _____ Unit 1 _____ Unit 2 _____
Shift No. _____

TECHNICAL DATA

Coating Applicator _____ Foreman _____ Inspector _____

Location of Work This Shift (Use attached drawing - include batch numbers in each area) _____

Ambient Conditions:
Date/Time _____ Relative Humidity _____%

Temperature, Ambient _____°F., Surface _____°F., Dew Point _____°F

Substrate

Type: Concrete _____ Masonry _____ Steel _____ Other _____

Defects Noted (Describe) _____

_____

Was All Deleterious Material Removed Prior to Coating? _____

Date/Time: Immediate Surface Preparation Completed _____

Coating Begun _____

Continued on Sheet 2

ATTACHMENT 7
(Sheet 2 of 3)

TECHNICAL DATA

Continued

Coating Material	Primer	Interm. Coat	Topcoat
Type:	_____	_____	_____
Product Numbers	_____	_____	_____
Batch Numbers (This Shift)	_____	_____	_____
Quantity Used, Gallons (This Shift)	_____	_____	_____
Reducer Used & Quantity (This Shift)	_____	_____	_____

Coating Equipment

Type Spray Gun Used _____ Fluid Tip _____ Air Cap _____

Paint Pot Pressure _____ Atomization Pressure _____

Were Traps & Separators Used? (Describe) _____

_____

Other Application Methods (Describe) _____

_____

Ventilating, Cooling and Heating Technique Used (Describe) _____

_____

Continued on Sheet 3

ATTACHMENT 7
(Sheet 3 of 3)

TECHNICAL DATA
Continued

Coating Application

Specified DFT, Mils: Primer 3 Interm. Coat N/A Topcoat 3

Measured DFT, Mils (Min. & Max.):

Primer _____ Intermediate Coat N/A Topcoat _____

Measuring Instrument Used (Describe) _____

Was Substrate Dry Before Applying Primer? _____

Time Between Coats: Specified _____ Actual _____

Was Each Previous Coat Dry Before Applying Subsequent Coat? _____

Coating Deviations	Primer	Interm. Coat	Topcoat
Any Imperfections Noted (Describe, including area location)			
Were All Areas of Low Film Build Recoated Satisfactorily?			

Remarks and Recommendations _____

_____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Painting Supt.
Document Control Center
Q.C. Department
Civil Engineering

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
	CCP-30	12	03/04/84	1 of 14

TITLE:

COATING STEEL SUBSTRATES INSIDE REACTOR BUILDING & RADIATION AREAS

OCN #1

ORIGINATOR: Mark Weller 3-3-84 Date

REVIEWED BY: N/C IPC III 5-5-84 B&R QA Date

N A Kinker 3/4/84 TUGCO QA Date

APPROVED BY: [illegible] for DCF 3-5-84 CONSTRUCTION PROJECT MGR Date

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FOR OFFICE AND ENGINEERING USE ONLY

DUE 8502210258

DUE TO EXTENSIVE REVISIONS CHANGE BARS HAVE BEEN OMITTED

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 1

Notice applicable to Construction Procedure No. 35-1195- CCP-30 Rev. 12.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following pages with the attached:

Page 8 of 14 and

page 13 of 14

Reviewed by:

Mark Wells 5/11/84
Originator Date

a/a TRC III 5-14-84
Brown & Root Quality Assurance Date

LMB
5-15-84
TUGCO Quality Assurance Date

Approved by:

G.C. Brooker 5-17-84
Construction Project Manager Date

5/17/84
Effective Date

1.0 INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements.

1.2 SCOPE

1.2.1 The scope of this pocedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating shall consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. To protect the prime coat from prolonged exposure, a "seal coat" consisting of approximately one mil DFT of Phenoline 305, thinned at 50% may be applied over the prime coat. Finish coating shall be applied when convenient.

In order to maintain traceability on protective coatings applied to shop coated steel cited for installation in the Reactor Building, these items shall be steel stamped with a unique coating code number. The code numbers shall be assigned by QC Paint and applied by craft personnel. Upon division of materials, this unique number will be transferred along with all other unique identifying numbers.

1.3.2 Vendor coated items shall have coating system verified for compliance to site specification prior to any additional coating or coating repair.

1.3.3 When there is a conflict between this procedure and Reference 5, the requirement of Reference 5 shall prevail.

2.0 SPECIAL ITEMS AND OPERATIONS

2.1 QUALIFICATION OF PERSONNEL

2.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the products as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the Brown & Root Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to a special coating procedure shall be qualified for that procedure.

2.2 SAFETY REQUIREMENTS

2.2.1 All appropriate health, safety, and fire protection requirements, pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Site Safety Department to establish the frequency of monitoring the coating work.

2.3 INSTRUMENTS AND THEIR USE

2.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include, such as but not limited to, surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

2.4 DOCUMENTATION

2.4.1 Records shall be maintained on Attachment 1 listed in Section 6.2. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

2.5 RECEIVING, STORAGE AND DISPENSING OF COATING MATERIALS

2.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure CP-CPM 8.1. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours are acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

2.5.2 Dispensing Material to the Field - Coating materials shall be transferred from the controlled area to a designated temporary storage area or area of intended use. Due to limited shelf-life of coating materials, this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the said container cannot be resealed and returned to "Q" storage area for later use. Containers opened and partially distributed from the "Q" paint storage area may be resealed and the remaining contents used for "Q" painting.

2.6 SPECIAL COATING PROCEDURE

2.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2. A log of all procedures of Attachment 2 shall be maintained. The following information shall be completed on each procedure.

2.6.1.1 Each procedure shall be given a unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project discipline Engineer (Mechanical, Civil, etc.,), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.0 PROCEDURE FOR SURFACE PREPARATION AND COATING

3.1 PREPARATION OF SUBSTRATES FOR PRIME COAT

3.1.1 Surface Preparation - If needed the surface to be primed shall be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning". Small amounts of grease or oil deposits may be removed by blast operations. Final blasting shall not begin unless the temperature of the surface to be blasted is 5°F or more above the dew point. The surface shall be cleaned by blasting to SSPC-SP-10, "Near White Blast" cleaning. Blasting operations shall be performed with blast abrasive which will achieve a minimum profile of 1 mil. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be recleaned before primer application. Generally a blast cleaned surface shall not be exposed for more than 8 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

b. Blasting using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from the edge of cleaned area and prime. When applying seal or finish coat on either of the above methods hold back approximately 12" - 18" from edge of primer.

3.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - if needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are sever enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All protrusions and peaks shall be ground to a rounded contour.

3.2 MIXING PRIMER

3.2.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen.

NOTE: Inorganic zinc primer shall be power mixed or "boxed" prior to use.

3.3 APPLICATION OF PRIME COAT

3.3.1 Prime Coat

Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. The primer shall be allowed to become tack free before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall be followed:

a. Normal conditions of ambient and surface temperature shall be 40° to 95°F and 40° to 110°F respectively. Primer may be applied within an ambient range of 0° to 130°F and a surface temperature of 0°F to 200°F. Normal thinning of Carbo Zinc 11 is 1½ pints per gallon. Application during other than normal conditions; Carbo Zinc 11 may be thinned up to 2 quarts per gallon .

b. Humidity values vary from 0 to 95% but Coating shall not be applied to a wet or damp surface.

c. Average thickness of prime coat shall range form .002" to .006".

d. A double regulated pot having an adequate air volume supply shall be used.

e. For spray application, as a guide, coating material may be applied using a 50% overlap with each pass while holding a gun 8 - 10 inches from the surface. Cross hatch application is permissible.

f. Cure time before topcoat shall be in accordance with Attachment 3 or the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel. (Minor amounts of zinc dust may be removed during cure verification; however, a burnished surface must be achieved). If required, the cure of Cabo Zinc 11 may be accelerated by the use of water spray; however, a minimum of one hour must elapse between application of coating and water spray. Below 25% relative humidity, water curing is recommended to obtain the desired cure. Water used for water curing shall have a pH factor from 5 to 9. Application of water spray for curing purposes may be as often as necessary to obtain the proper cure.

g. Primer application shall not begin unless the surface temperature is a minimum of 5°F above the Dew Point.

3.3.1A Viscosity shall be controlled by adding thinner, as required. Pot life of CZ11 shall be as shown in Attachment 4.

3.4 PREPARATION FOR FINISH COAT

3.4.1 Verify primer surface ready for finish coat.

3.4.1.1 If no primer defect exist, solvent wipe surface and allow solvent to flash off surface. Apply finish coat. Prime showing defects shall be repaired per 3.4.2 using conventional spray equipment or brush application per Note 2.

3.4.2 Primer Defects and Repair Methods

a. Sags or runs in excess of allowable coating thickness shall be abraded as required to bring the coating into acceptable limits. Sags or runs which are within the allowable thickness need not be repaired if there is no evidence of mudcracking.

b. Mudcracking is unacceptable and must be removed. After removal of mudcracking by blast, or power tooling, reprime the area. If the repaired area falls within minor defect critera or does not extend to metal substrate, topcoating may proceed.

c. Oil or grease shall be removed from inorganic zinc primer by solvent wiping then blast or power tool cleaning substrate.

d. High film thickness shall be removed by abrading to acceptable thickness.

e. Low film thickness shall be corrected by application of additional primer material to acceptable limit utilizing material thinned at two quarts per gallon.

f. Contamination as defined in Reference 5 shall be removed. (See Note 3.)

g. Treatment of Stains - Material causing stain shall be removed using bristle brush and water or Carboline Thinner #33. Area shall then be solvent wiped. Stains that remain on surface are acceptable as is. Allow the surface to dry thoroughly prior to further coating.

NOTE 1 Prior to recoating, the primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33.

NOTE 2 Brush touch-up painting shall be done on prime coat in accordance with the following:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

NOTE 3 For items primed with inorganic zinc, hand clean with 3-M "Scotch-brite" pads moistened with solvent such as xylol or Carbolines No. #33 or No. #305. Cleaning in this prescribed manner provides acceptable surface preparation for further coating applications.

3.5 MIXING OF FINISH COAT

3.5.1 The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner as required, but shall not exceed two quarts of thinner per gallon Phenoline 305. Pot life of Phenoline 305 is shown on Attachment 4.

3.6 FINISH COAT APPLICATION

3.6.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams, edges and other sharp geometrical discontinuities may receive an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit of Phenoline 305. To aid in continuity at edges, edges may be "striped" with Phenoline unthinned instead of the 50% mixture as stated above. In either "striping" or initial coating of edges, welds, etc., time should be allotted for the coating to harden sufficiently to maintain a "sealing" effect prior to continuing coating operations. The initial coating of edges, striping, etc., as stated above, shall be considered part of the total initial finish coating operation. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check may be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

a. The permissible range of surface and ambient temperature for application shall be 50° - 120° F. Temperature may rise above 120° F after material has become "tack free". Phenoline 305 may be thinned up to 2 quarts of Phenoline Thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix, i.e., usually advantageous to use more thinner at lower temperatures.

b. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

c. As a guide for spray application, coating material shall be applied using a 50% overlap with each pass while holding the gun 8 - 10 inches from the surface.

d. The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish shall not be applied unless the substrate temperature is 5°F or more above the dew point.

e. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature°F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 & above	2 days

f. Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above 75°F.

g. Tack free shall be defined as the extent of cure at which contaminants will not adhere to the coating.

h. The total coating system shall have an average dry film thickness range from .006" to .013". The finish coated system shall exhibit full "hiding" properties of the primer coat.

4.0 SYSTEM REPAIR AFTER FINAL TOP COAT

4.1 SURFACE PREPARATION

4.1.1 Substrate not Exposed - The surface shall be repaired by solvent wiping per SSPC-SP-1 followed by hand or power tool cleaning per SSPC-SP 2 or 3 to roughen surface. The area shall be solvent wiped to remove dust prior to coating application.

4.1.2 Substrate Exposed - The surface shall be solvent wiped per SSPC-SP-1. After solvent wiping, the surface shall be prepared by abrasive blast or power tool cleaning except when minor defects exist, hand tooling may be utilized. The cleanliness requirements shall be as defined in SSPC-SP10 "Near White Blast", unless on a weld or within 1 inch of a weld where the cleanliness requirements will be SSPC-SP6. In all cases a minimum profile of 1 mil shall be maintained.

NOTE: The 3-M Clean and Strip or the 60 grit or coarser flapper wheel properly used over previously blasted surfaces provide a 1 mil profile. Adjacent areas shall be roughened and tapered by hand or power tool a sufficient amount to ensure a smooth continous final coating system.

4.2 REPAIR PRIMER APPLICATION

4.2.1 For touch-up and repair areas, including major defects, primer may be applied utilizing material thinned up to 2 quarts of thinner per gallon. Allow sufficient time for solvent to "Flash off" prior to coating application.

NOTE: Brush touch-up utilizing inorganic zinc primer shall not exceed one square foot in area.

4.3 REPAIR FINISH APPLICATION

4.3.1 Remove any loose particles and solvent wipe. The area shall be coated with Phenoline 305 Thinner or Xylol. Allow sufficient time for solvent to "Flash off" prior to coating applicaiton. Apply finish coat to the area, including minor defects, as required. Finish coat applied over minor defects should be applied at a thickness sufficient to ensure a smooth transition to existing surrounding coatings.

4.4 DEFECTS AND REPAIRS

4.4.1 Runs and Sags - Runs and sags which have a DFT higher than that allowed per Section 3.6.1 h shall be repaired by abrading to bring coating to acceptable thickness.

4.4.2 Cracks or Mudcracking - Cracks shall be repaired by abrading to sound coating or substrate and recoat as necessary per 3.4.2 b.

4.4.3 Contamination - Contamination shall be removed by abrasion. If low film thickness results recoat as necessary.

4.4.4 Discontinuities, and Damaged Areas - Discontinuities and damaged areas shall be repaired by abrading and recoating as necessary.

4.4.5 Stains - Stains shall be solvent cleaned prior to any additional coating application.

4.4.6 Orange Peel - Moderate amount of orange peel is acceptable. If repair is necessary, abrade and recoat if required due to low film thickness.

4.4.7 Dry spray - Moderate amount adhering dry spray is acceptable in the finish coat. On primer, intermediate coats, or if necessary to recoat, dry spray is to be removed prior to additional coating being applied.

4.4.8 Low Film Thickness → Areas with low dry film thickness shall be repaired by applying additional coating.

NOTE: If coating removal is required from an area or item which has previously been coated in accordance with this procedure, shadows or tight residue of primer which may remain in the profile of the previously prepared substrate is acceptable. However, areas with residues of Carboline 191 Primer shall be recoated with Carboline 191 Primer. Areas with residues of inorganic zinc may be coated with either inorganic zinc or Carboline 191 Primer.

5.0 FINAL ACCEPTANCE

5.1 FINAL ACCEPTANCE INSPECTION

5.1.1 Final acceptance inspection may be performed after a minimum topcoat cure of 24 hours cure for recoat time as stated in section 3.6.1 e is satisfied.

Touch up of minor defects, as defined in section 6.1.1 of this procedure may be done at time of final inspection without later reinspection of the repair.

After final inspection and resolution of all discrepancies are completed the QC inspector shall document the final acceptance by completing and signing the final acceptance record. A copy will then be transmitted to the B&R Paint Superintendent as soon as possible after final acceptance is made.

5.2 HOLD POINTS

5.2.1 Onsite receipt of coating materials.

5.2.2 Substrates before and following surface preparation.

5.2.3 Mixing and preparation of coating material for application.

5.2.4 Film characteristics after drying and curing.

5.2.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

6.0 SUPPORTING INFORMATION

6.1 DEFINITIONS

6.1.1 Minor defect - Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length, and/or damaged area greater than ½" in width, but not to exceed 4 square inches in area either of which may extend to substrate.

6.1.2 Major defect - Major defects are defined as an area, either circular or linear, in which a ½" diameter circle can be completely inscribed at some point or along the entire length, and/or a damaged area which is greater than ½" in width and exceeds 4 square inches in area.

6.1.3 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 interfacing the interface of the coatings or systems shall be a maximum of approximately 1½ inch in width. Within the interface area, overlapping of any materials or systems is acceptable.

NOTE: When inorganic zinc is applied at an interface, the cured inorganic zinc shall be screened or abraded prior to application of next coat.

6.2 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

6.3 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner". Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instruction". October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", latest revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", latest revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", latest revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault (Orginal)

ATTACHMENT 2

"Q" Coating _____ Sheet ____ of _____
Procedure # _____
"Non Q" Coating _____ Rev. ____ Date ____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

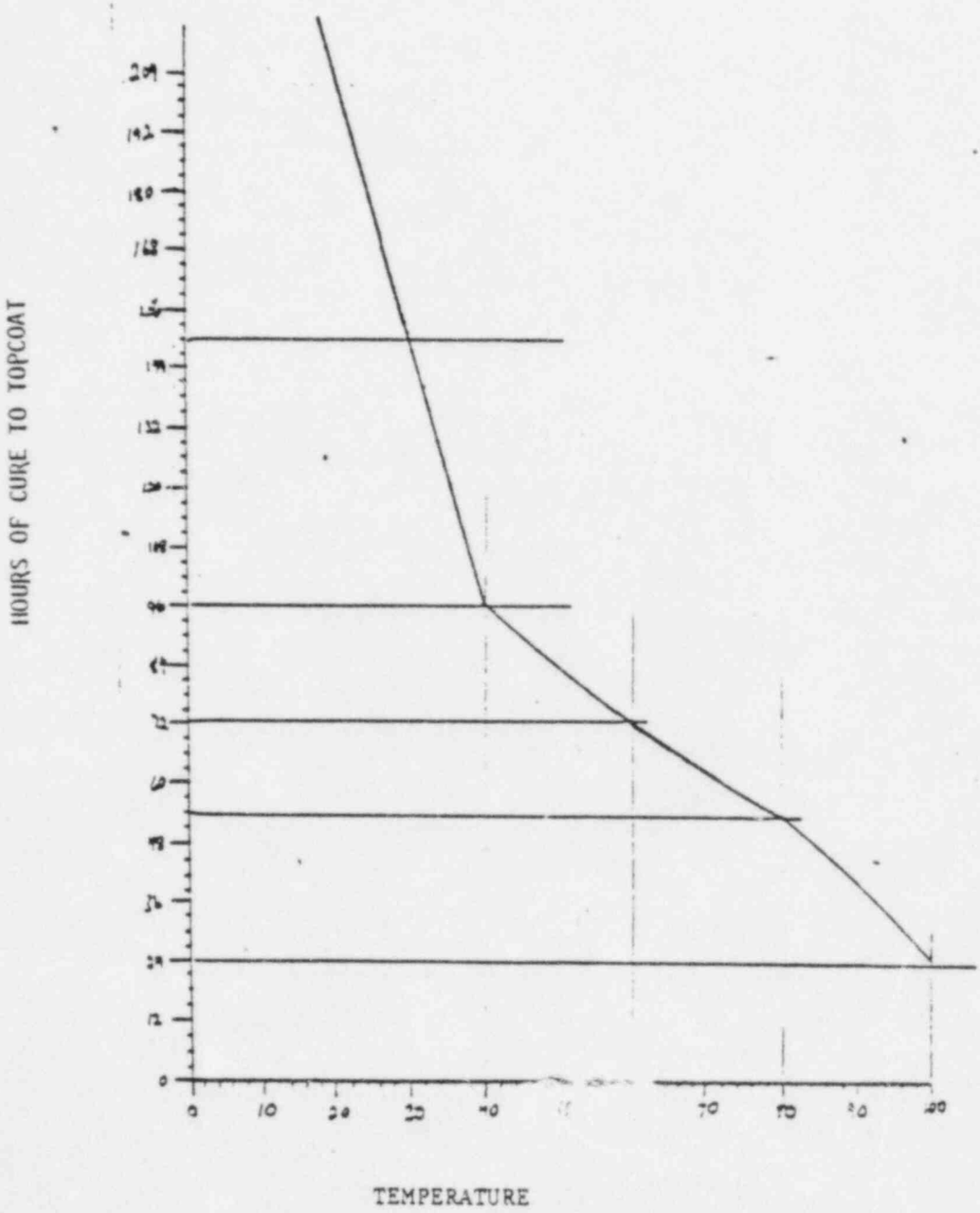
REFERENCE DOCUMENTS

ATTACHMENT 2
(Continued)

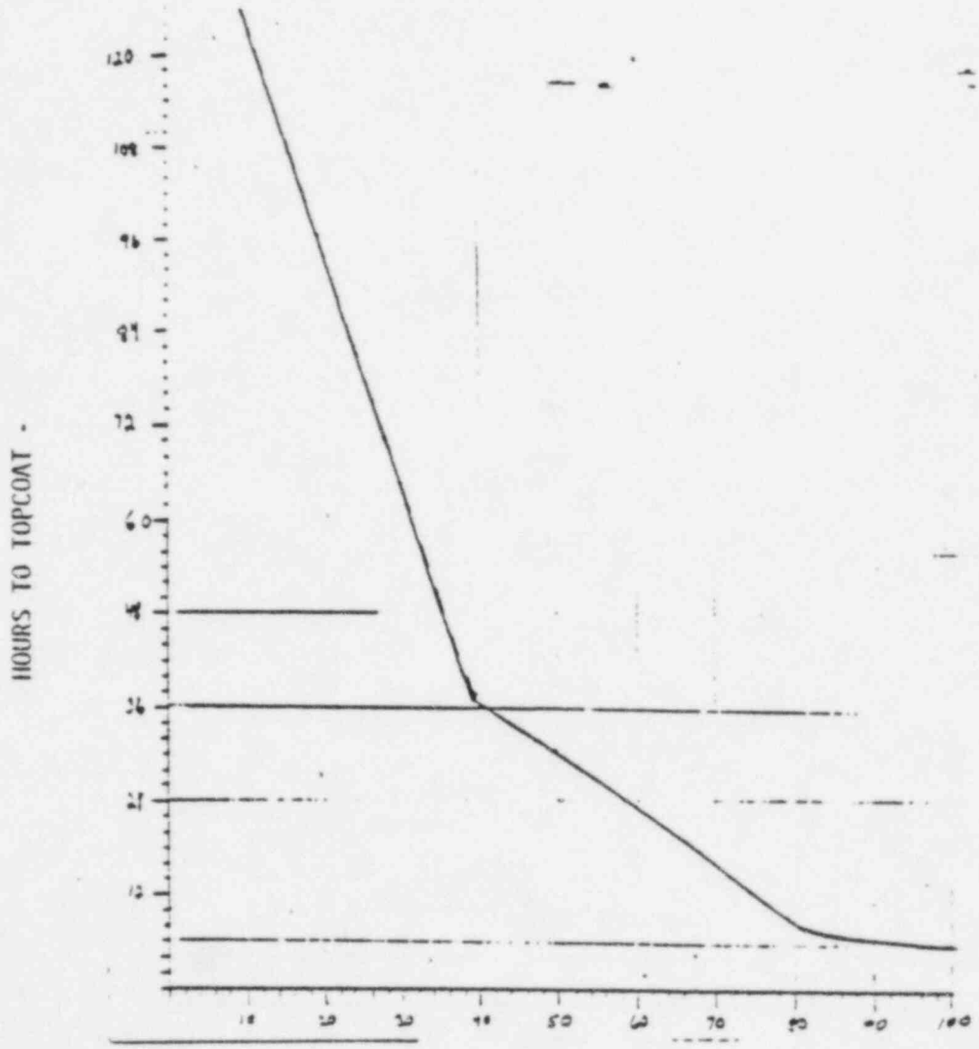
Sheet _____ of _____
Procedure # _____
Rev. ___ Date _____

REQUIREMENTS (Continued)

ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R. H.

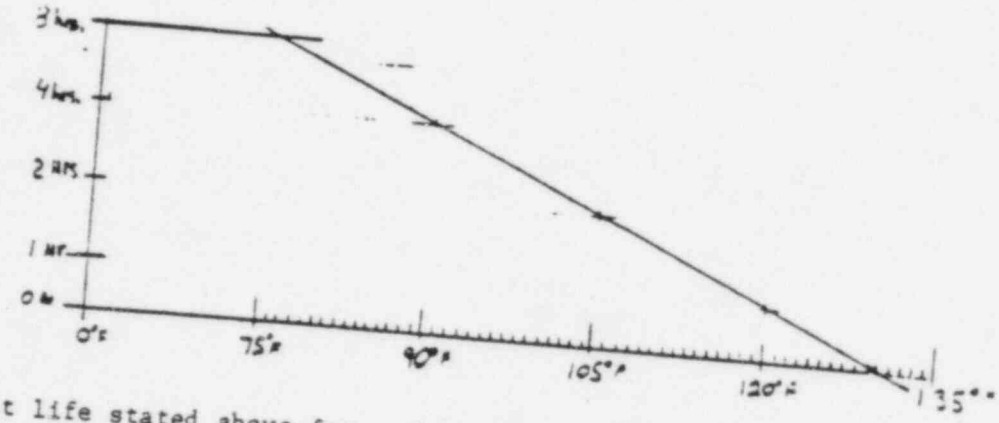


ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R. H.



ATTACHMENT 4
NORMAL POT LIFE - CZ-11

8 Hours Pot Life



Pot life stated above for unthinned coatings are the recommended times and should be utilized as a guideline for coating usage time, however, actual pot life may be longer. For unthinned coatings or coatings thinned 50% or less, actual pot life is determined by applicability of the coating.

POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50-54	10 hrs	24 hrs
55-59	7 hrs	24 hrs
60-64	4½ hrs	24 hrs
65-69	3½ hrs	24 hrs
70-74	2 hrs	24 hrs
75-79	1½ hrs	24 hrs
80-84	1½ hrs	24 hrs
85-89	1½ hrs	24 hrs
90-95	1 hrs	24 hrs

Pot life stated above for unthinned coatings are the recommended times and should be utilized as a guideline for coating usage time, however, actual pot life may be longer. For unthinned coatings or coatings thinned 50% or less, actual pot life is determined by the applicability of the coating.

d. High film thickness shall be removed by abrading to acceptable thickness.

e. Low film thickness shall be corrected by application of additional primer material to acceptable limit utilizing material thinned at two quarts per gallon.

f. Contamination shall be removed by abrading. Recoat if necessary.

g. Treatment of Stains - Material causing stain shall be removed using bristle brush and water or Carboline Thinner #33. Area shall then be solvent wiped. Stains that remain on surface are acceptable as is. Allow the surface to dry thoroughly prior to further coating.

NOTE 1 Prior to recoating, the primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33.

NOTE 2 Brush touch-up painting shall be done on prime coat in accordianc with the following:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

per DCN #1

VOID

3.5 MIXING OF FINISH COAT

3.5.1 The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner as required, but shall not exceed two quarts of thinner per gallon of Phenoline 305. Pot life of Phenoline 305 is shown on Attachment 4.

6.0 SUPPORTING INFORMATION

6.1 DEFINITIONS

6.1.1 Minor defect - Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length may extend to substrate.

6.1.2 Major defect - Major defects are defined as an area, either circular or linear, in which a ½" diameter circle can be completely inscribed at some point or along the entire length and which may extend to substrate.

6.1.3 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 interfacing the interface of the coatings or systems shall be a maximum of approximately 1½ inch in width. Within the interface area, overlapping of any materials or systems is acceptable.

NOTE: When inorganic zinc is applied at an interface, the cured inorganic zinc shall be screened or abraded prior to application of next coat.

6.2 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

VOID

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
JOB 35-1195	CCP-30	11	8/16/83	1 of 13

TITLE:

COATING STEEL SUBSTRATES INSIDE REACTOR BUILDING & RADIATION AREAS

OCN #1 #5
#2
#3
#4

ORIGINATOR: Mark Wells 8/16/83 DATE

REVIEWED BY: N/A T.A. Hornaty 8/16/83 B&R QA DATE

N. Buchner for C. Brent 8/16/83 TUGCO QA DATE

APPROVED BY G.B. Tanner 8-16-83 CONSTRUCTION PROJECT MANAGER DATE

VOID

VOID

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1.2 SCOPE
1.3 GENERAL DISCUSSION

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VOID

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 5

Notice applicable to Construction Procedure No. 35-1195- CCP-30 Rev. 11.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following pages with the attached:

Page 7 of 13

Page 9 of 13

Page 10 of 13

Attachment 1; Page 1 of 1

Reviewed by:

12/2/83
Originator Date

N/A Teresa Hamaty 12.1.83
Brown & Root Quality Assurance Date

12/5/83
TUGCO Quality Assurance Date
CT BRANDT

Approved by:

D.C. Trankum 12-6-83
Construction Project Manager Date

December 6, 1983
Effective Date

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 4

Notice applicable to Construction Procedure No. 35-1195- CCP-30 Rev. 11.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following pages with the attached:

Page 6 of 13

Page 9 of 13

Page 11 of 13

Reviewed by:

Originator — Date 11/8/83

N/A Teresa Hamaty — Brown & Root Quality Assurance — Date 11/7/83

Approved by:

TUGCO Quality Assurance — Date 11/8/83

Construction Project Manager — Date 11-8-83

Effective Date 11/8/83

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 3

Notice applicable to Construction Procedure No. 35-1195- CCP-30 Rev. 11.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following page with the attached:

Page 1 of 1; Attachment 4

Reviewed by:

Mark Weller 10/31/83
Originator Date

N/A Lorna Hamaty 10/31/83
Brown & Root Quality Assurance Date

Approved by:

M K Miles For 11/3/83
TUGCO Quality Assurance Date
C T BRANOT

E C Frankum 11-3-83
Construction Project Manager Date

November 3, 1983
Effective Date

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 2

Notice applicable to Construction Procedure No. 35-1195- CCP-30 Rev. 11.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following pages with the attached:

Page 5 of 13

Page 11 of 13

Page 12 of 13

Page 13 of 13

** Procedural changes on pages 5 and 11 only; pages 12 and 13 included to show paragraph movement only.

Reviewed by:

Mark Wells 10/13/83
Originator Date

N/A Lance Hamaty 10/13/83
Brown & Root Quality Assurance Date

10/18/83
TUGCO Quality Assurance Date

Approved by:

D.C. Trauchum 10/19/83
Construction Project Manager Date

October 19, 1983
Effective Date

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 1

Notice applicable to Construction Procedure No. 35-1195- CCP-30 Rev. 11.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following pages with the attached:

Page 12 of 13

Page 13 of 13

Attachment 4; Page 1 of 1

** Page 13 accompanies this DCN to show paragraphal movement only.

Reviewed by:

Mark Wells 9/21/83
Originator Date

N/A Louis Hamsty 9-21-83
Brown & Root Quality Assurance Date

Approved by:

M Richardson C T Beaudot 9/22/83
TUGCO Quality Assurance Date

9/27/83
Construction Project Manager Date

September 22, 1983
Effective Date

1.0 INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating shall consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. To protect the prime coat from prolonged exposure, a "seal coat" consisting of approximately one mil. of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Prior to finish coating, the seal coat shall be solvent wiped with Phenoline thinner or Xylol. Finish coating shall be applied when convenient prior to completion of the building or prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

In order to maintain traceability on protective coatings applied to shop coated steel cited for installation in the Reactor Building, these items shall be steel stamped with a unique coating code number. The code numbers shall be assigned by QC Paint and applied by craft personnel. Upon division of materials, this unique number will be transferred along with all other unique identifying numbers.

2.0 DEFINITIONS OF TERMS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

3.0 SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the products as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the Brown & Root Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements, pertaining to surface preparation and coating application, shall be followed. It shall be the responsibility of the Site Safety Department to establish the frequency of monitoring the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on Attachments 1 and 2 listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORAGE AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure CP-CPM 8.1. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours are acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed, in the field, it shall be transferred from the controlled area to a designated temporary storage area or area of intended use in the field. Due to limited shelf-life of coating materials, this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the said container cannot be resealed and returned to "Q" storage area for later use. Containers opened and partially distributed from the "Q" paint storage area may be resealed and the remaining contents used for "Q" painting. With the exception of thinners, the contents from partially used containers shall not be reused after a period of 7 days has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Site Coating Engineer. The following information shall be completed on each procedure.

3.6.2 Each procedure shall be given a unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat on vendor coated items other than pipe hanger support components, an adhesion test shall be perfromed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a nonconforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Final surface preparation shall not begin unless the temperatrue of the surface to be blasted and/or power tooled is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning". Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve a surface cleanliness equal to SSPC-SP-10, "near white" blast cleaning. Blasting operations shall be performed with blast abrasive which will achieve a minimum roughness of 1 mil. Typically, power tooling utilizing, but not limited to, 3M Clean-N-Strip, 80 grit or coaser Flapper Wheels or sanding discs, roto-peans, etc., may be used to achieve surface cleanliness equal to SSPC-SP-10. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be recleaned beform primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface whall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white meatal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All protrusions and peaks shall be ground to a rounded contour.

4.1.3 If coating removal is required from an area or item which has previously been coated in accordance with this procedure, shadows or tight residue of primer which may remain in the profile of the previously prepared substrate is acceptable. However, areas with residues of Carboline 191 Primer shall be recoatedwith Carboline 191 Primer. Areas with residues of inorganic zinc may be coated with either inorganic zinc or Carboline 191 Primer. It is not required that such areas meet the criteria of SSPC-SP10 or SSPC-SP6.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by the use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replaceing the primer. Power tool grinding and needle scaling should yield surface cleanliness equal to that of SSPC-SP-10 "near white" blast cleaning. Power tooled areas should be kept to a minimum however no size limitation is imposed providing acceptable surface cleanliness is achieved.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish shall not be applied unless the substrate temperature is 5°F or more above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen.

Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Carbo Zinc 11. Pot life of CZ11 shall be as shown in Attachment 4.

4.3.2 Finish Coat - The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner as required, but shall not exceed two quarts of thinner per gallon of Phenoline 305. Pot life of Phenoline 305 is shown on Attachment 4.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to become tack free before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 200°F. Carbo Zinc 11 may be thinned up to 1 quart per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

2. Humidity values vary from 0 to 95% however, coating shall not be applied to a wet or damp surface.

3. Average thickness of prime coat shall range form .002" to .006". Minimum and maximum spot check values shall be .0015" and .007" respectively.

4. A double regulated pot having an adequate air volume supply shall be used.

5. For spray application, as a guide, coating material may be applied using a 50% overlap with each pass while holding a gun 8 - 10 inches from the surface. Cross hatch application is permissible.

6. Cure time before topcoat shall be in accordance with Attachment 3 or the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel. (Minor amounts of zinc dust may be removed during cure verification, however, a burnished surface must be achieved). If required, the cure of Carbo Zinc 11 may be accelerated by the use of water spray, however, a minimum of one hour must elapse between application of coating and water spray. Below 25% relative humidity, water curing is recommended to obtain the desired cure. Water used for water curing shall have a pH factor from 5 to 9. Application of water spray for curing purposes may be as often as necessary to obtain the proper cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, if no major defects per section 4.4.2.9 are present, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noted on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline #33 per gallon mix. If required, this "50%" mixture is to be appled to achieve primer thickness as stated in Section 4.4.1.1 subparagraph 3.

4.4.1.3 Sags or runs in excess of allowable coating thickness shall be abraided as required to bring the coating into acceptable limits. Sags or runs which are withing the allowable thickness need not be repaired if there is no evidence of mudcracking. Mudcracking in sags or runs is unacceptable and must be removed. Remove mudcracking by blast, hand or power tooling, then reprime the area as required if damage is larger than "minor" defect. If the repaired area falls within minor defect critera or does not extend to metal substrate, topcoating may proceed without further recoating.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instruction (Carbo Zinc 11) Bulleting - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Contamination shall be removed by abrading, if low millage or "major" defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Stains - Remove loose residue, though not necessarily the stain with a bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly prior to further coating.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams, edges and other sharp geometrical discontinuities may receive an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit of Phenoline 305. To aid in continuity at edges, edges may be "striped" with Phenoline unthinned instead of the [illegible] misture as stated above. In either "striping" or initial coating of edges, welds, etc., time should be allotted forthe coating to harden sufficiently to maintian a "sealing" effect prior to continuing coating operations. The initial coating of edges striping, etc., as state above, shall be considered part of the total initial finish coating operation. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skps, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature for application shall be 50° - 120°F. Temperature may rise above 120°F after material has become "tack free". Phenoline 305 may be thinned up to 2 quarts of Phenoline Thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix, i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. For spray application, as a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8 - 10 inches from the surface.

4. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 and above	2 days

5. Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above 75°f.

6. Tack free shall be defined as the extent of cure at which foreigh contaminants will notadhere to the coating.

7. The total coating system shall have an average dry film thickness range from .006" to .013". Maximum spot check of total system shall not exceed .015:. The finish coated system shall exhibit full "hiding" properties of the primer coat.

4.4.2.2 Repair of Runs and Sags - Runs and sags which have DFT higher than that allowed per section 4.4.2.1 subparagraph 7, shall be repaired as required to bring the coating to acceptable thickness. If cracks are noted in the coating, the affected material shall be removed as required to "sound" coating or steel substrate. If removal or run or sag results in the requirement for additional material appliecation, apply primer and topcoat system if damage is classified as "major defect", and topcoat only if damage is "minor defect" or does not extend to substrate.

4.4.2.3 Repair of Contamination - Contamination shall be removed by abrasion. If low total system results from this removal, recoat the affected area as outlined in the repair of pinholes and discontinuities.

4.4.2.4 **Repair of Pinholes and Discontinuities** - Loose particles shall be removed by brushing or vacuum or compressed air. The affected area shall be solvent wiped with Phenoline 305 Thinner or Xylol. Pinholes and small discontinuities may be repair at the time of final inspection withour a later reinspection of the repair. If the reapir area required recoating, recoat the area with Phenoline 305 thinned 50%. Recoated areas require cure to final inspection time per section 4.5.1.

4.4.2.5 **Repair of Scratches and Damaged Areas** - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline thinner #33 for primer, Carboline Phenoline thinner or Xylol for topcoat) and repaird with appropriate

coating, i.e., Phenoline 305 if damage is considered a minor defect per section 4.4.2.8 and Carbo Zinc 11 and Phenoline 305 if damaged area is considered a major defect per section 4.4.2.9. All adges of existing coating around the perimeter of the cleaned area shall be "feathered" back a sufficient distance to ensure a smooth blend with existing coating. Thickness shall be as requried for the pertinent coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulleting 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If the finish coated surface is contaminated with rust stains or minute metallic particles, the surface shall be solvent wiped with Phenoline 305 Thinner or xylol. If recoating is required, recoat the area with Phenoline finish thinned as outlined in section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and clean any exposed steel to ensure contaminant free surface. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or bush Phenoline 305 finish at approximately 4 mil DFT over the damaged area. Overlap onto the surronding coating a sufficient amount ot insure a smooth and continuous topcoat system.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be bery thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be outline in section 4.1.1.

4.4.3.0 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 interfacing the interface of the coatings or systems shall be a maximum of approximately 1½ inch in width. Within the interface area, overlapping of any materials or systems is acceptable.

4.4.3.1 Cure of Minor Topcoat Repair - Minor defects, as defined in Section 4.4.2.8, which are noted in the topcoat and repaired, may be inspected for final acceptance after cure to recoat time as stated in Section 4.4.2.1(4) has been satisfied. Full cure to topcoat repairs shall be satisfied prior to placement into service.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 Final acceptance inspection may be performed after a minimum topcoat cure of 24 hours and cure for recoat time as stated in section 4.4.2.1 paragraph 4 is satisfied.

Touch up of minor defects, as described in section 4.4.2.8 of this procedure may be done at time of final inspection without later reinspection of the repair.

After final inspection and resolution of all discrepancies are completed the QC inspector shall document the final acceptance by completing and signing the final acceptance record. A copy will then be transmitted to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite reciept of coating matierials.

4.6.2 Substrates before and following surface preparation

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305
5. Coatings Verification Record

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", latest revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instruction", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", latest revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", latest revision

7. Gibbs & Hill Specificaiton 2323-MS-43B, "Nuclear Piping", latest revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", latest revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

Experience with Following Product Types _____

Application Test for Specified Substrate _____

Additional Qualifications (School) _____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault (Original)

"Q" Coating _____ ATTACHMENT 2 Sheet ____ of _____

Procedure # _____

"Non-Q" Coating _____ Rev. _____ Date _____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUCI _____

ENGINEER _____

REV. _____ DATE _____

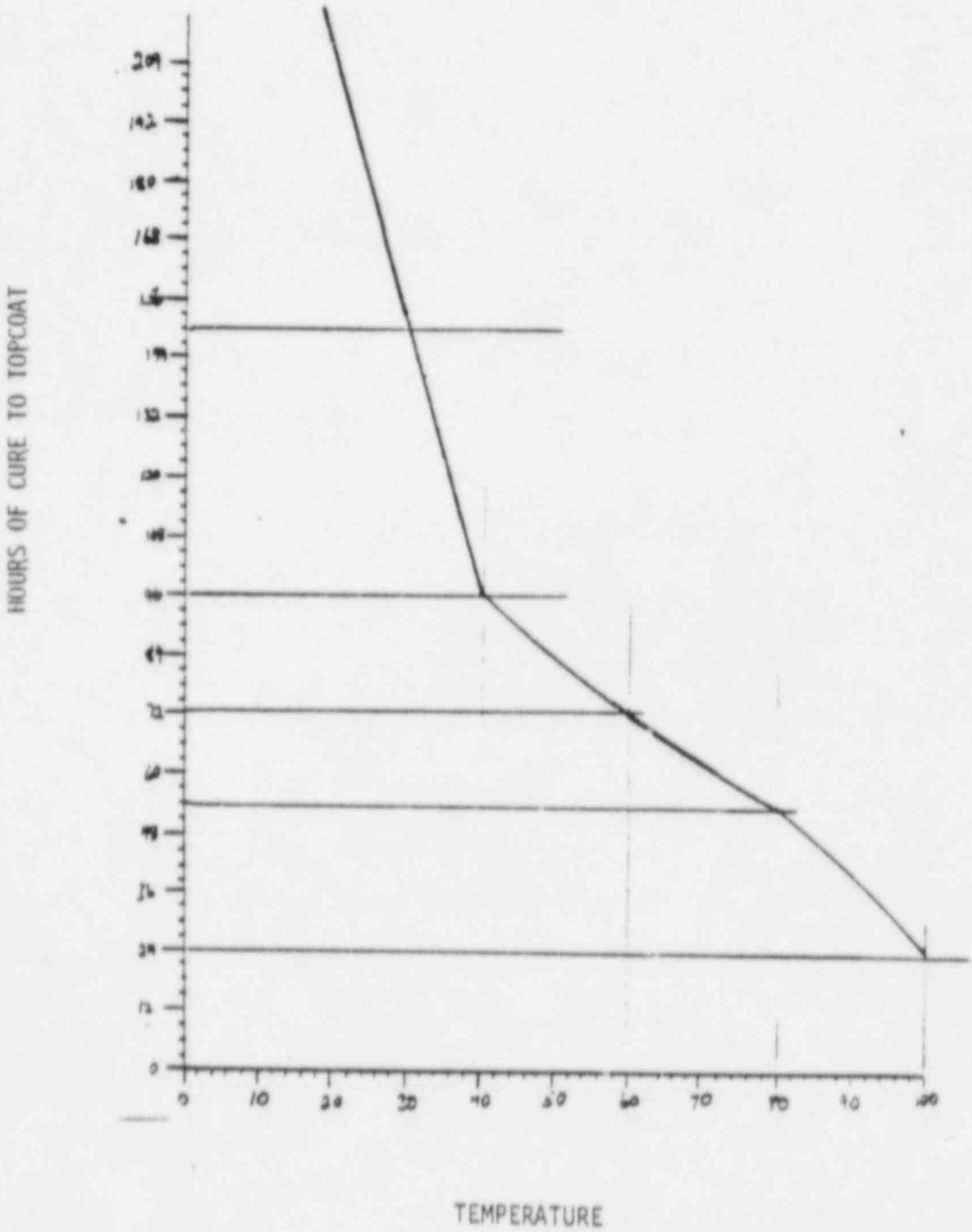
Sheet ____ of ____

ATTACHMENT 2 (Continued) Procedure # _____

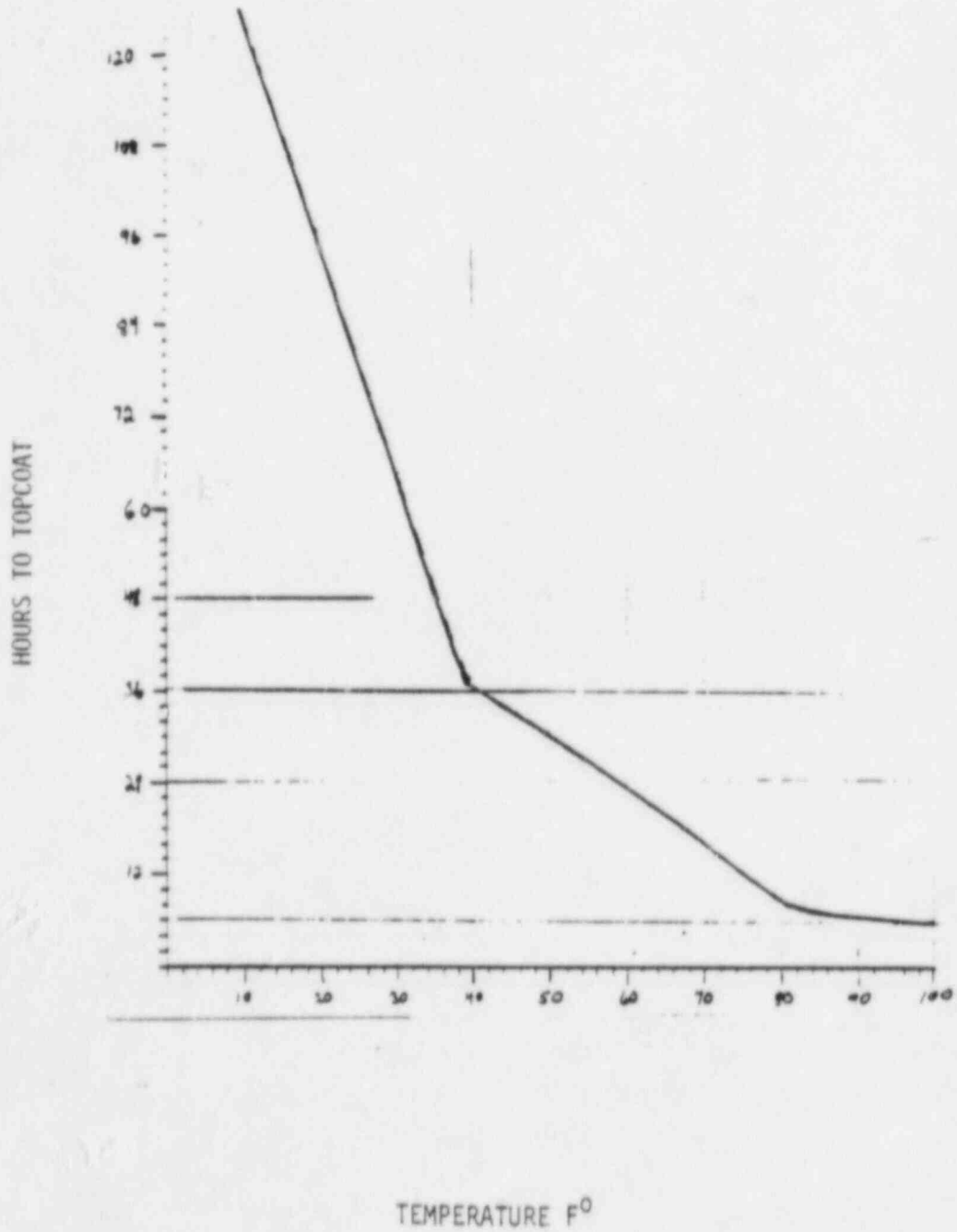
Rev. _____ Date _____

REQUIREMENTS (Continued)

Attachment 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R. H.



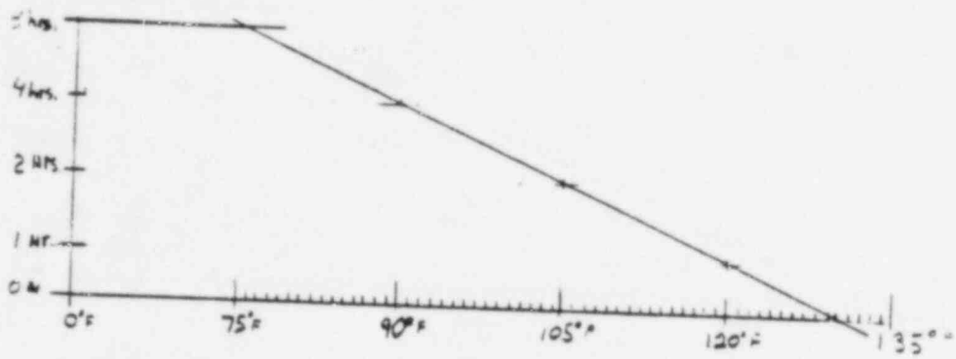
ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R.H.



ATTACHMENT 4

NORMAL POT LIFE - CZ 11

8 Hours Pot Life



Pot life stated above for unthinned coatings are the recommended times and should be utilized as a guideline for coating usage time, however, actual pot life may be longer. For unthinned coatings or coatings thinned 50% or less, actual pot life is determined by applicability of the coating.

POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50-54	10 hrs	24 hrs
55-59	7 hrs	24 hrs
60-64	4½ hrs	24 hrs
65-69	3½ hrs	24 hrs
70-74	2 hrs	24 hrs
75-79	1½ hrs	24 hrs
80-84	1½ hrs	24 hrs
85-89	1½ hrs	24 hrs
90-95	1 hrs	24 hrs

Pot life stated above for unthinned coatings are the recommended times and should be utilized as a guideline for coating usage time, however, actual pot life may be longer. For unthinned coatings or coatings thinned 50% or less, actual pot life is determined by the applicability of the coating.

Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Carbo Zinc 11. Pot life of CZ11 shall be as shown in Attachment 4.

4.3.2 Finish Coat - The finish coat, Phenoline 305, is packaged in a two component kit consiting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ration by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner as required, but shall not exceed two quarts of thinner per gallon of Phenoline 305. Pot life of Phenoline 305 sishown on Attachment 4.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a miximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to become tack free before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application prarmeters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 200°F. Carbo Zinc 11 may be thinned up to 1 quarts per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

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

3. Average thickness of prime coat shall range from .002" to .006". Minimum and maximum spot check values shall be .0015" and .007" respectively.

4. A double regulated pot having an adequate air volume supply shall be used.

5. For spray application, as a guide, coating material may be aplied using a 50% overlap with each pass while holding a gun 8-10 inches from the surface. Cross hatch application is permissible.

Per OCN #5

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or "major" defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Stains - Remove loose residue, though not necessarily the stain with a bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly prior to further coating.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams, edges and other sharp geometrical discontinuities may receive an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit of Phenoline 305. To aid in continuity at edges, edges may be "striped" with Phenoline unthinned instead of the 50% mixture as stated above. In either "striping" or initial coating of edges, welds, etc., time should be allotted for the coating to harden sufficiently to maintain a "sealing" effect prior to continuing coating operations. The initial coating of edges, striping, etc., as stated above, shall be considered part of the total initial finish coating operation. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. a continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

per DCN #5

VOID

1. The permissible range of surface and ambient temperature for application shall be 50° - 120°F. Temperature may rise above 120°F after material has become "tack free". Phenoline 305 may be thinned up to 2 quarts of Phenoline Thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix, i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. For spray application, as a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

4. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 and above	2 days

5. Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above 75°F.

6. Tack free shall be defined as the extent of cure at which foreign contaminants will not adhere to the coating.

7. The total coating system shall have an average dry film thickness range from .006" to .013". Maximum spot check of total system shall not exceed .015". The finish coated system shall exhibit full "hiding" properties of the primer coat.

per DCN #5

VOID

4.4.2.2 Repair of Runs and Sags - Runs and sags which have DFT higher than that allowed per section 4.4.2.1 subparagrpah 7, shall be repaird as required to bring the coating to acceptable thickness. If cracks are noted in the coating, the affected material shall be removed as required to "sound" coating or steel substrate. If removal or run or sag results in the requirement for additional material application, apply primer and topcoat system if damage is classified as "major defect", and topcoat only if damage is "minor defect" or does not extend to substrate.

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrasion. If low total system results from this removal, recoat the affected area as outlined in the repair of pinholes and discontinuities.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum or compressed air. The affected area shall be solvent wiped with Phenoline 305 Thinner or xylol. Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. If the repair area requires recoating, recoat the area with Phenoline 305 thinned 50%. Recoated areas require cure to final inspection time per section 4.5.1.

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches of damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline thinner #33 for primer, Carboline Phenoline thinner or xylol for topcoat) and repaired with appropriate

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
JOB 35-1195	CCP-30	11	8/16/83	1 of 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

per DCN #5

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

VOID

Experience with Following Product Types _____

Application Test for Specified Substrate _____

Additional Qualifications (School) _____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault (Original)

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All protrusions and peaks shall be ground to a rounded contour.

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

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by the use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replaceing the primer. Power tool grinding and needle scaling should yield surface cleanliness equal to that of SSPC-SP-10 "near white" blast cleaning. Power tooled areas should be kept to a minimum however no size limitation is imposed providing acceptable surface cleanliness is achieved.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish shall not be applied unless the substrate temperature is 5°F or more above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen.

VOID per DCN #4

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or "major" defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove loose residue, though not necessarily the stain with a bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly prior to further coating.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams, edges and other sharp geometrical discontinuities may receive an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit of Phenoline 305. To aid in continuity at edges, edges may be "striped" with Phenoline unthinned instead of the 50% mixture as stated above. In either "striping" or initial coating of edges, welds, etc., time should be allotted for the coating to harden sufficiently to maintain a "sealing" effect prior to continuing coating operations. The initial coating of edges, striping, etc., as stated above, shall be considered part of the total initial finish coating operation. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. a continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature for application shall be 50° - 120°F. Temperature may rise above 120°F after material has become "tack free". Phenoline 305 may be thinned up to 2 quarts of Phenoline Thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix, i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. For spray application, as a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

VOID per Ocn #4

coating, i.e., Phenoline 305 if damage is considered a minor defect per section 4.4.2.8 and Carbo Zinc 11 and Phenoline 305 if damaged area is considered a major defect per section 4.4.2.9. All adges of existing coating around the perimeter of the cleaned area shall be "feathered" back a sufficient distance to ensure a smooth blend with existing coating. Thickness shall be as requried for the pertinent coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulleting 473. Brush touch-up and complete application is allowed with no area restrictions.

per DCN#4

4.4.2.7 Treatment of Rust Stains - If the finish coated surface is contaminated with rust stains or minute metallic particles, the surface shall be solvent wiped with Phenoline 305 Thinner or xylol. If recoating is required, recoat the area with Phenoline finish thinned as outlined in section 4.4.2.4.

VOID

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and clean any exposed steel to ensure contaminant free surface. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or bush Phenoline 305 finish at approximately 4 mil DFT over the damaged area. Overlap onto the surronding coating a sufficient amount ot insure a smooth and continuous topcoat system.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be bery thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be outline in section 4.1.1.

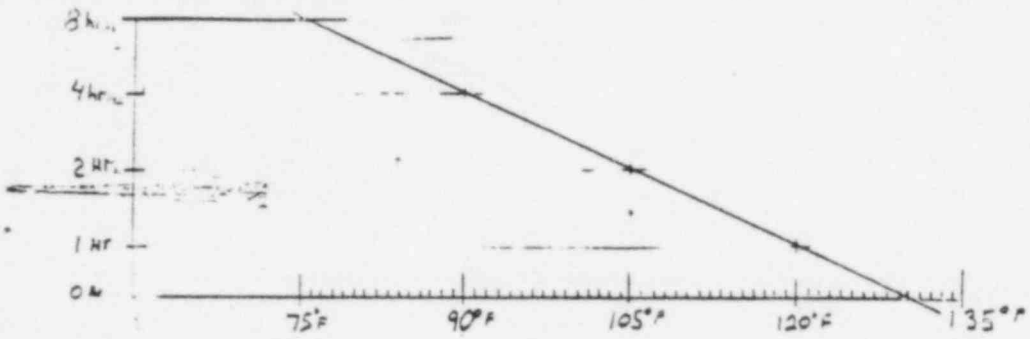
4.4.3.0 Coating Interface - At coating interface for finish and/or primer coat, the existing coating shall be "feathered back" a sufficient distance to ensure a smooth final coating system. When performing coating interfacing the interface of the coatings or systems shall be a maximum of approximately 1½ inch in width.

ATTACHMENT 4

NORMAL POT LIFE - CZ 11

8 Hours Pot Life

VOID per DCN# 3



Pot li[illegible] [illegible]tated above for unthinned coatings are the recommended times a[illegible] [illegible]hould be utilized as a guideline for coating usage time, however [illegible]tual pot life may be longer. For unthinned coatings or coating[illegible] [illegible]inned less than 50%, actual pot life is determined by applica[illegible]ity of the coating.

POT LIFE PHENOLINE 305

TEMPERAT[illegible]RE (°F)	UNTHINNED	THINNED-50%
50-[illegible]4	10 hrs	24 hrs
55-[illegible]9	7 hrs	24 hrs
60-[illegible]4	4½ hrs	24 hrs
65-69	3½ hrs	24 hrs
70-74	2 hrs	24 hrs
75-79	1½ hrs	24 hrs
80-8[illegible]	1½ hrs	24 hrs
85-8[illegible]	1½ hrs	24 hrs
90-9[illegible]	1 hrs	24 hrs

Pot life s[illegible]ated above for unthinned coatings are the recommended times and [illegible]hould be utilized as a guideline for coating usage time, however, a[illegible]tual pot life may be longer. For unthinned coatings or coatings t[illegible]inned less than 50%, actual pot life is determined by the applica[illegible]ility of the coating.

3.7 TOUCH-UP FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat on vendor coated items other than pipe hanger support components, an adhesion test shall be perfromed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a nonconforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Final surface preparation shall not begin unless the temperatrue of the surface to be blasted and/or power tooled is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning".

Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve a surface cleanliness equal to SSPC-SP-10, "near white" blast cleaning. Typically, power tooling utilizing, but not limited to, 3M Clean-N-Strip, 80 grit or coaser Flapper Wheels or sanding discs, roto-peans, etc., may be used to achieve surface cleanliness equal to SSPC-SP-10. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be re-cleaned beform primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface whall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white meatal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

coating, i.e., Phenoline 305 if damage is considered a minor defect per section 4.4.2.8 and Carbo Zinc 11 and Phenoline 305 if damaged area is considered a major defect per section 4.4.2.9. All adges of existing coating around the perimeter of the cleaned area shall be "feathered" back a sufficient distance to ensure a smooth blend with existing coating. Thickness shall be as requried for the pertinent coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulleting 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If the finish coated surface is contaminated with rust stains or minute metallic particles, the surface shall be solvent wiped with Phenoline 305 Thinner or xylol. If recoating is required, recoat the area with Phenoline finish thinned as outlined in section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and clean any exposed steel to ensure contaminant free surface. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or bush Phenoline 305 finish at approximately 4 mil DFT over the damaged area. Overlap onto the surronding coating a sufficient amount ot insure a smooth and continuous topcoat system.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be bery thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be outline in section 4.1.1.

4.4.3.0 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 sytem. When interfacing the 305/CZ11 systems with other coating systems, the interface of the two systems shall be a maximum of approximately 1½ in width.

4.4.3.1 Cure of Minor Topcoat Repair - Minor defects, as defined in Section 4.4.2.8, which are noted in the topcoat and repaired, may be inspected for final acceptance after cure to recoat time as stated in Section 4.4.2.1(4) has been satisfied. Full cure to topcoat repairs shall be satisfied prior to placement into service.

VOID

4.5 FINAL ACCEPTANCE TESTING

4.5.1 Final acceptance inspection may be performed after a minimum topcoat cure of 24 hours and cure for recoat time as stated in section 4.4.2.1 paragraph 4 is satisfied.

Touch up of minor defects, as described in section 4.4.2.8 of this procedure may be done at time of final inspection without later reinspection of the repair.

After final inspection and resolution of all discrepancies are completed the QC inspector shall document the final acceptance by completing and signing the final acceptance record. A copy will then be transmitted to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite reciept of coating matierials.

4.6.2 Substrates before and following surface preparation

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305
5. Coatings Verification Record

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", latest revision

2. Steel Structures Paint Council, Volume 2, Second Edition

4.5 FINAL ACCEPTANCE TESTING

4.5.1 Final acceptance inspectinon may be performed after a minimum topcoat cure of 24 hours and cure for recoat time as stated in section 4.4.2.1 paragraph 4 is satisfied.

After final inspection and resolution of all discrepancies are completed the QC inspector shall document the final acceptance by completing and signing the final acceptance record. A copy will then be transmitted to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

VOID

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instruction", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

per DCN #4

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100 "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

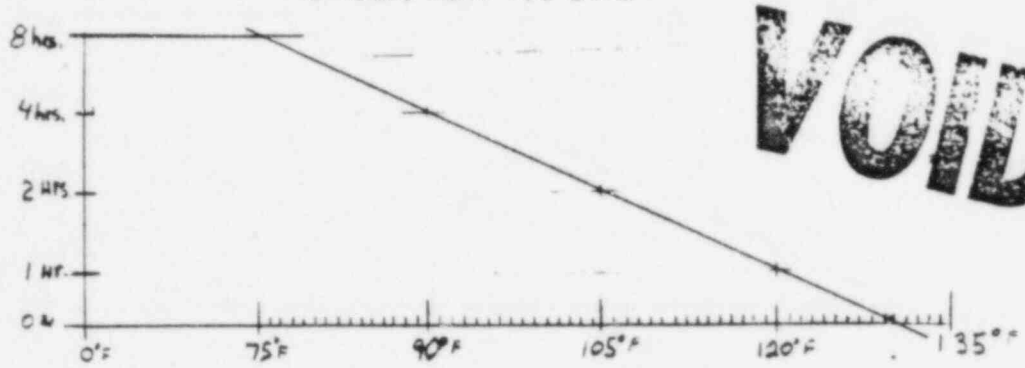
per DCN #7

VOID

ATTACHMENT 4

POT LIFE - CZ 11

8 Hours Max. Pot Life



VOID

VOID per DCN #7

POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50 - 54	10 hrs	24 hrs
55 - 59	7 hrs	24 hrs
60 - 64	4½ hrs	24 hrs
65 - 69	3¼ hrs	24 hrs
70 - 74	2 hrs	24 hrs
75 - 79	1½ hrs	24 hrs
80 - 84	1½ hrs	24 hrs
85 - 89	1½ hrs	24 hrs
90 - 95	1 hr	24 hrs

Pot life for coatings thinned up to but not including max. amount of thinner allowed, use pot life for unthinned material.

For spray application, pot life as stated above is recommended maximum times and should be utilized for a basis for coating usage time; however, actual pot life may be longer. If coating when temperature is above 95°F, or if pot life as stated above has been exceeded, the actual pot life ends when proper atomization and spraying becomes difficult and the coating loses body and begins to sag. When utilizing other than spray application methods, pot life shall be as stated in the above table.

ARMS INDEXED

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
JOB 35-1195	CCP-30	10	1/26/82	1 of 13

TITLE:

COATING STEEL SUB-STRATES INSIDE REACTOR BUILDING AND RADIATION AREAS

ORIGINATOR: Mark Wilkie 1-23-82 DATE

REVIEWED BY: [illegible] 1-25-82 DATE
B&R QA

R. C. Cummings Jr. 1-25-82 DATE
TUGCO QA

APPROVED BY Charles Norwood 1-26-82 DATE
CONSTRUCTION PROJECT MANAGER

DCN #1
DCN #2
DCN #3
DCN #4
DCN #5
DCN #6
#7

VOID

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1.2 SCOPE
1.3 GENERAL DISCUSSION

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3.2 SAFETY REQUIREMENTS
3.3 INSTRUMENTS AND THEIR USE
3.4 DOCUMENTATION
3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS
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4.0 PROCEDURE FOR COATING
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VOID

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 7

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Please replace the following pages with the attached:

Page 10 of 13
Page 12 of 13

Reviewed by:

Mark Weller 6/10/83
Originator Date

N/A
Brown & Root Quality Assurance Date

Reviewed by:

for RCSCOTT 6/11/83
TUGCO Quality Assurance Date

Approved by:

D.C. Franklin 6-11-83
Construction Project Manager Date

6-11-83
Effective Date

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 6

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following pages with the attached:

Page 8 of 13
Attachment 3 Page 1 of 2
Attachment 3 Page 2 of 2

Reviewed by:

Mark Wells 4/29/83
Originator Date

N/A Robert H. Erwin 4-29-83
Brown & Root Quality Assurance Date

Reviewed by:

4/29/83
TUGCO Quality Assurance Date

Approved by:

D.C. Trenkum 4-29-83
Construction Project Manager Date

April 29, 1983
Effective Date

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 5

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10 .

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following page with the attached:

Page 11 of 13

Reason for change: Additional requirement.

Reviewed by:

Originator — Date: 1-11-83

Brown & Root Quality Assurance — Date: 1-12-83

Reviewed by:

TUGCO Quality Assurance — Date: 1/14/83

Approved by:

Construction Project Manager — Date: 1-17-83

Effective Date: 1/17/83

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 4

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following page with the attached:

Page 11 of 13

Reason for change: Change in requirement.

Mark Wells 12-17-82
Originator Date

Reviewed by: NA
Brown & Root Quality Assurance Date

Reviewed by: 12/21/82
TUGCO Quality Assurance Date

Approved by:

D.O. Drachenberg 12/22/82
Construction Project Manager Date

12/21/82
Effective Date

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 3

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following pages with the attached:

Page 11 of 13
Page 12 of 13
Page 1 of 1 Attachment 4

Reason for change: Additional requirements

Reviewed by:

Originator Date 9/14/82

Brown & Root Quality Assurance Date

Reviewed by:

TUGCO Quality Assurance Date 9/20/82

Approved by:

Construction Project Manager Date 9-20-82

Effective Date 9/21/82

ARMS
INDEXED

JOB 35-1195
Comanche Peak Steam Electric Station

DATE

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 2

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following page with the attached:

Page 6 of 13

Reason for change: Additional requirement

Reviewed by:

Mark Wells 5/10/82
Originator Date

Brown & Root Quality Assurance Date

Reviewed by:

5/10/82
TUGCO Quality Assurance Date

Approved by:

D. Franklin 5-10-82
Construction Project Manager Date

5/11/82
Effective Date

ARMS
INDEXED

DATE

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 1

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 10.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following page with the attached:

Page 5 of 13

Reason for change: Additional requirements

Reviewed by:

Originator — Date 2-16-82

Brown & Root Quality Assurance — Date N/A 2/16/82

Reviewed by:

TUGCO Quality Assurance — Date 2/17/82

Approved by:

Construction Project Manager — Date 2-17-82

Effective Date 2/17/82

1.0 INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating shall consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. To protect the prime coat from prolonged exposure, a "seal coat" consisting of approximately one mil. of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Prior to finish coating, the seal coat shall be solvent wiped with Phenoline thinner or Xylol. Finish coating shall be applied when convenient prior to completion of the building or prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

In order to maintain traceability on protective coatings applied to shop coated steel cited for installation in the Reactor Building, these items shall be steel stamped with a unique coating code number. The code numbers shall be assigned by QC Paint and applied by craft personnel. Upon division of materials, this unique number will be transferred along with all other unique identifying numbers.

2.0 DEFINITIONS OF TERMS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

3.0 SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the products as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the Brown & Root Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements, pertaining to surface preparation and coating application, shall be followed. It shall be the responsibility of the Site Safety Department to establish the frequency of monitoring the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on Attachments 1 and 2 listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORAGE AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure CP-CPM 8.1. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours are acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed, in the field, it shall be transferred from the controlled area to a designated temporary storage area or area of intended use in the field. Due to limited shelf-life of coating materials, this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the said container cannot be resealed and returned to "Q" storage area for later use. Containers opened and partially distributed from the "Q" paint storage area may be resealed and the remaining contents used for "Q" painting. With the exception of thinners, the contents from partially used containers shall not be reused after a period of 7 days has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Site Coating Engineer. The following information shall be completed on each procedure.

3.6.2 Each procedure shall be given a unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat on vendor coated items other than pipe hanger support components, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a nonconforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Final surface preparation shall not begin unless the temperature of the surface to be blasted and/or power tooled is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning".

Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve an equivalent of SSPC-SP10-63, "near white" blast cleaning. Although 1-3 mil. surface profile is preferred, a minimum of 1 mil. profile is required. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be re-cleaned before primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All protrusions and peaks shall be ground to a rounded contour.

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

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by the use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be equivalent to a near white blast SP-10 specification with no size limitation as long as the millage requirements are obtained.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish coat shall be applied unless the substrate temperature is more than 5°F above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Carbo Zinc 11. Pot life of CZ 11 shall be as shown in Attachment 4.

4.3.2 Finish Coat - The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Phenoline 305. Pot life of Phenoline 305 shall be shown on Attachment 4.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to become tack free before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The foll[illegible] application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temparature range of 0° - 200°F. Carbo-Zinc 11 may be thinned up to 2 quarts per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

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

3. Thickness of prime coat shall have a minimum dry film thickness of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regulated pot having an adequate air volume supply shall be used.

5. As a guide, coating material may be applied using a 50% overlap with each pass while holding a gun 8-10 inches from the surface. Cross hatch application is permissible.

6. Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickle. (Minor amounts of zinc dust may be removed during cure verification, however, a burnished surface must be achieved). Attachment 3 may be utilized as general guidelines for cure to topcoat time of CZ-11 above 25% relative humidity. If required, the cure of carbo zinc II may be accelerated by the use of water spray, however, a minimum of one hour must elapse between application of coating and water spray. Below 25% relative humidity, water curing is recommended to obtain the desired cure. Water utilized in conjunction with water curing shall have a PH factor from 5 to 9. Application of water spray for curing purposes maybe as often as necessary to obtain the proper cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, if no major defects per section 4.4.2.9 are present, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline NO. 33 per gallon mix. This will be applied to achieve a 2.0 - 4.5 mils total DFT. Only two recoats may be applied. Special attention should be given to spray application and dry film thickness when using a 50% mix. The primed surface shall not be recoated until cured per section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be adraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams, edges and other sharp geometrical discontinuities may receive an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit of Phenoline 305. To aid in continuity at edges, edges may be "striped" with Phenoline unthinned instead of the 50% mixture as stated above. In either "striping" or initial coating of edges, welds, etc., time should be allotted for the coating to harden sufficiently to maintain a "sealing" effect prior to continuing coating operations. The initial coating of edges, striping, etc., as stated above, shall be considered part of the total initial finish coating operation. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature for application shall be 50° - 120°F. Temperature may rise above 120°F after material has become "tack free". Phenoline 305 may be thinned up to 2 quarts of Phenoline Thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix, i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

4. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 and above	2 days

5. Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above 75°F.

6. Tack free shall be defined as the extent of cure at which foreign contaminants will not adhere to the coating.

7. The total coating system shall have a dry film thickness range of 7 to 11 mils, with a minimum spot check of 7 mils and a maximum spot check of 11.5 mils.

4.4.2.2 Repair of Runs and Sags - Runs and sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until cure times stated in Section 4.4.2.1(4) have been satisfied.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum r compressed air. The affected area shall be solvent wiped with Phenoline 305 Thinner or xylol. Pinholes and small discontinuities may be repaired at the time of final inspection without a later reinspection of the repair. If the repair area requires recoating, recoat the area with Phenoline 305 thinned 50%. Recoated areas require cure to final inspection time per section 4.5.1.

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area shall then be solvent wiped (Carboline thinner #33 for primer, Carboline Phenoline thinner or xylol for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage is considered a minor defect per section 4.4.2.8 and Carbo Zinc 11 and Phenoline 305 if damaged area is considered a major defect per section 4.4.2.9. All edges of existing coating around the perimeter of the cleaned area shall be "feathered" back a sufficient distance ot ensure a smooth blend with existing coating. Thickness shall be as required for the pertinent coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner or xylol and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and clean any exposed steel to ensure contaminant free surface. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or brush Phenoline 305 finish at approximately 4 mil DFT over the damaged area. Overlap onto the surrounding coating a sufficient amount to insure a smooth and continuous topcoat system.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.4.3.0 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 sytem. When interfacing the 305/CZ11 system and the 305/D6 system, the interface of the two primers shall be no greater than 1½" in width.

4.4.3.1 Cure of Minor Topcoat Repair - Minor defects, as defined in Section 4.4.2.8, which are noted in the topcoat and repaired, may be inspected for final acceptance after cure to recoat time as stated in Section 4.4.2.1(4) has been satisfied. Full cure to topcoat repairs shall be satisfied prior to placement into service.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 Final acceptance inspection may be performed after a minimum topcoat cure of 24 hours and cure for recoat time as state in section 4.4.2.1 paragraph 4 is satisfied.

After final inspection and resolution of all discrepancies are completed the QC inspector shall document the final acceptance by completing and signing the final acceptance record. A copy will then be transmitted to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instruction", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault (Original)

"Q" Coating _____ ATTACHMENT 2 Sheet ____of_____

Procedure # _____

"Non-Q" Coating _____ Rev. _____Date_____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____DATE_____

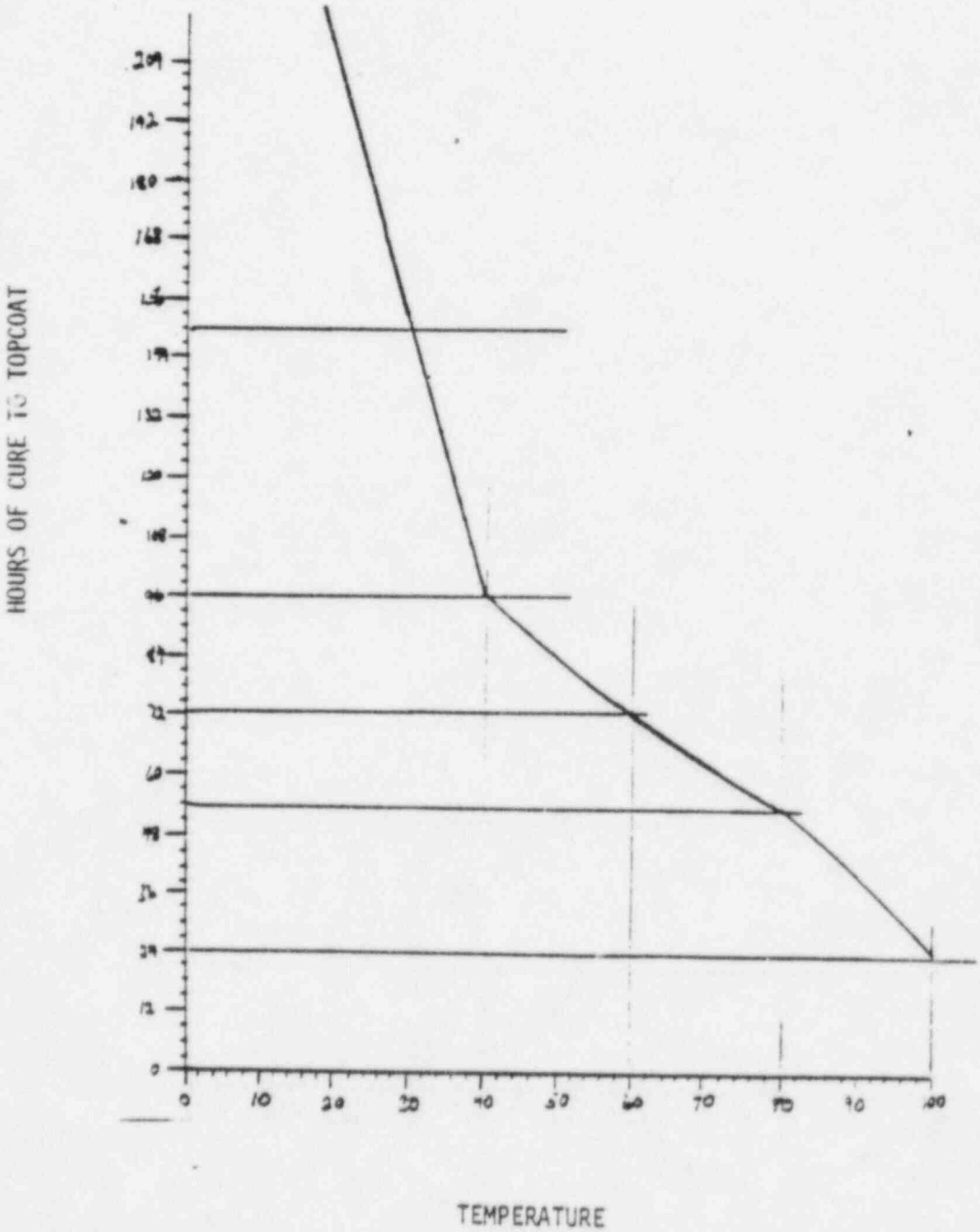
Sheet ____ of ____

ATTACHMENT 2 (Continued) Procedure # _____

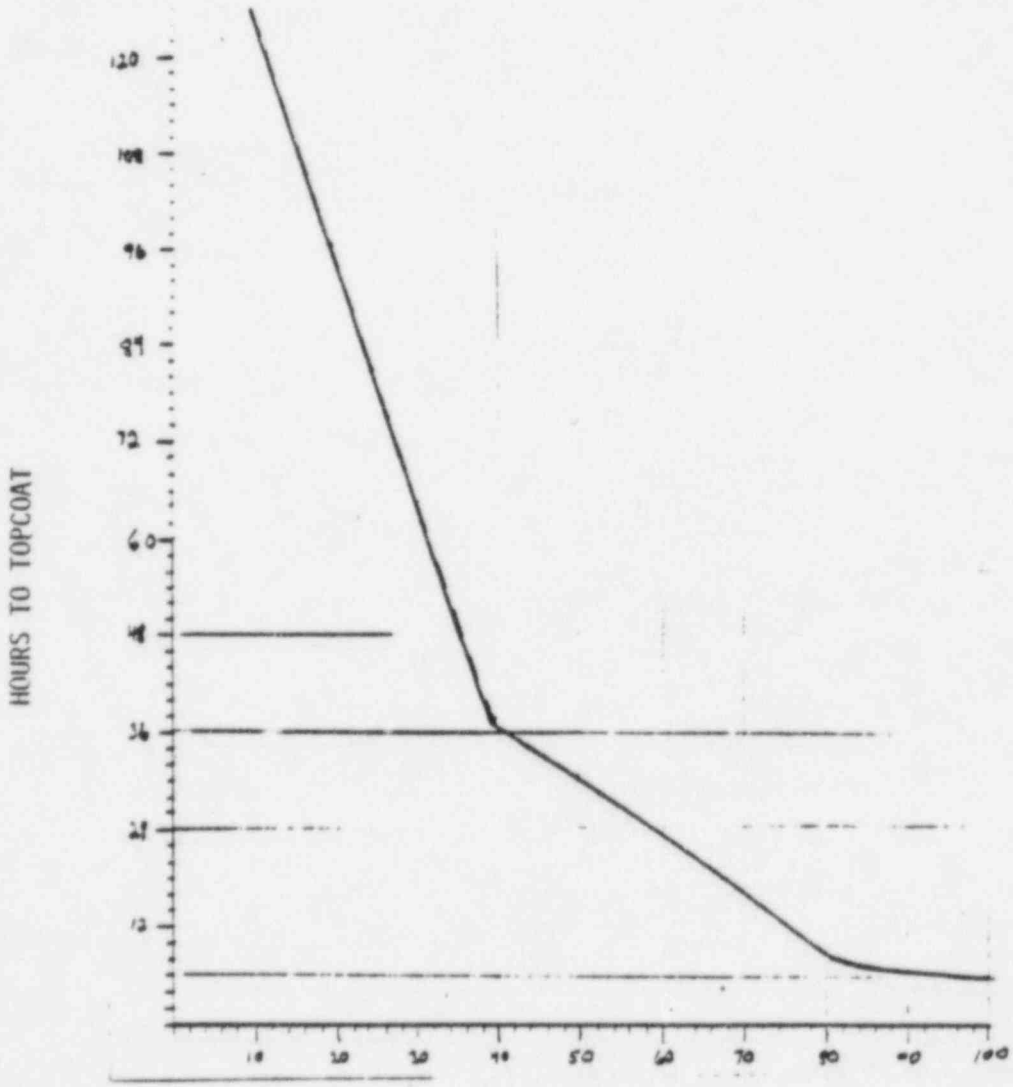
Rev. _____ Date _____

REQUIREMENTS (Continued)

Attachment 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R. H.



ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R.H.

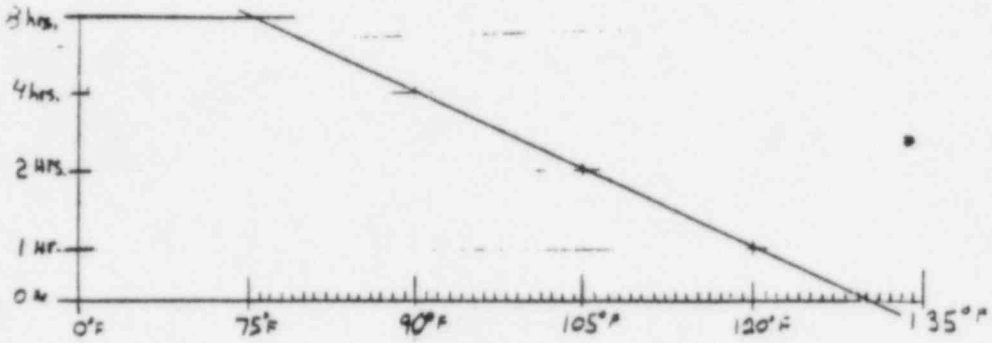


TEMPERATURE F°

ATTACHMENT 4

POT LIFE - CZ 11

8 Hours Max. Pot Life



POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50 - 54	10 hrs	24 hrs
55 - 59	7 hrs	24 hrs
60 - 64	4½ hrs	24 hrs
65 - 69	3½ hrs	24 hrs
70 - 74	2 hrs	24 hrs
75 - 79	1½ hrs	24 hrs
80 - 84	1½ hrs	24 hrs
85 - 89	1½ hrs	24 hrs
90 - 95	1 hr	24 hrs

Pot life for coatings thinned up to but not including max. amount of thinner allowed, use pot life for unthinned material.

For spray application, pot life as stated above is recommended maximum times and should be utilized for a basis for coating usage time; however, actual pot life may be longer. If coating when temperature is above 95°F, or if pot life as stated above has been exceeded, the actual pot life ends when proper atomization and spraying becomes difficult and the coating loses body and begins to sag. When utilizing other than spray application methods, pot life shall be as stated in the above table.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.
2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner or xylol and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.4.3.0 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 interfacing the 305/CZ11 system and the 305/D6 system, the interface of the two primers shall be no greater than 1½" in width.

4.4.3.1 Cure of Minor Topcoat Repair - Minor defects, as defined in Section 4.4.2.7, which are noted in the topcoat and repaired, may be inspected for final acceptance after cure to recoat time as stated in Section 4.4.2.1 (4) has been satisfied. Full cure of topcoat repairs shall be satisfied prior to placement into service.

Voided per DCN #4

4. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 and above	2 days

5. Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above 75°F.

6. Tack free shall be defined as the extent of cure at which foreign contaminants will not adhere to the coating.

7. The total coating system shall have a dry film thickness range of 7 to 11 mils, with a minimum spot check of 7 mils and a maximum spot check of 11.5 mils.

4.4.2.2 Repair of Runs and Sags - Runs and sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until cure times stated in Section 4.4.2.1(4) have been satisfied.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner or xylol and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.1(4) for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area shall then be solvent wiped (Carboline thinner #33 for primer, Carboline Phenoline thinner or xylol for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage is considered a minor defect per section 4.4.2.8 and Carbo Zinc 11 and Phenoline 305 if damaged area is considered a major defect per section 4.4.2.9. All edges of existing coating around the perimeter of the cleaned area shall be "feathered" back a sufficient distance to ensure a smooth blend with existing coating. Thickness shall be as required for the pertinent coating.

VOID per Board 7

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

VOID VOID Per DCN 7

3. Carboline Corporation "Application Instruction", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", latest revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", latest revision

7. Gibbs & Hill Specificaiton 2323-MS-43B, "Nuclear Piping", latest revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", latest revision

VOID

6. Cure time before topcoat shall be in accordance with Attachment 3 and the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel. This amount of cure would equal or exceed the amount of cure that is achieved by the graphs in attachment 3. If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray; however, a minimum of one hour must elapse between application of coating and water spray. Water used in accelerated curing shall be clean water with a pH range of 5-9. Application of water spray may be as often as necessary to obtain the desired cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, if no major defects per section 4.4.2.9 are present, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline No. 33 per gallon mix. This will be applied to achieve a 2.0 - 4.5 mils total DFT. Only two recoats may be applied. Special attention should be given to spray application and dry film thickness when using a 50% mix. The primed surface shall not be recoated until cured per section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

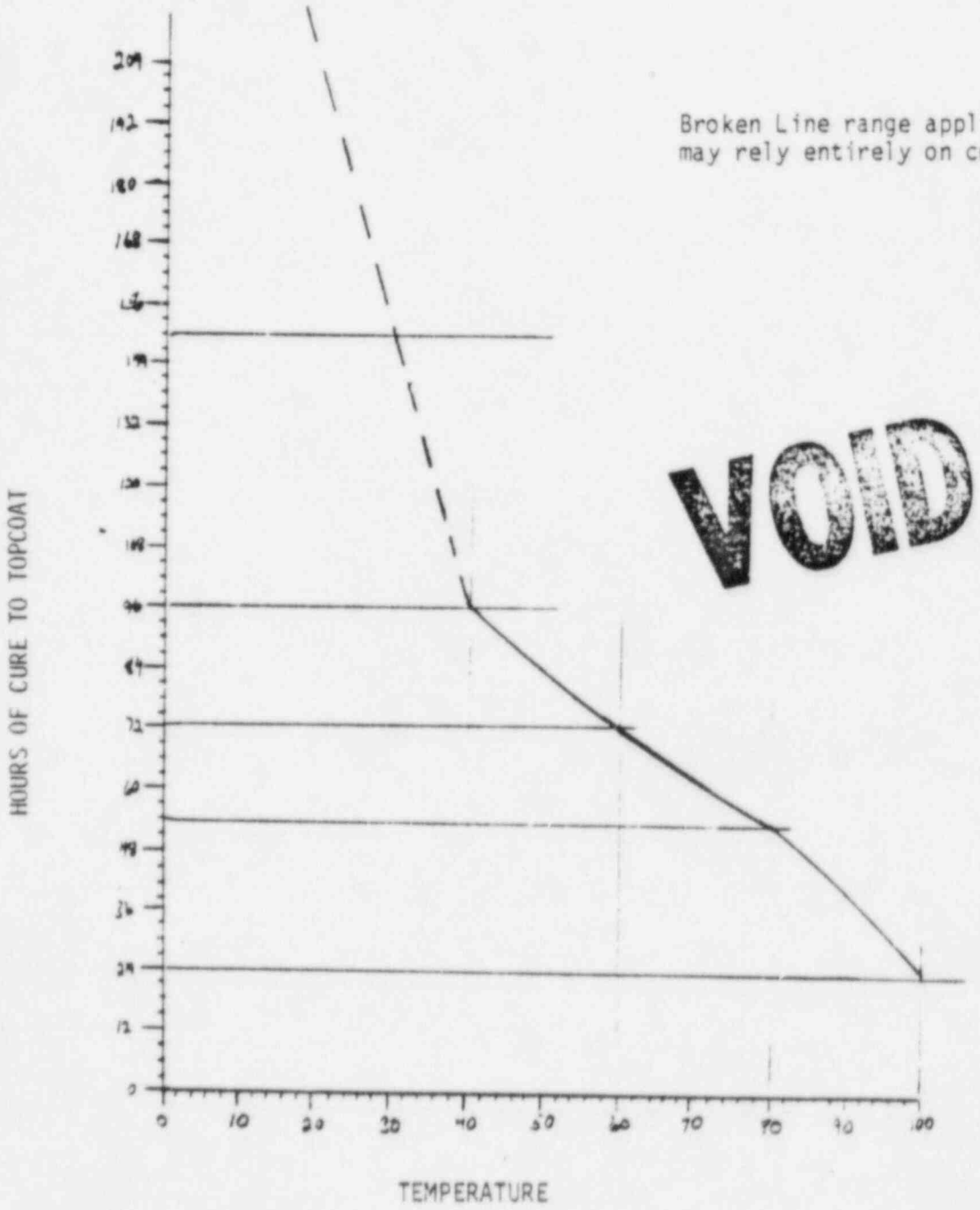
Prime Coat:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

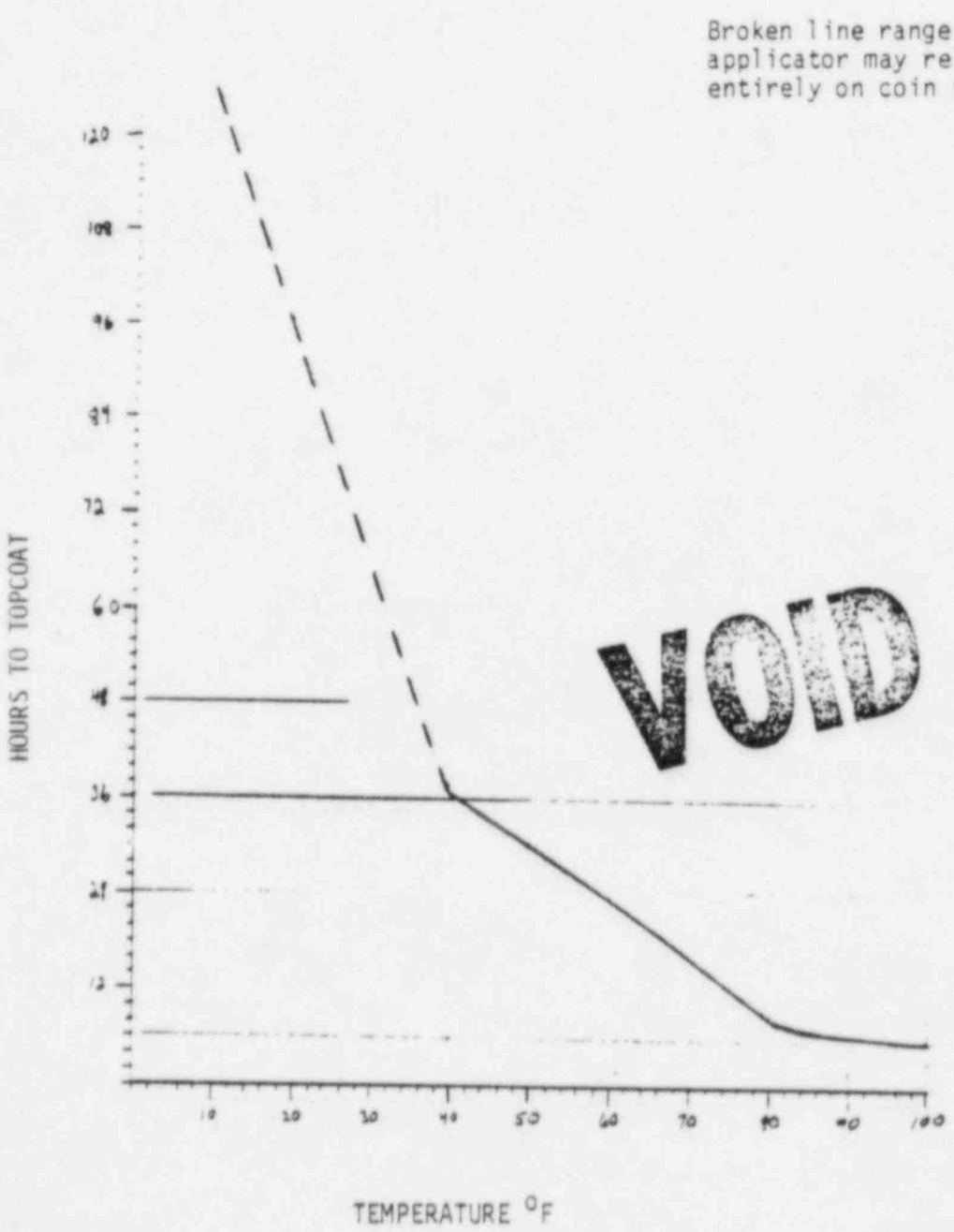
2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

VOID per DCN #6

ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R.H.



ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R.H.



4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner or xylol and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or brush Phenoline 305 finish at approximately 4 mil DFT over the damaged area. Overlap onto the surrounding coating a sufficient amount to insure a smooth and continuous topcoat system.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.4.3.0 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 interfacing the 305/CZ11 system and the 305/D6 system, the interface of the two primers shall be no greater than 1½" in width.

4.4.3.1 Cure of Minor Topcoat Repair - Minor defects, as defined in Section 4.4.2.7, which are noted in the topcoat and repaired, may be inspected for final acceptance after cure to recoat time as stated in Section 4.4.2.1 (4) has been satisfied. Full cure of topcoat repairs shall be satisfied prior to placement into service.

VOID Rev Dcn #5

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner or xylol and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.4.3.0 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 interfacing the 305/CZ11 system and the 305/D6 system, the interface of the two primers shall be no greater than 1½" in width.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R

VOID page per DCN #3

Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

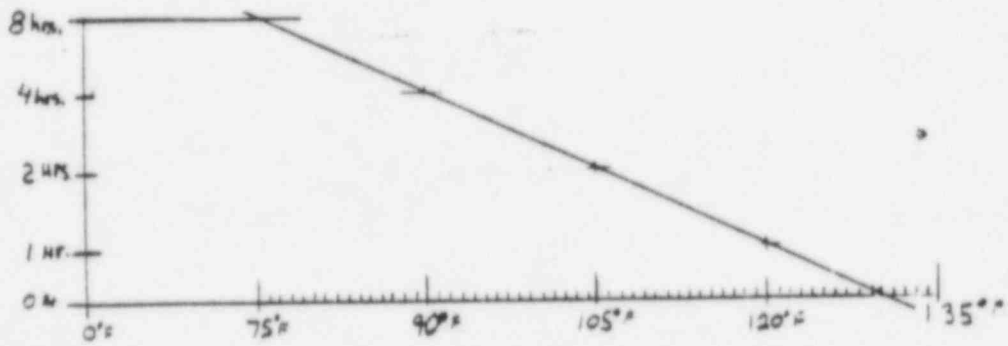
5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. Steel Structures Paint Council, Volume 2, Second Edition
3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision
4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"
5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revisio

VOID

ATTACHMENT 4

POT LIFE - CZ 11
8 Hours Max. Pot Life



POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50 - 54	10 hrs	24 hrs
55 - 59	7 hrs	24 hrs
60 - 64	4½ hrs	24 hrs
65 - 69	3½ hrs	24 hrs
70 - 74	2 hrs	24 hrs
75 - 79	1½ hrs	24 hrs
80 - 84	1½ hrs	24 hrs
85 - 89	1½ hrs	24 hrs
90 - 95	1 hr	24 hrs

Pot life for coatings thinned up to but not including max. amount of thinner allowed, use pot life for unthinned material.

VOID

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All protrusions and peaks shall be ground to a rounded contour.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be equivalent to a near white blast SP-10 specification with no size limitation as long as the millage requirements are obtained.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish coat shall not be applied unless the substrate temperature is more than 5°F above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Carbo Zinc 11. Pot life of CZ 11 shall be as shown on Attachment 4.

VOID page per DCN #2

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat on vendor coated items other than pipe hanger support components, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a nonconforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Final surface preparation shall not begin unless the temperature of the surface to be blasted is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning".

Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve an equivalent of SSPC-SP10-63, "near white" blast cleaning. Although 1-3 mil. surface profile is preferred, a minimum of 1 mil. profile is required. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be re-cleaned before primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

VOID Void Page #1

IM #22855

INTEROFFICE MEMO

February 18, 1982

TO: Controlled Copy Holders of Subject Documents

FROM: Robert M. Darrin

SUBJECT: CCP-30, Rev. 10; CCP-30A, Rev. 1; CCP-40, Rev. 3

The latest DCN's against the subject procedures were inadvertently issued with the effective date omitted.

By copy of this letter, the DCN's are being re-issued. All file custodians are instructed to replace their copies with the ones attached.

If you have any questions, please contact the Staff Engineer's office at Extension 366.

Robert M. Darrin
R. M. Darrin
Staff Engineer

RMD/lah

VOID

BROWN & ROOT, INC. CPSES JOB 35-1195	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
	CCP-30	9	11/4/81	1 of 13

ARMS INDEXED

TITLE:		
COATING STEEL SUB-STRATES INSIDE REACTOR BUILDING AND RADIATION AREAS	ORIGINATOR: Mark Wells	11-2-81 DATE
	REVIEWED BY: N/A RET B&R QA	11/3/81 DATE
	TGCO QA	11/2/81 DATE
	APPROVED BY DC Franklin CONSTRUCTION PROJECT MANAGER	11-3-81 DATE

DCN 1
DCN 2
DCN 3
DCN 4
DCN 5

VOID

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1.1 PURPOSE
1.2 SCOPE
1.3 GENERAL DISCUSSION

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3.2 SAFETY REQUIREMENTS
3.3 INSTRUMENTS AND THEIR USE
3.4 DOCUMENTATION
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3.6 SPECIAL COATING PROCEDURE
3.7 TOUCH-UP & FINISH COATING OF VENDOR APPLIED COATINGS

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4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS
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VOID

ARMS
INDEXED

DATE:

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 5

This notice applies to Construction Procedure No. 35-1195-CCP-30 Revision 9.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following pages with the attached:

Page 9 of 13
Page 10 of 13

Reason for change: Additional requirements

This change approved by:

Mark Wells 1-5-82
Originator Date

Reviewed by:

N/A 1/5/82
Brown & Root Quality Assurance Date

Reviewed by:

R C Cummins 1-5-82
TUGCO Quality Assurance Level II Date

Reviewed by:

Charles Douggs 1-5-82
Construction Project Manager Date

1-5-82
Effective Date

ARMS
INDEXED

DATE

JOB 35-1195
Comanche Peak Steam Electric Station

Sheet 1 of 3

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 4

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 9.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following pages with the attached:

Page 9 of 13
Page 10 of 13

Reason for change: Change in requirement

This change approved by:

Mark Wells 11-18-81
Originator Date

Reviewed by:

N/A 11/18/81
Brown & Root Quality Assurance Date

Reviewed by:

C. Mauer 11/18/81
TUGCO Quality Assurance Date

Reviewed by:

D.C. Brandimore 11-19-81
Construction Project Manager Date

11/19/81
Effective Date

ARMS
INDEXED

DATE

JOB 35-1195
Comanche Peak Steam Electric Station

Sheet 1 of 4

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 3

This notice applies to Construction Procedure No. 35-1195-CCP-30 Revision 9.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following pages with the attached:

Page 9 of 13
Page 11 of 13
Page 12 of 13

Reason for change: Additional requirements

This change approved by:

Mark Weiler 11-13-81
Originator Date

Reviewed by:

N/A 11/16/81
Brown & Root Quality Assurance Date

Reviewed by:

11/16/81
TUGCO Quality Assurance Date

Reviewed by:

11/16/81
Construction Project Manager Date

11/16/81
Effective Date

ARMS
INDEXED

DATE:

JOB 35-1195
Comanche Peak Steam Electric Station

Sheet 1 of 2

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 2

This notice applies to Construction Procedure No. 35-1195-CCP-30 Revision 9.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following page with the attached:

Page 11 of 13

Reason for change: Additional requirement

This change approved by:

Mark Weller 11/10/81
Originator Date

Reviewed by:

11/10/81
Brown & Root Quality Assurance Date

Reviewed by:

11/10/81
TUGCO Quality Assurance Date

Reviewed by:

11-11-81
Construction Project Manager Date

11/11/81
Effective Date

ARMS
INDEXED

JOB 35-1195
Comanche Peak Steam Electric Station

DATE:

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 1

This notice applies to Construction Procedure No. 35-1195-CCP-30 Revision 9.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace the following page with the attached:

Page 8 of 13
Page 10 of 13
Page 11 of 13

Reason for change: Additional requirements

This change approved by:

Mark Wells 11-4-81
Originator Date

Reviewed by:

N/A 11/4/81
Brown & Root Quality Assurance Date

Reviewed by:

11/4/81
TUGCO Quality Assurance Date

Reviewed by:

11-6-81
Construction Project Manager Date

11/6/81
Effective Date

1.0 INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating shall consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. To protect the prime coat from prolonged exposure, a "seal coat" consisting of approximately one mil. of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Prior to finish coating, the seal coat shall be solvent wiped with Phenoline thinner or Xylol. Finish coating shall be applied when convenient prior to completion of the building or prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

In order to maintain traceability on protective coatings applied to shop coated steel cited for installation in the Reactor Building, these items shall be steel stamped with a unique coating code number. The code numbers shall be assigned by QC Paint and applied by craft personnel. Upon division of materials, this unique number will be transferred along with all other unique identifying numbers.

2.0 DEFINITIONS OF TERMS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

3.0 SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the products as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the Brown & Root Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements, pertaining to surface preparation and coating application, shall be followed. It shall be the responsibility of the Site Safety Department to establish the frequency of monitoring the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on Attachments 1 and 2 listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORAGE AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure CP-CPM 8.1. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours are acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed, in the field, it shall be transferred from the controlled area to a designated temporary storage area or area of intended use in the field. Due to limited shelf-life of coating materials, this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the said container cannot be resealed and returned to "Q" storage area for later use. Containers opened and partially distributed from the "Q" paint storage area may be resealed and the remaining contents used for "Q" painting. With the exception of thinners, the contents from partially used containers shall not be reused after a period of 7 days has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Site Coating Engineer. The following information shall be completed on each procedure.

3.6.2 Each procedure shall be given a unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat on vendor coated items other than pipe hanger support components, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a nonconforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Final surface preparation shall not begin unless the temperature of the surface to be blasted is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning".

Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve an equivalent of SSPC-SP10-63, "near white" blast cleaning. Although 1-3 mil. surface profile is preferred, a minimum of 1 mil. profile is required. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be re-cleaned before primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All protrusions and peaks shall be ground to a rounded contour.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be equivalent to a near white blast SP-10 specification with no size limitation as long as the millage requirements are obtained.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish coat shall not be applied unless the substrate temperature is more than 5°F above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Carbo Zinc 11. Pot life of CZ 11 shall be as shown on Attachment 4.

4.3.2 Finish Coat - The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Phenoline 305. Pot life of Phenoline 305 shall be shown on Attachment 4.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to become tack free before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temparature range of 0° - 200°F. Carbo-Zinc 11 may be thinned up to 2 quarts per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

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

3. Thickness of prime coat shall have a minimum dry film thickness of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regulated pot having an adequate air volume supply shall be used.

5. As a guide, coating material may be applied using a 50% overlap with each pass while holding a gun 8-10 inches from the surface. Cross hatch application is permissible.

6. Cure time before topcoat shall be in accordance with Attachment 3 and the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel. This amount of cure would equal or exceed the amount of cure that is achieved by the graphs in attachment 3. If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray; however, a minimum of one hour must elapse between application of coating and water spray. Water used in accelerated curing shall be clean water with a pH range of 5-9. Application of water spray may be as often as necessary to obtain the desired cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, if no major defects per section 4.4.2.9 are present, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline No. 33 per gallon mix. This will be applied to achieve a 2.0 - 4.5 mils total DFT. Only two recoats may be applied. Special attention should be given to spray application and dry film thickness when using a 50% mix. The primed surface shall not be recoated until cured per section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams, edges and other sharp geometrical discontinuities may receive an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit of Phenoline 305. To aid in continuity at edges, edges may be "striped" with Phenoline unthinned instead of the 50% mixture as stated above. In either "striping" or initial coating of edges, welds, etc., time should be allotted for the coating to harden sufficiently to maintain a "sealing" effect prior to continuing coating operations. The initial coating of edges, striping, etc., as stated above, shall be considered part of the total initial finish coating operation. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Phenoline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

4. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature ^{o}F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 - 120	2 days

5. Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above $75^{o}F$.

6. Tack free shall be defined as the extent of cure at which foreign contaminants will not adhere to the coating.

7. The total coating system shall have a dry film thickness range of 7 to 11 mils, with a minimum spot check of 7 mils and a maximum spot check of 11.5 mils.

4.4.2.2 Repair of Runs and Sags - Runs and sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until cure times stated in Section 4.4.2.1(4) have been satisfied.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner or xylol and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.1(4) for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area shall then be solvent wiped (Carboline thinner #33 for primer, Carboline Phenoline thinner or xylol for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage is considered a minor defect per section 4.4.2.8 and Carbo Zinc 11 and Phenoline 305 if damaged area is considered a major defect per section 4.4.2.9. All edges of existing coating around the perimeter of the cleaned area shall be "feathered" back a sufficient distance to ensure a smooth blend with existing coating. Thickness shall be as required for the pertinent coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner or xylol and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2,9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.4.3.0 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 interfacing the 305/CZ11 system and the 305/D6 system, the interface of the two primers shall be no greater than 1½" in width.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R

Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ 11 and Phenoline 305

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. Steel Structures Paint Council, Volume 2, Second Edition
3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision
4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"
5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault (Original)

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
JOB 35-1195	CCP-30	9	11/4/81	1 of 2

"Q" Coating _____ ATTACHMENT 2 Sheet ____ of ____

"Non-Q" Coating _____ Procedure # _____

Rev. _____ Date _____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____ DATE _____

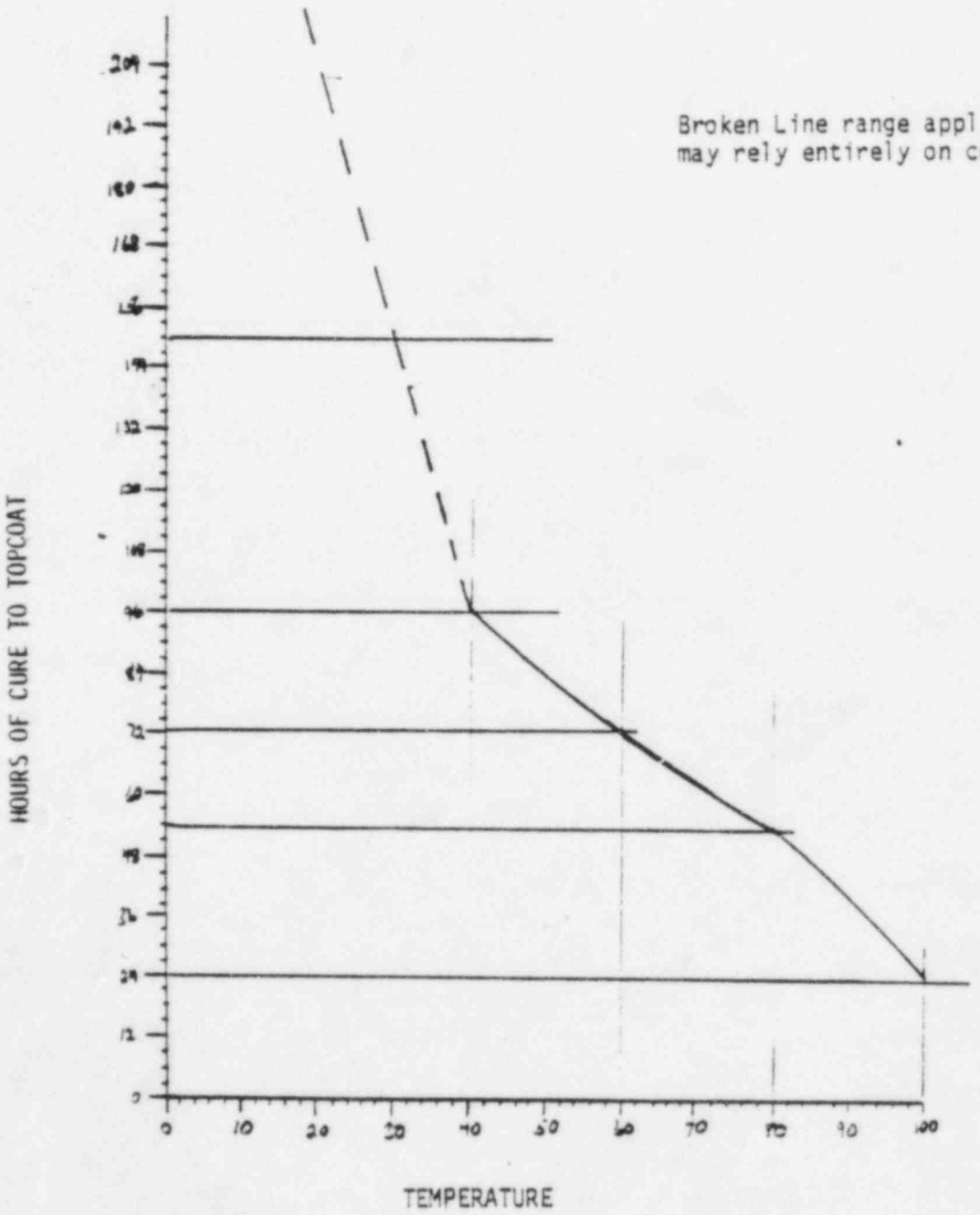
Sheet ____ of _____

ATTACHMENT 2 (Continued) Procedure # _____

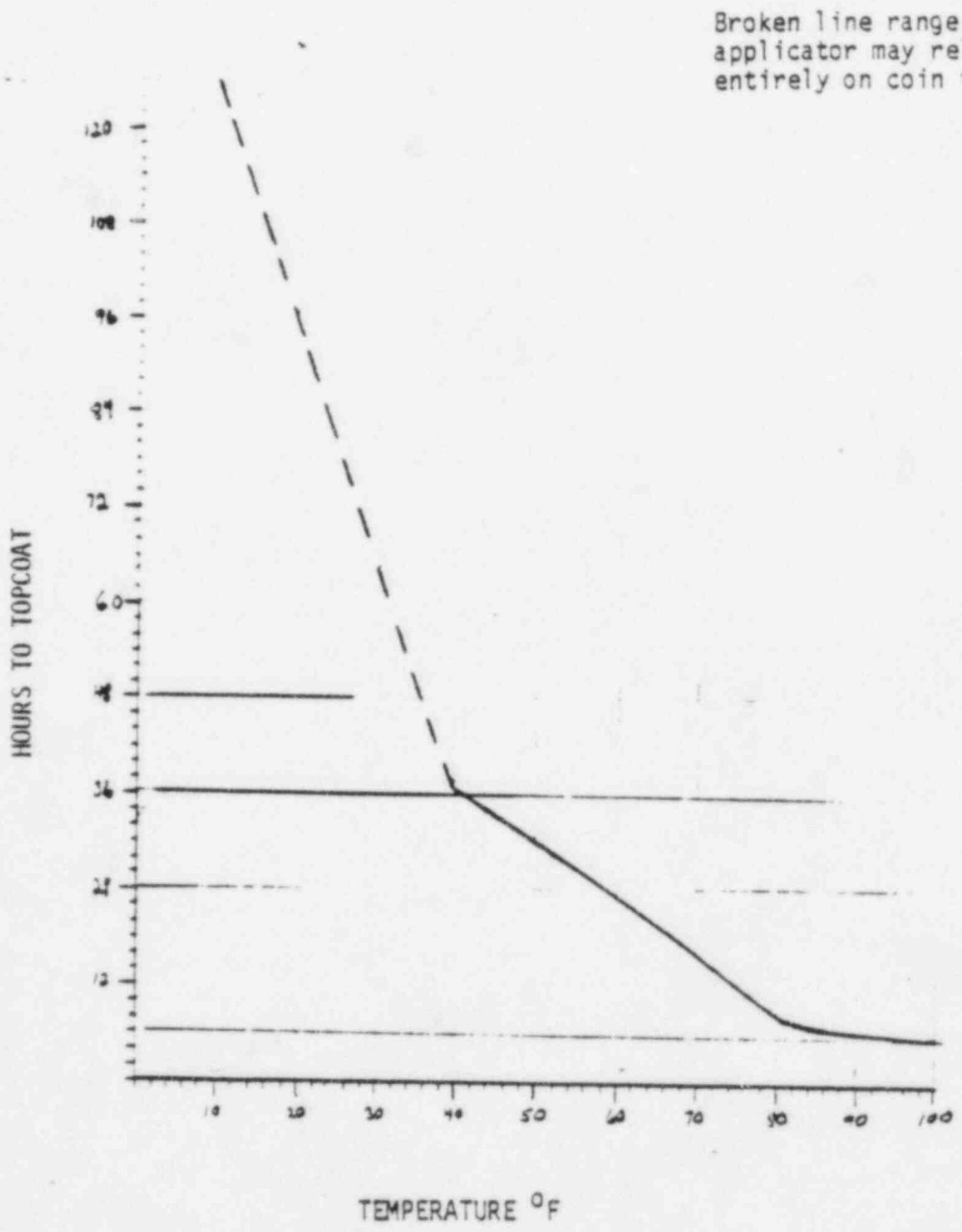
Rev. ____Date_____

REQUIREMENTS (Continued)

ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R.H.

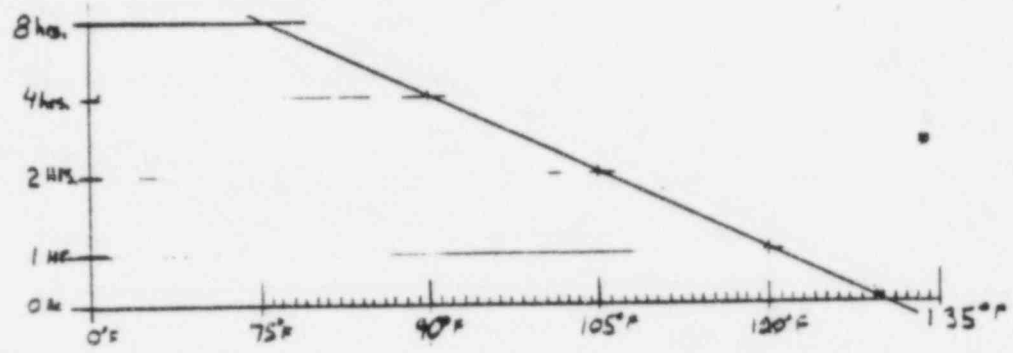


ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R.H.



ATTACHMENT 4

POT LIFE - CZ 11
8 Hours Max. Pot Life



POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50 - 54	10 hrs	24 hrs
55 - 59	7 hrs	24 hrs
60 - 64	4½ hrs	24 hrs
65 - 69	3½ hrs	24 hrs
70 - 74	2 hrs	24 hrs
75 - 79	1½ hrs	24 hrs
80 - 84	1½ hrs	24 hrs
85 - 89	1½ hrs	24 hrs
90 - 95	1 hr	24 hrs

Pot life for coatings thinned up to but not including max. amount of thinner allowed, use pot life for unthinned material.

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foriegn matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Phenoline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

4. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 - 120	2 days

VOID

Void per Dcn #5

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.1.7 Coating Interface - Refer to Section 4.4.3.0 for coating interfacing.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foriegn matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Phenoline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall have minimum dry film thickness of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 respectively.

4. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 - 120	2 days

VOID Pages Per DCN #4

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags have a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Phenoline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative hunidity shall be 0% and 85% respectively.

3. Thickness of coating shall have minimum dry film thickness of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Curing and time to recoat Phenoline 305 shall be as shown below:

Between Coats	Temperature °F	Final Cure
72 hours	50 - 59	12 days
36 hours	60 - 74	8 days
18 hours	75 - 89	4 days
12 hours	90 - 120	2 days

VOID Pages per DCN #3

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner or xylol and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline's Phenoline Thinner or xylol. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

VOID

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ-11 and Phenoline 305

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. Steel Structures Paint Council, Volume 2, Second Edition
3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision
4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"
5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

VOID

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat and/or CZ 11 Minor Defects - (Minor defects are defined as an area, either circular or linear, in which a ½' diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline Surface Preparation I. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat and/or CZ 11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed ay any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

VOID

Void Page Per DCN #2

6. Cure time before topcoat shall be in accordance with Attachment 3 and the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel. This amount of cure would equal or exceed the amount of cure that is achieved by the graphs in attachment 3. If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray; however, a minimum of one hour must elapse between application of coating and water spray. Water used in accelerated curing shall be clean water with a pH range of 5-9. Application of water spray may be as often as necessary to obtain the desired cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline No. 33 per gallon mix. This will be applied to achieve a 2.0 - 4.5 mils total DFT. Only two recoats may be applied. Special attention should be given to spray application and dry film thickness when using a 50% mix. The primed surface shall not be recoated until cured per section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

Void Page Per DCN #1

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

VOID

Phenoline thinned at 50% and applied as a seal coat may be recoated after 4 hours of cure at or above 75°F.

6. Tack free shall be defined as the extent of cure at which foreign contaminants will not adhere to the coating.

7. The total coating system shall have a dry film thickness range of 7 to 11 mils, with a minimum spot check of 6 mils and a maximum spot check of 11.5 mils.

4.4.2.2 Repair of Runs and Sags - Runs and sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until cure times stated in Section 4.4.2.1(5) have been satisfied.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner or xylol and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.1(5) for recoating time.

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner or xylol for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged (if area is considered a major defect). Thickness shall be as required for the pertinent coating. If damage extends to metal and is considered a major defect, (Refer to Section 4.4.2.9), damaged area will be blasted, hand or machine ground until bare metal is exposed. If power grinding, grind and/or needle scale until a profile of approximately one mil is achieved. All edges of existing coating around perimeter of cleaned area shall be feathered back a sufficient distance to ensure a smooth blend with existing coating.

VOID

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat/CZ-11 Minor Defect - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline Surface Preparation I. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat/CZ-11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

VOID

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault (Original)

"Q" Coating _____ ATTACHMENT 2 Sheet ___of_____

Procedure # _____

"Non-Q" Coating _____ Rev. _____Date_____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____DATE_____

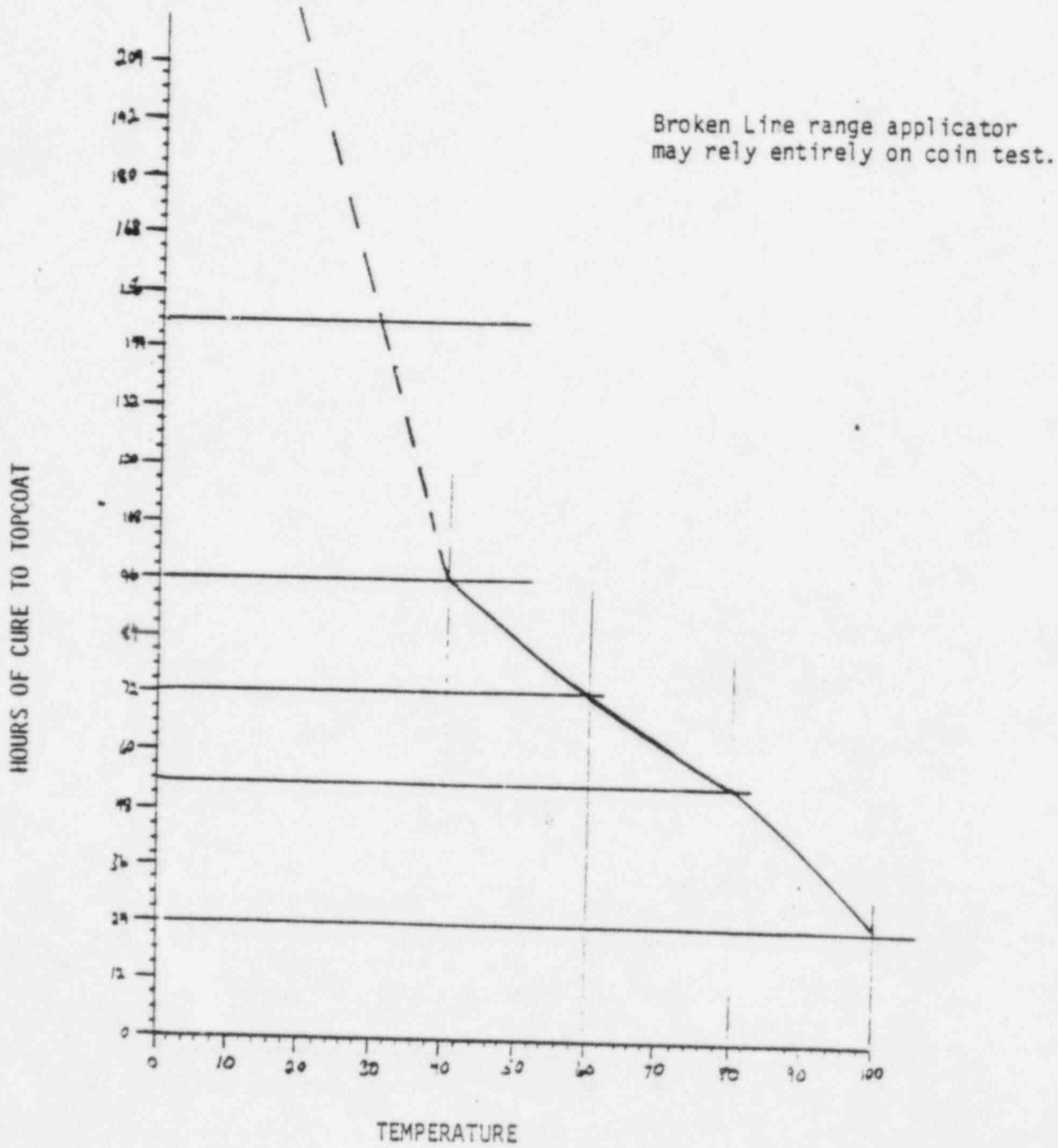
Sheet ____ of _____

ATTACHMENT 2 (Continued) Procedure # _____

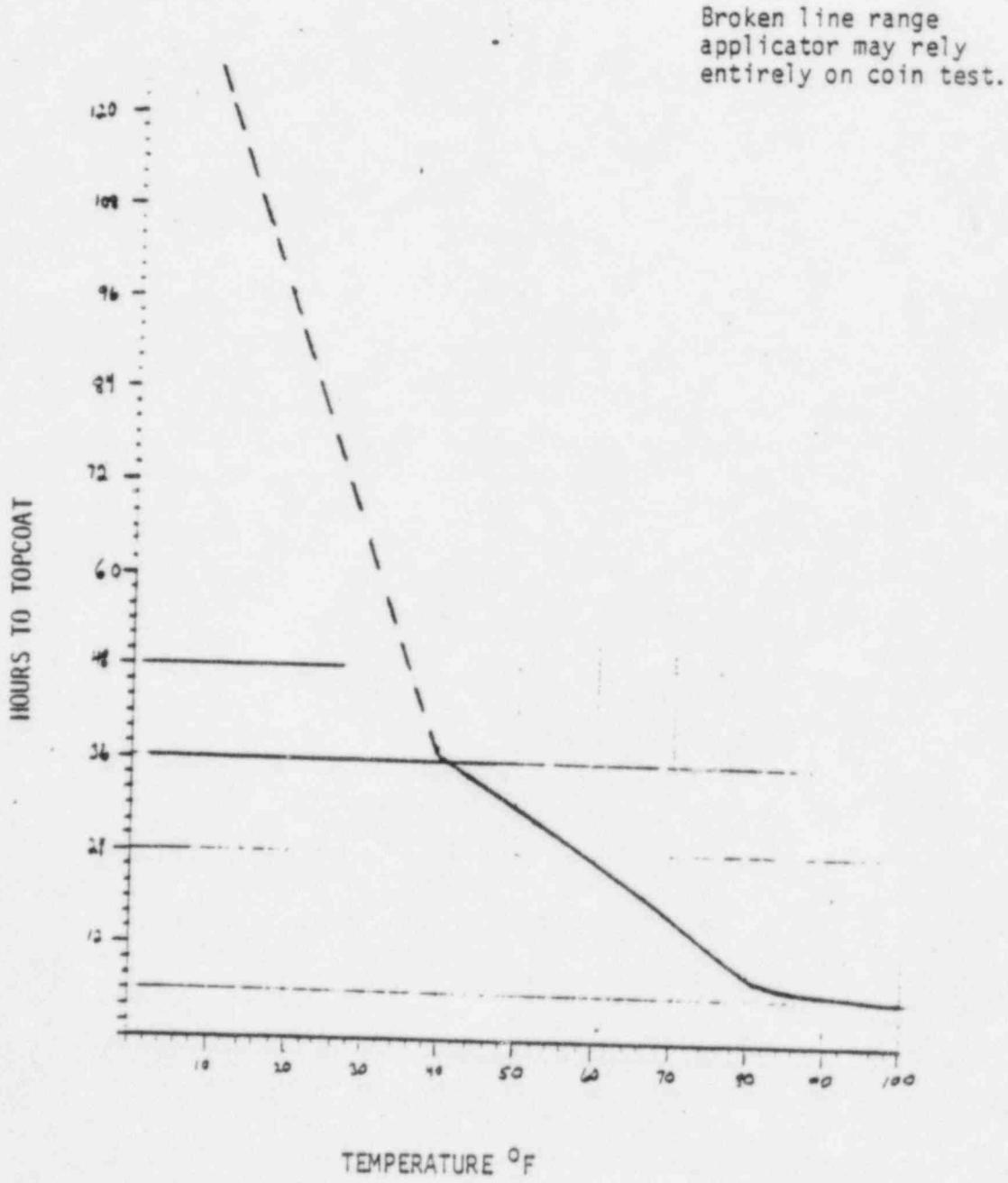
Rev. ____Date_____

REQUIREMENTS (Continued)

ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R.H.

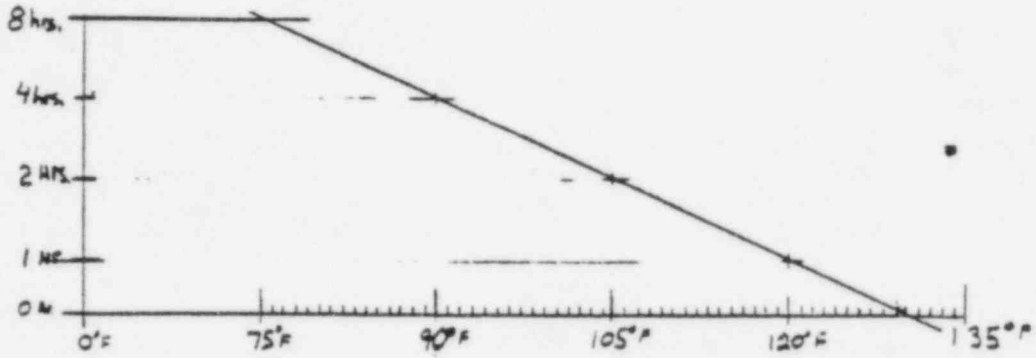


ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R. H.



ATTACHMENT 4

POT LIFE - CZ 11
8 Hours Max. Pot Life



POT LIFE PHENOLINE 305

TEMPERATURE (°F)	UNTHINNED	THINNED-50%
50 - 54	10 hrs	24 hrs
55 - 59	7 hrs	24 hrs
60 - 64	4½ hrs	24 hrs
65 - 69	3¼ hrs	24 hrs
70 - 74	2 hrs	24 hrs
75 - 79	1½ hrs	24 hrs
80 - 84	1½ hrs	24 hrs
85 - 89	1½ hrs	24 hrs
90 - 95	1 hr	24 hrs

Pot life for coatings thinned up to but not including max. amount of thinner allowed, use pot life for unthinned material.

ARMS
INDEXED

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	~~EFFECTIVE DATE~~ DATE	PAGE
JOB 35-1195	CCP-30	8	10/22/81	1 of 13

TITLE:
COATING STEEL SUB-STRATES INSIDE REACTOR BUILDING AND RADIATION AREAS

ORIGINATOR: Mark Wells 10-22-81 DATE

REVIEWED BY: James C. [illegible] QA/QC 10/22/81 DATE

APPROVED BY: D.C. [illegible] CONSTRUCTION PROJECT MANAGER 10/22/81 DATE

VOID

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VOID

1.0 INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating shall consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. To protect the prime coat from prolonged exposure, a "seal coat" consisting of approximately one mil. of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Prior to finish coating, the seal coat shall be solvent wiped with Phenoline thinner or Xylol. Finish coating shall be applied when convenient prior to completion of the building or prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

In order to maintain traceability on protective coatings applied to common stock steel cited for installation in the Reactor Building, these items shall be steel stamped with a unique coating code number. The code numbers shall be assigned by QC Paint and applied by craft personnel. Upon division of materials, this unique number will be transferred along with all other unique identifying numbers.

2.0 DEFINITIONS OF TERMS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

3.0 SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the products as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the Brown & Root Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements, pertaining to surface preparation and coating application, shall be followed. It shall be the responsibility of the Site Safety Department to establish the frequency of monitoring the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on Attachments 1 and 2 listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORAGE AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure CP-CPM 8.1. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours are acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed, in the field, it shall be transferred from the controlled area to a designated temporary storage area or area of intended use in the field. Due to limited shelf-life of coating materials, this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the said container cannot be resealed and returned to "Q" storage area for later use. Containers opened and partially distributed from the "Q" paint storage area may be resealed and the remaining contents used for "Q" painting. The contents from partially used containers shall not be reused after a period of 7 days has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Site Coating Engineer. The following information shall be completed on each procedure.

3.6.2 Each procedure shall be given a unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a nonconforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Final surface preparation shall not begin unless the temperature of the surface to be blasted is 5°F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning".

Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve an equivalent of SSPC-SP10-63, "near white" blast cleaning. Although 1-3 mil. surface profile is preferred, a minimum of 1 mil. profile is required. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be re-cleaned before primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All edges, protrusions, and peaks shall be ground smooth to a rounded contour; 1/8-inch radius of the contour may be used for a guide.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be equivalent to a near white blast SP-10 specification with no size limitation as long as the millage requirements are obtained.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish coat shall not be applied unless the substrate temperature is more than 5°F above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Carbo Zinc 11. Pot life of CZ 11 shall be as shown on Attachment 4.

4.3.2 Finish Coat - The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner, as required, but shall not exceed two quarts of thinner per gallon of Phenoline 305. Pot life of Phenoline 305 shall be shown on Attachment 4.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to become tack free before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temparature range of 0° - 200°F. Carbo-Zinc 11 may be thinned up to 2 quarts per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

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

3. Thickness of prime coat shall have a minimum dry film thickness of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regulated pot having an adequate air volume supply shall be used.

5. As a guide, coating material may be applied using a 50% overlap with each pass while holding a gun 8-10 inches from the surface. Cross hatch application is permissible.

6. Cure time before topcoat shall be in accordance with Attachment 3 and the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel. This amount of cure would equal or exceed the amount of cure that is achieved by the graphs in attachment 3. If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray; however, a minimum of one hour must elapse between application of coating and water spray. Water used in accelerated curing shall be clean water with a pH range of 5-9. Application of water spray may be as often as necessary to obtain the desired cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline No. 33 per gallon mix. This will be applied to achieve a 2.0 - 4.5 mils total DFT. Only two recoats may be applied. Special attention should be given to spray application and dry film thickness when using a 50% mix. The primed surface shall not be recoated until cured per section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5 5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instruction (Carbo Zinc 11) Bulletin - October 76-N.

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to become tack free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags have a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Phenoline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative hunidity shall be 0% and 85% respectively.

3. Thickness of coating shall have minimum dry film thickness of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90°F or 18 hours at 75°F and 50% R.N. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free shall be defined as the extent of cure at which foreign contaminants will not adhere to the coating.

7. Full cure is achieved in 7 days at 75°F and 50% R. H.

8. The total coating system shall have a dry film thickness range of 7 to 10 mils, with a minimum spot check of 6 mils and a maximum spot check of 11 mils.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinhcles and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75°F or 12 hours @ 90°F for full strength mixture, or 4 hours at above temperatures for 50% thinned mixture has elapsed.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for re-coating time).

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged (if area is considered a major defect). Thickness shall be as required for the pertinent coating. If damage extends to metal and is considered a major defect, (Refer to Section 4.4.2.9), damaged area will be blasted, hand or machine ground until bare metal is exposed. If power grinding, grind and/or needle scale until a profile of approximately one mil is achieved. All edges of existing coating around perimeter of cleaned area shall be feathered back a sufficient distance to ensure a smooth blend with existing coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instruction (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat/CZ-11 Minor Defect - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline Surface Preparation I. Spray or brush apply Phenoline 305 finish at 4 mils nominal DFT over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat/CZ-11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbo Zinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time
4. Pot Life CZ-11 and Phenoline 305

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. Steel Structures Paint Council, Volume 2, Second Edition
3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision
4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"
5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

BROWN & ROOT, INC. CPSES	PROCEDURE NUMBER	REVISION	EFFECTIVE DATE	PAGE
JOB 35-1195	CCP-30	7	5/7/81	1 of 17

ARMS INDEXED

TITLE:

COATING STEEL SUB-STRATES INSIDE REACTOR BUILDING AND RADIATION AREAS

ORIGINATOR: [illegible] 7/23/81 DATE

REVIEWED BY: [illegible] QA/QC 5-5-81 DATE

APPROVED BY: [illegible] CONSTRUCTION PROJECT MANAGER 5-6-81 DATE

VOID

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1.0 INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating shall consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. To protect the prime coat from prolonged exposure, a "seal coat" consisting of approximately one mil. of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Prior to finish coating, the seal coat shall be solvent wiped with Phenoline thinner or Xylol. Finish coating shall be applied when convenient prior to completion of the building or prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

2.0 DEFINITIONS OF TERMS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

3.0 SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the products as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the Brown & Root Paint Superintendent or his representative. A coating

manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings, when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements, pertaining to surface preparation and coating application, shall be followed. It shall be the responsibility of the Site Safety Department to establish the frequency of monitoring the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be in accordance with Brown & Root Construction Procedure ACP-3. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - $110^{o}F$. Infrequent dips in air temperature in storage areas as low as $32^{o}F$ for up to 24 hours are acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed, in the field, it shall be transferred from the controlled area to a designated temporary storage area or area of intended use in the field. Due to limited shelf-life of coating materials, this shall be done on

a "first-in", "first-out" basis. After materials have been partially used from an individual container, the said container cannot be resealed and returned to "Q" storage area for later use. Containers opened and partially distributed from the "Q" paint storage area may be resealed and the remaining contents used for "Q" painting. The contents from partially used containers shall not be reused after a period of 7 days has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Site Coating Engineer. The following information shall be completed on each procedure.

3.6.2 Each procedure shall be given an unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a non-conforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4.0 PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5° F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP-1-63 "Solvent Cleaning".

Small amounts of grease or oil deposits may be removed by blast operations. The surface shall then be cleaned by blast, hand or power tool operations to achieve an equivalent of SSPC-SP10-63, "near white" blast cleaning. Although 1-3 mil. surface profile is preferred, a minimum of 1 mil. profile is required. After the above surface preparation, the surface to be primed shall be air blasted and/or solvent wiped to remove dust, sand or foreign contaminants from the surface. Air blasting shall not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer application. If rust forms after surface preparation, the rusted area shall be re-cleaned before primer application. Under no case shall a blast, hand, or power tool cleaned surface be exposed for more than 24 hours prior to priming without additional cleaning of the surface. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows:

a. Blasting using no border tape - Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Hold back approximately 12" - 18" from edge of blasted area when applying primer.

b. Blast, hand or power tool cleaning using border tape - Clean the steel to near white metal approximately 3" - 6" beyond the point which will receive primer. Place border tape approximately 1" in from edge of cleaned area and prime. When applying seal or finish coat on either of above methods hold back approximately 12" - 18" from edge of primer.

4.1.2 Removal of weld spatter and other minor surface imperfections (not to exceed .031" for containment liners) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SSPC-SP-3. If it is determined that surface defects are severe enough to require later repair, the area to be repaired will be blocked out and spot painted at a later date. All edges, protrusions, and peaks shall be ground smooth to a rounded contour; 1/8-inch radius of the contour may be used for a guide.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed, of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will

be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be equivalent to a near white blast SP-10 specification with no size limitation as long as the millage requirements are obtained.

4.2.2 The ambient temperature and relative humidity shall be measured to determine the dew point temperature. Phenoline 305 finish coat shall not be applied unless the substrate temperature is more than 5°F above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. First the base shall be thoroughly mixed. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner, as required, up to the maximum allowed by Carboline Manufacturing Corporation.

4.3.2 Finish Coat - The finish coat, Phenoline 305, is packaged in a two component kit consisting of Phenoline 305 base, Part A, and a Phenoline catalyst, Part B. Mixes are made by combining and thoroughly mixing the base and catalyst. Partial mixes may be made by combining, in a ratio by volume, four parts base to one part catalyst. Viscosity shall be controlled by adding thinner, as required, up to the maximum amount permitted by Carboline Manufacturing Corporation.

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to dry as much as possible. (½ hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create con-

tamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temperature range of 0° - 200°F. Carbo-Zinc 11 may be thinned up to 2 quarts per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

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

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regulated pot having an adequate air volume supply shall be used.

5. As a guide, coating material may be applied using a 50% overlap with each pass while holding a gun 8-10 inches from the surface. Cross hatch application is permissible.

6. Cure time before topcoat shall be in accordance with Attachment 3 and the following: Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickle. This amount of cure would equal or exceed the amount of cure that is achieved by the graphs in attachment 3. If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray; however, a minimum of one hour must elapse between application of coating and water spray. Water used in accelerated curing shall be clean water with a pH range of 5-9. Application of water spray may be as often as necessary to obtain the desired cure.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated shall be wiped with clean rags moistened with Carboline Thinner #33. Wiping shall continue until no appreciable discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline No. 33 per gallon mix. This will be applied to achieve a

2.0 - 4.5 mils total DFT. Only two recoats may be applied. Special attention should be given to spray application and dry film thickness when using a 50% mix. The primed surface shall not be recoated until cured per section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin - October 76-N

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.0.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry as much as possible before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Pheroline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. As a guide, coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90°F or 18 hours at 75°F and 50% R.N. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free time at 75° and 50% R.H. is 9 hours.

7. Full cure is achieved in 7 days at 75F and 50% R.H.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of inholes and discontinuities. Recoating shall not be performed until 18 hours @ 75°F or 12 hours @ 90°F for full strength mixture, or 4 hours at above temperatures for 50% thinned mixture has elapsed.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Phenoline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged (if area is considered a major defect). Thickness shall be as required for the pertinent coating. If damage extends to metal and is considered a major defect (Refer to Section 4.4.2.9), damaged area will be blasted, hand or machine ground until bare metal is exposed. If power grinding, grind and/or needle scale until a profile of approximately one mil is achieved. All edges of existing coating around perimeter of cleaned area shall be feathered back a sufficient distance to ensure a smooth blend with existing coating.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat/CZ-11 Minor Defect - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline Surface Preparation I. Spray or brush apply Phenoline 305 finish at 4 mils nominal D.F.T. over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat/CZ-11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, by machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbozinc 11 touch-up. The resulting surface preparation shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after drying and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5.0 SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure
3. CZ 11 Cure to Topcoat Time

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department
Tugco QA Vault

"Q" Coating _____ ATTACHMENT 2 Sheet ____of_____

Procedure # _____

"Non-Q" Coating _____ Rev. _____Date_____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____DATE_____

Sheet ____ of ____

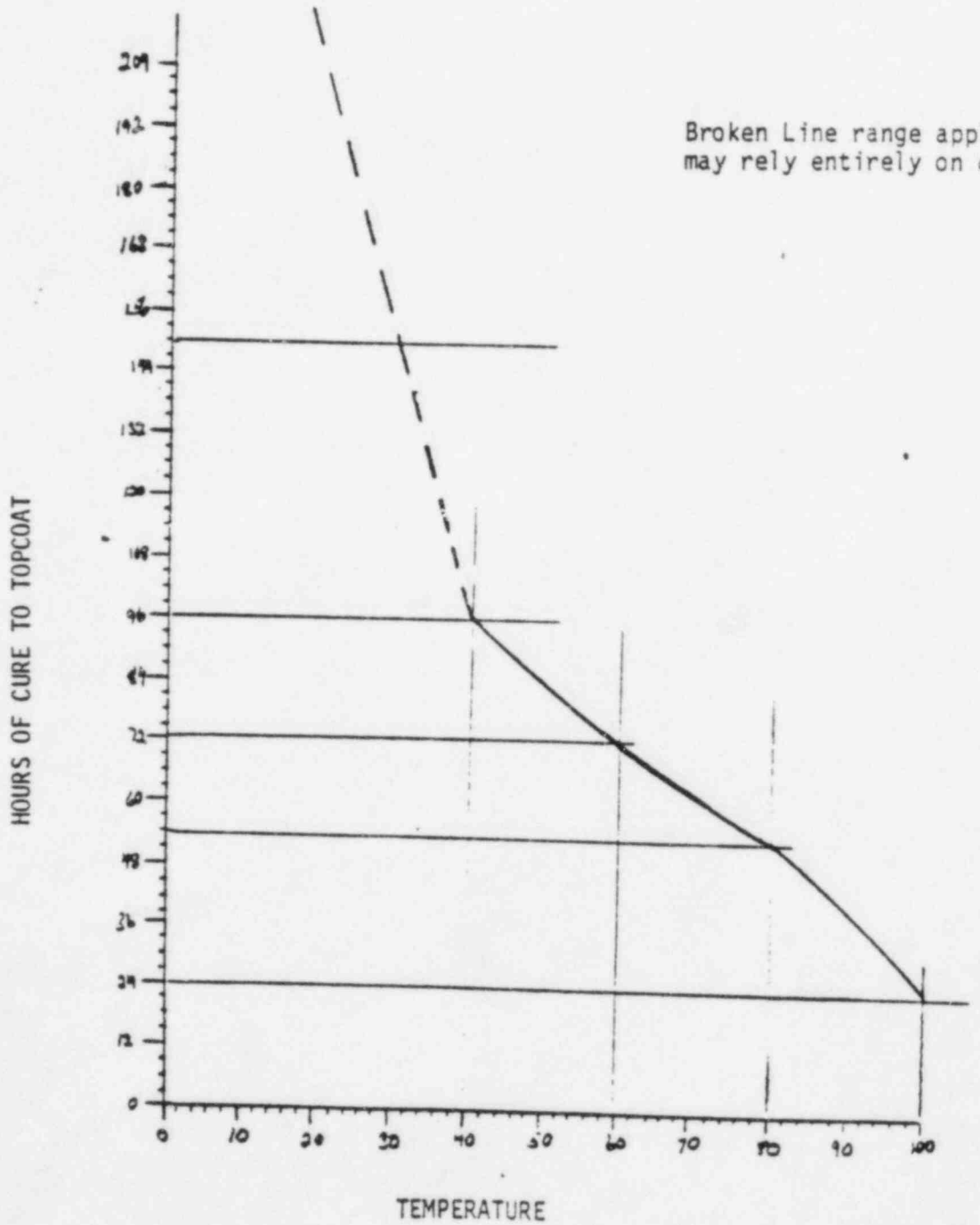
ATTACHMENT 2 (Continued) Procedure # _____

Rev. ____Date_____

REQUIREMENTS (Continued)

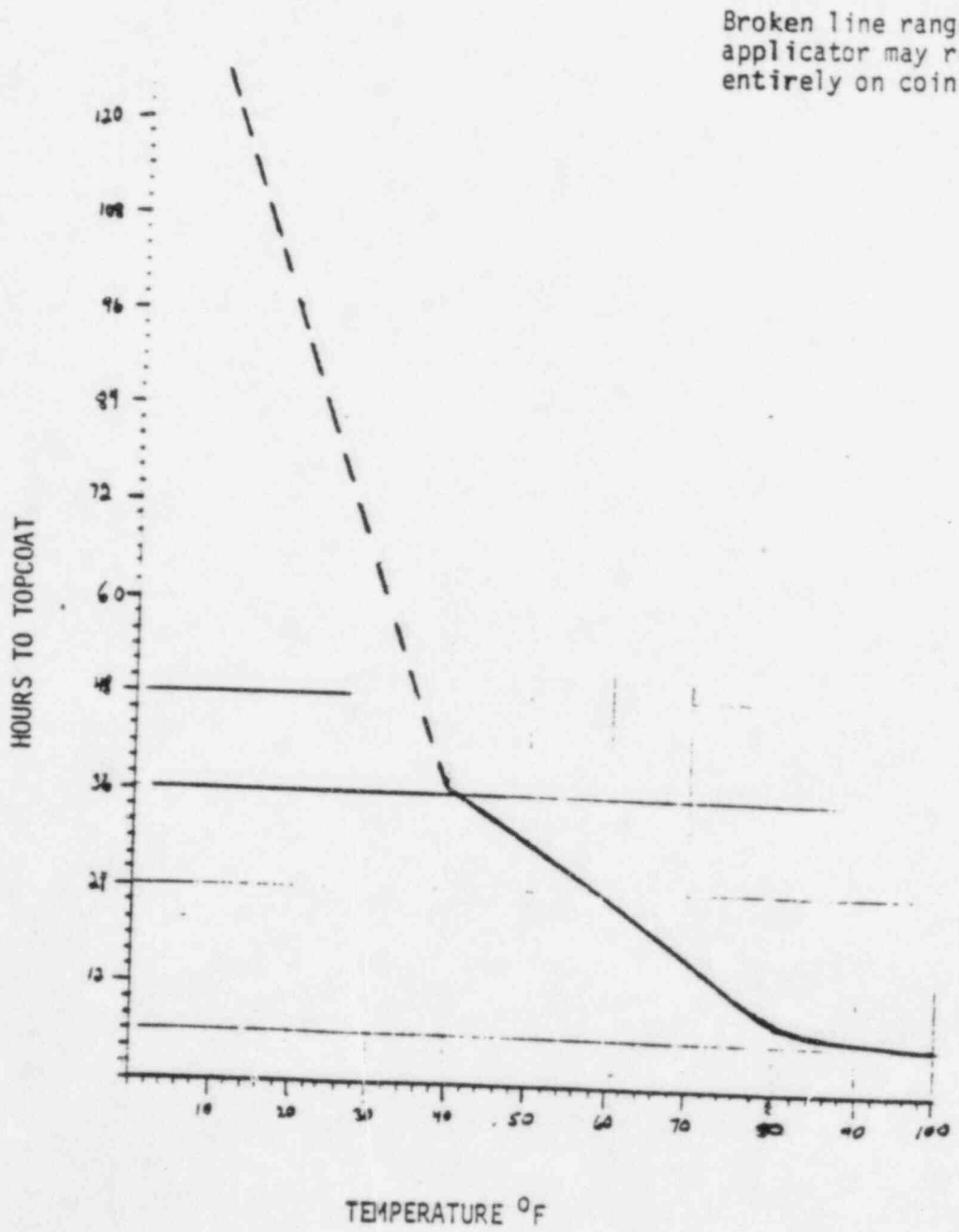
ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
25-50% R.H.

Sheet 1 of 2



ATTACHMENT 3
CZ-11 CURE TO TOPCOAT TIME
50-100% R. H.

Sheet 2 of 2



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INDEXED

July 16, 1976

REVISION 6, November 22, 1978

ICN #1
DCN #2
DCN #3
DCN #4

VOID

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

CONSTRUCTION PROCEDURE

35-1195-CCP-30

COATING STEEL SUBSTRATES INSIDE REACTOR BUILDING AND RADIATION AREAS

APPROVED BY:

J. H. Magner 11/28/78
Date

J. H. Magner

Project Chief Engineer

APPROVED BY:

U. D. Douglas 11/22-78
Date

U. D. Douglas

Construction Project Manager

PREPARED BY:

11/27/78
Date

D. G. Sutton/G. McPhail

Civil Engineers

REVIEWED BY:

11-29-78
Date

11-28-78

Quality Assurance

BROWN & ROOT, INC.
HOUSTON, TEXAS

VOID

ARMS
INDEXED
DATE

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 4

This notice applies to Construction Procedure No. 35-1195-CCP-30 Revision 6.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace Pages 8 of 17 and 11 of 17 with the attached.

Reason for change: Carboline Corp. allows the use of up to 2 quarts per gallon of the appropriate thinner for Carbozine 11 or Phenoline 305.

This change approved by:

Mark Wells 10/27/80
Originator Date

Reviewed by:

N/A
Brown & Root Quality Assurance Date

J R Arsenault 10/29/80
TUGCO Quality Assurance Date

Reviewed by:

D Clanhum 11-4-80
Construction Project Manager Date

November 7, 1980
Effective Date

ARMS
INDEXED

DATE

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 3

This notice applies to Construction Procedure No. 35-1195- CCP-30 Revision 6.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace Page 10 of 17 with the attached.

Reason for change: To broaden the scope of Section 4.4.1.5.

This change approved by:

Mark G Wells 10/3/80
Originator Date

Reviewed by:

N/A
Brown & Root Quality Assurance Date

10/3/80
TUGCO Quality Assurance Date

Reviewed by:

Construction Project Manager Date

October 6, 1980
Effective Date

ARMS
INDEXED

JOB 35-1195
Comanche Peak Steam Electric Station

DATE

Construction Procedure
DOCUMENT CHANGE NOTICE NUMBER 2

This notice applies to Construction Procedure No. 35-1195-CCP-30 Revision 6.

This change will be incorporated in the next revision of the procedure.

Change the procedure as follows:

Replace Page 12 of 17 with the attached.

Reason for change: Clarification of requirements.

This change approved by:

D. D. Sutton 8/28/80
Originator Date

Reviewed by:

W/A 8/29/80
Brown & Root Quality Assurance Date

JR Wainwright 8/29/80
TUGCO Quality Assurance Date

Reviewed by:

9/2/80
Construction Project Manager Date

9/2/80
Effective Date

ARMS
INDEXED

JOB 35-1195
COMANCHE PEAK STEAM ELECTRIC STATION

DATE:

INTERIM CHANGE NOTICE NUMBER 1

This notice applies to: 35-1195-CCP-30, Revision 6.

The intent of this change will (XX) / will not ( ) be incorporated in the next revision to the procedure or instruction.

This Change applies:
Until Further Notice ( ) Until the next Revision is Issued (XX)
Only as follows:

CHANGE THE PROCEDURE/INSTRUCTION AS FOLLOWS:

Delete sentence from paragraph 3.6.1:

"A log of all procedures ... Mechanical Engineer".

Reason for change: To delete unnecessary requirement.

This change approved by:

Department Head — Date

Quality Assurance — Date 1/10/80

Reviewed By:

Procedures & Reports — Date 1-7-1980

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NOTE

This document has been completely retyped for convenience in issuing Revision 6. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 6.

1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Surface preparation of the seal coat prior to finish coating shall consist of solvent wiping if exposed longer than 30 days. Finish coating shall be applied when convenient prior to completion of the building ----or, prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

2. DEFINITIONS OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS

2.2.1 (NONE)

2.3 SYMBOLS

2.3.1 (NONE)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by the Paint Superintendent or his representative in the use of the produce as consistent with carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings, when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Safety Department Representative who will be present to establish the frequency of monitoring of the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet and dry film gauges. Viscosity measuring devices will not

be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be done in accordance with Brown & Root Construction Procedure ACP-3. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110° F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours is acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field; due to limited shelf-life this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the same container cannot be resealed and returned to "Q" storage area. Containers opened and partially used in the "Q" paint storage area may be resealed and the contents used for later "Q" painting. The contents from partially used containers will not be reused after a period of one week has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mechanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Project Mechanical Engineer. The following information shall be filled out on each procedure.

3.6.2 Each procedure shall be given an unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.9.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a non-conforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4. PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5° F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP10, "Near White Blast Cleaning", hand, or power tool grinding and scaling to achieve a 1-3 mil profile. After sand blasting, hand or power tool grinding and scaling, the surface to be primed shall be air blasted and/or solvent wiped to remove all sand and foreign materials. This shall be done until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Suffi-

cient time shall be provided to allow suspended particles to settle before beginning primer placement. If rust forms after blast cleaning, the surface shall be "shower blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows: Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Drop back approximately 12" - 18" on the primer when applying the seal-coat.

4.1.2 Removal of Weld Spatter and Other Minor Surface Imperfections (NOT TO EXCEED .031" FOR CONTAINMENT LINERS) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2, and SP-3. In areas where grinding and needle scaling is required, this will be witnessed by a Brown & Root QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date. All edges, protrusions, and peaks shall be ground smooth to a rounded contour; as a guide 1/8-inch radius of the contour may be used.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting, hand, or power tool grinding, and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be equivalent to a near white blast SP-10 specification with no size limitation as long as the millage requirements are obtained.

4.2.2 The ambient temperature and relative humidity should be measured to determine the dew point temperature. Phenoline 305 finish coat should not be applied unless the substrate temperature is more than 5° F above the dew point.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number, October 76-N, except recoating mixes (refer to Section 4.4.1.2). Primer coat shall be grey or green.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be as required by the governing specification. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, (except recoating mixes - refer to Section 4.4.1.4).

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to dry as much as possible. (½ hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temperature range of 0° - 200°F. Carbo-Zinc 11 may be thinned up to 2 quarts per gallon for application; however, when using higher thinning levels at or below normal temperature range, care must be taken to obtain proper film build. Above 85°F it is advisable to use up to 2 quarts per gallon to minimize dry spray. In no case shall carboline limits be exceeded.

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

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regulated pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface. Cross hatch application is permissible.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

Temperature with over 50% R.H.	Curing Time Before Topcoating
0°F.	7 days
40°F.	24 hours
60°F.	16 hours
80°F.	8 hours
100°F.	6 hours

If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray after allowing at least one hour cure after application. This shall be done as often as required using clean water having a ph range of 6 to 8. If used, a filter system will be installed in order to assure proper cleanliness of the curing water.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.0 - 4.5 mils total DFT. (Only two overcoats shall be applied.) Special attention should be given to spray application and dry film thickness. The primed surface shall not be recoated until cured per Section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin - October 76-N

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Embedded foreign particles shall be removed by abrading, if low millage or major defects result, recoat or repair per section 4.4.1.2 or section 4.4.2.9.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry as much as possible before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50° - 120°F. Phenoline 305 may be thinned up to 2 quarts of Phenoline thinner per gallon mix. The ratio of thinner to Phenoline will be that which gives the best workable mix; i.e., usually advantageous to use more thinner at lower temperatures.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90 degrees F. or 18 hours at 75 degrees F. and 50% R.H. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free time at 75 degrees and 50% R.H. is 9 hours.

7. Full cure is achieved in 7 days at 75 degrees F. and 50% R.H.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75 degress F. or 12 hours @ 90 degrees F. have elapsed.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Pheonline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged (if area is considered a major defect). Thickness shall be as required for the pertinent coating. If damage extends to metal and is considered a major defect (Refer to Section 4.4.2.9), damaged area will be blasted, hand or machine ground until bare metal is exposed. If power grinding, grind and/or needle scale until a profile of approximately one mil is achieved. All edges of existing coating around perimeter of cleaned area shall be feathered back approximately ½ inch.

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat/CZ-11 Minor Defect - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline Surface Preparation I. Spray or brush apply Phenoline 305 finish at Four mils nominal D.F.T. over the damaged area, overlap at least one inch onto the surrounding 305 finish.

4.4.2.9 Repair of Topcoat/CZ-11 Major Defects - (Major defects are defined as an area, either circular or linear, in which a ½" diameter circle could be completely inscribed at any point or along the entire length.) Spot blast or abrade, by machine or hand, the damaged area. Power tool or hand abrading must be very thorough in order to prepare the surface for Carbozinc 11 touch-up. The profile shall be equivalent to a near white SP-10 Specification. A surface roughness equivalent to a minimum of one mil blast profile shall be obtained.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inspection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

4.6 HOLD POINTS

4.6.1 Onsite receipt of coating materials.

4.6.2 Substrates before and following surface preparation.

4.6.3 Mixing and preparation of coating material for application.

4.6.4 Film characteristics after dring and curing.

4.6.5 Control of ambient conditions and surface temperatures during all phases of the coating work.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure

(CONTINUED ON NEXT PAGE)

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision

2. Steel Structures Paint Council, Volume 2, Second Edition

3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision, and 473, Latest Revision

4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"

5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department

"Q" Coating _____ ATTACHMENT 2 Sheet ____ of ____
Procedure # _____

"Non-Q" Coating _____ Rev. ____ Date _____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____ DATE: _____

Sheet ____ of _____

ATTACHMENT 2 (Continued)

Procedure # _____

Rev. ____Date_____

REQUIREMENTS (Continued)

Void Pages Per DCN #4

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number, October 76-N, except recoating mixes (refer to Section 4.4.1.2). Primer coat shall be grey or green.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be as required by the governing specification. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, (except recoating mixes - refer to Section 4.4.1.4).

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 75 feet. Care must be taken to assure that air and material pressures are adjusted to compensate the additional length of hose from 50' to 75' in length. The primer shall be allowed to dry as much as possible (½ hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F, respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temperature range of 0° - 200°F. Under other than normal conditions, it may be advisable to use more thinner to reduce dry spray. If surface temperature is above 85°F, it is advisable to use between 1 pint and 2 quarts Carboline Thinner #33 per gallon Carbo Zinc 11. In no case shall Carboline limits be exceeded.

VOID

Void per DCN 24

1. The permissible range of surface and ambient temperature shall be 50 - 120 degrees F. However, when surface temperatures are outside the range of 60 - 85 degrees F. or ambient temperature outside 65 - 85 degrees F., it is permissible to use up to two quarts of Phenoline Thinner per gallon kit of Phenoline 305. The amount of thinner used under these conditions (1 1/2 pints-2 quarts) shall be that which gives the best workable mix under the given temperature conditions, i.e., usually advantagious to use more thinner at lower temperature.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90 degrees F. or 18 hours at 75 degrees F. and 50% R.H. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free time at 75 degrees and 50% R.H. is 9 hours.

7. Full cure is achieved in 7 days at 75 degrees F. and 50% R.H.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75 degress F. or 12 hours @ 90 degrees F. have elapsed.

VOID

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Pheonline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged (if area is considered a major defect). Thickness shall be as required for the pertinent coating. If damage extends to metal and is considered a major defect (Refer to Section 4.4.2.9), damaged area will be blasted, hand or machine ground until bare metal is exposed. If power grinding, grind and/or needle scale until a profile of approximately one mil is achieved. All edges of existing coating around perimeter of cleaned area shall be feathered back approximately 2 inches.

per DCN #2

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.4.2.8 Repair of Topcoat/CZ-11 Minor Defect - (Minor defects are defined as an area, either circular or linear, in which a ½" diameter circle could not be completely inscribed at any point along the entire length.) Blast or abrade, by machine or hand, the Phenoline 305 finish surrounding the damaged area and grind any exposed steel to a bright finish. Solvent wipe the surrounding 305 finish with Carboline Surface Preparation I. Spray or brush apply Phenoline 305 finish at Four mils nominal D.F.T. over the damaged area, overlap at least one inch onto the surrounding 305 finish.

VOID

Void per DCN #3

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, blast, hand abrade or power tool grind to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin - October 76-N

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Repair of Embedded Foreign Particles - Embedded foreign particles shall be removed by abrading and recoated as outlined in Section 4.4.1.2.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using conventional, airless, brush or roller. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry as much as possible before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuitite are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

VOID

ARMS
INDEXED

July 16, 1976
DATE
REVISION 5, January 24, 1978

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

CONSTRUCTION PROCEDURE

35-1195-CCP-30

VOID

COATING STEEL SUBSTRATES INSIDE REACTOR BUILDING AND RADIATION AREAS

APPROVED BY:

P. F. Foscolo

Project Engineer

APPROVED BY:

U. D. Douglas

Construction Project Manager

PREPARED BY:

KDW D. G. Sutton

D. G. Sutton/K. D. Williams

Civil Engineers

REVIEWED BY:

for B. C. Scott

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

VOID

ARMS
INDEXED

DATE:

JOB 35-1195
COMANCHE PEAK STEAM ELECTRIC STATION

INTERIM CHANGE NOTICE NUMBER 1

This notice applies to: Construction Procedure #35-1195-CCP-30, Revision 5.

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure or instruction.

This Change applies:
Until Further Notice ( ) Until the next Revision is issued (X)
Only as follows:

CHANGE THE PROCEDURE/INSTRUCTION AS FOLLOWS:

Change the last sentence of Paragraph 4.3.1 to read as follows:

..... Carbo Zinc 11 Primer Coat shall be either grey or green.

Reason for change: Green Carbo-Zinc Primer shipped by accident. Both green and grey acceptable by Carboline Corporation

This change approved by:

W. Hamilton 9-22-78
Department Head DATE

Russell Chilson 9-22-78
Quality Assurance DATE

Reviewed By:

N. K. Hench 9-22-78
Procedures & Reports

9-22-78
Date

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 18. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	Revision 5	January 24, 1978
2 through 18	Revision 5	January 24, 1978

NOTE

This document has been completely retyped for convenience in issuing Revision 5. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 5.

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners and radiation areas in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings and radiation areas scheduled to receive protective coatings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Surface preparation of the seal coat prior to finish coating shall consist of solvent wiping if exposed longer than 30 days. Finish coating shall be applied when convenient prior to completion of the building ----or, prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

2. DEFINITIONS OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS

2.2.1 (NONE)

2.3 SYMBOLS

2.3.1 (NONE)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by Carboline in the use of their product as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 1. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort. Applicators performing work to Attachment 2 shall be qualified for "Q" coatings, when applicable.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Safety Department Representative who will be present to establish the frequency of monitoring of the coating work.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to insure efficiency of coating applications. This shall include surface profile comparators, holiday detectors, thermometers, and wet [illegible]ry film guages. Viscosity measuring devices will not

be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. After completion, each form shall be forwarded to the Brown & Root Document Control Center for filing and distribution to the various parties as listed on the distribution sheet.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be done in accordance with Brown & Root Construction Procedure ACP-3. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110° F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours is acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field; due to limited shelf-life this shall be done on a "first-in", "first-out" basis. After materials have been partially used from an individual container, the same container cannot be resealed and returned to "Q" storage area. Containers opened and partially used in the "Q" paint storage area may be resealed and the contents used for later "Q" painting. The contents from partially used containers will not be reused after a period of one week has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mehcanical, Civil, Electrical) shall complete Attachment 2 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 2 shall be maintained by the Project Mechanical Engineer. The following information shall be filled out on each procedure.

3.6.2 Each procedure shall be given an unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with sections 4.4.2.2 through 4.4.2.5.

3.7.2 The QC Inspector or his representative shall notify the responsible area engineer and/or the Paint Superintendent as soon as possible after receipt of a non-conforming item in need of paint repair to allow time for Attachment 2 preparation and a planned schedule for repair.

4. PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5° F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP10, "Near White Blast Cleaning", or power tool grinding and needle scaling to achieve a 1-3 mil profile. After sand blasting or power tool grinding and needle scaling, the surface to be primed shall be air blasted and/or solvent wiped to remove all sand and foreign materials. This shall be done

until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If rust forms after blast cleaning, the surface shall be "shower blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows: Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Drop back approximately 12" - 18" on the primer when applying the seal-coat.

4.1.2 Removal of Weld Spatter and Other Minor Surface Imperfections (NOT TO EXCEED .031" FOR CONTAINMENT LINERS) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2, and SP-3. In areas where grinding and needle scaling is required, this will be witnessed by a Brown & Root QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date. All edges, protrusions, and peaks shall be ground smooth to a rounded contour; as a guide 1/8-inch radius of the contour may be used.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting or power tool grinding and needle scaling and then by solvent wiping the area prior to replacing the primer. Power tool grinding and needle scaling should be limited to small areas.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number, October 76-N, except recoating mixes (refer to Section 4.4.1.2). Primer coat shall be grey.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be as required by the governing specification. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, (except recoating mixes - refer to Section 4.4.1.4).

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 50 feet. Equipment pressure shall be regulated to conform to manufacturer's instruction. The primer shall be allowed to dry tack free (1/2 hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F, respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temperature range of 0° - 200°F. Under other than normal conditions, it may be advisable to use more thinner to reduce dry spray. If surface temperature is above 85°F, it is advisable to use between 1 pint and 2 quarts Carboline Thinner #33 per gallon Carbo Zinc 11. In no case shall Carboline limits be exceeded.

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

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regulated pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

Temperature with over 50% R.H.	Curing Time Before Topcoating
0°F.	7 days
40°F.	24 hours
60°F.	16 hours
80°F.	8 hours
100°F.	6 hours

If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray after allowing at least one hour cure after application. This shall be done as often as required using clean water having a ph range of 6 to 8. If used, a filter system will be installed in order to assure proper cleanliness of the curing water.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.0 - 4.5 mils total DFT. (Only one overcoat shall be applied.) The primed surface shall not be recoated until cured per Section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, a blast and/or power tool grinding to near white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin - October 76-N

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Repair of Embedded Foreign Particles - Embedded foreign particles shall be removed by abrading and recoated as outlined in Section 4.4.1.2.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry until it is tack-free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50 - 120 degrees F. However, when surface temperatures are outside the range of 60 - 85 degrees F. or ambient temperature outside 65 - 85 degrees F., it is permissible to use up to two quarts of Phenoline Thinner per gallon kit of Phenoline 305. The amount of thinner used under these conditions (1 1/2 pints-2 quarts) shall be that which gives the best workable mix under the given temperature conditions, i.e., usually advantagious to use more thinner at lower temperature.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90 degrees F. or 18 hours at 75 degrees F. and 50% R.H. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free time at 75 degrees and 50% R.H. is 9 hours.

7. Full cure is achieved in 7 days at 75 degrees F. and 50% R.H.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer by power tool grinding followed by solvent wiping. If no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Reapir of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinholes and discontinuities. Recoating shall not be performed until 18 hours @ 75 degress F. or 12 hours @ 90 degrees F. have elapsed.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thinned down Pheonline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged. Thickness shall be as required for the pertinent coating. If damage extends to metal, damaged area will be blast cleaned or power ground with a carborondum wheel until bare metal is exposed. If power grinding, grind and/or needle scale until a profile of approximately one mil is achieved. All edges of existing coating around perimeter of cleaned area shall be feathered back approximately 2".

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.5 FINAL ACCEPTANCE TESTING

4.5.1 After coating system cure, final inpsection, and resolution of all discrepancies is completed, the QC Inspector shall document the final acceptance by completing and signing the final acceptance record and will transmit a copy of this record to the B&R Paint Superintendent as soon as possible after final acceptance is made.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Painter Qualification Record
2. Special Coating Procedure

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. Steel Structures Paint Council, Volume 2, Second Edition
3. Carboline Corporation "Application Instructions", October 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision, and 473, Latest Revision
4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"
5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department

"Q" Coating _____ ATTACHMENT 2 Sheet ____ of ____
Procedure # _____

"Non-Q" Coating _____ Rev. ____ Date _____

SPECIAL COATING PROCEDURE NO. _____

SCOPE _____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____ DATE: _____

Sheet ____ of _____

ATTACHMENT 2 (Continued)

Procedure # _____

Rev. ____Date_____

REQUIREMENTS (Continued)

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INDEXED

July 16, 1976

REVISION 4, October 3, 1977

ICN 1
ICN 2

JOB 35-1195

COMANCHE PEAK STEAM ELECTRIC STATION

CONSTRUCTION PROCEDURE

35-1195-CCP-30

VOID

COATING STEEL SUBSTRATES INSIDE REACTOR BUILDING

VOID

APPROVED BY:

M. E. Hogg

Project Engineer

APPROVED BY:

H. C. Dodd, Jr.

Construction Project Manager

PREPARED BY:

D. G. Sutton

Civil Engineer

REVIEWED BY:

for P. L. Bussolini

Quality Assurance

BROWN & ROOT, INC.

HOUSTON, TEXAS

VOID

ARMS
INDEXED

JOB 35-1195
Comanche Peak Steam Electric Station

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 2 DATE: 2

This notice applies to Construction Procedure No. 35-1195- CCP-30 , Revision 4 .

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued (X)
Only as follows:

Change the procedure as follows:

Add the following sentence to section 4.4.2.5:

.....one mil is achieved. "Alternatively, the profile may be achieved by mechanical roughening with needle scalers."

Reason for change: To eliminate spot blasting for repair areas.

This change approved by:

Department Head

Quality Assurance

Reviewed By:

Procedures & Reports

Jan. 13, 1978
Date

ARMS
INDEXED

JOB 35-1195
Comanche Peak Steam Electric Station

DATE:

Construction Procedure
INTERIM CHANGE NOTICE NUMBER 1

This notice applies to Construction Procedure No. 35-1195- CCP-30 , Revision 4 .

The intent of this change will (X) / will not ( ) be incorporated in the next revision to the procedure.

This Change applies:
Until Further Notice ( ) Until the next revision is issued (X)
Only as follows:

Change the procedure as follows: Change title to read : Coating Steel Substrates Inside the Reactor Buildings and Radiation Areas. Change first sentence of Section 1.1.1 to read as follows: ... applied to the containment liners and radiation areas, in accordance with specification ..... Change the first sentence of Section 1.2.1 to read as follows: ... inside the Reactor Buildings and Radiation Areas scheduled to receive protective coatings.

Reason for change: To broaden the scope of CCP-30 to permit coating of radiation areas outside the Reactor Buildings.

This change approved by:

Mr. Bee for Hoog
Department Head

Quality Assurance

Reviewed By:

N.H. Hench
Procedures & Reports

Nov 23, 1977
Date

LIST OF EFFECTIVE PAGES

The total number of pages in this document is 20. The page numbering sequence and revision status of each page is as follows:

PAGE	REVISION STATUS	DATE
Title	Revision 4	October 3, 1977
2 through 20	Revision 4	October 3, 1977

NOTE

This document has been completely retyped for convenience in issuing Revision 4. Vertical lines (change bars) appearing in the margin indicate what information was actually changed, added, or deleted by Revision 4.

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1. INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this procedure is to establish the methods by which the prime and finish coats are to be applied to the containment liners, in accordance with specification, drawing, and manufacturer's requirements. This procedure may also be used for coating any steel substrate inside the reactor buildings scheduled to receive Carbo Zinc 11 primer and Phenoline 305 finish coat.

1.2 SCOPE

1.2.1 The scope of this procedure covers the surface preparation and coating of Unit 1 and 2 steel substrates inside the reactor buildings.

1.3 GENERAL DISCUSSION

1.3.1 All coating materials covered by this procedure shall be as manufactured by Carboline Corporation of St. Louis, Missouri. The coating system will consist of a prime coat of Carbo Zinc 11 with a finish coat of Phenoline 305. In order to protect the prime coat from prolonged exposure, a seal coat consisting of approximately one mil of Phenoline 305, thinned in accordance with Section 4.4.2.4, may be applied over the prime coat. Surface preparation of the seal coat prior to finish coating shall consist of solvent wiping if exposed longer than 30 days. Finish coating shall be applied when convenient prior to completion of the building ----or, prior to placement of concrete, equipment, or obstructions which would make finish coating impossible.

2. DEFINITIONS OF TERMS, ABBREVIATIONS AND SYMBOLS

2.1 TERMS

2.1.1 Substrate - The uncoated surface to which a coating is applied.

2.2 ABBREVIATIONS

2.2.1 (NONE)

2.3 SYMBOLS

2.3.1 (NONE)

3. SPECIAL ITEMS AND OPERATIONS

3.1 QUALIFICATION OF PERSONNEL

3.1.1 Coating application personnel shall be qualified per previous experience and practical application. In addition, each painter shall have been instructed by Carboline in the use of their product as consistent with Carboline's training procedures, which includes both classroom instruction and a field application demonstration. This shall be verified by completing a form similar to Attachment 2. This form shall be executed by the B&R Paint Superintendent or his representative. A coating manufacturer's representative will be available for technical supervision upon initial painting effort.

3.2 SAFETY REQUIREMENTS

3.2.1 All appropriate health, safety, and fire protection requirements pertaining to surface preparation and coating application shall be followed. It shall be the responsibility of the Paint Superintendent to carry out actions as required by the Safety Department Representative who will be present to monitor and enforce safety during blasting, solvent cleaning, and coating application.

3.3 INSTRUMENTS AND THEIR USE

3.3.1 The painting Foreman and General Foreman shall have access to and be familiar with the use of all instruments necessary to complete the documents listed under Section 5.1. This shall include surface profile comparators, holiday detectors, thermometers, wet and dry film guages, and a psychrometer for measuring relative humidity. Viscosity measuring devices will not

be used. Wet film gauges will be randomly used during coating application as an aid to field personnel on Phenoline 305 only. Readings will be limited to the minimum necessary to control coating thickness.

3.4 DOCUMENTATION

3.4.1 Records shall be maintained on all attachments listed in Section 5.1. The Superintendent in charge of painting, or his representative, shall assure that all necessary forms are completed by the appropriate personnel. After completion, each form shall be forwarded to the Brown & Root Quality Control Department for filing and distribution to the various parties as listed on the distribution section.

3.5 RECEIVING, STORING AND DISPENSING OF COATING MATERIALS

3.5.1 Receiving and Storage - Upon receipt of a shipment of coating materials, the B&R QC Representative accepting shipment shall be responsible for completing all necessary receiving inspection documentation. General receiving procedures shall be done in accordance with Brown & Root Construction Procedure ACP-3. It shall then be segregated from Non-"Q" materials and stored in the paint storage building where temperatures will be maintained between 45° - 110°F. Infrequent dips in air temperature in storage areas as low as 32°F for up to 24 hours is acceptable. Temporary storage may be required at the receiving warehouse due to receiving or other problems.

3.5.2 Dispensing - When coating materials are needed in the field, they shall be transferred from the controlled storage area to temporary storage in the field; due to limited shelf-life this shall be done on a "first-in", "first-out" basis. At the time of issuance Attachment 1 shall be used to verify the issuance of paint from each individual batch. After materials have been partially used from an individual container, the same container cannot be resealed and returned to "Q" storage area. Containers opened and partially used in the "Q" paint storage area may be resealed and the contents used for later "Q" painting. The contents from partially used containers will not be reused after a period of one week has elapsed from date of initial opening.

3.6 SPECIAL COATING PROCEDURE

3.6.1 When items require special coating not covered under the content of this document, the appropriate Project Engineer (Mehcanical, Civil, Electrical) shall complete Attachment 4 and transmit it to the Paint Superintendent. A log of all procedures from Attachment 4 shall be maintained by the Project Mechanical Engineer. The following information shall be filled out on each procedure.

3.6.2 Each procedure shall be given an unique number. The scope will describe the working limits of the procedure with detailed work requirements being listed under the requirements section. The approvals section shall have signatures of the following: Project Discipline Engineer (Mechanical, Civil, etc.), QA Manager if coating of item is safety related, TUSI representative when required, Engineer who prepared document, and a revision number and date. Upon completion of the document, distribution shall be made to all holders of this procedure.

3.7 TOUCH-UP AND FINISH COATING OF VENDOR APPLIED COATINGS

3.7.1 Prior to touch-up of primer or application of topcoat, an adhesion test shall be performed by the Brown & Root QC Department. If results are acceptable, work may proceed in accordance with section 4.4.2.5.

4. PROCEDURE FOR COATING

4.1 PREPARATION OF SUBSTRATES AND COATING MATERIALS

4.1.1 Surface Preparation for Primer - Under normal conditions, surface preparation shall not begin unless the temperature of the surface to be blasted is 5° F above the dew point. If needed, the surface to be primed shall then be cleaned of any heavy oil or grease deposits in accordance with SSPC-SP10, "Near White Blast Cleaning", to achieve a 1-3 mil profile. After sand blasting, the surface to be primed shall be air blasted to remove all sand and foreign materials. This shall be done

until the surface is clean and will not be performed where air-borne contaminants could adhere to tacky paint. Sufficient time shall be provided to allow suspended particles to settle before beginning primer placement. If rust forms after blast cleaning, the surface shall be "shower blast" cleaned before painting. Under no case will a blast cleaned surface be exposed for more than 24 hours prior to priming. When applying coatings that will be joined together by a later coating operation, the interface shall be constructed as follows: Overblast the steel to near white metal approximately 12" - 18" beyond the point which will receive primer. Drop back approximately 12" - 18" on the primer when applying the seal-coat.

4.1.2 Removal of Weld Spatter and Other Minor Surface Imperfections (NOT TO EXCEED .031" FOR CONTAINMENT LINERS) - If needed, weld spatter omitted by others will be removed by Painting Personnel in accordance with SSPC-SP-2 and SP-3. In areas where grinding is required, this will be witnessed by a Brown & Root QC Representative. If it is determined that surface defects are severe enough to require later repair, then the area to be repaired will be blocked out and spot painted at a later date. All edges, protrusions, and peaks shall be ground smooth to a rounded contour; as a guide 1/8-inch radius of the contour may be used.

4.2 SURFACE PREPARATION FOR FINISH COAT

4.2.1 Surface preparation for the finish coat shall consist of the removal, if needed of any oil or grease. This shall be accomplished by use of a manufacturer recommended cleanser or cleansing method on areas that have been seal-coated. On areas where the Carbo Zinc 11 primer is exposed, oil and grease will be removed by sand blasting and then solvent wiping the area prior to replacing the primer.

4.3 PREPARATION OF COATING MATERIALS

4.3.1 Primer - The primer, Carbo Zinc 11, is packaged in a two component kit consisting of a base and zinc filler. The base shall be thoroughly mixed first. Zinc filler shall then be added under constant agitation and mixed until free of lumps. Partial mixes shall be mixed by weight in a proportion of 10 parts base to 22 parts zinc filler using a suitable scale to achieve a plus or minus 2 percent accuracy. The mixture shall then be strained through a 30-mesh screen. Viscosity shall be controlled by adding thinner as required up to the maximum allowed by the latest revision of Carboline publication number, October 76-N, except recoating mixes (refer to Section 4.4.1.2). Primer coat shall be grey.

4.3.2 Finish Coat - The finish coat consists of Phenoline 305, to which is added a catalyst. This shall be thoroughly mixed while combining in a ratio, by volume, of four parts Phenoline 305 to one part catalyst; the finish color shall be as required by the governing specification. Viscosity control shall be accomplished by adding thinner up to the maximum amount permitted by the latest revision of Carboline Publication Number 473, (except recoating mixes - refer to Section 4.4.1.4).

4.4 APPLICATION OF PRIME AND FINISH COATING

4.4.1 Prime Coat

4.4.1.1 Coating material shall be applied using conventional spray equipment with agitated pressure pots having a maximum hose length of 50 feet. Equipment pressure shall be regulated to conform to manufacturer's instruction. The primer shall be allowed to dry tack free (1/2 hr. min. @ 70°F, 50% R.H.) before start of other construction operations which could create contamination problems. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall also be followed:

1. Normal conditions of ambient and surface temperature shall be 40° - 95°F and 40° - 110°F, respectively; however, primer may be applied within an ambient range of 0° - 130°F and a surface temperature range of 0° - 200°F. Under other than normal conditions, it may be advisable to use more thinner to reduce dry spray. If surface temperature is above 85°F, it is advisable to use between 1 pint and 2 quarts Carboline Thinner #33 per gallon Carbo Zinc 11. In no case shall Carboline limits be exceeded.

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

3. Thickness of prime coat shall be a minimum of 2 mils and a maximum of 4.5 mils. Minimum and maximum spot test values shall be 1.5 and 5.5 mils respectively.

4. A double regualted pot having a adequate air volume supply shall be used.

5. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

6. Curing time shall be as follows, depending upon approximate temperature and relative humidity conditions:

Temperature with over 50% R.H.	Curing Time Before Topcoating
0°F.	7 days
40°F.	24 hours
60°F.	16 hours
80°F.	8 hours
100°F.	6 hours

If required, the cure of Carbo Zinc 11 may be accelerated by use of water spray after allowing at least one hour cure after application. This shall be done as often as required using clean water having a ph range of 6 to 8. If used, a filter system will be installed in order to assure proper cleanliness of the curing water.

4.4.1.2 Recoating of Carbo Zinc 11 Primer - Prior to recoating, the entire primed surface to be recoated will be wiped with clean rags moistened with Carboline Thinner #33. Wiping will continue until no discoloration is noticed on the rags. Carbo Zinc 11 shall then be thinned by using two quarts Carboline Thinner #33 per gallon. This will be applied in order to achieve 2.0 - 4.5 mils total DFT. (Only one overcoat shall be applied.) The primed surface shall not be recoated until cured per Section 4.4.1.1.6.

4.4.1.3 Repair of Sags and Runs - Sags or runs in excess of 5.5 mils will be abraded with an aluminum screen or sandpaper to 2.0 to 5.5 mils. Sags or runs 5.5 mils or less which show no evidence of mud-cracking will not be repaired. If coating surface is satisfactory after abrading, then finish coat may be applied; however, if coating surface is unsatisfactory, a blast to white metal is required and primer coat re-applied. A satisfactory coating is considered one having no mud-cracking to the metal surface as visible to the unaided eye.

4.4.1.4 Brush touch-up painting shall be done on the prime coat in accordance with the following:

Prime Coat:

1. Carboline Application Instructions (Carbo Zinc 11) Bulletin - October 76-N

2. Carboline Product Data Sheet (Carbo Zinc 11) Bulletin - October 76-N. Brush touch-up allowed on areas one square foot or less.

4.4.1.5 Repair of Embedded Foreign Particles - Embedded foreign particles shall be removed by abrading and recoated as outlined in Section 4.4.1.2.

4.4.1.6 Treatment of Rust Stains - Remove residue, though not necessarily the stain, with bristle brush and water or Carboline Thinner #33. Allow to dry thoroughly.

4.4.2 Finish Coat

4.4.2.1 Finish coating shall be applied using the same or similar type of equipment as used for the prime coat. Weld seams may be given an initial coat of 1-2 mils finish coating thinned by using two quarts Phenoline Thinner per each gallon kit Phenoline 305. The material shall be allowed to dry until it is tack-free before any other construction operations proceed which could create contamination problems by dust or other foreign matter. A continuity check shall be performed in accordance with NACE T-6F-3 Condition "C". No gross discontinuities are acceptable such as holidays, voids, skips, bubbles, and misses. Any runs or sags having a detrimental effect on the coating system shall be removed and repaired. The following application parameters shall govern:

1. The permissible range of surface and ambient temperature shall be 50 - 120 degrees F. However, when surface temperatures are outside the range of 60 - 85 degrees F. or ambient temperature outside 65 - 85 degrees F., it is permissible to use up to two quarts of Phenoline Thinner per gallon kit of Phenoline 305. The amount of thinner used under these conditions (1 1/2 pints-2 quarts) shall be that which gives the best workable mix under the given temperature conditions, i.e., usually advantagious to use more thinner at lower temperature.

2. Minimum and maximum values of relative humidity shall be 0% and 85% respectively.

3. Thickness of coating shall be minimum of 2.5 mils and a maximum of 5.5 mils. Minimum and maximum spot test values shall be 1.9 and 6.5 mils respectively.

4. Coating material shall be applied using a 50% overlap with each pass while holding the gun 8-10 inches from the surface.

5. Recoating time of Phenoline 305 is 12 hours at 90 degrees F. or 18 hours at 75 degrees F. and 50% R.H. Phenoline 305 thinned at two quarts Phenoline Thinner per gallon kit may be recoated after four hours. After 30 days it shall be solvent wiped prior to recoating with Phenoline 305 Thinner.

6. Tack free time at 75 degrees and 50% R.H. is 9 hours.

7. Full cure is achieved in 7 days at 75 degrees F. and 50% R.H.

4.4.2.2 Repair of Runs and Sags - Runs or sags will be abraded until the DFT of the Phenoline 305 is within 1.9 - 4.5 mils. If cracks are visible, then runs and sags will be removed to primer; if no cracking occurs, top coat will be considered acceptable. Area will be recoated as outlined in the Repair of Pinholes and Discontinuities (Section 4.4.2.4).

4.4.2.3 Repair of Embedded Foreign Particles - Foreign particles shall be removed by abrading and then recoated as outlined in the repair of pinhoes and discontinuities. Recoating shall not be performed until 18 hours @ 75 degrees F. or 12 hours @ 90 degrees F. has elapsed.

4.4.2.4 Repair of Pinholes and Discontinuities - Loose particles shall be removed by brushing or vacuum. The entire area shall then be solvent wiped using Phenoline 305 Thinner and recoated using thineed down Pheonline 305 consisting of two quarts Phenoline Thinner per each gallon kit of Phenoline 305 applied at approximately 1-2 mils DFT. (See Section 4.4.2.3 for recoating time.)

4.4.2.5 Repair of Scratches and Damaged Areas - Any scratches or damaged areas will be abraded until loosely adherent particles are removed. The area will then be solvent wiped (Carboline Thinner #33 for primer. Phenoline Thinner for topcoat) and repaired with appropriate coating, i.e., Phenoline 305 if damage does not extend to primer; Carbo Zinc 11 and Phenoline 305 if primer is damaged. Thickness shall be as required for the pertinent coating. If damage extends to metal, damaged area will be blast cleaned or power ground with a carborondum wheel until bare metal is exposed. If power grinding, grind until a profile of approximately one mil is achieved All edges of existing coating around perimeter of cleaned area shall be feathered back approximately 2".

4.4.2.6 Brush touch-up painting shall be done on the finish coat in accordance with the following:

1. Carboline Application Instructions (Phenoline 305) Bulletin 775.

2. Carboline Product Data Sheet (Phenoline 305 Primer and Finish) Bulletin 473. Brush touch-up and complete application is allowed with no area restrictions.

4.4.2.7 Treatment of Rust Stains - If surface is contaminated with rust stains or minute metallic particles, then surface shall be prepared by solvent wiping with Phenoline 305 Thinner and overcoating with a coat of Phenoline 305 prepared in accordance with Section 4.4.2.4.

4.5 TESTING

4.5.1 All testing as performed by the B&R Foremen, General Foremen or their Representatives shall be performed in order to complete the necessary referenced documents and to insure that proper application procedures are being followed. All other testing shall be the responsibility of the Brown & Root Quality Control Department. After coating system cure, final inspection, and resolution of all discrepancies is completed. The QC Inspector shall document the final acceptance by completing and signing the final acceptance record.

5. SUPPORTING INFORMATION

5.1 ATTACHMENTS

1. Coating Materials - Warehousing Record
2. Painter Qualification Record
3. Coating Applicator's Coating Record
4. Special Coating Procedure

5.2 REFERENCES

1. Gibbs & Hill Specification 2323-SS-14, "Containment Steel Liner", Latest Revision
2. Steel Structures Paint Council, Volume 2, Second Edition
3. Carboline Corporation "Application Instructions", Ocotober 76-N Revision and Bulletin Number 775 - data sheets October 76-N Revision, and 473, Latest Revision
4. ANSI N 101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities"
5. Gibbs & Hill Specification 2323-AS-31, "Protective Coatings", Latest Revision

6. Gibbs & Hill Specification 2323-MS-101, "Equipment Erection", Latest Revision

7. Gibbs & Hill Specification 2323-MS-43B, "Nuclear Piping", Latest Revision

8. Gibbs & Hill Specification 2323-MS-44B, "Non-Nuclear Piping"

9. Gibbs & Hill Specification 2323-MS-100, "Piping Erection"

10. Gibbs & Hill Specification 2323-SS-17, "Miscellaneous Steel", Latest Revision

ATTACHMENT 1

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Materials - Warehousing Record

(To be used by Painting Dept. when issuing paint)

GENERAL DATA

Date _____ Report No. _____ Purchase Order No. _____

TECHNICAL DATA

Coating Manufacturer _____

Product Name & Number _____

Batch Number _____ Expiration Date _____

Gallons Received _____ Date Received _____

Date	Storage Temperature o F (Rpt. Daily-if uncontrolled)	Number Gallons Withdrawn	Number Gallons Remaining	Remarks

Signature/Title _____

Distribution: Painting Supt.
Q.C. Department

ATTACHMENT 2

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Painter Qualification Record

GENERAL DATA

Date _____ Report Number _____

_____

_____

TECHNICAL DATA

Name of Painter _____

Summary of Field Experience _____

_____

_____

Experience with Following Product Types _____

_____

_____

Application Test for Specified Substrate _____

_____

_____

Additional Qualifications (School) _____

_____

Signature _____
Applicator's Field Supervisor

Distribution: Painting Supt.
Q.C. Department

ATTACHMENT 3

BROWN & ROOT, INC.
COMANCHE PEAK STEAM ELECTRIC STATION

Coating Applicator's Coating Record

GENERAL DATA

Date _____ Report No. _____ Unit No. _____ Shift No. _____

TECHNICAL DATA

Applicator _____ Inspector _____

Location of Work _____

Drawing Number(s) (If available) _____

Type of Coating PRIME ____ INT.COAT ____ FIN. COAT ____ Surface Prep. _____

Coating Batch Numbers

Description _____

Comp. A _____

Comp. B _____

Thinner _____

Coating Equipment

Spray gun type _____

Fluid tip type _____

Air cap type _____

Spray pot type _____

Moisture Separator Used & Type _____

Applicator's Signature/Title _____

Foreman's Signature _____

Distribution: Paint Supt.
Q. C. Department
Civil Eng.

"Q" Coating _____ ATTACHMENT 4 Sheet ____ of ____
Procedure #_____

"Non-Q" Coating _____ Rev.____Date_____

SPECIAL COATING PROCEDURE NO. _____

SCOPE_____

_____

_____

REQUIREMENTS:

_____

REFERENCE DOCUMENTS

APPROVALS

PDE _____

QA/QC _____

TUSI _____

ENGINEER _____

REV. _____DATE: _____

Sheet ____ of _____

ATTACHMENT 4 (Continued)

Procedure # _____

Rev. ____Date_____

REQUIREMENTS (Continued)