WPPSS	WASHINGTON PUBLIC POWER SUPPLY SYSTEM REVERIFICATION INSTRUCTION	NO. QVI-09 REV. NO. 1 EFFECTIVE DATE 3/16/83 QUALITY AFFECTING [X] YES [ ] NO

TITLE

SPECIAL STRUCTURAL STEEL REINSPECTION CRITERIA

1.0 PURPOSE/SCOPE

This instruction describes the criteria to be used to determine the significance of discrepancies discovered during the reverification inspections of structural steel welding at WNP-2.

2.0 DEFINITIONS

- o Visual Examination Acceptance Criteria - A set of "fitness-for-use" inspection criteria for determining whether welded structural components are adequate for their intended purpose. Such criteria shall be approved by the Architect Engineer in accordance with Paragraphs 3.7.4 and 3.7.5 of AWS D1.1, the Structural Welding Code, 1972 Edition.

- o Structural Steel - For the purpose of this instruction, structural steel includes pipe supports, hangers, ductwork, stiffeners, cable trays, unistrut, brackets and similar components, as well as structural shapes and plates and miscellaneous steel.

3.0 PROCEDURE

Responsibility		Action
Reverification Inspection Team	.1	Inspects the welded structures for conformance with the requirements of the drawings, specifications, codes and standards, except as modified herein. The visual Examination Acceptance Criteria identified in Attachment 2, shall be used in lieu of the acceptance criteria specified in AWS D1.1. The justification for these criteria is included as Attachment 1 to this instruction.
	.2	Records the results of the inspections in accordance with QVI-08.

4.0 REFERENCES

4.1 Quality Verification Program QVI-01

4.2 American Welding Society Structural Welding Code D1.1, 1972 Edition

4.3 Reverification Inspection Team Concept, QVI-08

5.0 ATTACHMENTS

5.1 Justification For WNP-2 Visual Examination Acceptance Criteria

5.2 WNP-2 Visual Examination Acceptance Criteria For Reverification Inspection Of Welded Structures

JUSTIFICATION FOR WNP-2 VISUAL EXAMINATION ACCEPTANCE CRITERIA

1.0 JUSTIFICATION FOR VISUAL ACCEPTANCE CRITERIA

The use of the AWS D1.1 code for the WNP-2 Plant was specified by the Engineer as the applicable structural welding code on behalf of the Owner, and as such AWS D1.1-72 is identified in the FSAR. Unlike the ASME code, the use of the code is not a mandatory State or NRC regulatory requirement. The Engineer has the authority under the AWS code to modify selected provisions of the AWS code to suit a particular application.

It is important to understand that the AWS D1.1 code is the applicable structural code for both completed work (first-line inspection) and on-going construction. Site construction and inspection procedures require that welds be made to the applicable AWS criteria and that the first-line inspection be performed in accordance with the AWS D1.1 code. In cases where deviations are evaluated by the Engineer to be non-significant in terms of the ability of the component to perform its designed function, the Engineer has the authority to disposition the deviation "accept-as-is" as appropriate, or compensate for the deviation by additional evaluation or have construction performed to an approved, revised design.

During the initial QVP reinspection of completed work, a number of minor deviations with respect to some AWS criteria were encountered which were evaluated by the Engineer as acceptable in certain categories of application. Since the specific deviations had been evaluated by the Engineer to be acceptable for these categories of application, the processing of additional deviations of the same type in the same categories served no purpose.

Thus, a generic disposition was developed by the Engineer for acceptance of specified deviations from the AWS D1.1, 1972 code in selected applications. This generic disposition has taken the form of a revised inspection criteria for use by the QVP for reinspection of completed work. These criteria are embodied within the reverification inspection requirements in Attachment 2 of QVI-09.

QVI-09
Rev. 1

WNP-2 PROJECT

VISUAL EXAMINATION ACCEPTANCE CRITERIA

FOR

REVERIFICATION INSPECTION

OF

WELDED STRUCTURES

Approved: _____
Burns & Roe, Inc.

Date: 3-17-83

Attachment 2
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1.0 SCOPE

This document provides visual examination acceptance criteria for reverification inspection of structural steel and miscellaneous metal welding performed in accordance with AWS D1.1, the Structural Welding Code. These criteria reflect requirements consistent with the engineering approval specified in AWS D1.1 for evaluation of structural welding. This document also includes acceptance standards for light gauge HVAC ductwork, and other systems which are not specifically covered by AWS D1.1.

1.1 These criteria shall be used by Construction Quality Control for performing reverification inspection by including it on the QCIR as an applicable inspection reference criteria document to evaluate deviations to AWS D1.1.

2.0 CODES AND STANDARDS

The criteria in this document provide the basis for visual examination of AWS D1.1 welding. The required engineering approval, as specified in Paragraphs 3.7.4 and 3.7.5 of AWS D1.1 has been provided by the Architect Engineer. Authorization for this is given in Paragraph 1.1 of AWS D1.1.

3.0 BASIS FOR EVALUATION

The applicable weld categories will be entered on the QCIR as a part of the inspection reference criteria based upon the definitions described below.

3.1 Category A Welds

Must be in accordance with the visual acceptance criteria of the specified section of AWS D1.1. This category applies to elements of fans, cranes, rotating equipment, and other machinery subject to frequent stress reversals.

3.2 Category B Welds

Have an acceptance level modified to meet the required service conditions. This category applies to members of the building frame that carry principal design loads, radial beams, sacrificial shield wall, pipe whip restraints, pipe supports, and similar principal load bearing structures.

3.3 Category C Welds

Are connections between Category B Steel and Miscellaneous Metal.

3.4 Category D Welds

Are not part of the main building frame, but rather provide support or framing for electrical, instrumentation, and HVAC systems, components and equipment. Also included in the D Category are welds joining miscellaneous metal including, but not limited to, stairways, embedments, fan housings, doors, windows, hatches, frames, ledger angles, gratings and their supports.

3.5 Category E

Is an acceptance level established for relatively thin materials such as HVAC ductwork, cable trays, and unistrut supports.

4.0 ACCEPTANCE CRITERIA

Acceptance shall be based on the weld joint meeting each criteria listed for the applicable category. Skewed joints will be evaluated in accordance with Contract Specifications and Project Engineering Directives.

4.1 Category A Welds

4.1.1 Category A welds must comply with the visual examination requirements of the specified section of AWS D1.1.

4.2 Category B Welds

4.2.1 Oversize Fillet Welds

The weld shall meet or exceed the specified size requirements. Either or both fillet weld legs may exceed design size. Welds may be longer than specified. Continuous welds may be accepted in place of intermittent welds. Unequal leg fillet welds are acceptable, provided the smaller leg meets or exceeds minimum requirements.

4.2.2 Undersize Welds

4.2.2.1 The fillet leg dimension shall not under run the nominal fillet size by more than 1/16 inch. For flange to web joints the undersize condition may not be within two flange thicknesses of the weld end.

4.2.2.2 Groove welds may be underfilled by 5 percent or 1/32-inch, whichever is greater.

4.2.3 Porosity and Slag

4.2.3.1 The weld may contain a maximum of 5 percent by surface area of unaligned porosity and/or slag.

4.2.4 Profile

4.2.4.1 Convexity height, roll over, and butt weld reinforcement are acceptable.

4.2.5 Craters

4.2.5.1 The weld may have an underfilled crater, provided the underfill depth does not exceed 1/16 inch, and the crater has a smooth contour blending gradually with the adjacent weld and base metal without acute notches.

4.2.6 Undercut

4.2.6.1 Continuous undercut shall not be greater than: 1/32 inch for material 3/8 inch and less; 1/16 inch for material over 3/8 inch thick.

Intermittant undercut may be twice the value for continuous undercut for a maximum accumulated length of 10% of weld length. Localized undercut less than 3/8 inch in length may be accepted provided the depth does not exceed 3/32 inch for thickness 3/4 inch and less or 1/8 inch for thickness over 3/4 inches.

4.2.7 Cracks

4.2.7.1 Cracks are unacceptable.

4.2.8 Fusion

4.2.8.1 Incomplete fusion between weld metal and base metal is unacceptable.

4.2.9 Weld Spatter

4.2.9.1 Weld spatter shall be acceptable.

4.2.10 Arc Strikes

4.2.10.1 Arc strikes are acceptable provided there are no cracks.

4.2.11 Backing Fitup

4.2.11.1 The fitup of backing bars is not a basis for rejection.

4.3 Category C Welds

4.3.1 The welds on the main frame member side shall meet the requirements for Category B.

4.3.2 The welds on the miscellaneous metal side shall meet the requirements for Category D.

4.4 Category D Welds

4.4.1 Oversize Fillet Welds

4.4.1.1 The weld shall meet or exceed the specified size requirements. Either or both fillet weld legs may exceed design size. Welds may be longer than specified. Continuous welds may be accepted in place of intermittent welds. Unequal leg fillets are acceptable, provided the smaller leg meets or exceeds minimum requirements.

4.4.2 Undersize Welds

4.4.2.1 The fillet leg dimension shall not under run the nominal fillet size by more than 1/16 inch.

4.4.2.2 Groove welds may be undersize by 5 percent or 1/16 inch, whichever is greater.

4.4.3 Porosity and Slag

4.4.3.1 Porosity and slag are not a basis for rejection.

4.4.4 Profile

4.4.4.1 Convexity height, roll over, and butt weld reinforcement are acceptable.

4.4.5 Fusion

4.4.5.1 Incomplete fusion between weld metal and base metal is unacceptable.

4.4.6 Undercut

4.4.6.1 (Same as 4.2.6.1)

4.4.7 Craters

4.4.7.1 Underfilled groove weld craters shall be accepted provided the depth of underfill is 1/16 inch or less. Underfilled single-pass fillet weld craters shall be accepted provided the crater length is less than 5 percent of the weld length. On multi-pass fillet welds a crater depth of 1/16 inch or less is acceptable.

4.4.8 Cracks

4.4.8.1 All cracks are unacceptable.

4.4.9 Misalignment

4.4.9.1 Misalignment not in excess of the thinner member thickness is acceptable.

4.4.10 Arc Strikes

4.4.10.1 Arc strikes are acceptable provided there are no cracks.

4.4.11 Backing Fit-Up

4.4.11.1 The fit-up of backing bars is not a basis for rejection.

4.4.12 Weld Spatter

4.4.12.1 Weld spatter shall be acceptable.

4.5 Category E Welds

4.5.1 Oversize Fillet Welds

4.5.1.1 The weld meets or exceeds specified size requirements. Either or both fillet weld legs may exceed design size. Welds may be longer than specified. Continuous welds may be accepted in place of intermittent welds. Unequal leg fillets are acceptable, provided the smaller leg meets or exceeds minimum requirements.

4.5.2 Undersize Welds

4.5.2.1 The fillet leg dimension may not under run the nominal fillet size by more than 1/16 inch. Fillet weld size need not be greater than the thickness of the thinner member.

4.5.2.2 Groove welds may be undersize by 5 percent by 1/32 inch, whichever is greater.

4.5.3 Porosity or Slag Inclusions

4.5.3.1 Porosity or slag inclusions are not a criteria for rejection.

4.5.4 Profile

4.5.4.1 Convexity height, roll over, and weld reinforcement are acceptable.

4.5.5 Cracks

4.5.5.1 All cracks are unacceptable.

4.5.6 Fusion

4.5.6.1 Incomplete fusion between weld metal and base metal is unacceptable.

4.5.7 Undercut

4.5.7.1 (Same as 4.2.6.1)

4.5.8 Misalignment

4.5.8.1 Misalignment is not a basis for rejection.

4.5.9 Corner Welds

4.5.9.1 Corner welds used to seal ductwork are designated partial penetration welds. Such welds do not require full fusion. Weld reinforcement greater than the material thickness shall verify the adequacy of the weld, provided that the toes of the weld have complete fusion.

4.5.10 Burn-through

4.5.10.1 Fillet welds joining turning vanes to turning vane rails or to heavier gauge ductwork may exceed the profile and convexity limits as previously described and are acceptable for this application. Minor burn-through on vanes will be permitted up to 1/4 inch in length, provided equivalent lengths of fillet welds are added to compensate for welds weakened by burn-through 4.5.10.2. Burn-through is permitted provided there are no visible through-thickness holes. Metal flow on the inside of the duct is permitted, provided it is fused completely with the parent metal and metal thickness is not reduced by greater than 50 percent.

4.5.11 Arc Strikes

4.5.11.1 Arc strikes are acceptable provided there are no cracks.

4.5.12 Weld Spatter

4.5.12.1 Weld spatter shall be acceptable.

4.5.13 Backing Fit-Up

4.5.13.1 The fit-up of backing bars is not basis for rejection.