	QUALITY ASSURANCE SPECIFICATION	**QAS: 5.01**
		REVISION: 0
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BOILER RADIOGRAPHY ACCEPTANCE CRITERIA		**PAGE 1 OF 5**

1.0 Purpose

This purpose of this specification is to establish the NRG acceptance criteria for non-code Radiographic Testing (RT) of boiler pressure retaining welded joints.

2.0 Scope

This specification applies to boiler butt welds under the scope of the ASME Boiler & Pressure Vessel Code, made by any repair organization at NRG Energy owned or operated stations, which are radiographed for any reason other than to satisfy a mandatory code requirement.

3.0 Definitions

3.2 ASME – American Society of Mechanical Engineers

3.4 NRG – NRG Energy Inc.

3.5 NRG QA - The NRG individual responsible for nondestructive examination aspects of the project

3.6 Repair Organization – The organization performing the welding

4.0 References

4.1 ASME Boiler & Pressure Vessel Code, Section I, “Rules for Construction of Power Boilers”

5.0 Responsibility

5.1 The Manager – Quality Assurance & Quality Control has the overall responsibility for the preparation, review, approval, and implementation of this specification.

5.2 NRG shall include this procedure with project specifications for the installation of boiler tubing and the criteria shall be considered as part of that document, and be adhered to during the tube installation processes.

6.0 Examination

6.1 All welds selected by NRG for process-control radiography must satisfy the visual examination criteria of ASME Section I.

6.2 Completed butt welds shall meet the examination requirements in Paragraph PW-35 of ASME Section I and the requirements set forth in this specification. For field installation of boiler tubes, NRG may elect to randomly radiograph butt welds to assure quality.

7.0 Definitions

7.1 T = Wall thickness of the tube being examined.

7.2 t = Wall thickness of the weld being examined (wall thickness of the tube plus a total estimated weld reinforcement of 0.125”). UT measurement of the actual weld reinforcement is not required.

7.3 “Base Metal Reference Density” (BMRD) is the density of the RT film in a ¼” wide zone above or below the weld being examined, on an imaginary line drawn through the questionable discontinuity and parallel to the tube axis. When measurement of the BMRD is required, it shall be performed using a calibrated densitometer, on the same side of the elliptical image of the weld as the discontinuity being evaluated.

8.0 Acceptance Criteria

8.1 General Requirements

A one-exposure elliptical RT technique shall be used unless otherwise specified or approved by NRG. The area of interest on

the radiograph shall be the entire elliptical image of the weld, including the edge views.

8.2 Specific Requirements

8.2.1 Linear Indications:

8.2.1.1 Cracks are rejectable.

8.2.1.2 Incomplete Fusion is rejectable.

8.2.1.3 Incomplete Penetration is rejectable.

8.2.2 Elongated Indications:

8.2.2.1 For O.D. 1” or smaller and T less than or equal to 0.180”:

Maximum length of ¼” per occurrence, separated by at least T for multiple occurrences. Aggregate length shall not exceed 25% of tube outside surface circumference.

8.2.2.2 For O.D. greater than 1” and T greater than 0.180”:

Maximum length of 3/8” per occurrence, separated by at least T for multiple occurrences. Aggregate length shall not exceed the lesser of 25% of the tube outside surface circumference or 1-1/2”.

8.2.3 Rounded Indications

Acceptance standards are in accordance with ASME Boiler and Pressure Vessel Code, Section I, with the following Appendix A-250 exceptions:

8.2.3.1 The maximum permissible size of any indication shall be 1/4t, except that the size of an isolated indication separated from an adjacent indication by ½” or more may be 1/3t. The thickness of the weld reinforcement, where measurable in the radiographic image of the weld edge views, shall be at least as thick as the indication (s).

8.2.3.2 Rounded indications in the edge view of a weld are acceptable provided the indications are located in the area of the weld cap that extends outside the plane of the tube OD, except where in the judgment of the interpreter or reviewer these indications fall in the edge view due to the direction of the RT source, for instance if a weld is an outside weld on the film when a number of waterwall tube welds are radiographed in a single exposure.

8.2.4 Internal Concavity

8.2.4.1 Internal concavity in excess of 1/6", as measured from the tube ID in the edge view, is rejectable.

8.2.4.2 Internal concavity is also rejectable if the measured radiographic film density of the discontinuity exceeds the BMRD.

8.2.5 Excessive Internal Reinforcement (Flow Blockage)

8.2.5.1 For tubes with OD greater than 1", ID weld projection shall not exceed 1/8" as measured from the tube's interior wall in the edge views.

8.2.5.2 For tubes with OD less than or equal to 1", ID weld projection shall not exceed 1/16" as measured from the tube's interior wall in the edge views.

8.2.6 Undesirable Root Condition (URC)

Any root condition (other than those identified elsewhere in this specification), that suggests some form of weld contamination/anomaly in excess of 3/8" in circumferential length, shall be identified on the RT examination report by the Level II interpreter, and brought to the attention of NRG QA for evaluation. Examples of URC include "sugaring" of

the root ID due to the loss of internal gas purge, shielding gas, or other contaminates, and root undercut.

9.0 Attachments

None