1.0 Purpose

1.1 The purpose of this specification is to establish the minimum quality requirements for boiler and pressure vessel repairs or alterations by welding at NRG owned or operated facilities.

2.0 Scope

2.1 This specification shall apply to all Contractors performing repairs or alterations to boiler and pressure vessel components that are under the jurisdiction of the National Board Inspection Code, the ASME Boiler & Pressure Vessel Code, or the ASME B31.1 Power Piping Code (boiler external piping only). For ASME B31.1 non-boiler external piping welding requirements, refer to NRG Specification QAS 4.02.

2.2 The specification is intended to be used in conjunction with a project specification that contains the material, quantity, bid, contract, schedule, transportation, delivery, and other job, plant and site-specific requirements.

3.0 Definitions

3.1 ANSI – American National Standards Institute

3.2 ASME – American Society of Mechanical Engineers

3.3 ASNT - American Society for Nondestructive Testing

3.4 Contractor – The responsible repair organization

3.5 NRG - The NRG individual responsible for the overall management of the project cost and schedule

3.6 NRG QA - The NRG individual responsible for the welding and quality aspects of the project

3.7 Hold Point – Points identified within the Contractor's Work Process Documentation that require the Contractor to notify NRG prior to proceeding. NRG may elect to perform inspections at that time or waive the right to inspect.

3.8 NBI – National Board of Boiler and Pressure Vessel Inspectors

3.9 QAS – NRG Quality Assurance Specification

3.10 QC – Quality Control refers to the Contractor's quality activities

3.11 Quality System – The Contractor's program, procedures, inspections and documentation that are implemented to verify that the work meets the required codes and specifications.

3.12 Work Process Documentation (WPD) – A tracking form that documents the weld procedure specification being used, the essential details of the welding process (e.g., base metal, filler metal, preheat, etc.), and any special procedures/techniques, materials and hold points. Work process documentation may be a Removal and Replacement Procedure, Weld Data Sheet, Repair Plan, or Contractor-equivalent form.

4.0 References

4.1 ANSI/NB-23, "National Board Inspection Code"

4.2 ASME B31.1, "Power Piping"

4.3 ASME Boiler & Pressure Vessel Code, Section I, "Rules for Construction of Power Boilers"

4.4 ASME Boiler & Pressure Vessel Code, Section II, Part C, "Specifications for Welding Rods, Electrodes, and Filler Metals"

4.5 ASME Boiler & Pressure Vessel Code, Section VIII, Division 1, "Rules for Construction of Pressure Vessels"

4.6 ASME Boiler & Pressure Vessel Code, Section IX, "Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators"

4.7 SNT-TC-1A, “Personnel Qualification and Certification in Nondestructive Testing"

4.8 NRG QAS 4.02, “Welding - ASME B31.1 Non-Boiler External Piping”

4.9 NRG QAS 4.05, “Welding - Heat Treatment”

4.10 NRG QAS 5.01, “NDE - Boiler Radiography Acceptance Criteria”

4.11 NRG QAS 5.02, “NDE - Performance Requirements”

The latest edition of the above codes, standards, and specifications shall apply. In the event of conflicts between this specification and the references cited above, the Contractor shall notify NRG, who will make the final judgment and interpretation.

5.0 Responsibility

5.1 The Contractor shall be responsible for fulfilling the requirements as set forth in this specification including all required welding, inspection, test, and quality control documentation. Exceptions to and deviations from this specification shall be clearly delineated in the Contractor’s bid for disposition by NRG.

5.2 The Contractor shall hold a valid “R” Stamp issued by the NBIC and submit a copy of their R-Stamp Certificate of Authorization prior to the start of work.

5.3 The Contractor shall complete an R-1, R-2, and any applicable ASME Data Forms when required by their Authorized Inspector.

5.4 The Contractor shall submit Weld Process Documentation for NRG review and approval prior to the start of work.

5.5 The Contractor shall identify clearly in their proposal any and all subcontractors intended to be used. All subcontractors must be approved by NRG prior to the issuance of a purchase order.

5.6 NRG shall be responsible for identifying the applicable code for the work being performed and advising the Contractor accordingly.

5.7 NRG shall provide the Contractor with the dimensions, wall thickness, material specification and grade, and the design temperature and pressure of the component being welded.

5.8 NRG may issue a NRG Quality Assurance Plan that details site-specific requirements.

6.0 Welding Procedure Specifications

6.1 The Contractor shall have weld procedure specifications (WPS) and supporting procedure qualification records (PQR) which conform to the rules of ASME B31.1 or the ASME B&PV Code, Section IX.

6.2 Contractor's PQR's and WPS's shall be submitted to NRG QA for review and approval at least two weeks prior to the start of work.

7.0 Welder Performance Qualification

7.1 Welders shall be qualified in accordance with the Contractor's Quality System and the ASME B&PV Code, Section IX.

7.2 The Contractor shall submit the welder performance qualification records and proof of continuity to NRG QA for review and approval prior to the start of work.

7.3 The acceptability of welders qualified through "Common Arc" will be specified by NRG as part of the project specification. If accepted, the contractor shall submit the welder performance qualification records and proof of continuity in accordance with "Common Arc" procedures to NRG QA for review and approval prior to the start of work.

7.4 If NRG QA does not accept qualification from the "Common Arc" program, qualification in accordance with Paragraph 7.5 is required.

7.5 Welders without current qualifications must qualify on-site. On-site qualification testing shall comply with Paragraph 7.1 and the following:

7.5.1 The Contractor shall notify NRG QA before any on-site testing.

7.5.2 NRG QA reserves the right to witness or inspect any phase of the welder qualification test.

7.5.3 Upon completion of the weld coupon, NRG QA and the Contractor's QC Inspector shall perform a visual inspection of the coupon prior to testing. The coupon shall be free of:

7.5.3.1 Lack of penetration
7.5.3.2 Excessive penetration exceeding 3/32" on the I.D.
7.5.3.3 Surface undercutting exceeding 1/32"
7.5.3.4 Crown reinforcement exceeding 3/16"
7.5.3.5 Abrupt valleys between passes with depths exceeding 1/32"
7.5.3.6 Insufficient filler metal such that the weld surface is below the surface of the coupon
7.5.3.7 Excessive internal concavity exceeding 3/32" or 20% of the thinner of two sections being joined
7.5.3.8 A weld cover pass width exceeding 125% of the widest point on the weld bevel
7.5.3.9 Burning through the backing ring or plate (when used)

Failure to meet the above criteria shall result in rejection of the test coupon.

7.5.4 After visual acceptance, radiographic examination or bend testing shall be performed by the Contactor with acceptance criteria per the ASME B&PV Code, Section IX for welder coupons.

7.5.5 When mechanical testing is performed, the Contractor shall provide for review, a procedure for bend testing which includes, as a minimum, the following:

7.5.5.1 The detailed method of identifying weld coupons and bend test specimen
7.5.5.2 Visual inspection criteria for the welds
7.5.5.3 The method of locating, sizing, removing, preparing and bending the test specimen
7.5.5.4 The examination of the test specimen with acceptance criteria
7.5.5.5 A description of the equipment used with dimension of the bending jig
7.5.5.6 The person responsible for examining the bend specimen and their qualifications

7.5.6 A welder whose test coupon fails to meet the acceptance criteria is permitted to take a multi-coupon retest. A welder who fails the retest is not permitted to take any further tests for those processes for the duration of the contract.

7.6 Welder Performance Qualification Test Records shall include the welder's full name and last four of the welder's social security number.

7.7 NRG reserves the right to retest any welder performing work at a NRG facility.

8.0 Material Control

8.1 The Contractor shall provide Certified Material Test Reports and/or ASME Manufacturer's Partial Data Reports (ASME P-4 Form) for all pressure parts and membrane supplied by them. NRG shall provide Certified Material Test Reports and/or ASME Manufacturer's Partial Data Reports (ASME P-4 Form) for material supplied by to the Contractor by NRG.

8.2 The Contractor shall be responsible for maintaining material traceability throughout the installation. Heat numbers shall be transferred whenever material is cut.

8.3 The minimum filler metal control requirements are as follows:

8.3.1 Portable rod ovens, in working condition, shall be utilized at each work area.

8.3.2 The following storage requirements apply to electrodes once removed from the hermitically sealed containers:

8.3.2.1 Non-low hydrogen (e.g., E-6010, E-7010-A1), and Inconel (e.g., ENiCrFe-2, ENiCrFe-3) electrodes shall be maintained at room temperature in a secure, clean, and dry environment.

8.3.2.2 Low-hydrogen electrodes (e.g., E-7018, E-801X-BX, E-9018-B3), austenitic stainless steel (e.g., E-3XX-15/16), and martensitic stainless steel (e.g., E4XX) electrodes shall be stored at 250° F to 300° F in rod ovens with temperature indication.

8.3.3 Carbon steel and low alloy electrodes shall not be used after a period of four hours for E70XX Type, two hours for E80XX Type, and one hour for E90XX Type from the time they were issued from holding ovens or a portable rod warmer. Coated electrodes shall be scrapped or redried per the manufacturer's recommendations if exposure is longer than specified above. Coated electrodes that have been wet shall be discarded. Low-hydrogen electrodes shall not be rebaked more than once.

8.3.4 Filler metal utilized for GTAW welding shall be identified on both ends of the wire indicating wire classification.

8.3.5 Straight lengths or spooled electrodes and filler metal shall be suitably protected from being contaminated at the work site.

9.0 Welding

9.1 All welding variables shall be in accordance with the Weld Process Documentation.

9.2 A debris control system shall be established to prevent foreign material from entering tubes, pipes, and headers.

9.3 Torch cutting is not permitted for initial breaching of boiler or piping systems. Torch cutting after initial breaching of boiler or piping systems shall be approved by NRG QA.

9.4 All tubing, piping and headers shall be capped or plugged to prevent inadvertent entry of foreign material. Covering ends with tape is not acceptable.

9.5 Purge dam material used in boiler tubes and pipe for reducing drafts or retaining a gas shield shall be approved by NRG QA.

9.6 All new tubes and existing tubing below cut lines shall be tested for obstructions using air pressure or a borescope.

9.7 The Contractor shall submit a procedure for keeping track of tools/bits to NRG QA for review and approval as a means to prevent blockage of tubing.

9.8 Welding materials shall be in accordance with the ASME B&PV Code, Section II, Part C with the following restrictions:

9.8.1 Low carbon (‘L' Grade) filler materials are prohibited when welding ferritic materials.

9.8.2 Filler metal for attachment welds between dissimilar metals on superheater and reheater tubes shall match the tube material (e.g., a P8 lug welded to a P4 tube shall be joined with Type E8018-B2 filler material).

9.9 All circumferential butt welds in tube and pipe shall utilize a gas tungsten arc (GTA) welded root pass unless specifically permitted otherwise by NRG QA.

9.10 The use of backing rings requires approval by NRG QA prior to the award of contract.

9.11 For all NRG plants except Keystone and Conemaugh, waterwall panel membrane welding shall be with a semi-automatic GMAW and/or SMAW process using vertical (3G) downhill welding. The maximum electrode diameter for GMAW shall be 0.035".

9.12 For Keystone and Conemaugh, waterwall panel membrane welding shall be with a semi-automatic FCAW (w/dual shielding) and/or SMAW process using vertical (3G) uphill welding. Membrane greater than ½” in width shall be welded with stringer beads only.

9.13 Non-clad waterwall panel membrane shall be welded utilizing a filler metal or electrode compatible with the tube material of the panel being installed unless otherwise approved by NRG QA.

9.14 Damage to clad or overlayed panels that occurs during waterwall panel installation shall be repaired using the GTAW or SMAW process. Any exception to this requirement shall be submitted to NRG QA for review and approval.

9.15 Capping of waterwall butt welds shall be with the SMAW process in the horizontal position (2G) with electrode diameter not exceeding 3/32".

9.16 Stops and starts shall be confined to the bevel or weld metal for all positions.

9.17 Any stop or start made on tube material shall be ground out, inspected for crater cracks and repaired.

9.18 For Type 622 Inconel laser clad panels, the weld filler metal shall be compatible with 622 inconel (SFA-5.14, ERNiCrMo-10 for GMAW or GTAW and SFA-5.11, ENiCrMo-10 for SMAW electrode).

9.19 A backing gas (argon) purge shall be used for the GTAW process on all austenitic stainless steels and when the base metal contains an excess of 3% chromium for ferritic steels.

9.20 Shielding gases and gases used for back purging shall be welding grade.

9.21 Welding shall be done only on clean metal, free of cracks, scale, rust, oil, grease, paint, water, or any foreign matter which would adversely affect the quality of the weld.

9.22 Prior to welding, the base metal surface shall be cleaned at least ½" from the weld bevel on both the outside and inside diameters. No more than 0.010” of tube wall thickness shall be removed from the O.D.

9.23 Each weld layer shall be cleaned by suitable means, such as brushing, filing, grinding or chipping, prior to depositing additional weld passes and after the final weld layer.

9.24 No welding shall be performed when there is impingement of rain, snow, sleet, or high wind on the weld area.

9.25 Any grinding or chipping of welds, including clad and overlay tubular products, shall be done so as not to gouge, groove or reduce the base metal thickness below the specified minimum wall.

9.26 Weld joint fit-up shall conform to the alignment tolerances of the applicable code and the Work Process Documentation. Internal misalignment of boiler tubes shall not exceed 1/16”.

9.27 All butt welds shall be full penetration and shall meet the reinforcement requirements of the applicable code.

9.28 No weld shall be "cold sprung", prestressed or have heat applied unless so indicated in the project specification or engineering drawings and approved by NRG.

9.29 Peening or quenching of welds is not permitted.

10.0 Preheat and Post Weld Heat Treatment

10.1 The minimum preheat temperatures shall be per the Work Process Documentation.

10.2 Preheating may be accomplished by utilizing either electric resistance heating pads, induction heating or oxy-fuel torches.

10.3 Either temperature indicating crayons or contact pyrometers (thermocouples) shall be used for monitoring minimum preheat and maximum interpass temperature.

10.4 Preheating also applies to thermal cutting (e.g., P4 and P5A).

10.5 The maximum interpass temperature shall be 800° F for carbon and low alloy steels and 350° F for manual welding of austenitic stainless steels including dissimilar metal welds and nickel base alloys.

10.6 For austenitic stainless steel and inconel butt welds in tubing made with an automatic welding process, the maximum interpass temperature shall not exceed 500° F unless the weld receives a heat treatment.

10.7 For P-3, P-4, P-5A, P-5B, P-6 and P-15E alloys, preheat shall be maintained. If, however, welding is to be interrupted and preheat will not be maintained during the interruption, the following shall apply:

10.7.1 For boiler tube welds, the root and at least one fill pass shall be installed prior to the interruption of welding.

10.7.2 For other welds covered by ASME Section I and Section VIII, the lesser of at least 3/8” of the required weld shall be deposited, or 25% of the weld groove shall be filled. In addition, after cooling and before welding is resumed, a liquid penetrant (PT) or magnetic particle (MT) examination shall be performed to assure that no cracks have formed.

10.7.3 For boiler external piping covered by ASME B31.1, the requirements of ASME B31.1, Paragraph 131.6.1 (Reference 4.2) shall be met and, after cooling and before welding is resumed, a liquid penetrant (PT) or magnetic particle (MT) examination shall be performed to assure that no cracks have formed.

10.8 Post weld heat treatment (PWHT) shall be performed in accordance with NRG Specification QAS 4.05 and the applicable code identified by NRG in Paragraph 5.6. Applicable references for PWHT are as follows:

10.8.1 ASME B&PV Code, Section I (Table PW-39)

10.8.2 ASME B&PV Code, Section VIII, Division I (Table UCS-56 for carbon and low alloy materials)

10.8.3 ASME B31.1 (Table 132)

10.9 Welds requiring post weld heat treatment shall be preheated utilizing the same methods (i.e., electric resistance, induction heating) unless otherwise approved by NRG QA.

10.10 Post-weld heat treatment temperature and time shall be recorded using a minimum of two thermocouples, one of which shall be below the weld for vertical pipe or at the bottom of the pipe for horizontal pipe. The thermocouples shall be positioned at the edge of the code-required PWHT zone. Temperatures shall be recorded when the metal temperature is above 600°F. Time/temperature chart recordings shall be submitted with the project documentation.

10.11 Post-weld heat treatment with the exothermic process is prohibited.

11.0 Work Process Documentation

11.1 The Contractor shall develop Removal and Replacement Procedures, Weld Data Sheets, Repair Plans, or Contractor-equivalent forms (hereafter referred to as Work Process Documentation) for each type of job.

11.2 Work process documentation shall document the weld procedure specification being used, the essential details of the welding process (e.g., base metal, filler metal, preheat, etc.), special procedures/techniques (e.g., heat treatment), material verification and control, hold points, and design control calculations for alterations (see Attachment 8.1 as an example).

11.3 Work process documentation shall be submitted to the Contractor's Authorized Inspector and NRG QA for review and signature approval prior to the start of work. The Contractor shall provide

timely advance notification to their Authorized inspector of pre-established hold points.

11.4 Work process documentation shall be posted at the work location for reference by the welder, Contractor QC, and NRG QA.

12.0 Inspection and Testing

12.1 The Contractor shall prepare an inspection checklist for the inspection of the work. The inspection checklist shall identify the attributes and variables to be inspected with the accept/reject criteria for each from applicable technical specification, code, or contract document and shall identify the frequency of inspection of each attribute/variable. The inspection checklist shall, as a minimum, include the following items, as applicable:

12.1.1 Cut lines
12.1.2 Joint preparation
12.1.3 Debris control and obstruction inspection for tubes and pipe
12.1.4 Joint fit-up
12.1.5 Welding filler metals
12.1.6 Weld preheat
12.1.7 Root inspection
12.1.8 Final weld inspection
12.1.9 NDE
12.1.10 Post weld heat treatment

12.2 The inspection checklist shall provide for recording the following for each weld:

12.2.1 Weld joint identification
12.2.2 Welder(s) who performed the work
12.2.3 Date weld completed
12.2.4 Inspection results, inspection, and date.

12.3 The inspection checklist shall be submitted to NRG QA for review and approval prior to the start of work. The utilization of the preplanned inspection checklists does not relieve the contractor of responsibility to comply with the requirement of codes and drawings.

12.4 The Contractor shall implement and use the inspection checklist as the work progresses and document the inspection results the same day the inspection is performed. Upon completion of work, the

Contractor shall provide a copy of the inspection results to NRG QA.

12.5 Each crew's in-process work shall be inspected and documented.

12.6 Inspection frequency shall be uniform throughout the job and increased when nonconforming work is identified.

12.7 100% of all finished welds shall be visually inspected and the inspection results documented.

12.8 Visual inspection shall be conducted prior to any NDE that may be performed.

12.9 All inspections and heat treatment shall be completed prior to any painting, coating or insulation.

12.10 Each weld shall be uniform in width and size throughout its full length. Each layer of weld passes shall be smooth, free of slag, and shall be completely fused to the adjacent weld bead and/or base metal. The cover pass(es) shall be free of coarse ripples, irregular surfaces, high crowns, crevices, or high ridges, and suitable for interpretation of any subsequent non-destructive examination required.

12.11 Finished welds shall meet the examination and testing requirements of the applicable code and this specification. In addition, surface indications such as porosity or slag inclusions are unacceptable.

12.12 Arc strikes shall be ground smooth and inspected for cracking.

12.13 All temporary welds to pressure parts shall be removed and ground to the contour of the base metal unless otherwise directed by NRG QA. After weld removal, the ground area shall be examined by the liquid penetrant method (information only) to verify no cracking exists.

12.14 Maximum reinforcement of girth and longitudinal butt welds shall meet the requirements of the applicable code.

12.15 Non-Destructive Examination shall be performed in accordance with the applicable code, this specification, and NRG Specification QAS-5.02.

12.16 NDE personnel shall have current Level II or III qualifications and certification in accordance with the requirements of SNT-TC-1A. NDE may be performed by non-certified personnel if it is for information purposes only.

12.17 The Contractor shall make available NDE procedures, personnel qualifications and certification to NRG QA for review and approval.

12.18 NRG's QA shall perform inspections of the Contractor's work, as work progresses, either in conjunction with, or independent of, the Contractor inspection, in order to ensure that the Contractor's welding process is being controlled in accordance with specified requirements. NRG's inspection will be based upon 100% inspection of each welder or weld team at the onset of work to ensure that each welder is performing to specified requirements. Once confidence in each welder is reached, based upon satisfactory performance, NRG QA inspections shall decrease to random daily inspection of each weld team. The performance of inspection, including radiography by NRG, is designed to ensure the process is being controlled by the Contractor.

12.19 The Contractor (Supervisor and QC Inspector) will be notified of the NRG QA inspection results when an attribute/variable is identified that does not meet specified acceptance criteria. An NCR will only be processed by NRG QA when each unacceptable condition is not corrected within the shift of the inspection.

12.20 When the process is identified to be out of control for respective defects by a weld team or teams, the amount of inspection by NRG will be increased and the Contractor will be required to take action to identify the problem with its cause and action to prevent recurrence of the problem in order to bring the process into control.

12.21 Circumferential butt-welded joints will be radiographed on a random sample basis by NRG QA. The following requirements apply to radiography performed by NRG:

12.21.1 Radiography will be scheduled with the Plant and will not interfere with Contractor's production welding

12.21.2 Acceptance criteria shall be in accordance with NRG Specification QAS 5.01

12.21.3 Rejected welds will be identified on an NCR that will be given a disposition by NRG

12.21.4 When specified by NRG, the Contractor shall be responsible to perform rework or repair of each weld in a time frame that will allow re-radiography by NRG prior to hydrostatic or vacuum testing

12.21.5 The Contractor shall notify NRG QA of the completion of each repair.

12.21.6 The Contractor will be responsible for the cost of rework or repair of each weld

13.0 Repairs

13.1 All repairs to the boilers, boiler external piping, and pressure vessels shall be performed in accordance with the NBIC, the applicable ASME code, the Contractor's Quality System and this specification.

13.2 When arc gouging or flame gouging is used for defect removal, the material shall be preheated to the temperature specified on the original Work Process Documentation for the original weld.

13.3 Liquid penetrant or magnetic particle examination shall be used to verify complete removal of the defect. This may be performed on an "Information Only" basis by the Contractor's QC Inspector. NRG QA may elect to verify the results of the examination.

13.4 Full penetration welds shall be used to repair defects that penetrate the full thickness of a pressure part. NRG considers the following to be full penetration welds:

13.4.1 Welds made with a GTAW root
13.4.2 Welds made with a SMAW root using EXX10 electrodes (other electrodes require NRG QA approval)
13.4.3 Welds made with backing similar in composition to the base metal
13.4.4 Welds made by welding from both sides

The above welds must be made in accordance with the Work Process Documentation.

13.5 If a full penetration weld cannot be made due to special conditions (e.g., internal contaminates that interfere with GTAW root) the Contractor shall notify NRG QA for review and technical evaluation.

13.6 No weld shall be repaired more than twice without written approval from NRG QA.

14.0 Quality Control

14.1 The Contractor shall implement their Quality System for all boiler and pressure vessel fabrication, repairs, or alterations.

14.2 The Contractor's Quality System shall include, as a minimum, the following:

14.2.1 Material Control
14.2.2 Welding Control
14.2.3 Tool Accounting (Serialization) Control
14.2.4 Inspection Program
14.2.5 Control of Nonconformances
14.2.6 Control of Nondestructive Examination
14.2.7 Control of Heat Treatment
14.2.8 Calibration Program
14.2.9 Authorized Inspection
14.2.10 Document Control

14.3 The Contractor shall have available their latest Quality System Manual, Quality System Procedures and other Quality System documents at the job location during execution of the contract for NRG QA review and audit.

14.4 The Contractor shall provide a full-time qualified Quality Control representative for all shifts during repairs, alterations and fabrication.

14.5 The Quality Control representative shall administer the Contractor's Quality System and assure conformance to the program requirements.

14.6 The Quality Control representative shall not be a craft supervisor unless approved by NRG prior to the award of the contract.

14.7 The Contractor's QC personnel shall be certified to perform visual inspection to at least one of the following requirements:

14.7.1 AWS CWI or CAWI
14.7.2 VT Level II per SNT-TC-1A
14.7.3 VT Level II per the Contractor's Quality System

14.8 The Contractor shall submit a copy of QC personnel certifications to NRG QA for review and approval.

14.9 The Contractor's QC representative shall be on site prior to the start of work to become familiar with the project and prepare the inspection checklists and Work Process Documentation.

14.10 The Contractor shall initiate disposition, and control deficiencies and discrepancies from the contract, specification, or drawing requirements using Nonconformance Report Forms (NCR).

14.11 NCRs shall be documented in accordance with the Contractor's Nonconformance procedure.

14.12 A copy of all NCRs issued by the Contractor's Quality Control Organization shall be submitted to NRG QA within 24 hours. The Contractor shall provide a recommended disposition for NCRs for NRG review and approval.

14.13 NRG's approval of the Contractor's recommended NCR disposition must be obtained before any corrective action is initiated.

14.14 The Contractor shall obtain his Authorized Inspector's approval of each Nonconformance Report identifying code deficiencies or discrepancies.

15.0 Documentation

At the conclusion of the project, the Contractor shall submit to NRG QA a complete documentation package consisting of:

15.1 R-stamp certificate of authorization
15.2 R-1 forms and R-2 forms
15.3 Certified material test reports (if applicable)
15.4 ASME P-4 forms (if applicable)
15.5 Work Process Documentation
15.6 Welder qualification records
15.7 QC and NDE personnel certifications
15.8 Inspection checklists
15.9 NDE reports
15.10 Heat treatment charts
15.11 Hydrostatic test data
15.12 Nonconformance reports
15.13 Special process procedures
15.14 Tool accounting (serialization) procedure forms

Documentation to be in a format agreed to by NRG and the Contractor at the start of work.

16.0 Attachments

16.1 Work Process Documentation (example)

Attachment: 16.1
QAS No.: 4.01

Removal and Replacement Procedure

QA Specification No.	4.01
R&R Number	

Station _____ Unit _____ Work Order Number _____

National Board No. _____ Serial No. _____ Year Built _____

Job Description _____

Applicable Code(s) _____

Pipe Line Spec No. _____ Design Pressure _____ psig Design Temp _____ °F

Removal Procedure & Replacement Material

Removal Method [ ] Arc [ ] Flame [ ] Saw [ ] Grinding Wheel [ ] Machine

Rep.Material _____ SA-_____ Gr _____ P-No. _____ _____ "OD _____ " Thk. / Press. Class

_____ SA-_____ Gr _____ P-No. _____ _____ "OD _____ " Thk. / Press. Class

_____ SA-_____ Gr _____ P-No. _____ _____ "OD _____ " Thk. / Press. Class

_____ SA-_____ Gr _____ P-No. _____ _____ "OD _____ " Thk. / Press. Class

Replacement Procedure

Weld Procedure Specification: _____ Rev. _____

Type of Weld Joint: _____[ ] Fillet _____[ ]* Socket [ ]**Butt _____[ ]Build up _____/_____[ ] Overlay_____

***All welds** shall have at least two layers of filler metal. **Max. thickness of butt weld reinforcement _____

Material P-No. _____ To _____ GTAW _____ SMAW _____ FCAW/GMAW _____

Weld Preparation: Root Gap _____ Bevel _____ Land _____

Root Design: [ ] GTAW [ ] Open [ ] Backing [ ] ID Argon Purge Required

Preheat Temperature: _____ °F Interpass Temperature: _____ °F

Prep NDE:	[ ] Visual	[ ] PT	[ ] MT	[ ] RT	[ ] UT
Root NDE:	[ ] Visual	[ ] PT	[ ] MT	[ ] RT	[ ] UT
Final NDE:	[ ] Visual	[ ] PT	[ ] MT	[ ] RT	[ ] UT

Comments: _____

Post Weld Heat Treatment

Required ? [ ] Yes [ ] No Procedure No. _____

Temperature _____ °F Soak Time _____

Heat Rate _____ °F/hr (above 600 °F) Cooling Rate _____ °F/hr (above 600 °F)

Hydrostatic Test

Required ? [ ] Yes [ ] No Pressure _____ PSI Hold Time _____ Minutes

Hold Points – The following HOLD POINTS must be signed off by the AI and/or NRG QA Rep. Initial/Date

A: _____ _____

B: _____ _____

C: _____ _____

D: _____ _____

Approvals - The following approvals must be obtained prior to start of work:

	Signatures	Date
Authorized Inspector	_____	_____
Contractor QC Rep.	_____	_____
NRG QA Rep	_____	_____

(Document Repairs on Weld Repair Record)