UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-348/87-36 and 50-364/87-36

Licensee: Alabama Power Company
600 North 18th Street
Birmingham, AL 35291-0400

Docket Nos.: 50-348 and 364 License Nos.: NPF-2 and NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: December 12-16, 1987

Inspectors: R. W. Newsome 1-21-88
R. W. Newsome Date Signed

J. L. Coley 1/22/88
J. L. Coley Date Signed

Approved by: 1/22/88
J. J. Blake, Chief Date Signed
Materials and Processes Section
Division of Reactor Safety

SUMMARY

Scope: This special announced inspection was in the areas of nondestructive examinations (NDE) and other activities associated with events related to Unit 2, Safety Injection System (SIS), six inch line, through wall crack, and actions taken by the licensee to assure the integrity of similar systems in Units 1 and 2.

Results: In the areas inspected, violations or deviations were not identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. Badham, Systems Performance Engineer
*R. Berryhill, Performance and Planning Manager
S. Burns, Senior Project Engineer
*R. Coleman, Systems Performance Supervisor
*D. Hartline, Systems Performance Engineering Supervising
D. Morey, Assistant General Manager, Farley Nuclear Power (FNP) Operations
*J. Osterholtz, Supervisor Safety Audit Engineering Review
*W. Shipman, Assistant General Manager, FNP Support
*J. Thomas, FNP Maintenance Manager
G. Waymire, General Plant Engineer
*J. Woodard, General Manager, FNP

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, security force members, and office personnel.

Other Organization

*R. Davis, Southern Company Services (SCS), Lead Level III
K. Johns, SCS, Level III

NRC Resident Inspectors

*W. Bradford, Senior Resident Inspector
*W. Miller, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 16, 1987, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings. In addition, the inspectors discussed the following commitments agreed to by the licensee:

a. Perform radiography on weld D, Loop 3, shown on isometric/grinnel spool number EG686/JF-16-38, in Unit 1, during the next scheduled outage. (Same as weld #3 on ISI ISO. No. ALA-143) (See details in paragraph 5 C.(2)(h));

b. Perform radiography on Loop 1, weld B, shown on isometric/grinnel spool number 2-101/JG-16G-37, in Unit 2, during this outage. (Same as weld # 31 on ISI ISO No. APR-1-4109) (See details in paragraph 5.C (2)(h));

c. Conduct a visual examination of the inside surface of the SIS nozzle to main coolant piping on Loop 2, in Unit 2 prior to welding replacement piping into place. (Reference Report No. 50-364/87-27 for additional information).

No dissenting comments were received from the licensee. Proprietary information is not contained in this report.

NOTE: A list of abbreviations used in this report is contained in paragraph 6.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Cracked 6" Pipe Weld in Safety Injection System (SIS)

a. Background

(1) On December 9, 1987, reactor coolant leakage of approximately .8 gallons per minute was detected in the Unit 2, Loop 2, cold leg safety injection line. The reactor was shutdown to investigate the leakage which appeared to be in the vicinity of the Loop 2 resistance temperature detector (RTD) manifold. Investigation in this areas resulted in the discovery of a steam leak, through the insulation, at a location downstream of check valve V051B, on the cold leg SIS and at a position in close proximity to a 90 degree elbow weld, identified on inservice inspection (ISI) isometric drawing APR1-4210 as weld number 16.

The Unit 2 reactor operating conditions at the time of the steam leak discovery were:

- Steady State Mode 3
- Reactor Power 0
- Net Output 0 MWe
- Reactor Coolant 525 °F Tav
- Reactor Coolant Pressure 2235 Psig

Following identification of the general location of the steam leak, the licensee commenced cooldown and depressurization of the reactor coolant systems while simultaneously initiating several activities designed to identify the exact location, cause, and severity of the leakage. These activities included:

- removal of insulation in the general area;

- removal of a small pipe support that was clamped onto the SIS over weld number 16; and

- conducting visual examinations following insulation and pipe support removal

Following the visual examination of the areas and elimination of check valve V051B as the leaking component, attention was directed to weld 16, a pipe to 90° elbow weld. Liquid penetrant (PT) examination of this weld by site personnel did not result in conclusive evidence that weld 16 was the source of the leak primarily because the pipe was full of water and under pressure; therefore, the later detected crack was filled with water at this time and would not allow the penetrant to enter the opening. However, during this period, droplets of water could be seen forming on the weld at the 6 o'clock position indicating the probability of a through wall crack.

During the preliminary leak detection activities, the licensee had contracted SCS to conduct ultrasonic (UT), NDE, as required, to determine if weld 16 was cracked. SCS personnel were able to determine the probable existence of a crack in weld 16. The crack appeared to be through wall for a portion of its length, appeared to be circumferential and approximately 7" in length. The crack was determined to start at approximately 120° and terminate at approximately 240° along the circumference of the pipe using top dead center (TDC) of the pipe as the 0° reference point and measuring clockwise. The crack appeared to be through wall starting at 165° to 195°, approximately 1.5" in length.

Following the SCS detection of the crack-like indication, radiography (RT) of weld 16 was conducted by site personnel. The RT was conducted with the pipe still full of water and the radiographs were not of highest quality due to the pipe being filled with water. However, the radiographs did confirm the existence of a crack, running circumferentially near the 180° (6 o'clock) circumferential position of the pipe.

Following confirmation of a crack in weld 16 by RT, with water in the pipe, the SIS loop 2 cold leg was isolated and draining of the pipe was started. RT of weld 16 was scheduled to be accomplished again once the water was drained from the pipe.

(2) Detection of the crack by UT according to SCS was difficult and signal amplitude from the indication using a standard 45° shear wave while establishing the reference level using 10% notches from the reference standard, the most commonly used technique for the detection of cracked welds, would only yield a signal amplitude of 10% of reference level with the gain setting at reference level. However, by using a 60° shear wave technique, the signal amplitude from the crack was at 100% of the reference level with the gain setting at reference level. Since a 45° shear wave is almost always very sensitive to notch reflectors (cracks like), and a 60° shear wave is generally less sensitive to notch reflectors, the fact that the 60° was able to detect the crack much better than the 45° seemed to contradict generally accepted UT crack detection capabilities unless some unknown factor is present. In view of this contradiction, the NRC inspectors requested that calibration of UT equipment, using both 45° and 60° shear waves be accomplished and the calibration be observed by the inspectors. In addition, following calibration of the UT equipment, the inspectors requested that the cracked weld be partially examined using the two shear waves. The inspectors observed the calibrations and the examinations of the cracked weld using both the 45° shear wave and the 60° shear wave and concluded that, in this case, the 60° shear wave technique was far superior to the 45° shear wave technique for detection of this particular crack. The NRC inspectors suggested examination of the weld using a 45° longitudinal wave probe, if possible, since longitudinal waves generally penetrate stainless steel weld metal more easily than do shear waves. This was not accomplished because longitudinal wave examinations are not commonly done on pipe diameters this small, and special longitudinal wave probes would have to be made to accommodate this size pipe. The inspectors suggested that longitudinal wave probes be ordered for this size pipe for possible use in the future. No explanation for the crack signal response being better with the 60° shear wave than with the 45° shear wave could be given at this time. Additional information maybe deduced from an analysis of the crack following removal of the weld from the SIS system and subsequent planned analysis.

(3) The licensee initiated a progressive examination plan for those welds adjacent to the cracked weld and for all similar system welds on all three loops in both Unit 1 and Unit 2. The examination of these additional welds utilized a 45° and a 60° shear wave UT examination, with increased examination gain setting, on each of these welds. The NRC inspectors requested that the next three welds in Unit 2, Loop 2, cold leg, SIS, upstream of valve V051B be UT examined since damage to this portion of the system due to sympathic harmonic vibration with the cracked weld might be possible. Examination of these welds was accomplished and examinations did not reveal any relevant UT indications.

(4) The licensee's contractor, SCS, was tasked to review all of the fabrication radiographs of the welds being examined by UT and to review the radiographs taken of the cracked weld both with the pipe full of water and the radiographs taken following the draining of the water from the line. The SCS review of the film revealed some minor discrepancies and resulted in the re-radiographing of one weld due to a potential unacceptable root condition. The NRC inspectors also reviewed all of these film with some questions regarding the radiographs associated with two welds, one in Unit 1 and one in Unit 2 (for details see paragraph 5.b.(2)(h).

(5) A complete system walkdown of all three SIS loops in both Units 1 and 2 was initiated to determine if any pipe restrictions, leakage, or other problems were evident. During the walkdown of Unit 1, loop 2, a snubber clamp was found that apparently was coming in contact with a snubber support. A nonconformance report was initiated to correct this condition and the work was accomplished. No additional significant problems were identified in either Units 1 or 2.

b. Licensee's Intended Corrective Actions

Discussions with involved licensee personnel disclosed the following:

(1) The 90° elbow and straight runs of pipe at each end of the cracked elbow to pipe weld would be removed from the SIS cold leg on loop 2. This portion of the SIS contains weld 16. The removal effort would be accomplished by cutting the weld located at valve V051B, the up steam side of the 90° elbow, and by making a second cut in the SIS at the main coolant loop nozzle to SIS pipe weld. By making cuts at these locations, no additional welds would be introduced into the system. A replacement 90° elbow and a section of 6", scheduled 160, 304 stainless steel material had been purchased for replacement of the removed section.

The NRC inspectors requested that a visual examination of the internal surface of the nozzle be accomplished following the cut near this location because of the recent loss of the thermal sleeve at the SIS nozzle to main coolant loop at this location (see Inspection Report No. 50-364/87-27 for additional information) and the surface would be available for examination for any internal surface damage that may have occurred as a result of the thermal sleeve disengagement. The licensee agreed to examine this surface prior to welding the replacement section of the SIS into place.

(2) The removed section of the loop 2, SIS, containing the defective pipe weld, will be shipped to a Westinghouse (W) laboratory for evaluation to determine the mechanism and causes of cracking and leakage of the weld joint and to develop information that would be helpful in taking corrective actions. The investigation will center around the six inch diameter pipe to elbow joint containing the crack and will consist of the following tasks:

(a) Preliminary Evaluations

Preliminary evaluations will be undertaken to establish the mechanism of cracking by conducting limited examinations on an expedited basis. The purpose of these evaluations is to provide a preliminary assessment of the cracking mechanism. The evaluations will include surface examinations, metallographic examinations and limited scanning electron microscopy of the freshly opened crack. Chemistry evaluation of crack deposits by Edax will also be conducted as needed.

(b) Detailed Metallurgical Evaluations

- SURFACE EXAMINATIONS: The as-received surface condition of the cracked weld will be examined carefully by visual and low power light microscopy techniques for evidence of surface deposits, corrosion, cracks and/or other mechanical damage. The location and orientation of the surface cracks present, if any, will be examined. The results of the surface examinations will be photographically recorded.

- METALLOGRAPHIC EXAMINATIONS: Light optical metallographic exmainations on sections containing the fracture and/or major cracked regions will be conducted to establish the morphology, orientation and distribution of cracks and their relationship to local microstructure. The metallographic examinations will also establish the microstructure of the weld and base materials.

- FRACTOGRAPHIC EXAMINATIONS: The fracture faces of the freshly opened crack will be examinated in the virgin and in the endoxed (oxide removed) conditions by light optical and scanning electron microscopy techniques. The light optical fractographic examinations will establish the fracture orientation, the crack initiation sites, bench marks (crack arrest lines) and crack propagation history while the scanning electron fractographic examination will establish the fracture morphology and cracking mechanism. Evidence for intergranular/transgranular morphology, corrosion and

crack deposits as well as for the presence of fatigue striations or overload deposits as well as for the presence of fatigue striations or overload dimpled morphology will be established under this task.

- CHEMISTRY EVALUATIONS: Chemistry evaluation of the crack deposits will be examined by energy dispersive X-ray analysis to establish the role of any contaminants while wet chemistry analysis of the weld material composition will be conducted to examine if the material meets the specification requirements.

- MECHANICAL PROPERTY MEASUREMENTS: Hardness measurements will be made on the polished sections of the weld material to establish the ductility and tensile strength of the material.

- DATA ANALYSIS: The results of the various examinations will be analyzed and the mechanism and causes of the weld cracking will be established. In case the failure is confirmed to be due to cyclic loads, detailed evaluations will be conducted to identify low cycle and high cycle fatigue regions. Striation spacing measurements will be made to relate to the applied loads. The contributors to the crack initiation and their propagation will be identified.

(c) The preliminary evaluations are expected to be completed within two days after the receipt of the sample. The detailed evaluations are expected to be completed within three weeks after the receipt of the sample at which time a summary results report will be provided.

c. Observations and review of licensee's activities

The inspectors examined documents, activities, and records as indicated below, to determined whether these activities were being conducted in accordance with applicable procedures, regulatory requirements, and licensee commitments. The UT examinations were being performed by SCS while the remainder of the activities noted were being performed by Alabama Power (AP) site personnel.

(1) The inspectors reviewed the procedures indicated below to determined whether the procedures were consistent with regulatory requirements and licensee commitments. The procedures were also reviewed in the areas of procedure approval, requirements for qualification of NDE personnel, and compilation of required records; and if applicable, division of responsibility between the licensee and contractor personnel if contractor personnel are involved in the effort.

Procedure	Title
(SCS) UT-F-480 (R1) with Modification Attachment	Manual Ultrasonic Examination of Full Penetration Welds (0.200" to 2.5")
(AP) CDM-NDE-01 Proc. No. 3.0 (R2)	Nondestructive Examination Procedure for Radiographic Inspection of Weldments and Components

The inspectors reviewed procedure UT-F-480 to ascertain whether it had been reviewed and approved in accordance with the licensee's established QA procedures. The above procedure was reviewed for technical adequacy and conformance with ASME, Section V Article 5 and other license commitments/requirements in the following areas: type of apparatus used; extent of coverage of weldment; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method for demonstrating penetration; limits for evaluating and recording indications; recording significant indications; and acceptance limits.

The inspectors reviewed the RT procedure to determined whether it contained sufficient information to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, or any additional specification requirement: type of material to be radiographed; material and weld surface condition requirements; type of radiation source, effective focal spot or effective source size; film brand or type; number of films in cassette; minimum source to film distance; type and thickness of intensifying screens and filters; quality of radiographs; film density and contrast for single and composite viewing; use of densitometers for assuring compliance with film density requirements; system of radiograph identification; use of location markers; methods of reducing and testing for back-scatter; selection of penetrameters including penetrameter placement; number of penetrameters; shims under penetrameters; radiographic technique for double wall viewing; and, evaluation and disposition of radiographs.

(2) The inspectors reviewed certification records of equipment, materials, and NDE personnel which had been and will be utilized during the required examinations. The reviews conducted by the inspectors are documented below.

(a) The inspectors reviewed the qualification documentation for the below listed SCS and AP examiners in the following areas: employer's names; person certified; activity qualified to perform; effective period of certification; signature of employer's designated representatives; basis

used for certifications; and annual visual acuity, color vision examination and periodic recertification.

		Method - Level				
Company	Examiner	UT	PT	MT	RT	VT
SCS	RTD	III	III	III	III	III
SCS	KSJ	III	III	III	III	II
SCS	LEM	III	II	II	-	II
AP	JEA	-	-	-	II	-
AP	TJS	-	-	-	II	-

(b) The inspectors observed an ultrasonic examination demonstration being conducted on the Unit 2 welds indicated below. The observations were compared with the applicable procedure and the Code in the following areas: availability of and compliance with approved Nondestructive Examination (NDE) procedure; use of knowledgeable NDE personnel; use of NUE personnel qualified to the proper level; type of apparatus used; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method of demonstrating penetration; limits of evaluating and recording indications; and, recording significant indications.

ISO NO.	Description	Weld I.D.
APR-1-4210	6" Pipe to Elbow	16
APR-1-4210	6" Pipe to Elbow	17

The UT demonstrations on the above welds were accomplished using both a 45° shear wave and a 60° shear wave examination technique. UT equipment calibration, prior to the above demonstrations, were observed by the inspectors.

(c) Completed ultrasonic examination data and evaluations of Units 1 and 2 45° and 60° shear wave examinations were reviewed by the inspectors to ascertain whether: the methods, technique and extent of the examination complied with applicable NDE procedures; findings were properly recorded and evaluated by qualified personnel; programmatic deviations were recorded as required; personnel, instruments, calibrations blocks, and NDE materials were designated. Records reviewed are listed below.

UNIT 1

ISO. No ISI/(Grinnel Spool)	Weld I.D ISI/(Grinnel)	Loop
ALA-118 (EG 718/JF-19-508A)	1 (FW44)	1
" "	2 (B)	1
" "	3 (A)	1
" "	4 (FW32)	1
ALA-132 (EG 686/JF-16-45)	1 (FW1)	2
" "	2 (C)	2
" "	3 (B)	2
" "	4 (FW34)	2
" (NA)	6 N/A	2
" (NA)	7 N/A	2
ALA-143 (EG 686/JF-16-38)	1 (FW11)	3
" "	2 (E)	3
" "	3 (D)	3
" "	4 (C)	3
" "	5 (B)	3
" "	6 (FW1)	3

UNIT 2

APR-1-4109 (2-101/JG-16G-37)	30 (FW8)	1
" "	31 (B)	1
" "	32 (C)	1
" "	33 (FW2)	1
APR-1-4210 (2-100/JG-16G-32)	*15 (FW5)	2

"	"	*16 (B)	2
APR-1-4210	(2-100/JG-16G-32)	*17 (C)	2
"	"	*18 (FW1)	2
"	(NA)	12 (N/A)	2
"	(NA)	13 (N/A)	2
"	(NA)	14 (N/A)	2
APR-1-4309	(2-454/JG-16G-82)	29 (FW8)	3
"	"	30 (B)	3
"	"	31 (C)	3
"	"	32 (D)	3
"	"	33 (E)	3
"	"	34 (FW6)	3

*Examination data obtained prior to removal of these welds from the SIS.

The Unit 2, loop 2, SIS preservice ultrasonic examination data for welds 12, 13, 14, 15, 16, 17, and 18 and the inservice examination data, conducted in April 1986, for weld 16, was reviewed by the inspectors in order to determined if any relevant indications were reported as a result of these examinations. These examinations did not report any indications at these locations.

(d) The following listed ultrasonic equipment and materials certification records were reviewed:

Ultrasonic Instruments

Manufacturer/Model	Serial No.
USK/7	27276-4309-2
USL/38	210310W
USK/7	27276-4314-2
USK/7	27276-4317-2

Ultrasonic IIW blocks with serial no. 790607, 793392 and 793393

Ultrasonic couplant sonotrace 40, batch no. 8662

Ultrasonic Transducers

Size	Frequency	Serial No.
.5	2.25 MHz	J21437
.375	1.5 MHz	15271
.5	5.0 MHz	C03680
.375	2.25 MHz	031294
.25	2.25 MHz	021693
.375	1.5 MHz	15149

Ultrasonic calibration blocks ALA-6 and APR-1

(e) The inspectors reviewed the Unit 2 radiographs and associated documentation for the radiographic examinations indicated below. The reviews were compared with the applicable procedures and the Code in the following areas: the type of material to be radiographed has been identified; the material thickness is within the specified range; type of radiation source; type, and number of films in cassette; minimum source to film distance; type and thickness of intensifying screens and filters; exposure conditions; quality of radiographs; film density and sufficient contrast for single and composite viewing; use of densitometers for assuring compliance with film density requirements; system of radiograph identification; use of location markers; methods of testing for back-scatter; selection and use of penetrameters including penetrameter placement, and special requirements for single and double wall viewing; number of penetrameters; shims under penetrameters; radiographic technique; and, evaluation and disposition of radiographs.

ISO No.	Description	Weld I.D	Comment
APR-1-4210	6" Pipe to Elbow	16	RT with water in pipe
"	6" Pipe to Elbow	17	RT with water in pipe

"	6" Pipe to Elbow	16	RT no water in pipe
"	6" Pipe to Elbow	17	RT no water in pipe

Following RT of weld 16 with no water in the pipe, a circumferential crack in the weld was evident in the radiograph. The crack followed the approximate weld heat affected zone on the elbow side of the weld for approximately 2-1/2" then crossed the weld metal at approximately a 45° angle and proceeded another 2-1/2" along the weld heat affected zone on the pipe side of the weld.

(f) The below listed fabricated weld acceptance radiographic film was reviewed to determine if radiographic quality was in accordance with the applicable procedure and Code requirements and to specifically verify the following: penetrameter sensitivity; film density and density variation; film identification; film quality; weld coverage; and weld acceptability.

Unit 1

Isometric	Weld ID	Film Reviewed
EG686-JF-16-38	FW-11	0-5, 5-10, 10-15, 15-0
"	FW-1	0-5, 5-10, 10-5, 15-0
"	B	JAC, BE, EH, HI
"	E	AD, DG, GJ, JA
"	**D	AD, DG, GI, IA
"	C	AD, DF, FI, IA
EG718-JF-19-508A	A	KD, DG, GJ, JK
"	B	AD, DG, GJ, JA
"	FW-32	0-5, 5-10, 10-5, 15-0
"	FW-44	0-5, 5-10, 10-15, 15-0
EG686-JF-16-45	B	A-D, D-G, F-J, J-A
"	C	B-E, E-H, H-J, J-B

"	FW-1	0-5, 5-10, 10-15, 15-0
"	FW-34	0-5, 5-10, 10-15, 15-0

UNIT 2

EG2-100-JG-16G-32	*B	J-A-B, B-E, E-H, H-J
"	*C	A-C, C-E, E-G, G-I, I-A
"	*FW-5	0-5, 5-10, 10-15, 15-0
"	*FW-1	0-5, 5-10, 10-15, 15-0
EJ2-454-JG-16G-82	B	A-C, H-I, B-J, F-J, E-H, C-E
"	C	A-C, C-E, E-H, H-I, I-K, K-A
"	D	A-C, C-E, E-G, G-I I-K, K-A
"	E	A-C, C-D-E, E-G, G-I I-K, K-A
"	FW-6	0-5, 5-10, 10-15, 15-0
"	FW-8	0-5, 5-10, 10-15, 15-0
EG2-101-JG-16G-37	C	A-D, D-G, G-J, J-A
"	**B	K-A-D, D-G, G-J, J-A
"	FW-B	0-5, 5-10, 10-15, 15-0
"	FW-8(R1)	0-4, 4-8, 8-12, 12-16, 16-0
"	FW-2	0-5, 5-10, 10-15, 15-0

* Welds to be removed from SIS
** Welds with indications noted during review

(g) The inspectors reviewed the associated examination records for the above listed welds to determine compliance with procedure requirements for examination records and to determine if disposition of the welds radiographed was in compliance with applicable Code and specification requirements.

(h) During the review of the fabrication radiographs by the inspectors, two welds were noted which contained controversial indications. These two welds are identified below along with the indication location and a description of the indications.

- Unit 1, loop 3, weld D, as identified on isometric EG686-JF-16-38. Possible indication noted on radiographic film view I-A at station K. The indication is approximately 7/8" in length and appears to be a possible lack-of-fusion condition.

- Unit 2, loop 1, weld B, as identified on isometric EG2-101-G-16G-37. Possible indication noted on radiographic film view J-A at station K. The indication is approximately 1/2" in length and appears to be a transverse linear indication extending out of a small porosity indication and running across the weld root.

It should be noted that each of these welds have been UT examined as noted in paragraph 5.c.(2) (c), above. The UT examinations did not reveal any relevant indications and, therefore, it is improbable that if these are valid indications they would have any appreciable through wall dimensions. However, the inspectors discussed with the licensee, the possibility that these indications could be valid. Following these discussions, the licensee made the following commitments:

- Unit 1, loop 3, weld D, isometric EG86-JF-16-38, will be radiographed during the next scheduled Unit 1 outage.

- Unit 2, loop 1, weld B, isometric EG2-101-JG-16G-37, will be radiographed during the current Unit 2 outage.

(i) The inspectors reviewed the fabrication weld history records for the below listed SIS 90° and 45° elbow to pipe welds that are similar to the failed elbow to pipe weld. These reviews were conducted to confirm that the required materials, welding procedure, and inspection requirements were in accordance with applicable requirements.

UNIT 1

Isometric	Weld ID	Loop
EG718-JF-19-508A	A	1
"	B	1
EG686-JF-16-45	B	2
"	C	2

EG686-JF-16-38	B	3
"	C	3
"	D	3
"	E	3

UNIT 2

EG2-101-JG-16G-37	B	1
"	C	1
EG-2-100-JG-16G-32	*B	2
"	C	2
EG2-454-JG-16G-82	B	3
"	C	3
"	D	3
"	E	3

* Cracked weld

(j) The licensee established reference alignment measurements prior to making the initial cut to remove the failed section of the Unit 2 pipe. The initial measurements were compared to measurements made immediately following the initial cutting operation in order to determine if an excessive cold spring motion was evident. The inspectors reviewed these measurements and concluded that no significant cold spring motion had taken place.

(k) The inspectors reviewed the material certification documentation for the replacement pipe spool piece and the replacement 90° elbow.

Within the areas inspected, no violations or deviations were identified.

6. List of Abbreviations

AP	Alabama Power
DAC	Distance Amplitude Correction
ID	Identification
IIW	International Institute of Welding
ISI	Inservice Inspection
ISO	Isometric
MHz	Megahertz
MT	Magnetic particle
Mwe	Megawatt electrical
NDE	Nondestructive Examination
No.	Number
NRC	Nuclear Regulatory Commission
Psig	Pounds per square inch gauge
PROC	Procedure
PT	Liquid penetrant
QA	Quality Assurance
R	Revision
RT	Radiograph
RTD	Resistance temperature detector
SCS	Southern Company Services
SIS	Safety Injection System
Tav	Temperature average
TDC	Top dead center
UT	Ultrasonic
VT	Visual
W	Westinghouse