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 FACIL: 50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
 AUTH. NAME: WOODY, C. D. AUTHOR AFFILIATION: Florida Power & Light Co.
 RECIP. NAME: THADANI, A. C. RECIPIENT AFFILIATION: PWR Project Directorate B

SUBJECT: Informs of completion of plant inservice insp review from 770701 to present. Relief Requests 5 & 6 submitted on 770701 require NRC approval. Requests 7 & 8 also submitted. Description of relief requests encl. Fee paid.

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INTERNAL:	ADM/LFMB	1 0	AEOD/PTB	1 1
	ELD/HDS2	1 0	NRR/DSRD/EIB	1 1
	NRR/TAMB	1 1	REG FILE 04	1 1
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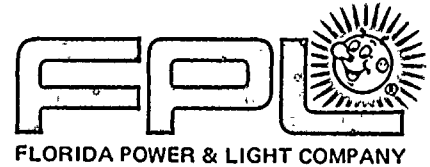
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OCTOBER 29 1986

L-86-411

Office of Nuclear Reactor Regulation
Attention: Mr. Ashok C. Thadani, Director
Project Directorate #8
Division of PWR Licensing - B
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Thadani:

Re: St. Lucie Unit No. 1
Docket No. 50-335
Inservice Inspection Program

A review of Florida Power & Light Company (FPL) correspondence to the NRC and of NRC correspondence to FPL regarding the St. Lucie Unit 1 Inservice Inspection Program, covering the period from July 1, 1977 to the present, has been completed. Based on this review, certain issues requiring NRC approval for the first 10-year Inspection Interval have been identified.

First, as required by 10 CFR 50.55a (g), FPL has updated the ISI Program for St. Lucie Unit 1 to the requirements of the 1974 Edition through Summer 1975 Addenda of Section XI of the ASME Boiler and Pressure Vessel Code. This is still applicable for the first 10-year Inspection Interval which ends February 11, 1988. The program was submitted to NRC by FPL letters L-77-203 (July 1, 1977) and L-77-291 (September 16, 1977). Interim NRC approval was granted on December 20, 1977, but final NRC approval is still pending.

Second, on April 22, 1983 (L-83-254), FPL requested relief from schedular requirements for mechanized examinations, as a result of the thermal shield problems which necessitated removal of the reactor internals. The relief request also included FPL's intent to conduct the vessel examinations to the ASME 1977 Edition through Summer 1978 Addenda, and Regulatory Guide 1.150, Revision 1, with the exception of those examinations conducted during the first inspection period per the St. Lucie Unit 1 Technical Specifications and ASME 1974 edition through Summer 1975 Addenda. Although the schedular relief became unnecessary due to the extended outage, NRC approval is still needed for FPL to take credit for the vessel examinations conducted as described above.

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Mr. Ashok C. Thadani
L-86-411
Page two


The remaining issues concern the outstanding relief requests which require NRC approval. Attached is a description of each of the relief requests. Relief requests 2, 3, and 4 were originally submitted to NRC on April 29, 1983 (L-83-271), and, by FPL error, they were withdrawn on February 16, 1984 (L-84-34). These are still applicable for the first inspection interval.

Relief requests 5 and 6 were originally submitted to NRC on July 1, 1977 (L-77-203), as part of the ISI program. Formal NRC approval is still pending.

Relief requests 7 and 8 are new requests and have not previously been submitted for your approval. Therefore, attached is FPL Check No. 2859 as remittance for the required review fee. In order to complete ISI preparation for the upcoming 1987 refueling outage for St. Lucie Unit 1, your review and approval of relief request 8 is requested by mid-December 1986.

Should you have any questions regarding this submittal, do not hesitate to contact us.

Very truly yours,

for 
C. O. Woody
Group Vice President
Nuclear Energy

COW/RJS/gp

Attachments

cc: Dr. J. Nelson Grace, USNRC, Region II
Mr. Alan Schubert, Florida Dept. of Health and Rehabilitative Services
Harold F. Reis, Esquire, Newman & Holtzinger

The following information was obtained from the records of the
 Department of the Interior, Bureau of Land Management, on the
 subject of the above-captioned matter. The information is being
 furnished to you for your information and use.

On or about the date of the above-captioned matter, the
 Department of the Interior, Bureau of Land Management, advised
 that the above-captioned matter was being handled by the
 Department of the Interior, Bureau of Land Management, and
 that the Department of the Interior, Bureau of Land Management,
 was in the process of reviewing the matter.

The Department of the Interior, Bureau of Land Management,
 advised that the above-captioned matter was being handled by
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The Department of the Interior, Bureau of Land Management,
 advised that the above-captioned matter was being handled by
 the Department of the Interior, Bureau of Land Management, and
 that the Department of the Interior, Bureau of Land Management,
 was in the process of reviewing the matter.

Very truly yours,
 [Signature]

St. Lucie Unit #1
Inservice Inspection

RELIEF REQUEST NO. 2

A. Component Identification: Class 1

1. Code Examination Category B-I-1 Interior Clad Surfaces of Reactor Vessels, applies to Closure Head only.
2. Code Examination Category B-I-2 Interior Clad Surfaces of Vessels Other Than Reactor Vessels.

B. Examination Requirements:

1. Item B1.13 - Visual and Surface, or Volumetric Examination of reactor vessel closure head cladding, at least six patches, evenly distributed to be conducted during each Inspection Interval.
2. Item B2.9 and B3.8 - Visual examination of vessels other than reactor vessels (Pressurizer and Steam Generators) cladding, patches may be deferred to the end of the Inspection Interval.

Basis: St. Lucie Unit 1 Tech Spec (i.e., 1971 Edition thru Winter 1972 Addenda and 10 CFR 50.55 a (g), 1974 Edition thru Summer 1975 Addenda).

C. Identification of Relief From Code Requirement:

1. FPL requests relief from performing code examinations of interior clad surfaces of:
 1. Reactor Vessel Closure Head (Category B-I-1, Item B1.13) and
 2. Other Than Reactor Vessels (Pressurizer and Steam Generators) (Category B-I-2, Item B2.9 and B3.8)

D. Basis For Relief

1. Analysis has shown that flaws which may initiate in the reactor vessel cladding, at locations other than nozzles, are not likely to propagate through the clad-base metal interface. Because of this data, the need to confirm the initiation clad fissures is not considered relevant. Accordingly, the ASME code has completely eliminated the B-I-1 and B-I-2 Examination Categories from the later editions of Section XI.
2. Performing these cladding examinations constitutes needless radiation exposure to personnel with no compensatory increase in safety or quality. Current surveys have recorded levels of radiation ranging from 15 R to 35 R in the applicable areas of examinations of components subject to these examination requirements.

3. Pursuant to 10 CFR 50.55 a (g) (4) (iv), FPL opts to update to the requirements of the 1977 Edition thru Summer 1978 Addenda which deletes the examination requirement.

E. Alternate Examinations:

Not applicable.

F. Implementation Schedule:

Not applicable.

St. Lucie Unit #1
Inservice Inspection

RELIEF REQUEST NO. 3

A. Component Identification: Class 1

1. Code Examination Category, B-K-1, Support Members for Piping, Valves and Pumps.

B. Examination Requirements:

1. Item B4.9 - Piping Integrally welded supports
2. Item B5.4 - Pump Intergrally welded supports
3. Item B6.4 - Valve Integrally welded supports

Volumetric Examinations of support attachments shall cover 25% of the integrally welded supports during each Inspection Interval.

Basis: St. Lucie Unit 1 Tech Spec (i.e., 1971 Edition thru Winter 1972 Addenda and 10 CFR 50.55 a (g), 1974 Edition thru Summer 1975 Addenda).

C. Identification of Relief From Code Requirements:

1. FPL opts to conduct Surface Examinations in lieu of Volumetric Examinations of integrally welded support members for piping, valves and pumps for Examination Category B-K-1 (items B4.9, B5.4 and B6.4).

D. Basis For Relief:

1. Volumetric Examinations on numerous integrally welded support members are found to be impractical. Because of the design and configuration, these welds are not conducive to meaningful nor conclusive ultrasonic or radiographic examinations.
2. Pursuant to 10 CFR 50.55 a (g) (4) (iv), FPL opts to update to the examination requirements of the 1977 Edition thru Summer 1978 Addenda which permits the licensee to substitute surface for Volumetric Examination.

E. Alternate Examinations:

Perform Surface Examinations on integrally welded supports (Category B-K-1) to ASME 1977 Code Edition thru Summer 1978 Addenda. The examinations include only those attachments whose base material design thickness is 5/8 inch and greater. The examination shall include the component supports of the piping required to be examined by Category B-J, and the component support of pumps and valves integral to such piping. Essentially 100% of weld length is included.

F. Implementation Schedule:

The examinations shall cover 25% of the integrally welded supports during the Inspection Interval.

St. Lucie Unit #1
Inservice Inspection

RELIEF REQUEST NO. 4

A. Component Identification: Class 1

Code Examination Category B-J Pressure Containing Welds In Piping.

B. Examination Requirements:

Item B4.5 Piping Circumferential and Longitudinal Welds. Volumetric Examination of circumferential welds and the base metal for one wall thickness beyond the edge of the weld.

Basis: St. Lucie Unit 1 Tech Spec (i.e., 1971 Edition thru Winter 1972 Addenda and 10 CFR 50.55 a (g), 1974 Edition thru Summer 1975 Addenda.

C. Identification of Relief From Code Requirement:

FPL opts to conduct Surface Examinations in lieu of Volumetric Examinations of the piping circumferential welds and base metal beyond the edge of the welds within the limitations of existing configurations for Examination Category B-J (Item B4.5). See attached sketch of "Typical Configuration".

D. Basis For Relief:

1. Volumetric Examinations of the piping circumferential welds and base metal beyond the edge of the welds are found to be impractical. Because of the design and configuration, these welds are not conducive to Ultrasonic Examination and do not lend themselves to good Radiographic Examination technique.
2. The code (Examination Category B-J, Item B4.7) permits Surface Examination of Branch Pipe Connection welds six (6) inch diameter and smaller. This is somewhat typical and consistent with the pipe to tee welds which are six (6) inch nominal pipe diameter (see attached sketch).
3. Conduct of the Volumetric Examinations to meet the code would constitute undue hardship and unusual difficulty without a compensatory increase in the level of quality and safety.

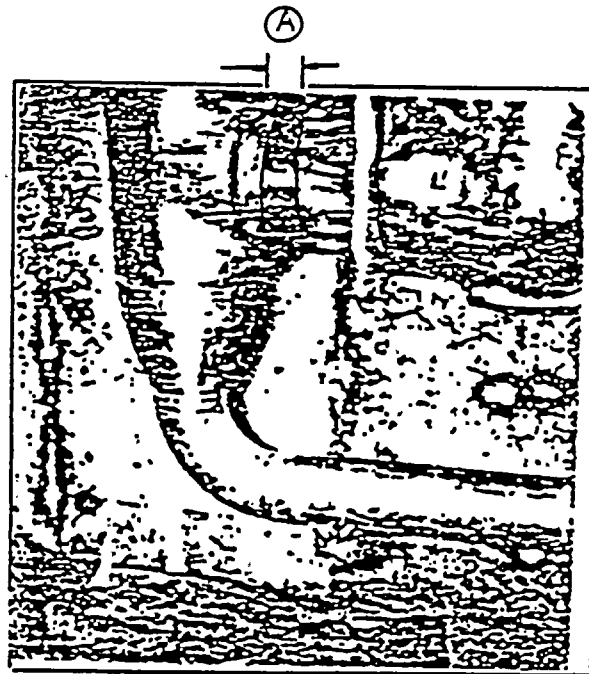
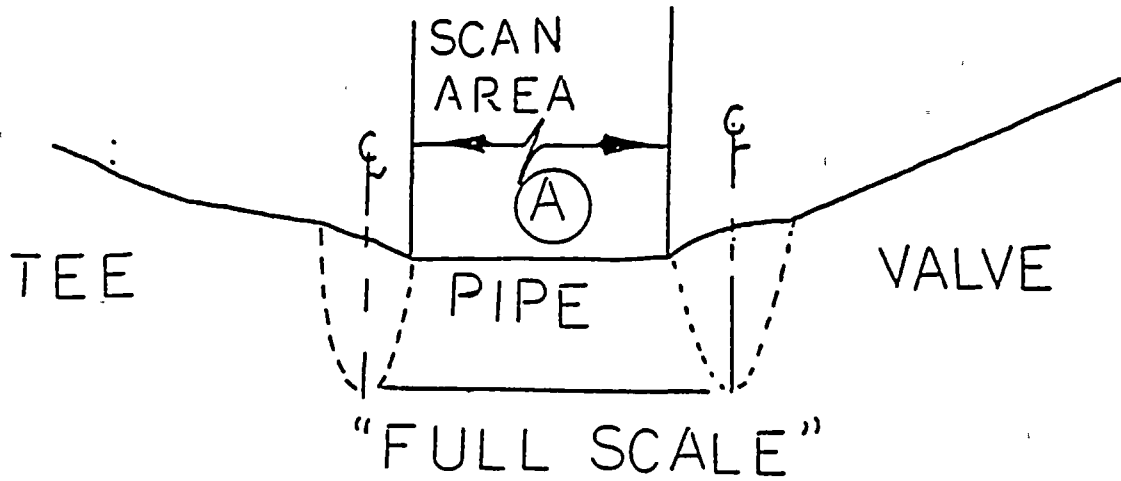
E. Alternative Examinations:

Perform Surface Examinations on the piping circumferential welds and base metal beyond the edge of the welds within the limitations of existing configurations for Examination Category B-J (Item B4.5).

F. Implementation Schedule:

The examinations shall cover 25% of the circumferential joints during each Inspection Interval.

ST. LUCIE UNIT NO.1
ATTACHMENT- RELIEF REQUEST NO.4



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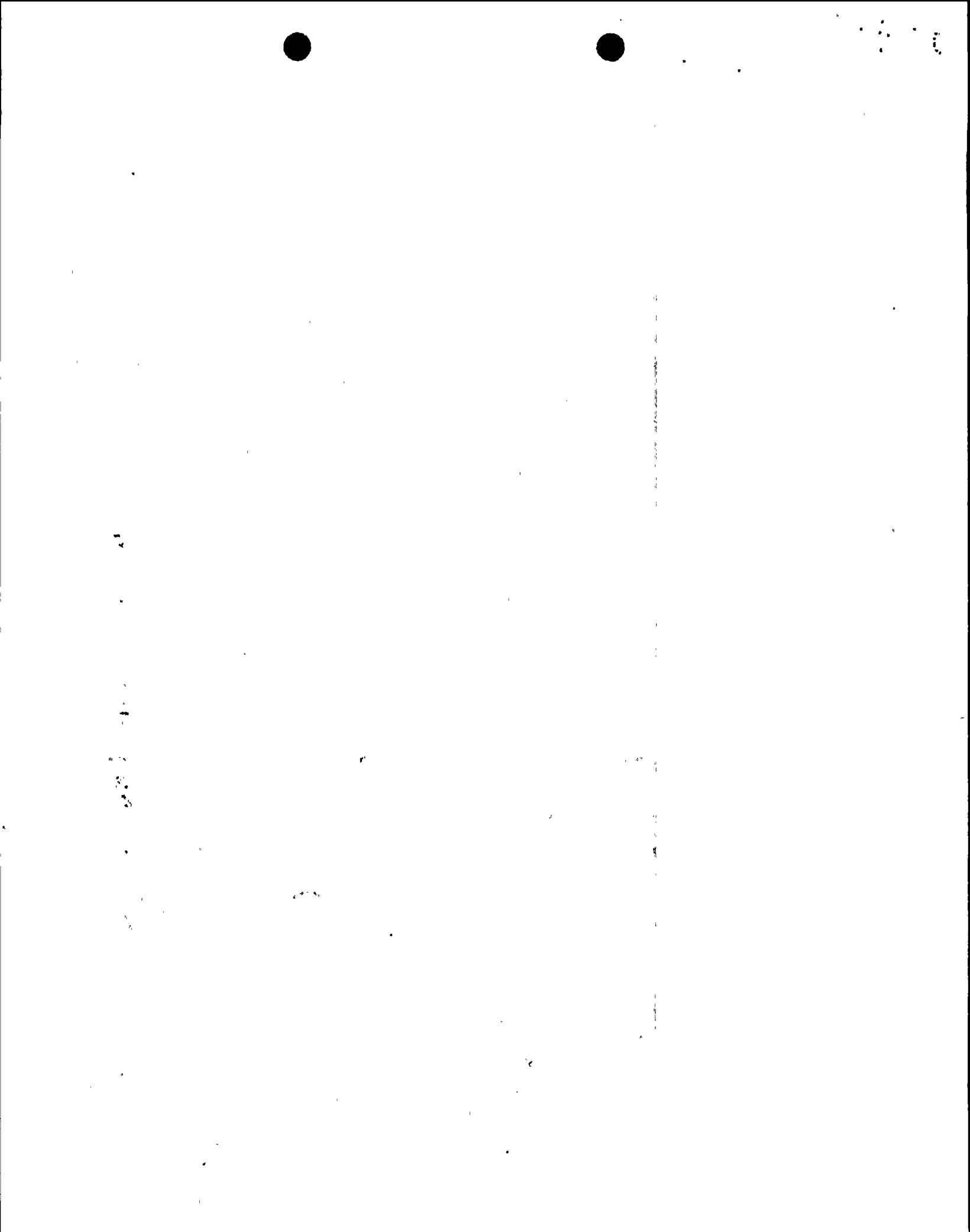
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"TYPICAL CONFIGURATION"

ST. LUCIE UNIT NO. 1

ATTACHMENT - RELIEF REQUEST NO. 4

SYSTEM	WELD IDENTIFICATION	DESCRIPTION
SAFETY INJECTION	6"-SI-112-2	TEE TO PIPE
SAFETY INJECTION	6"-SI-112-2a	PIPE TO VALVE CV-3124
SAFETY INJECTION	6"-SI-113-2	TEE TO PIPE
SAFETY INJECTION	6"-SI-113-2a	PIPE TO VALVE CV-3114
SAFETY INJECTION	6"-SI-110-2	TEE TO VALVE CV-3144
SAFETY INJECTION	6"-SI-111-2	TEE TO VALVE CV-3134



ST. LUCIE UNIT 1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST # 5

A. COMPONENT IDENTIFICATION:

- CLASS 2 - STEAM GENERATOR STAYWELL DOME TO STAYWELL CYLINDER WELDS.

B. EXAMINATION REQUIREMENTS:

ITEM	EXAM CAT.	ITEM NO.	DESCRIPTION
1	C-A	Cl.1	- STAYWELL DOME TO STAYWELL CYLINDER WELD

C. RELIEF REQUESTED:

RELIEF IS REQUESTED FROM THE VOLUMETRIC EXAMINATION WHICH REQUIRES THAT AT LEAST 20% OF EACH CIRCUMFERENTIAL WELD, INCLUDING WELD METAL AND BASE METAL FOR ONE PLATE THICKNESS BEYOND THE EDGE OF THE WELD, UNIFORMLY DISTRIBUTED AMONG THREE AREAS AROUND THE CIRCUMFERENCE.

D. BASIS FOR RELIEF:

THE STAYWELL DOME TO STAYWELL CYLINDER WELD IN BOTH STEAM GENERATORS DUE TO ITS GEOMETRY AND ACCESSIBILITY, IS NOT CONDUCTIVE TO ANY MEANINGFUL RESULTS.

BECAUSE OF THE ULTIMATE STOP OF THE PERMANENT TRACK INSTALLATION, THE CLEARANCE OF THE TRANSDUCER, AND THE LIMITED AREA FOR THE WELD AND BASE METAL SCAN, ULTRASONIC EXAMINATION OF THE WELD PRODUCES MEANINGLESS RESULTS.

IN THE TRANSVERSE CONFIGURATION OF THE MODULE THERE IS THE 3/4 INCH AREA OF BASE METAL THAT IDEALLY CAN BE EXAMINED. BUT THE ROOT OF THE WELD IS NOT A SMOOTH AREA AND, THEREFORE, THE TRANSDUCER MODULE CANNOT RIDE OVER THE WELD SMOOTHLY. HENCE, THE EXAMINATION IS OBSTRUCTED BY THIS FACTOR, AND ALSO BY THE CURVATURE OF THE STAYWELL CYLINDER DOME.

AN ATTEMPT TO COVER THE WELD FROM ITS BOTTOM SIDE WILL NOT BE SUCCESSFUL DUE TO THE TUBE SHEET THICKNESS. THE BEAM CANNOT BE BOUNCED ON A BACK WALL TO COVER THE ROOT OF THE WELD AND AGAIN DUE TO THE AREA GEOMETRY ONLY PARTIAL SCANNING OF THE WELD CROWN AND APPROXIMATELY THE UPPER THRID OF THE WELD CAN BE PERFORMED. OF COURSE, TRANVERSE EXAMINATION IS USELESS DUE TO THE TUBE SHEET THICKNESS AND TUBE CONFIGURATION.

RELIEF REQUEST NO. 5 CONTINUED

THEREFORE, THE ULTRASONIC EXAMINATION OF THE WELD CANNOT MEET CODE REQUIREMENTS AND THE LIMITED EXAMINATION THAT CAN BE PERFORMED IS NOT ENOUGH TO PRODUCE ANY MEANINGFUL OR CONCLUSIVE RESULTS.

RADIOGRAPHY, SURFACE, OR VISUAL EXAMINATIONS CANNOT BE PERFORMED DUE TO INACCESSIBILITY OF THE WELD BECAUSE OF THE STATIONARY TRACK INSTALLED FOR THE ULTRASONIC EXAMINATIONS OF THE REST OF THE STAYWELL CYLINDER WELDS.

E. ALTERNATE EXAMINATION:

OTHER WELDS IN THE STAYWELL ARE VOLUMETRICALLY EXAMINED BY MECHANIZED ULTRASONICS.

THE WELDS WILL BE SUBJECTED TO A HYDROSTATIC TEST IN ACCORDANCE WITH IWC-5000 OF SECTION XI.

F. IMPLEMENTATION SCHEDULE:

FIRST INSERVICE INSPECTION INTERVAL

G. ATTACHMENTS:

NONE

ST. LUCIE UNIT 1

FIRST INSPECTION INTERVAL

INSERVICE INSPECTION

RELIEF REQUEST # 6

A. COMPONENT IDENTIFICATION:

ULTRASONIC EXAMINATION OF CLASS 1 AND CLASS 2 COMPONENTS

B. EXAMINATION REQUIREMENTS:

ASME CODE SECTION XI (1974 EDITION), PARAGRAPH IWA-2232, ULTRASONIC EXAMINATION: " ULTRASONIC EXAMINATION SHALL BE CONDUCTED IN ACCORDANCE WITH THE PROVISIONS OF APPENDIX I. WHERE APPENDIX I (I-1200) IS NOT APPLICABLE, THE PROVISIONS OF ARTICLE 5 OF SECTION V SHALL APPLY."

ASME CODE SECTION V (1974 EDITION), PARAGRAPH T-537, EVALUATION OF INDICATIONS: "ALL INDICATIONS WHICH PRODUCE A RESPONSE GREATER THAN 20 PERCENT OF THE REFERENCE LEVEL SHALL BE INVESTIGATED TO THE EXTENT THAT THE OPERATOR CAN EVALUATE THE SHAPE, IDENTITY, AND LOCATION OF ALL SUCH REFLECTORS IN TERMS OF THE ACCEPTANCE-REJECTION STANDARDS OF THE REFERENCING CODE SECTION."

C. RELIEF REQUESTED:

RELIEF IS REQUESTED FROM THE 20 PERCENT DAC (DISTANCE-AMPLITUDE CORRECTION) CRITERIA OF PARAGRAPH T-537 OF SECTION V.

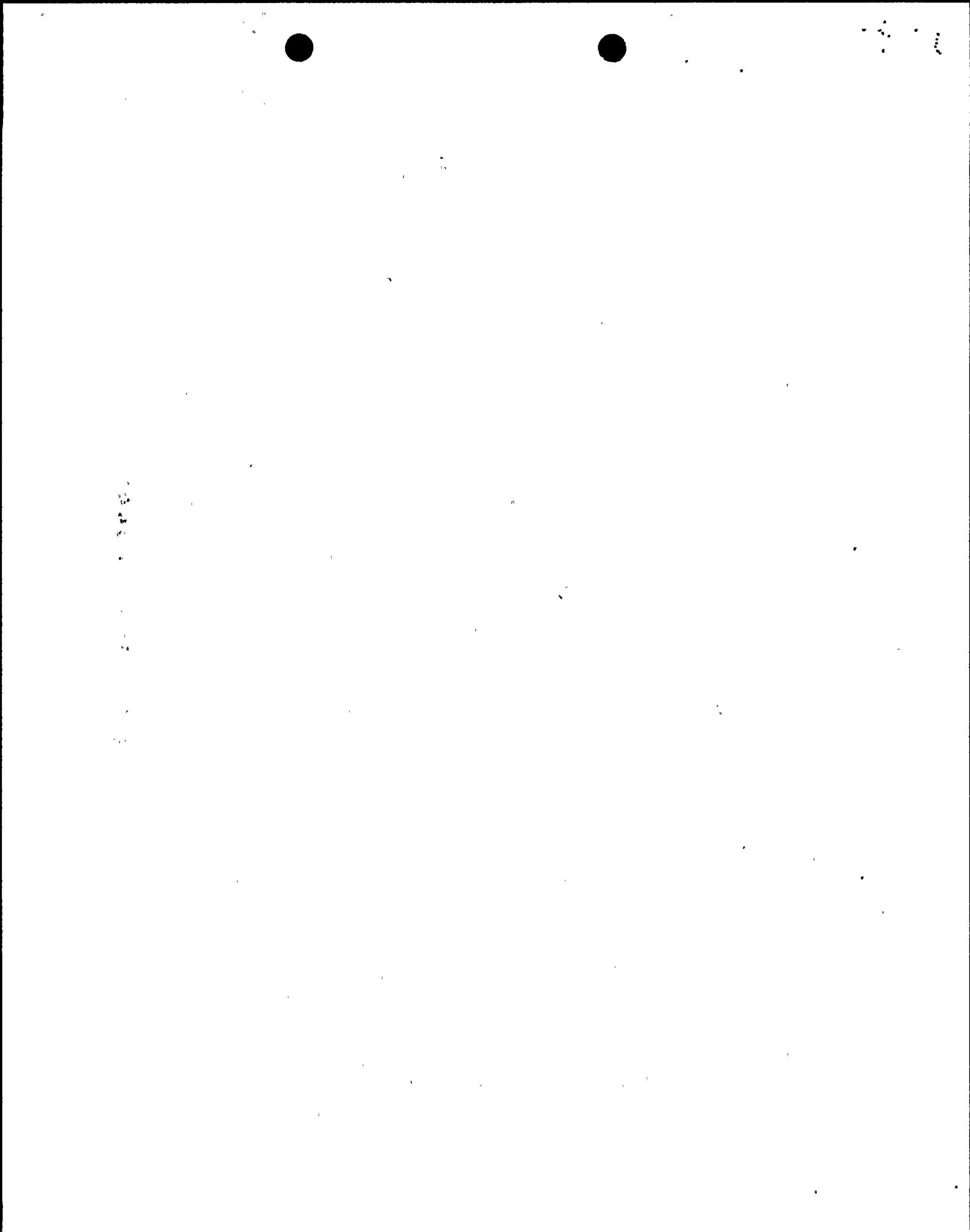
D. BASIS FOR RELIEF:

THE 20 PERCENT DAC CRITERIA OF PARAGRAPH T-537 OF SECTION V IS IMPRACTICAL.

THE PRIMARY REFERENCE LEVEL (100 PERCENT DAC) CRITERIA FOR THE ULTRASONIC (UT) EXAMINATION OF PIPING WELDS PROVIDES A LEVEL OF SAFETY COMPARABLE TO THE SECTION V STANDARDS.

RECORDING AND EVALUATING INDICATIONS AT 20 PERCENT DAC IS IMPRACTICAL FOR THE FOLLOWING REASONS:

- A. THE WELDED JOINTS IN NUCLEAR PIPING FREQUENTLY CONTAIN CODE ALLOWABLE WALL THICKNESS DIFFERENCES (12 PERCENT OF THE NORMAL THICKNESS) AS WELL AS SOME WELD DROPTHROUGH, COUNTER-BORE TAPER, CROWN HEIGHT, ETC. THESE CONDITIONS GENERATE AN EXTREMELY LARGE NUMBER OF GEOMETRIC REFLECTORS WHICH PRODUCE UT INDICATIONS GREATER THAN 20 PERCENT DAC.
- B. WELD METAL IN STAINLESS STEEL PIPING CONTAIN REFLECTORS DUE TO THE METALLURGICAL STRUCTURE WHICH PRODUCE A LARGE NUMBER OF UT INDICATIONS.



RELIEF REQUEST NO. 6 CONTINUED

C. ALL EXAMINATION PERSONNEL EXPERIENCE RADIATION EXPOSURE DURING INSERVICE EXAMINATIONS. THE SECTION V REQUIREMENTS TO RECORD AND EVALUATE UT INDICATIONS AT THE 20 PERCENT DAC PLACES AN UNNECESSARY BURDEN ON THE LIMITED NUMBER OF EXPERIENCED AND QUALIFIED EXAMINERS AVAILABLE TO THE OWNER.

E. ALTERNATE EXAMINATION:

AS AN ALTERNATE EXAMINATION FP&L PROPOSES THE FOLLOWING:

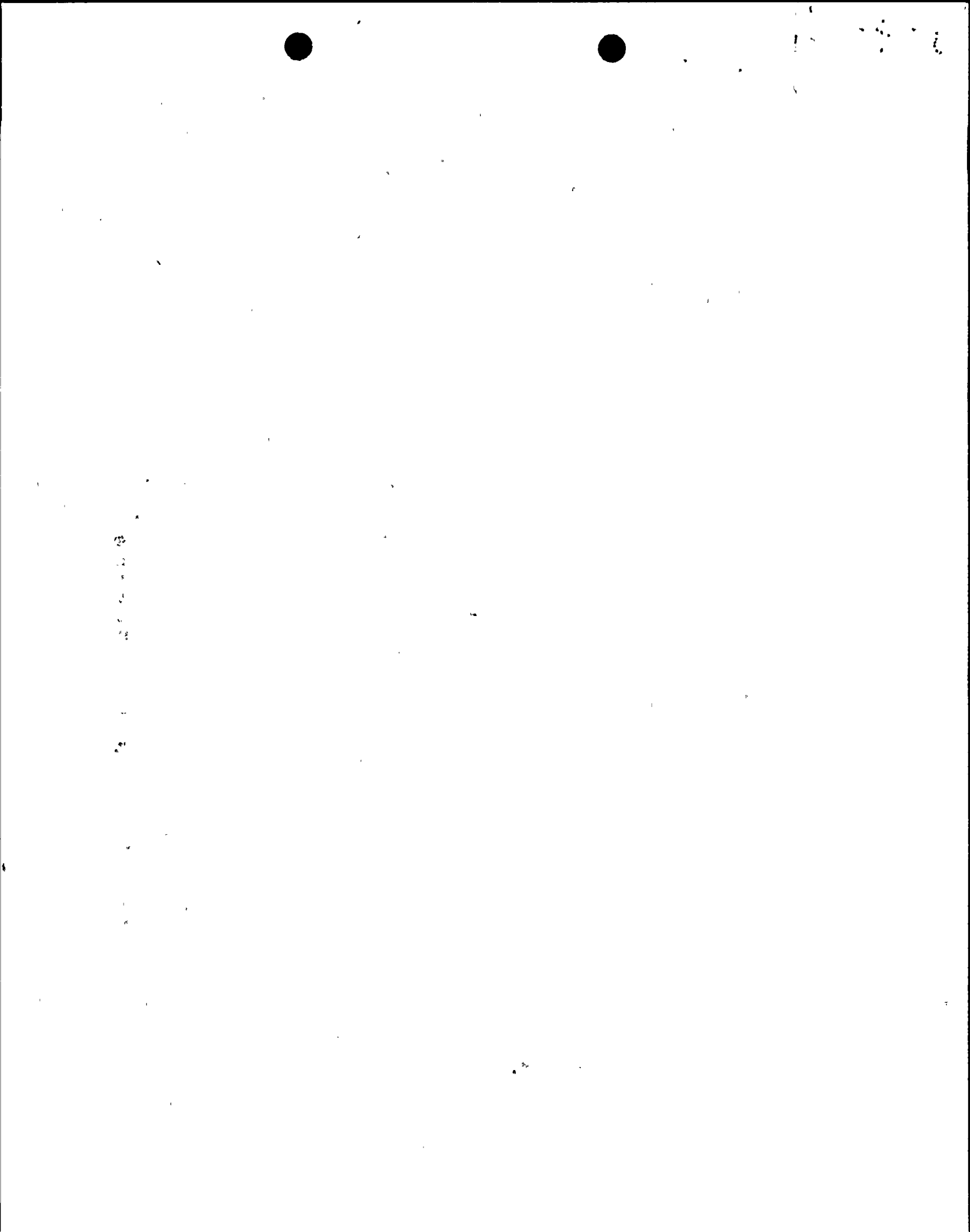
1. Indications 50% of DAC or greater shall be recorded.
2. Any indication 100% of DAC or greater shall be investigated by a level II or level III examiner to the extent necessary to determine the shape, identity, and location of the reflector.
3. Any non-geometric indication, regardless of DAC, discovered during the Ultrasonic (UT) examination of piping welds and base metal materials shall be recorded and investigated by a level II or level III examiner to the extent necessary to determine the shape, identity, and location of the reflector.
4. FP&L shall evaluate and take corrective action for the disposition of any indication investigated and found to be other than geometric in nature.

F. IMPLEMENTATION SCHEDULE:

FIRST INSERVICE INSPECTION INTERVAL

G. ATTACHMENTS:

NONE



ST. LUCIE UNIT 1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST # 7

A. COMPONENT IDENTIFICATION:

- CLASS 1
- CODE EXAMINATION CATEGORY B-M-2
- VALVE BODIES

B. EXAMINATION REQUIREMENTS:

- 1) ITEM B6.7 - VISUAL EXAMINATION OF INTERNAL SURFACES - VALVES

C. BASIS FOR RELIEF:

Disassembly of these valves for the sole purpose of performing a visual examination is not practical. The process of disassembling these components will result in considerable exposure of personnel to radiation and significantly increase the risk of component damage or failure without providing a compensating increase in the level of quality and safety.

D. ALTERNATIVE EXAMINATION

- 1) Periodic Inservice testing per subarticles IWV-3400 and/or IWV-3520 (valves);

or
- 2) Periodic system leakage test per Category B-P, table IWB-2500;
- 3) Perform the required Visual examinations, in accordance with the sampling criteria of table IWB-2500, category B-M-2 in the event the components are disassembled for maintenance or repair;
- 4) The alternative tests and examinations provide an assurance of acceptable quality and safety.

E. IMPLEMENTATION SCHEDULE

- FIRST INSPECTION INTERVAL



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ST. LUCIE UNIT NO.1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST NO. 8

a. Component Classification:

- Class 1
- Manufacturer - Byron Jackson
- Type pump - DFSS
- Size - 35 x 35 x 43
- Component - Reactor Coolant Pump

b. Examination Requirements:

<u>Exam Cat.</u>	<u>Item No.</u>	<u>Examination Requirements</u>
B-L-1	B5.6	Volumetric examination to include 100% of pressure retaining welds, of one pump in each group of pumps performing similar functions in a system. The examinations shall be performed during each inspection interval, and may be performed at or near the end of the inspection interval.
B-L-2	B5.7	Visual examination of the internal pressure boundary surface on one pump in each of the group of pumps performing similar functions in the sytem during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

RELIEF REQUESTED:

Relief is requested from the ASME Code required examinations for the following:

1. 100% volumetric examination of the reactor coolant pump casing welds.
2. 100% visual examination of the reactor coolant pump interior pressure boundary surface.



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ST. LUCIE UNIT NO. 1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST NO. 8 (cont'd.)

3. Relief is requested for the following components:

<u>Pump Identification</u>	<u>Serial Number</u>	<u>R.C. Numbers</u>
1A1	681-N-0445	34356
1A2	681-N-0446	34981
1B1	681-N-0447	34982
1B2	681-N-0448	34983

c. Basis for Relief:

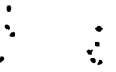
GENERAL

St. Lucie Nuclear Power Plants, Unit No. 1 has reactor coolant pumps which were manufactured prior to the initial issuance of the ASME Boiler and Pressure Vessel Code, Section XI and the design did not provide for the disassembly and removal of fixed internals. The pumps were designed to provide reliable service for the plant lifetime without internal maintenance or inspection. The impracticality of performing these examinations is not unique to St. Lucie, and has initiated generic studies to evaluate the need for inspection and to develop specific examination techniques. To date, no technique has been qualified and proven practical for performing inservice inspections of the Type E pump design without pump disassembly.

DISASSEMBLY & REASSEMBLY

The disassembly and reassembly of the pumps is extremely difficult given the interference and/or tight fits which need to be addressed. Without painstaking care, the disassembly/reassembly process could degrade the pump internals from an operational standpoint.

There is a very low probability, based upon experience, to disassemble pump(s) solely for maintenance purposes. There is no requirement by the pump manufacturer (Byron Jackson) to disassemble the pump(s) as part of normal maintenance or inspection. Accordingly, Florida Power & Light Company's procedures do not require disassembly of the pump(s) for maintenance or inspection purposes.



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ST. LUCIE UNIT NO. 1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST NO. 8 (cont'd.)

EXAMINATIONS

CONVENTIONAL RADIOGRAPHY

The presence of the diffuser vanes (Fig. No. 1) precludes conventional radiography, in that the vanes prevent placement of the RT film cassettes inside the pump (as does the radiation field in terms of the radiographic film and personnel radiation exposure).

Placement of the film on the outside of the pump is feasible, but there is no radiographic source suitable for placement inside the pump. Standard isotopic radiation sources are too weak to penetrate the thick casting and background radiation from the inside surface of the pump would diminish sensitivity.

Special strong isotopic sources would be impractical to handle and position inside the pump due to personnel radiological exposure from the radiographic source itself.

MINIATURE LINEAR ACCELERATOR (MINAC)

The Miniature Linear Accelerator was considered, but the Type E pump design precludes positioning of the accelerator inside the pump.

Double wall radiography utilizing the MINAC has also been considered with some hope of attaining meaningful radiographs of a portion of the casing welds. This technique has not been qualified to date and appears to be some time off, if at all possible.

To perform its examination, large expenditures of manhours and man-rem are required. Based on actual data compiled from the radiographic examination of the Turkey Point Unit No. 3 reactor coolant pumps casing welds and the visual examination of the internal pressure boundary surface on one pump, in excess of 5900 manhours and 46 man-rem exposure was expended in the disassembly, examinations and reassembly of the pump. This data does not include engineering time or pre-outage job planning, nor does it include radiation protection personnel that required direct coverage and the postponement of work activities in other areas of the containment building due to the amounts of radiation being produced during the conduct of the radiography exposures of the casing welds.



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ST. LUCIE UNIT NO. 1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST NO. 8 (cont'd.)

ULTRASONIC EXAMINATION

Ultrasonic examination is not feasible due to the material construction of the pump casing. The pump casing is fabricated from cast stainless steel (ASTM A351, Grade CF8M). The material is essentially a cast-type 316 stainless steel. The coarse grain structure inherent in thick stainless steel castings preclude the use of conventional ultrasonic examinations. Future developments in ultrasonic examination techniques may provide a method to examine thick stainless steel castings. When and if a major breakthrough in ultrasonic examination techniques is made that satisfies the examination requirements of the ASME code, Florida Power & Light will comply with the intent of the code.

LIQUID PENETRANT METHOD

Florida Power & Light Company has considered using the liquid penetrant method of examination as a alternate to the volumetric examination referenced in the code, but rejected this method based on the following:

Because of the porous condition of the casting surface of the weld zones, considerable surface smoothing will be required in order to enable meaningful examination and interpretation of the results.

Such weld surface finishing operations, if not performed prior to the preservice inspection, will be extremely difficult at the time of the inservice inspection.

The recommended method of penetrant is the water-washable type. Using this method would require: a sufficient water supply, a method of containing the water and disposal of the run off after removal of the penetrant. This has the potential to cause a contamination problem.

The solvent-removable type penetrant method was rejected due to the large size of the pump and the surface roughness which would entrap the penetrant thereby precluding meaningful examination and valid interpretation of the results. Using this method would also require excessive manhours and man-rem.



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ST. LUCIE UNIT NO. 1
FIRST INSPECTION INTERVAL
INSERVICE INSPECTION

RELIEF REQUEST NO. 8 (cont'd.)

MATERIAL CONSIDERATIONS

As noted, the material of construction is CF8M which is a casting grade of 316 stainless steel which has seen extensive service in pressurized water reactor systems. This material has a typical ferrite content of 15% which imparts high resistance to stress corrosion cracking.

A generic analysis of Type E pumps was performed by Nutech Engineers, Inc., under EPRI project 2057. Two modes of degradation are considered; low cycle fatigue loading from events such as heat-up and cool-down, operating transients and seismic events; and thermal aging of austenitic castings.

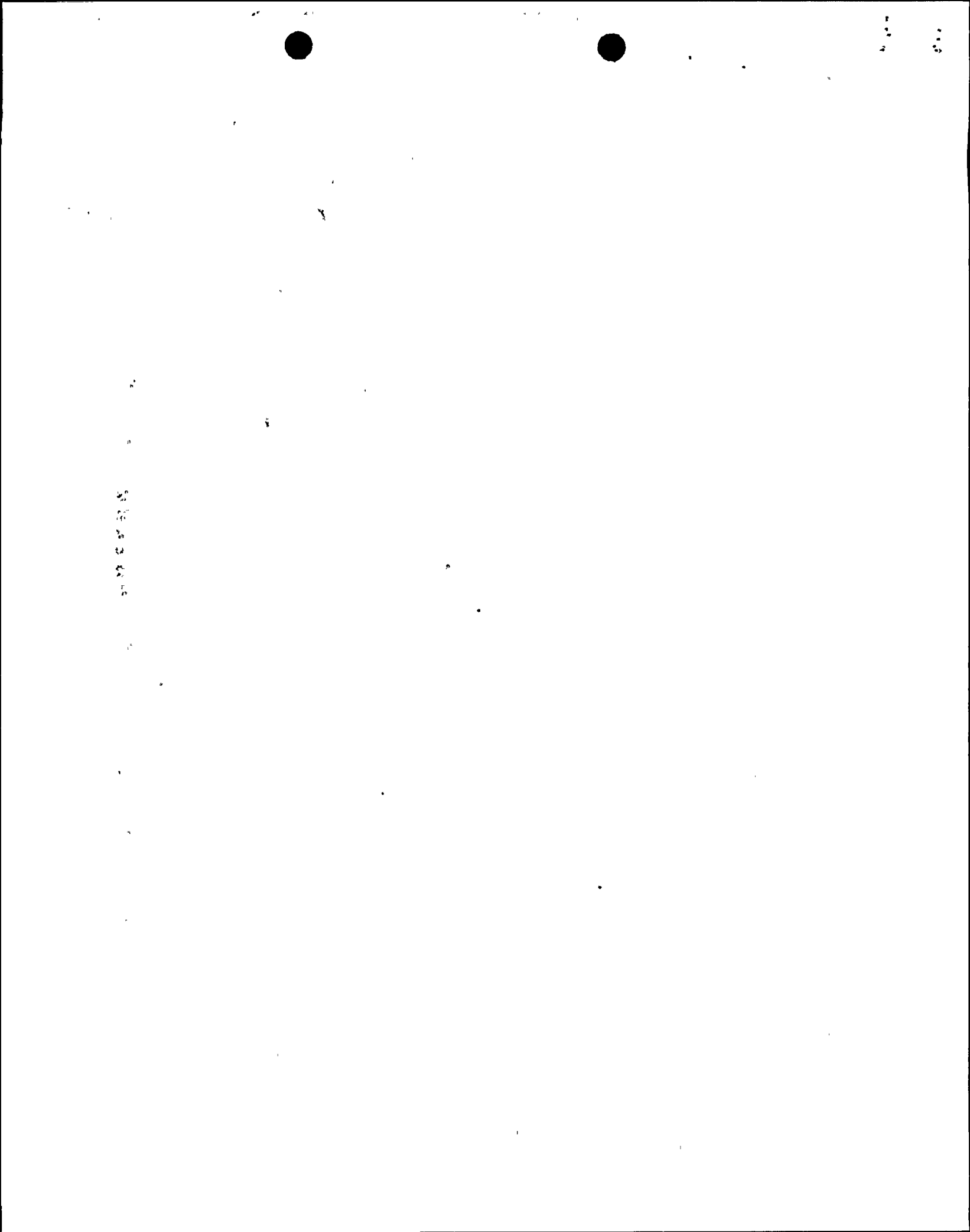
Fatigue crack growth analysis showed that both maximum code, allowable shrinkage flaws and postulated surface cracks, grow to less than 20% of the wall thickness after 20 years of operating life even assuming worst case residual stress patterns. Fracture will not initiate for cracks less than 30% of wall thickness.

J-integral elastic plastic analysis indicated additional margin against instability in tearing. This analysis used lower bound data from aged test specimens to simulate service time at temperature degraded properties.

This study concluded that:

1. Based on the generic pump casing analysis, there is justification for the extension of the pump-casing examination up to 15 years.
2. Plant-unique analysis will show greater margins of safety.
3. The tearing modulus analysis shows that large, final flaw sizes can be tolerated in the pump casing before fracture is predicted.
4. The recent 10-year Inservice Inspection of several pump casing (Type F) indicates no detectable flaw growth from baseline inspections, which corroborates the above analytical conclusion.

There have been no reported failures in these pump casings with this model pump.



ST. LUCIE UNIT NO. 1
FIRST INSPECTION INTERVAL
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RELIEF REQUEST NO. 8 (cont'd.)

CODE REQUIREMENTS

The examination requirements for pumps (Figure IWB-2500, ASME Code, Section XI) were originally developed for Type F, radially split, axisymmetric casing designs. St. Lucie Plant has Type E pump designs (Fig. No. 2) which have geometric configurations that make examination of the casing welds not practical or meaningful to perform under the current code requirements.

Florida Power & Light Company feels that adequate safety margins are inherent in the basic design. The structural integrity afforded by the existing pump casing material will not significantly degrade over its lifetime. Pump casings are generally overdesigned (because of added wall thickness) to provide stability under operating load. Operating stresses in the pump casings are well below the levels associated with vessels, therefore, with lower operating stresses, fatigue life is significantly improved.

Florida Power and Light Company feels that the satisfactory inspection results achieved on our Turkey Point Plant in 1982, coupled with the same results conducted by three (3) other utility companies provide the additional assurance as to the pumps casing integrity.

d. Alternate Examinations:

As an alternate to the examinations required by the code, Florida Power & Light Company proposes the following:

1. A 100% visual examination of the pump interior to the extent practical (recognizing the interference by the vanes) (Fig. No. 1) should the pump be disassembled for maintenance.
2. The reactor coolant pump shall be hydrostatically tested, per the requirements of the ASME Boiler & Pressure Vessel Code, Section XI, 1980 Edition.

ST. LUCIE UNIT NO. 1
FIRST INSPECTION INTERVAL
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RELIEF REQUEST NO. 8 (cont'd.)

3. A 100% visual examination of the external surfaces only, of one (1) pump and one (1) weld at or near the end of the inspection interval.

The alternate examinations and tests provide assurance of an acceptable level of quality and safety.

e. Implementation Schedule

At or near the end of the inservice inspection interval. Interval dates:

Start: December 21, 1976 End: February 11, 1988

f. Attachments to Relief Request No. 8

Figure No. 1	Horizontal Cross Section of Pump
Figure No. 2	Vertical Cross Section of Pump
Figure No. 3	Pump Weld Location



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HORIZONTAL CROSS SECTION

DIFFUSER VANES

RELIEF REQUEST NO. 8

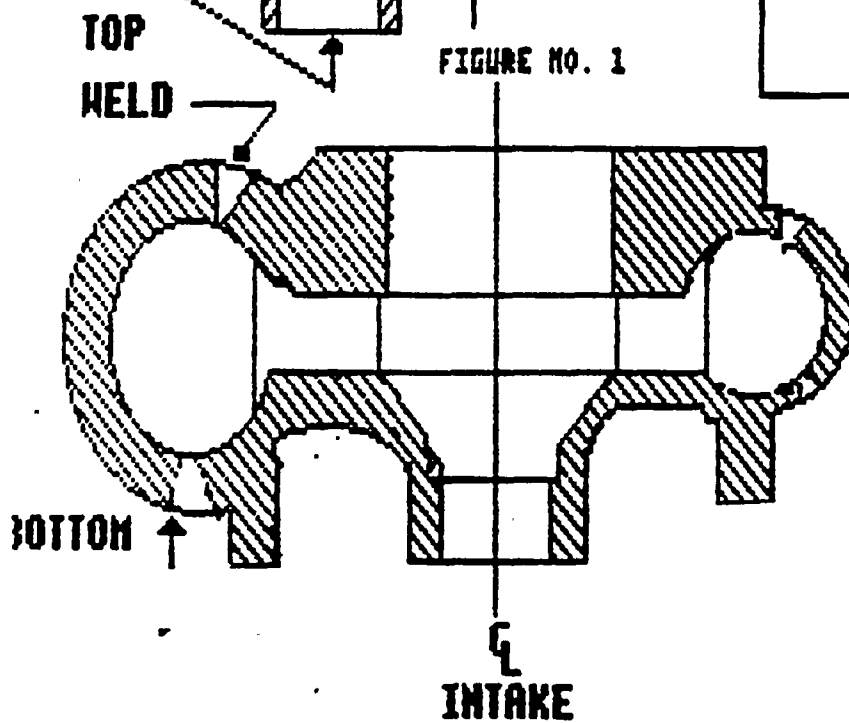
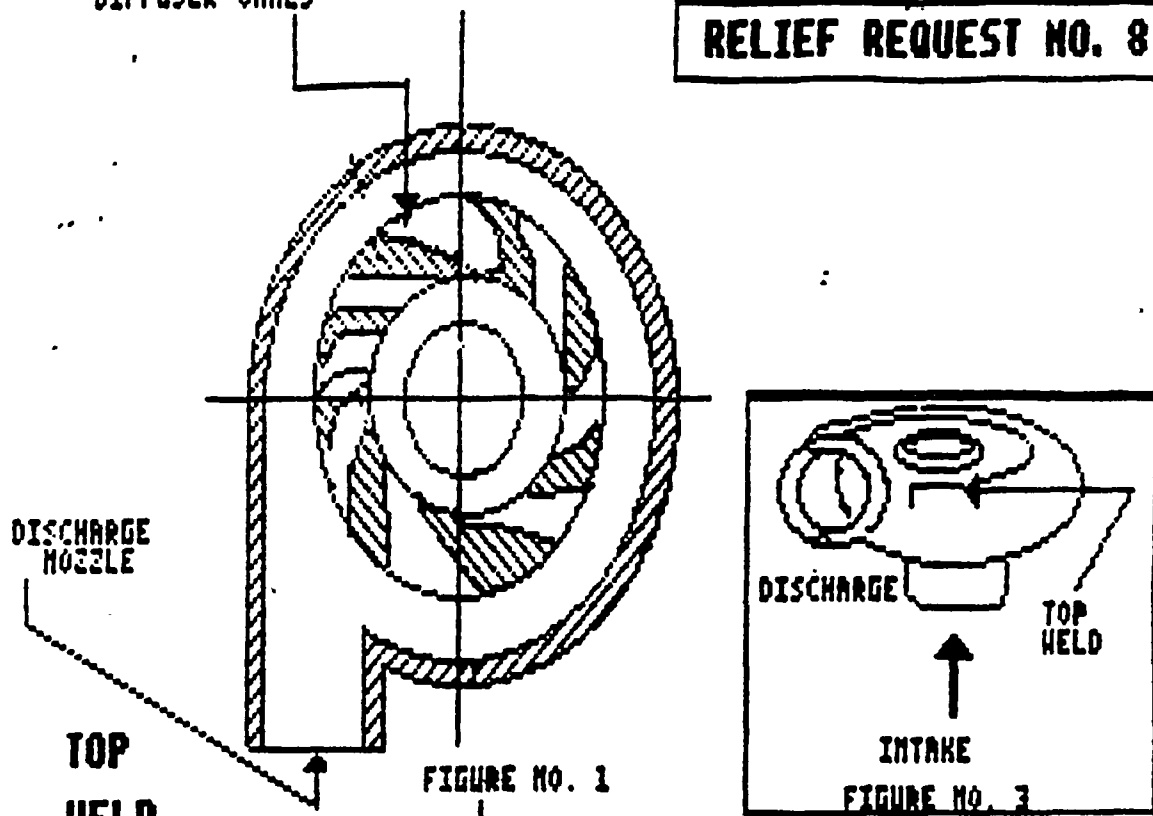


FIGURE NO. 2

VERTICAL CROSS SECTION

BYRON JACKSON TYPE E PUMP DETAIL
FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1