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**To:** Tom Alexion <twalex@nrc.gov>  
**Date:** 3/25/03 9:59AM  
**Subject:** Copy of Entergy Mag Particle Procedure

Tom,

Attached is the MT procedure that being used to perform the MT of the L-3 critical welds.

steve

**CC:** "PANTHER, KENNETH C" <KPANTHE@entergy.com>



Title: Magnetic Particle Examination (MT)

Reviews	Required
Cross Discipline Review .....	No
Code Reviews:	
10CFR50.59 Review .....	Yes
10CFR50.54 Review .....	No
Environmental Qualification .....	No
On-Site Safety Review Committee Reviews .....	No

Procedure Owner: \_\_\_\_\_ Supervisor, Quality Inspections / NDE, W3  
(Print Name / Title)

Approved: *[Signature]* 2-14-03  
(Procedure Owners Signature) (Date)

Effective Dates: 2/17/03 2/17/03 2/17/03 2/17/03 N/A  
ANO GGNS RBS W3 Echelon

New Procedure/Revision/Cancellation Basis:

General Changes:

2.1,2.2,2.3, and 2.4, Deleted reference to site Chemical Control Programs

2.5.2, Updated Reference Title

2.5.5, Deleted reference to the DEAM, Added reference to CEP-WP-001

2.5.6, Added NMM, Company Procedure Number EV-112, Chemical Control Program

5.3.2, Changed recommended fluorescent particle concentration range to read 0.1 to 0.5 ML

8.0, Incorporated "Table" format for Obligation and Regulatory Commitment Cross Reference

9.2, Deleted "Note"



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TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	PURPOSE .....	3
2.0	REFERENCES .....	3
3.0	DEFINITIONS .....	3
4.0	RESPONSIBILITIES.....	4
5.0	DETAILS.....	4
	5.1 PREREQUISITES.....	4
	5.2 SAFETY PRECAUTIONS.....	5
	5.3 MATERIALS & EQUIPMENT.....	5
	5.4 INSTRUCTIONS.....	6
	5.5 EXAMINATION PROCESS .....	8
	5.6 EVALUATION OF INDICATIONS.....	10
	5.7 POST-CLEANING REQUIREMENTS AND DEMAGNETIZATION .....	11
6.0	INTERFACES .....	11
7.0	RECORDS .....	11
8.0	OBLIGATION AND REGULATORY COMMITMENT CROSS REFERENCE.....	11
9.0	ATTACHMENTS.....	11
	ATTACHMENT 9.1 ACCEPTANCE STANDARDS .....	12
	ATTACHMENT 9.2 MAGNETIC PARTICLE EXAMINATION REPORT	16

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## 1.0 PURPOSE

- 1.1 This instruction provides requirements for magnetic particle examination of welds or materials utilizing magnetic particle examination equipment with dry, wet or fluorescent magnetic particles.
- 1.2 This instruction includes requirements for personnel safety, equipment, materials, personnel qualification/certification, technique requirements, standards of acceptance and records to be used.
- 1.3 This instruction is applicable to the examination of castings, forgings, rolled shapes, bolting, welds, weld repairs and base metal in components or parts made from ferromagnetic material.
- 1.4 The use of this instruction is for the examination of ASME, SECTION III, VIII, DIV. I, ANSI B31.1, AWS D1.1 and any other non-code applications as applicable

## 2.0 REFERENCES

- 2.1 Arkansas Nuclear One Reference Documents
  - 2.1.1 None
- 2.2 Grand Gulf Reference Documents
  - 2.2.1 None.
- 2.3 River Bend reference documents
  - 2.3.1 None
- 2.4 Waterford 3 reference documents
  - 2.4.1 None
- 2.5 Common Reference Documents
  - 2.5.1 American Society of Mechanical Engineers (ASME) Code Section V, Article 7, Magnetic Particle Examination
  - 2.5.2 Nuclear Management Manual, Company Procedure Number NDE 2.10, Certification of NDE Personnel
  - 2.5.3 Nuclear Management Manual, Company Procedure Number LI-102 Corrective Action Process
  - 2.5.4 EOI Quality Assurance Program Manual (QAPM)
  - 2.5.5 Central Engineering Procedure, CEP-WP-001, Appendix C, E-NDE-1, E-NDE-2
  - 2.5.6 Nuclear Management Manual, Company Procedure Number EV-112 Chemical Control Program

## 3.0 DEFINITIONS

- 3.1 Linear Indications - Indications in which the length is greater than three times the width.
- 3.2 Rounded Indications - Indications that are circular or elliptical with the length equal to or less than three times the width.
- 3.3 Indication - Any magnetically held particle pattern on the surface of an article being tested.

	<b>EN-S NUCLEAR MANAGEMENT MANUAL</b>	<b>QUALITY RELATED</b>  <b>REFERENCE USE</b>	<b>NDE9.30 Revision 2</b>  <b>Page 4 of 16</b>
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- 3.4 Interpretation - The determination of the cause and significance of indications or discontinuities from the standpoint of whether they are detrimental defects or false or non-relevant indications.
- 3.5 Evaluation - a review, following interpretation, of the indications noted to determine whether or not they meet the specified acceptance criteria.
- 3.6 Area of Interest - the specific portion of the object that is to be evaluated.
- 3.7 Magnetic Particle Examination (MT) - a nondestructive test method used to detect discontinuities on or near the surface of ferromagnetic materials.

**4.0 RESPONSIBILITIES**

- 4.1 Supervisor
  - 4.1.1 The Supervisor charged with the responsibility for NDE at each site is responsible for implementation of this procedure.
- 4.2 Entergy NDE Level III
  - 4.2.1 The Entergy Level III is responsible for the development, interpretation and qualification of this procedure as required by reference 2.5.2.
  - 4.2.2 The Entergy Level III is responsible for demonstration of this procedure to the ANII when requested.
- 4.3 NDE Personnel
  - 4.3.1 All personnel performing magnetic particle examination in accordance with this procedure shall be certified to at least Level I in the magnetic particle method. Level I personnel may perform pre-cleaning, equipment setup and examinations under the direction of a Level II or Level III. Level I personnel shall not independently interpret or evaluate examination results.
  - 4.3.2 Only personnel holding Level II or Level III certifications may perform interpretation and evaluation.
  - 4.3.3 Personnel who perform examinations per this instruction shall be qualified and certified to Reference 2.5.2 or a program meeting the requirement of Reference 2.5.2.

**5.0 DETAILS**

**5.1 PREREQUISITES**

- 5.1.1 The surface may be in the as-welded, as-cast, as-forged, or as-rolled condition. Where surface irregularities could mask indications of discontinuities, surface preparation by grinding or machining may be necessary.
- 5.1.2 When extensive cleaning or decontamination of the surface is necessary, it should be performed per site requirements.
- 5.1.3 All surfaces to be examined and all adjacent areas within at least one (1) inch shall be dry and free of dirt, paint, grease, oil, lint, scale, welding flux and splatter, or other extraneous matter that could interfere with the examination or mask indications of discontinuities.



5.1.3.1 Cleaning may be accomplished using detergents, organic solvents, descaling solutions, paint removers, vapor degreasing, sand or grit blasting, or ultrasonic cleaning methods.

5.1.4 The surface of the part shall not exceed 600°F for examinations using dry magnetic particles.

5.1.4.1 Parts that can be handled or touched with bare hands require no further verification of temperature and may be recorded as "ambient". Parts that cannot be handled or touched with bare hands should be verified with a calibrated thermometer. The temperature and M&TE number shall be recorded on the examination report.

5.1.5 When using visible wet or fluorescent magnetic particles for examinations, the surface of the part and the wet particle suspension temperature shall be less than 135°F.

5.1.6 Instrument and equipment calibrations are accomplished per site requirements.

5.1.7 All marking materials (e.g. white leaded pencils or other markers), applied to the component surface shall be requisitioned and purchased per Reference 2.5.6.

5.1.8 Lighting (natural or artificial) shall be sufficient to detect relevant discontinuities. This may include droplights, flashlights and industrial lighting. Mirrors or optical instruments may be used as necessary.

5.1.9 Mercury vapor lights are used in accordance with site directives. If the bulb is broken, Chemistry shall be notified immediately.

## 5.2 SAFETY PRECAUTIONS

5.2.1 Personnel using materials or equipment should follow general safety precautions. Avoid breathing magnetic particle dust and suspension fumes.

5.2.2 Wet and fluorescent particle suspensions should be used in well-ventilated areas. The aerosol cans should not reach temperatures above manufacturer's recommendations or be exposed to open flames or hot surfaces. Aerosol cans should not be thrown into an open fire or disposed of within the power block. *Empty aerosol cans should be disposed of per site requirements.*

5.2.3 The prod magnetization technique should not be utilized if other techniques provide adequate magnetization for a given application. This also applies to certain direct magnetization techniques due to the contact variables involved. If used, care should be exercised to prevent arcing, fire and possible shock hazards.

5.2.4 A combustible control permit may be required before entering the plant power block with wet or fluorescent materials. Combustible control permits should be obtained per site procedures.

## 5.3 MATERIALS & EQUIPMENT

### 5.3.1 Examination Materials

5.3.1.1 All examination materials should be requisitioned and purchased per site requirements.



5.3.1.2 The color of particles shall provide adequate contrast with the surface being examined. The following examination mediums or equivalent medium may be used:

- a. Magnaflux - #1 grey dry powder
- b. Magnaflux - #3A black dry powder
- c. Magnaflux - #8A red dry powder
- d. Magnaflux wet bath - #9CM red
- e. Magnaflux wet bath - #14AM fluorescent
- f. Magnaflux wet bath - #14A fluorescent
- g. Circlesafe - 778A fluorescent
- h. Circlesafe - 820A - black/wet
- i. Circlesafe - 850A - red/fluorescent

5.3.1.3 For wet magnetic particle examination, aerosol or bulk suspensions may be used.

5.3.2 When bulk suspensions are used, they should be kept thoroughly agitated during use. The particle concentration should be verified every time the application apparatus is refilled. This is verified by the use of an ASTM pear-shaped centrifuge tube. A 100 ML portion of the bath is taken from the applicator hose or nozzle and allowed to settle for thirty minutes. The volume settling out at the bottom of the tube is indicative of the particle concentration. With red or black particles, the concentration from a 100 ML sample should be 1.2 to 2.4 ML. For fluorescent particles, the concentration should be 0.1 to 0.5 ML.

#### 5.3.3 Magnetizing Equipment

5.3.3.1 The magnetizing equipment shall be capable of inducing a magnetic flux of sufficient intensity to reveal surface and/or subsurface discontinuities.

5.3.3.2 Magnetizing equipment may be of a mobile or portable type. The equipment shall be capable of providing half-wave rectified direct current (HWDC), except for yoke applications, where only the alternating current (AC) must be used.

## 5.4 INSTRUCTIONS

### 5.4.1 Yoke Equipment

5.4.1.1 The yoke is used for detection of surface discontinuities only. Electromagnetic yokes must be used in the AC current mode.

5.4.1.2 The yoke pole spacing must be a minimum of two inches and a maximum of eight inches measured from inside the poles.

5.4.1.3 The magnetizing force of yokes shall be sufficient to lift at least ten pounds at the maximum pole spacing used for the examination. The lifting power shall be demonstrated before each examination or series of examinations.

### 5.4.2 Prod Equipment



- 5.4.2.1 Prod magnetizing equipment shall be equipped with a remote switch to avoid arcing.
- 5.4.2.2 Half wave direct current (HWDC) of 100 to 125 amps per inch of prod spacing shall be used for material thickness of 3/4 inch and greater. For thickness less than 3/4 inch, 90 to 110 amps per inch of prod spacing shall be used.
- 5.4.2.3 The prod tips shall be kept clean and the contact area flat, to minimize arcing. When smoothly machined surfaces are to be examined by the prod technique, copper braided tips should be used. Copper tipped prods should not be used whenever the open circuit voltage is greater than 25 volts, lead, steel or aluminum tipped prods are recommended to avoid copper deposits on the part being examined.
- 5.4.2.4 Prod spacing shall be three inch minimum to eight inch maximum. Prods shall be firmly pressed against the surface and the current turned on with the remote switch after the prods have been positioned and turned off before they are removed from the component.
- 5.4.2.5 If arc burns occur on the object being examined, the arc burn shall be removed/evaluated per site requirements.
- 5.4.3 Circular Magnetization
- 5.4.3.1 Direct Contact Equipment
- 5.4.3.1.1 Small forgings, castings or other parts may be examined by passing HWDC directly through the part. The required current shall be determined using the following guidelines. The greatest cross sectional diagonal in a plane at right angles to the current flow shall be used for the diameter.
- 5.4.3.1.2 For parts with outer diameters up to five inches, 700 to 900 amps/inch of diameter shall be used.
- 5.4.3.1.3 For parts with outer diameters over five inches, up to ten inches, 500 to 700 amps/inch of diameter shall be used.
- 5.4.3.1.4 For parts with outer diameters over ten inches up to fifteen inches, 300 to 500 amps/inch of diameter shall be used.
- 5.4.3.1.5 For parts with outer diameters over fifteen inches, 100 to 330 amps/inch of diameter shall be used.
- 5.4.3.1.6 The current may be induced in a part by clamping or pressing of electrodes, prods or leaches to the opposite ends of the part.
- 5.4.3.2 Central Conductor or Through Coil
- 5.4.3.2.1 For this technique, a rod or cables passed through the bore of a cylinder or ring shaped part may be used to induce circular magnetization.
- 5.4.3.2.2 The field strength required shall be equal to that determined in 5.4.3.1 for the specific application with a single-turn central conductor.



5.4.3.2.3 The magnetic field will increase in proportion to the number of times the central conductor cable passes through a hollow part (e.g., using a through turn coil).

#### 5.4.4 Longitudinal Magnetization

##### 5.4.4.1 Coil/Cable Wrap

5.4.4.1.1 Small or medium sized parts with length (L) to diameter (D) ratio of at least two may be examined by passing HWDC current through cables wrapped around the part or through a fixed coil.

5.4.4.1.2 If a fixed, pre-wound coil is used, the part shall be placed near the side of the coil, not in the center.

5.4.4.1.3 Cable wrap coils must consist of three turns as a minimum.

5.4.4.1.4 For noncylindrical parts, "D" shall be the maximum cross sectional diagonal.

5.4.4.1.5 The magnetizing current shall be within  $\pm 10\%$  of the ampere turns value determined as follows:

When length divided by diameter (L/D) ratio is greater than or equal to four, Ampere - turns = 35,000 divided by the L/D ratio plus 2.

$$\text{Ampere turns} = \frac{35,000}{(L/D) + 2}$$

When the L/D ratio is less than four but not less than two, Ampere - turns = 45,000 divided by the L/D ratio.

$$\text{Ampere turns} = \frac{45,000}{L/D}$$

For parts with L/D ratios less than two, an alternate form of magnetization shall be used.

5.4.4.1.6 The current shall be determined by dividing the ampere turns by the number of turns in the coil.

5.4.4.1.7 If the area to be magnetized extends beyond six inches on either side of the coils, field adequacy shall be demonstrated using a magnetic particle field indicator.

##### 5.4.4.2 Fixed A/C Coil

5.4.4.2.1 When using a fixed, pre-wound coil with non-adjustable current (e.g., Magnaflux L-10), the manufacturer's ampere-turns value shall be utilized. The part shall be placed near the side of the coil during examination.

### 5.5 EXAMINATION PROCESS

5.5.1 Examinations shall be conducted with sufficient overlap to assure 100 percent coverage at the required test sensitivity.



- 5.5.1.1 When using a coil, the effective field extends approximately  $\frac{1}{2}$  the diameter of the coil on either side of the coil but in no case shall a field longer than 18 inches be considered.
- 5.5.1.2 Eighteen inches shall be "L" for long parts.
- 5.5.2 At least two separate examinations shall be performed on each area. The lines of flux during the second examination shall be approximately perpendicular ( $90^\circ$ ) to those of the first examination. A different magnetizing technique may be used for the second examination.
- 5.5.2.1 All examinations using localized magnetization shall be conducted with sufficient overlap to assure 100% coverage at the required sensitivity.
- 5.5.2.1.1 For prod or yoke technique, a minimum overlap of  $\frac{1}{4}$  the pole or prod spacing in both flux directions shall be maintained during the examination.
- 5.5.2.2 Examinations shall be limited to a maximum of six inches on either side of a coil. In addition, if a cable wrap coil is used, the area obstructed by cables must be reexamined after cables are moved to an adjacent location.
- 5.5.3 Examination Coverage Requirements
- 5.5.3.1 A minimum of  $\frac{1}{2}$ " on either side of the weld, or as specified in the work package, shall be examined. 100% of the weld volume shall be examined.
- 5.5.3.1.1 For socket and fillet welds, required examination areas are the external weld surfaces only.
- 5.5.3.1.2 For class one pipe branch connection welds, the examination area shall be the external weld surface, and accessible internal weld surfaces and the base material for  $\frac{1}{2}$  T or one inch on each side of the weld, whichever is greater.
- 5.5.3.2 When the entire examination volume cannot be examined due to interference by another component or part geometry, the examination data sheet shall identify both the cause of the limitation and the percent of total examination coverage.
- 5.5.3.3 The NDE Level III may specify additional coverage requirements should the above criteria not apply.
- 5.5.3.4 To verify the adequacy or direction of the magnetic field, a magnetic particle field indicator (pie gauge) shall be used, except when using yoke or prod techniques.
- 5.5.4 When fluorescent particle suspension is used, the examination shall be conducted in a darkened area using filtered black light.
- 5.5.4.1 The black light shall be warmed up for at least five minutes prior to use.
- 5.5.4.2 Black light intensity at the surface under examination shall be measured using a meter that is sensitive to light in the ultraviolet spectrum. The minimum blacklight intensity shall be  $800 \text{uwatts/cm}^2$
- 5.5.4.3 The black light intensity shall be measured at the test surface once every eight hours or whenever the work location changes. Measurements should be performed per manufacturers instructions.



5.5.4.4 Examination personnel shall be in the darkened area at least five minutes prior to inspection to allow the inspection personnel's eyes to adapt to dark viewing.

5.5.4.5 If the examiner wears glasses or contact lenses, they shall not be photosensitive.

#### 5.5.5 Wet Fluorescent Particles

5.5.5.1 The magnetizing current shall be ON during the application of the particle suspension and must remain ON a minimum of one second after the suspension application is stopped. This is referred to as the "continuous method."

5.5.5.2 Independent of which type of suspension is used (i.e. aerosol or bulk), it should be applied by a light spray completely covering the examination area. Care should be taken to prevent an excessively hard spray or high velocity flow over the surface.

5.5.5.3 The examination area must be observed during application and removal of particles to identify the formation of possible indications.

5.5.5.4 When the aerosol cans are used, they must be kept thoroughly agitated during use.

#### 5.5.6 Dry Particles

5.5.6.1 The magnetizing current shall be ON prior to application of particles and shall remain ON until the excess particles are removed (continuous method).

5.5.6.2 Particles must be applied by lightly dusting small quantities over the examination area. A powder bulb, powder gun or shaker may be used to apply particles.

5.5.6.3 Excess particles must be removed with a gentle stream of air from a hand bulb or a powder gun, held at an oblique angle to the surface.

5.5.6.4 Broad areas of particle accumulation, which might mask indications from discontinuities, shall be cleaned and reexamined.

5.5.6.5 The examination area must be observed during application and removal of particles to identify the formation of possible indications.

### 5.6 EVALUATION OF INDICATIONS

5.6.1 Indications resulting from inadequate preparation (cleaning), surface irregularities, grinding marks, permeability variations (usually broad, straight and less distinct than indications from surface discontinuities) or similar conditions may be considered nonrelevant or false indications. Indications determined to be nonrelevant or false may receive additional surface preparation. Areas receiving additional surface preparation shall be reexamined.

5.6.2 Any indication that is believed to be non-relevant shall be reexamined to verify whether or not actual defects are present.

5.6.3 Broad areas of accumulation, which might mask indications from discontinuities, are prohibited and such areas shall be cleaned and reexamined.

- 5.6.4 Mechanical discontinuities at the surface will be indicated by the retention of the examination medium. All indications are not necessarily defects, however, certain metallurgical discontinuities and magnetic permeability variations may produce similar indications that are not relevant to the detection of unacceptable discontinuities.
- 5.6.5 Indications resulting from mechanical discontinuities (e.g., cracks, weld flaws) shall be considered relevant flaw indications.
- 5.6.6 All indications shall be evaluated in terms of the acceptance standards listed in Attachment 9.1.
- 5.6.7 If no acceptance criteria exists, the responsible Engineer and/or the Level III shall develop a usable criterion based upon codes, specifications etc. which apply.
- 5.6.8 Non-relevant indications that would mask indications or defects are unacceptable.

**5.7 POST-CLEANING REQUIREMENTS AND DEMAGNETIZATION**

- 5.7.1 All surfaces shall be cleaned to remove all magnetic particles after testing is complete and work areas is as clean as originally found.
- 5.7.2 When residual magnetism could interfere with subsequent processes, demagnetization shall be performed by using the appropriate process.

**6.0 INTERFACES**

- 6.1 None

**7.0 RECORDS**

- 7.1 Examination results shall be recorded in an Examination Data Report. Attachment 9.2 or a similar form may be used provided the minimum required information is contained on the report.
- 7.2 Examination reports shall be processed per site procedures.

**8.0 OBLIGATION AND REGULATORY COMMITMENT CROSS REFERENCE**

Document	Document Section	Procedure Section	Site Applicability
QAPM	B.11.c	All	All

**9.0 ATTACHMENTS**

- 9.1 Acceptance Standards
- 9.2 Magnetic Particle Examination Report (Sample)

	EN-S NUCLEAR MANAGEMENT MANUAL	QUALITY RELATED  REFERENCE USE	NDE9.30 Revision 2  Page <u>12</u> of <u>16</u>
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**ATTACHMENT 9.1**

**ACCEPTANCE STANDARDS**

**STANDARDS OF ACCEPTANCE**

**A. WELDS**

**1. ASME Section I**

a. An indication is the evidence of a mechanical imperfection. Only indications with major dimensions greater than 1/16 in. shall be considered relevant.

1. A linear indication is one having a length greater than three times the width.
2. A rounded indication is one of circular or elliptical shape with the length equal to or less than three times the width.
3. Any questionable or doubtful indications shall be reexamined to determine whether or not they are relevant.

b. All surfaces to be examined shall be free of:

1. Relevant linear indications.
2. Relevant rounded indications in a line separated by 1/16 in. or less (edge-to-edge).

**2. ANSI/ASME B31.1**

a. Indications whose major dimensions are greater than 1/16 in. shall be considered relevant. The following relevant indications are unacceptable.

1. Any cracks or linear indications.
2. Rounded indications with dimensions greater than 3/16 in..
3. Four or more rounded indications in a line separated by 1/16 in. or less edge to edge.
4. Ten or more rounded indications in any 6 square inches of surface with the major dimension of this area not to exceed 6 in. with the area taken in the most unfavorable location relative to the indications being evaluated.

**3. ASME III, (NB, NC, ND, NE and NF)**

a. Examination of Weld Edge Preparation Surface

1. Only indications with major dimensions greater than 1/16 in. shall be considered relevant indications.



2. Laminar-type imperfections are acceptable without repair if they do not exceed 1 in. in length. If laminar indications exceed 1 inch in length, Site Design Engineering shall be notified for further disposition.
3. Indications of nonlaminar imperfections as specified below are unacceptable:
  - a. Any linear Indications greater than 3/16 in. long;
  - b. Rounded indications with dimensions greater than 3/16 in.;
  - c. Four or more indications, in a line separated by 1/16 in. or less, edge to edge.
- b. Welds
  1. Only imperfections producing indications with major dimensions greater than 1/16 in. shall be considered relevant indications. Imperfections producing the following indications are unacceptable:
    - a. Any cracks or linear indications;
    - b. Rounded indications with dimensions greater than 3/16 in.;
    - c. Four or more rounded indications in a line separated by 1/16 in. or less edge to edge;
    - d. Ten or more rounded indications in any 6 square inches of surface with the major dimension of this area not to exceed 6 in. with the area taken in the most unfavorable location relative to the indications being evaluated.
- c. Examination of Base Material Adjacent to Subsection NB Welds
  1. Only imperfections producing indications with major dimensions greater than 1/16 in. shall be considered relevant indications.
  2. Imperfections producing the following indications are unacceptable:
    - a. Any linear indications greater than 1/16 in. long for material less than 5/8 in. thick, greater than 1/8 in. long for material from 5/8 inches thick to under 2 inches thick, and 3/16 in. long for material 2 inches thick and greater;
    - b. Rounded Indications with dimensions greater than 1/8 in. for thicknesses less than 5/8 inches and greater than 3/16 in. for thicknesses 5/8 in. and greater;

	<b>EN-S NUCLEAR MANAGEMENT MANUAL</b>	<b>QUALITY RELATED</b>  <b>REFERENCE USE</b>	<b>NDE9.30 Revision 2</b>  <b>Page 14 of 16</b>
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- c. Four or more indications in a line separated by 1/16 in. or less edge to edge;
      - d. Ten or more indications in any 6 square inches of area whose major dimension is no more than 6 in. with the dimensions taken in the most unfavorable location relative to the indications being evaluated.
    - d. Examination of Repairs to Base Material, ASME III, (NB, NC, ND, and NE)
      - 1. Used the criteria specified in A.3.c.
    - e. Examination of Repairs to ASME III (NF) Supports Base Material
      - 1. The acceptance criteria shall be based on the material specification and must be specified by Design Engineering.
- 4. ASME Section VIII, Div 1; API 620/650 (Storage Tanks)
  - a. An indication is the evidence of a mechanical imperfection. Only indications with major dimensions greater than 1/16 in. shall be considered relevant.
    - 1. A linear indication is one having a length greater than three times with width.
    - 2. A rounded indication is one of circular or elliptical shape with the length equal to or less than three times with width.
    - 3. Any questionable or doubtful indications shall be reexamined to determine whether or not they are relevant.
  - b. All surfaces to be examined shall be free of:
    - 1. Relevant linear indications;
    - 2. Relevant rounded indications greater than 3/16 in.;
    - 3. Four or more relevant rounded indications in a line separated by 1/16 in. or less (edge-to-edge);
    - 4. An indication of an imperfection may be larger than the the basis for acceptance evaluation.
- 5. AWS
  - a. Welds



**NOTE**

Prior to Magnetic Particle Examination, the weld must be inspected and accepted per E-VE-2.

1. The weld shall have no cracks.
2. Thorough fusion shall exist between adjacent layers of weld metal and between weld metal and base material.
3. All craters shall be filled to the full cross section of the weld except for the ends of intermittent fillet welds outside their effective length.
4. For material less than 1 inch thick, undercut shall not exceed 1/32 inch except that a maximum 1/16 inch is permitted for an accumulated length of 2 inches in any 12 inches of weld. For material equal to or greater than 1 inch thick, undercut shall not exceed 1/16 inch for any length of weld.
5. The sum of diameters of visible piping porosity 1/32 inch or greater in fillet welds shall not exceed 3/8 inches in any linear inch of weld and shall not exceed 3/4 inch in any 12 inch length of weld.
6. A fillet weld in any single continuous weld shall be permitted to underrun the nominal size specified by 1/16 inch without correction provided the undersized portion of the weld does not exceed 10% of the length of the weld. On web-to-flange welds on girders, no underrun is permitted at the ends for a length equal to twice the width of the flange.
7. Complete joint penetration groove welds in butt joints transverse to the direction of computed tensile stress shall have no visible piping porosity. For all other groove welds, the sum of the visible piping porosity 1/32 inch or greater in diameter shall not exceed 3/4 inch in any 12 inch length of weld.

**B. MATERIALS AND PRODUCT FORMS**

1. Acceptance criteria for materials and product forms (castings, forgings, bolting, etc.) are not included in this instruction and must be specified by Design Engineering.



ATTACHMENT 9.2

MAGNETIC PARTICLE EXAMINATION REPORT

 <b>ENTERGY</b> MAGNETIC PARTICLE EXAMINATION REPORT		REPORT NO.:	DATE:		
		PROCEDURE / REV.:			
<input type="checkbox"/> ASME III	<input type="checkbox"/> ASME VIII	<input type="checkbox"/> ASME XI	<input type="checkbox"/> AWS	<input type="checkbox"/> B31.1	<input type="checkbox"/> OTHER
WORK DOCUMENT:			COMPONENT IDENTIFICATION:		
ISO/DWG:		SYSTEM:		TEMP.:	
TEMP. INSTRUMENT CAL. NO.:			M&TE DUE DATE:		
MAG. PARTICLES <input type="checkbox"/> WET <input type="checkbox"/> DRY <input type="checkbox"/> FLUORESCENT		MFG: _____ TYPE: _____ BATCH NO: _____		BLACK LIGHT METER MODEL NO: _____ SERIAL NO: _____	
HORZ. UNIT (H-820) _____ AMPS _____ TURN COIL CURRENT <input type="checkbox"/> AC <input type="checkbox"/> HV/DC	<input type="checkbox"/> YOKE MFG: _____ MODEL: _____ S/N: _____ SPACING: _____ <input type="checkbox"/> 10 LBS. LIFT	<input type="checkbox"/> PRODS MFG: _____ MODEL: _____ AMPS: _____ SPACING: _____ EQUIP. NO: _____ DUE: _____	<input type="checkbox"/> COIL OR CABLE WRAP MFG: _____ MODEL: _____ AMPS: _____ TURNS: _____ EQUIP. NO: _____ DUE: _____		
LIFT BLOCK NO:	CAL. <input type="checkbox"/> BEFORE		<input type="checkbox"/> FIELD INDICATOR USED		
WELD/ITEM NO.	ACC.	REJ.	REMARKS		
SKETCH: INDICATE SIZE, LOCATION, ORIENTATION AND DISTRIBUTION OF INDICATIONS.					
EXAMINED BY:		REVIEW:		FINAL REVIEW: <input type="checkbox"/> ANII <input type="checkbox"/> QA	
_____		_____		_____	
LEVEL: _____ DATE: _____		LEVEL: _____ DATE: _____		DATE: _____	
PAGE 1 OF _____					

**Mail Envelope Properties** (3E806ED4.541 : 20 : 34113)

**Subject:** Copy of Entergy Mag Particle Procedure  
**Creation Date:** 3/25/03 9:59AM  
**From:** "BENNETT, STEVE A" <SBENNE2@entergy.com>

**Created By:** SBENNE2@entergy.com

**Recipients**

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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	106	03/25/03 09:59AM
Part.001	729	
NDE9-30.pdf	508585	
Mime.822	698502	

**Options**

**Expiration Date:** None  
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