Entergy

ENGINEERING STANDARD

EN-EP-S-002-MULTI Rev. 0 Effective Date: 10/30/2009

Buried Piping and Tanks General Visual Inspection

Applicable Sites		Effective Date Exception	Applicable Sites		Effective Date Exception
IP-1	☐		ANO-1	☒	
IP-2	☒		ANO-2	☒	
IP-3	☒		GGNS	☒	
JAF	☒		RBS	☒	
PLP	☒		WF3	☒	
PNPS	☒		NP	☐	
VY	☒			☐	

Safety Related: X Yes

EC No(s). N/A ____ No

Prepared by: Martin Mantenfel

Approved by: Steve Woods P Scott for S. Woods
Engineering Standard Owner

Date: 10/29/09

Process Applicability Exclusion (EN-LI-100) / Programmatic Exclusion (EN-LI-101)
All Sites: ☒ Specific Sites: ANO ☐ GGNS ☐ IPEC ☐ JAF ☐ PLP ☐ PNPS ☐ RBS ☐ VY ☐ W3 ☐

REQUIREMENTS AND REVISION SUMMARY

Revision No.	Date	Changes
0		Original Issue

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This engineering standard is written to document the requirements to perform buried piping general visual inspection. The visual examination is performed to assess the general condition of the coatings and piping/tank surfaces to detect evidence of degradation that may affect structural integrity or leak tightness. This examination satisfies the requirements of EN-DC-343 and CEP-BPT-0100.

1.2 This engineering standard applies to personnel examining components identified per EN-DC-343, Buried Piping and Tanks Inspection and Monitoring Program.

2.0 REFERENCES

2.1 NUREG-1801, "Generic Aging Lessons Learned (GALL) Report", dated July 2001

2.2 NUREG-6876, "Risk-Informed Assessment of Degraded Buried Piping Systems in Nuclear Power Plants", dated June 2005

2.3 10 CFR 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants"

2.4 10 CFR 50, Appendix B "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"

2.5 ANSI N18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants"

2.6 NUMARC 93-01 (1996), "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants", April 1996

2.7 NEI 95-10 (1996), "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 –The License Renewal Rule", March 1996

2.8 "Industry Ground Water Protection Initiative, Final Guidance Document, Nuclear Energy Institute (NEI), NEI 07-07, August 2007

2.9 EPRI Report 1011829, "Condition Assessment of Large-Diameter Buried Piping, Phase 2: Vehicle Design and Construction"

2.10 INPO Engineering Program Guide, "Underground Piping Reliability Management", dated June 2006

2.11 INPO Operating Experience Digest OED 2007-09, "External Degradation of Buried Piping", dated April 2007

2.12 ASM Handbook, Volume 13A, "Corrosion: Fundamentals, Testing and Protection, ASM International", October 2003

2.13 ASM Handbook, Volume 13B, "Corrosion: Materials, ASM International", November 2005

2.14 "Corrosion Resistance of Stainless Steels in Soils and in Concrete", by Pierre-Jean Cunat. Paper presented at the Plenary Days of the Committee on the Study of Pipe Corrosion and Protection, Ceocor, Biarritz, October 2001

2.15 API Standard 570, "Inspection, Repair, Alteration, and Rerating of In-Service Systems Piping Systems", Second edition, Addendum 1, February 2000

2.16 EPRI TR1016456, "Recommendations for an Effective Program to Control the Degradation of Buried Pipe". December 2008.

2.17 CEP-BPT-0100, "Buried Piping and Tanks Inspection and Monitoring".

2.18 EN-DC-167, "Classification of Structures, Systems, and Components"

2.19 EN-DC-343, "Buried Piping and Tanks Inspection and Monitoring Program".

3.0 DEFINITIONS

3.1 Baseline Inspection – The inspection of a new or replaced component that has not previously been involved in plant operations.

3.2 Buried Section – A buried portion of piping or tank in a plant system that is placed below grade either in soil or concrete, (generally categorized by P &ID) which has similar parameters; i.e. similar pressure, temperature and materials.

3.3 Concrete Piping - Piping that is manufactured from concrete or cementitious material with or without metallic reinforcement. Concrete piping is generally used for large diameter lines such as the water intake piping from sources of cooling water (e.g., lakes, rivers, and reservoirs).

3.4 Corrosion - The chemical or electrochemical reaction between a material, usually a metal, and its environment that produces a deterioration of the material and its properties. A common example is the oxidation of an iron-based alloy exposed to water (rusting).

3.5 Crevice Corrosion - Localized corrosion that may occur in areas of stagnant solutions existing in crevices, joints, and contacts between metals or between metals and non-metals.

3.6 Erosion - Deterioration of materials by the abrasive action of moving fluids or gases, usually accelerated by the presence of solid particles or gases in suspension. When corrosion occurs simultaneously, the term Erosion/Corrosion is often used.

3.7 General (also called Uniform) Corrosion - This type of corrosion attacks the entire un-protected surface in a uniform manner. Of all types of corrosion, this is the least damaging and easiest to determine or quantify the corrosion rate.

3.8 Holidays - also known as pinholes, voids, discontinuities in coatings.

3.9 Initial Operational Inspection - The first inspection of a component that has been in-service.

3.10 Inspection Program – A systematic evaluation of all buried components using various techniques [e.g., ultrasonic testing (UT), radiographic testing (RT), visual testing (VT), leak testing (LT), eddy current (ET)].

3.11 Microbiologically Influenced Corrosion (MIC) - Corrosion caused by the presence and/or activities of microorganisms in biofilms on the surface of the material. Microorganisms have been observed in a variety of environments that include seawater, natural freshwater (lakes, rivers, wells), soils, and sediment. Microbiological organisms include bacteria, fungi, and algae.

3.12 Pitting - A form of localized corrosion that results in the formation of small, sharp edged cavities in a metal.

3.13 Quality Assurance Classification – For this purpose of this procedure Safety Class or QA Category is used to designate safety classification. Refer to EN-DC-167 for a summary of the corresponding "legacy" classifications formerly used at each plant and how they are classified as safety related, augmented and non-safety related.

3.14 Redox - Of or relating to oxidation-reduction.

3.15 Subsequent Re-inspection – The inspection of a component that has been previously subjected to a Baseline Inspection and/or an Initial Operational Inspection.

3.16 Visual Inspection – The inspection of a component accessible for direct observation by inspectors or by the use of remote visual inspection devices.

4.0 RESPONSIBILITIES

[1] Program Owner – has the responsibility to develop, maintain, and implement the Buried Piping and Tanks Inspection and Monitoring Program.

The Program Owner or designee Responsible Engineer, from Site Engineering has responsibility to review/evaluate the examination results. The individual shall be experienced in reviewing / evaluating the condition of buried piping or Tanks. The Program Owner and/or qualified individual shall also be responsible for:

[a] Development of plans and procedures for examination of buried components within the program.
[b] Instruction, training, and approval of visual examination of personnel.
[c] Performance or direction of general and detailed visual examinations.

[2] Certified Inspector – has the responsibility to conduct buried piping component & tank inspections in accordance with this standard.

5.0 DETAILS

5.1 General Guidelines

[a] The General Visual examination shall be performed either directly or remotely with sufficient illumination and resolution to assess the general condition of the accessible surfaces. The examination should be documented and may be supplemented by photographic and/or video records.

[b] Inaccessible areas are not required to be examined unless specifically warranted by scope expansion.

[c] Examiners shall visually inspect non-coated and coated surface areas.

[d] Painted or coated areas shall be examined for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

[e] Non-coated areas shall be examined for evidence of cracking, discoloration, wear, pitting, excessive corrosion, gouges, surface discontinuities, dents, and other signs of surface irregularities.

[f] Pressure retaining bolting shall be examined for defects which may cause the bolted connection to violate either leak tightness or structural integrity.

[g] Following completion of the examinations the detailed results should be documented.

[h] If the examiners note indications which need further review, a condition report shall be issued.

5.2 Review of Results

5.2.1 The inspection elements are presented as a guide for examination personnel to determine when an existing condition is acceptable or requires acceptance review. The guide is not intended to be all-inclusive. When a questionable condition is encountered, the examination personnel should always be conservative and initiate a condition report.

5.2.2 Conditions exceeding inspection guidelines must be evaluated through the CR and/or EC process.

- Proper characterization of the degradation is essential in future trending. The RE or designee shall initiate Work Orders to identify required repairs and further inspections (e.g. NDE).

- If the RE determines that additional information is needed for the acceptance review, actions shall be developed and tracked in PCRS.

5.2.3 Inspection guidelines for uncoated surface areas:

If any of the relevant conditions listed below are present, further review may be required. Initiate a CR as required:

- Cracking in base metal
- Discoloration resulting from age, heat, or corrosion
- Discernible wear
- Pits, dents, or gouges in the base metal.
- Excessive external corrosion.
- Corrosion which results in discernible base metal loss
- Discernible bulges
- Arc strikes
- Other conditions causing discernible degradation of the base metal

5.2.4 Coated Surface areas:

If any of the relevant conditions listed below are present, further review may be required. Initiate a CR as required.

- Any of the conditions listed for uncoated surfaces
- Missing or degraded coating
- Blisters in the coating
- Significant cracking in the coating
- Excessive Flaking of the coating
- Dents or gouges in the coating

5.2.5 Bolting Assemblies

If any of the relevant conditions listed below are present, further review may be required. Initiate a CR as required.

- Bending, twisting, stretching or deforming of bolts or studs
- Missing or loose bolts, studs, nuts, or washers
- Fractured bolts, studs, or nuts
- Degradation of protective coatings on bolting surfaces
- Evidence of leakage near bolting
- Misalignment of connection or bolting

5.3 Personnel Qualification:

5.3.1 Personnel conducting general visual examinations shall have an annual eye examination and meet visual acuity as specified in CEP-NDE-100 and/or ASME XI IWA 2321.

5.3.2 The Engineering Program Owner shall be qualified in accordance with FTK-ESPP-G00121 "Buried Piping and Tanks Program Owner".

6.0 RECORDS

6.1 No quality records are generated by this procedure. A copy of the completed inspection checklist should be attached to the work order and also included in the program notebook.

7.0 ATTACHMENTS

7.1 Inspection Checklist

ATTACHMENT 7.1 **INSPECTION CHECKLIST**

Sheet 2 of 2

Piping / Tank _____ **INSPECTION DATE:** _____

ELEVATION: _____ **LOCATION DWG:** _____ **INSPECTOR:** _____

				NOTE
1.	ANY BLISTERING (COATING)?	YES ☐	NO ☐	_____
2.	ANY PEELING (COATING)?	YES ☐	NO ☐	_____
3.	ANY FLAKING (COATING)?	YES ☐	NO ☐	_____
4.	ANY DELAMINATION (COATING)?	YES ☐	NO ☐	_____
5.	ANY EMBRITTLEMENT (COATING)?	YES ☐	NO ☐	_____
6.	ANY EMBEDDED ROCKS (COATING AND/OR METAL)?	YES ☐	NO ☐	_____
7.	ANY CRACKING (COATING AND/OR METAL)?	YES ☐	NO ☐	_____
8.	ANY RUST (METAL)?	YES ☐	NO ☐	_____
9.	ANY CORROSION (METAL)?	YES ☐	NO ☐	_____
10.	ANY FLAKING OR SCALING (METAL)?	YES ☐	NO ☐	_____
11.	ANY MECHANICAL DAMAGE (METAL)?	YES ☐	NO ☐	_____
12.	ANY NICKS, GOUGES OR ARC STRIKES (METAL)?	YES ☐	NO ☐	_____
13.	ANY TUBERCLES (METAL – IF INTERNAL INSPECTION)?	YES ☐	NO ☐	_____

GENERAL APPEARANCE (Inspector):

DEGRADATION FOUND? YES ☐ NO ☐ CR-_____

FURTHER EVALUATION REQUIRED? YES ☐ NO ☐

COMMENTS (Inspector):

INSPECTOR(S) PRINT/SIGN/DATE: _____ _____

ATTACHMENT 7.1 **INSPECTION CHECKLIST**

Sheet 2 of 2

EVALUATION: ACCEPTABLE ☐ ACCEPTABLE WITH DEFICIENCIES ☐ UNACCEPTABLE ☐

RECOMMENDED ACTION (Program Owner):

FUTURE MONITORING: ☐

PREVENTIVE MAINTENANCE: ☐

CORRECTIVE ACTIONS: ☐

PHOTOGRAPHIC OR VIDEO RECORDS ATTACHED? YES ☐ NO ☐

PROGRAM OWNER PRINT/SIGN/DATE: _____ _____