

May 24, 2011

MEMORANDUM TO: Robert O. Hardies, Senior Level Advisor  
Division of Component Integrity  
Office of Nuclear Reactor Regulation

FROM: David Alley, Sr. Materials Engineer        /RA/  
Piping and NDE Branch  
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SUBJECT: ANNUAL EVALUATION OF THE QUALIFICATION AND APPLICATION  
OF GUIDED WAVE ULTRASONIC INSPECTION TECHNIQUES FOR  
EVALUATION OF PIPING CONDITION

Buried piping action plan item 2-8 requires an annual status report concerning the qualification and application of guided wave as an inspection tool for buried and underground piping. While this status report is an annual event, DCI's review of the qualification and application of guided wave is an ongoing process. Based on its review to date DCI concludes that a) in terms of the ASME code, guided wave remains an unqualified inspection technique; b) there is no reason to believe that guided wave will become a qualified inspection procedure within the next year; c) guided wave is currently used in an effective manner as a screening tool to indicate locations at which further evaluation should be conducted; and, d) guided wave is currently not an acceptable substitute for qualified inspection techniques such as ultrasonic inspection because it is not capable of precisely determining the extent of localized pipe wall loss.

Comments on the above conclusions are provided below.

In terms of the ASME code or other similar consensus standards, guided wave is not a qualified NDE process in that there are no established procedures or acceptance standards by which the technique or the operators thereof may demonstrate their efficacy in detecting flaws. As the time this is being written, there does not appear to be a concerted effort on the part of purveyors of guided wave technology to achieve such a qualification in the near term. There are, currently, some activities which may eventually assist in such an effort. EPRI is currently developing a test facility which will permit the evaluation of guided wave on known flaws in both buried and above ground piping. NACE currently has two committees addressing various aspects of guided wave. The first committee is developing a standard for guided wave. It is currently unclear as to whether this standard will address the suitability of guided wave as a stand alone inspection technique or whether it will address only the process by which a plant

owner acquires the services of a firm which conducts guided wave inspections. The second committee is preparing a state of the art report concerning buried piping in nuclear power plants. This report is likely to consider the current and potential uses of guided wave and its effectiveness in performing those functions.

The industry's underground piping and tanks initiative contains provisions for both indirect and direct inspections. The indirect inspections, if conducted, are used to select locations for direct inspections. Based on the characteristics of guided wave it appears highly likely that this inspection technique will be heavily utilized by licensees in conducting indirect inspections. This use of guided wave appears appropriate in that the alternative, conducting random direct inspections, is, almost certainly, less effective in identifying pipe degradation. It must, however, be remembered that guided wave may fail to identify flaws located near discontinuities in the pipe such as pipe supports and guided wave will not distinguish between significant wall loss over a small area from a much less significant loss over a larger area. While failure to accurately characterize the extent of pipe wall loss over a very small area is not likely to be a safety concern, it may compromise the leak tight integrity of the pipe, which is contrary to the goals of the initiative. Based on the above it appears appropriate to use guided wave to assist in determining where to conduct direct inspections but not to evaluate any indications detected. At the present time it does not appear prudent to use guided wave to make a determination that flaws are not present in piping.

At the present time it appears that Pipeline and Hazardous Materials Safety Administration (PHMSA) permits guided wave inspections to play a much greater role in the inspection of buried pipelines than is currently deemed appropriate by the NRC. The exact reason for, and extent of, this apparent discrepancy is not fully known, however, the relative lack of discontinuities in buried transmission pipelines as compared to buried pipe in nuclear power plants may be significant in PHMSA's decision making process.

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