A successful Guided Wave Ultrasonics (GWUT) assessment of cased pipe is dependent on having a process in place to produce credible, repeatable, consistent results. PHMSA and the pipeline industry are working to improve confidence in these results through collaboration in research, technology demonstrations and by providing further guidance on determining the important considerations for the PHMSA review.

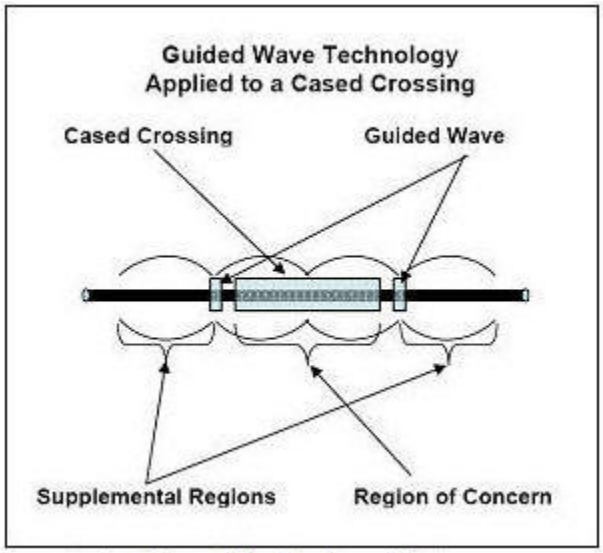
PHMSA and the pipeline industry are constantly evolving and improving their knowledge base for effectively using GWUT on cased crossings. This is similar in how ECDA is a continuous improvement process. Targeted guidance improves over time and sometimes takes multiple iterations.

PHMSA released its first targeted guidance via a Federal Register Notice on July 29, 2005 about the use GWUT on cased crossings in meeting integrity management regulations. The guidance proscribed the manner in which GWUT is validated and then applied to pipeline cased crossings.

Further guidance was then provided on the Natural Gas IM website about how to construct 180-Day Notifications for using "Other Technology" such as GWUT for these assessments. The initial guidance was to include statements and attachments documenting how 39 people, process and equipment type points were addressed concerning GWUT's usage on cased crossings. These 39 points were structured along an in-line inspection mentality which was the common thinking at that time. PHMSA would then review each notification on the merits of the individual submittal.

The collaborative research, technology demonstrations and discussions with subject matter experts drove revision to the checklist from 39 points down to 18 focused points grouped in issues for pipeline operators, technology vendor personnel, the application process on cased crossings and for the technology hardware.

Each category contains a descriptive narrative to assist operators and GWUT vendors on the appropriate parameters to include in a 180-Day Notification. Many of these parameters address the physical depiction shown in the figure. GWUT technology has inconsistencies between service providers as well as detection strengths and weaknesses. These understandings resulted in a "Go" or "No-Go" approach for cased crossings. Improvements in people, process and equipment will further improve confidence when applying this to cased crossings. A finer line could then be drawn on where this technology should and should not be applied.



Depiction of the Region of Concern.

Technology Demonstrations

Technology demonstrations are a means of evaluating the merit of technologies that are reaching the prototype stage. Demonstrations expose the technologies to the environment in which the technology must be operated successfully. Demonstrations also promote the deployment and utilization of new technologies through observations and participation by pipeline operators, equipment vendors, standards organizations, and pipeline safety officials.

When these demonstrations occurred, GWUT was not considered "a prototype" technology, but still requiring further validated to build defect libraries conducive for higher confidence in produced results. To address this, PHMSA and the pipeline industry are holding multiple formal and informal technology demonstrations. Some while carrying out the scopes of research projects described in the previous section and at test beds where defect libraries are controlled. These demos are building confidence in detection capabilities and drawing a finer line where this technology should and should not be applied.

Two formal and more than a dozen informal demonstrations were held by the PHMSA program and its research partners since 2002. The most notable one occurred July 17-19, 2006 in Binghamton, New York. This demonstration occurred at the NYSEARCH/Northeast Gas Association (NGA) technology test bed

specifically designed for testing GWUT and robotic technology for unpiggable gas pipelines. The following objectives were designed and sought by an industry and government steering committee:

1. To evaluate the capabilities of various GWUT providers in a known setting on cased pipes; and,
2. To exchange information among regulators, operators and technology providers and to determine what technical parameters are important for operator selection and/or evaluation of Guided Wave technologies.

The main demonstration output identified several important parameters or variables that influence the application of GWUT technology. Those parameters include:

1. Coating type
2. Coating thickness
3. Nearby pipe features that can absorb signal energy
4. Integrity of casing spacers
5. Knowledge of the positions of welds and other features such as casing spacers
6. GWUT vendor operator training
7. Wave type(s)
8. Temperature effects
9. Varying GWUT vendor application and consideration of parameters 1-8

Finally, this work raised additional questions and the need for continued dialogue between pipeline regulators, operators and with the GWUT vendor community. The following dialogue should address:

- How operators can best judge what defect selection threshold is acceptable for a GWUT job.
- For a range of operating pressures, what is the threshold for acceptability in the size and shape of a pipe defect.
- Whether commercial use of guided wave technology should also provide more education to operators and regulators about the current limits of the technology.
- Whether advancements are reducing the defect selection threshold to smaller sized defects.
- How sizes and shapes of defect impact guided wave performance.
- What additional improvements can be made to raise the reliability and applicability of guided wave ultrasound to natural gas pipelines.

The full July 2006 demonstration report provides a wealth of important information about applying GWUT to cased crossings.

These demonstrations served to validate GWUT hardware and software improvements under existing research, identified the most influential technical parameters that refined the natural gas IM GWUT checklist and finally advanced the state of knowledge for the regulators and pipeline operators who participated.