API Standard 1104 – Welding of Pipelines and Related Facilities, is the most widely-used industry standard in the world for pipeline construction. For the majority of cross country pipelines constructed in the United States, the use of certain sections of API 1104 is mandated by Federal regulations. Many changes in the pipeline industry have occurred since the First Edition of API 1104 was introduced in 1953, although many of the construction practices that were used then are still used today. Significant changes include the development of higher strength line pipe materials and the development of high-productivity mechanized welding equipment. Many new long-distance transmission pipelines are constructed today using high-strength line pipe materials and high productivity mechanized welding equipment, and the completed girth welds are inspected using automated ultrasonic testing (AUT) equipment.

API 1104 is revised regularly to adapt to changing pipeline construction practices. In spite of these revisions, there are many requirements in API 1104 that are subject to interpretation. For example, many of the suggested ranges for procedure and welder qualification are nearly always taken literally, whereas the intent is to allow flexibility. Where the user does elect to specify another range or grouping, no guidance is given as to what constitutes an acceptable range or grouping. This can result in procedures that are less than completely consistent. Ranges that are too wide are specified or difficult to execute in the field when ranges that are too narrow are specified. The lack of guidance gives regulators little support in terms of enforcement. There is a formal procedure for handling requests for interpretations within the API 1104 committee structure, but these can take weeks and sometimes take up to a full year to resolve. There is also a database of previous requests for interpretations (technical inquiries), but this only contains relatively recent inquiries (from 1996) and the existence of this database may not be apparent to the typical user.

Why Attend?

The application of requirements contained in many industry codes and standards requires some interpretation by the user and by the regulator who is called upon to enforce their use. There are often differences in the way requirements are interpreted because of unclear rationale behind the requirements or novel or non-traditional applications. Some industry codes and standards contain guidance in the form of commentary sections or companion documents. This is not the case for API Standard 1104 – Welding of Pipelines and Related Facilities, where requests for interpretation are common because of unclear requirements or an absence of information pertaining to rationale.

Since API 1104 is written in the form of a specification, it cannot present background information or discuss the intent of the API 1104 committee. The intent of the API 1104 committee, and the rationale pertaining to how some of the requirements in API 1104 came about, lies with individuals who have been or were members of the committee for many years. Unfortunately, many of these individuals are no longer with us.

The reason for this training was to develop guidance for those using API 1104. As attendees of this course you will better understand the intent regarding interpretation of some requirements in API 1104, the rationale behind the requirements, and the applicability of the requirements to both conventional and modern high-strength pipelines.

Benefits of Attending: Attending this training and follow on use of the “PRCI Guidelines for Interpretation and Application of API 1104" provided to each attendee will allow both users and regulators to better understand the intent regarding the interpretation of some requirements, the rationale behind the requirements, and the applicability of API 1104 to both conventional and modern high-strength pipelines. The training and follow on use of the “PRCI Guidelines for Interpretation and Application of API 1104" will also increase the safety and reliability of newly constructed pipeline by avoiding misinterpretation of requirements. It will also allow users to confidently tailor welding procedures to better fit the requirements for their specific needs without fear of violating arbitrarily established ranges and groupings. This may in turn reduce the cost of pipeline construction and maintenance activities.

Instructor: Bill Amend is a Principal Engineer at Det Norske Veritas, (USA) in the Welding & Materials Engineering group. DNV works with pipeline operators to deliver comprehensive pipeline integrity strategies that manage risk and meet challenges in every phase of the pipeline lifecycle. Bill has a B.S. in metallurgical engineering from Cal Poly at San Luis Obispo (Calif.) and 32 years experience providing metallurgical, welding, and corrosion engineering support for natural gas pipelines, oil & gas production, and the geothermal energy production industry. Before joining the staff of DNV Bill was an Associate with the Pipeline Services Group of Structural Integrity. Prior to that Bill served as Sr. Research Engineer at Unocal's Science and Technology Division, and was Principle Engineer in Southern California Gas Company's Pipeline Integrity Management Dept. While at SoCalGas Bill managed a variety of research projects for various supervisory committees of Pipeline Research Council International, (PRCI), and served as chairman of research emphasis areas related to degradation and assessment of early generation pipelines and welding on-in-service pipelines.

Why Attend?

The application of requirements contained in many industry codes and standards requires some interpretation by the user and by the regulator who is called upon to enforce their use. There are often differences in the way requirements are interpreted because of unclear rationale behind the requirements or novel or non-traditional applications. Some industry codes and standards contain guidance in the form of commentary sections or companion documents. This is not the case for API Standard 1104 – Welding of Pipelines and Related Facilities, where requests for interpretation are common because of unclear requirements or an absence of information pertaining to rationale.

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the commentary section contained in AWS D1.1, Structural Welding Code – Steel. The format of the guidance document follows the format of the API 1104 document itself. Where additional guidance and/or a description of the rationale behind the requirement was determined to be necessary, it was developed and included in the guidance document. Where the requirement is self-explanatory, this was indicated in the document.

The guidance material was developed from this and using a variety of resources. These resources included:

- API 1104 Technical Inquiries Database
- CSA Z662 – Oil and Gas Pipeline Systems – code and commentary
- ASME Section IX – Welding and Brazing Qualifications
- AWS D1.1:2000, Structural Welding Code – Steel
- Proposed revisions to API 1104 (from committee member correspondence)
- Project team member experience
- Inquiries to PRCI member company representatives

To the extent that it was possible, the guidance that was developed pertains to both conventional pipelines constructed using conventional stove-pipe welding practices and modern high-strength pipelines constructed using high-productivity mechanized welding equipment. Guidance pertaining to Appendix A of API 1104 (alternative acceptance standards based on fitness-for-purpose criteria) and Guidance pertaining to Appendix B of API 1104 (in-service welding) is covered in detail. The PRCI Guidelines for Interpretation and Application of API 1104 will be a valuable addition to your reference library and help support your future API 1104 code interpretations.

Attendees will need to bring a copy of the API STD 1104, 20th Edition to the course.

Understanding API 1104 - Guidelines For Interpretation and Application

- The New Regulatory Focus on Pipeline Construction; What PHMSA has said with regard to pipeline welding
- How the PRCI guidance document for API 1104 was developed
- “Guidance” versus formal technical inquiries and interpretations
- Other sources of technical information; an introduction to and comparison with other welding standards
- General information, terms, specifications
- Qualification of Welding Procedures
- Qualification of Welders
- Design and Preparation of a Joint for Production Welding
- Inspection and testing of Production Welds
- Acceptance Standards for NDT
- Repair and Removal of Defects

- Procedures for Nondestructive Testing
- Mechanized Welding
- Appendix A; Alternative Acceptance Standards for Girth Welds
- Appendix B; In-service Welding
- A Review of Participant’s Examples of Welding Procedures, Welder
- Qualification Records, etc.
- Learning Check; Participant’s Solutions to Hypothetical Scenarios

Please complete the attached form and fax to TTI at 713-630-0560

Course Cost: $1495.00/student
Course Date: April 5 & 6, 2011

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