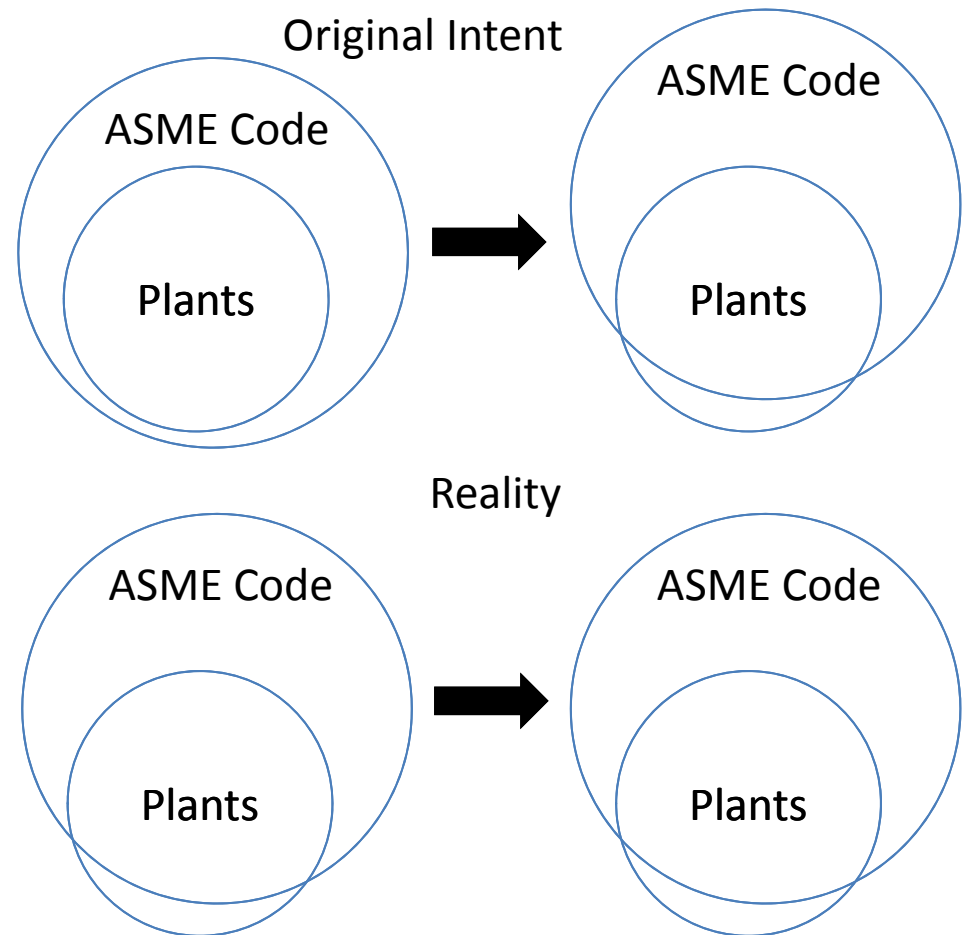


Coverage-Based Relief Requests

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NRC / Industry NDE Technical
Information Exchange Meeting
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Background

- 10 CFR 50.55a(g)(5)(iii) was originally intended to be used when ASME Code changes in a way that brings a plant out of compliance
- The impracticability rule was not intended to be a multi-decade solution to be applied repeatedly to the same components
- Licensees submit repetitive relief requests to the NRC, consuming licensee and NRC resources



Why over 40 years?

- While NDE technology has improved, many component geometries and materials remain challenging
- For many welds, the obtaining code coverage would require the redesign and modification of the component
- The NRC staff does not support removing components with good OE from existing plants over a compliance issue
- The relief request process has worked well and the NRC did not have a motivation to mandate a change

Technical Basis for Reduced Coverage Relief Requests

- Far side examinations are not able to detect small flaws reliably, but are expected to be able to detect large flaws
- Operational experience with reduced-coverage inspections has been favorable in recent decades
- A significant amount of engineering judgement is used

Some Notable Exceptions

- There have been instances where the NRC has granted relief followed by flaws being found in a component
- At least one leak has occurred after relief
- No pipe failures have occurred in a pipe covered in an impractical relief request

Not All Coverage is Created Equal

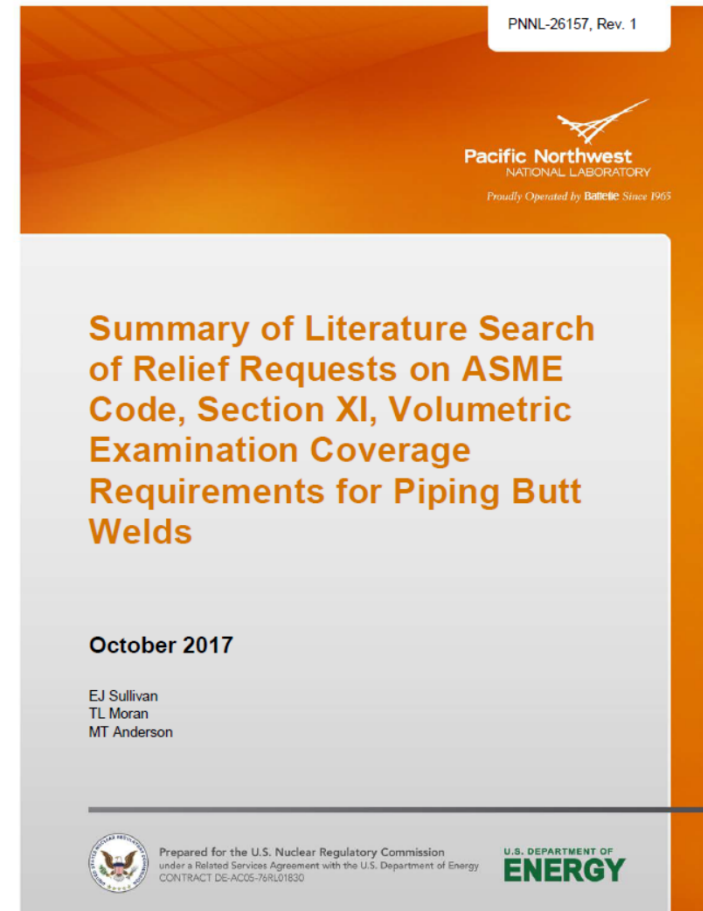
- Some methods work better than others through a weld
- Manual phased array likely outperforms conventional
- Encoded inspections have advantages over non-encoded
- Difficult to quantify the differences

Current Status

- The current process provides reasonable assurance of structural integrity and leak tightness
- The current process is largely based on operational experience and engineering judgment
- Changes to the current process will require a clear understanding as to why the current process has been working well

NRC Research

- While the NRC and Industry have been dealing with relief requests for decades, no effort had been made to quantify the causes of the relief requests
- Research was conducted into the main causes of missed coverage

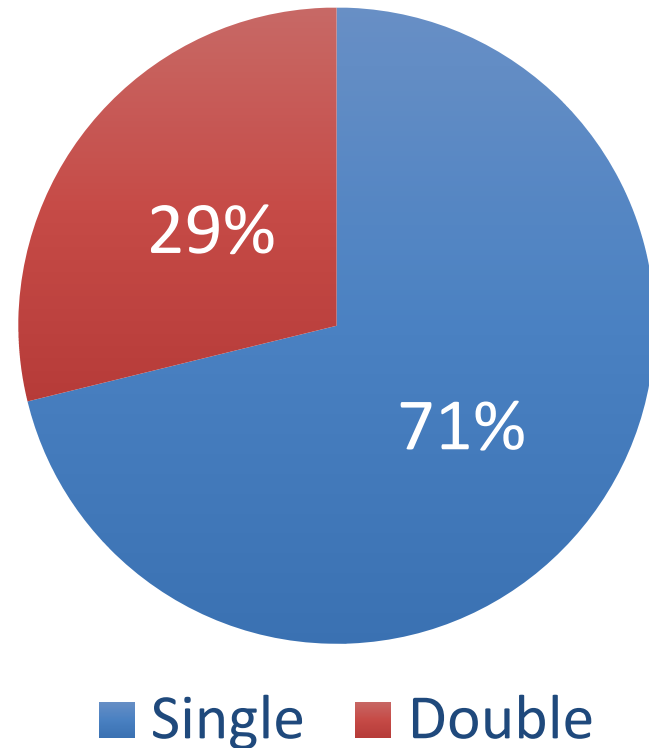


Goals of NRC Research

- Determine the main causes of missed coverage
- Determine the flaws that can be detected when coverage is limited
 - Austenitic
 - Ferritic
 - CASS
- Use of Modelling

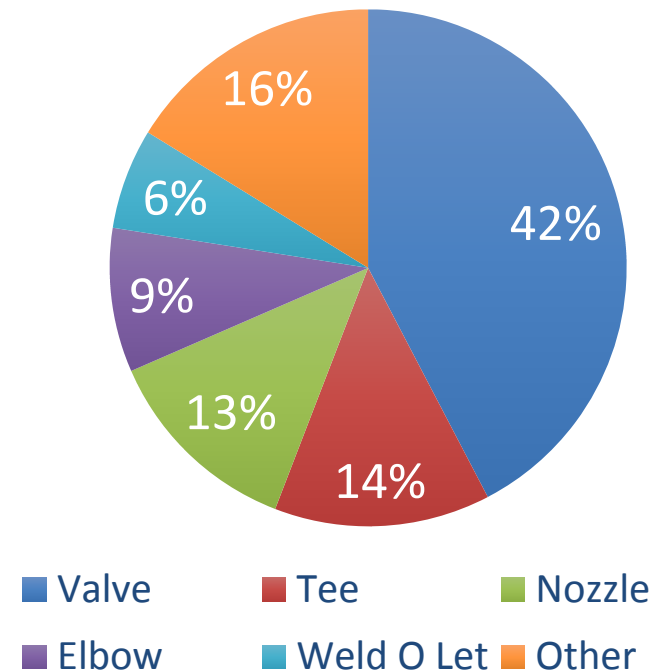
Causes of Missed Coverage

- The majority of missed-coverage examinations are caused by single-sided examinations



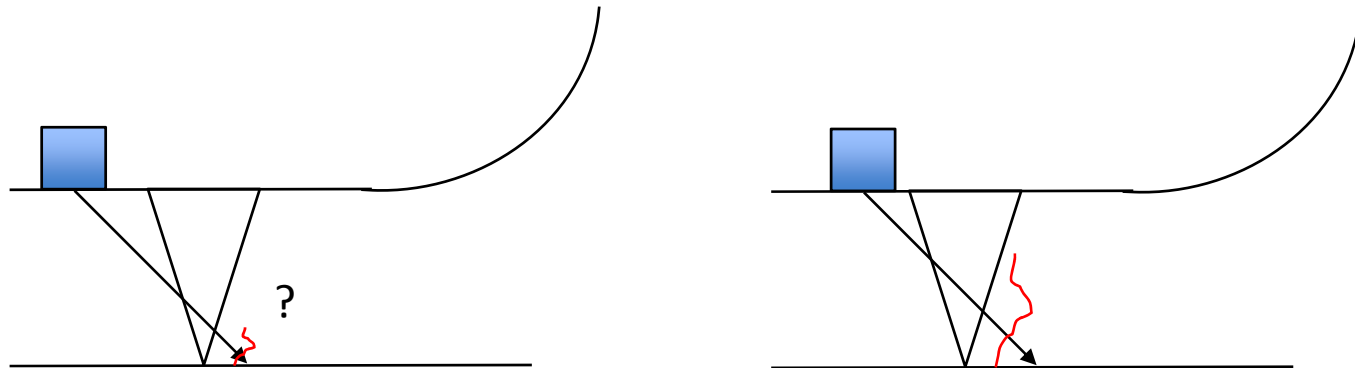
Causes of Single-Sided Examinations

- The most common cause of single sided examinations are pipe-to-valve configurations



Far-Side Examination

How much of a flaw has to be in a beam before it can be reliably detected?



Ferritic?
Wrought?
CASS?

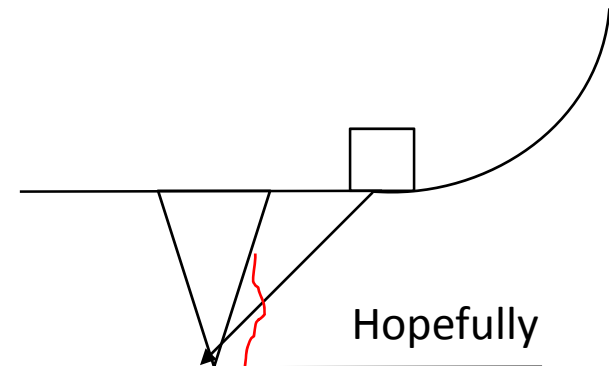
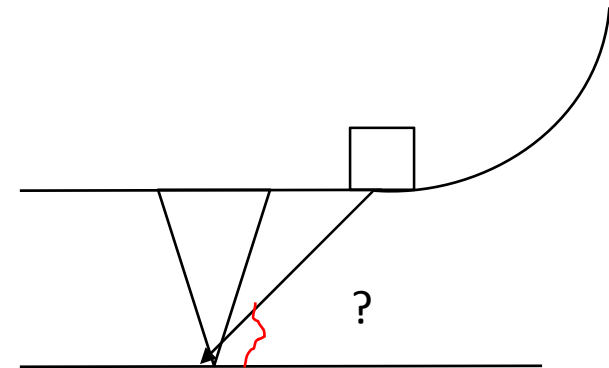
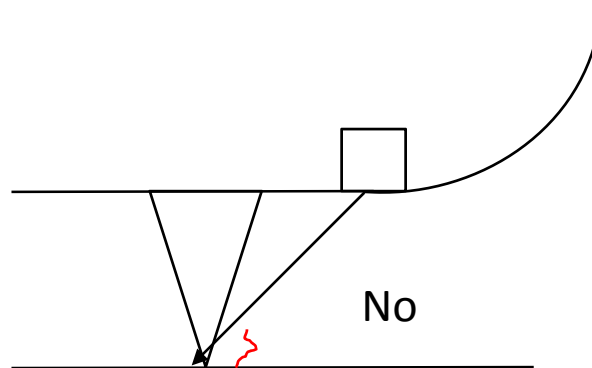
Conventional?
Phased Array?
Encoded?

No Corner Trap

How much of a flaw has to be in a beam before it can be reliably detected?

Ferritic?
Wrought?
CASS?

Conventional?
Phased Array?
Encoded?



Ultrasonic Modeling

- Modeling may be useful in determining the effectiveness of an examination
- The NRC will have confidence in the use of modeling when enough experiments have been conducted and the relationship between UT modeling and experiments has been established

Reducing Impractical Relief Requests

- New technology can allow for complete coverage
- Code coverage requirements can be changed with a sufficient technical basis
- The NRC can change the rules for how reliefs are given

New Technology

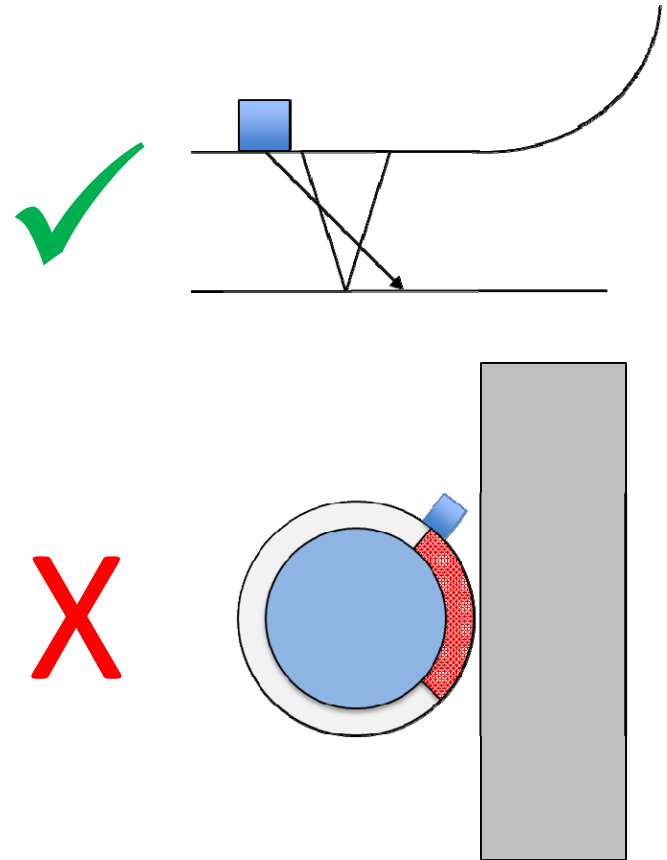
- While this is the ideal solution, it is challenging to mandate
- Even if the new technology emerges tomorrow, it would take many years to reach the field

Changes to ASME Code

- N-711-1 will likely eliminate $\approx 70\%$ of piping relief requests
- The remaining 30% will be complex cases that may require NRC review
- The NRC will address other possible changes as they arise

Code Case N-711-1

- N-711-1 redefines the required inspection volume in some cases
- N-711-1 is most effective at reducing relief requests for single-sided examinations
- N-711-1 is less useful for other types of obstructions, such as partial obstructions of the entire weld width



Changes to 10 CFR 50.55a

- The NRC staff have been exploring possible changes to how impractical relief requests, especially repetitive relief requests, are handled
- One challenge is to craft rules that handle new reactors, existing reactors, and novel reactor designs

Path Forward

- The NRC staff is conducting research into determining the effectiveness of examinations with missed coverage
- The NRC staff voted for N-711-1 at the ASME Code standards committee
- The NRC staff is looking into rulemaking or policy changes