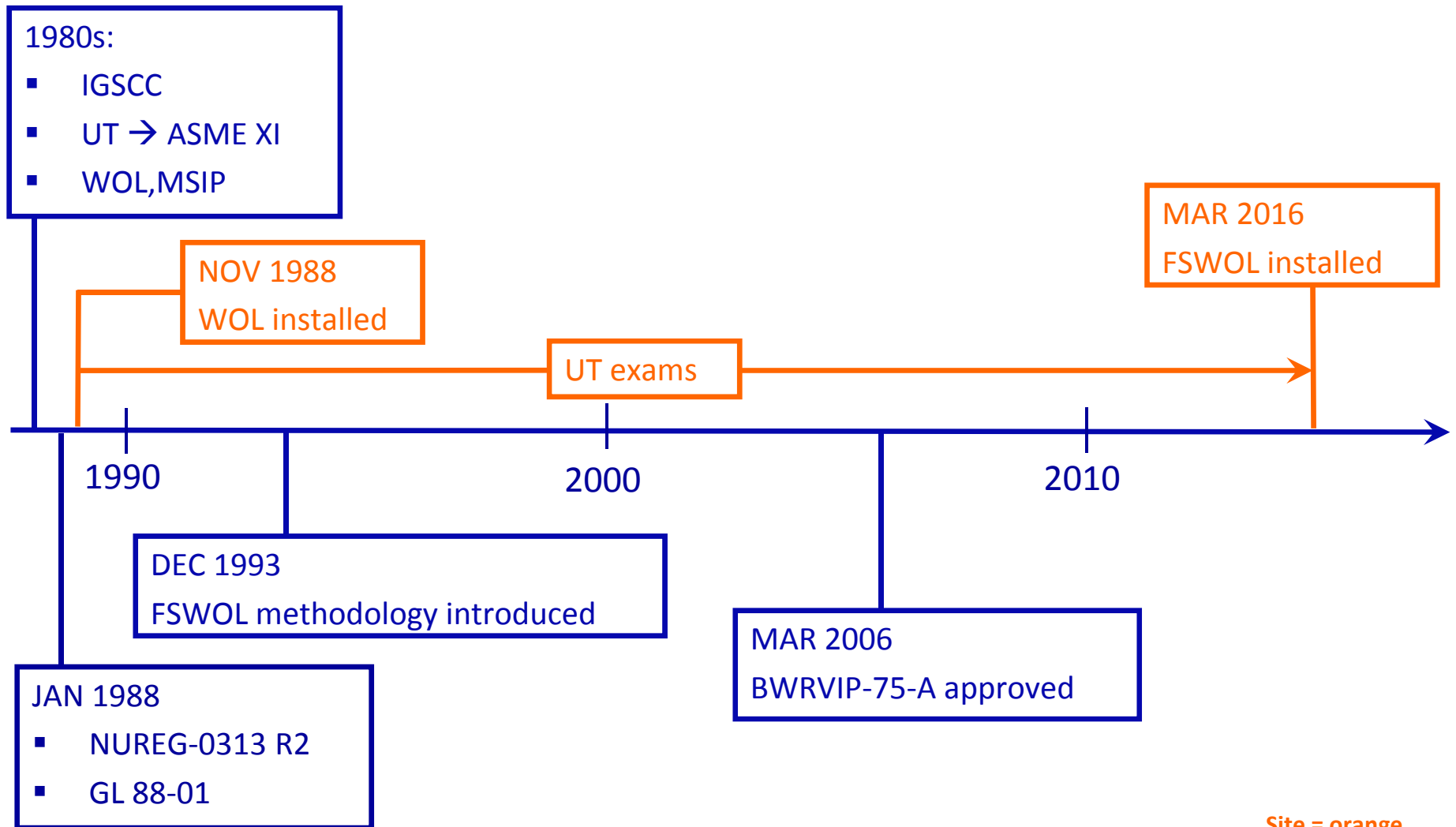


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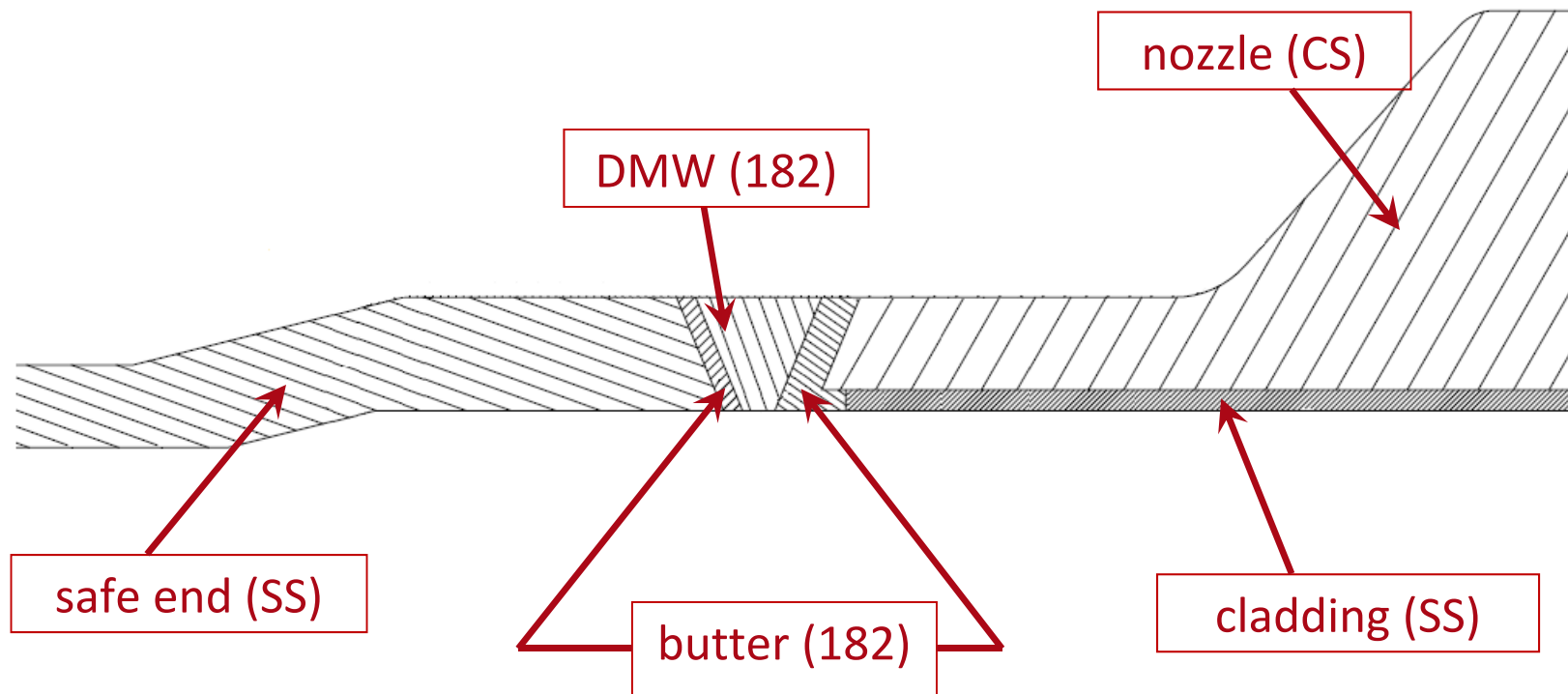
TIMELINE



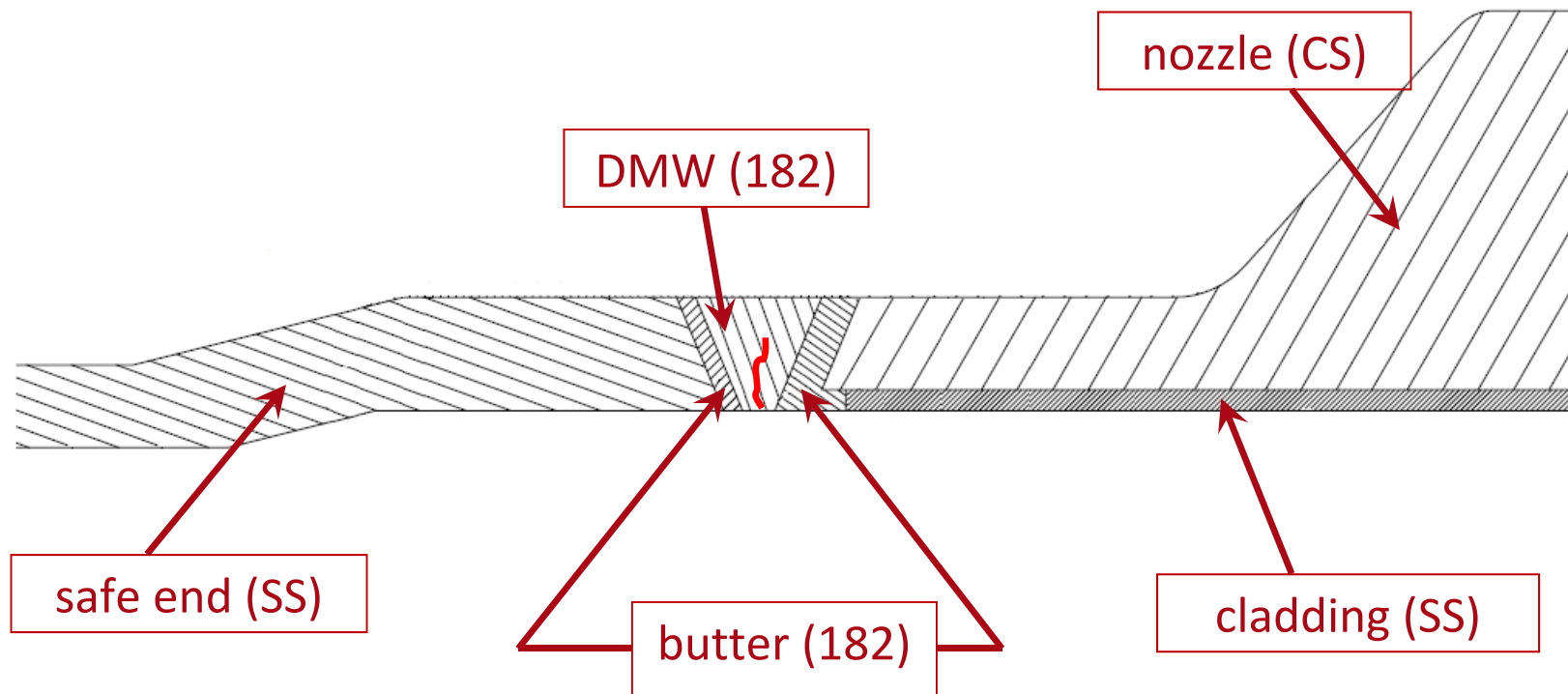
Site = orange

Industry = blue

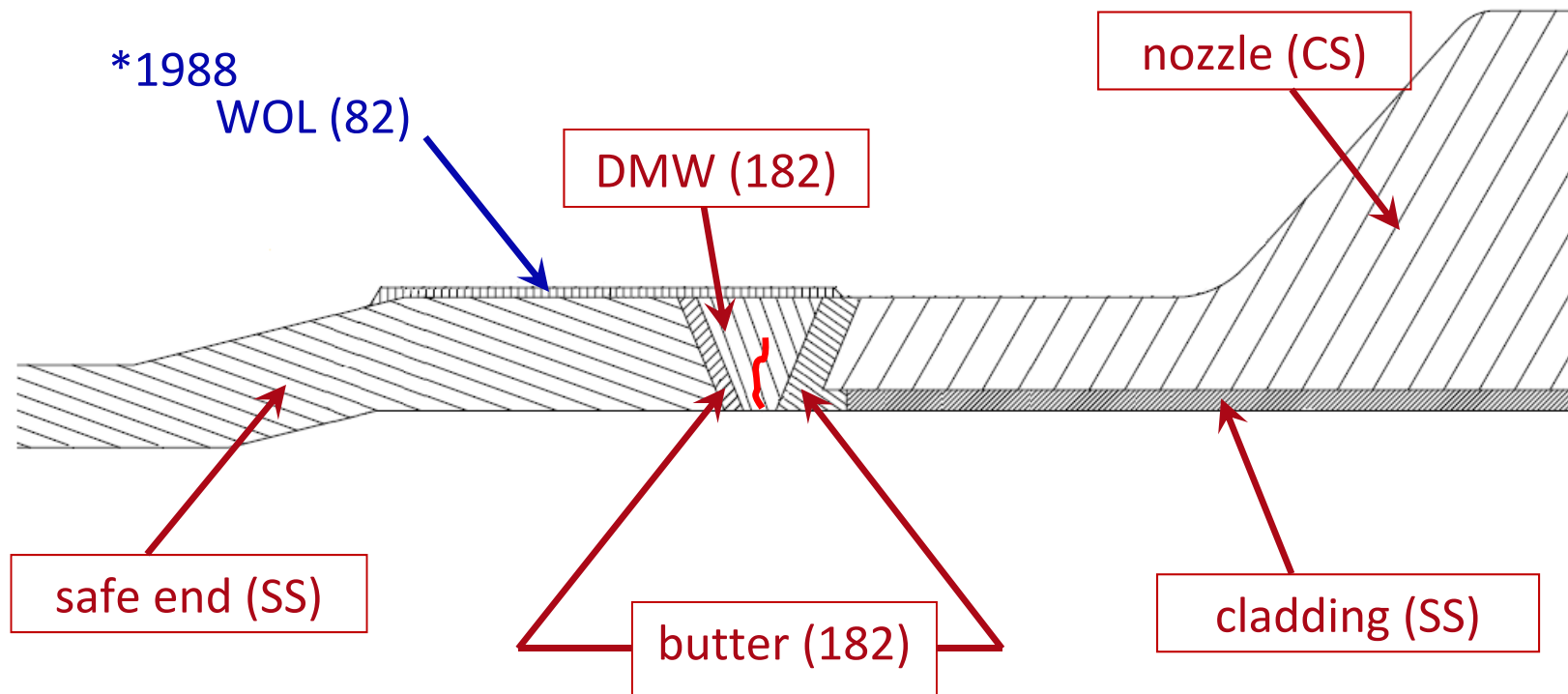
RECIRC NOZZLE



RECIRC NOZZLE



RECIRC NOZZLE



*1988
WOL (82)

DMW (182)

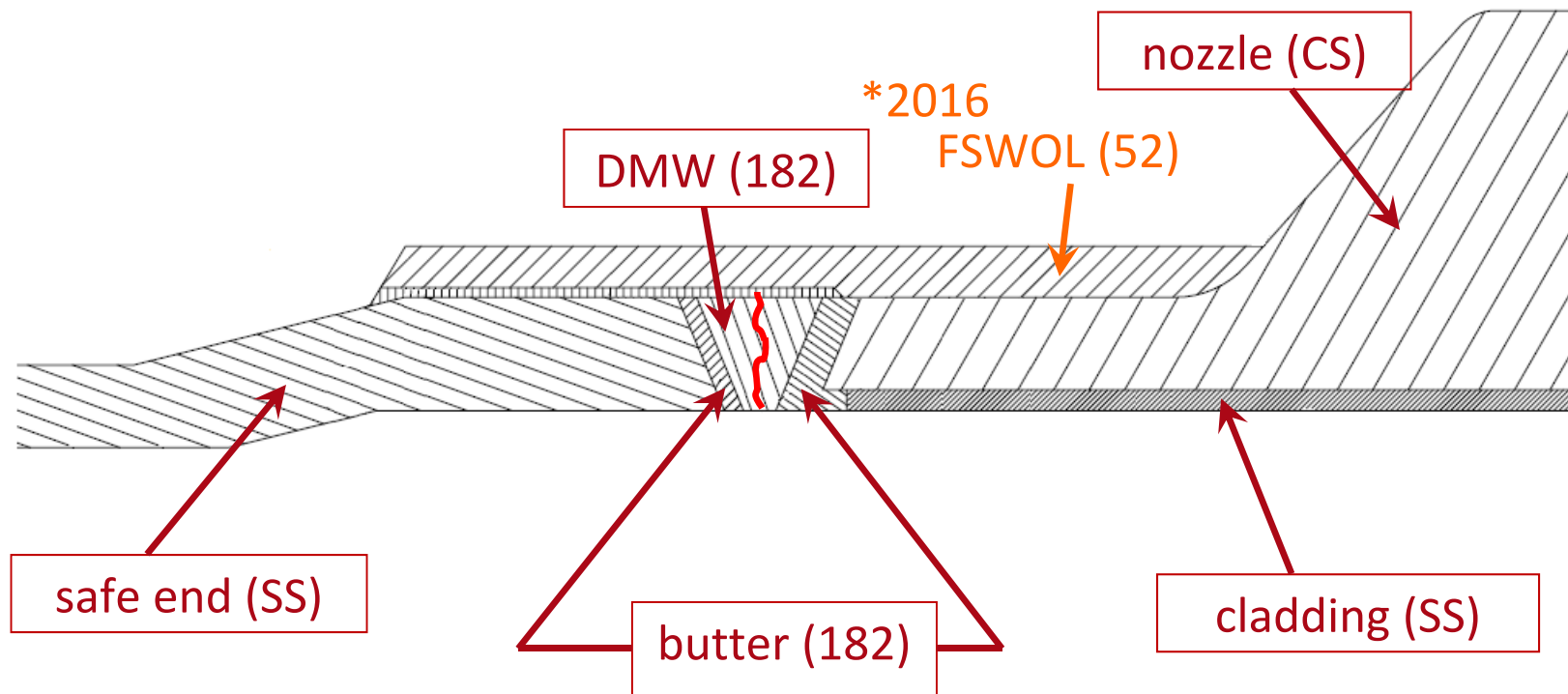
nozzle (CS)

safe end (SS)

butter (182)

cladding (SS)

RECIRC NOZZLE



ALLOY COMPOSITION

	alloy 182	alloy 82	alloy 52
	UNS W86182	UNS N06082	UNS N06052
	ASME 2007	ASME 2007	ASME 2007
	ERNiCrMo-3	ERNiCr-3	ERNiCrFe-7
C	0.10	0.10	0.04
Mn	5.0-9.5	2.5-3.5	1.0
Fe	10.0	3.0	7.0 - 11.0
P	0.03	0.03	0.02
S	0.015	0.015	0.015
Si	1.0	0.50	0.50
Cu	0.50	0.50	0.30
Ni	59.0 min	67.0 min	Rem
Co	0.12	0.12	-
Al	-	-	1.10
Ti	1.0	0.75	1.0
Cr	13.0-17.0	18.0-22.0	28.0 - 31.5
Mo	-	-	0.50
Nb(Cb)	-	-	-
Nb(Cb) + Ta	1.0-2.5	2.0-3.0	0.10
Al + Ti	-	0.010	1.5
Others	0.50	0.50	0.50

INDUSTRY INFORMATION

- **IAEA, “Stress Corrosion Cracking in Light Water Reactors: Good Practices and Lessons Learned,” (NP-T-3.13, 2011)**
 - “For some components in boiling water reactors (BWRs) made of austenitic stainless steel or nickel based alloy; e.g. the recirculation piping, ... intergranular stress corrosion cracking (IGSCC) has been a significant ageing degradation mechanism.”
 - “The mechanism of IGSCC of BWR components has been evaluated in detail and various kinds of measures for preventing, mitigating and repairing IGSCC have been established. Nevertheless, the IGSCC problem has not been fully solved and is still a concern for some BWR components.”
- **ANT International, “Environmentally-Assisted Degradation of Nickel-Base Alloys in LWRs” (2011)**
 - “Although IGSCC can be initiated in laboratory tests in the higher Cr content alloys, such as Alloy 82, there have been no occurrences of IGSCC in BWRs operating under the water chemistry guidelines recommended by EPRI. Indeed, in 1988, the United States Nuclear Regulatory Commission (USNRC) issued a statement ... based on plant experience that *‘Inconel 82 is the only commonly used nickel-base weld alloy (in BWRs) considered to be resistant (to SCC)’*.”

NRC ACTIONS

- **Address Site Issue**
 - Finish assessing site's actions
 - Identify any Performance Deficiencies
 - Issue inspection report

- **Address Potential Industry-Wide Implications**
 - Assess potential first instance of crack growth into Alloy 82 overlay material
 - Evaluate possible implications on other plants
 - Engage industry to ensure information is communicated

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