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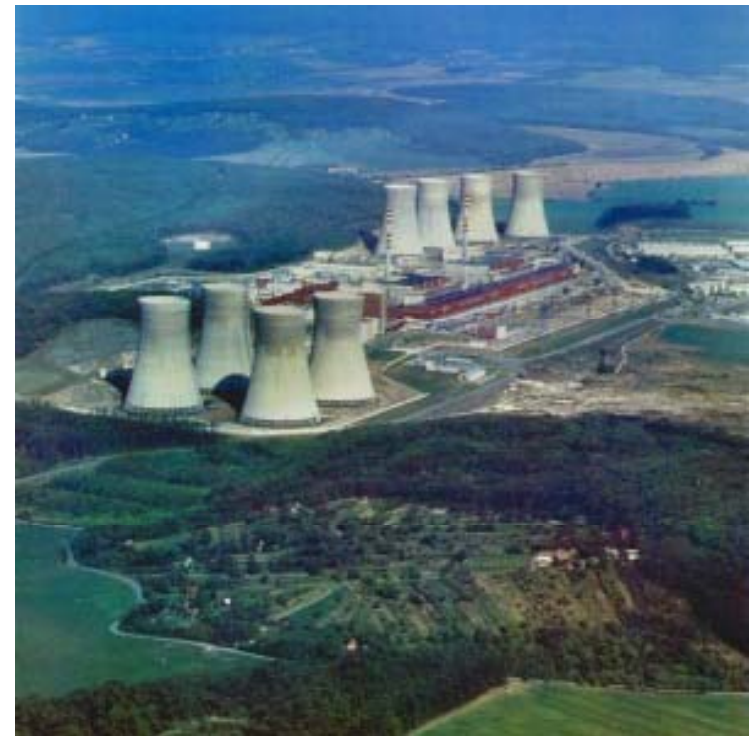
Management of EQ programs a Mochovce NPP, Unit 3 and 4, in the Slovak Republic

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IEEE SC2, Seattle
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1. Introduction

- Mochovce NPP consisting of four pressurized water reactors of Russian design type VVER 440/213 (unit output 440 MWe).
- Owner of the plant is Slovenské elektrárne, a nationally-owned company with a majority financial interest held by Enel, an Italian utility company.



2. Brief History

- Preparatory work was started on June 1981, and site construction for Mochovce 1 and Mochovce 2 started in November 1982.
- Construction of the remaining two units, Mochovce 3 and Mochovce 4, began in 1985 but work on all four units was halted in 1991 due to a lack of funds. In 1995 the Slovak government approved a plan to finish the first pair with additional Western safety technology. The first two units were commissioned in 1998 and 1999 respectively.
- Installed capacity of units 1 and 2 was up-rated by 7% in 2008.
- Construction of Units 3 and 4 restarted in November 2008 and is planned to be completed in 2012 and 2013.

4. Public Opinion & Electricity Needs

- Commissioning of the plant has sparking protests in Austria - a neighboring country strongly opposed to the use of nuclear energy in general.



- Completion of 2 units is highly demanded project because energy security of Slovak Republic (after decomisioning 2 units of EBO V1 NPP - 500 MWe permanent outage).

5. Nuclear Safety & EQ

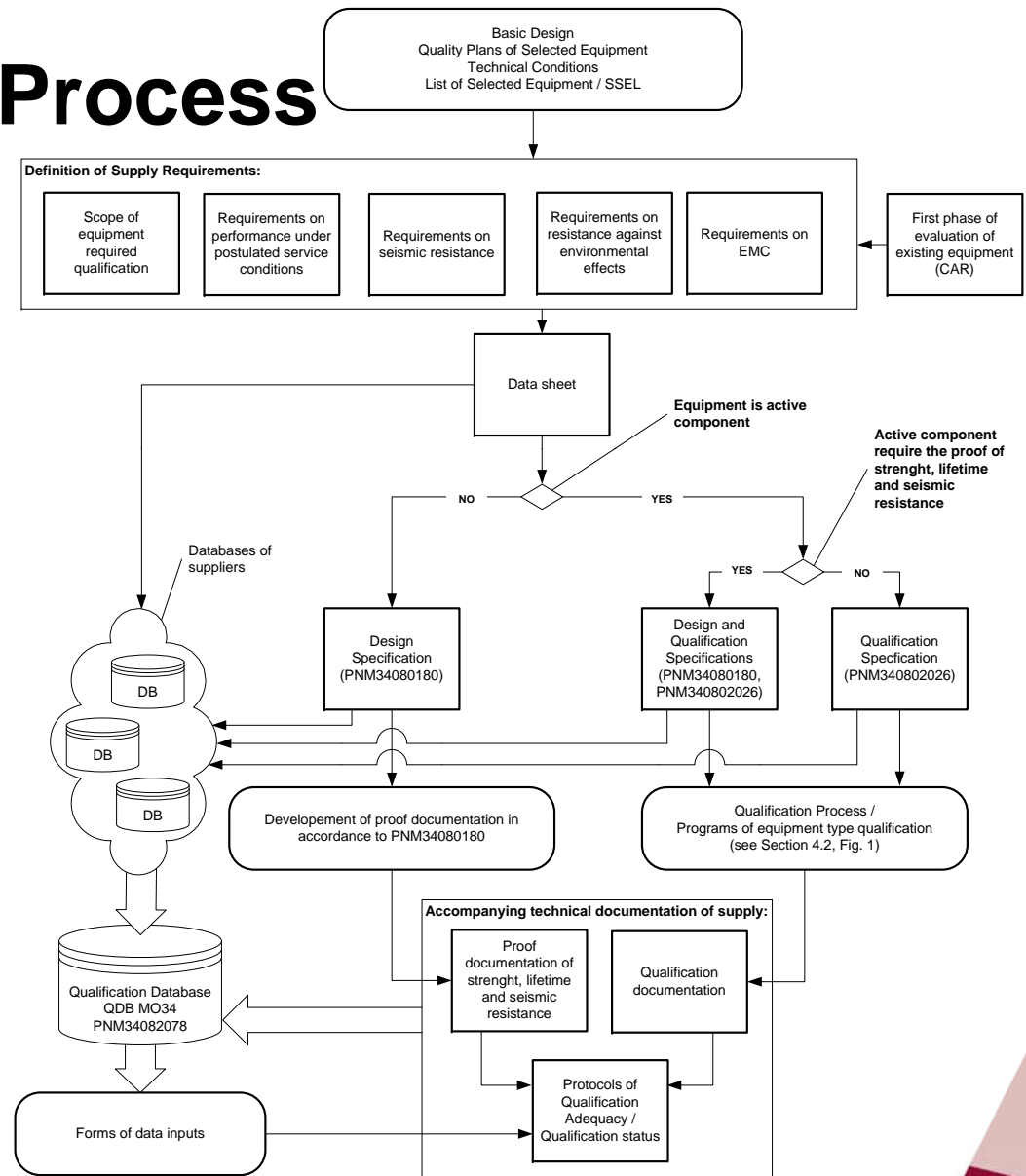
- In 2006, State Regulatory Authority (ÚJD) introduced completely new nuclear legislation.
- New legal nuclear codex recognized and define the term Equipment Qualification
- Anyhow, the term Equipment Qualification has been defined hard widely and freely applied interpretation causing headaches of suppliers managing directors with signed fixed price contracts.
- Through the methodology documents there is established process of equipment qualification explained as fight against common cause failure – principles of Defense in the depth approach, see IAEA SRS No. 3.

6. Methodology


- There was issued a set of 5 methodologies defining the scope and requirements for safety-related equipment documentation – graded approach.
- IEC 60780 has defined as a basis standards for Equipment Qualification.
- IEEE 323 - general qualification standard has been introduced as fully compatible with IEC 60780.
- Specific IEEE and other international recognized standards are recommended for individual types of equipment (cca 30 Equipment Classes)

6. Documentation Process

- Qualification specification defines the requirements on scope of qualification documentation for specific equipment in technological/process chains MO34.
- Individual Qualification Programs defines the roadmap how to achieved qualification requirements specified in Qualification Specification for equipment that
- Qualification Summary Report summarized and evaluated documentation of EQ programs.
- Qualification Adequacy Protocols collect the essential EQ data and defined qualification status = qualification life + conditions



7. Protocols Examples - QS



MOCHOVCE POWER PLANT
Completion of Unit 3 and 4

Doc. N°:

PNM04365788_E_Q01

QUALIFICATION SPECIFICATION

Rev:

00

Sheet:

1 of 10

Drive Operated Air Conditioning Valves

1 Equipment / Component Identification

1.1 List of Equipment / Component

S/S	ESS	ESS Name	Equipment / Component Name	Note	1	
3KLA10AA901	3.20.01	Equipment for sealed compartments	Hermetic quick acting damper		2	
3KLA10AA902	3.20.01	Equipment for sealed compartments	Hermetic quick acting damper		3	
3KLA10AA903	3.20.01	Equipment for sealed compartments	Hermetic quick acting damper		4	
3KLA10AA904	3.20.01	Equipment for sealed compartments	Hermetic quick acting damper		5	
3KLA10AA905	3.20.01	Equipment for sealed compartments	Hermetic quick acting damper		6	
3KLA10AA906	3.20.01	Equipment for sealed compartments	Hermetic quick acting damper		7	
4KLA10AA901	4.20.01	Equipment for sealed compartments	Hermetic quick acting damper		8	
4KLA10AA902	4.20.01	Equipment for sealed compartments	Hermetic quick acting damper		9	
4KLA10AA903	4.20.01	Equipment for sealed compartments	Hermetic quick acting damper		10	
4KLA10AA904	4.20.01	Equipment for sealed compartments	Hermetic quick acting damper		11	
4KLA10AA905	4.20.01	Equipment for sealed compartments	Hermetic quick acting damper		12	
4KLA10AA906	4.20.01	Equipment for sealed compartments	Hermetic quick acting damper		13	
Supplier	VÚJE, a. s., Okružná 5, 918 04 Trnava, Slovenská republika					14
Equipment / Component Type	Hermetic quick acting damper with triple eccentricity					15
Drive Type	Electric rotary multi-turn actuator - inside hermetic zone					16

1.2 List of References

No.	Doc. No.	Title	Rev.	Notes	17
1	PNM043657030	Methodology for complex qualification of structures, systems and components assurance of Mochovce NPP Unit 3 and 4	01		14
2	PNM043657183	Requirements on Evaluation of Seismic Resistance of Structures, Systems and Components of Mochovce NPP	02		30
3	PNM043657026	Qualification specification for MO34 equipment	01		21
4	PNM043657261	General technical requirements on special fittings for NPP	01	OTT-47	22
5	EN 60900-1-07:100	Environmental Characteristic	F	SE No. ENM0341989	20
6	DMO/022/0101/T/P2/E	Classification of classified equipment into the safety classes and seismic classification - final	F2	SE No. ENM03420705	24
7	DMO/022/0101/T/P4/E	SESL for 3rd unit EMO - Engineering part - equipment of seismic category 1a, 1b, 2a	F4	SE No. ENM03421281	26
8	DMO/022/0101/T/P4/E	SESL for 4th unit EMO - Engineering part - equipment of seismic category 1a, 1b, 2a	F4	SE No. ENM03421583	26
9	DMO/022/0101/T/P3/E	Environmental conditions parameters from normal operation and accidental conditions, Qualification database	F0	SE No. ENM03420032	22
10	DMO/022/0101/T/P3/E	CS 8001-02 Smoothed floor response spectra	F0	SE No. ENM03421128	26

1.3 List of Related Technical Documentation

No.	Doc. No.	Title	Rev.	Notes	30
1	PNM043657845	Data Sheet			31
2	PNM04364703	CEOP for hermetic closures, DN200, BT2 - I. period			32
3	PNM04364704	CEOP for hermetic closures, DN200, BT2, 3 unit - II. period			32
4	PNM04365105	CEOP for hermetic closures, DN200, BT2, 4 unit - II. period			34
5					36

1.4 Notes

- The basic identification of the equipment from MO34 technological systems incl. all categorization is taken from the document DMO/022/0101/T/P2/E, "Kategorizácia výstrojných zariadení do bezpečnostných tried - testová časť", however this information are at the same time kept up-to-date based on approved PIDs from the Detail Design.
- To determine the environment parameters the document from Basic Design 004100016T, "Charakteristika prostredí" is used exclusively. Document DMO/022/0101/T/P3/E, "Parametre prostredia pre normálne a havarijné podmienky" will be used only to determine the environment parameters of severe accident and of thermodynamic temperature and pressure profiles of LOCA and HELB.

vůje		MOCHOVCE POWER PLANT Completion of Unit 3 and 4				Doc. N°		PNM04365788_E_Q01						
		QUALIFICATION SPECIFICATION				Rev.		00						
						Sheet		2 of 10						
Drive Operated Air Conditioning Valves														
2 Equipment / Component Supplementary Identification														
2.1 Location									1					
Equipment / Components									2					
SIS	ESS	Unit	CS	Room	Elevation [m]	Placing in HZ <Y / N>	Flooding Impenden. <Y / N>	Flood Level [m]	Design Basis Event (DBE) <LOCA, HELB, Seismic>	3				
3KLA10AA901	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	4				
3KLA10AA902	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	5				
3KLA10AA903	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	6				
3KLA10AA904	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	7				
3KLA10AA905	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	8				
3KLA10AA906	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	9				
4KLA10AA901	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	10				
4KLA10AA902	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	11				
4KLA10AA903	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	12				
4KLA10AA904	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	13				
4KLA10AA905	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	14				
4KLA10AA906	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	15				
Drives ^a									16					
SIS	ESS	Unit	CS	Room	Elevation [m]	Placing in HZ <Y / N>	Flooding Impenden. <Y / N>	Flood Level [m]	Design Basis Event (DBE) <LOCA, HELB, Seismic>	17				
3KLA10AA901	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	18				
3KLA10AA902	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	19				
3KLA10AA903	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	20				
3KLA10AA904	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	21				
3KLA10AA905	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	22				
3KLA10AA906	3.20.01	3	8001-02	A263/1	+6.00	Y	N	N/A	Seismic, LOCA	23				
4KLA10AA901	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	24				
4KLA10AA902	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	26				
4KLA10AA903	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	28				
4KLA10AA904	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	27				
4KLA10AA905	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	28				
4KLA10AA906	4.20.01	4	8001-02	A263/2	+6.00	Y	N	N/A	Seismic, LOCA	29				
2.2 Requirements									30					
SIS	ESS	Safety Class and Safety Function			Seismic Class			Ss ^b	Req. for Emergen. Safety Funct. ^b	EMC Requir. <Y / N>	Severe accident likelihood <Y / N>	Qualified Lifetime Requir. [yr]	IEB ^c	31
		Meo.	IBC	EL	Meo.	IBC	EL							
3KLA10AA901	3.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	32
3KLA10AA902	3.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	33
3KLA10AA903	3.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	34
3KLA10AA904	3.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	35
3KLA10AA905	3.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	36
3KLA10AA906	3.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	37
4KLA10AA901	4.20.01	2g	21	21	1a	1a	1a	0145, 0160	1 day	N	Y	40	K	38

9. Lessons Learned

- The top managers of several companies misunderstanding the term of Equipment Qualification: after 1 year of preparation documents start to recognize distinction between Quality Assurance documents and EQ documentation.
- Overinflating of qualification requirements. (DESIGN VS ENVIRONMENTAL QUALIFICATION) The originally designed equipment according to industrial accepted standards are required to be qualified according to civil structure standard STN 332000-3 defining the special design features to equipment (see vibration resistance AH2 etc.) – the need to follow IEEE Std 627-2010!!

QUESTIONS ?!



A one of view to Mochovce NPP...