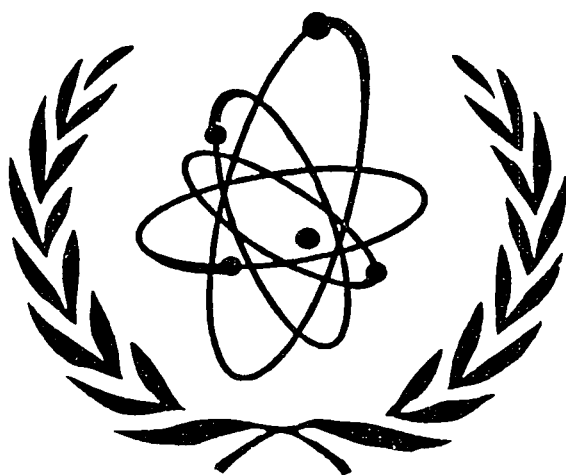


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# THE IAEA EXTRABUDGETARY PROGRAMME ON THE SAFETY OF WWER AND RBMK PLANTS

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**R. Havel, NENS, SAS/RSA  
IWG LMNPP**

**Vienna, Austria, August 31, 1995**

# Nuclear Power in Central and Eastern Europe I.

## WWER-440/213 reactors in operation

Czech Rep.	Dukovany	1	1985
		2	1986
		3	1986
		4	1987
Finland	Loviisa	1	1977
		2	1981
Hungary	Paks	1	1983
		2	1984
		3	1986
		4	1987
Russia	Kola	3	1982
		4	1984
Slovak Rep.	Bohunice	3	1984
		4	1985
Ukraine	Rovno	1	1980
		2	1981

## WWER-440/230 reactors in operation

Bulgaria	Kozloduy	1	1974
		2	1975
		3	1981
		4	1982
Russia	Novovoronezh	3	1971
		4	1972
	Kola	1	1977
		2	1980
Slovak Rep.	Bohunice	1	1979
		2	1981



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# Nuclear Power in Central and Eastern Europe II.

## WWER-1000 reactors in operation

Country	Plant	Start of operation	
Bulgaria	Kozloduy	5 1988	
		6 1991	
Russia	Novovoronezh	5 1981	
		Kalinin	1 1985
			2 1987
		Balakovo	1 1986
		2 1988	
		3 1989	
		4 1993	
Ukraine	Khmelnitski	1 1988	
		South Ukraine	1 1983
		2 1985	
		3 1989	
	Rovno	3 1987	
	Zaporozhe	1 1985	
		2 1985	
		3 1987	
		4 1988	
		5 1989	

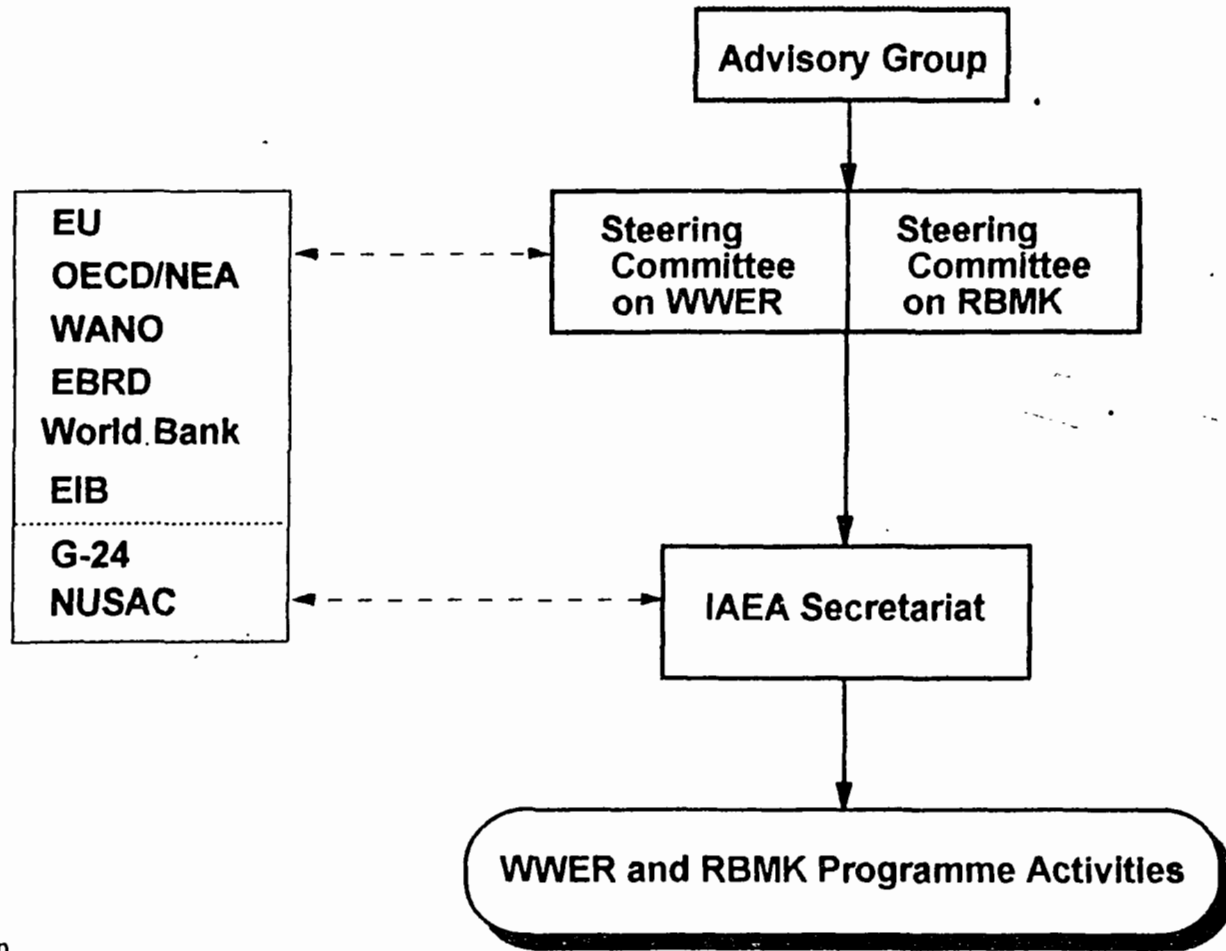
## RBMK reactors in operation

Country	Plant	Start of operation	
Lithuania	Ignalina	1 1985	
		2 1987	
Russia	Kursk	1 1977	
			2 1979
			3 1984
			4 1986
	Leningrad	1 1974	
		2 1976	
		3 1980	
		4 1981	
	Smolensk	1 1983	
		2 1985	
3 1990			
Ukraine	Chernobyl	1 1978	
		3 1982	

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# Organizational chart for the IAEA Extrabudgetary Programme



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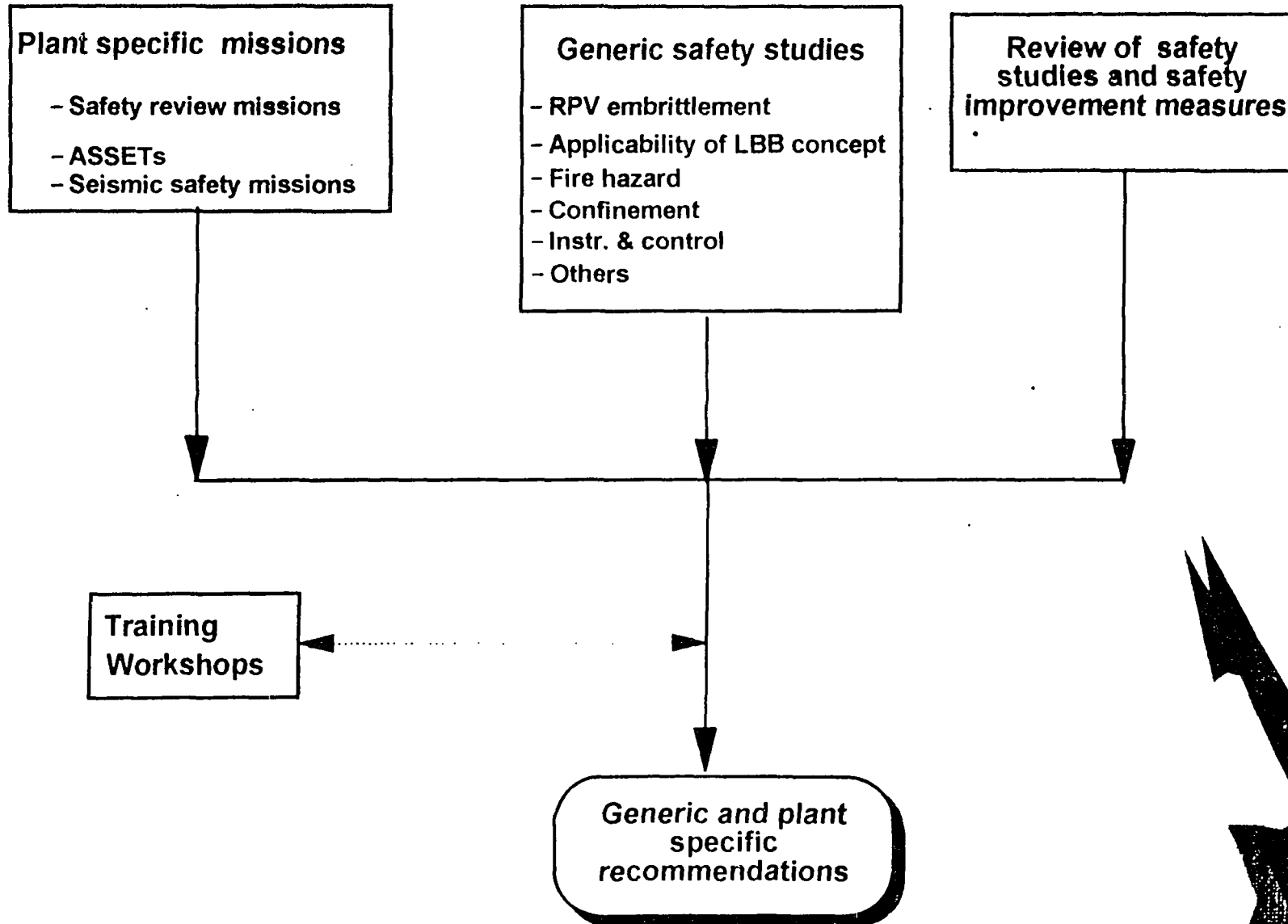
EC: European Commission  
OECD/NEA: Organization for Economic Cooperation and Development/ Nuclear Energy Agency  
WANO: World Association of Nuclear Operators  
EBRD: European Bank for Reconstruction and Development  
EIB: European Investment Bank  
G-24 NUSAC: G-24 Nuclear Safety Assistance Coordination



## **GENERAL PROGRAMME OBJECTIVE**

TO ASSIST COUNTRIES OF EASTERN EUROPE AND THE FORMER SOVIET UNION CONSTRUCTING AND/OR OPERATING WWER AND RBMK NPPS TO IDENTIFY DESIGN AND OPERATIONAL SAFETY DEFICIENCIES AND TO REVIEW COMPLETENESS AND ADEQUACY OF PROPOSED IMPROVEMENTS.

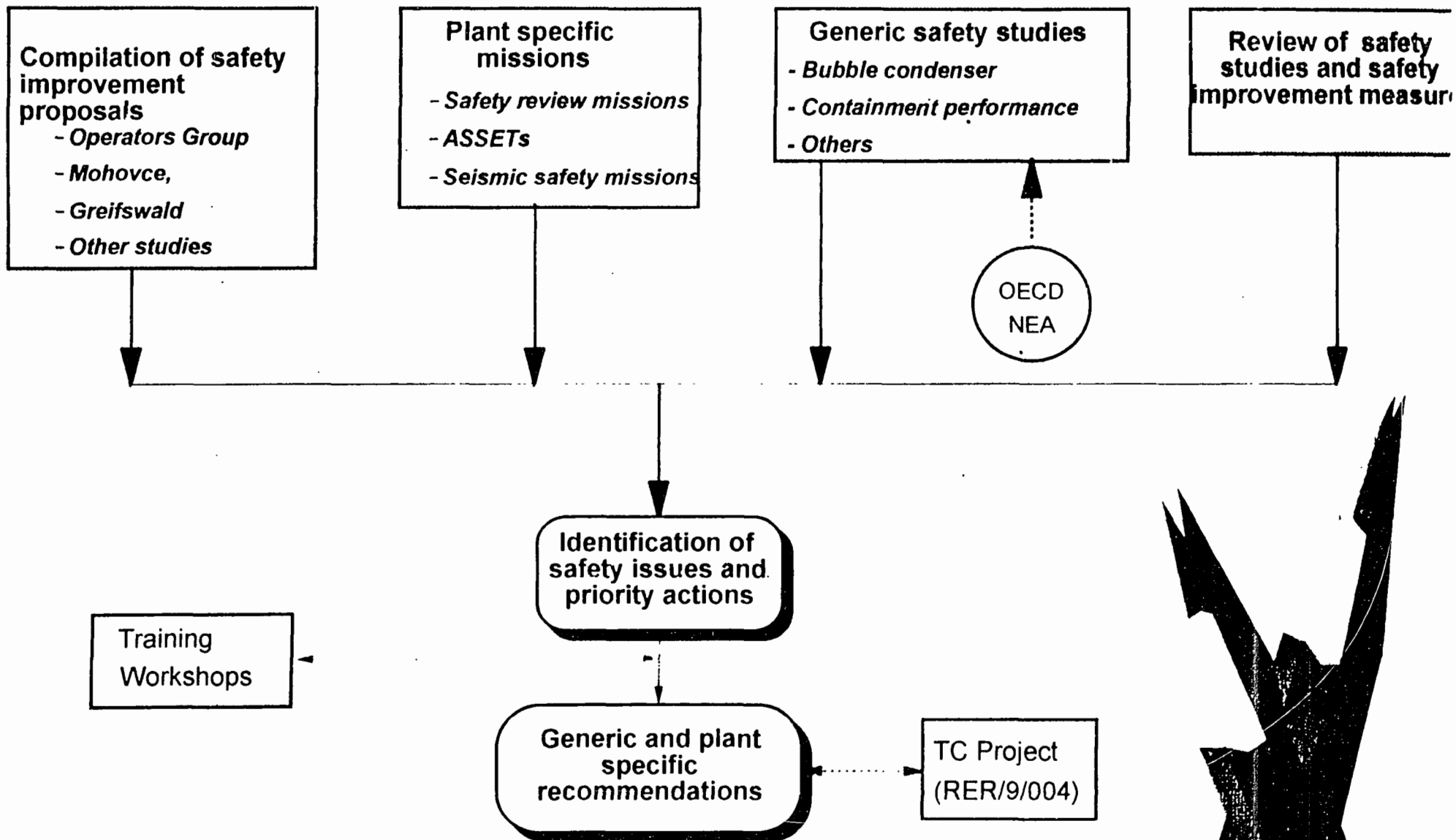
# Main components of WWER-440/230 Programme



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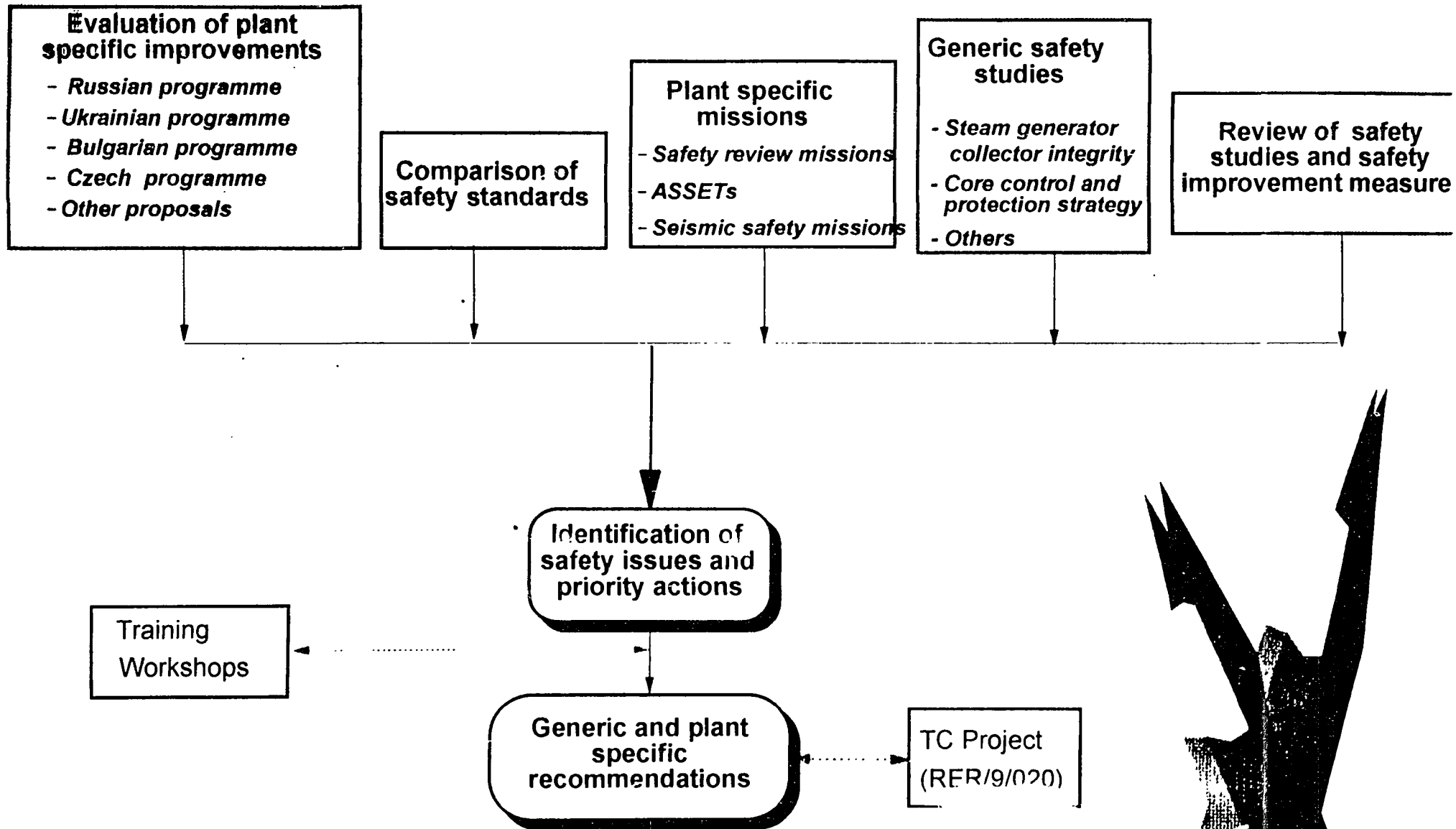
# Main components of WWER-440/213 Programme



- 2 / 1 -

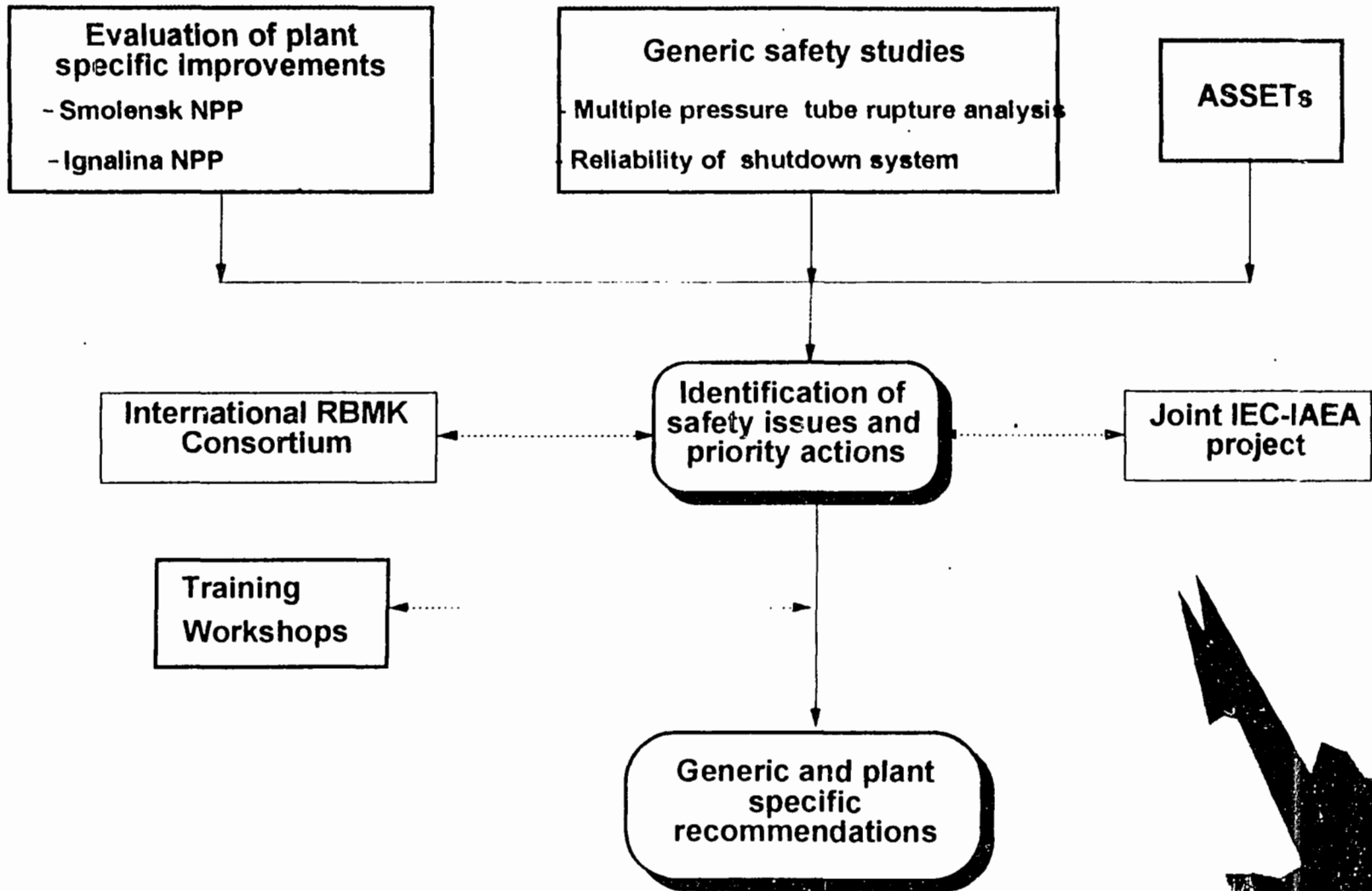


# Main components of WWER-1000 Programme





# Main components of RBMK Programme



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## IAEA REVIEWS

### PROVIDE

- CONSOLIDATED RESULTS BUILDING UPON DETAILED SAFETY REVIEWS CARRIED OUT IN THE FRAME OF NATIONAL OR MULTINATIONAL EFFORTS
- RECOMMENDATIONS BASED ON EXPERT OPINION REPRESENTING A WIDE RANGE OF INTERNATIONAL SAFETY PRACTICES AND REGULATIONS AND NUSS CODES AND GUIDES
- RESULTS WHICH CONSIDER THE POINTS OF VIEW OF REGULATORS, OPERATORS, RESEARCH INSTITUTE AND INDUSTRY
- INDEPENDENT AND UNBIASED TECHNICAL INPUT FOR NATIONAL DECISION MAKING

## DO NOT REPLACE

- REQUIRED IN-DEPTH SAFETY REVIEWS, IN FACT PROMOTES IT
- REGULATORY DECISIONS BASED ON APPLICABLE NATIONAL REGULATIONS

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## Work Programme for 1995

### WWER-440/230

Activity		Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Evaluation of safety improvements</b>														
	Review of LBB concept application (BUL/9/013)	Sofia			20--24									
	Review of status of safety improvements (ARM/9/003)	Medzamor			30--06									
	Review of RPV integrity assessment (units 1-4) (BUL/9/013)	Kozloduy			03--07									
	Review requirements for reporting NPP events (SLR/9/005)	Bratislava							03--07					
	Review of LBB concept application (BUL/9/013)	Sofia										09--13		
	Review of status of safety improvements	Novovoronezh											27--01	
	Review of status of safety improvements (RER/9/035)	Kozloduy												
<b>Topical meetings</b>														
	RPV embrittlement assessment	Vienna				24--28								
	RPV pressurized thermal shock analysis (RER/9/035)	Piestany					22--26							
	Feasibility of confinement improvement options	Vienna							10--14					
<b>Peer reviews</b>														
	Review RPV integrity (ARM/9/003)	Armenia							10--13					
	Review of Commissioning Test Programme (ARM/9/002)	Armenia									xx--xx			
	Review of Bohunice V1 improvement programme	Vienna												
	Review of level 1 PSA (modelling)	Novovoronezh												

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## Work Programme for 1995

### WWER-440/213

Activity		Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Evaluation of safety improvements</b>														
	Consolidation of safety issues and ranking	Vienna			27-.03									
	Review of safety improvements (RER/9/035)	Dukovany										02--12		
	Bubbler condenser strength evaluation (RER/9/035)	Bolunice/Moc											27-.01	
<b>Topical meetings</b>														
	Containment leakrate measurement	Vienna					08--12							
<b>Guidelines preparation</b>														
	Containment evaluation (RER/9/035)	Vienna			13--17									
	Containment evaluation (RER/9/035)	Vienna												04--0
<b>ASSET</b>														
	ASSET follow-up mission (RER/9/035)	Paks			06--10									
<b>Peer reviews</b>														
	Review of level 1 PSA (modelling) (RER/9/035)	Bolunice	17--27											
	Review of bubbler condenser integrity calculations (RER/9/035)	Vienna						12--16						
	Review of level 1 PSA (use in operation)	Rovno												
	Review of level 1 PSA (methods and results) (RER/4/006)	Dukovany												

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## Work Programme for 1995

### WWER-1000

Activity		Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Evaluation of safety improvements</b>														
	Consolidation of safety issues and ranking	Vienna		27	-03									
	RPV embrittlement assessment (BUL/9/013)	Kozloduy					15	-19						
	Review of safety improvements (RER/9/035)	Kozloduy							26	-01				
	Preparatory meeting for the review mission (RER/9/035)	Rovno							17	-21				
	Review of LBB concept application (RER/9/035)	Temclin									xx	-xx		
	Review of safety improvements (RER/9/035)	Rovno										01	-13	
	Review of safety improvements (postponed for 1996)	Temclin												
<b>Topical meetings</b>														
	Control rods insertion reliability	Vienna		20	-24									
	Steam generator integrity	Japan									25	-29		
<b>Workshops</b>														
	Preventive maintenance (RER/9/035)	Zaporozhje											30	-03
<b>ASSET/OSART</b>														
	ASSET Mission (RER/9/035)	South Ukraine	16	-27										
	ASSET Seminar (RER/9/035)	Khmelnitsky				24	-28							
	ASSET Seminar (RER/9/035)	Rovno						05	-09					
	ASSET follow-up mission (RER/9/035)	Khmelnitsky										02	-11	
	OSART Mission (RER/9/035)	Khmelnitsky										23	-10	
	ASSET Mission (RER/9/035)	Rovno											06	-17
<b>Peer reviews</b>														
	Review of seismic PSA (BUL/9/012)	Sofia		26	-04									
	Review of level 1 PSA (full power and shutdown initiators) (RER/9/035)	Temclin				24	-05							
	Review of status of level 1 PSA (methodology) (RER/9/035), Zaporozhje	Vienna						12	-16					
	Review of level 2 PSA (RER/9/035)	Temclin										16	-28	
	Review of level 1 PSA (external events) (RER/9/035)	Temclin												

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## Work Programme for 1995

### Common activities

Activity		Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Steering Committee/Advisory Group</b>														
	VIII. WWER SC meeting	Vienna		13-15										
	IX. WWER SC meeting	Vienna						12-14						
	X. WWER SC meeting	Vienna										16-17		
	Advisory Group Meeting	Vienna												14-15
<b>Topical meetings</b>														
	Accident analysis for EO and AM procedures (RER/9/035)	Vienna										02-06		
	Impact of PSAs in WWER safety improvement programmes*	Vienna										09-13		
	Configuration management (RER/4/011)	Bohunice											11-11	
	Accident analysis for shutdown and low power states	Vienna											06-10	
<b>Workshops</b>														
	Case studies on licensing of modifications	Spain				24-28								
	Case studies on licensing of modifications	Leningrad					22-26							
	Use of databases on safety issues	Japan							03-07					
	PSA methodology for fire, flooding and seismic events (RER/9/035)	Moscow									11-15			
	WWER thermohydraulic system code validation (RER/9/035)	Finland											13-17	
<b>Guidelines preparation</b>														
	Complete accident analysis guidelines	Vienna				24-26								
	Best estimate approach for accident analysis	Vienna						19-23						
	Qualification requirements for in-service inspection	Vienna									13-15			
	Guidance for PTS analysis	Vienna												
<b>ASCOT/OSART/ASSET</b>														
	ASSET Seminar (RER/9/035)	Prague				24-28								
	ASSET Seminar (RER/9/035)	Sofia						20-23						
<b>Databases</b>														
	Update of IAEA entries in G-24 Data Bank	Vienna				15-20								
	IAEA databases on safety issues (1. release)	Vienna				03-30								

\* Regular budget

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For TC related activities the project number is given in brackets

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## Work Programme for 1995 Common activities

Activity		Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Update of IAEA entries in G-24 Data Bank	Vienna								15-	-15			
	IAEA databases on safety issues (2. release)	Vienna											01-30	
	Update of IAEA entries in G-24 Data Bank	Vienna											15-	-15

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# Work Programme for 1995

## RBMK

Activity		Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Steering Committee</b>														
	VI. SC Meeting	Vienna		07--08										
	VII. SC Meeting	Vienna						08--09						
	VIII. SC Meeting	Vienna											08--09	
<b>Evaluation of safety improvements</b>														
	Review of Ignalina report	Vienna	12--13											
	Safety issues and priority improvements	Vienna	23--27											
	Presentation of international results (IAEA/EC programmes)	Vienna						30--02						
	Chernobyl sarcophagus safety* (report review)	Vienna							03--07					
	Safety improvements of 1st/2nd generation plants (document preparation)	Vienna												
<b>Topical meetings</b>														
	Evaluation of void and other reactivity effects	Moscow							17--21					
	Design options for shutdown system modernization	Vienna										16--20		
	Application of LBB	Leningrad										30--03		
	Review of calculations for thermohydraulic code validation	Vienna												
	3D computer codes for core and systems analysis	Munich												
<b>Workshops</b>														
	Comparison of level 1 PSA codes*	Vienna	30--01											
<b>ASCOT/OSART/ASSET</b>														
	ASSET Seminar (RER/9/035)	Kursk				04--06								
	ASSET Seminar	Smolensk							11--13					
	OSART Mission (RER/9/035)	Ignalina										04--22		
	ASSET topical analysis of safety culture events	Kursk										04--13		
<b>Peer reviews</b>														
	Integrity assessment of fuel channels	Plant site												

\* Regular budget

