Contents

NON-PROLIFERATION

	Review and Extension of the Treaty on the Non-Proliferation of Nuclear Weapons	I
Part A:	TRANSFER OF NUCLEAR TECHNOLOGY	
	From Technical Assistance to Partnership in Development	A 1
	Twenty Years of the IAEA's Nuclear Power and Safety Training Programme A.F. El-Saiedi, P. Schultze-Kraft	A 5
Saut D.	ADDI IOATIONO OF MILOUEAR TEOLOGICA	
art B:	APPLICATIONS OF NUCLEAR TECHNIQUES AND RESEARCH	
	Nuclear Techniques for a Cleaner Environment	В 1
	Effective Utilization of Research Reactors: An Overview of IAEA Activities K.M. Akhtar, H. Vera Ruiz	В 9
	Improving Animal Productivity by Nuclear Techniques M. García, M.C.N. Jayasuriya, B.M.A.O. Perera	B17
	Annex: The IAEA's Research Contract Programme in 1994	B33

Part C: NUCLEAR POWER, NUCLEAR FUEL CYCLE AND WASTE MANAGEMENT

Nuclear Power		C 1
STATUS AND TRENDS		C 1
Nuclear electricity generation		C 1
Nuclear power projections to 2015		C 3
Advanced reactor technology		C 6
Comparative assessment of nuclear and other energy	sources	C 8
Reducing greenhouse gas emissions: The role of nuc	lear power	C10
Greenhouse effect of 85Kr releases from the nuclear	fuel cycle	C11
NUCLEAR POWER DEVELOPMENTS IN THE WORL	D	C11
Argentina		C11
Armenia		C12
Belarus		C12
Belgium		C12
Brazil		C13
Bulgaria		C13
Canada		C14
China		C14
Croatia		C15
Cuba		C15
Czech Republic		C16
Egypt		C16
Finland		C16
France		C17
Germany		C17
Hungary		C18
India		C18
Indonesia		C19
Islamic Republic of Iran		C19
Italy		C19
Japan		C20
Kazakhstan		C21
Republic of Korea		C21
Lithuania		C23
Mexico		C23
Netherlands		C24 C24
Pakistan		C24
Philippines		C24

Romania	C25
Russian Federation	C25
Slovakia	C25
Slovenia	C26
South Africa	C26
Spain	C26
Sweden	C27
Switzerland	C27
Thailand	C27
Turkey	C28
Ukraine	C28
United Kingdom	C28
United States of America	C29
HIGHLIGHTS OF THE IAEA'S WORK	C30
International Conference on the Nuclear Power Option	C30
Revised NUSS quality assurance standards	C31
PRIS on PC	C32
Nuclear power plant personnel training and qualification	C33
Assistance to Member States in the area of nuclear power	C33
Chang ergers for configurated land	
Nachan Frank Cook	C2.
Nuclear Fuel Cycle	C35
STATUS AND TRENDS	C35
World uranium market	C35
Uranium production, supply and demand	C38
Future trends in supply and demand	C43
Uranium conversion	C45
Uranium anrichment	C47
Reactor fuel technology	C49
Control materials for water reactors	C62
Spent fuel management	C63
Plutonium	C68
SPECIAL EVENTS	C71
Return of spent research reactor fuel to its country of origin	C71
New reprocessing plants	
Scottish Nuclear to send spent fuel to BNFL	C71
US HEU inventory and proposals to sell excess on market	C71
Update of US purchase of warhead HEU from	070
the Russian Federation and Ukraine	C72
Development of USEC as a uranium supplier	C72

HIG	HLIGHTS OF THE IAEA'S WORK		C72
	Health and environmental aspects of nuclear fuel cycle acti	vities of malesus	C72
	Spent fuel management		C73
Rac	lioactive Waste Management		C75
	CLYLIN VOIL PRESI		
STA	ATUS AND TRENDS		C75
	Uncontrolled radiation sources		C75
	Application of exemption principles to radioactive		
	waste management		C75
	Quality assurance in radioactive waste management		C76
	Minimization of waste from nuclear power plants and		077
	the nuclear fuel cycle		C77
	In situ treatment and isolation of radioactive wastes		C78
	Low and intermediate level waste disposal		C78
	High level waste disposal		C83
	Decontamination and decommissioning of nuclear power		906
	and large research reactors and large research reactors and large research reactors		C86
			C88
	Cleanup criteria for contaminated land		C88
SPE	CIAL EVENTS	Núclear Fuel Cycle	C89
	Preparation for closure at the Centre de la Manche		
	near surface disposal facility		C89
	Progress at Chernobyl		C89
	Multilateral co-operation project at the nuclear training		
	centre at Paldiski		C90
HIG	ILIGHTS OF THE IAEA S WORK		C92
	Programmes for developing intelliber states		C92
	Advisory and peer review services for Member States		C93
	Regional co-ordinated efforts for repositories		C93
	sciection of a decommissioning strategy.		
	The 'safe enclosure' option		C95
	Decommissioning of research reactors		C96
	Conclusion of the Environmental Model Validation		
	Project (VAMP) in the language of the land to be a first t		C97
	RADWASS Safety Fundamentals and Safety Standards		C99
	to send spent fuel to BNFL costants		
140	and proposals to sell excess on market.		
App	pendix: IAEA Publications		C101
IAF	A Staff Contributors		C109
	A NOTES NO VALUE AND VALUE		

Part D: NUCLEAR SAFETY REVIEW

Highlights		D 1
Nuclear Safety — Topical Issues		D 7
STEAM GENERATORS		D 7
Maintenance strategies		D 8
WWER steam generators		D11
CONTROL ROD DRIVE NOZZLE CRAC	CKS	D13
Background		D13
Current status		D14
Implications of nozzle cracking for sa	ıfety	D14
Operating an affected plant		D15
CORE SHROUD CRACKS		D16
Safety concerns		D17
Action under way		D18
SUMP STRAINER BLOCKAGE		D18
FIRE PROTECTION		D20
	CONVERTMENTALIVATION	
Turbine generator fire concerns Fire potential during shutdown		D20
Electrical equipment fires		D22
• •		
Improvement in plant practices and co	Siditions	D23
COMPUTER SOFTWARE IMPORTANT	TO SAFETY	D23
Recent experience		D24
Software issues and characteristics		D26
Way forward		D27
SAFETY DURING SHUTDOWN		D27
Implications for safety		D27
Nature of shutdown events		D28
Mid-loop operation		D28
Areas for improvement		D29
OPERATIONAL SAFETY EXPERIENCE		D29
Operational events in 1994		D30
Lessons learned from operational expe	erience	D31
EXTERNAL HAZARDS AND OTHER SIT	TE RELATED ISSUES	D32

Radiation Safety — Topical Issues — YTHAR HARLOUM	D35
PUBLIC AND OCCUPATIONAL EXPOSURES	D35
Public exposures angildgill	D35
Occupational exposures	D35
CHILDHOOD CANCER AND NUCLEAR INSTALLATIONS	D36
Geographical studies 290TA93NFO TABLE	D36
Studies of pre-conception irradiation	D37
RADON INDUCED HEALTH EFFECTS	D38
Lung cancer ZNON BON BON BON BON BON BON BON BON BON	D38
Factors that may affect risk estimates	D39
Epidemiological studies of lung cancer and indoor radon exposure	D40
Other cancers quality and anisotral alexan to anotherique.	D41
MECHANISMS AND GENETICS OF TUMOUR INDUCTION	D 41
Mechanisms of radiation tumorigenesis	D 41
Genetic susceptibility to radiation tumorigenesis	D43
CONTAMINATED LAND ISSUES	D43
International Safety Activities	D45
CONVENTION ON NUCLEAR SAFETY	D45
Structure and content	D45
Implementation and peer review process memory leading and appearance of the control of the contr	D46
INTERNATIONAL BASIC SAFETY STANDARDS	D46
OSART MISSIONS — SAFETY PERSPECTIVE	D48
Plants in countries with well developed nuclear power programmes Plants in countries with developing or rapidly changing	D49
nuclear power programmes	D51
Progress towards improvement	D52
EASTERN EUROPE UPDATE: THE SAFETY OF WWER	
AND RBMK NUCLEAR POWER PLANTS	D52
WWER-440/230	D52
WWER-440/213	D54
WWER-1000	D56
RBMK # 10/ HEMPS TEELAS LAMOREASENO LOW TO SEE THE ACTUAL CONTRACTOR AND THE PROPERTY OF TH	D57
SEVERE ACCIDENT INVESTIGATIONS — RASPLAV PROJECT	D61
CHERNORYL ACCIDENT LIPDATE	D62

	ASSESSMENT OF THE KAZAKHSTAN NUCLEAR TEST SITE	D64
	DEVELOPMENT OF DOSE PER UNIT INTAKE FACTORS Occupational intakes	D67 D67
	Public intakes	D68
	RADIATION PROTECTION: SCIENTIFIC BASIS — 1994 UNSCEAR REPORT	D60
	Epidemiological studies	D69 D69
	Adaptive responses	D71
	RADIATION PROTECTION AND PUBLIC HEALTH: OECD/NEA REPORT	D72
	THE EUROPEAN COMMISSION	D73
	Radiation protection	D73
	Plant safety	D73
	Radioactive waste	D73
	Research and technological development	D73
	International action	D73
	IAEA INTERNATIONAL CONFERENCE	D74
	Contributors	D 75
Part E:	IAEA SAFEGUARDS	
	Safeguards Implementation 1994	E 1
	Safeguards at a Turning Point B. Pellaud, R. Hooper	E 5
	Swipe Sampling: A Tool for Safeguards E. Kuhn	E13
	New Initiatives: The Evolution of IAEA Verification Responsibilities and Related Functions T.E. Shea	E17
	Annex: Safeguards Statistics for 1994	E27
D =	r son die Somework of Singholio - Europe vong seit om part 1 van de die profite	
Part F:	THE IAEA	
	Operating Framework and Functions	F 1