CSNI REPORT NO. NEA/CSNI/R(91)8

Issued November, 1991

RESTRICTED

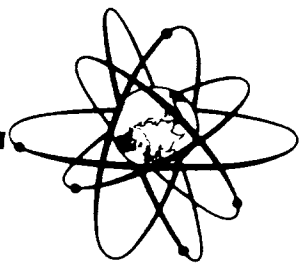
OECD

NEA

STATISTICAL DATA ON REACTOR SCRAMS

DATA FOR 1989

Compiled by the NEA Secretariat
from contributions by Principal Working Group No.1
of the OECD/NEA Committee on the
Safety of Nuclear Installations



COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS
OECD NUCLEAR ENERGY AGENCY
38, boulevard Suchet, 75016 Paris, France

COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

The Committee on the Safety of Nuclear Installations (CSNI) of the OECD Nuclear Energy Agency (NEA), is an international committee made up of senior scientists and engineers. It was set up in 1973 to develop and coordinate the activities of the Nuclear Energy Agency concerning the technical aspects of the design, construction and operation of nuclear installations insofar as they affect the safety of such installations. The Committee's purpose is to foster international cooperation in nuclear safety among the OECD Member Countries.

The CSNI constitutes a forum for the exchange of technical information and for collaboration between organizations which can contribute, from their respective backgrounds in research, development, engineering or regulation, to these activities and to the definition of its programme of work. It also reviews the state of knowledge on selected topics of nuclear safety technology and safety assessment, including operating experience. It initiates and conducts programmes identified by these reviews and assessments in order to overcome discrepancies, develop improvements and reach international consensus on technical issues of common interest. It promotes the coordination of work in different Member Countries including the establishment of cooperative research projects and international standard problems, and assists in the feedback of the results to participating organizations. Full use is also made of traditional methods of cooperation, such as information exchanges, establishment of working groups, and organization of conferences and specialist meetings.

The greater part of the CSNI's current programme of work is concerned with safety technology of water reactors. The principal areas covered are operating experience and the human factor, reactor coolant system behaviour, various aspects of reactor component integrity, the phenomenology of radioactive releases in reactor accidents and their confinement, containment performance, risk assessment, and severe accidents. The Committee also studies the safety of the nuclear fuel cycle, conducts periodic surveys of reactor safety research programmes and operates an international mechanism for exchanging reports on safety related nuclear power plant incidents.

In implementing its programme, the CSNI establishes cooperative mechanisms with NEA's Committee on Nuclear Regulatory Activities (CNRA), responsible for the activities of the Agency concerning the regulation, licensing and inspection of nuclear installations with regards to safety. It also cooperates with NEA's Committee on Radiation Protection and Public Health and NEA's Radioactive Waste Management Committee on matters of common interest.

FOREWORD

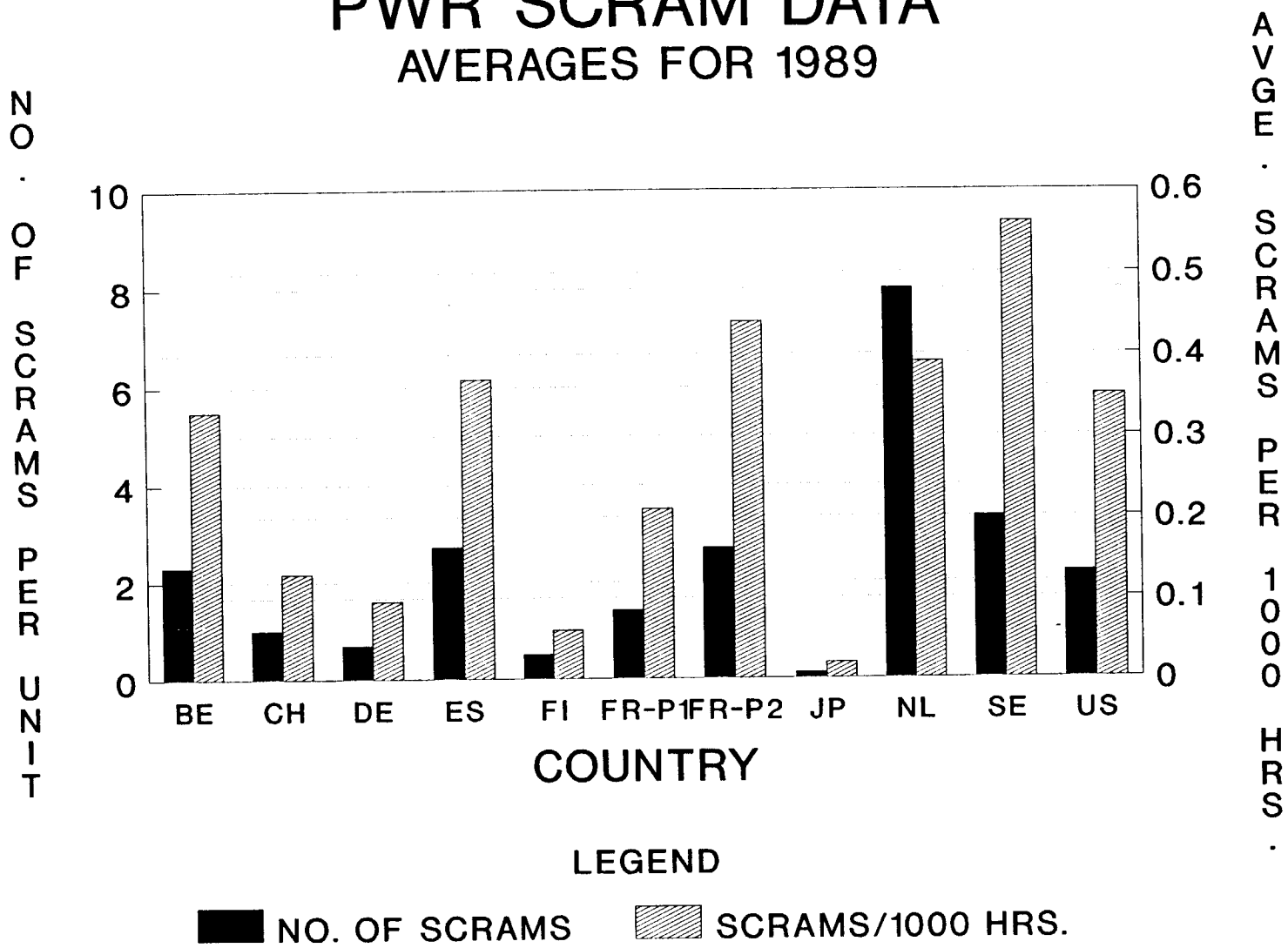
At the OECD/NEA Symposium on Reducing Reactor Scram Frequency (Tokyo, April 1986), it was recommended that the collection of statistical data on reactor scrams be continued and updated regularly; this recommendation was subsequently endorsed by the NEA Committee on the Safety of Nuclear Installations (CSNI). As a follow up to this initiative, the NEA Secretariat compiled a second issue of the statistical data on reactor scrams for 1987; that compilation was published as CSNI Report No. 157 in May 1989. The CSNI subsequently agreed that such a report be updated and disseminated annually.

Based on feedback from the participating Member Countries, the Secretariat modified the initial data collection scheme to facilitate information acquisition and subsequent use. The present report thus consists of two sections. In Section I a number of graphs is given, with each representing a certain parameter that could be used in inter-comparisons among countries and/or reactor types; all the figures in those graphs were taken from the tables, given in Section II, which were submitted to the Secretariat by its Members.

SECTION I:

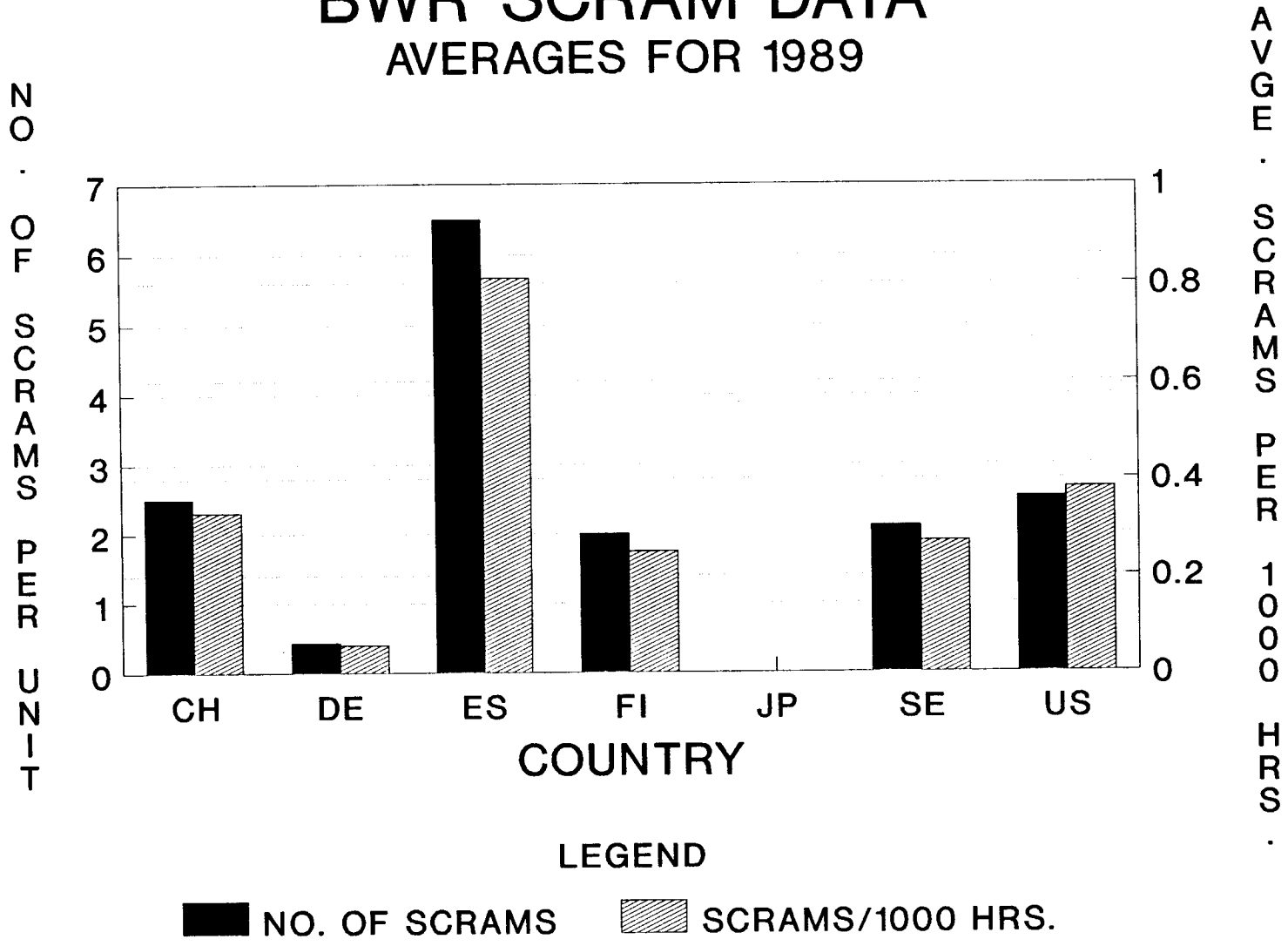
GRAPHS

PWR SCRAM DATA
AVERAGES FOR 1989



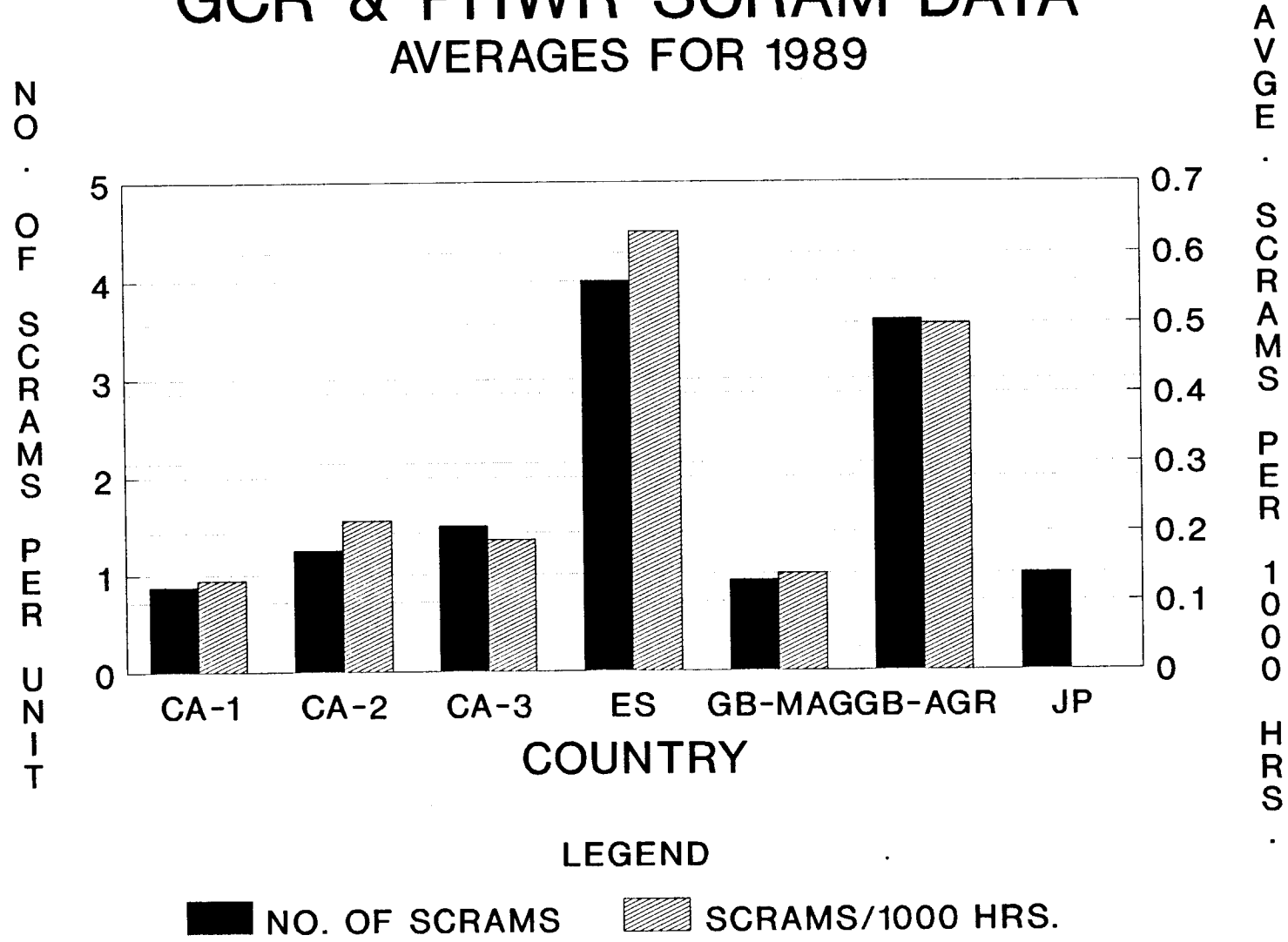
FR-P1/P2 REFER TO THE 900/1300 UNITS

BWR SCRAM DATA
AVERAGES FOR 1989



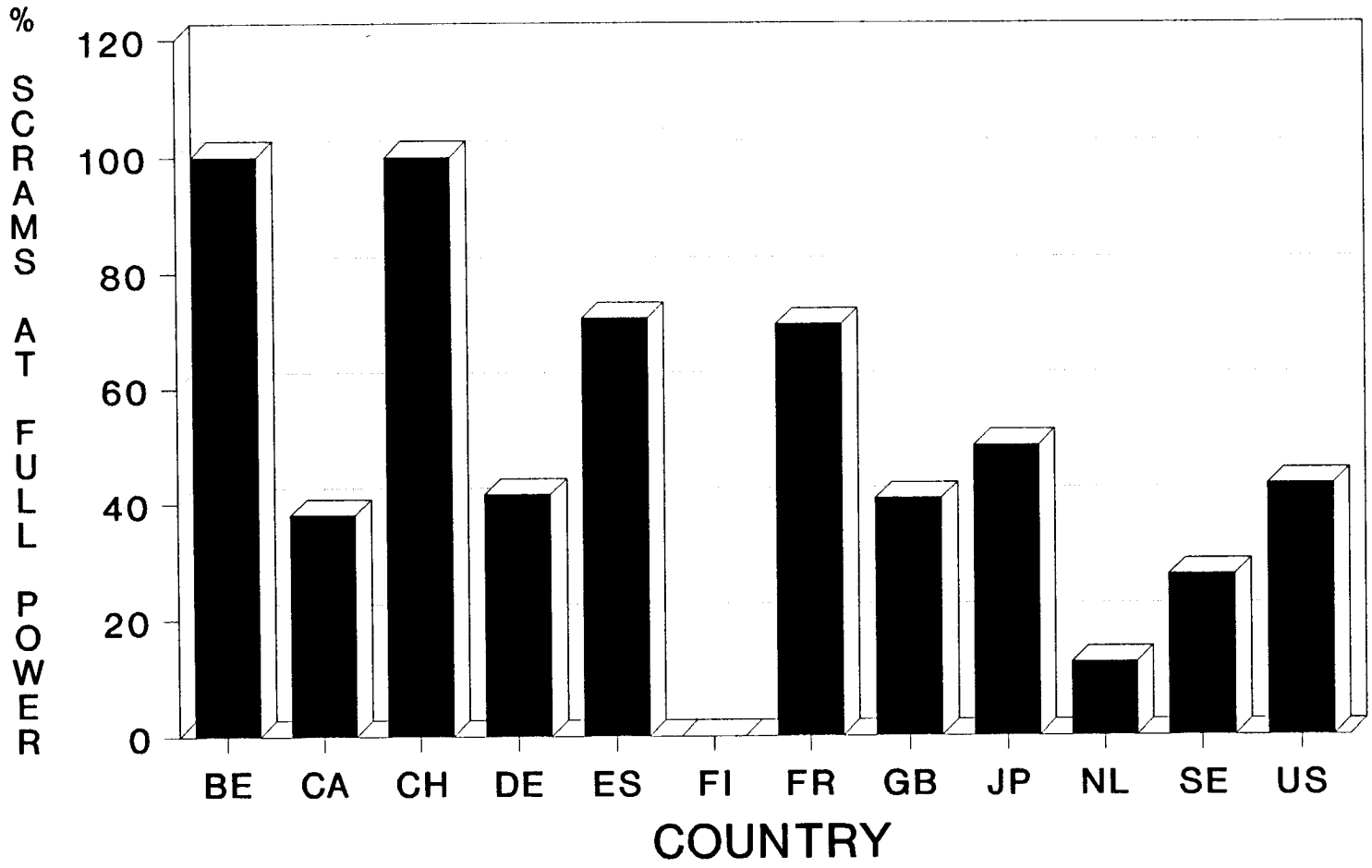
GCR & PHWR SCRAM DATA

AVERAGES FOR 1989



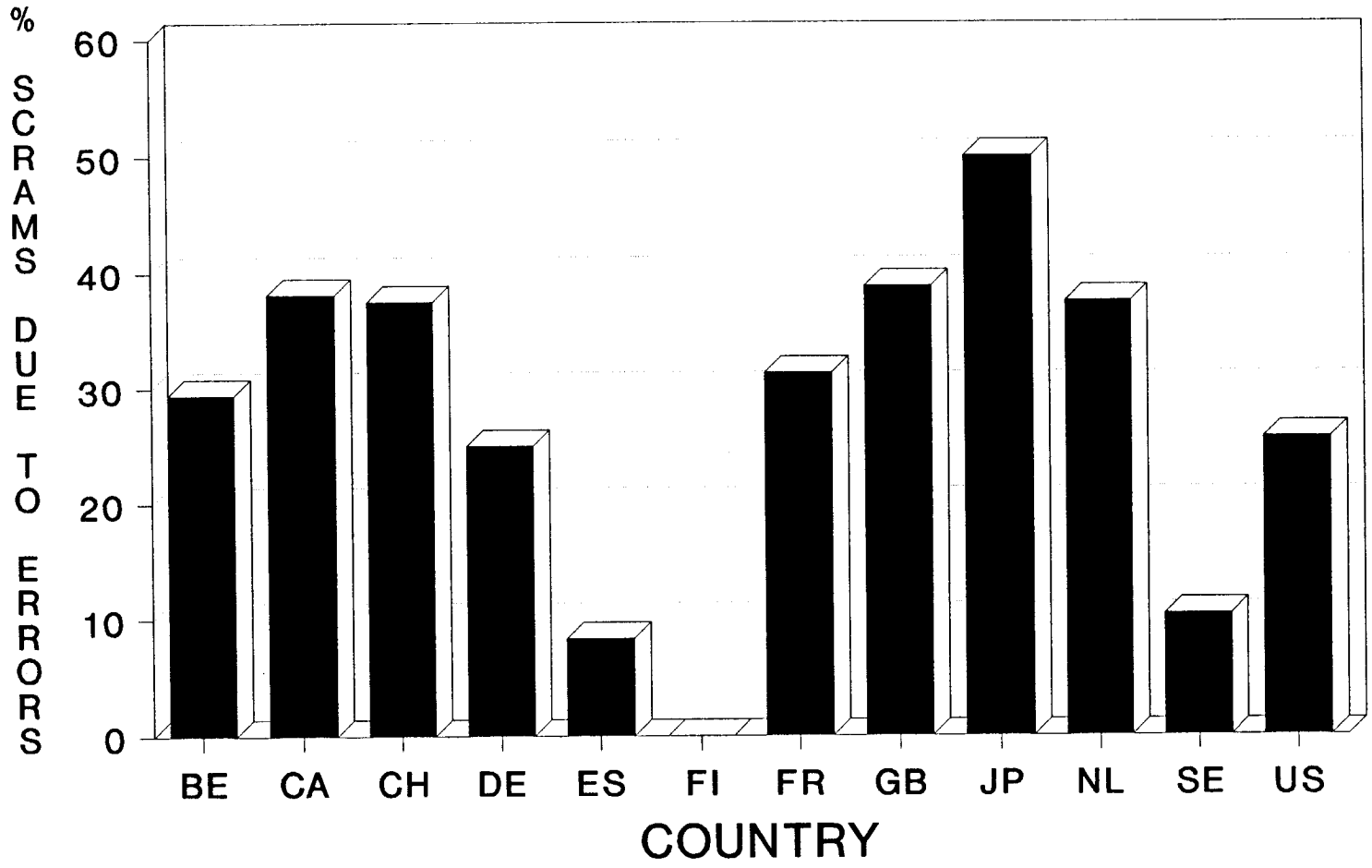
CA1/2/3 REFER TO BRUCE/PICK-A/ALL OTHERS

PERCENTAGE OF SCRAMS
FROM FULL POWER IN 1989



GIVEN AS A % OF TOTAL NO. OF SCRAMS

PERCENTAGE OF SCRAMS
CAUSED BY HUMAN ERRORS IN 1989



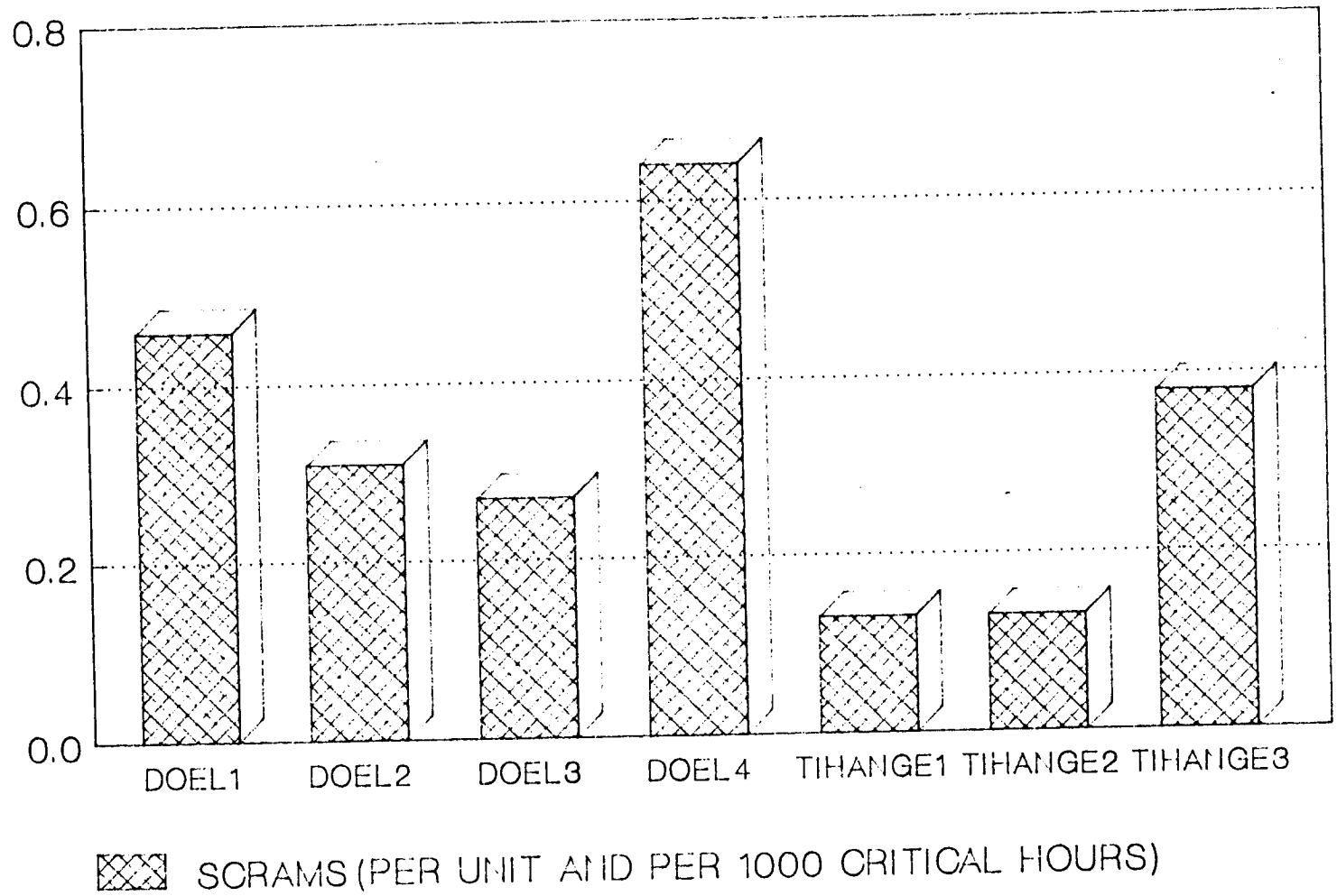
GIVEN AS % OF TOTAL NO. OF SCRAMS

SECTION II:

TABLES

BELGIUM

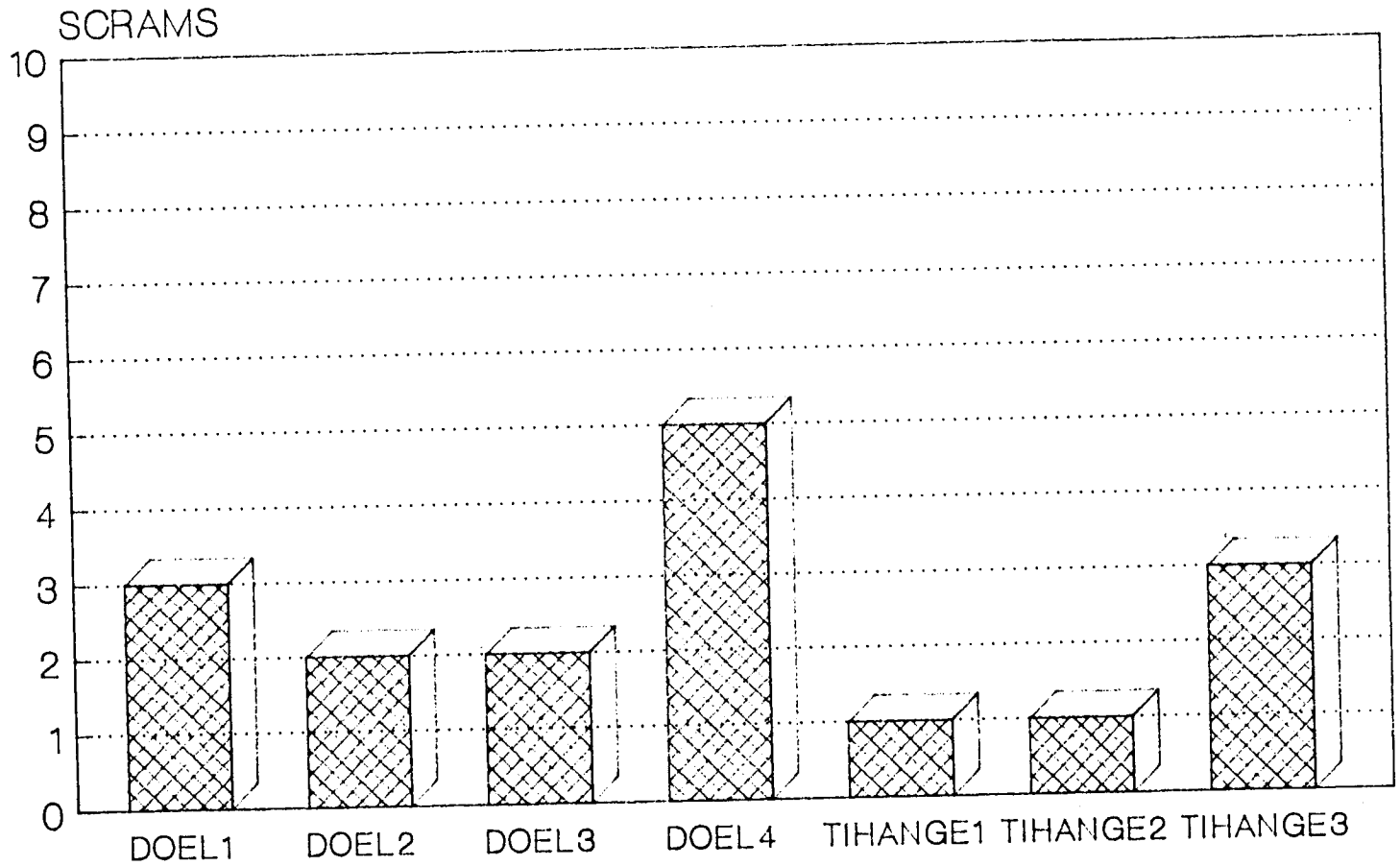
SCRAMS PER UNIT
YEAR 89



BELGIUM

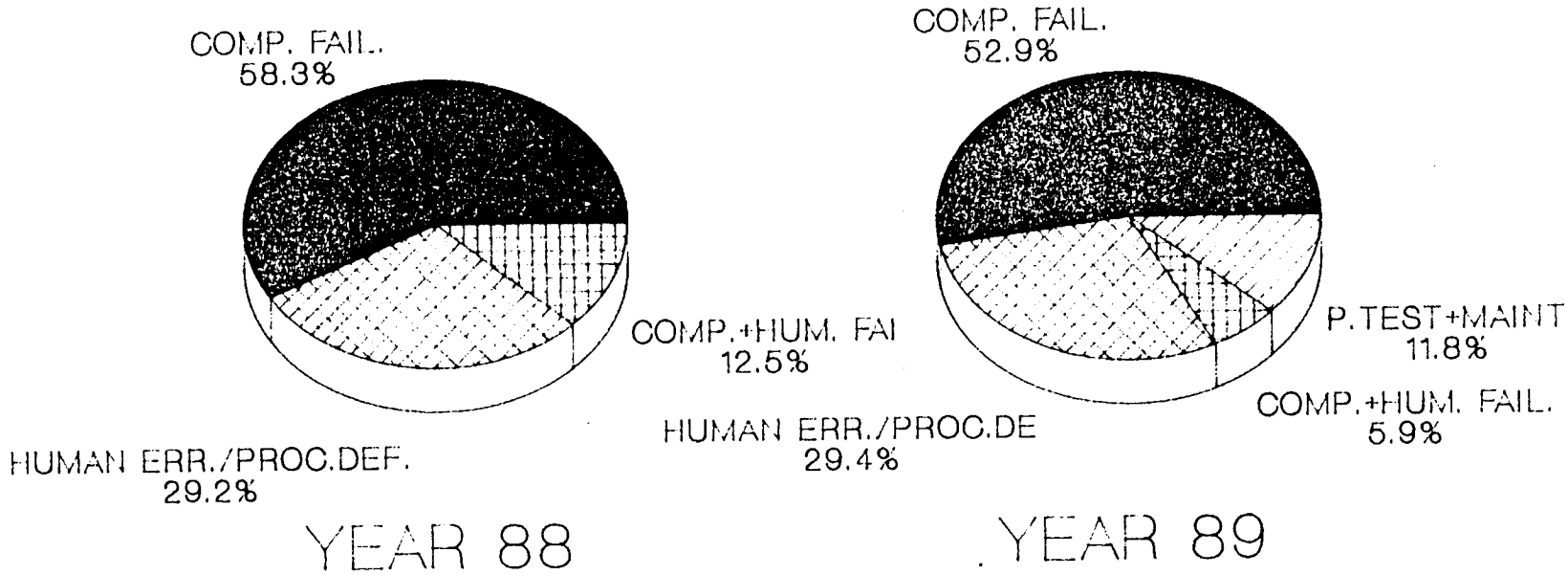
NUMBER OF SCRAMS PER UNIT

YEAR 1989



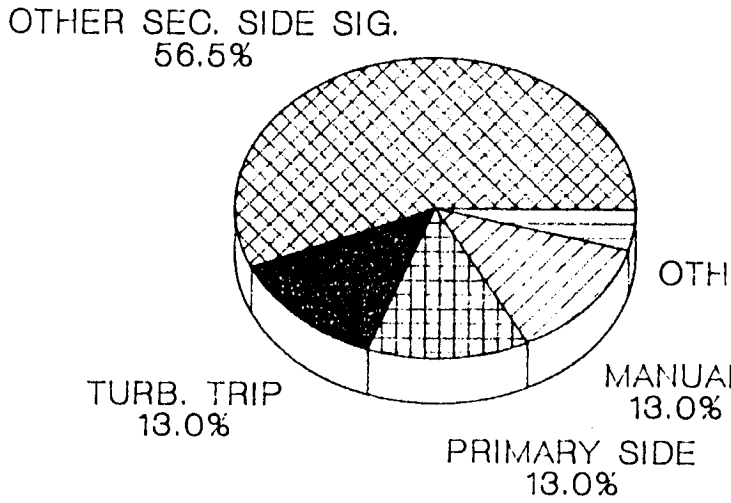
BELGIUM

MAIN CAUSES
ALL PLANTS

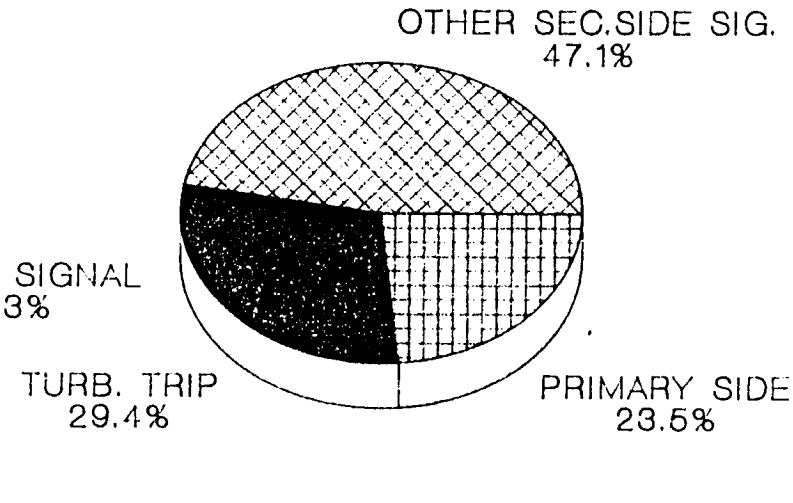


BELGIUM

MAIN SIGNALS
ALL PLANTS



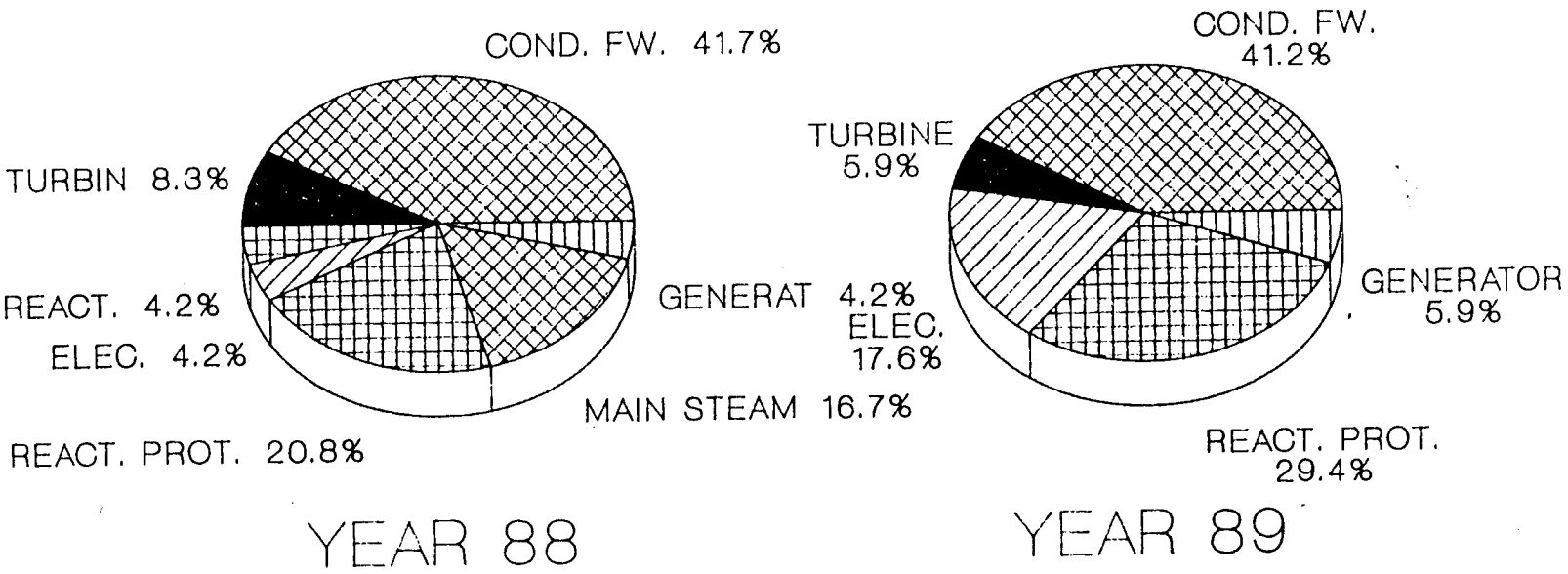
YEAR 88



YEAR 89

BELGIUM

INITIATING SYSTEMS
ALL PLANTS



COUNTRY: CANADA

YEAR: 1989

PLANT		NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN FACTORS
UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100%)	10 - 100%	LESS THAN 10%	STARTING UP	SHUTTING DOWN	
BRUCE 1-4	PHWR	1.25	0.202			2			3	1	4				3
BRUCE 5-8	PHWR	0.5	0.061			2					2				
PICKERING 1-4	PHWR	1.25	0.218		1	2		1	1	1	3	1			3
PICKERING 5-8	PHWR	1.50	0.199		2	1	1	2		3			2	1	2
POINT LEPREAU	PHWR	2.0	0.242					2		2					
GENTILLY 2	PHWR	1.0	0.130					1		1					

COUNTRY: FRG

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100%)	10 - 100%	LESS THAN 10%	STARTING UP	SHUTTING DOWN	
	7	BWR	0,43	0,057			2		1		2			1		1
	13	PWR	0,69	0,096		4	3		1	1	3	4		2		2

COUNTRY: FINLAND

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
Loviisa	1	PWR	0	0												
Loviisa	2	PWR	1	0.12					1					1		
TVO	1	BWR	2	0.27			1		1			2				
TVO	2	BWR	2	0.24			2					1		1		

COUNTRY: FRANCE

YEAR. 1989

Récapitulation 900 and 1300 MWe units

PLANT			NUMBER OF SCRAMS PER REACTOR (Group on-line)	NUMBER OF SCRAMS PER 1000 and 7000 CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE		1000h	7000h	TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
		900 MW (34 units)	1,41	0,21	1,49	6	16	7	15	0	4	35	12	0	0	0	14
		1300 MWe (13 units)	2,69	0,44	3,13	15	2	10	6	2	0	24	6	0	0	0	12

N.B. Number of scrams/7000 crttigal and turbine on line hours values have been added since they are henceforward used for international data

COUNTRY : FRANCE

YEAR : 1989

PLANT			NUMBER OF SCRAMS PER REACTOR GROUPE COUPLE POST-MSI	NUMBER OF SCRAMS PER 1000 ou 7000 h CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE		/1000 h	/7 000 h	TURBINE TRIP	OTHER SECONDARY -SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC - SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
FES	01	PWR 900	1	0.24	1.70		1						1				
FES	02	"	1	0.14	1.0						1						1
BUG	02	"	1	0.17	1.22	1						1					
BUG	03	"	3	0.46	3.24	2	1					3					1
BUG	04	"	5	0.72	5.07		3		1		1	4	1				1
BUG	05	"	3	0.48	3.39	2			1			1	2				
TRI	01	"	0	0	0												
TRI	02	"	2	0.3	2.1			2				2					1
TRI	03	"	1	0.13	0.97		1					1					

COUNTRY : FRANCE

YEAR : 1989

PLANT			NUMBER OF SCRAMS PER REACTOR GROUPE COUPLE POST-MSI	NUMBER OF SCRAMS PER 1000 ou 7000 h CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE		/1000 h	/7 000 h	TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
TRI	04	PWR 900	1	0.13	0.95				1				1				
GRA	01	"	3	0.48	3.37		1				2	3					1
GRA	02	"	2	0.26	1.87	1	1					2					1
GRA	03	"	3	0.40	2.86		1		2			2	1				1
GRA	04	"	1	0.16	1.16				1				1				1
GRA	05	"	1	0.13	0.97		1					1					
GRA	06	"	1	0.15	1.11		1						1				
DAM	01	"	2	0.24	1.70			1	1			2					2
DAM	02	"	1	0.14	1.01				1			1					

COUNTRY : FRANCE

YEAR : 1989

PLANT			NUMBER OF SCRAMS PER REACTOR GROUPE COUPLE POST-MSI	NUMBER OF SCRAMS PER 1000 ou 7000 h CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE		/1000 h	/7 000 h	TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
DAM	03	PWR 900	1	0.13	0.96			1				1					
DAM	04	"	0	0	0												
BLA	01	"	0	0	0												
BLA	02	"	2	0.29	2.08		1		1			1	1				
BLA	03	"	1	0.13	0.96				1			1					
BLA	04	"	2	0.27	1.93		1		1			2					
SLB	01	"	0	0	0												
SLB	02	"	0	0	0												
CHB	01	"	0	0	0												

COUNTRY : FRANCE

YEAR : 1989

PLANT			NUMBER OF SCRAMS PER REACTOR GROUPE COUPLE POST-MSI	NUMBER OF SCRAMS PER 1000 ou 7000 h CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
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CHB	02	PWR 900	1	0.12	0.89			1					1				1
CHB	03	"	0	0	0												
CHB	04	"	1	0.17	1.23		1					1					
CRU	01	"	0	0	0												
CRU	02	"	1	0.13	0.91		1					1					
CRU	03	"	1	0.15	1.06			1				1					1
CRU	04	"	6	0.99	6.97		1	1	4			4	2				2

COUNTRY : FRANCE

YEAR : 1989

PLANT			NUMBER OF SCRAMS PER REACTOR GROUPE COUPLE POST-MSI	NUMBER OF SCRAMS PER 1000 ou 7000 h CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
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PAL	01	PWR 1300	4	0.61	4.26	1		1	1	1		3	1				2
PAL	02	"	5	0.68	4.75		1	3	1			4	1				2
PAL	03	"	5	0.79	5.56	2		2	1								2
PAL	04	"	0	0	0												
FLA	01	"	1	0.14	0.98	1						1					
FLA	02	"	3	0.78	5.47	1		2				2	1				
SAL	01	"	1	0.17	1.18		1					1					
SAL	02	"	3	0.62	4.37	2			1			3					1
CAT	01	"	4	0.72	5.04	3				1		4					1

COUNTRY : FRANCE

YEAR : 1989

PLANT			NUMBER OF SCRAMS PER REACTOR GROUPE COUPLE POST-MSI	NUMBER OF SCRAMS PER 1000 ou 7000 h CRITICAL & TURBINE ON-LINE HOURS		NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
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CAT	02	PWR 1300	0	0	0												
BEL	01	"	1	0.23	1.64	1						1					1
BEL	02	"	8	1.07	7.54	4		2	2			5	3				3
NOG	01	"	0	0	0												

COUNTRY: JAPAN

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100%)	10 -100%	LESS THAN 10%	STARTING UP	SHUTTING DOWN	
ORI	2	PWR	1	0.11			1				1					
TSURUGA	2	PWR	1	0.15			1							1		1
ALL PWR			0.12	0.019												
ALL BWR			0	0												
ALL GCR			1	0												
GRAND TOTAL			0.054	0.0087												

COUNTRY: NETHERLANDS

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
			8	0.39 7710.8 hrs.	0	0	1	4	0	3 (manual)	1	1	1	4	1	3

COUNTRY: SPAIN

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
VANDELLOS	I	GCR	4	0.63			1		3		2	2				
JOSE CABRERA		PWR	3	0.38		1	1		1		3					
SANTA MARIA DE GARONA		BWR	7	0.84		1	3	1	2		6	1				1
ALMARAZ	I	PWR	0	0												
ALMARAZ	II	PWR	3	0.39		3					2	1				
ASCO	I	PWR	5	0.64		2		1	2		3	2				
ASCO	II	PWR	2	0.25					2		2					
COERENTES		BWR	6	0.78	2		2		2		4	2				1
TRILLO	I	PWR	1	0.13			1				1					1
VANDELLOS	II	PWR	5	0.78	2	2			1		3	2				

COUNTRY: SWEDEN

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
BAR.	1	BWR	3	0.383		1	2				2	1				1
SEB-																
ACK	2	BWR	2	0.244	1		1					1		1		
FOR-	1	BWR	3	0.392	1		2				1	1		1		
SMA-	2	BWR	1	0.124		1								1		1
RK.	3	BWR	1	0.129		1					1					
OSK-	1	BWR	1	0.130		1							1			
ARS-	2	BWR	3	0.388	1		1		1			1	1	1		
HAM-																
N.	3	BWR	3	0.367	1	1	1				2		1			
RIN-	1	BWR	2	0.274	1	1					1	1				
GWA	2	PWR	5	1.016	2	1			2		1	1	1	1	1	
LS.	3	PWR	1	0.138			1								1	
	4	PWR	4	0.530		1	2		1			2			2	1

COUNTRY: Switzerland

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER (100 %)	10 - 100 %	LESS THAN 10 %	STARTING UP	SHUTTING DOWN	
Beznau	I	PWR	0	0							0					
Beznau	II	PWR	2	0.26		1			1		2					
Gösgen		PWR	1	0.13			1				1					1
Mühleberg		BWR	1	0.14						1	1					1
Leibstadt		BWR	4	0.52	3		1				4					1

COUNTRY: UNITED KINGDOM

YEAR: 1989

PLANT			NUMBER OF SCRAMS PER REACTOR	NUMBER OF SCRAMS PER 1000 CRITICAL & TURBINE ON-LINE HOURS	NUMBER OF MAIN SIGNALS RESULTING IN REACTOR SCRAMS						NUMBER OF SCRAMS OCCURRING AT VARIOUS POWER LEVELS OR OPERATIONAL STATES					NUMBER OF SCRAMS CAUSED BY HUMAN ERRORS
NAME	UNIT	REACTOR TYPE			TURBINE TRIP	OTHER SECONDARY SIDE SIGNALS	PRIMARY SIDE SIGNALS	NEUTRONIC SIGNALS	OTHER SIGNALS	SPURIOUS OR INADVERTENT SCRAMS	FULL POWER 100%	10-100%	LESS THAN 10%	STARTING UP	SHUTTING DOWN	
Bradwell	1 2	M M		0.00 0.00												
Dungeness A	1 2	M M		0.00 0.00												
Hinkley Point A	1 2	M M	3 2	0.49 0.28			1 1		2 1		1	2 1		1		1
Oldbury	1 2	M M	2	0.00 0.23			2				2					2
Sizewell A	1 2	M M	2 2	0.46 0.24		1 1			1 1		1	1 2				1
Trawsfynydd	1 2	M M	1	0.00 0.15					1			1				
Wylfa	1 2	M M	1	0.13 0.00					1		1					
Dungeness B	21 22	A A	1	0.37 0.00		1						1				1
Hartlepool	1 2	A A	8 9	1.71 1.88	3 1	1 3	3 4		1 1		4 4	2 4		1 1	1	5 5
Heysham 1	1 2	A A	1	0.14 0.00		1						1				1
Heysham 2	7 8	A A	4 2	0.90 0.29	1		1	1	1 2		1 2	3				2
Hinkley Point B	3 4	A A	6 5	0.72 0.97	2	1	3	3	1 1		3 1	2 3		1 1		1

M = Magnox A = AGR

GENCWO101101/03F (LOC20,FONT6,LM8,V5)

TABLE 1. 1989 SCRAM DATA FOR OECD COMPARISON — UNITED STATES

Plant Name [a]	Unit	Type	Total Scrams	Manual Scrams	Scram Rate	Signals: Turbine	Signals: Secondary	Signals: Primary	Signals: Neutron	Signals: Other	Signals: Spurious	Scram Power Levels: 100%	Scram Power Levels: 10-99%	Scram Power Levels: ≤10%	Startingup	Shutting Down	Personnel Error	Critical Hours
ARKANSAS	1	P	5		0.83	2	1	2	--	--	1	1	4	--	--	--	4	5999.1
ARKANSAS	2	P	2		0.30	--	1	1	--	--	--	2	--	--	--	--	--	6610.1
BEAVER VALLEY	1	P	4		0.68	--	2	--	1	1	1	--	4	--	1	--	2	5887.6
BEAVER VALLEY	2	P	1		0.16	1	--	--	--	--	--	--	1	--	--	1	--	6307.5
BIG ROCK POINT		B	1		0.14	--	--	--	1	--	--	--	1	--	--	--	--	6921.0
BRAIDWOOD	1	P	2		0.36	--	1	--	1	--	1	--	2	--	--	--	--	5586.8
BRAIDWOOD	2	P	3		0.39	--	1	--	2	--	--	1	2	--	--	1	--	7618.1
*BROWNS FERRY	1	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	0.0
*BROWNS FERRY	2	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	0.0
*BROWNS FERRY	3	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	0.0
BRUNSWICK	1	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	5749.3
BRUNSWICK	2	B	1	1	0.17	--	--	--	--	1	--	--	1	--	--	1	1	5779.9
BYRON	1	P	1	1	0.11	--	--	--	--	1	--	--	1	--	--	--	--	8742.7
BYRON	2	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	7060.4
CALLAWAY		P	2	1	0.27	--	--	--	1	1	1	--	1	1	--	1	--	7481.6
CALVERT CLIFFS	1	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	1806.6
CALVERT CLIFFS	2	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	1766.4
CATAWBA	1	P	3	2	0.40	--	--	--	1	2	--	1	2	--	--	2	1	7485.1
CATAWBA	2	P	3	1	0.47	--	2	--	--	1	--	--	3	--	--	1	1	6448.2
CLINTON	1	B	5	4	1.18	1	--	--	--	4	--	1	3	1	1	3	1	4244.3
COOK	1	P	2		0.32	1	--	--	1	--	1	--	2	--	--	1	2	6169.8
COOK	2	P	1		0.15	--	--	--	--	1	1	1	--	--	--	--	--	6580.9
COOPER STATION		B	3		0.45	1	--	1	1	--	2	3	--	--	--	--	--	6672.9
CRYSTAL RIVER	3	P	1		0.23	--	--	--	--	1	--	--	1	--	--	--	1	4274.4
DAVIS-BESSE		P	2		0.23	1	--	1	--	--	--	2	--	--	--	--	--	8547.1
DIABLO CANYON	1	P	1		0.14	--	--	--	--	1	--	1	--	--	--	--	--	7189.1
DIABLO CANYON	2	P	4	3	0.49	--	1	--	--	3	--	2	2	--	--	1	--	8136.8
DRESDEN	2	B	2		0.28	--	--	2	--	--	1	--	2	--	--	--	1	7252.5
DRESDEN	3	B	3		0.41	2	--	--	--	1	--	--	3	--	--	--	--	7311.6
DUANE ARNOLD		B	5	1	0.72	1	--	2	1	1	1	4	1	--	--	1	2	6921.1
FARLEY	1	P	1		0.13	--	1	--	--	--	--	--	1	--	--	--	1	7613.4
FARLEY	2	P	6	1	0.83	2	3	--	--	1	--	2	3	1	2	--	3	7205.2
FERMI	2	B	4	2	0.67	1	--	1	--	2	--	1	3	--	--	1	2	6002.4
FITZPATRICK		B	2		0.25	--	--	--	2	--	1	1	1	--	--	--	--	8086.8
FORT CALHOUN		P	1	1	0.13	--	--	--	--	1	--	--	--	1	--	1	--	7816.5
FORT ST. VRAIN		GA	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	3331.9
GINNA		P	1		0.15	1	--	--	--	--	--	--	1	--	1	--	--	6648.5
GRAND GULF		B	5	1	0.71	1	--	1	1	2	2	3	1	1	--	2	--	7005.5
HADDAM NECK		P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	5883.3
HATCH	1	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	8760.0
HATCH	2	B	1		0.15	--	--	1	--	--	--	--	1	--	--	--	--	6495.8
HOPE CREEK		B	2		0.29	1	--	1	--	--	--	1	1	--	--	1	--	6813.9
INDIAN POINT	2	P	2		0.35	1	--	--	1	--	1	2	--	--	--	--	--	5644.2
INDIAN POINT	3	P	1	1	0.19	--	--	--	--	1	--	1	--	--	--	--	--	5352.0
KEWAUNEE		P	1		0.13	1	--	--	--	--	--	1	--	--	--	--	--	7436.2
LASALLE	1	B	1		0.16	1	--	--	--	--	--	--	1	--	--	--	--	6114.8
LASALLE	2	B	1		0.15	1	--	--	--	--	1	--	1	--	--	1	--	6693.0

TABLE 1. 1989 SCRAM DATA FOR OECD COMPARISON (CONTINUED) — UNITED STATES

Plant Name [a]	Unit	Type	Total Scrams	Manual Scrams	Scram Rate	Signals: Turbine	Signals: Secondary	Signals: Primary	Signals: Neutron	Signals: Other	Signals: Spurious	Scram Power Levels: 100%	Scram Power Levels: 10-99%	Scram Power Levels: ≤10%	Startingup	Shutting Down	Personnel Error	Critical Hours
LIMERICK	1	B	0		0.00	--	--	--	--	--	--	--	1	--	--	--	--	5784.5
LIMERICK	2	B	1		0.51	1	--	--	--	--	--	--	--	--	--	--	--	1961.8
MAINE YANKEE		P	2		0.24	2	--	--	--	--	--	2	--	--	--	--	--	8210.0
MCGUIRE	1	P	2	1	0.28	--	--	1	--	1	1	2	--	--	--	--	--	7210.8
MCGUIRE	2	P	3		0.43	--	2	--	1	--	--	2	1	--	--	1	--	6943.4
MILLSTONE	1	B	3		0.41	2	1	--	--	--	--	--	2	1	1	1	1	7377.3
MILLSTONE	2	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	6027.7
MILLSTONE	3	P	2	1	0.30	--	--	--	1	1	1	1	1	--	--	--	--	6716.1
MONTICELLO		B	2		0.30	--	--	2	--	--	1	1	1	--	--	1	--	6679.1
*NINE MILE PT.	1	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	0.0
NINE MILE PT.	2	B	6		1.15	1	--	1	4	--	2	2	3	1	--	1	3	5206.2
NORTH ANNA	1	P	3		0.60	1	2	--	--	--	--	--	2	1	--	1	--	5023.1
NORTH ANNA	2	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	6918.9
OCONEE	1	P	3	1	0.41	--	--	1	--	2	2	1	2	--	1	--	2	7371.0
OCONEE	2	P	3		0.41	2	--	--	--	1	--	3	--	--	--	--	2	7385.8
OCONEE	3	P	2		0.26	2	--	--	--	--	--	2	--	--	--	--	1	7682.9
OYSTER CREEK		B	5	1	1.00	4	--	--	--	1	--	2	2	1	--	1	3	5015.2
PALISADES		P	1		0.17	--	1	--	--	--	--	--	1	--	--	--	--	6050.6
PALO VERDE	1	P	1		0.66	--	--	1	--	--	1	1	--	--	--	--	--	1522.0
PALO VERDE	2	P	3		0.71	--	1	2	--	--	2	2	1	--	1	--	--	4226.0
PALO VERDE	3	P	1		0.83	--	1	--	--	--	--	--	1	--	--	--	--	1209.5
*PEACH BOTTOM	2	B	4		0.75	--	--	2	2	--	1	2	2	--	2	--	1	5330.5
*PEACH BOTTOM	3	B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	801.4
PERRY		B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	4997.0
PILGRIM		B	5	1	0.89	1	--	3	--	1	1	--	5	--	--	--	--	5613.8
POINT BEACH	1	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	7728.3
POINT BEACH	2	P	2		0.28	2	--	--	--	--	--	2	--	--	--	--	--	7243.6
PRAIRIE ISLAND	1	P	1		0.11	--	--	1	--	--	--	1	--	--	--	--	1	8740.7
PRAIRIE ISLAND	2	P	3		0.38	--	1	--	2	--	--	3	--	--	--	--	--	7852.4
QUAD CITIES	1	B	3	2	0.45	1	--	--	--	2	--	--	3	--	--	--	--	6621.4
QUAD CITIES	2	B	2		0.24	2	--	--	--	--	--	--	2	--	--	--	1	8434.7
RANCHO SECO		P	1		0.42	--	--	1	--	--	--	--	1	--	--	1	--	2354.6
RIVER BEND		B	4		0.66	2	--	1	1	--	--	--	3	1	1	--	--	6051.7
ROBINSON	2	P	3		0.70	2	--	--	--	1	--	2	1	--	--	--	2	4262.0
SALEM	1	P	3		0.48	1	2	--	--	--	1	1	1	1	1	--	2	6276.4
SALEM	2	P	4	1	0.52	--	3	--	--	1	--	2	2	--	--	2	--	7650.0
SAN ONOFRE	1	P	3	2	0.84	--	--	1	--	2	1	--	3	--	--	--	1	3582.8
SAN ONOFRE	2	P	1	1	0.19	--	--	--	--	1	--	--	1	--	--	1	--	5227.0
SAN ONOFRE	3	P	2		0.24	1	1	--	--	--	--	1	1	--	--	--	--	8251.6
*SEABROOK		P	1	1	5.14	--	--	--	--	1	--	--	--	1	--	--	--	194.4
SEQUOYAH	1	P	2		0.23	--	2	--	--	--	--	2	--	--	--	--	1	8671.3
SEQUOYAH	2	P	4		0.63	--	3	--	1	--	--	1	3	--	2	--	2	6343.8
SHEARON HARRIS		P	6		0.86	3	3	--	--	--	--	4	2	--	--	--	1	6962.6
*SHOREHAM		B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	2.7
SOUTH TEXAS	1	P	3		0.52	1	--	1	--	1	--	3	--	--	--	--	--	5750.7
SOUTH TEXAS	2	P	10	1	2.22	3	2	2	1	2	1	5	5	--	--	--	1	4514.1
ST. LUCIE	1	P	2		0.24	1	1	--	--	--	--	--	1	1	1	--	1	8290.1

TABLE 1. 1989 SCRAM DATA FOR OECD COMPARISON (CONTINUED) UNITED STATES

Plant Name [a]	Unit	Type	Total Scrams	Manual Scrams	Scram Rate	Signals: Turbine	Signals: Secondary	Signals: Primary	Signals: Neutron	Signals: Other	Signals: Spurious	Scram Power Levels: 100%	Scram Power Levels: 10-99%	Scram Power Levels: <10%	Startingup	Shutting Down	Personnel Error	Critical Hours
ST. LUCIE	2	P	2	1	0.30	1	--	--	--	1	--	--	2	--	1	--	1	6626.9
SUMMER		P	5	2	0.69	1	2	--	--	2	--	4	1	--	1	1	--	7276.2
SURRY	1	P	2	1	0.47	1	--	--	--	1	--	1	1	--	--	--	1	4272.2
SURRY	2	P	2		1.33	1	1	--	--	--	--	--	2	--	1	--	1	1504.3
SUSQUEHANNA	1	B	4	1	0.61	3	--	--	--	1	--	1	2	1	2	1	2	6592.5
SUSQUEHANNA	2	B	1	1	0.14	--	--	--	--	1	--	--	1	--	--	1	--	6916.4
THREE MILE ISL	1	P	1		0.11	--	--	1	--	--	--	1	--	--	--	--	--	8717.2
TROJAN		P	1		0.18	--	--	1	--	--	1	--	1	--	--	--	--	5423.2
TURKEY POINT	3	P	1		0.17	1	--	--	--	--	1	--	--	1	--	--	--	5806.6
TURKEY POINT	4	P	2	1	0.48	--	--	1	--	1	--	1	1	--	--	--	1	4147.1
VERMONT YANKEE		B	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	7416.2
VOGTLE	1	P	5	3	0.59	--	2	--	--	3	--	3	2	--	1	1	--	8413.0
VOGTLE	2	P	7	1	1.14	2	1	1	2	1	2	3	4	--	1	--	3	6134.5
WASH. NUCLEAR	2	B	4		0.58	2	--	2	--	--	--	2	2	--	--	--	1	6857.8
WATERFORD	3	P	3	2	0.41	--	--	--	--	3	--	2	1	--	--	--	--	7232.6
WOLF CREEK		P	2		0.23	1	1	--	--	--	--	2	--	--	--	--	1	8715.3
YANKEE-ROWE		P	3	1	0.37	--	--	2	--	1	--	2	--	1	1	--	2	8137.2
ZION	1	P	1		0.19	1	--	--	--	--	--	--	1	--	--	--	1	5268.3
ZION	2	P	0		0.00	--	--	--	--	--	--	--	--	--	--	--	--	8333.9

a. An asterisk indicates a plant that was in a extended shutdown.