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INTERNATIONAL ATOMIC ENERGY AGENCY

IAEA-CPS-92/02
2 April 1992
Original: ENGLISH

COUNTRY PROGRAMME SUMMARY

THE AGENCY'S TECHNICAL CO-OPERATION

PROGRAMME WITH

CUBA

1982 - 1992

COUNTRY PROGRAMME SUMMARIES

DEPARTMENT OF TECHNICAL CO-OPERATION

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CUBA

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COUNTRY PROGRAMME SUMMARIES

EVALUATION SECTION

DEPARTMENT OF TECHNICAL CO-OPERATION

THE AGENCY'S TECHNICAL CO-OPERATION

PROGRAMME WITH

CUBA

1982 - 1992

COUNTRY PROGRAMME SUMMARIES

This report contains a review of the Agency's technical co-operation activities in Cuba carried out during 1982 - 1992. In terms of coverage and analytical depth, country programme summaries stand somewhere midway between in-depth country programme evaluations and individual project evaluations. They attempt to provide a comprehensive, descriptive picture of the Agency's co-operation with a Member State in a manner that will be particularly useful for programming decisions. The attempt is very much to describe -- largely through statistical data -- not to provide independent analysis and evaluation.

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INTRODUCTION

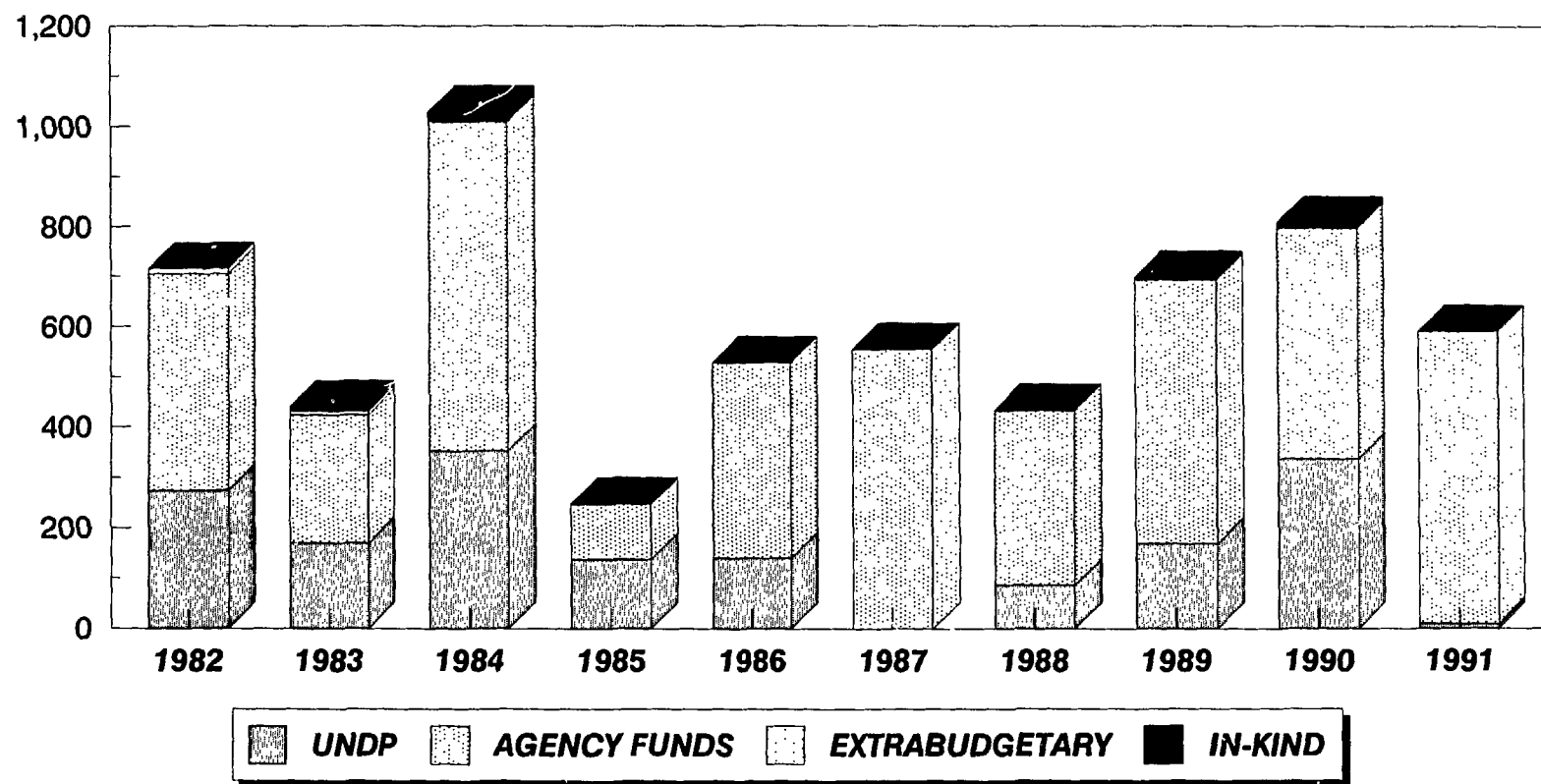
The country programme summary reported on here is one in the series of such studies being undertaken of the Agency's TC programme with Member States. With almost \$8.2 million of Agency support received, Cuba ranks 19th among all recipients of technical assistance in the period 1958 - 1991, whereby it ranked as high as 3rd in 1982 and 4th in 1984.

Over three quarters of the assistance during the past ten years has been provided in the form of equipment (81%), followed by expert services (10%) and training (9%). Seventy-one per cent of the resources were made available through the Technical Assistance and Co-operation Fund, while 28% of the resources were provided by UNDP. The remaining 1% was made available through extrabudgetary and in-kind contributions.

With regard to project disbursements by sector, the largest areas have been general atomic energy development (36%), agriculture (20%), nuclear physics and chemistry (10%) and nuclear safety (10%). Industry and hydrology, nuclear engineering and technology, and nuclear medicine have each received less than ten per cent of the assistance provided.

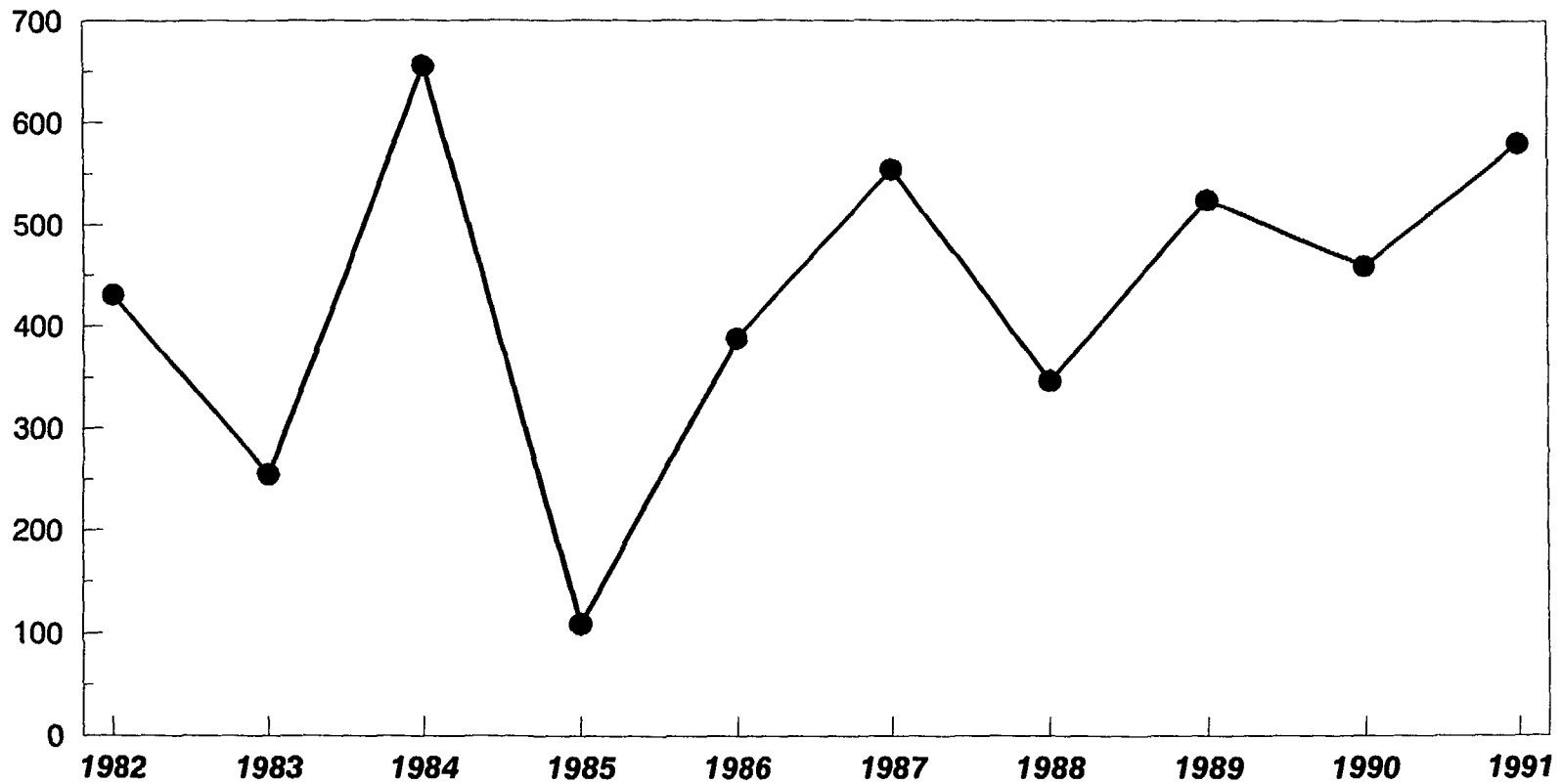
**ASSISTANCE PROVIDED BY THE AGENCY TO
CUBA, BY SOURCE, 1982 - 1991**

THOUSANDS OF DOLLARS



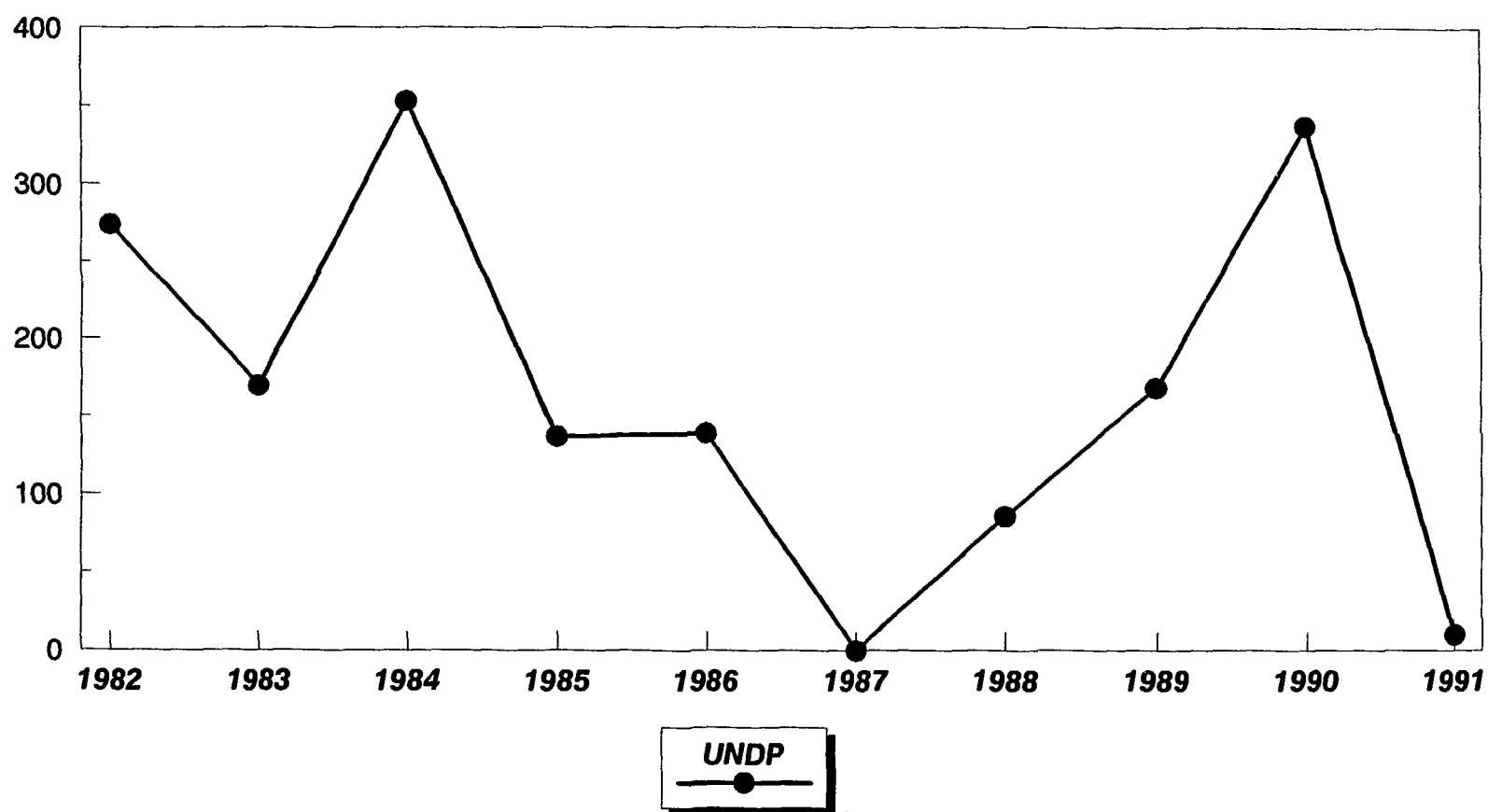
**TACF ASSISTANCE PROVIDED TO
CUBA, 1982 - 1991**

THOUSANDS OF DOLLARS

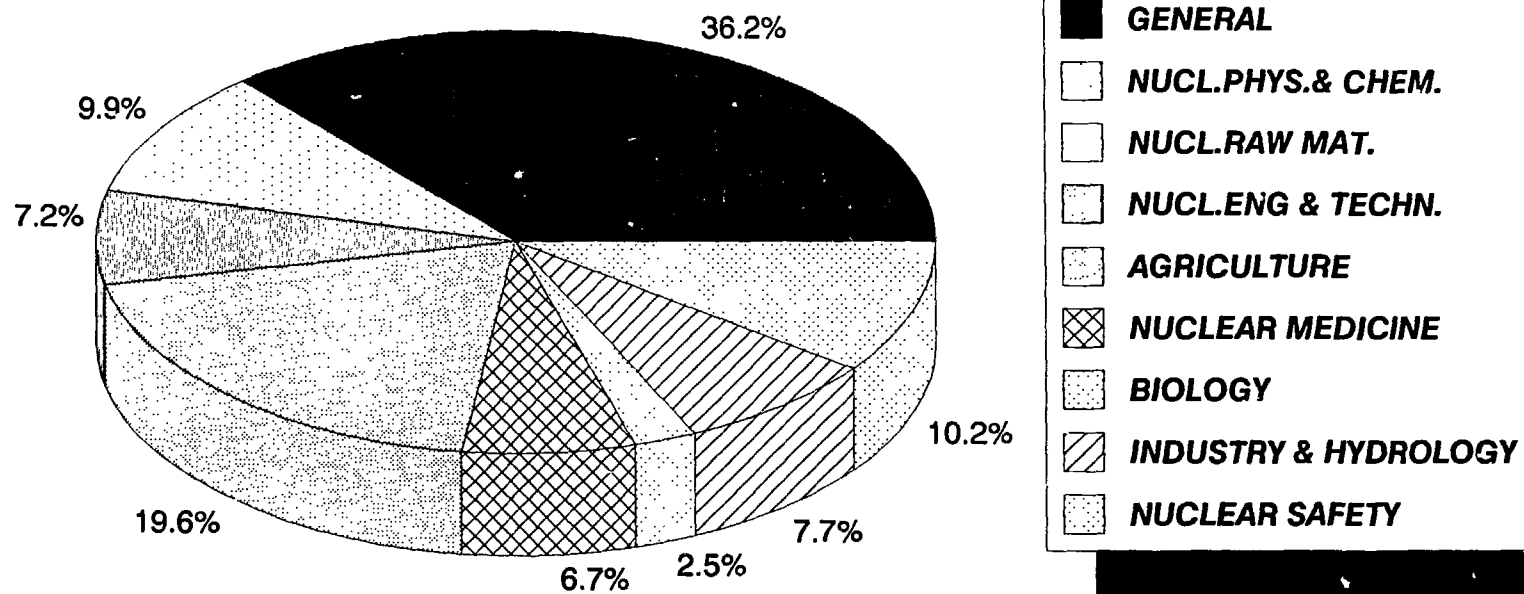


UNDP ASSISTANCE PROVIDED TO CUBA, 1982 - 1991

THOUSANDS OF DOLLARS

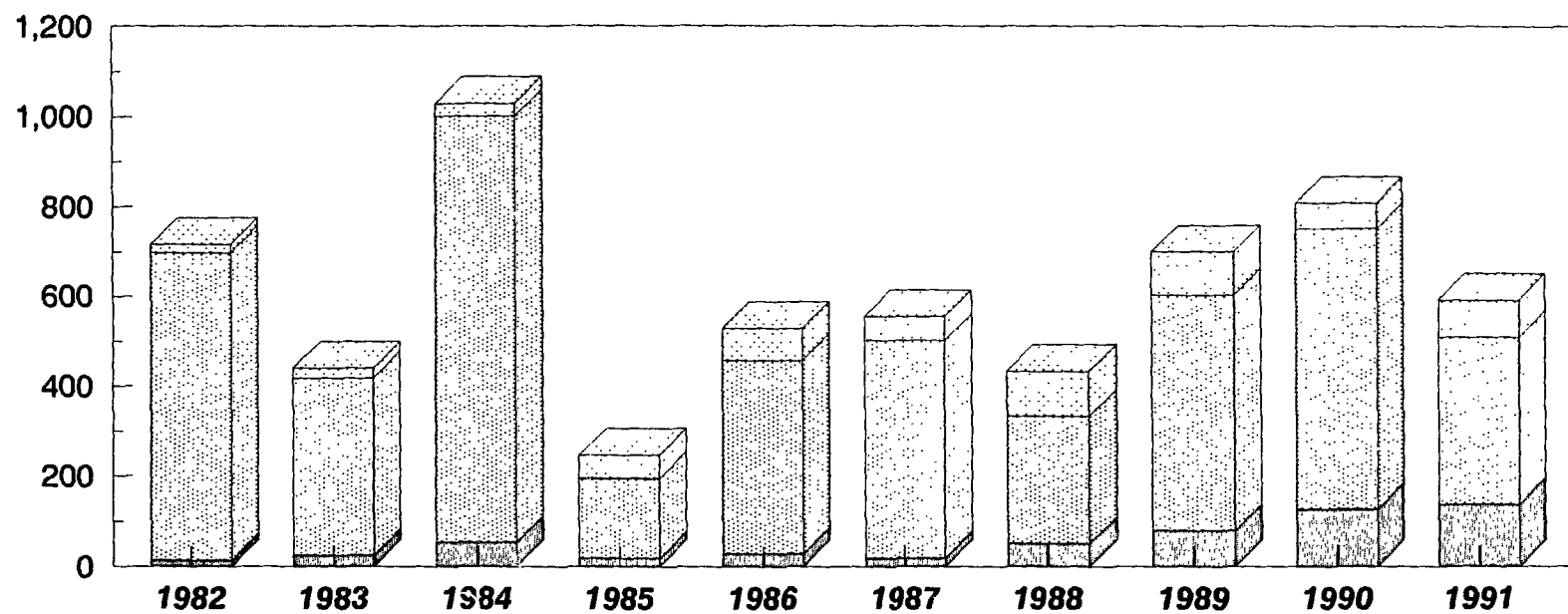


**TC PROJECT DISBURSEMENTS IN CUBA,
BY SECTOR, 1982 - MARCH 1992**



ASSISTANCE PROVIDED BY THE AGENCY TO CUBA, BY TYPE, 1982 - 1991

THOUSANDS OF DOLLARS



	SUBCONTRACTS		GROUP TRAINING		FELLOWSHIPS
	EQUIPMENT		EXPERTS		

**EXPERT SERVICES, EQUIPMENT AND PROJECT-FUNDED
TRAINING PROVIDED TO CUBA, 1982 - MARCH 1992**

DOLLARS

3,000,000

2,500,000

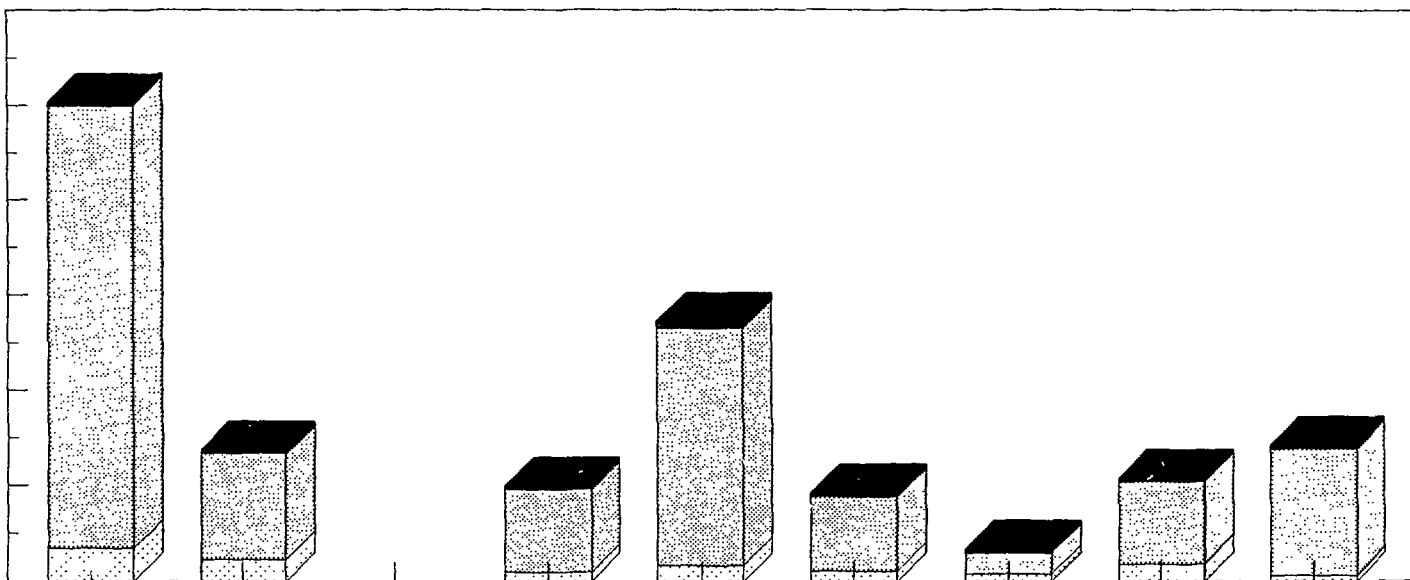
2,000,000

1,500,000

1,000,000

500,000

0



GENERAL

RAW MAT.

AGRIC.

BIOLOGY

NUCL. SAFETY

PHYS. & CHEM.

NUCL. ENG. & TECHN.

NUCL. MED.

IND. & HYDROLOGY



EXPERTS



EQUIPMENT



TRAINING

THE AGENCY'S TECHNICAL CO-OPERATION PROGRAMME WITH CUBA

ALL SOURCES

CUBA'S RANKING AS A TC RECIPIENT
1958 - 1991
(in \$1000)

YEAR	RANKING	AMOUNT
1958-81	23 rd	2129.5
1982	3 rd	715.7
1983	16 th	439.8
1984	4 th	1028.7
1985	35 th	246.6
1986	22 nd	527.1
1987	26 th	554.1
1988	21 st	432.5
1989	12 th	697.9
1990	14 th	807.5
1991	23 rd	590.7
1958-91	19 th	8170.1

"TOP FIVE" RECIPIENTS OF AGENCY ASSISTANCE
1958 - 1991 (in \$1000)

ALL SOURCES

Year	I	II	III	IV	V	CUBA
1958-81	BRA 7907.9	IND 6670.7	ARG 5200.4	PAK 5091.2	CHI 5005.7	23 rd - 2129.5
1982	EGY 807.5	PER 746.4	CUB 715.7	COL 667.7	THA 654.3	3 rd - 715.7
1983	EGY 2077.9	PER 1116.8	VIE 948.1	PHI 778.6	IRA 722.1	16 th - 439.8
1984	EGY 3625.9	PER 1750.4	THA 1094.6	CUB 1028.7	PHI 881.2	4 th - 1028.7
1985	EGY 2494.8	PER 1120.7	THA 1117.4	BGD 1068.2	PHI 963.7	35 th - 246.6
1986	EGY 2317.0	BRA 1452.9	THA 1169.4	POL 1050.3	BGD 896.4	22 nd - 527.1
1987	HUN 3452.6	EGY 1775.4	THA 1742.4	INS 1312.5	YUG 1223.2	26 th - 554.1
1988	EGY 1486.9	BUL 1361.6	CPR 1278.5	THA 1158.7	BRA 1096.7	21 st - 432.5
1989	CPR 1542.3	EGY 1505.1	THA 1205.3	BRA 1096.5	INS 999.1	12 th - 697.9
1990	POL 2308.1	CPR 2005.0	VIE 1589.2	INS 1412.6	BRA 1229.1	14 th - 807.5
1991	INS 1305.2	CPR 975.0	EGY 959.8	BRA 951.2	BUL 934.7	23 rd - 590.7
1958-91	EGY 22222.3	BRA 17021.1	THA 14596.1	PER 12631.1	INS 12383.8	19 th - 8170.1

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1

TOP FIVE RECIPIENTS OF AGENCY ASSISTANCE
1958 - 1991 (in \$1000)

TECHNICAL ASSISTANCE AND CO-OPERATION FUND

Year	I	II	III	IV	V	CUBA
1958-81	HUN 2533.0	PAK 2010.9	EGY 1898.7	THA 1712.8	BRA 1704.8	10 th - 1420.9
1982	EGY 507.1	HUN 438.2	CUB 430.7	ECU 398.4	ZAM 354.9	3 rd - 430.7
1983	EGY 1049.4	VIE 897.4	POL 667.8	PAK 498.5	PHI 430.0	19 th - 254.5
1984	EGY 1197.2	CUB 655.6	ECU 565.6	BGD 506.3	BUL 472.4	2 nd - 655.6
1985	BGD 991.8	VIE 745.0	THA 708.7	BRA 571.8	POR 538.7	53 rd - 108.9
1986	BRA 1381.8	THA 871.9	POL 833.5	BGD 823.9	SYR 751.8	25 th - 387.9
1987	HUN 3305.2	DRK 986.8	BUL 888.5	INS 885.8	EGY 878.9	18 th - 554.0
1988	BUL 1195.6	PER 856.5	EGY 768.6	INS 751.7	MAL 656.0	19 th - 346.5
1989	EGY 990.9	CPR 868.2	POR 769.6	CHI 756.9	MAL 619.4	11 th - 524.1
1990	POL 1562.3	VIE 1518.8	DRK 1156.2	IRA 958.0	YUG 933.4	20 th - 458.9
1991	BUL 893.1	PAK 868.8	INS 855.1	VIE 817.6	CPR 814.5	16 th - 580.6
1958-91	EGY 9591.3	HUN 8256.5	POL 7793.5	BRA 7433.5	PAK 7346.0	12 th - 5722.6

ASSISTANCE PROVIDED BY THE AGENCY TO CUBA

Financial Summary 1982 - 1991
(In thousands of dollars)

Year	ASSISTANCE PROVIDED, BY TYPE						ASSISTANCE PROVIDED, BY SOURCE					
	Experts	Equipment	Fellowships	Group training	Sub-contracts	Total	UNDP	TACF CC	TACF NCC	Extra-budgetary	In-kind	Total
1982	18.7	683.2	13.8	-	-	715.7	274.0	232.1	198.6	11.0	-	715.7
1983	22.1	393.6	24.1	-	-	439.8	169.4	151.2	103.3	6.9	9.0	439.8
1984	28.8	946.6	53.3	-	-	1028.7	352.9	208.6	447.0	-	20.2	1028.7
1985	52.1	176.8	17.7	-	-	246.6	136.9	87.7	21.2	-	0.8	246.6
1986	71.5	427.0	28.6	-	-	527.1	139.2	302.8	85.1	-	-	527.1
1987	53.4	482.0	18.7	-	-	554.1	0.1	471.6	82.4	-	-	554.1
1988	99.7	281.6	51.2	-	-	432.5	86.0	283.7	62.8	-	-	432.5
1989	96.9	520.9	80.1	-	-	697.9	168.4	479.4	44.7	-	5.4	697.9
1990	58.2	622.5	126.8	-	-	807.5	336.9	437.6	21.3	-	11.7	807.5
1991	82.3	370.5	137.9	-	-	590.7	10.1	540.5	40.1	-	-	590.7
1982-91	583.7	4904.7	552.2	-	-	6040.6	1673.9	3195.2	1106.5	17.9	47.1	6040.6

TECHNICAL CO-OPERATION PROJECTS IN CUBA
BY SECTOR

PROJECTS COMPLETED AND OPERATIONAL 1982 - 1992

TOTAL PROJECT ALLOTMENTS AND DISBURSEMENTS
(as of mid-March 1992)

SECTOR	NO. OF PROJECTS	ALLOTMENTS	% OF TOTAL	DISBURSEMENTS	% OF TOTAL
General atomic energy development	3	2 518 757	29.0	2 518 259	36.2
Nuclear physics and chemistry	9	1 573 435	18.1	689 144	9.9
Nuclear raw materials	-	-	-	-	-
Nuclear engineering and technology	3	501 230	5.8	499 362	7.2
Nuclear techniques in agriculture	5	1 473 691	17.0	1 362 601	19.6
Nuclear medicine	3	474 089	5.4	462 917	6.7
Nuclear techniques in biology	3	296 744	3.4	170 618	2.5
Nuclear techniques in industry and hydrology	8	846 125	9.7	538 231	7.7
Nuclear safety	5	1 006 099	11.6	710 949	10.2
TOTAL	39	8 690 170	100.0	6 952 081	100.0

TECHNICAL CO-OPERATION PROJECTS IN CUBA
 COMPLETED AND OPERATIONAL, BY SECTOR, 1982 - 1992
 (As of mid-March 1992)

Sector	No. of projects	Total project allotments \$	Total project disbursements \$
<u>Completed projects</u>			
General atomic energy development	2	1 909 330	1 908 823
Nuclear physics and chemistry	5	539 135	533 263
Nuclear raw materials	-	-	-
Nuclear engineering and technology	3	501 230	499 362
Nuclear techniques in agriculture	3	1 151 650	1 152 518
Nuclear medicine	2	352 212	353 376
Nuclear techniques in biology	1	159 944	169 669
Nuclear techniques in industry & hydrology	3	286 213	281 213
Nuclear safety	1	150 000	149 730
TOTAL	20	5 049 714	5 047 954
<u>Operational projects</u>			
General atomic energy development	1	609 427	609 436
Nuclear physics and chemistry	4	1 034 300	155 881
Nuclear raw materials	-	-	-
Nuclear engineering and technology	-	-	-
Nuclear techniques in agriculture	2	322 041	210 083
Nuclear medicine	1	121 877	109 541
Nuclear techniques in biology	2	136 800	949
Nuclear techniques in industry & hydrology	5	559 912	257 018
Nuclear safety	4	856 099	561 219
TOTAL	19	3 640 456	1 904 127

EXPERT SERVICES, EQUIPMENT AND PROJECT-FUNDED TRAINING PROVIDED TO CUBA, BY SECTOR
 PROJECTS COMPLETED AND OPERATIONAL 1982 - 1992
 (As of mid-March 1992)

FIELD	TOTAL PROJECT ALLOTMENTS				TOTAL PROJECT DISBURSEMENTS			
	EXPERT SERVICES		EQUIPMENT	TRAINING	EXPERT SERVICES		EQUIPMENT	TRAINING
	M/M	\$	\$	\$	M/M	\$	\$	\$
General atomic energy development	20/01	175 339	2 324 763	18 655	20/18	173 189	2 326 415	18 655
Nuclear physics and chemistry	24/11	199 305	1 339 571	34 559	14/20	113 399	555 273	20 472
Nuclear raw materials	-	-	-	-	-	-	-	-
Nuclear engineering and technology	7/16	47 070	435 203	18 957	7/20	49 198	431 207	18 957
Nuclear techniques in agriculture	14/20	117 050	1 291 230	65 411	10/23	85 474	1 240 614	36 513
Nuclear medicine	8/00	56 900	384 827	32 362	8/06	54 870	386 678	21 369
Nuclear techniques in biology	7/00	45 100	221 706	29 938	5/15	40 883	108 820	20 915
Nuclear techniques in industry & hydrology	17/00	129 765	657 178	59 182	12/20	91 896	428 720	17 615
Nuclear safety	15/22	136 990	797 600	71 509	3/14	29 225	661 965	19 759
TOTAL	114/10	907 519	7 452 078	330 573	83/16	638 134	6 139 692	174 255

AGENCY FELLOWS FROM CUBA

1982 - 1992¹
(As of mid-March 1992)

Sector	No. of fellowships	No. of months/days	Host countries
General atomic energy development	11	26/10	AUS, GDR, BRA, IAEA, USSR
Nuclear physics	7	22/20	MEX, HUN, UKR, CZE, IAEA
Nuclear chemistry	3	7/01	HUN, VEN, IAEA
Nuclear raw materials	-	-	-
Nuclear engineering and technology	7	8/12	SWI, GER, HUN, YUG, USSR
Nuclear techniques in agriculture	22	73/22	NET, HUN, GDR, COS, MEX, CAN, BRA, GER, ECU, POL, USSR, IAEA
Nuclear medicine	32	102/07	CAN, VEN, ITA, GER, URU, SWI, GDR, HUN, FRA, MEX, POR, ARG, NET, AUS, BRA, DEN, SPA, CHI, URU, CZE, UK, IAEA
Nuclear techniques in biology	5	12/01	AUS, MOC, THA, MEX, IAEA
Nuclear techniques in industry and hydrology	12	30/10	GDR, FIN, GER, FRA, ARG, BRA, USSR, IAEA
Nuclear safety	14	26/12	FIN, SPA, MEX, CZE, HUN, BRA, BUL, USSR, IAEA
TOTAL	113	309/05	

¹/ Only includes fellows who have completed or at least started training.

CUBA
 FELLOWSHIPS LONGER THAN 12 M/M
 1982 - 1992
 (As of mid-March 1992)

Name	Field of study	Host country	Date	Duration	Project
ALONSO RODRIGUEZ	Radioimmunoassay procedures	SWI	Apr.85 - Oct.85 Apr.88 - Oct.88	12/03	CUB/0/002
CONDE ALMEIDA	Administration of fellowships	IAEA	Started: Feb.91	18/00	RLA/0/014
PEREZ LEON	Plant breeding and genetics	POL	Started: Feb.92	12/00	RLA/0/014

CUBAN NATIONALS WHO WERE AWARDED MORE THAN ONE
FELLOWSHIP OR SCIENTIFIC VISIT
1982 - 1992
(As of mid-March 1992)

Name	Field of study	Host country	Date	Duration	Project
CARDENAS VALDES	1. Nuclear medicine	MEX	Nov.87 - Dec.87	1/04	CUB/6/007
	2. Nuclear medicine	BRA IAEA CHI URU BRA VEN ARG MEX	Sep.91 - Nov.91	2/01	RLA/0/014
DURAN SARDUY	1. Nuclear medicine	FRA	Nov.88 - Jan.89	2/00	CUB/0/004
	2. Nuclear medicine	IAEA CHI URU BRA VEN ARG MEX	Sep.91 - Nov.91	2/01	RLA/0/014
FONG CHI	1. Nuclear medicine	UK	Mar.90 - Jul.90	4/01	CUB/6/009
	2. Radiopharmacy	CZE HUN UK	Jan.92 - Feb.92	0/19	CUB/6/009
FRANQUIZ GARCIA	1. Gamma cameras	GDR HUN UK GER FRA IAEA	Aug.85 - Sep.85	0/27	CUB/6/007
	2. Nuclear medicine	ARG	Nov.86	0/13	CUB/6/007
	3. Nuclear medicine	AUS	Nov.91	0/06	RLA/0/014

CUBAN NATIONALS WHO WERE AWARDED MORE THAN ONE
FELLOWSHIP OR SCIENTIFIC VISIT
1982 - 1992
(As of mid-March 1992)

Name	Field of study	Host country	Date	Duration	Project
GONZALEZ BAEZ	1. Isotope hydrology 2. Isotope hydrology	GER GER	Dec.85 May 90	0/12 1/00	CUB/8/007 RLA/0/011
OLIVA GONZALEZ	1. Nuclear medicine 2. Nuclear medicine	GER CAN	Nov.84 - Jan.85 Aug.90 - Sep.90	2/00 1/03	- RLA/0/011
OSORIO FERNANDEZ	1. Data processing by computer 2. Nuclear physics	IAEA IAEA	Aug.87 - Oct.87 Jul.88 - Oct.88	1/17 3/28	CUB/4/008 CUB/1/005
SANTOS SANAME	1. Isotope hydrology 2. Isotope hydrology	USSR ARG	Sep.82 - Nov.82 Jul.89 - Sep.89	2/00 2/22	CUB/8/007 -

AGENCY TRAINING COURSES WITH CUBAN PARTICIPATION

1982 - 1992
(As of mid-March 1991)

Field	Number of participants	Number of courses
General atomic energy development	6	5
Nuclear physics	5	5
Nuclear chemistry	9	7
Nuclear raw materials	3	2
Nuclear engineering and technology	24	15
Nuclear techniques in agriculture	32	28
Nuclear medicine	14	12
Nuclear techniques in biology	3	2
Nuclear techniques in industry & hydrology	2	2
Nuclear safety	48	29
TOTAL	146	107

MULTIPLE PARTICIPATION IN AGENCY TRAINING COURSES
BY CUBAN NATIONALS
1982 - 1992
(As of mid-March 1991)

Name	Course No.	Course title	Year	Location
CASTELLS BARRIO	INT/9/068 (001) RLA/9/011 (001)	ITC on management and disposal of radioactive wastes RTC on radiological emergencies	1986 1991	CAN PER
CIMINO QUICONES	INT/0/043 (001) RLA/4/006 (015)	ITC on interfacing in nuclear experiments RWS on local area networks and their application in data transfer in nuclear experiments	1987 1988	POR URU
DEUS RENTERIA	INT/5/116 (001) RLA/5/021 (005)	ITC on the induction and use of mutations in plant breeding Second RWS on improvement of rice and other cereals in Latin America through mutation breeding	1989 1990	AUS BRA
GARCIA DE LA CRUZ	INT/9/046 (001) INT/9/063 (001) INT/9/076 (001)	ITC on radiological protection and nuclear safety IWS on evaluation of NPP surveillance test intervals and limiting conditions of operation using PSA ITC on probabilistic safety assessment for NPP operation	1983 1988 1987	ARG AUS SPA
GONZALEZ CEPERO	INT/5/118 (001) RLA/5/021 (005)	ITC on induction and use of mutations in plant breeding Second RWS on improvement of rice and other cereals in Latin America through mutation breeding	1990 1990	AUS BRA
JOVA SED	RLA/9/009 (042) RLA/9/011 (005)	Fifth RWS on radiation protection Regional symposium on radiation protection and nuclear safety	1989 1991	BRA ARG
MARIN ZAMBRANA	INT/3/010 (001) INT/3/012 (001)	ITC on uranium ore analysis ITC on uranium ore processing	1982 1983	SPA SPA
QUINTERO MENDEZ	INT/4/067 (001) INT/9/051 (001)	ITC on quality assurance ITC on safety analysis	1984 1984	GER GER

MULTIPLE PARTICIPATION IN AGENCY TRAINING COURSES
BY CUBAN NATIONALS
1982 - 1992
(As of mid-March 1991)

Name	Course No.	Course title	Year	Location
RIVERO CABRERA	RLA/0/009 (002)	First RWS on nuclear information	1988	BRA
	RLA/0/009 (006)	Third RWS on nuclear information	1991	ECU
RODRIGUEZ CABRERA	RLA/6/011 (001)	Regional train-the-trainers course on radioisotope methodology with special emphasis on radioimmunoassay	1988	ARG
	RLA/6/016 (001)	RTC on optimization of radioimmunoassay methodology for neonatal hypothyroid screening	1991	BOL
ROMERO MOLINA	INT/5/100 (001)	ITC on the use of isotope and radiation techniques to enhance biological nitrogen fixation	1985	AUS
	RLA/2/004 (001)	RTC on nuclear analytical techniques in the agroindustry and food analysis	1988	BRA
ROSABAL SOCARRAS	INT/9/036 (001)	Study tour on low/intermediate-level waste management	1982	BEL CZE FRA GER HUN GER
	INT/9/044 (001)	ITC on waste management	1983	
SAAVEDRA MARTINEZ	INT/4/106 (001)	ITC on quality assurance in NPP operation	1991	SPA
	INT/9/095 (001)	ITC on safety in NPP operation with PWR/LWER	1989	CZE

PROJECTS COMPLETED IN CUBA SINCE 1982
(As of mid-March 1992)

STARTED	PROJECT NO.	TITLE	ALLOTMENTS				DISBURSEMENTS				COMPLETED
			EXPERTS		EQUIPMENT	TRAINING	EXPERTS		EQUIPMENT	TRAINING	
			M/M	\$	\$	\$	M/M	\$	\$	\$	
1977	CUB/0/002	Nuclear technology	1/01	39 187	1 562 170	15 920	1/01	39 187	1 562 170	15 920	1987
1983	CUB/0/003	Nuclear training	18/00	118 575	173 478	-	18/00	116 425	175 121	-	1989
1980	CUB/1/002	Nuclear science laboratory	2/00	9 600	127 350	-	1/24	10 676	128 925	-	1984
1982	CUB/1/004	Ionizing radiation metrology	-	-	117 000	-	-	-	108 710	-	1984
1988	CUB/1/005	Nuclear measurements research laboratory	8/11	64 880	74 905	6 300	8/08	67 027	74 884	5 707	1991
1982	CUB/2/004	Production of labelled compounds	-	-	63 300	-	-	-	61 830	-	1983
1986	CUB/2/005	Preparation and quality control of radiopharmaceuticals	3/00	22 200	53 600	-	3/06	22 280	53 224	-	1990
1976	CUB/4/006	Nuclear electronics	2/00	6 000	66 800	-	2/04	11 190	63 811	-	1984
1981	CUB/4/007	Mössbauer spectrometry	-	-	236 000	-	-	-	235 014	-	1987
1987	CUB/4/008	Nuclear electronics	5/16	41 070	132 403	18 957	5/16	38 008	132 382	18 957	1991
1976	CUB/5/004	Food irradiation	1/00	6 600	942 751	-	1/04	6 049	942 512	-	1991

PROJECTS COMPLETED IN CUBA SINCE 1982
(As of mid-March 1992)

STARTED	PROJECT NO.	TITLE	ALLOTMENTS				DISBURSEMENTS				COMPLETED
			EXPERTS		EQUIPMENT	TRAINING	EXPERTS		EQUIPMENT	TRAINING	
			M/M	\$	\$	\$	M/M	\$	\$	\$	
1985	CUB/5/006	Radiation preservation of agricultural products	4/00	29 250	71 242	-	4/00	31 414	71 472	-	1991
1987	CUB/5/009	Cattle infertility in sub-tropical areas	2/05	15 650	78 346	7 811	2/02	14 774	78 383	7 914	1991
1979	CUB/6/006	Radioimmunoassay	1/00	3 800	9 800	-	1/00	6 283	9 423	-	1982
1985	CUB/6/007	Nuclear cardiology	4/00	28 500	300 300	9 812	4/04	26 362	302 529	8 779	1988
1979	CUB/7/002	Radioisotopes in biology	5/00	28 300	107 606	24 038	5/08	39 934	108 820	20 915	1990
1978	CUB/8/005	Radioisotopes in industry	1/00	3 500	65 000	-	1/00	5 549	64 897	-	1984
1979	CUB/8/006	Industrial applications	-	-	118 513	-	-	-	107 554	-	1983
1982	CUB/8/007	Isotopes in hydrology	5/26	36 240	62 960	-	5/28	38 371	64 842	-	1989
1980	CUB/9/006	Environmental contamination	-	-	150 000	-	-	-	149 730	-	1986
	TOTAL	20 projects	63/29	453 352	4 513 524	82 838	64/15	473 529	4 496 233	78 192	

OPERATIONAL PROJECTS IN CUBA
(As of mid-March 1992)

STARTED	PROJECT NO.	TITLE	ALLOTMENTS				DISBURSEMENTS			
			EXPERTS		EQUIPMENT	TRAINING	EXPERTS		EQUIPMENT	TRAINING
			M/M	\$	\$	\$	M/M	\$	\$	\$
1988	CUB/0/004	Extension of the application of nuclear techniques	1/00	17 577	589 115	2 735	1/17	17 577	589 124	2 735
1989	CUB/1/006	Secondary standards dosimetry laboratory	4/00	37 975	220 000	17 959	0/14	5 046	46 731	7 962
1989	CUB/1/007	Nuclear measurements	2/00	17 700	404 588	-	-	-	57 142	-
1991	CUB/2/006	Preparation and quality control of radiopharmaceuticals	3/00	27 900	178 828	-	0/28	8 370	23 827	-
1991	CUB/2/007	Metal pollution of the marine ecosystem	2/00	19 050	100 000	10 300	-	-	-	6 803
1986	CUB/5/008	Nuclear techniques in soil-science studies	5/15	47 400	136 345	30 900	3/12	28 069	127 808	26 134
1991	CUB/5/010	Mutation breeding in sugarcane	2/00	18 150	62 546	26 700	0/05	5 168	20 439	2 465
1989	CUB/6/009	Preparation of reagents for tumor marking	3/00	24 600	74 727	22 550	3/02	22 225	74 726	12 590
1990	CUB/7/003	Applied radiobiological techniques	2/00	16 800	54 100	-	0/07	949	-	-
1991	CUB/7/004	Encapsulation of mammalian cells	-	-	60 000	5 900	-	-	-	-

**OPERATIONAL PROJECTS IN CUBA
(As of mid-March 1992)**

STARTED	PROJECT NO.	TITLE	ALLOTMENTS				DISBURSEMENTS			
			EXPERTS		EQUIPMENT	TRAINING	EXPERTS		EQUIPMENT	TRAINING
			M/M	\$	\$	\$	M/M	\$	\$	\$
1989	CUB/8/008	Nuclear techniques in the sugar industry	2/00	16 500	85 475	7 200	1/29	15 468	72 193	7 359
1989	CUB/8/009	Nuclear techniques in sedimentation studies	2/04	18 175	87 376	15 732	1/17	12 843	85 684	8 186
1989	CUB/8/010	Development of irradiation techniques	2/00	17 250	4 400	23 000	2/06	19 665	4 184	2 070
1991	CUB/8/011	Nuclear techniques in the nickel industry	4/00	38 100	114 454	13 200	-	-	29 366	-
1991	CUB/8/012	Upgrading of irradiation facility	-	-	119 000	-	-	-	-	-
1984	CUB/9/006	Radiation protection	3/22	26 290	461 600	20 209	1/26	16 195	391 496	17 929
1989	CUB/9/007	Environmental radiation monitoring	-	-	83 000	-	-	-	78 413	-
1991	CUB/9/008	Nuclear power plant safety assessment	8/00	72 600	28 000	38 100	1/18	13 030	7 527	-
1991	CUB/9/009	Radiation protection	4/00	38 100	75 000	13 200	-	-	34 799	1 830
	TOTAL	19 projects	50/11	454 167	2 938 554	247 735	19/01	164 605	1 643 459	96 063

Footnote-a project not yet upgraded:

CUB/6/010 Quality control in radiotherapy

COUNTERPART INSTITUTIONS IN CUBA (I)
(By Project)

<u>Project No.</u>	<u>Institute</u>	<u>Counterpart(s)</u>
<u>GENERAL ATOMIC ENERGY DEVELOPMENT</u>		
CUB/0/002	Atomic Energy Commission, Havana	ROSALES ARIAS
CUB/0/003	Advanced Institute of Sciences and Nuclear Technology, Havana	BELLO VARELA
CUB/0/004	1. Atomic Energy Commission, Havana 2. National Institute of Oncology and Radiobiology, Department of Nuclear Medicine, Havana 3. Advanced Institute of Sciences and Nuclear Technology, Havana	ROSALES ARIAS CARDENAS VALDES BELLO VARELA
<u>NUCLEAR PHYSICS AND CHEMISTRY</u>		
CUB/1/002	1. University of Havana, Havana 2. University of the Orient, Santiago	ROIG NUNEZ -
CUB/1/004	Cuban Academy of Sciences, Nuclear Research Institute, Department of Dosimetry and Radiation Protection, Havana	VIZOSO GARCIA
CUB/1/005	Advanced Institute of Sciences and Nuclear Technology, Havana	LOPEZ MENDES
CUB/1/006	Centre of Hygiene and Radiation Protection, Havana	JOVA SED MORALES CARBALLO
CUB/1/007	Advanced Institute of Sciences and Nuclear Technology, Havana	LOPEZ MENDES SARIA

COUNTERPART INSTITUTIONS IN CUBA (I)
(By Project)

<u>Project No.</u>	<u>Institute</u>	<u>Counterpart(s)</u>
<u>NUCLEAR PHYSICS AND CHEMISTRY (cont'd)</u>		
CUB/2/004	Cuban Academy of Sciences, Nuclear Research Institute, Department of Radioisotopes, Havana	MORIN ZORRILLA
CUB/2/005	National Institute of Oncology and Radiobiology, Department of Nuclear Medicine, Havana	ZAYAS CRESPO
CUB/2/006	Centre of Studies Applied to Nuclear Development, Havana	TEJERA OLIVE ALVAREZ
CUB/2/007	1. Cuban Academy of Sciences, Nuclear Research Institute, Havana 2. University of Havana, Faculty of Biology, Havana	GARCIA MONTERO MARTINEZ MEDEROS GONZALEZ
<u>NUCLEAR ENGINEERING AND TECHNOLOGY</u>		
CUB/4/006	Cuban Academy of Sciences, Nuclear Research Institute, Havana	DIAZ MORERA
CUB/4/007	Cuban Academy of Sciences, Nuclear Research Institute, Department of Solid State Nuclear Physics, Havana	FERNANDEZ MIRANDA
CUB/4/008	Centre of Studies Applied to Nuclear Development, Havana	ROBLES CORTES
<u>AGRICULTURE</u>		
CUB/5/004	Research Institute for the Food Industry, Havana	ARENCIBIA PEREZ

COUNTERPART INSTITUTIONS IN CUBA (I)
(By Project)

<u>Project No.</u>	<u>Institute</u>	<u>Counterpart(s)</u>
<u>AGRICULTURE (cont'd)</u>		
CUB/5/006	Research Institute for the Food Industry, Havana	ARENCIBIA PEREZ
CUB/5/008	Ministry of Agriculture, Alejandro Humbolt Institute of Basic Research in Tropical Agriculture, Department of Nuclear Techniques Applied to Agriculture, Havana	TABLADA ROMEROA LABRADA RAMON
CUB/5/009	Ministry of Agriculture, Research Centre for Animal Improvement, Havana	MORALES CARBALLO VERDURA
CUB/5/010	1. National Scientific Research Centre, Directorate of Biotechnology, Havana 2. Centre of Studies Applied to Nuclear Development, Havana	MARIBONA PADRON
<u>NUCLEAR MEDICINE</u>		
CUB/6/006	Commander Fajardo Institute of Endocrinology and Metabolic Diseases, Havana	GONZALES SUAREZ
CUB/6/007	Institute of Cardiology and Cardiovascular Surgery, Havana	GARCIA BARRETO FRANQUIZ GARCIA
CUB/6/009	National Institute of Oncology and Radiobiology, Department of Nuclear Medicine, Havana	FONG CHI RAMIREZ FERNANDEZ
<u>NUCLEAR TECHNIQUES IN BIOLOGY</u>		
CUB/7/002	University of Havana, Faculty of Biology, Department of Biochemistry, Havana	JIMENEZ MERCADAL

COUNTERPART INSTITUTIONS IN CUBA (I)

(By Project)

<u>Project No.</u>	<u>Institute</u>	<u>Counterpart(s)</u>
<u>NUCLEAR TECHNIQUES IN BIOLOGY (cont'd)</u>		
CUB/7/003	Centre of Hygiene and Radiation Protection, Havana	BILBAO ALFONSO NUNEZ
CUB/7/004	Genetic Engineering and Biotechnology Centre, Tissue Culture Laboratory, Havana	LLEONART ESTRADA
<u>NUCLEAR TECHNIQUES IN INDUSTRY AND HYDROLOGY</u>		
CUB/8/005	Cuban National Scientific Research Centre, Department of Nuclear Techniques, Havana	MARRERO DEDIN
CUB/8/006	Centre for Metallurgical Research, Havana	CALDERIN MOSER
CUB/8/007	Cuban Institute of Hydroeconomy, Havana	ARELLANO ACOSTA
CUB/8/008	Cuban Sugar Research Institute, Processing Department, Havana	GRIFFITH MARTINEZ MESA MANRESA
CUB/8/009	Cuban Institute of Hydroeconomy, Havana	ARELLANO ACOSTA LOBO MESA
CUB/8/010	National Centre for Animal and Plant Health, Irradiation Techniques Laboratory, Havana	FERNANDEZ MIRANDA CASTILLO RODRIGUEZ
CUB/8/011	1. Laterite Research Centre, Moa, Holguin 2. Union of Nickel Companies, Havana 3. Higher Mining-Metallurgical Institute, Moa, Huguin	FONT CORDOVA MASO FALCON
CUB/8/012	National Centre for Animal and Plant Health, Irradiation Techniques Laboratory, Havana	FERNANDEZ MIRANDA

COUNTERPART INSTITUTIONS IN CUBA (I)
(By Project)

<u>Project No.</u>	<u>Institute</u>	<u>Counterpart(s)</u>
<u>NUCLEAR SAFETY</u>		
CUB/9/005	Cuban Academy of Sciences, Nuclear Research Institute, Department of Dosimetry and Radiation Protection, Havana	CUESTA GOBEL
CUB/9/006	Centre of Hygiene and Radiation Protection, Havana	BILBAO ALFONSO JOVA SED
CUB/9/007	Centre of Hygiene and Radiation Protection, Havana	BILBOA ALFONSO DE LA CRUZ RODRIGUEZ
CUB/9/008	1. Centre of Hygiene and Radiation Protection, Havana 2. Ministry of Basic Industry, Directorate of Nuclear Centres, Havana	RIVERO OLIVA NAPOLES BROTONS
CUB/9/009	1. Centre of Hygiene and Radiation Protection, Havana 2. Ministry of Basic Industry, Directorate of Electronuclear Centres, Havana	BILBAO ALFONSO JOVA SED MORENO

COUNTERPART INSTITUTIONS IN CUBA (II)

(By Institute)

HAVANA

Atomic Energy Commission

Havana

CUB/0/002 Nuclear Technology
CUB/0/004 Extension of the Application of Nuclear Techniques

Advanced Institute of Sciences and Nuclear Technology

Havana

CUB/0/003 Nuclear Training
CUB/0/004 Extension of the Application of Nuclear Techniques
CUB/1/005 Nuclear Measurements Research Laboratory
CUB/1/007 Nuclear Measurements

National Institute of Oncology and Radiobiology

Department of Nuclear Medicine

Havana

CUB/0/004 Extension of the Application of Nuclear Techniques
CUB/2/005 Preparation and Quality Control of Radiopharmaceuticals
CUB/6/009 Preparation of Reagents for Tumor Marking

Cuban Academy of Sciences

Nuclear Research Institute

Havana

CUB/2/006 Preparation and Quality Control of Radiopharmaceuticals
CUB/2/007 Metal Pollution of the Marine Ecosystem
CUB/4/006 Nuclear Electronics

Cuban Academy of Sciences

Nuclear Research Institute

Department of Dosimetry and Radiation Protection

Havana

CUB/1/004 Ionizing Radiation Metrology
CUB/9/005 Environmental Contamination

COUNTERPART INSTITUTIONS IN CUBA (II)

(By Institute)

HAVANA (cont'd)

**Cuban Academy of Sciences
Nuclear Research Institute
Department of Radioisotopes
Havana**

CUB/2/004 Production of Labelled Compounds

**Cuban Academy of Sciences
Nuclear Research Institute
Department of Solid State Nuclear Physics
Havana**

CUB/4/007 Mössbauer Spectrometry

**Centre of Hygiene and Radiation Protection
Havana**

CUB/1/006 Secondary Standards Dosimetry Laboratory

CUB/7/003 Applied Radiobiological Techniques

CUB/9/006 Radiation Protection

CUB/9/007 Environmental Radiation Monitoring

CUB/9/008 Nuclear Power Plant Safety Assessment

CUB/9/009 Radiation Protection

**Centre of Studies Applied to Nuclear Development
Havana**

CUB/4/008 Nuclear Electronics

CUB/5/010 Mutation Breeding in Sugarcane

**Research Institute for the Food Industry
Havana**

CUB/5/004 Food Irradiation

CUB/5/006 Radiation Preservation of Agricultural Products

**Ministry of Agriculture
Research Centre for Animal Improvement
Havana**

CUB/5/009 Cattle Infertility in Sub-tropical Areas

COUNTERPART INSTITUTIONS IN CUBA (II)
(By Institute)

HAVANA (cont'd)

Ministry of Agriculture
Alejandro Humbolt Institute of Basic Research in Tropical Agriculture
Department of Nuclear Techniques Applied to Agriculture
Havana

CUB/5/008 Nuclear Techniques in Soil-Science Studies

Ministry of Basic Industry
Directorate of Nuclear Centres
Havana

CUB/9/008 Nuclear Power Plant Safety Assessment

Ministry of Basic Industry
Directorate of Electronuclear Centres
Havana

CUB/9/009 Radiation Protection

National Centre for Animal and Plant Health
Irradiation Techniques Laboratory
Havana

CUB/8/010 Development of Irradiation Techniques
CUB/8/012 Upgrading of Irradiation Facility

National Scientific Research Centre
Directorate of Biotechnology
Havana

CUB/5/010 Mutation Breeding in Sugarcane

Commander Fajardo Institute of Endocrinology and Metabolic Diseases
Havana

CUB/6/006 Radioimmunoassay

COUNTERPART INSTITUTIONS IN CUBA (II)
(By Institute)

HAVANA (cont'd)

Institute of Cardiology and Cardiovascular Surgery
Havana

CUB/6/007 Nuclear Cardiology

Genetic Engineering and Biotechnology Centre
Tissue Culture Laboratory
Havana

CUB/7/004 Encapsulation of Mammalian Cells

Cuban National Scientific Research Centre
Department of Nuclear Techniques
Havana

CUB/8/005 Radioisotopes in Industry

Centre for Metallurgical Research
Havana

CUB/8/006 Industrial Applications

Cuban Institute of Hydroeconomy
Havana

CUB/8/007 Isotopes in Hydrology
CUB/8/009 Nuclear Techniques in Sedimentation Studies

Cuban Sugar Research Institute
Processing Department
Havana

CUB/8/008 Nuclear Techniques in the Sugar Industry

Union of Nickel Companies
Havana

CUB/8/011 Nuclear Techniques in the Nickel Industry

COUNTERPART INSTITUTIONS IN CUBA (II)

(By Institute)

HAVANA (cont'd)

**University of Havana
Havana**

CUB/1/002 Nuclear Science Laboratory

**University of Havana
Faculty of Biology
Havana**

CUB/2/007 Metal Pollution of the Marine Ecosystem

**University of Havana
Faculty of Biology
Department of Biochemistry
Havana**

CUB/7/002 Radioisotopes in Biology

SANTIAGO

**University of the Orient
Santiago**

CUB/1/002 Nuclear Science Laboratory

MOA, HOLGUIN

**Laterite Research Centre
Moa, Holguin**

CUB/8/011 Nuclear Techniques in the Nickel Industry

**Higher Mining-Metallurgical Institute
Moa, Holguin**

CUB/8/011 Nuclear Techniques in the Nickel Industry

**THE AGENCY'S TECHNICAL CO-OPERATION PROGRAMME WITH
CUBA
SINCE 1982**

LONG-TERM EXPERT ASSIGNMENTS

NONE

RESEARCH CONTRACTS/AGREEMENTS IN CUBA SINCE 1982 ¹
(As of mid-March 1992)

Field of activity	No. of contracts/ agreements	Amount allocated \$
Nuclear physics	6	45 428
Nuclear chemistry	4	30 978
Nuclear engineering and technology	4	33 700
Nuclear techniques in agriculture	8	47 500
Nuclear medicine	9	43 500
Nuclear techniques in biology	2	19 000
Nuclear techniques in industry & hydrology	4	49 000
Safety in nuclear energy	3	23 300
TOTAL	40	292 406

¹/ New awards since 1982

**SCIENTISTS FROM CUBA SERVING AS AGENCY
TECHNICAL CO-OPERATION EXPERTS OR
TRAINING COURSE LECTURERS
1982 - 1992
(As of mid-March 1992)**

Name	No. of assignment:	Project(s)
RELLANO ACOSTA	1	RLA/0/006
AVILA MORENO	1	RLA/9/009
DEUS RENTERIA	1	RLA/5/021
FERNANDEZ NODARSE	2	RLA/0/009
FERNANDEZ, S.	3	RLA/6/011, RLA/6/016
JOVA SED	2	RLA/9/009, RLA/9/011
LARIA MENCHACA	1	RLA/4/008
MOLERIO LEON	1	RLA/8/014
MORALES CARBALLO	1	RLA/5/019
MORALES MONZON	2	RLA/9/009
MORIN ZORRILLA	2	RLA/0/006
PRESA SAGUE	1	RLA/4/009
QUEVEDO GARCIA	2	RLA/9/009
ROBLES CORTES	2	INT/4/054, RLA/4/006
SOLER DESCHAPELLS	1	RLA/4/009
TOTAL	23	

**AGENCY FELLOWSHIPS AND SCIENTIFIC VISITS
HOSTED BY CUBA
1982 - 1992
(As of mid-March 1992)**

Recipient country	No. of fellowships	No. of scientific visits	TOTAL ¹
ARGENTINA	-	6	6
BANGLADESH	-	3	3
BOLIVIA	-	2	2
BRAZIL	-	3	3
CHILE	-	1	1
ECUADOR	1	1	2
GUATEMALA	1	-	1
MEXICO	1	12	13
NICARAGUA	1	-	1
VIET NAM	4	-	4
TOTAL	8	28	36

¹/ Includes trainees who have completed or at least started their studies.

**REGIONAL AND INTERREGIONAL TRAINING EVENTS
HOSTED BY CUBA
1982 - 1992
(As of mid-March 1992)**

Course No.	Course Title	Participants	Year
RLA/0/009 (004)	Second RWS on nuclear information	6	1989
RLA/4/006 (018)	RTC on design and production of printed boards	11	1989
RLA/5/019 (002)	RTC on radioimmunoassay and enzyme assay for the determination of hormones, metabolites and antibodies in animal production and health	15	1990
RLA/6/011 (028)	RTC on optimization of the production and preparation of bulk reagents with present methodology	14	1990
RLA/6/013 (001)	RTC on medical scintigraphy	14	1988
RLA/6/015 (001)	RTC on medical scintigraphy	14	1990
RLA/8/014 (006)	Regional II technical co-ordination meeting on the study of resources and contamination of underground water	11	1991
RLA/9/009 (047)	RTC on radiation protection in medical applications of ionizing radiation	13	1990
8 COURSES	TOTAL	98	