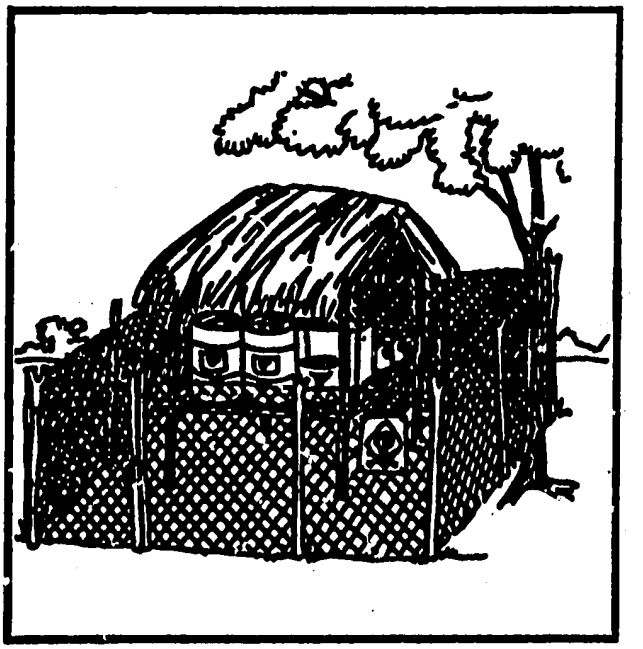
PN-ABN-506
81302

West African Regional Conference on Pesticide Disposal: *Disposal of Pesticide Containers and Obsolete Pesticides*

Niamey, Niger
January 21-26, 1990



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U.S. Agency for International Development
with the
Office of International Cooperation and Development,
U.S. Department of Agriculture

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PROCEEDINGS OF THE USAID WEST AFRICAN REGIONAL CONFERENCE ON PESTICIDE DISPOSAL: *DISPOSAL OF PESTICIDE CONTAINERS AND OBSOLETE PESTICIDES*

Niamey, Niger
January 21 - 26, 1990.

Edited by

Walter I. Knausenberger
Jude Andreasen and
Yeneneh T. Belayneh

Africa Emergency Locust/Grasshopper Assistance (AELGA) Project:
Agriculture and Natural Resources Division
Office of Technical Resources
Bureau for Africa

U.S. Agency for International Development
Washington, D.C. 20523

August, 1991.

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INTRODUCTION

Africa's steadily growing population and wide-spread food deficit require improved and sustainable agricultural productivity. Food self-reliance is a policy objective in many sub-Saharan nations, but this goal is significantly constrained by the losses caused by diseases, pests and weeds. As a result, increasingly large quantities of pesticides are being used to mitigate these problems, particularly in dealing with emergency situations. For example, from 1986 to 1989 international development agencies spent over $275 million on locust and grasshopper control programs in 23 African and Middle East countries. In 1988 alone, 14.5 million hectares were treated with 700,000 liters of pesticides during the peak of the desert locust outbreak. In the Sahel, the amount of grain crops lost to pests during this period is estimated to roughly equal the amount of grain imported under food aid programs.

Pesticide-related problems in Africa are multifaceted. The current trend of increasing pesticide use has, in many ways, already exceeded availability of technology for management and disposal of unused pesticides and empty pesticide containers. Over the past three decades, substantial stocks of pesticides have accumulated in Africa, particularly in response to the periodic upsurges of the desert locust. For instance, in Morocco alone, there are over 2 million liters of obsolete pesticides in addition to the 2.6 million liters of solvents that have been identified as unusable.

As estimated 80% percent of all pesticide imports in sub-Saharan African are donated or subsidized. Over the years many of these pesticides have become unwanted or unusable. Problems of pesticide stocks are often the result of excessive or inappropriately-timed donations, improper storage or packaging and inadequate labeling. Many stockpiles of pesticides have degraded and are considered hazardous wastes.

Empty pesticide containers are often used by resource-poor farmers for water and grain storage. This remains a major threat and a serious human health hazard, as no empty container can be absolutely free of pesticide, even after it is properly rinsed.

The existing pesticide-related problems in Africa have been highlighted in a number of recent meetings, seminars and workshops. For instance, an A.I.D.-funded workshop on Pesticide Management in East and Southern Africa was held in Nairobi, Kenya, from March 10-15, 1985. The workshop emphasized the need for improvement of pesticide management practices in Africa. An FAO-organized meeting on the use and hazards of dieldrin in desert locust control was held in Rome on October 21, 1988. Concerns regarding problems associated with old pesticide stocks, particularly dieldrin, and how to properly handle them were expressed in the meeting. FAO also conducted a Sub-Regional Workshop on Pesticide Management for Western Africa which was held in Accra, Ghana, September 4-8, 1989. The following recommendations were forwarded by the workshop: a sub-regional pesticide analytical laboratory for training, information dissemination and reference should be established; a survey to assess the extent of obsolete and unwanted pesticide problems as the first step towards finding proper solutions to these problems should be conducted; technical assistance agencies working on pesticide management in the sub-region should work in close collaboration; governments should give high priority for the distribution and implementation of FAO Code of Conduct for the Distribution and Use of Pesticides; governments should provide financial support for operation of pesticide regulatory and control schemes.

West African Regional Pesticide Disposal Conference: Disposal of Pesticide Containers and Obsolete Pesticides

As a response to the continent-wide existence of pesticide disposal problems and a follow-up to the September 1989 FAO Sub-Regional Workshop, USAID organized a regional conference on disposal of obsolete pesticides and pesticide containers, hosted by the government of Niger in Niamey, 21-26 January, 1990. The conference was funded under USAID's Africa Emergency Locust/Grasshopper Assistance (AELGA) project. The major emphasis of the conference were container disposal, management and disposal of obsolete stocks, public awareness of pesticide safety and disposal legislation. Although these themes were introduced in the FAO workshop on pesticide management held in Accra, Ghana, September 4-8, 1989, none of them were addressed, with the exception of pesticide legislation.

The conference was organized with the following objectives:

A. Provide delegates with the latest information regarding disposal of unwanted pesticides and empty pesticide containers.

B. Provide the opportunity to exchange ideas and develop pesticide disposal strategies appropriate to delegates' countries.

C. Formulate informal country action plans by each delegate proposing short and long-term approaches to addressing the disposal problem in the delegates respective countries.

Delegates from 15 of the 20 countries invited, were present. The delegates were officials responsible for pesticide management or crop protection in Burkina Faso, Cameroon, Cape Verde, Chad, Gambia, Ghana, Guinea-Bissau, Ivory Coast, Liberia, Mali, Mauritania, Morocco, Niger, Senegal, and Togo. Representatives from agrochemical industries, environmental groups, and international development agencies also attended the conference.

The conference was designed to allow for small-group work of delegates to ensure that the delegates have time to discuss country situations and identify how the information obtained from the conference can best be used to further their efforts. The small working groups were organized to allow both English and French speaking delegates to join in the discussion according to their language capabilities.

The topics covered in the conference were grouped under the following major categories:

- Container disposal
- Managing obsolete stocks
- Alternative methods of disposal and public awareness
- Pesticide stock management and pesticide disposal legislation
- Development of action plans.

During the meeting, a consensus on the definition of "obsolete pesticides" was reached. It was agreed that obsolete pesticides constitute those pesticides that are no longer usable based on one or more of the following criteria:

- Prohibited, legally restricted by national regulatory agency
- Replaced by more modern products
- Degraded formulations (chemical, physical), deteriorating containers
- No alternative uses within the country where stored.

Potential follow-up activities, including monitoring of the country action plan development process, were also identified. It was concluded that national action plans should begin with setting up an inventory system and immediate containment of especially hazardous stocks. Potential confusion could arise as to the types of pesticides that are considered banned or obsolete in one country and may not be treated the same way in another country. In this regard it was suggested that future inclusion of background information, such as reasons for any change in status of pesticides (e.g. changes in USEPA registration) will reduce the existing misconception and confusions regarding such pesticides.

The past assistance of the U.S. Government agencies, such as A.I.D., was often acknowledged. Participants anticipated that U.S. Government will be one of the more important sources of innovative disposal techniques and a possible source of funding for assessments, feasibility studies and pilot projects on waste disposal.

Walter I. Knausenberger
Yeneneh T. Belayneh

August, 1991.

COUNTRY REPORTS IN TABLE FORM

Country representatives were asked to prepare reports for the conference which would include an inventory, to the extent possible, of the obsolete or unwanted pesticides and empty containers stored in their respective countries. This information is often difficult to obtain, particularly in cases where pesticides are stored in isolated areas in the interior of the country. The invitational cable asked for the names, quantities, location, and condition of the stored products, which country representatives provided either in tabular or text form. For the sake of clarity, a standard format has been developed for presenting the collected information. The following tables reflect the information provided. Country participants are encouraged to use this format in conducting future inventories.

Quantity of Obsolete Pesticides — BURKINA FASO — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Heptachlor Thioral	Dust	(seed treatment)		1974	-	39,000 kg	Ouaga		Bags 25 g	Damaged
Fenitrothion	ULV	96%	-	1985	-	5,000 L	Djibo		Drums 200 & 60 L	Pierced, rusty
Endrin	-	-	-	1978	-	2,977 L	Fada		Bottles 250 cc	-
Monocrotophos/DDT Nuvocroncombi	-	-	-	1978	-	8,811 L	Fada		Bottles 250 cc	-
Propoxur	Dust	1%	-	1982	-	30,150 kg	Guaya		Drums 25 kg	-
Dimethoate Roxion	-	-	-	1982	-	900 L	Guaya		Drums 200 & 25 L	-
Baythion Phoxime	-	-	-	1982	-	800 L	Guaya		Drums 25 L	-
Dimethoate	-	-	-	1982	-	150 L	Guaya		Drums 25 L	-
Fenitrothion	ULV	-	-	1982	-	500 L	Guaya		Drums 50 L	-
Lindane	-	-	-	1982	-	50 L	Guaya		Drums 50 L	-
Dibromochloropropane Fumazone	-	-	-	1982	-	150 L	Guaya		Drums 50 L	-
Fenitrothion Accothion	-	-	-	1982	-	150 L	Guaya		Drums 50 L	-

Quantity of Obsolete Pesticides (cont'd.) BURKINA FASO January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Pirimiphos methyl Actellic	Dust	-	-	1982	-	982 kg	Guaya Dedougon		Bags 25 - 250 g	-
Acridicide	-	-	-	-	-	16 kg	Dedougon		Sachets 1 kg	-
	-	-	-	1976	-	1,950 L	Yatenga		Drums 50 L	-
Heptochlore + TMTD Thioral	-	-	-	-	-	72 kg	Dedougon		Bags 25 g to 1 kg	-

N.B.: In a commercial pesticide establishment, there are 6,700 kg of dieldrin delivered in 1986. Burkina Faso notes that prohibited active materials (by national law) are still used: DDT, DDD or TDE, HCH, dieldrin, endrin, chloralane, heptachlore, toxaphene, polychlorocamphanes, paraquat, diquat, hexachlorophene, captafol, chloramphenicol, cyhexatine, dinosebe, acetate of dinosebe, alachlore, chloral hydrate, DBB, TCA, DBBT, Ugilec 121 and 141. The empty containers are discarded in nature or other inappropriate places, or reused without having been decontaminated. The problem of elimination of stocks and empty containers has been acute since 1987. The CPS has been in contact with BUMIGEB (Bureau of Mines and Geology of Burkina) in order to study methods of destruction, and has met with Ministries of Agriculture and Husbandry, of Health, of the Environment and of Tourism, and of Economic Promotion. It is necessary to find a zone appropriate for the installation of an incinerator, either local or sub-regional, with the collaboration and support of international organizations.

Quantity of Obsolete Pesticides — CAPE VERDE — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Trichlorfon Diptrex		5%				15,500 kg			50 kg	
Phoxime	ULV	800 g/L				925 L			24 L	
Volaton	EC	50%				520 L			5 L	
Fenitrothion	Dust					50 kg			25 kg	
	WP	40%				425 kg			25 kg	
Fenthion	ULV	1000 g/L				800 L			25 L	
Racumin	Dust	0.75%				200 kg			1 kg	
		0.8%				100 L			1 L	
Bostar	EC	720 g/L				100 L			5 L	
Oxydemeton-Methyl Metasystox						300 L				
Chinomethionate Morestan	WP	25%				118 kg			50 kg	
Propineb Antracol	WP	70%				25 kg				
Triadimefone Bayleton	WP	25%				25 kg				
Phenamiphos Nemacur		25%				450 kg				
Dimethoate Perfekthion	EC	40%				1,600 L			1 L	
Empty drums						27			200 L	
						220			25 L	

Quantity of Obsolete Pesticides — CHAD — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Lindane	Dust	5%		1987		20,000 kg				
Lindane	ULV	300 g/L		1988		35,000 L				
Dieldrin	ULV			1981		3,000 L	Lere	Outdoors		
HCH				1984		39,000 kg				
Fenthion	ULV, EC	60 g/L				4,400 L				

N.B.: Other stocks were listed which date from 1986 - 1989 (fenitrothion, malathion, dursban, propoxur, etc.) which are probably still effective and usable, but which are often stored under poor and variable conditions. Chad also suffers from the dilemma of empty containers - nearly all the containers (drums, small barrels, jugs) are recovered and reused by farmers.

Quantity of Obsolete Pesticides — GAMBIA — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Diazinon	G	10%		1975	-	200 kg				Crystallized
Basudin	EC	60%		1977	-	20 L				Crystallized
Isopar L	-	-		1977	Esso-Sénégal	200 L			Drums	
Trichlorphon Diptrex	WP	-		1977	-	1,600 kg			Drums	
Thiram/Dieldrine Fernasan D	Seed dressing			1977	U.K.	60 kg			Sacks	
DDT	Dust	5%		1977	-	50 kg			Sacks	
Malathion	EC	50%		1977	-	600 L			Drums	
	EC	50%		1986	-	200 L			Drums	
Dichloromethane	-	-		1977	-	400 L			Drums	
Disola M-3015		-		1980	-	400 L			Drums	
Dimethoate + Metasystox Systoate/Doaphene		CE	-	1980	SSPC	400 L			drums	
Fenitrothion Folithion	ULV	96%		1986	Germany	600 L			Drums	
Endosulphan Thiodan	ULV	96%		1986	Sénégal	920 L			Drums	
Unknown: Poison (Rats)	Baits	-		1986	Japan	5,000 kg			Cartons	

Quantity of Obsolete Pesticides (cont'd.) GAMBIA January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Dimethoate Rogor	EC	40%		1986	-	50 L			Drums	
A Funack 60	EC	-		1986	Japan	4 L			Bottles 1 L	
Carbaryl Sevin-4-Oil	ULV	-		1987*	U.S.A.	600 L			Drums	
Malathion	ULV	96%		1987*	U.S.A.	34,000 L			Drums	

* This is the inventory of stocks received up to 1987, of indeterminate efficacy. Stocks of malathion and carbaryl received in 1987 are also included, although they were not necessarily "obsolete" at the time of the inventory.

Quantity of Obsolete Pesticides GHANA January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Parathion	EC			1985		4,800 L				Poor
DDVP	EC			1979		1,500 L				Poor
Propoxur Baygon				1979		128 L				Poor
Malathion	EC			1979		4,840 L				Poor
Propoxur	WP			1979		4,300 kg				Poor
Gobasul	WP			1979		8,875 kg				Poor
Tetron Sodium	-			1979		5,500 kg				Poor
Caroat	Dust			1979		6,720 kg				Poor

N.B.: Ghana emphasizes the importance of education and of sensitizing the population about the dangers of pesticides. Rural training sessions, financed by FAO, are reinforced by articles in newspapers and announcements on the radio about pesticides and their empty containers.

Quantity of Obsolete Pesticides GUINEA-BISSAU January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Propoxur	ULV		-			140 L				
Fenitrothion	ULV		-			9,000 L				
Fenitrothion	-		96%			245 L				
Malathion	ULV		-			6,000 L				
Chlorpyriphos Dursban 12	-		-			2,400 L				
Lindane	-		5%			4,000 kg				

In July, 1990, a consultant from EPA, in collaboration with the Bissau Crop Protection Service, completed the following inventory of obsolete pesticides:

Carbaryl Sevin	6,400 L	Nhoma
Dichlorvos DDVP	350 L	Contuboel
Dicofol Kelthane	600 L	Nhoma
Edifenphos Hinosan	600 L	Sonoco
Fenitrothion Agrothion	78 L	Bafata/Contuboel
Fenthion Baytex	100 L	Bafata
Phoxim Volaton	1,000 L	Contuboel
Triadimefon Bayleton	75 kg	Bafata
Unknown	200 L	Bafata

Quantity of Obsolete Pesticides — IVORY COAST — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Dieldrin Dieldrex	EC	20%		1979	Grass-hopper Project	2,500 kg	Bouafle		Drums 60 L	Poor
Isophenphos Oftanol										
Carbofuran Furadan										
Monocrotophos Nuvacron	EC	-		1986	Local	500 kg	Cotton Zone		Drums	Good
Oxadiazon Ronstar										
Benthiocarb + Propanil Tamariz										
Lindane	Dust/EC	-		1977	Local	-	Cocoa Zone		Sacks/Jugs 15 L	Unknown
DDT		-	-	1975	-	-	-		Sacks	Poor
Endrin		-	-	1977	-	-	Coffee Zone		Metal	Unknown
Propoxur	Dust	1%		1984	Local	-	Divo, Abeng., Boungo.		Sacks	Poor
2,4-D Herbazol										

Quantity of Obsolete Pesticides (cont'd.) IVORY COAST January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Bentazone + Propanil Basagran PL2										
Dipropetryne + Metolachlore Cotodon										
Fluometuron + Prometryne Cotogard										
Atrazine + Metolachlore Primagram										
Atrazine + Cyanazine Bellater										
Metribuzine Sencor										
Paraquat Gramoxone										

N.B.: With the exception of the above-mentioned obsolete stocks, development organizations order what they need according to demand. Commercial firms only produce large quantities as needed. Methods of elimination of stocks and containers remain inadequate: to bury the pesticides and burn the containers. UNIPHYTO has submitted a project for financing the construction of an incinerator to the Ivoirian Government.

Quantity of Obsolete Pesticides — LIBERIA — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition

N.B.: Liberia does not have old pesticide stocks. All pesticides are imported by commercial enterprises, who order the amount that they need for the agricultural campaign. However, the problem of reuse of empty containers persists. Farmers keep and reuse the small containers, and commercial firms release drums to individuals who sign a document stating that they understand the risk to their health and to the environment.

Quantity of Obsolete Pesticides — MALI — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Dieldrin	ULV	5%	-	>20 yrs	-	49,000 L	Gao		Drums 200 L	-
	ULV	20%	-	>20 yrs	-	4,800 L	Niono		Drums 25 L	-
	ULV	5%	-	5 yrs	-	200 L	Kayes, Yelimane		Drums 200 L	-
Procidacri	ULV	20%	-	>20 yrs	-	9,500 L	Tin Essako, Aguelhoc		Tank 5.000 L	-
Parathion ethyl	-	-	-	-	-	180 L	Niono		Jugs 5 L	-
	ULV	25%	-	-	-	450 L	Kayes, Yel.		Drums 25 L	-
Endrin Technical	-	-	-	-	-	150 kg	Niono		Drums 175 kg	-
HCH	Dust	25%	-	4 yrs	-	575 kg	Mourdiah		Sacks 25 kg	-
	Liquid	-	-	14 yrs	-	400 L	Kayes, Yel.		Drums 25 L	-
Fenitrothion	ULV	1000 ULV	-	-	OCLALAV	0	Kayes, Yel.		Drums 25 L	200 Old Drums
	ULV	50%	-	-	OCLALAV	0	Kayes, Yel.		Drums 25 L	600 Old Drums
					OCLALAV				Drums 200 L	40 Old Drums
	-	-	-	-	OICMA	0	Bamako		Drums 60 L	8 Old Drums
					OICMA	12,000 L	Bamako		Drums 200 L	70 Record. Drums
Lindane	-	20%	-	>15 yrs	OICMA	0	Bamako		Drums 20 L	28 Old Drums
Unknown	-	-	-	-	OICMA	0	Bamako		Drums 200 L	3 Old Drums
Chlorpyriphos? Procidea Roussel/ ULLAF		16%	-	>15 yrs	OICMA	18,000 L	Bamako		Drums 60 L	Old Stock

Quantity of Obsolete Pesticides — MAURITANIA — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Dieldrin	-	-	-	>30 yrs	-	204,450 L	5 regions		Drums	-
Malathion	-	-	-	>20 yrs	-	8,100 L	3 regions		Drums	-
Fenitrothion	-	-	-	>20 yrs	-	24,775 L	4 regions		Drums	-
Lindane	-	-	-	>20 yrs	-	1,340 L	H. Chargui		Drums	-
Malathion Zithiol	-	-	-	>20 yrs	-	100 kg	H. Chargui		-	-
HCH	-	-	-	>20 yrs	-	1,400 L	Assaba		Drums	-
Propoxur	-	-	-	>20 yrs	-	1,600 L	Assaba		Drums	-

Quantity of Obsolete Pesticides — MOROCCO — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
BHC	Liquid	15%	7%	>20 yrs	-	497,400 L	-	-	Drums	Corroded
		10%	10%	>20 yrs	-	271,200 L	-	-	Drums	Corroded
	Dust	-	-	>20 yrs	-	460,790 kg	-	-	-	-
	Bait	5%	-	>20 yrs	-	632,930 kg	-	-	-	-

N.B.: Morocco manages an enormous stock of insecticides, comprised of organochlorines (OC), especially BHC stored since 1961 for the locust campaign, and organophosphates (OP) and pyrethroids (2,000,000 L, in addition to more than 2,600,000 L of solvent) acquired during the recent cycle of grasshopper and locust invasions. Their old drums are continually corroding, and the OPs and pyrethroids are stored in newer drums of poor quality without shelter. They are also rapidly degrading, which will result in a considerable monetary loss, in addition to endangering the environment. Morocco is searching for a means to 1) destroy the OCs; 2) put in place large capacity cisterns or tanks in fiberglass or stainless steel; 3) construct hangars; 4) use or convert the OPs and the pyrethroids while awaiting an eventual invasion; 5) destroy or recondition the empty containers. Morocco continues discussions with USAID on the subject, and a feasibility study will be finalized and implemented in 1990. The cost of incineration of the OCs is estimated at 9 to 10 million $US, and the cost of 2) and 3) is estimated at 8 million $US.

Quantity of Obsolete Pesticides NIGER January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Dieldrin	ULV	20 g/L	-	-	OCLALAV Libya	27,060 L	Agadez		Drums 200 L Drums 50 L	Good/ damaged
Fenitrothion Sumithion	ULV	500 g/L	48 g/L 190 g/L	-	Nigeria	3,000 L	Niamey		Drums 200 L	Moderately damaged
		50%	10%		Nigeria		Zinder			
Endosulfan Thiodan	ULV	25%	40%	>10 yrs	-	1,000 L	Tahoua			
Endosulfan + * Calithion	ULV	*	50/356/92	>10 yrs	-	Minimal	Niamey			Poor
Dimethoate	-	400 g/L	15%		-		Niamey, Tahoua			
Pyrimiphos methyl Actellic	-	2%	0%		-		Niamey			
Lindane	Dust	5%	0%		-		Niamey			
Polyram 80W Maneb					-		Niamey			
Phorate	-	5%	<0,2%		-		Dosso			

* Endosulfan 165 g/L + DDT 275 g/L + Parathion methyl 83 g/L

N.B.: Niger is the only country which conducted an analysis of the stored pesticides in cooperation with GTZ of the Federal Republic of Germany.

Quantity of Obsolete Pesticides — SENEGAL — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Dieldrin Diemul	EC	0 g/L	-	>20 yrs	OCLALAV	42,600 L		Warehouse	Drums 200 L	-
Dieldrin Diemul	EC			>20 yrs	OCLALAV	3,600 L		Warehouse	Drums 200 L	-
Endosulfan Thimul	EC	350 g/L	-	>4 yrs	-	150 L		Warehouse	Drums 50 L	-
Carbofuran	G	98%	-	>5 yrs	-	1,200 kg		Warehouse	Sacks 25 kg	-
Hexapoudre HCH	Dust	25%	-	>20 yrs	OCLALAV	55,000 kg		Warehouse	Sacks 25 kg	-
Lindane	ULV	300 g/L	-	1988	-	10,010 L		Warehouse	Drums 50 L	-
DDT + * Zeidane	EC	225 g/L	-	>15 yrs	OCLALAV	110 L		Outdoors	Jugs 5 L	-
Coumafene Wafarin	bait	0.025%	-	>3 yrs	-	6,800 kg		Warehouse/ Outdoors	Sacks ?	-
Atrazine	EC	500 g/L	-	>5 yrs	-	50 L		Outdoors	Jugs 5 L	-
Isopropaline	EC	750 g/L	-	>5 yrs	-	30 L		Outdoors	Jugs 5 L	-

* DDT + Endosulfan (162 g/L) + Parathion M. 81 g/L

Quantity of Obsolete Pesticides (cont'd.) SENEGAL January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial		Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Fenitrothion	ULV	500 g/L	-		>3 yrs	-	7,945 L		Warehouse	Drums 50 L	-
Sumithion	EC	500 g/L	-		>3 yrs	-	4,020 L		Warehouse	Drums 50 L	-
	Dust	2%	-		>3 yrs	-	700 kg		Outdoors	Plastic Sacks	-
Malathion	EC	500 g/L	-		>3 yrs	-	9,025 L		Warehouse	Drums 50 L	-
Pyrimyphos Methyl Actellic	Dust	2%	-		>3 yrs	-	1,600 kg		Outdoors	Plastic sacks	-
Fenthion	ULV	600 g/L	-		>20 yrs	-	620 L		Warehouse	Drums 50 L	-
Parathion	EC	25%	-		>20 yrs	-	2,300 L		Warehouse	Drums 50 L	-
	EC	95%	-		>20 yrs	-	900 L		Warehouse	Drums 50 L	-
Propoxur Undene	Dust	1%	-		>3 yrs	-	15,440 kg		Warehouse	Plastic Sacks	-
Cypermethrin Cymbush	ULV	15 g/L	-		>3 yrs	-	20 L		Outdoors	Jugs 5 L	-
Deltamethrin	EC	25 g/L	-		>3 yrs	-	40 L		Outdoors	Small Metal Containers	-
Deltamethrin	Dust	0.05%	-		>3 yrs	-	1,500 kg		Warehouse	Sacks 25 kg	
Unidentified products							200 L		Outdoors	Drums 30 L	
C. 8% + Maneb 64%**	Dust	8%/64%	-		>5 yrs	-	50 kg		Outdoors	Sacks	-
B. 7% + Maneb 48%***	Dust	7%/48%	-		>4 yrs	-	1,700 kg		Warehouse/ Outdoors	Drums 60 L	-

** C. = Carbendazime
*** B. = Benomyl

Quantity of Obsolete Pesticides (cont'd.) SENEGAL January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition
Fenitrothion or Malathion						0			12 Drums Metal 200 L	Poor
Malathion						0			7 Drums Plastic 203 L	Poor
Carbaryl						0			96 Drums Metal 114 L	Good
Fenitrothion						0			1,714 Drums Metal 50 L	Good
						0			100 Drums Metal 50 L	Poor
						0			243 Drums Metal 30 L	Poor
						0			40 Drums Metal 25 L	Poor

Quantity of Obsolete Pesticides — TOGO — January 1990

Active Ingred. / Commercial Name	Formulation	Concentration Initial	Concentration Current	Year of Manufacture	Source	Quantity	Storage Location	Storage Type	Container Type	Container Condition

Togo does not have a problem with stored obsolete pesticides. Their biggest problem is the reuse of 3-liter plastic jugs having contained ULV formulations (pyrethroid and organophosphate). On an annual basis, more than 52,000 empty plastic jugs are put into circulation in rural milieu instead of being destroyed.

In 1981, approximately 5 tons of various products were destroyed by burning in a deep, rock-lined pit. In 1985, 9 tons of products (liquid and powder formulations) were buried in a concrete pit. Since, the Crop Protection Service has tried to plan its acquisitions of pesticides so as to avoid a large stock which will need to be stored for a long time.

ABSTRACTS OF TECHNICAL PAPERS

PESTICIDE CONTAINER DISPOSAL PROBLEMS: AN OVERVIEW

Janice King Jensen
Office of Pesticide Programs (H-7507C)
U.S. Environmental Protection Agency

"Empty" pesticide containers pose a serious problem for all countries, but especially developing countries. Discarded drums and containers, many leaking chemicals, may create serious pollution problems, particularly if they are left where chemicals can leak into water. For example, in the South Pacific Island Commonwealth of Northern Mariana Islands, seventy-five cattle died from drinking water in old and discarded drums which had originally contained an organoarsenate herbicide.

In developing countries, pesticides are sold in a wide variety of container sizes and materials. This variety magnifies the problems of developing a generic container disposal method. There are cases in which pesticides are sold in containers not originally designed for holding pesticides. In Somalia, diazinon powder was stored in bags that had originally contained donated grain. In Kenya, pesticides were being sold in old liquor bottles.

What is the magnitude of the problem? In Morocco, for example, it is estimated that there are more than 7,000 steel drums (200 liter) for disposal. During the locust campaign in Senegal in 1988, it was estimated that the three big planes in service there could use over 150 drums daily, creating a major problem with drum disposal.

Additionally there is the problem of drums not being adequately drained after use. In Sudan, for instance, it has been observed that during aerial spray operations, returned "empty" containers frequently contain more than 5 liters of pesticide.

Used pesticide containers are valuable commodities. In Sudan, one empty drum is worth about the same as the wages earned in one week by a semi-skilled worker such as a car driver. And people persist in using them for carrying water, food and feed as well as for a variety of other purposes. Even when a container is empty, dangerous amounts of chemical may still remain. Poisonings often occur from the use of discarded pesticide containers for food and water storage. Other typical uses of containers are: used for walls of open, roofed stores or similar purposes; used as pit latrines; used as flow regulators for irrigation; and used as charcoal stoves.

There are no easy answers to the problems associated with container disposal. A key objective of this conference was to discuss the available, practical, environmentally sound, cost-effective options for empty container management in order to avoid the types of problems described in this paper.

SAFE DISPOSAL OF EMPTY CONTAMINATED PESTICIDE CONTAINERS

Keith S. Johnson
ICI Agrochemicals, U.K.

Large numbers of emptied contaminated containers emerge from the production and re-processing of agrochemical products.

The containers cannot be fully cleaned and detoxified to an acceptable standard for alternative use outside the pesticide industry as pesticide residues adsorb strongly into the walls of containers and over a considerable period of time continue to leach out into the liquid medium subsequently placed in the container.

The prime concern is that the containers are often used for storage of drinking water, food stuffs and animal feed thus involving risks of toxic exposure and poisoning.

These reasons alone justify a policy of non-re-use except within the industry for all containers which have contained pesticide active ingredients.

Two methods employed to ensure that empty containers are rendered unusable and properly disposed are described.

a. Decontamination and Immobilization:

Empty plastic and metal pesticide containers need to be properly washed to remove product residues before disposal.

Plastic containers are produced in 1-25 liter range which makes individual treatment labor intensive. Therefore, these containers should be mechanically shredded and the fragments subsequently washed before incinerating or disposing of in burial landfill.

Steel drums are manufactured in larger sizes, 25 and 200 liter drums for liquids and 50 kg drums for dusts. These containers should be punctured and crushed using drum crushing equipment. Ideally before disposing metal containers, they should be rinsed with water and detergent to remove residues or dry sand or other absorbent should be added to soak-up liquid residues.

By placing small containers inside larger drums it is possible to crush an assorted range of these into compact bundles of much smaller volumes of the original. Crushed drums should finally be disposed either to a steel smelter or to burial in a licensed landfill site.

b. Treatment of Contaminated Washings:

Aqueous washings from contaminated container washing operations are toxic and polluting.

A simple combined treatment of chemical flocculation and physical adsorption that could produce high quality detoxified effluent suitable for re-use in drum washing operations is described.

A portable treatment unit capable of treating 1 cubic meter batches of wash waters is currently available on the market. This unit is designed for use by non-technical operators in the field employing the use of standard packs of treatment chemicals and modular units of adsorbents.

FEASIBILITY OF RE-USE/RECYCLING OF 220 LITER STEEL DRUMS WHICH PREVIOUSLY CONTAINED PESTICIDE PRODUCTS

Daniel W. Barber
NBADA-The Association of Container Reconditioners

This paper presents an overview of a process of the management of steel drums when used in the transport of dangerous goods, known as "Responsible Container Management." The purpose is to address economic, legal, and regulatory concerns associated with this activity.

The process is recommended to drum users by the steel drum reconditioning industry in the United States, which processes approximately forty-two million used, empty steel drums a year for secondary use in a variety of product applications.

The industry plays a key economic role by providing drums at a lower cost than that of new drums, utilizing technology which is environmentally sound and provides employment for over three thousand people.

The industry also provides an infrastructure at over one hundred locations across the United States which functions in the final disposition of drums no longer capable of performing, through neutralization of the used container from the product previously contained, prior to recycling the material by the steel industry.

"Responsible Container Management" has several key elements; three are discussed: selection of the original container specification, a management audit to assist in selection, and final disposition of the empty used drum.

The paper also refers to the January 1, 1991 adoption date of the United Nations Performance Oriented Packaging Standards by many nations, including the United States.

Concluding comments are directed to an overview of the steel drum reconditioning process and the value of the empty, used drum as a recyclable material.

OVERDRUMS FOR PESTICIDE CONTAINERS

L.S. Dollimore
Shell International Chemical Company Limited

Overdrums are large drums with removable heads, designed so that a conventional drum can be placed inside and the top sealed. They are used to contain conventional drums that are either leaking or are liable to develop leaks. They are designed for short-term containment and are available in a range of sizes from specialist suppliers. They are also referred to as overpack barrels.

The leaking drum should be raised using a lifting strap, sling, or other device and then lowered into the overdrum and the lid sealed in place. Some types of lifting straps are designed to be left around the inner drum to facilitate its easy removal.

The important considerations when purchasing and using overdrums are:

1. Size.

   Leaking drums are frequently also distorted. The overdrum must therefore be large enough to hold distorted drums. For example, a 330- to 360-litre drum may be required for a distorted 200-litre drum.

2. Shelf Life.

   Normal overdrums are designed for short-term containment. If extended storage is likely, particularly in severe climates and with a leaking product incompatible with mild steel, then overdrums with a lacquer lining and with an outer primer undercoat and epoxy top coat may be required. In extreme cases, either galvanized or stainless steel drums could prove necessary.

3. Cost.

   Subject to order size, a normal 360-litre overdrum can be obtained for around US$70. Galvanized overdrums are two to three times more expensive and stainless steel overdrums are up to ten times more expensive.

4. Safety.

   Very stringent safety precautions are required when loading overdrums, because of both the hazardous nature of the products and the potential fragility and weight of the corroded and leaking container.

   Two major international suppliers of overdrums and their lifting devices are Mauserwerke GmbH, Bruehl, West Germany and Skolnik Industries Inc., Chicago, USA.

MICROBIAL AND CHEMICAL DEGRADATION OF PESTICIDES

Cathleen J. Somich, Ph.D.
Agricultural Research Service
U.S. Department of Agriculture

Treatment options for the disposal or detoxification of unusable pesticide stocks include: bioremediation (enzymatic or microbial processes), chemical degradation (hydrolysis, dechlorination, photolysis, oxidation), or a combination of methods. Disposal generally refers to the elimination of environmental toxicity and transformation to innocuous products or mineralization, i.e., breakdown into water, carbon dioxide, ammonia, and salts. Conversely, detoxification usually refers to the removal of acute human toxicity of the pesticide although products of unknown toxicity remain.

Enzymatic processes are detoxification techniques whereby an enzyme is mass-produced and used to catalyze a specific reaction in a waste stream of known composition. Advantages include rapid reaction rate and potential recovery of the enzyme; disadvantages are the cost of production, denaturation under non-ideal conditions, and reaction specificity.

Microbial degradation results in the complete mineralization of pesticides. Pure cultures or consortia (groups) of micro-organisms have been isolated that degrade carbamates, organophosphates, and recently chlorohydrocarbons such as BHC. Consortia must tolerate waste stream conditions and effectively remove inhibitory products because high concentrations of these products can cause the system to become biostatic. Advantages are complete mineralization, production of additional reagent (microbial growth), and self-regulation by the microbial consortium. These processes, however, are relatively slow.

Chemical degradation methods are detoxification techniques. Alkaline hydrolysis is rapid and can be carried out under much higher concentrations than bioremediation processes, however, this reaction is specific to carbamates, pyrethroids, and organophosphates. Formulations may act as buffers and inhibit or retard hydrolysis. In dechlorination, chlorine is removed with strong base, but the products can be toxic; for example, lindane, when treated under these conditions, affords trichlorobenzene. Photolysis requires that the energy absorption spectrum of the pesticide overlap with the emission spectrum of the light source. The ultraviolet light emission spectrum of the sun does not overlap with the absorption spectrum of most pesticides, so an artificial light source must be used to affect a chemical reaction. Sunlight can be used, however, as a source of heat energy to concentrate or evaporate the pesticide. Photolysis is usually rapid, but absorption of the light energy by the formulating agents can impede the reaction rate and in some cases totally quench any reaction. Many compounds are also susceptible to oxidation using ozone and/or hydrogen peroxide.

Chemical treatments significantly enhance microbial mineralization of most hazardous materials. Thus, combined chemical treatment - bioremediation schemes can be broad spectrum exploiting the most effective steps of each process. All of these processes are currently under development and are not yet marketable. Some may not be commercially available for ten years. Technical expertise, analytical capabilities, and capital are required. Finally, the concentrated material must be diluted with water, which in many areas can render most of these options inapplicable.

PESTICIDE DISPOSAL DEMONSTRATION VIA THERMAL DESTRUCTION IN A CEMENT KILN IN PAKISTAN

Gudrun Hartig Huden
Office of U.S. Foreign Disaster Assistance
Agency for International Development

Pakistan's most modern cement factory at Dera Ghazi Khan, the Punjab, was the site of the OFDA-sponsored pilot pesticide disposal project. With the blessing of the Environmental Protection Agency of the Punjab and the GOP Ministries of Agriculture, Production, and Finance, 12,000 liters of organophosphate and 5,500 liters of organochloride pesticides were collected from seven storage sites in the Punjab in November 1989 and burned during the normal process of cement-making in December 1989. Planning involved an environmental assessment and logistics plan, and the collection and transport was preceded by safety training of workers.

The objective of this project was to demonstrate destruction efficiency and environmental safety while maintaining quality of cement production.

The pesticides were injected into the firing zone as a "cocktail": the organophosphates at a rate of up to 3 liters/minute; the organochlorides at a rate of 1.3 - 2 liters/minute. The burn itself was uneventful and was accomplished over the course of 5 days.

While awaiting analysis of emissions sampling, some important conclusions can be drawn about prerequisites for large-scale pesticide disposal operations using cement kilns. Considerations should include:

- analytic capability to determine nature of formulation of waste pesticides to be destroyed (percent of active ingredient);
- official fiat from Government Ministries;
- transport and logistics;
- security;
- full concurrence from cement manufacturer;
- incentives;
- labor unions; and
- public relations and NIMBYS (Not In My Back Yard Syndrome).

With the proper groundwork having been laid, we conclude that if it was possible in Pakistan, it may be possible most anywhere.

DISPOSAL OF PESTICIDES AND CHEMICAL WASTE IN A CEMENT KILN IN MALAYSIA

Wolfgang A. Schimpf
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
Pesticide Service Project
West Germany

Destruction of chemical waste without pollution of the environment is a general problem. In industrial countries the problem is solved by incinerators and chemical dumps, which are usually not available in developing countries.

An alternative method for small quantities of pesticide waste and organical solvents is the incineration by means of rotary kilns, which are used in cement plants.

Rotary kilns operate at high temperatures of around 1850°C in the flame of the oil-burner and between 1250° - 1450°C in the clinker. Due to the high temperature and the long residence time in the rotary kiln, pesticide waste can be destroyed without the formation of the dangerous substance dioxin.

In the Malaysian-German Pesticide Project, the following method is used:

- Solid pesticide waste is dissolved in kerosene.
- Concentrated liquid waste is diluted in kerosene. The mixture of waste and kerosene is poured into the storage tank of the waste introduction system.

The advantages of dissolving/diluting the pesticide waste in the fuel are:

- The concentration of the pesticide is reduced considerably.
- The pesticide waste is not incinerated all at once, but over space of time.

This is a technically simple and cheap method suitable for developing countries.

ALTERNATIVE METHODS FOR DISPOSAL OF OBSOLETE PESTICIDES

Janice King Jensen
Office of Pesticide Programs (H-7507C)
U.S. Environmental Protection Agency

This paper has a three-fold objective: to summarize a variety of potential technologies for the disposal of obsolete pesticides in Africa; to serve as a general reference; and to stimulate discussion regarding the feasibility of these technologies in each specific country. Each of the alternatives listed below is discussed in detail in the paper, with the information summarized as follows:

FEASIBILITY OF DISPOSAL ALTERNATIVES*

Method of Disposal	Semi-Solid	Solid	Liquid
Incineration Disposal			
Rotary Kiln	F	F	F
Transportable Incinerator	F	F	F
Liquid Injection	U	U	F
Co-Firing	F	F	F
Open Burning	Q	Q	Q
Vulcanis-Type Ocean-going Ship	Q	Q	Q
Chemical Disposal	U	U	F
Microbial Disposal	U	U	F
Physical Disposal	Q	Q	Q
Land Disposal Technology			
Landfill	Q	Q	U
Land Application	Q	Q	F
Disposal Pit	Q	Q	Q
Burial	U	Q	U
Shipment to Developed Country			
Land Burial	U	Q	U
Reprocessing	Q	Q	Q
Incineration	F	F	F
Long-Term Secured Warehousing	U	Q	U
Reformulated In-Country			
Product Easily Disposable	Q	Q	Q
Suitable for Application	U	U	U

F means the technology is feasible; U means unacceptable; Q means questionable.

* Based primarily on the World Environment Center "Evaluation of Disposal Options Re: Pesticide Wastes in East Africa--The Sudan, Ethiopia, Kenya and Somalia" (1987)

PUBLIC AWARENESS ABOUT THE DANGERS OF PESTICIDE USE

Jude Andreasen
Office of Pesticide Programs
U.S. Environmental Protection Agency

Many of the pesticide poisonings which occur in developing countries befall an uninformed public, people not reached by applicator safety training programs, who are unaware of the level of danger from the products, and who use the empty containers for storing food and water.

Training the public is the task of extension agents, non-governmental organizations, rural development project personnel, and volunteers from developed countries serving in villages. Village-level training can be very effective if the trainer is competent and has access to resources. Women should be included in village-level pesticide awareness campaigns, since they are frequently the users of pesticides, and they are responsible for storing and preparing the family's food and water. First aid techniques for cases of pesticide poisoning should be included in village-level training. Visual aids, such as posters, printed fabric, and calendars, are useful tools in addition to structured training. Rural radio programs with pesticide safety as the message have been successfully used in many countries. In addition to this type of public education, governments should pursue ways of eliminating the container problem, such as assuring the availability of new, affordable containers, prohibiting the importation of the most highly toxic pesticides, instituting container recycling or reconditioning programs, and supporting programs geared to lower pesticide use and integrated pest management.

PESTICIDE DONATIONS: THE NEED FOR BETTER INTERNATIONAL COLLABORATION

Janice King Jensen
Office of Pesticide Programs (H-7507C)
U.S. Environmental Protection Agency

In many developing countries, especially in Africa, serious problems already exist with large stocks of obsolete and over-age pesticides. These stocks are often improperly stored and often represent an imminent hazard to the surrounding population and environment. Many of these problems can be traced back to pesticide donations from international and bilateral organizations. These problems are caused by several factors:

- inappropriate package size;
- formulation instability;
- poor storage conditions;
- inappropriate pesticide donations;
- poor labels;
- unsolicited donations; and
- bad products.

To reduce these problems in the future, recipient countries and donor organizations should fully cooperate and collaborate among themselves. Guidelines and internal policies should be developed by donors which are aimed at reducing to an absolute minimum the excessive donation of pesticides. These should include the following points:

- establish responsibilities and standards;
- encourage donor/recipient country dialogue;
- know what questions to ask;
- provide a method for the disposal of excess pesticides; and
- encourage training with pesticide donations.

A serious need exists to encourage international donors and national governments to be more responsible in the area of pesticide management. To reduce disposal problems associated with pesticide donations in the future, guidelines and internal policies should be developed by donors to reduce, to an absolute minimum, excessive donations of pesticides. This would be an appropriate way to encourage more responsible pesticide management in developing countries.

UPSTREAM/DOWNSTREAM OF THE TECHNICAL SOLUTIONS

Marie Noël de Visscher
PRIFAS/CIRAD, Montpellier

The management of empty containers and of outdated stocks of pesticides poses a problem which can not be solved by increasing the efficient use of pesticides only. The problem arises before (upstream) as well as after (downstream) the application of pesticides.

BEFORE: The goal is to manage the use of pesticides in such a manner as to reduce the quantity requiring storage, i.e., to reduce the number of empty barrels or containers, in order to minimize the production of pesticide waste. To achieve this goal we must strive to:

1. Improve: (a) criteria for pesticide application; (b) identification of target; (c) choice and quantity of products and the methods of application; (d) procedures and techniques of pest control services.

2. Facilitate management by implementing, in different countries, appropriate legislation focused on reducing the number of effective active ingredients authorized for use.

3. Determine the quantity and composition of the stocks of pesticides as well as the pattern of pesticide use in relation to need. A database of the status of the stocks in relation to their acquisition and use would be ideal if it were updated regularly by the plant protection service. Another problem to be solved is the rapid deterioration of the labels on the containers while in the warehouses.

All the activities mentioned above must be accompanied by training efforts and information dissemination.

AFTER: The problem at this stage is the neutralization of the "empty" containers.

1. Barrels and other containers are never completely empty. It is dangerous to burn or bury them. Possible solutions: reconditioning and recycling, rinsing procedures, or a system of deposit on containers. These must be studied in depth.

2. Users must be trained and informed at all levels. The agricultural extension services will be relied upon for these efforts in Africa.

3. Disposal of pesticide wastes raises problems of financing. In West Africa, the responsibility for disposal will fall to the governments unless suppliers and distributors agree to do it.

AVOIDANCE OF OBSOLETE PESTICIDE STOCKS

L.S. Dollimore
Shell International Chemical Company Limited

There are three principal areas requiring special attention by purchasers of pesticides if obsolete stock accumulation is to be avoided, namely:

- product quality;
- container and label quality; and
- stock management.

The key recommendations for each area are as follows:

1. Product quality:

   - buy from reputable suppliers because they will ensure good product stewardship support
   - select products that have shelf-lives appropriate to the circumstances and ensure batch numbers and dates of manufacture are printed on the drums
   - buy according to strict specifications, e.g., FAO or WHO, and request a certificate of analysis from the supplier
   - request light-coloured drums because they will ensure lower product temperatures in direct sunlight and hence less thermal stress

2. Container and label quality:

   - ensure the container will withstand the longest anticipated storage period under local conditions. For example, with steel drums this can include using a primer undercoat and epoxy topcoat (2 coats), and heavier duty steel (16 gauge)
   - specify labels (printing, facing, and adhesive) to have good resistance to the product, water, fading, and scuffing

3. Stock management:

   - avoid overstocking
   - protect against rain and sun, and follow good stacking practice
   - keep good stock records and handle products carefully
   - follow the principle of "first in, first out"
   - inspect stock regularly and use trained operators

If the above recommendations are followed, then the likelihood of obsolete stocks accumulating will be considerably reduced.

PESTICIDE STORAGE AND MANAGEMENT

Walter I. Knausenberger
Bureau for Africa - AFR/TR/ANR
U.S. Agency for International Development

Proper management of pesticide stocks is a process involving the following elements:

Pre-Campaign Decision-Making and Planning

This must be done in the context of a national campaign plan whose objectives are to apply pesticides only as needed--based on survey data and specific treatment decision criteria--and to prevent pesticide shortages or oversupply. National crop protection services and donors should:

- determine what chemicals and the probable quantities which will be required, and where;
- ascertain the sites and facilities available for storage, and conditions there which should be improved;
- specify appropriate formulations and packaging (size and type) early in the planning process, suitable for rough handling and tropical conditions, to protect the effectiveness and useful life of the products. A.I.D. promotes the use of smaller drums (e.g., 100-liters);
- insist on full and proper labelling, in at least two appropriate languages, including at minimum: product name, active ingredients, and formulation; net contents; name and address of manufacturer; and first aid and disposal recommendation. Special conditions or precautions should be specified. And
- refuse to consider unsolicited donations of pesticides.

Pre-positioning

To enhance accessibility on short notice, chemicals should be strategically pre-positioned in appropriate sites as near as possible to the sites of treatment.

Pesticide Banks

Donors should consider establishing pre-purchased stocks of pesticides maintained in the donor nation or at an appropriate transshipment site en route to the recipient nation. These stocks then could be mobilized on fairly short notice (10 to 20 days) to the country where they are needed.

Adherence to Effective Practices of Pesticide Storage:

1. Have a special place for storage:
   - keep it fenced or locked
   - label it with warning signs
   - should be away from food, feed, seed and water
   - keep it well-ventilated
   - should be as far from living areas as possible
2. Keep non-qualified people and children away from this special storage area.

3. Use properly labeled containers for pesticide storage:

   - store pesticides in their original labeled container
   - specify size and type of packaging early in planning process

4. Be familiar with and know how to anticipate and correct common storage problem situations:

   - improper storage
   - pesticide deterioration
   - leaks
   - fires
   - flooding
   - strong vapors

5. Maintain a good inventory of the types and quantities of pesticides/products stocked in the storage area:

   - establish inspection procedures
   - establish active ingredient testing procedures
   - plan disposal options for empty containers

PESTICIDE DISPOSAL, LEGISLATIVE MEASURES AND FAO ACTIVITIES

F.W. Kopisch-Obuch
FAO, Rome

There is a growing need for legislative measures to guarantee environmentally sound disposal of pesticides and containers. Over-supply and stocks of pesticides banned after their acquisition and distribution can cause disposal problems. Also disposal by users may contaminate the environment. Disposal of pesticides and containers and treatment of contaminated soil is costly.

A number of internatical guidelines, conventions, and recommendations make the international movement of dangerous goods extremely difficult, if not impossible; disposal problems have to be solved almost exclusively on a national level. Countries without pesticide regulations depend on international guidance.

Besides legislation and regulation, other prerequisites for a disposal system include:

- proper implementation and enforcement procedures;
- provision of adequate facilities for disposal; and
- training at all levels.

The International Code of Conduct on the Distribution and Use of Pesticides may be useful in the resolution of disposal problems such as:

- disposal as such, following the relevant FAO guidelines; and
- prevention of disposal problems, in adherence to the Code.

The articles of the Code address various parties and assign responsibility for actions which will directly or indirectly influence solutions to disposal problems:

1. Responsibilities of governments:

   Article 3: Pesticide Management
   Article 4: Testing of Pesticides
   Article 5: Reducing Health Hazards
   Article 6: Regulatory and Technical Requirements
   Article 7: Availability and Use

2. Responsibilities of industries (in addition to 3, 4, and 6 above):

   Article 8: Distribution and Trade
   Article 10: Labelling, Packaging, Storage and Disposal

3. Responsibilities of governments AND industries:

   A close joint collaboration of the two entities in order to:

   - coordinate education programs;
   - disseminate information to all concerned;
   - conduct post-registration surveillance or monitor studies; and
   - provide safe storage and safe disposal at warehouse and farm level.

FAO has developed a tentative Pesticide Disposal Action Plan which needs more expert advice before obtaining international recognition.

USA REGULATIONS ON THE DISPOSAL OF PESTICIDES

Janice King Jensen
Office of Pesticide Programs (H-7507C)
U.S. Environmental Protection Agency

The United States Environmental Protection Agency was created by the U.S. Congress in 1970 from several existing groups, and was charged with implementing environmental laws. This included developing and issuing rules and regulations consistent with legislation, as well as conducting enforcement work.

The law that regulates pesticides is called FIFRA, which stands for the Federal Insecticide, Fungicide, and Rodenticide Act. FIFRA is an old law that dates back to 1947, with amendments added by Congress as needed. Basically, FIFRA is a labelling law. That is, if it is on the label, it is enforceable. Labels are approved after very strenuous registration requirements, such as toxicology and environmental fate studies. Legislative authority for disposal is in Section 19 in FIFRA.

Before 1988, EPA only had limited legislative authority in Section 19 to address disposal. Because of this limited authority, in 1974 EPA recommended procedures, not enforceable regulations, for the storage and disposal of pesticides and its containers.

However, all that changed in 1988, when Congress expanded EPA's authority to regulate the storage, transportation, and disposal of pesticides. In addition, EPA is now authorized to require data on storage and disposal methods from industry before a pesticide is registered. Also, EPA is authorized to establish labeling requirements for the transportation, storage, and disposal of pesticides and its containers. The new law also enables EPA, for the first time, to take direct enforcement action against violations of storage, disposal, and transportation requirements.

The 1988 amendments eliminate from FIFRA the requirement that EPA, upon request, must accept suspended and canceled pesticides and dispose of them at government expense. Under the new law, EPA may require industry to recall these products.

Because of the major problems in the U.S. with container disposal, 1988 amendments required that EPA write regulations on pesticide containers to make them safer to use, easier to clean, and easier to dispose. These Section 19 regulations must be finalized by December 1991.

DISPOSAL OF OBSOLETE PESTICIDE STOCKS IN WEST AFRICA

Joseph Thornton
Greenpeace USA

Greenpeace is very concerned that large quantities of unused and unusable pesticides, particularly chlorinated hydrocarbons such as dieldrin, lindane, and hydrochlorobenzene, be disposed of in a way that does not endanger public health and the environment in West African nations. Greenpeace does not support incineration as a viable option for disposal because of their belief that the processes of waste combustion are not sufficiently understood, and that toxic products such as polychlorinated dioxins and furans could be emitted even from high-temperature incinerators if combustion is incomplete. Furthermore, their position is that the efficiency of incinerator operation is difficult to monitor due to the weak correlation of indicators (e.g., temperature, oxygen) with performance (destruction efficiency), and that fluctuations in incinerator conditions may result in pollutant emissions, termed Products of Incomplete Combustion.

Because lindane, dieldrin, and BHC are persistent, bioaccumulative, and toxic at low doses, their release, or that of the by-products of their combustion, could pose a threat to organisms at upper trophic levels of the food chain. As such, the approach preferred by Greenpeace is to place them in secure and monitored storage until appropriate detoxification methods (chemical or biological) are developed. Greenpeace advocates a "Return to Sender" policy for unwanted pesticide products, and suggests that pesticide wastes be retrieved and shipped back to the producer for storage at the producer's or donor's expense until clean technologies for waste treatment are developed.

ABSTRACTS OF SPECIAL REPORTS

DIELDRIN RISK REDUCTION - IMPLEMENTATION PLAN

Issoufou Denga, Crop Protection Service of Niger
and
Charles Kelly, USAID Niger

Still in use in Niger, dieldrin is an organochloride pesticide, totally restricted or severely limited in many countries because of the bioaccumulative and persistent nature of this type of pesticide. By its very nature, dieldrin presents a long-term risk to humans and to the environment.

Soil contamination through leakage and degradation of the barrels are the two main sources of immediate risk in Niger. The seriousness of the risk was assessed in five storage centers in the country. Two centers, Arlit and Tchintoulouse, reported leakage and soil contamination, a pressing problem; furthermore, the need to ensure proper containment and storage for damaged, deteriorating, and potentially deteriorating dieldrin barrels was identified in all five centers, though this is considered a relatively less pressing problem.

DIELDRIN RISK REDUCTION PLAN

A plan is proposed to reduce the human and environmental risk posed by the pesticide. The strategy calls for the involvement in the implementation plan of key local government authorities and ministries, donors and companies, and suggests the temporary creation of an office within the Ministry of Agriculture and Environment designated to coordinate all the plan's actions. The plan is to be implemented in two phases: Phase I addressing the immediate, high risk problems; and Phase II addressing long-term safety of the population and the environment.

Phase I

General activities include: 1) the designation by the Government of a special site for safe storage; 2) the training of all personnel who will implement the plan; and 3) the medical testing of all the participating personnel before, during, and after the testing, containment, and storage operations. Site-specific actions are prioritized by immediate risk level.

Other activities include: sampling and protective measures; containment and storage of damaged barrels; transportation of damaged barrels; and soil recovery.

Phase II

The objective of this second phase is to establish procedures for the centralization and secure storage of dieldrin and the decontamination of warehouses and yards where it was previously stored. The objective of this phase is expected to be reached in 5 years.

NIGER BARREL DISPOSAL PLAN

Issoufou Donga, Niger Crop Protection Service
and
Charles Kelly, USAID Niger

Niger representatives presented a draft plan for the safe disposal of empty barrels which had previously contained organophosphate pesticides. The plan was to be implemented at the departmental level, and included descriptions of the decontamination process, the facilities, personnel and equipment needed, and alternative uses for the decontaminated barrels. The plan is summarized as follows:

Decontamination Procedure: The barrels are to be drained and rinsed three times with 10 liters of alkali solution, either by use of a pump spray or rolling the sealed barrel for agitation. The barrels are then rinsed with 20 liters of clear water and drained for at least 30 minutes. All rinsate is to be stored for later disposal in barrels which have been decontaminated. The rinsate can either be applied by aircraft over barren ground during the dry season or evaporated to a sludge in a sump pit, for later incineration or burial in low permeability soil. Tops and bottoms of barrels are to be removed and the barrels split. It should be noted that the alkali rinsate itself requires precautions in use.

Facilities/Equipment: The decontamination facility should be isolated from unauthorized access, have basic sanitation facilities, adequate shelter from the elements, and storage area for barrels and rinsate. Equipment needed includes barrel cleaning and draining stands, a rinsate catchment area, pumps, barrel cutting (or crushing) tools, and worker protective clothing (respirators, gloves, boots, coveralls, rubber aprons, face shields or goggles, etc.).

Personnel: A regular cadre of Crop Protection Service employees should be trained in decontamination procedures, and occasional laborers can be hired if appropriately trained. All personnel involved in decontamination will receive a minimum of 16 hours of specialized training, including safety training. Supervisory personnel will receive first aid training to recognize and treat symptoms of pesticide poisoning, and will be instructed in record keeping for the decontamination procedures.

Safety Monitoring: All personnel involved in barrel decontamination will be tested periodically for changes in cholinesterase level and will maintain a test record card. Individuals whose cholinesterase level drops below 75% of the reference level will be relieved from decontamination operations until the level normalizes.

Barrel Disposal: Some alternative uses for decontaminated barrels were proposed for further investigation. Under no circumstance should reuse bring the barrels into contact with food, water, or permanent habitation. Among the alternative uses proposed were: storage for pesticides, rinsate, or other materials which have become contaminated with pesticides; construction materials for pesticide storage facilities; fuel storage; desert road markers; culverts in areas with little rainfall; tree protection against animals; and smelting.

Records: Three types of records should be maintained: 1) personnel records, including cholinesterase results; 2) materials and equipment inventory, including sign-out sheets for protective clothing and equipment maintenance records; and 3) barrel and rinsate container inventory, with all barrels numbered on the side, top, and bottom and ultimate disposition noted.

ENVIRONMENTAL PROTECTION LAWS OF THE GAMBIA
WEST AFRICA

Bakary B. Trawally
Ministry of Agriculture, The Gambia

Two laws, passed by the Parliament of the Gambia and signed by the President of the Republic of the Gambia, deal specifically with pesticides and hazardous wastes. These two laws complement each other:

1. Pesticide Control and Management - Act 1983

1.1 Pesticide Control and Management

The Director of Crop Protection Service in the Ministry of Agriculture is the Director of Pesticide Control. He is overseen by a Pesticide Advisory Board whose members are drawn from various ministries including the Ministry of Health.

The Board has three functions: to advise the Director on the use and application of pesticides; to consider and approve application for registration of pesticides; and to determine which registered pesticides shall be canceled on the recommendation of the Director of Pesticides Control.

1.2 Licensing of Pesticides Users

Fourteen sections of the Part IV of this act define the terms and conditions essential for licensing of pesticides users.

1.3 Enforcement and Penalties

Ten sections of Part V of this act define clearly the modus operandi of the law enforcement officers. The penalties consist of fines or prison terms ranging from 6 months to 2 years and, in some cases, up to 14 years.

2. Environmental Protection (Prevention of Dumping) - Act 1988

2.1 Environmental Protection

This act sets measures for the prevention of dumping of industrial waste products whether or not they are known to be hazardous to human health or to the natural environment. It is very detailed in penalties, although the methods for the disposal of waste are not well explained. The fines are high and prison terms can be up to a maximum of 14 years.

Few methods are recommended for the disposal of obsolete pesticides in the existing legislation.

DISCUSSION GROUP SUMMARIES

TASK I - CONTAINER DISPOSAL PROBLEM

QUESTIONS TO BE ADDRESSED BY THE DISCUSSION GROUP:

1. Is container disposal a problem facing your respective countries?

2. What has/is being done to address container disposal?

3. What problems are being encountered with all of your countries' disposal efforts?

RESULTS FROM THE GROUP DISCUSSIONS

1. Preliminary considerations

   The problem associated with disposal of containers concerns all countries. It includes small and large containers of different types, each having their own specific drawbacks. Industrialized countries have serious difficulties regarding the recycling of small containers and barrels, while steel drums are a problem for every country.

   The major problems associated with pesticide containers are: the variety of their sizes and materials, and the fact that they are highly valued for other uses, such as food storage and as construction materials by both consumers and private industries. Collection systems were considered a good method of container management, but thought to require significant infrastructure. The practice of repackaging by users to accommodate farmers needing small quantities is common, and the disposal of rinsate are also current concerns.

2. Current and future methods of container management

   Training was listed first, i.e., instruction of village populations in the proper handling of pesticides and destruction or return of containers. It was felt that a container tracking system, linked to a deposit requirement, would help considerably. Disposal laws are being developed, which should include penalties for non-compliance and standard specifications for size and symbols including permanent labels. It was noted that pesticide donations should include a provision for disposal.

   Current strategies include: salvage, either by the CPS or development agencies; burying; destruction; and training in farmers awareness. Four countries have submitted specific proposals for which financing is pending.

3. Constraints

   Four constraints in regard to container disposal were listed:

   - individual motivation for proper disposal is lacking
   - drums are sold for profit by agencies and individuals
   - problems are recognized but solutions are beyond the means available
   - some drums are at least partly filled

   The main constraints to the efficient management of containers include lack of financing, of technologies adapted to the conditions, and of phytosanitary legislation. Highlighted was the need to sensitize the village populations to the risks related to the re-use of containers. Finally, the small size of most farms requires small containers.

SUMMARY OF CURRENT STRATEGIES FOR DEALING WITH EMPTY CONTAINERS

COUNTRY	Recovery by CPS	Recovery by private sector	Burial or destruction	Storage	Awaiting financing	Public awareness
Ivory Coast			●		●	●
Senegal	●	●		●	●	●
Togo						●
Mauritania	●	●		●		
Niger	●			●		
Algeria	●			●		●
Morocco	●		Partial	●	●	
Guinea-Bissau			●		●	
Burkina Faso	●		Partial			●
Cape Verde	●					●
Chad	●					

TASKS II & III - CURRENT METHODS AND ALTERNATIVES FOR DEALING WITH OBSOLETE PESTICIDES

THEMES TO BE ADDRESSED BY THE DISCUSSION GROUP:

Task II. For each method presented (Microbial Degradation, Cement Kiln Incineration and Mobile High Temperature Incineration), identify the aspects which make each method feasible and the constraints to using each method.

Task III. Look for possible alternative methods, their feasibility and constraints.

RESULTS OF THE GROUP DISCUSSIONS

A preventive, rather than curative strategy would limit the accumulation of obsolete stocks and of surplus containers. The disposal of containers and obsolete stocks must be seen as one and the same problem. All disposal methods have risks which must be studied.

Note: thirteen out of the fifteen countries represented had no experience with any of the three methods offered for discussion.

A. Methods for Dealing with Obsolete Stocks (Task II)

1. Microbial Degradation

- methods not available as yet, still in research stage, but have potential for the future; African research institutes should be involved; and Ivory Coast, Senegal, and Niger are carrying out experiments with these methods

2. Cement Kiln Incineration

- only Mali and Niger have cement kilns (one in each country); these kilns are old, lack appropriate filters, and are located in urban areas
- political and economic objections could be raised regarding the use of kilns and to the transportation of pesticides from a country without a kiln to a country with a kiln
- feasibility studies of large kilns should be requested (e.g., by UNDP, UNEP or FAO)
- the cement kiln solution does not seem realistic, for the kiln would have to be built by the private sector which might be difficult and expensive

3. Mobile High Temperature Incineration

- too costly for individual countries (particularly for large incinerator of good quality)
- incineration at sea was discussed but does not seem to be a valid solution because of:
  - risks connected with transport
  - instability of the kiln at sea would not guarantee perfect combustion
  - risks of exposing the marine food chain to pollution
  - the method is prohibited in Europe and in the U.S.A.

- incineration of obsolete stocks could possibly be organized by a donor(s) for a group of countries under the condition that the method be recognized as reliable and prudent (no dioxin, poisonous ashes, or partial combustion):

  - advantage: all types of formulations plus containers and contaminated soils can be destroyed on the spot

  - disadvantage: may attract requests for destruction of other chemical waste from laboratories, hospitals, universities, industries, etc.

- look into possibilities of incineration in Europe

- mobile incineration, type Shell, particularly for small countries such as Guinea-Bissau and Cape Verde; industrial type for regional or national mobile units:

  - advantage: availability

  - disadvantage: high cost, mobility doubtful, needs smoke control systems

B. Alternative Methods of Disposal of Obsolete Stocks (Task III)

- Senegal suggested reformulation and/or return of obsolete pesticides to producers and distributers

- Chad and Mauritania proposed the use of cisterns set in the middle of the desert to promote evaporation, but could not assess the disadvantages: slow process, air pollution, leaks during transport, disposal of toxic residue, etc.

- a system of deposit and exchange for containers of appropriate pesticides

- use of crushers for the large containers

- safe long-term containment and storage as an interim option

- land application at very low rate: quantities may be a problem and it has environmental implications

CONCLUSIONS

Feasibility of a method can be determined only after risk evaluation.

Criteria for the choice of a method:

- flexibility of products
- efficacy of process
- cost
- health/safety/environmental assessment
- expertise needed
- political/legal considerations
- practicality

Suggestion: develop a simple check-list for use by the affected country's decisionmakers to guide the determination of risks and benefits of the various options.

TASK IV - STOCK MANAGEMENT

QUESTIONS TO BE ADDRESSED BY THE DISCUSSION GROUP:

1. Identify and list the problems you face with stock management in your countries.

2. Prioritize these problems, with the most prevalent being number 1 and the least prevalent being last.

3. Identify what assistance you would need to address these problems.

RESULTS OF THE GROUP DISCUSSIONS

A. Questions 1 and 2

The problems identified were divided into three categories listed in order of priority based on their importance:

1) Very important: stock management problems
2) Important: empty containers
3) Less important: distribution/waste/health

1. Stock Management Problems

- no legislation to control stocks of pesticides
- storage capacity

  - no infrastructures (or few) for storage at strategic points
  - not enough appropriate locations identified for stocks
  - too many appropriate locations, but no storage facilities
  - money and construction material lacking to improve existing facilities
  - design of facilities not appropriate to local climate/conditions
  - lack of information as to optimal amount of pesticides to be stocked (particularly for emergency use)
  - problem of transportation between users' sites
  - no inventories (emergency use)
  - storage facilities overstocked with obsolete products (degraded containers)
  - lack of proper handling equipment (forklift)
  - use of products not coordinated (materials become inert or obsolete)
  - poor labeling (foreign language, illegible, deteriorated or absent, dosage/application information not understood by users, code of conduct not respected)

2. Empty Containers

- personnel lack training for handling containers safely
- lack of clear definition of needs

3. Distribution/Waste/Health

- duplicate distributions from government and private sector cause waste
- imposed acceptance of products from friendly countries
- packages too large for needs
- lack of cooperation among donors: duplicate donations cause overstock

- pesticides are donation-specific, not recipient-specific in amount or type
- no medical follow-up for the personnel handling stocks

B. Question 3

Assistance considered necessary falls into three categories:

1) Technical assistance
2) Material
3) Financial aid

1. Technical Assistance

- expert advice for the building of storage facilities
- training of personnel
- help to develop standards/audit checklists for storage and training

2. Material

- storage facilities
- means of transportation
- laboratory equipment

3. Financial Aid

- to build storage facilities
- for countries to assume training of their own personnel

RECOMMENDATIONS

- donations based on recipient's needs, and based on recipient's evaluation and information
- producers, packagers, and shippers required to meet FAO Code of Conduct Guidelines
- recipients allowed to design own aid packages
- pesticide bank for emergency distribution of large quantities
- IPM methods for Africa, in Africa, developed in cooperation with African institutions in order to reduce the need for chemical pesticides

ANALYSIS OF DISPOSAL OPTIONS Dr. L. Dollimore

KEY CRITERIA	INCINERATION					CHEMICAL TREATMENT
	FIXED LOCAL UNIT	LOCAL CEMENT KILN	LARGE MOBILE UNIT	EXPORT FOR INCIN.	SMALL MOBILE UNIT	
FLEXIBILITY (in terms of burning products and drums) Good = 5 Bad = 0	3	3	5	5	3 (only liquids and drums)	2
EFFICACY High = 5 Low = 0	4	5	5	5	4 *	3 *
AVAILABILITY Now = 5 Soon = 3 Unlikely = 0	0 *	2 *	3	3	2	2
COST Low = 5 High = 0	2	3	0	0	4	4
PRACTICALITY Easy = 5 Hard = 0	3	3	3	2 (need to redrum)	4	4
SAFETY Good = 5 Bad = 0	4	3	4	3 (need to redrum)	3	2
ENVIRONMENTAL EFFICIENCY Good = 5 Bad = 0	4	5	5	3 (need to redrum)	3 *	2 *
EXPERTISE REQUIRED Low = 5 Much = 0	4 (trained staff)	3	4	3 (need to redrum)	3	4
LOGISTICAL SIMPLICITY Easy = 6 Hard = 0	3	3	3	1	4	3
LEGISLATIVE SIMPLICITY Easy = 5 Difficult = 0	5	3	3	2 (export/ import)	0 - 5	0 - 5
POLITICAL SIMPLICITY Straightforward = 5 Difficult = 0	5	0 - 3	2 - 5 *	2 * (export/ import)	2 - 4	5

* = critical factors

ILLUSTRATIVE ACTION PLANS FOR THE DISPOSAL OF UNWANTED PESTICIDES AND PESTICIDE CONTAINERS

At the end of the conference, country representatives were asked to participate in an exercise to develop preliminary action plans to address the specific disposal problems in their respective countries. The plans developed were not to be considered as officially sanctioned by the ministries of their countries, but as examples of the types of strategies which were feasible and appropriate, given the technical information presented at the conference.

In developing the action plan, representatives were asked to consider the following elements:

- characterization of pesticide stocks: definition of "obsolete" stocks, target pests, prioritization, survey/information needs
- characterization of "empty" container situation: size, type (plastic, metal), quantity, extent of control
- disposal/disposition options for unwanted pesticides and containers
- time line and anticipatory planning
- research and resource needs
- environmental, legal, and political aspects

A few of the action plans are summarized below to illustrate the range of problems and diversity of approaches to possible solutions in West Africa. An example of regional collaboration can be seen in the combined plan of Mali, Niger, and Burkina Faso. Other plans are from the Gambia, Ivory Coast, Guinea-Bissau, Liberia, and Morocco. A matrix suggested by Dr. Dollimore of Shell for analysis of disposal options is also included.

ACTION PLAN - MALI, NIGER, BURKINA FASO

These three countries' common problems: stocks of dieldrin at concentrations of 5% to 20%, stocks of other obsolete or unusable pesticides, and accumulation of empty pesticide containers. The country representatives collaborated to formulate a joint plan of action.

Obsolete Products

- a system of adequate storage with donor assistance
- installation or use of mobile incinerators
- facilitation of transfer of product to manufacturer for destruction

Empty Containers

- decontamination of 60- to 200-liter metal drums for reuse or reconditioning as pesticide containers or alternative uses (e.g., road construction, tree protection)
- encourage the development/introduction of containers which are less attractive or less readily adapted for alternative uses
- intensification of public awareness campaigns for the destruction of empty pesticide containers

Technical and Financial Assistance Needed

- elaboration and implementation of pesticide legislation
- improvement of long and short-term storage conditions
- creation of the regional information network proposed in Accra in 1989, and use of other existing networks
- creation of regional analytical laboratories for quality control of pesticides (or refurbishment of national laboratories)
- scientific research on crop protection products
- research on the impact of pesticide use on human health and the environment

Proposals

- renovation of storage areas and related infrastructure, and reconditioning and transfer of old stocks to these areas within 6 to 12 months
- acquisition of incinerators as soon as possible

ACTION PLAN - HE GAMBIA

DATE	ACTION	OBJECTIVE	CONTACT/COLLABORATION
Nov./ Dec. 1989	1. Survey of obsolete pesticide stocks. 2. Review of Gambian pesticide and environmental laws.	1. Obtain inventory of obsolete pesticide stocks. Determine legal implications of disposal.	Main storage sites in the Gambia. Min. Justice (Att. General); Min. Health (Envir. Unit).
Jan. 1990	1. USAID Conference on the Disposal of Obsolete Stocks.	1. Gather info on disposal options. 2. Develop action plans.	USAID/Niamey
Feb. 1990	1. Report to Director of Agricultural Service, Ministry of Ag. 2. Report to Environmental Unit of Min. of Health. 3. Verification of active ingredients: liquid, solid, unknown formulations. 4. Second survey: obsolete stocks.	1. Briefing on action plans and conference. 2. Briefing on national situation. 3. Determine suitability for use, reformulation. 4. Update inventory.	Agric. Headquarters Min. Ag./Banjul USAID; American Cyanamid; SPIA; CIE; GTZ. Extension Serv.
March 1990	1. Requisition for pest control equipment and protective clothes. 2. Establish pesticide analytical laboratory.	1. Facilitate use of products if lab results positive. 2. In-country analytical capability.	Min. Ag.; Donors, UK, USA, GTZ, EEC, Canada. TCP FAO; Envir. Unit, Min. Health.
April 1990	1. Training: pesticide stock management (short term).	1. Increase trained personnel.	Dept. Ag.; FAO, TCP; GIFAP.
May 1990	1. Farmer training on pesticide stock management, safe use. 2. Radio programs on safe handling of pesticides	1. Have farmers trained in rural areas. 2. Increase public awareness of danger.	Extension Serv.; Donors, FAO. Min. Information, the press.
June 1990	1. Reformulation of products if feasible.	1. Reuse rather than disposal.	Donors; Industry; Min. Ag.
July/ Aug. 1990	1. Survey of empty containers. 2. Collect all containers in central site.	1. Establish factual data base. 2. Facilitate easy disposal.	Extension Serv.; Dept. Ag.; USAID; NABADA*; Dept. Ag.
Sept./ Oct. 1990	1. Ship products to developed country if reformulation not feasible. 2. Mobile incinerator feasibility study & envir. impact analysis.	1. For incineration. 2. Incineration of liquid products.	Donors; Min. Ag. Donors.

ACTION PLAN - THE GAMBIA (Continued)

DATE	ACTION	OBJECTIVE	CONTACT/COLLABORATION
Nov./ Dec. 1990	1. Feasibility study on increasing/improving storage facilities, inc. maintenance & village stores.	1. Determine storage needs, capability, potential.	Dept. Ag.; FAO, USAID, EEC.
	2. Environmental assessment of 1.	2. Determine impact.	Dept. Ag.; FAO, USAID, EEC.
Jan. 1991	1. Training: pesticide stock management.	1. Improve staff competence.	Dept. Ag.; GIFAP; Donors, FAO.
	2. Establish pesticide data base.	2. Improve monitoring imports, use.	Gov. Agencies; Dept. Ag; FAO.
Feb. 1991	1. Pesticide Bank.	1. Prompt response to national needs from international ready reserve; minimize need for large strategic stocks in-country.	EEC; FAO; USAID; Donors.
	2. Biological control.	2. Explore alternative pest control.	IITA; CIE; UK; Donors.

* U.S. National Association of Container Reconditioners.

ACTION PLAN: GUINEA-BISSAU 1990 - 1993

ACTIVITY	YEAR 1 (SHORT TERM)	YEAR 2 (MIDTERM)	YEAR 3 (LONG TERM)
Utilization of existing stocks	XXXXXXXXXXXXXXXXXXX		
Elaboration of legislation	XXXXX		
Implementation of legislation to prevent future problems	XXXXXXXXXXXXXXXXXXXXXXXXX.....		
Complete inventory of all pesticides	XXXXX.....		
Quality analysis of all products (Portugal)		XXXXX	
Training of agents in storage, management and disposal	XXX	XXX	XXX
Reformulation (collaboration with chemical industry)		XXX	
Collection of empty containers	XXX.....		
Destruction of empty containers	---------- AFTER APPLICATION ----------		
Installation of mobile incinerators			XXX ???

NEEDS:
1. A trainer on-site for the management of stored pesticides and elimination or destruction of unwanted products and containers.
2. Research on environmental impacts of pesticide use, which requires the establishment of an analytical laboratory.
3. Financing for training, research, and purchase of material.

ACTION PLAN - IVORY COAST

Elements

1. Sensitization (Time Required: 2 - 3 months)

   Public officials, including those in other ministries, must be made aware of the extent of the danger inherent in storing obsolete pesticides and the need to dispose of empty pesticide containers.

2. Inventory (Time Required: 2 - 3 months)

   Quantitative and qualitative inventory of stocks and empty containers.

3. Feasibility Study (Time Required: 6 - 7 months)

   Choice of most appropriate disposal method.

4. Completed Installation (Time Required: 12 - 24 months)

   Industrial unit installed to handle disposal.

Needs

In order to implement this plan of action, particularly for items 2, 3, and 4, assistance of a technical, material, and financial nature is needed.

ACTION PLAN - LIBERIA

Liberia does not have a problem of old pesticide stocks or stored empty containers, and pest infestations have not warranted strategic pesticide stockpiles. Pesticides are imported by small and large private agricultural companies. These companies keep on hand only the stocks that can be used in a short period of time, and they plan shipments when 75% of the stock is depleted. These companies control their own containers and often reuse them for fuel.

The Liberian govemment does not normally purchase pesticides or other agrochemicals, but does receive pesticide grants, principally from Japan. As warehouses are scarce, these pesticides are quickly distributed to avoid a storage problem, being used in crop and public health protection.

Liberia's major problem in this connection is the need for pesticide legislation and a pesticide registration scheme. A quality control laboratory is sorely needed, as the govemment must accept products without confirming their identity or concentration.

Successful control of pesticide use in Liberia requires:

- Establishment of pesticide legislation

  Laws must be promulgated that will regulate the importation, distribution, safe and efficient use of pesticides and the disposal of old pesticide stocks and containers.

- Establishment of a national pesticide registration system

  Records must be established and maintained on all products, formulations, active ingredients, quality, quantity, etc. The govemment will have to set up a system of enforcement for the legislation and the pesticide register.

Recommendations

- Individual govemments could seek full implementation at a sub-regional level through the Economic Community of West African States (ECOWAS) for the enforcement of ECOWAS mandates regarding pesticides.

- Laboratories could be established in individual countries for quality control so that cooperation would be encouraged between member states at the sub-regional level.

- Training should be done to have quality manpower to operate the laboratories.

ACTION PLAN - MOROCCO

Obsolete Pesticides from the Locust Control Campaign

1.1 Unusable Insecticides (25 - 30 years old)

Basic Facts

- 1,800 tons of organochloride insecticides in the form of oil solutions, powders, and baits (esp. BHC)
- containers: 200-liter drums for liquids, paper sacks for powders (25 kg), and jute sacks for baits (50 kg)
- storage in hangars completely full of powders, baits, and some of the liquids

Problems Posed

- deterioration of the containers
- possible environmental pollution

Proposed Solutions

- Option 1: a truly mobile incinerator with a capacity to treat 5 to 8 tons per day and equipped for adequate emission purification

- Option 2: a stationary incinerator with the same capacity and purification equipment; in this case, the installation of an analytical laboratory is essential to assure permanent control for the duration of the destruction operation

- if the technology of pesticide destruction will take more than 1 year, the oil solutions must be immediately reformulated or repackaged

Cost

- $10 to $15 million (US) dollars

1.2 Usable Pesticides

Basic Facts

- approximately 2,000 tons of organophosphate insecticides and pyrethroids, of which 1,830 tons are ULV solutions and 170 tons are EC (1 to 2 years old)
- containers: principally 200-liter drums, with some 25- and 50-liter drums
- storage: principally outdoors, with 2,600 tons of heavy aromatic solvent stored in government tanks and private tanks on loan

Problems Posed

- rapid deterioration of the containers and the quality of the pesticides
- probable environmental pollution
- risk of these stocks becoming unusable in a few years

Proposed Solutions

- construction of fiberglass tanks with a capacity of 20 to 50 thousand liters for strategic stocks
- hangar construction for remaining stock and drums (1,600 tons)
- steel tank construction (3,000 cubic meters) for solvent
- feasibility studies for using these insecticides against other crop pests in Morocco, or for transferring them (with donor aid in the transport) to other countries which need them for locust control or other pest

Cost

- variable, depending on the results of the two feasibility studies cited above
- if storage in fiberglass tanks and outdoor drums is the only possible solution, cost would be $8 million U.S. dollars
- if products must be stored for several years they will become unusable and both they and their containers will have to be destroyed (paragraph 1.1)

2. Crop Protection Against Other Pests

Moroccan agriculture is privately managed: farmers handle their own acquisition and use of pesticides. Despite the training role played by the National Crop Protection Service throughout the country, the problem of managing stocks and containers remains very important and deserves detailed study.

RECOMMENDATIONS

1. Countries which have not yet established a valid, dynamic inventory system for obsolete stocks should do so; all countries should immediately secure these stocks to avoid further risk to human health and to the environment.

2. FAO is encouraged to organize an expert consultation on disposal options which would take into consideration the different ecological zones.

3. FAO should draw up guidelines for collaboration between donors and recipients in regards to pesticide donations.

4. A feasibility study should be conducted on the establishment of off-shore pesticide banks to avoid the inadequate storage of pesticides in remote areas of Africa.

5. The conferees recognize the need for and appropriateness of FAO guidelines on the construction of pesticide storage facilities and recommend the rapid completion of such guidelines.

6. Technical agencies, such as GTZ or national pesticide industry associations, should assist countries to analyze pesticide formulation, where local laboratory facilities do not yet exist.

7. FAO and GIFAP should draw up model tender documents and guidelines for pesticide purchases, in order to safeguard the interest of all parties.

8. Registration schemes and pesticide legislation, including pesticides and used container disposal, should be instituted in those countries where they do not yet exist.

9. Workshops on pesticide management (to include management of obsolete stocks and used containers) should be organized by national governments in order to sensitize decision-makers to the disposal problem.

West African Regional Conference on Pesticide Disposal:
Disposal of Pesticide Containers and Obsolete Pesticides

Niamey, Niger
21-26 January 1990

DELEGATES

Burkina Faso:
Abdoulaye COMBARI
Directeur de la Protection des
Végétaux et du Conditionnement
01 B.P. 5362
Ouagadougou 01, Burkina Faso

Cameroun/Cameroon:
Jean NDOMBOU
S/Directeur Protection des Végétaux
Ministry of Agriculture
Yaounde, Cameroon

Cape Verde:
Ana Paula LEVY
Ministerio do Desenvolvimento Rural
e Pescas Divisão de Protecao Vegetal
P.O. Box 50
Praia, Cape Verde

Chad:
Abou PALOUMA
Direction de la Protection des Végétaux
B.P. 441
N'Djamena, Chad

Côte d'Ivoire:
Mamadou CISSE
Direction de la Protection des Végétaux
Ministère de l'Agriculture et des
Eaux et Forêts
B.P. V7
Abidjan, Côte d'Ivoire

The Gambia:
Bakary TRAWALLY
Agricultural Officer
Department of Agricultural Services
Ministry of Agriculture
The Gambia

Ghana:
George Michael Sowah KLUFIO
Environmental Protection Council
P.O. Box 326
Accra, Ghana

Guinea-Bissau:
Pedro Correia LANDIM
MDRA/DPV
Cx Postal 71
Bissau, Guinee-Bissau

Liberia:
Legendre MILLER
Ministry of Agriculture
P.O. Box 9010
Monrovia, Liberia

Mali:
Lassana Diarra SYLVESTRE
Service Protection des Végétaux
B.P. 1560
Bamako, Mali
Tel: 22-24-04

Mauritania:
Tahara GALLEDOU
c/o Bill Thomas
USAID/Nouakchott
B.P. 222
Nouakchott, Mauritania

Morocco:
Tahmi BENHALIMA
Centre National de Lutte
Antiacridienne d'Ait-Melloul
B.P. 125
Inezgane, Maroc

Republic of Niger:
Ana Paula LEVY
Kimba HASSANE
Ministère de l'Hydraulique et
Environnement DE/SGE
B.P. 578
Niamey, Niger

Mohamed Salissou KANE
Direction de l'Hygiène et Médecine Mobile
Ministere de la Santé Publique
Niamey, Niger

Garba YAHAYA
Centre National Antiacridienne d'Agadez
B.P. 158
Agadez, Niger
Tel: 440527

Issoufou DENGA
Direction de la Protection des Végétaux
B.P. 323
Niamey, Niger
Tel: 73-25-56

Sénégal:
Faustin DIATTA
Direction de la Protection des Végétaux
Km 15, Route de Rufusque
B.P. 20054
Poste Tharoye
Dakar, Sénégal

Togo:
Kossi AFANOU
Service de la Protection des Végétaux
B.P. 1263, Cacaveli
Lome, Togo
Tel: 213773

OBSERVERS

Georges BRUGE
Rhône Poulenc Agrochimie
14-20, rue Pierre Baizet
69009 Lyon, France

Dominque DAUTHVILLE
Représentant de Dow Chemical Co., GIFAP
01 B.P. 1521
Abidjan 01, Côte d'Ivoire

Boua DIARRA
DFPV, Centre Agrhymet, CILSS
B.P. 12625
Niamey, Niger
Tel: 73-21-81

Dr. Lawrie DOLLIMORE
(CHSEL/23)
Shell International Chemical Co. Ltd.
Shell Centre
London, SEI 7 PG
United Kingdom

James EVERTS
Department of Toxicology, Bomenweg 6
6703 HD Wageningen, Netherlands

Mamadou FOFANA
USAID/Bamako
B.P. 34
Bamako, Mali

Claude GENEST
Agriculture Canada
Projet Protection des Végétaux
01 B.P. 548
Ouagadougou 01, Burkina Faso

Abderrahmane HAFRAOUI FAO
Pièce C-737
Via delle Terme di Caracalla
00100 Rome, Italy
Tel: 57954812
Telex: 610181 FAO1

Robert HANCHETT
USAID/REDSO/WCA
c/o American Embassy
B.P. 1712
rue Jesse Owens
Abidjan 01, Côte d'Ivoire

Keith JOHNSON
ICI Agrochemicals
Fernhurst
Haslemere, Surrey, UK

Joe KITTS
USAID/Morocco
137, Ave. Allal Ben Abdellah
B.P. 120
Rabat, Morocco

Mahaman KONDO
USAID/Niger
B.P. 11201
Niamey, Niger

Siaka KONE
UNIPHYTO
s/c Sochim.CI
01 B.P. 3715
Abidjan 01, Côte d'Ivoire

Hadama KOUANDA
Protection des Végétaux
01 B.P. 5362
Ouagadougou
01 Burkina Faso

Stanislaw MANIKOWSKI
ACDI/CIDA
11971 Bd. de l'Acadie
Montréal, Québec
Canada H3M 2T6

Sanou MOUSSA
Departement de Formation en Protection
des Végétaux
B.P. 12625
Niamey, Niger

Peter NATKANSKI
ICI Agrochemicals
OHSD Department
Fernhurst, Haslemere
Surrey, UK

Alioune Badara NDIAYE
FAO/OCLALAV
B.P. 8063
Dakar-Yoff, Sénégal

John NEWBY
Représentant WWF
Fonds Mondiale pour la Nature
B.P. 10933
Niamey, Niger
Tel: 73-33-38

Otto SCHENK
c/o CIBA-GEIGY Ltd.
AG Division
CH 4002 Basle, Switzerland

Bill THOMAS
USAID/Nouakchott
B.P. 222
Nouakchott, Mauritania

Joe THORNTON
Greenpeace USA
1017 W. Jackson Blvd.
Chicago, IL 60607

Klaus WETTSTEIN
Sandoz Agro Ltd.,
CH 4002 Basle, Switzerland

Harry VAN DER WULP
FAO Regional Office for Africa
P.O. Box 1628
Accra, Ghana
Tel: 66851-4
Telex: 2139 FAO GH

RESOURCE PERSONS

Jude ANDREASEN
Office of Pesticide Programs (H7508C)
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Daniel W. BARBER
Daniel W. Barber, Inc.
P.O. Box 11244
Wilmington, Delaware 19850-1244
Tel: (302) 737-6485
Fax: (302) 737-7189

Carl CASTLETON
Area Director, USDA/APHIS
B.P. 1712
5, rue Jesse Owens
01 Abidjan, Côte d'Ivoire

Christy COLLINS
Equator
1850 K Street, NW, Suite 390
Washington, D.C. 20006
Tel: (202) 293-3275
Telex: 6716706 EASL DC

Marie-Noël DE VISSCHER
PRIFAS/CIRAD
B.P. 5035 34032
Montpellier Cedex, France

Gudrun HUDEN
Environmental Officer
Office of U.S.Foreign Disaster Assistance
(OFDA) Agency for International Development
Room 1262 A, NS
Washington, DC 20523
Tel: (202) 647-7554

Janice King JENSEN
Office of Pesticide Programs (H-7507-C)
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Walter KNAUSENBERGER, Ph.D.
Entomology Advisor
U.S. Agency for International Development
AFR/TR/ANR/NR
Bldg. SA-8A, Room 602
Washington, DC 20523-1515

Dr. F.-W. KOPISCH-OBUCH
FAO Room C-754
Via delle Terme di Caracalle
00100 Rome, Italy
Tel: 57973623
Telex: 610181 FAO1
Fax: 5146172

Wolfgang A. SCHIMPF
Deutsche Gesellschaft feur Techn.
Zusammenarbeit (GTZ)
Pesticide Service Project
Postfach 5180
D-6236 Eschborn/TS
Germany

Cathleen J. SOMICH, Ph.D.
USDA/ARS/NRI
Pesticide Degradation Lab
Bldg. 050, Room 100 BARC-West
Beltsville, MD 20705
Tel: (301) 344-3233

INTERPRETERS:

W.K. AKPAWU
B.P. 7166
Lome, Togo

Muyiwa PHILLIPS
B.P. 100032
Lome, Togo
Tel: 217999

Edwin SEWA-OCLOO
B.P. 7271
Lome, Togo

Victor IMBOUA-NIAVA
B.P. 474 Cidex 1
Abidjan 06
Côte d'Ivoire

ACKNOWLEDGEMENTS

Funding for this report was provided by the United States Agency for International Development, Bureau for Africa, Office of Technical Resources under the Africa Emergency Locust/Grasshopper Assistance Project (AELGA, 698-0517). The active support end encouragement received from the USAID/Niger in assisting with local arrangements (particularly C. Kelly, Disaster relief Unit) is greatly appreciated. The organization of this regional conference was facilitated by the International Training Division of the United States Department of Agriculture's Office of International Cooperation and Development (OICD). Pierrette Countryman assisted in the translation and proofreading of the drafts.

August, 1991.