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EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Forty-first Meeting  
Montreal, 17 - 19 December 2003

**Addendum**

**LIQUID CARBON DIOXIDE (LCD) TECHNOLOGY AND GUIDELINES FOR LCD  
PROJECTS: FOLLOW-UP TO DECISIONS 39/52 (b) and 40/17 (g)**

- II. Report on the follow-up study on LCD technology: On-site visits to foam manufacturing enterprises with approved LCD projects in Morocco (Decision 40/17 (g)).

**Add** the following after part I, page 19.

## **REPORT ON THE FOLLOW-UP STUDY ON LIQUID CARBON DIOXIDE (LCD) TECHNOLOGY**

### **II. ON-SITE VISITS TO FOAM MANUFACTURING ENTERPRISES WITH APPROVED LCD PROJECTS IN MOROCCO (DECISION 40/17 (g)).**

#### **BACKGROUND INFORMATION**

1. At the 40<sup>th</sup> Meeting, during consideration of projects with implementation delays, the Executive Committee decided in connection with Moroccan LCD foam projects (Decision 40/17):

- To defer until the 41<sup>st</sup> Meeting any decision on cancellation of the Salidor and Bonbino foam projects in Morocco implemented by UNDP; and
- To request the Secretariat to visit the LCD foam projects in Morocco as part of its visits to LCD projects mandated by Decision 39/52 and to report on its findings to the 41<sup>st</sup> Meeting.

2. The Secretariat fielded a mission for on-site visits to Morocco from 8 - 12 September 2003. The mission was undertaken by the Senior Project Management Officer responsible for foam sector projects at the Secretariat. While the visit to Morocco is part of the mandate under Decision 39/52 to study the implementation of the LCD projects, the Secretariat set for the mission the following objectives:

- Determine from the stakeholders (the Government, the enterprises, the technology provider and the implementing agency) the reasons for the delays in implementation of the projects and/or the inability of the LCD technology to achieve the desired results so far;
- Learn from the parties concerned the options proposed for successful completion of the projects as approved by the Executive Committee, i.e. through conversion to LCD technology;
- Report the findings to the Executive Committee for use in decision-making.

#### **METHODOLOGY**

3. The following activities were undertaken towards the achievement of the set objectives:

- Review of project documents and other relevant documents, such as progress reports of the implementing agency, purchase orders, analysis of bids etc. of the individual projects;

- Collation of all relevant information on the issue, translation into French and English as necessary and distribution to all parties involved prior to the mission;
- Discussions with all the parties involved (the government, recipient companies, technology supplier, executing and implementing agencies);
- Visits to the six enterprises (Richbond, Dolidol, Sodiflex in Casablanca, Bonbino Confort and Mousse d'Or in Fez, and Salidor in Meknes) (See Annex I for programme of the visits);
- Review of information from the recipient enterprises provided during the mission.

### **Country visit**

4. Prior to the mission, the Secretariat invited the participation of the Government, UNDP, UNOPS and through UNDP the technology provider, Cannon. The mission was coordinated by the Division of Chemical and Parachemical Industries of the Ministry of Industries, Commerce and Telecommunications of Morocco. The Divisional Chief and the National Ozone Officer participated on behalf of the Government while both UNDP and UNOPS were represented by UNDP's foam expert and Cannon was represented by the President and Director General of Cannon France.

5. The visits to the individual companies were preceded by a meeting at the Ministry of Industries, Commerce and Telecommunications chaired by the Divisional Chief. Representatives of all the Moroccan foam companies having LCD foam projects were present. The representatives of the executing and implementing agencies (UNOPS and UNDP), Cannon and the Manager of Chemical Business Development of Woodbridge Group attended the meeting.

6. Visits were organized by the Division of Chemical and Parachemical Industries to all the companies, three of which are located in the Casablanca area while the other three are located in Meknes and Fez.

## **FINDINGS**

### **Background on the foam projects in Morocco**

7. Morocco's baseline consumption of CFCs is 802.3 ODP tonnes. Therefore, in order to meet the 50% reduction in CFC consumption by 1 January 2005 Morocco has to phase out 401.15 ODP tonnes by the end of 2004. Morocco's consumption of CFCs in 2002 was 668.6 ODP tonnes of which 425.68 ODP tonnes was in the foam sector.

8. Six foam projects with a total value of US \$2.53 million were approved to be implemented by UNDP to phase out 578 ODP tonnes CFC-11 through conversion to LCD technology between May 1997 (22<sup>nd</sup> Meeting) and July 1998 (25<sup>th</sup> Meeting). It therefore can be inferred that phasing out of CFC from the on-going flexible slabstock foam projects is the critical condition to be met to ensure Morocco's compliance with the 2005 phase-out schedule.

## **Projects affected by Executive Committee decisions**

9. Short descriptions of conversion activities as reported by four of the enterprises which have been the subject of Executive Committee decisions on project implementation delays are included in the following paragraphs.

### **Salidor**

10. The project was approved in November 1997 at the 23<sup>rd</sup> Meeting. According to information provided by the company delivery of LCD equipment to the company was completed in mid-2000. Equipment problems arose after installation and were solved by Cannon by the end 2002. There was a major fire at the factory on 4 December 2001. The fire did not destroy the machines and production resumed two months later.

11. Cannon made 19 trials from 9 April – 4 June 2003 which were inconclusive. After three months of unsuccessful trials Cannon requested the company to undertake essential modification to its original machine which would enable the machine to be adapted to the LCD. The company expects the necessary modifications to be completed by mid-January 2004 for the new trials to be subsequently conducted. The schedule for trials is yet to be agreed with UNOPS and Cannon.

### **Mousse d'Or**

12. The project was also approved at the 23<sup>rd</sup> Meeting in November 1997. According to the company, the LCD equipment was delivered in 1998 and installation began in 1999. Installation of LCD equipment has been completed. Progress was affected by the following factors:

- Shortage of spare parts (valves were borrowed from Dolidol and Bonbino, electric panel from Sodiflex);
- Cannon stopped its activities in Fez and Meknes in October 2002 due to the problems it was experiencing in the enterprises in Casablanca and resumed on 8 September 2003;
- The electricity supply had to be upgraded twice which involved additional local works with completion on 10 September 2003;
- Parts of the new equipment required modifications by the supplier which were completed in September 2003.

13. The company also indicated that in October 2002 it was requested by Cannon to arrange supply of LCD for trials. The trials have not yet started, but contract conditions require the company to pay for tank lease and for LCD.

### **Bonbino Confort**

14. The project was approved at the 25<sup>th</sup> Meeting in July 1998. The company indicated that on 22 December 1998 it reached agreement with Cannon to produce three grades of hard foam of densities 10 kg/m<sup>3</sup>, 12 kg/m<sup>3</sup> and 14 kg/m<sup>3</sup>. Installation of the Cardio equipment started in October/November 1999 but between November and December 2002 equipment parts were removed and sent to other enterprises with projects under implementation. The company indicated that as at 18 September 2002 some parts had not been returned. The installation was

completed in October 2002. At the request of Cannon the company leased an LCD storage tank and procured LCD (about US \$4,000) which was subsequently not used causing the LCD supplier (Air Liquide) to transfer the storage tank to another company. The LCD storage tank required to be reinstalled at the factory, but Air Liquide demanded additional financial guarantees (about US \$6,000) before reinstalling the LCD storage tank. Trials had not started as the LCD equipment has to be tested since it has been idle for about a year. It is possible that the trials would be done in sequence with those at Salidor and Mousse d'Or to take advantage of experience gained at the other two factories.

### **Dolidol**

15. The project was approved in May 1997 at the 22<sup>nd</sup> Meeting. Unlike Richbond, the other large foam producer which operates a Cannon Viking Maxfoam machine, Dolidol operates an OMS Planniblock low pressure machine. According to the company, during the conversion, Cannon advised the company to upgrade the line to high pressure which was done. Thus, its retrofit was a direct retrofit, while the others were indirect.

16. The company experienced technical difficulties. The installations and trials were not successful in spite of the interventions of the senior technologist of Cannon and UNOPS senior experts.

17. The problems associated with the conversion of the foam machine appeared to the company to be a compatibility problem with the Cardio system. The company provided records showing a total expenditure of approximately US \$330,000 of its own funds as a result of the conversion of its equipment to the Cannon Cardio system. These expenditures included US \$126,000 claimed to be the cost of the trials, US \$112,000 for investment in the LCD equipment and US \$94,000 for upgrade of the low pressure lines to high pressure.

18. Relevant correspondence between the company, the executing agency and the equipment supplier on the issue are provided in the attached Annex II.

### **Related information**

19. The Secretariat received extensive documentation from the enterprises comprising communications between the enterprises, the technology suppliers and UNDP. While many raise technical arguments about equipment capability and the adequacy of the test runs, they also relate invariably to the contractual arrangements between the technology provider and the implementing agency. A sample of the information provided by the enterprises is provided in Annex III. Relevant extracts of a sample project document, the related bid analysis reports and purchase orders for the projects provided by UNOPS, are presented in figures 1 - 4.

## **ISSUES ASSOCIATED WITH THE IMPLEMENTATION OF THE MOROCCAN LCD FOAM PROJECTS**

20. A report received from the Government of Morocco following the mission of the consultant to Morocco in connection with the study on LCD technology summed up the problems of implementation of the LCD foam projects as inter alia lack of adequate support and assistance from Cannon Viking to the enterprises, lack of spare parts at the companies during the interventions by the Cannon Viking technicians thus slowing down progress of the conversions, trials that did not achieve satisfactory results, communication difficulty during installation and training of factory personnel since the Cannon Viking technicians did not speak French and all the manuals were in English.

### **Summary of Issues Relating to the of Casablanca and Fez-Meknes Groups**

21. The six companies in Morocco fall into two groups on account of the problems they face and the discussion of the issues follows these two groups.

- Casablanca group, namely Dolidol, (160 ODP tonnes CFC-11), Richbond (150 ODP tonnes CFC-11) and Sodiflex and Tiznit (85 ODP tonnes CFC-11). The three companies account for about 70% of the CFC consumption in the sub-sector.
- Fez-Meknes group, namely Bonbino Confort (90 ODP tonnes CFC-11), Mousse d'Or (45 ODP tonnes CFC-11) and Salidor (48 ODP tonnes CFC-11).

### **Casablanca group**

22. The Casablanca group of companies being the large foam producers were the first to have the LCD conversion projects started over six years ago. There is documented evidence that the conversions have met with difficulties in equipment delivery, installation, trials and commissioning. Records provided to the mission by the enterprises showed that delivery and installation of the LCD units had taken much longer than proposed in the project milestones. The installed LCD equipment experienced breakdowns as a result of malfunction of circuits and valves while there was lack of readily available back-up spare parts resulting in spare parts or units of equipment being taken from machinery installed at other companies. Trials were done mainly on European foam grades (e.g. 32 at Dolidol and about 17 at Sodiflex) and had generally been unsuccessful.

23. The companies said that their confidence in the technology has been eroded in the face of lengthy trials, some stretching over a period of more than two years without proving the capacity to produce Moroccan grade foam.

24. Both UNOPS and Cannon took measures to address the situation. UNOPS put UNDP's senior foam expert in charge of the projects in early 2001. On 19 April 2001, an agreement was reached with all relevant parties to compensate the companies for their failed trial costs and other related costs up to that time, and for Cannon to continue the foam trials based on European foam grades to prove the functionality of the LCD equipment to be followed up with trials for Moroccan grade foam. Cannon also sponsored a visit by the directors of the companies to

Argentina to observe the implementation of the Cardio conversions in that country. The level of compensation offered was:

Dolidol	US \$40,000
Richbond	US \$37,500
Sodiflex	US \$35,000

25. Richbond and Sodiflex agreed to accept the payment. However, Dolidol declined the compensation as it did not cover a substantial part of its costs. The trials were resumed at Richbond and Sodiflex.

26. UNDP's senior process expert has assisted both Richbond and Sodiflex with the new trials. However, there were conflicting claims about the outcomes of these trials, and whether or not the companies had agreed to sign completion certificates. The certificate for Richbond was signed by the UNDP expert and UNOPS declared the projects technically completed. In spite of the differences, discussions at the two companies showed that the prospects for success at these two companies has been considerably enhanced. A copy of a memorandum (dated 22 June 2001) of the UNOPS expert on the trials addressed to Richbond is attached as Annex IV.

### **Fez-Meknes Group**

27. Detailed description of the implementation of these projects is provided in paragraphs 10 - 14 above. Except for Bonbino, the companies are relatively small and their projects require counterpart funding. Therefore, they have through Cannon France, made their own arrangements for payment of their counterpart funding. In addition, they have entered into agreement with Cannon whereby Cannon is obliged to ensure the capability of the LCD equipment to produce Moroccan grade foam (see Annex V). If this agreement is respected by both parties and monitored by UNDP the problems associated with the implementation of the Casablanca projects may be avoided.

### **Progress reporting**

28. Table 1 below shows the status of implementation of the six LCD foam projects as described in UNDP's 2002 progress report. The progress report shows extension of project completion dates by 3-4 years resulting in project durations of 6 years for the Casablanca group and 5-5 1/2 years for the Fez-Meknes group. While there is a short description in the progress report of the problems encountered in the implementation of the projects and the consequent delays, there is little reference to the technical problems associated with the projects' implementation as well as capacity of the LCD technology in meeting the needs of the enterprises in achieving the CFC consumption reductions in light of the Montreal Protocol requirements

**Table 1: Morocco LCD Projects - Progress of Project Implementation as at the end of 2002 Reported by UNDP**

Project	Status	Date Approved	Date of Completion	Revised Date of Completion	Consumption ODP to be Phased Out per Proposal	Consumption ODP Phased Out	Delays (months)	Remarks (Specify milestone achieved, remedial actions, and issues of relevance to Executive Committee)
Bonbino Confort	Ongoing	Jul-98	Aug-00	Dec-03	90.0	0.0	43.5	All local works completed. Because of slow progress, equipment supplier took away leased LCD tank and did not re-install it before year-end. Will do so in 2003. A two-year phase-in period now being contemplated in spite of UNDP's efforts for fast completion.
Salidor S.A.	Ongoing	Nov-97	Dec-99	Dec-03	48.0	0.0	52.2	A fire fortunately did not damage the machine beyond repair. It was cleaned up and the last set of trials started in Dec 02. Unfortunately, they could not be finished before Christmas. Cannon is scheduled to return in 2003 to complete the project.
Dolidol	Closed	May-97	Jun-99		0.0	0.0	NA	Cancelled in Dec 01. Finrev to be issued. Balance to be returned in 2003.
Mousse d'Or S.A.	Ongoing	Nov-97	Dec-99	Dec-03	45.0	0.0	52.2	Progress stopped pending company's decision on financing remaining activities. Government has been requested to urge Mousse D'Or to resume. A two-year phase-in period now being contemplated by enterprise in spite of UNDP's efforts for fast completion.
Richbond S.A.	Ongoing	May-97	Jun-99	Dec-03	150.0	150.0	58.7	In spite of all efforts demonstrating low-density foam requested can indeed be produced with LCD, company will still not use it. A two-year phase-in period now being contemplated by enterprise in spite of UNDP's efforts for fast completion.
Sodiflex and Tiznit Plastic S.A.	Ongoing	Nov-97	Dec-99	Dec-03	85.0	0.0	52.2	Trials successful. Same situation as for MOR-08. UNDP considers this project completed, however company will use CFCs until it has no choice. A two-year phase-in period now being contemplated by enterprise in spite of UNDP's efforts for fast completion.

### Disbursements of the Project Grants

29. UNOPS informed the Secretariat that the approved project grants for all the projects have been fully spent except for balances left to be returned to the Fund or to cover outstanding expenses, and that the purchase orders for the LCD equipment to all the enterprises have been fully paid to Cannon. The remaining balances are as follows:

- (a) Dolidol: an uncommitted balance of US \$61,533 to be returned to the Fund;
- (b) Richbond: a balance of US \$40,036 to be returned to the Fund;
- (c) Salidor: a balance of US \$7,615 remaining to cover experts' costs;



- (d) Sodiflex: a balance of US \$10,010 for reimbursement for trial costs to be paid when a Hand-over Protocol is signed by the company.

### **XanaThane EMT Technology**

30. At the meeting held at the Department of Commerce and Industries on 8 September 2003, the Chef de la Division indicated that the UNDP/UNOPS expert and a representative of Woodbridge Group XanaThane Systems proposed a new technology, XanaThane EMT technology to the Moroccan Government for introduction to the Moroccan slabstock foam manufacturing industry since the LCD technology appeared not to be working for the companies for the production of the Moroccan grade of foam. According to the representative of the Woodbridge Group, the technology involves the use of a chemical powder additive which reduces the core temperature of the foam considerably during production and therefore had the potential to enable the Moroccan foam manufacturers to produce the required grades of low density foam without the fire risk and without additional capital investment.

### **The way forward**

31. On 10 September 2003 during a meeting at the headquarters of Dolidol (the largest foam manufacturer in Morocco) at which the Government, UNDP/UNOPS and Cannon were represented, the implications of the inability of Morocco to phase-out substantial amounts of CFC-11 from the foam sector were explained and discussed. The discussion resulted in an agreement that would see all the stakeholders including Dolidol, whose project had been cancelled, making additional effort to ensure rapid phase-out of CFC-11 in the shortest possible time, namely within one year. This means that the Government of Morocco should be able to cut the import of CFC-11 for the foam sector drastically by 1 January 2005 and meet its Montreal Protocol CFC reduction obligations. The details of the agreement are described in the conclusions below.

32. Due to circumstances that pre-empted the final meeting with the stakeholders the cost implications of the agreement could not be discussed. It remains necessary for the implementing agency and the stakeholders to work out a mechanism for meeting the costs involved, if any, and it is understood that there would be no cost implications to the Fund.

## **CONCLUSIONS**

### **Projects affected by Decision 40/17 (Bonbino Confort, Mousse d'Or and Salidor)**

33. The mission concluded that the speed of delivery and the circumstances surrounding installation and trials of the equipment, where undertaken, were a major contributory factor to the delays encountered by the projects. It also concluded that the executing agency UNOPS and the equipment and technology supplier have put in place procedures to accelerate the completion of the projects. Cannon France acting for Cannon Viking could address the language difficulty, although the need for equipment and training manuals in French would have to be addressed. The written agreement between Cannon and the three companies to produce Moroccan grade foam should also facilitate a smoother implementation. Furthermore the approaches that have been agreed to be adopted to meet Morocco's CFC phase-out obligation under the Montreal

Protocol will strictly define the time frame for the completion of the projects as approved. Such completion is expected to be accomplished by 1 January 2006.

### **Implementation of LCD projects in Morocco**

34. As with the finding in Part I of this report, regarding the difficulties associated with retrofit of a Hennecke foam machine with Cardio system, while the retrofit of Maxfoam baseline foam machines in Morocco went relatively well, the retrofit of the machines other than Maxfoam, such as the OMS Planniblock machine at Dolidol appeared from the company's records to have been problematic. This may be worthy of investigation by the technology provider to determine whether equipment compatibility problems are involved.

35. As stated earlier the primary causes of the delays in the implementation of the Moroccan LCD foam projects were delays in the delivery and installation, and lack of success with trials and commissioning of the LCD equipment. However, efforts have been made on all sides since April 2001 to address the difficulties and move forward. These efforts have resulted in the agreement described in paragraphs 36 - 39 below, which if implemented would enable Morocco to comply with the 50% reduction in CFC consumption by 2005 without constraints on consumption of sectors that might need the use of CFCs. The efforts must be sustained in order to restore the companies' confidence in the technology and facilitate the phase-out of CFCs from the Moroccan foam industries in an environmentally sound manner as originally intended by the Government and the foam industry. The agreement by Cannon to assist the companies to reformulate their Moroccan grade foams at no risk to the companies removes a significant difficulty in the way of acceptance of the technology by the Moroccan companies.

### **Measures for rapid phase-out of CFC in the foam sector**

36. The technical objective of the agreement is to ensure the production of Moroccan grade foam with LCD by the year 2006. By this approach both UNDP and Cannon would have the time to assist in the formulation of Moroccan grade LCD blown foam. It could also provide an opportunity to take advantage of the introduction of new additional technology to the Moroccan foam industry to augment efforts to eliminate the use of methylene chloride. The broad framework of the agreement which was endorsed by the other companies is as follows:

- (a) Cannon will be responsible for the technical performance of the LCD equipment, ensuring that the LCD equipment could handle the Moroccan foam formulation without risk to the companies;
- (b) UNOPS will be responsible for assisting the development of Moroccan grade formulations in the period 2003-2005;

- (c) The Ministry of Commerce, Industry and Communications will coordinate the agreement in the period 2003-2005, to facilitate missions and reports on progress (this does not preclude the implementing agencies own progress report under its agreement with the Executive Committee);
- (d) The Fund Secretariat will keep the activity in view and undertake another mission to Morocco before January 2007.

37. The milestones of the agreement are as follows:

	Activity	2003	2004	2005	2006	2007
(i)	Foam production with CFC	—————▶				
(ii)	Foam production with LCD	.....▶			—————▶	
(iii)	Foam production with Water	—————▶				
(iv)	Foam production with Methylene Chloride	.....▶		—————▶		

Note: .....▶ Trial production  
 —————▶ Actual commercial production

- (i) Foam production with CFC should cease by end of 2004;
- (ii) - The LCD formulations suitable for producing Moroccan grade foam will be developed with the assistance of UNOPS/UNDP between the period 2003-2005;
- Equipment supplier (Cannon) will ensure technical feasibility of the equipment;
- Moroccan enterprises should be able to produce all grades of LCD foam by the beginning of 2006;
- (iii) Formulations with water using other chemicals (e.g. Xanthane) could also be tried at the same time at no cost to the Multilateral Fund as a supplement to the efforts to find technical solution to the foam production problem;
- (iv) In the interim period 2004-2005 the Moroccan companies could use methylene chloride as the auxiliary blowing agent.

38. Additionally, the Casablanca group presented a document to the mission on 11 September 2003, the “Technical Installation Contract” which sets out criteria of performance against which the new agreement could be operated. This document which should have been discussed at the last meeting of the mission is attached (Annex VI) for information. While it has

not been agreed at this stage, it should be subject to further discussion between the implementing agency, the executing agency, the technology supplier and the companies concerned.

## **RECOMMENDATIONS**

39. The Fund Secretariat recommends that the Executive Committee considers:

- (a) Taking note with appreciation of the initiatives taken by the Government of Morocco, the implementing and executing agencies, and the stakeholders, as contained in paragraphs 36 - 38 above, to ensure speedy elimination of CFC in the foam sector to enable Morocco to meet its reduction schedules under the Montreal Protocol;
- (b) Taking note that the agreement is without prejudice to Multilateral Fund rules, particularly with regard to project implementation delays, and that the implementation of the agreement is without any cost implications for the Multilateral Fund;
- (c) Taking note that the projects for Bonbino Confort, Mousse d'Or and Salidor would require extension of the project duration in order to ensure completion based on the approved (LCD) technology.

## Figure 1

### Extracts from Project Documents (Sample from Richbond Project)

#### Description of the proposed reversion

- To produce qualities which do not require auxiliary blowing agent, current mixing head has to remain in operation.
- Carbon dioxide is an inert gas, no additional provisions for ventilation and safety are required.
- Carbon dioxide has lower heat capacity than CFC-11. This requires to replace more water, leading to lower hardness.
- To re-establish the hardness, it is necessary to use cross-linkers or a co-polymer polyol, in a proportion of 2 to 10% of the current polyol.
- Also, different surfactants are required. Richbond produced mainly low density hard foams, so reformulation of the different grades is needed.
- The benefits of a less expensive blowing agent will be partially offset by the higher costs of this co-polymer polyols and surfactants.
- Technicians have to be trained in the use of the new technology and a long learning curve is anticipated.
- Reconversion would be made formulation by formulation
- The start-up will be supervised by UNDP appointed experts.

#### Project Costs:

Incremental capital cost (US \$)	627,500
Incremental operating savings (US \$)	156,875
Approved Grant (US \$)	470,625
Expected company contribution (US \$)	156,875

Cost of trials: US \$15,000. Based on:

- 3 foam types
- Each type consists of 3 trials of 5 minutes each (total of 9 trials)
- Cost of each trial US \$600/min, with 45% cost recovered through scrap foam sales.

#### Operating costs

- CO<sub>2</sub> is cheaper than CFC-11 and is also used in a lower ratio compared with CFC-11.
- Increase of the energy consumption to maintain CO<sub>2</sub> liquid, increase of the polyol and surfactant prices and also operational costs due to provision of nitrogen and for renting the CO<sub>2</sub> storage and increase of maintenance compensate partially for the lower price and use of CO<sub>2</sub>.

**Figure 2**

Project Execution Milestones of the Moroccan LCD Projects (Sample from Richbond Project)

Activity	Trim 1	Trim 2	Trim 3	Trim 4	Trim 5 to 8
1. Preparation: License Agreement Procurement Preparation Procurement	x  x x x x	  x x x	  x		
2. Installation Arrival customs Installation			 x  x		
3. Start-up Machine start-up Trials Training (in process) Certification				 x x  x  x	
4. Development of all the qualities with the new technologies					x x x x

### **Figure 3**

#### Extracts from the Bid Analysis Report of Richbond S.A. (Transmitted to the Company on 20 December 1999)

- Technically, the two bidders (Beamech and Cannon Viking) give detailed technical specifications of their own LCD system.
- Both bidders meet the requirements of the technical specification.
- Beamech meets the requirements of the specifications with the following processing comments:
  - (d) Foams can be made with good reproducible physical properties down to  $14 \text{ kg/m}^3$ . Foams below  $13 \text{ kg/m}^3$  have been made experimentally on the Pilot Plant.
  - (e) Foam with superior reproducible cell structure across the whole of the block with no problem of random bubbles in the top of the block.
  - (f) No  $\text{CO}_2$  filled foams can be made on the existing mixing head. In Morocco, many companies use calcium carbonate, co-polymers as fillers to increase the hardness and to reduce the cost price.
  - (g) If colours are required, it would have to be based on the Milliken Reactant System. All Moroccan companies use only colorant pigments to reduce the cost price.
  - (h) Beamech has two (2) years full scale production experience with foaming runs in excess of 5 hours.
- Cannon meets the requirements of the specification, with the following processing comments:
  - (a) The ability to operate with high levels liquid  $\text{CO}_2$  in the formulation process, up to 10 pph producing a  $10 \text{ kg/m}^3$  density foam, without premature frothing in the laydown device.
  - (b) The ability to operate for the duration of long production runs (Unlimited run length) using polymer polyols and filled polyols in the process formulations, without any blockage of the laydown device.
  - (c) All LCD systems from Cannon include formulation change as standard to be able to make wide formulation grade changes on the fly.
  - (d) Production of good block shape by virtue of the laydown device spanning almost the conveyor width.

- (e) Cannon reported to produce foam with superior reproducible cell structure across the whole of the block with no problem of random bubbles in the top of the block. This is a point for clarification in the event of selection.
- (f) Pigments colorants can be used with no blockage problem of the laydown device.
- (g) Cannon was the first company to develop LCD blowing technology, and to date is the most experienced supplier, having supplied more than twenty LCD equipment in the world.

(B) MOR/97/G6 “Processing Evaluation”

Comp.	Polymer polyol	Colour Pigment	Calcium carbonate	Variable pressure	Run length	Minimum density (kg/m <sup>3</sup> )	Square block
Beamech	NO	NO	NO	NO	Limited	14	Limited
Cannon	YES	YES	YES	YES	Unlimited	10	OK



**Figure 4**

Extracts from Purchase Orders

(Sample from Richbond Project)

Claims

Without any prejudice to other recourse, this purchase order is issued by UNOPS for Richbond in Morocco. Richbond reserves its right to pursue directly with any eventual claims which may arise as a result of this purchase order. The vendor in turn shall have contractual obligation under this purchase order to allow the recipient organization to directly pursue such claims.

Payment terms

1. 20% of total amount against bank guarantee.
2. 20% upon submission of specification and pipework schematic drawing
3. 20% upon submission of major proprietary equipment purchase order
4. 30% against submission of shipping document.
5. 10% upon submission of machine acceptance.



**Annex I**

**Schedule of Secretariat's Visits**

**(9-12 September 2003)**

<b>9 September 2003</b>	
9:00 a.m.	Meeting with representatives from the Department
	Venue: Department of Commerce and Industry
	- Industrial Production Branch (Rabat)
10:30 a.m.	Meeting with companies and representatives from the Department
	Venue: Department of Commerce and Industry
	- Industrial Production Branch (Rabat)
<b>10 September 2003</b>	
9:00 a.m.	Visit to Richbond (Casablanca)
11:00 a.m.	Visit to Sodiflex (Casablanca)
15:00 p.m.	Visit to Dolidol (Casablanca)
<b>11 September 2003</b>	
10:00 a.m.	Visit to Salidor (Meknès)
15:00 p.m.	Visit to Bonbino Confort (Fès)
17:00 p.m.	Visit to Mousse d'Or (Fès)
<b>12 September 2003</b>	
10:00 a.m.	Visit to Dolidol (Casablanca)
15:00 p.m.	Meeting with representatives from the Department
	Venue: Department of Commerce and Industry
	- Industrial Production Branch (Rabat)



**Annex II (a)**

**Dolidol Correspondence to UNOPS and Others on the Quality of  
Cannon Equipment and Service  
(Official Translation)**

UNI  
CONFORT  
MAROC  
Manufacturers of polyurethane foam  
And spring mattresses

DOLIDOL

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CASABLANCA, 20<sup>th</sup> March 2001

**ATTENTION**

- Ms Linda CAUVIN
- Mr Allal JNIOUI
- Mr SAFI/ MINISTRY IN RABAT
- Mr VAN DE VELDE / BRUSSELS
- Mr Bob Mc ARTHUR / CANNON VIKING

Subject: Reply to your letters dated 13<sup>th</sup> February and 12<sup>th</sup> March respectively which have just been forwarded to us by the Ministry of Trade and Industry (Mr ESSAFI)

\*\*\*\*\*

Dear Sirs,

Following his visit to us, Mr. VAN DE VELDE, Senior Expert in foam manufacturing, was able to verify the facts and must surely have informed you of his findings.

The fact remains that this report must certainly address the inability to produce a standard grade of foam both on account of the machinery as well as the CANNON VIKING technicians themselves.

We drew up and forwarded to you a report about the number of tests, the tonnage produced (of which more than 50% were failures) and the expenses incurred both by way of investments and waste.

In your report you seem to want to imply that all the blame lies with the local technicians and that CANNON VIKING technicians share no part of this blame. You therefore ask us to resume the tests, train our technicians and award them diplomas as if the equipment supplied were in perfect working order. Unfortunately one cannot but note the lack of reliability in terms of spare parts; well, given the fact that the machinery is new, this is hardly a good start as we are going to have to end up paying CANNON VIKING a fortune for spare parts when we operate the machinery again in the future and, in the process, bring our company to its knees, once again interrupting production in order to wait for the spare parts to arrive.

Annex II

Kindly note that our technicians were never involved in the production tests of standard foam, and the installation of the equipment was always left in the hands of CANNON VIKING technicians who were assisted by our local technicians.

Unfortunately, following the plans drawn up in Rabat, none of the tests carried out by CANNON VIKING technicians produced acceptable foam blocks.

You can see for yourselves, from all the reports you have heard and despite the fact that our technicians were not involved; CANNON technicians were incapable of operating the new machinery. How then can you blame our technicians and say that they need training when first and foremost it is the CANNON VIKING technicians who sorely need such training?

When the tests were being carried out our technicians asked the CANNON VIKING technicians for a double copy of the reports that were sent to Manchester or to be given the opportunity to present a joint report drawn up by DOLIDOL and CANNON VIKING technicians. Sadly, the latter always refused.

All this diminished our technicians' faith in CANNON machinery, given that even CANNON technicians did not seem to have faith in their own machinery.

Please note that throughout the 35 years that we have been operating in the industrial sector no machinery that we have purchased has ever required more than 15 days to a month before it was fully and definitively operational. Now, the machinery that has been installed for over two years is still not operational, isn't one justified to wonder why? Out of courtesy, we will not mention the failures currently experienced by our Moroccan colleagues.

In conclusion, one must know how to operate machinery before attempting to provide training on that very machinery.

We feel that we are being used as a "laboratory" factory where CANNON VIKING tests all its new machinery, and in order to do this, they have abused our trust, selling us machinery which – according to them – is indispensable if we are to upgrade our equipment to the level of the new CANNON technology. This machinery costs no less than 110,000.00 US Dollars.

In view of the above, we feel compelled to take the following decisions:

1. Turn down the program proposed by CANNON.
2. Ask CANNON VIKING to take back its machinery and be refunded for the investments made by us (see our previous report dated 12.02.2001).

Yours truly,

Mohamed BENMOUSSA  
CEO

**Annex II (b)**

**UNOPS Correspondence to Dolidol Regarding Continuation of  
Cardio Foam Trials at Dolidol  
(Official Translation)**

UNOPS  
**United Nations Office for Project Services**

Fax Transmission

Date: 22<sup>nd</sup> March 2001  
To: Mr M Benmoussa, CEO  
Organization: Dolidol  
City, Country: Casablanca, Kingdom of Morocco  
Fax Number: (212) 2 35 21 46  
From: Linda Cauvin, Portfolio Manager, Tel: (212) 457 1852  
Sender's Fax Number: (212) 457 4044/4043  
Pages: 2  
Subject: MOR/97/G61 – Your fax dated 20<sup>th</sup> March

Dear Mr Benmoussa,

Thank you for your letter dated 20<sup>th</sup> March that I have just received.

Please allow me to set the record straight regarding each party's "faults".

When we visited Cannon Viking in Manchester, we informed them that, irrespective of what had happened previously, the fact that 30 tests had been carried out unsuccessfully seemed to indicate that Cannon Viking did not know how to operate the machinery nor did they understand the technology. We therefore expected Cannon Viking to rectify this situation and gave them one last chance to prove that their machinery did in fact work and was able to produce foam of acceptable quality. In the face of our determination, Cannon Viking accepted to cover the costs of sending their technician to us for three weeks in April.

We also informed Cannon Viking that it was their responsibility to train Moroccan technicians in the use and maintenance of the machinery. Insofar as we were able to see the Moroccan technicians did not know how to operate the machinery, we therefore insisted that Cannon Viking hold a proper, systematic training course instead of the scraps of information that they had haphazardly provided until then.

Concerning your doubt with regards to the machinery and Cannon Viking's ability to operate it, I can only tell you that the same Cannon Viking technicians successfully installed and put into operation equipment of the same type as that sent to Morocco, for Montreal Protocol projects, carried out by UNOPS, for five companies in Argentina. Furthermore, our experts (Mr. Jnioui, Mr. Van de Velde, Mr. Veenendaal) all know of several companies all over the world where

Cannon Viking has installed such equipment and it functions perfectly. This is why I hope that the problems encountered in Morocco can be solved. The experts and technicians confirm that there exists no technical reason why your machinery should not work satisfactorily. This is why we told Cannon Viking that we would give them a last chance.

UNOPS suggests that you too ought to give them one last chance. I would be grateful if you would let me know whether you would reconsider your position.

I remain,  
Yours truly,

cc: Mr. Semou Diouf, Attn. Ms Khadija Kabbej, Fax. (212-7) 70 15 66  
Mr. El Jamali Director for Industrial Production, Fax. (212-7) 76 35 37  
Messrs Chakour & Essafi, Industrial Production Division, Fax. (212-7) 66 00 27  
Mr. B. Veenendaal, Fax. (219) 328 8047  
Mr. A. Jnioui, Fax (33-4) 92 94 0805  
Mr B. Arview, Fax. (33 1) 60 19 22 78



**Annex II (c)**

**Fax from Cannon France to Dolidol Regarding Post-Commissioning Formulation Trials**  
(Official Translation)

**CANNON FRANCE**

07 May 1999

From : Bernard ARVIEU / Cannon France  
To: Mr. Fahmi – Dolidol / Uniconfort Maroc  
CC: B. McArthur / P. Spinelli – Cannon Viking  
Object: Procedure of commissioning of CarDio™ equipment

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Further to our telephone conversations recently, please find hereunder confirmation of the formal procedure applied for the commissioning of our CarDio equipment and the signing of the Protocol of final and definite acceptance of said equipment.

As you can see, this is nothing but the official procedure that Cannon Viking applies to all UNOPS' and other projects. This procedure has been confirmed to you on several occasions during the technical meetings held between us.

The commissioning program of CarDio equipment is mainly intended to confirm, to the Client, to UNOPS and to ourselves – as well – that the equipment sold is complete and in good running order and in full compliance with the performance criteria provided in the Contract of sale that was passed between UNOPS and Cannon Viking.

Our experience, through the commissioning of some 20 sets of equipment of this kind throughout the world, confirmed that the procedure followed and the selection of the grades of foam to be tested is the most efficient way of commissioning for all parties concerned (Client/UNOPS/Viking).

This is why Cannon Viking suggest the production of three grades of foam which, together, cover the range of gravity where CO<sub>2</sub> is used. These tests do demonstrate the possible output range of liquid CO<sub>2</sub>.

Cannon Viking wanted neither to act irresponsibly nor to take any chances with your equipment. That is why Cannon Viking chose to produce only those foam grades that are proven with regard to TDI index and the exothermic released in the block.

Once this aim implemented, our CarDio engineer asks the Client to sign with him the copies of the Acceptance Protocol. Copy of said Protocol is herein attached for your perusal.

Once the Protocol is signed, Cannon Viking and their engineer propose to stay on the Client's premises for some 3 or 4 days in order to help in the adjustment and the manufacturing of the other grades that the Company may wish to produce.

Obviously, since the Client has accepted the line, any damage that may arise as a result of risks related to the so-called dangerous grades (TDI, high water content and very high exothermic) would be of the sole responsibility of the Client.

In conclusion and, as we proposed earlier on, we are prepared to reduce to 2 (or even to 1) the number of the so-called “safe” grades prior to the signing of the Protocol so that, once said Protocol is signed, we will be able to dedicate – under your responsibility – more time to the other grades that you intend to produce. To do so, it is absolutely necessary that you indicate to us – as already requested – these grades. Once we have received these grades we will then forward to you a copy of your Protocol.

I do hope that the above will clarify all the misunderstandings that were reported these last few weeks. While we look forward to the signing of your Protocol and to visiting you on the 17<sup>th</sup> May with Mr. Ganem, General Manager of Cannon France, I remain,

Yours sincerely,

Barnard ARVIEU  
(*signed*)

**Annex II (d)**

**Correspondence from Dolidol to Cannon France Regarding Acceptance of  
Installed Cannon Cardio Equipment  
(Official Translation)**

UNI  
CONFORT  
MAROC  
Manufacturers of polyurethane foam  
And spring mattresses

DOLIDOL

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CASABLANCA, 17<sup>th</sup> October 2000

**ATTENTION: MR. BERNARD ARVIEU / CANNON France**

Copied to: Ms LINDA CAUVIN – UNOPS  
Mr. CHAKOUR - Ministry of Industry  
Mr. ESSAFI - Ministry of Industry  
Mr. JNIOUI – UNOPS Expert  
P. SPINELLI – B.M.C ARTHURE – CANNON VIKING  
Mr. GANEM – CANNON France

Dear Sir,

Further to your fax dated 06.10.00, we regret to inform you that we are not on the same wavelength as you.

In fact, as we were able to see on site, the persistent problem of holes inside the foam is far from being solved and will never be accepted by our end users.

Regarding the plates of the OMS conveyor, the machine is made that way, and during your preliminary visits accompanied by your engineers, you were able to see for yourself the differences that exist between the plates of the conveyors; this is a fact which can never be changed.

In the second paragraph, you referred to the defects in the CO2 dosing pump that, may I remind you, your men changed twice, and some of its parts were changed several times.

This proves that this pump is totally unreliable especially because it is the very basis of the entire system although you do consider replacing it under warranty.

This causes fluctuations in the height of the blocks which consequently significantly lower our cost price.

Annex II

In response to paragraph 3 where you referred to very high quality foam of European standard and in accordance with UNOPS specifications, we are talking of foam that is full of holes, with variations in height and cracks caused by defects in the CO2 pump.

We therefore cannot for the moment confirm our definite acceptance of the machinery.

In response to paragraph 4, we wish to draw your attention to the fact that the inventory lasted just one day, Friday 29.09.00 and should have continued on Monday 02.10.00, while allowing for resumption with your technicians on Tuesday 03.10.00.

In conclusion, we regret that we are unable to accept this machinery until such a time as it begins to produce foam having none of the abovementioned defects. Our machine and technicians will be at your disposal when you deem fit to resume the tests. We do not feel responsible for the delay in concluding this project satisfactorily.

May we remind you that UNI CONFORT MAROC DOLIDOL has contributed time, energy, raw materials, overtime by its staff and invested in machinery purchased from you in order to complete your line and adapt ours just so that this project might be successful?

We thank you for your understanding and hope your technicians will return.

Yours truly,

*(Signed)*

M. Benmoussa  
CEO

**Annex II (e)**

**Dolidol's Conditions for Installation of Cannon's Cardio Equipment  
Following a Series of Failed Trials  
(Official Translation)**

UNI

CONFORT

MAROC

DOLIDOL

Casablanca, 12<sup>th</sup> November 2001

**DOLIDOL Uni Confort Maroc  
Installation of CARDIO system**

The text below gives a set of requirements which must be met before the CARDIO system is installed. This text will be circulated to all Cannon, UNDP and Ministry for Trade and Industry representatives.

**1. Repairing the equipment currently installed:**

The CARDIO system that is currently in place presents numerous technical problems which were noted both by Mr Veenendal (UNDP expert) and by Mr FIERRO (Cannon representative). In this regard, Mr Fierro admitted that Cannon had made several mistakes when installing the system.

Therefore, before proceeding with the follow-up of the tests carried out on this system, Dolidol demands that its plant benefit from an overall technical upgrade.

The parts which have been repaired several times are to be changed and replaced by new ones. Said upgrade of the plant must be validated by a UNDP expert.

**2. Spare Parts:**

A list of spare parts was drawn up by a UNDP expert. Dolidol has repeatedly asked to be given a copy of said list.

Cannon, who has a copy of this list shall put at Dolidol's disposal:

- all the parts that appear on the list drawn up by the UNDP expert;
- all the spare parts required for the plant to function properly during and after the tests.

**3. Delivery of spare parts:**

Delivery of the spare parts (as per UNDP list or others) must be formalised and verified by Dolidol and Cannon.

**4. Availability of basic components (pumps):**

Should one of the basic components (e.g. TDI pump) break down, Dolidol expects the Ministry for Trade and Industry, UNDP and Cannon to do everything in their power to ensure that the system is repaired with the least possible delay.

**5. Reimbursement for expenses incurred for tests carried out:**

Dolidol demands reimbursement for:

- the cost of production tests carried out on site that amounts to US \$138,000.00;
- the cost of retrofitting (adaptation of) the system that amounts to US \$100,000.00.

**Remark:** Dolidol has shown its willingness to integrate this system and, following Cannon's recommendation, has embarked on a retrofitting exercise to shift from an indirect to a direct system. These alterations cost US \$122,000.00.

**6. Carrying out the tests:**

Dolidol requests that the tests on the Cardio system be carried out in the presence of a Cannon technician and that of an expert in the manufacture of polyurethane foam, produced using the CARDIO system. These people must be present to ensure follow-up throughout the entire period when the tests are being carried out.

The foam produced during the tests must be of the so-called "Moroccan" grade.

**7. Use of polyols:**

Cannon must ensure that the Cardio system is operational irrespective of the type of copolymers used.

**8. Guarantee:**

The guarantee shall not come into effect until such a time as the system begins to systematically and uninterruptedly produce foam of the so-called "Moroccan" grade. Mr. Fierro specifically undertook to ensure this.

**9. Training:**

Cannon shall be responsible for the training of Dolidol technicians. Such training must be given in French. All technical documentation (manuals) should be available in French.

**10. Visit:**

After visits to companies in Argentina, Dolidol maintains that so far it has never seen a machine identical to the one it owns operating using the Cardio system.

Dolidol would like to see the Cardio system working on "planni-block" machines.

**11. Notice:**

Kindly reply in writing to each one of the points raised above.

Omar Fahmi (*signed*)

Copied to: Mr Chakour (MCI)  
Mr Jnioui (UNOPS expert)  
Mr Veenendal (UNOPS expert)

**Annex II (f)**

**Report on the visit by Cannon technicians and representatives of UNOPS and  
the Ministry of Trade and Industry  
(Official Translation)**

UNI  
CONFORT  
MAROC  
Manufacturers of polyurethane foam  
And spring mattresses

DOLIDOL

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CASABLANCA, 20<sup>th</sup> November 2001

- ◆ Arrival of Cannon technicians at Dolidol on 8 November 2000.

**09.11.2000**

- They proceeded to do the following works:
- ◆ Cutting part of the gate-bar diffuser by a company in Casablanca to allow for its retrofitting.
- ◆ Changing the joints of the CO2 pump, this is done every time.
- ◆ Retrofitting of a new filter on the gate bar.
- ◆ Adjusting of the conveyor angle

**10.11.2000**

A test to produce CO2 foam was carried out on this date, 44 blocks equivalent to 2639 kg.

**Result:**

- ◆ In all blocks the foam was very clogged with large holes in the centre.

**Difficulties encountered:**

- ◆ TDI valve seized up and did not open when machine was started.
- ◆ Wrong pressure when machine was started a second time, no explanation for this.

**13.11.2000**

The technicians proceeded to:

- ◆ Calibration of stannous octoate pump
- ◆ Replace the CO2 nozzle tip.

A test of 29 blocks equivalent to 1682 kg of foam was carried out today in the presence of Mr. Jnioui and the two representatives from the Ministry for Trade and Industry.

**Results:**

◆ A type of European-grade foam not suitable for the Moroccan market was produced having small holes on certain parts of the block. This foam can almost be considered acceptable even though the system did not produce the desired quality.

**15.11.2000**

◆ Today a test was planned and carried out in the presence of the entire commission on the three grades, on thicknesses 15, 17 and 19 of approximately 5 mm each for 42 blocks equivalent to 2567 kg.

With regards to grade 15 that had already been produced on 13.11.2000 using the same parameters, it was noted that the foam is totally different, clogged and the blocks lose shape during stabilisation, this mousse is not usable and is to be thrown away (total loss). At the end of the test the cardio Kit had the following problems:

◆ the TDI valve was blocked.

◆ The antifreeze pump meant to warm and lubricate the CO2 pump, had broken down.

Mr Jnioui explained to us over the phone that the Cannon technicians suspected that the gate bar, that had already been changed once, was no good and asked us to borrow the Bonbino Confort's gate bar in Fez, as it belongs to the new generation.

**16.11.2000**

◆ While the Dolidol technical directors were at a meeting at the Ministry for Trade and Industry in Rabat, the Cannon technician changed the joints for the nth time and explained to our technician that the joints need to be changed weekly. He then cleaned the filter of the CO2 line and repaired the leak in the antifreeze pump.

The Cannon technicians took back with them to England the CO2 pump joints with the aim of finding a solution for them since they very often cause problems.

**17.11.2000**

Cannon technicians came to Dolidol to pick up samples of the foam produced that would enable them to carry out an analysis. They informed us they would be away for twenty days.

*(Signed)*

Mr. BENMOUSSA  
CEO



**Annex III (a)**

**Initial Correspondence between Cannon France and Sodiflex Setting up Dates for Trials  
and Commissioning of Cardio (LCD) Equipment**  
(Official Translation)

***CANNON COMPANY FAX MESSAGE***

From: Bernard ARVIEU  
Cannon France

Tel.: 00 33 1 60 19 10 00

**URGENT !!**

To : Mr. Bouzmane – SODIFLEX  
CC : Mr. Salah Gacimi – Ifriquia Plastic  
Mr. Ziadi – Ifriquia Plastic  
P. Spinelli – Cannon Viking

**Re: Commissioning of CarDio™**

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Dear Sir,

May we first extend our best wishes to you, your family and all the personnel at SODIFLEX.

Regarding your plant, Cannon Viking is suggesting to come over to your premises and mount CarDio, some time next January. The assembling of the equipment will be followed by a testing of the foams on UNOPS standards. Once these operations are completed, we will sign the Acceptance Protocol and then move on to the final stage, i.e., high exothermic formula of SODIFLEX.

This operation may be implemented towards the end of January, as soon as the team working on the Richbond plant will have completed its tasks there.

We are kindly asking you to confirm your agreement to the above schedule by week 4 or 5, ensuring the full availability of your line for 2 to 3 weeks (no production during this period).

May we remind you that once we have completed the jobs at Richbond's and Dolidol's, and that we have made substantial progress on your own job, we will then be able to set a date for the CarDio Seminar which will take place in Casablanca and to which all foam block manufacturers, from Africa and the Middle East, will be invited to attend. We would like to secure the attendance of Sodiflex to the CarDio demonstrations that will be conducted after the seminar.

Whilst we extend, once again, our best wishes for the New Year, we remain

Yours sincerely,

**Bernard ARVIEU** (*signed*)

**Response of Sodiflex to Cannon France**

**SODIFLEX**

14<sup>th</sup> January 2000

CANNON France  
Attn: Mr. Bernard ARVIEU

Thank you for your fax dated 4<sup>th</sup> instant. We also extend our best wishes to you, your family and to all the staff at Cannon France.

We hereby confirm our agreement to your intervention on week 4 or 5.

Yours sincerely,

A. Bouzmane (*signed*)

PS.: Kindly send your fax messages to Sodiflex (not at Ifriquia Plastic) at the following fax number: 212 2 35 33 72

**Annex III (b)**

**Report from Sodiflex to UNOPS on the Second Series of Cannon Cardio Foam Trials**  
(Official Translation)

**SODIFLEX**

Casablanca, 3<sup>rd</sup> November 2001

Attention: Ms Linda Cauvin (UNOPS)  
CC: Mr. Bouazzaoui (MCI)

Dear Ms Cauvin,

Further to Mr. Chakour's (MCI) fax message dated 1<sup>st</sup> November, we are pleased to provide hereunder our answers to the queries made in connection with the prevailing situation:

- Testing

- During the first tests (September – October – November 2000) we encountered all sorts of difficulties and, according to Cannon, all these problems would disappear with the change of gatebar
- Following the meeting held on 22.06.2001 at Hôtel Farrah, and which was attended by Mssrs:
  - Ziadi & M. Bouzmane (Sodiflex)
  - Annouch (Richbond)
  - Essafi (MCI)
  - Veenandaal (RAPPA)
  - Jnioui (UNOPS)
  - Roy Stewart (Cannon)

We agreed on a program of tests as well as on the choice of density. To undertake these tests, Dolidol company promised to provide us with polyol HL109 and, in view of this, Mr. Veenandaal had to change the quantity of stannous octoate in the formulations (HL109 was loaded at 15% and HL106 at 10%, therefore HL109 requires less stannous octoate than HL106).

After that, neither Mr. Jnioui nor Mr. Veenandaal have ever raised this issue of polyol.

Please find (herein attached) a fax message from DOW, a leader in polyols and TDI and well as Mr. Chakour's message)

- SODIFLEX Company has been manufacturing all kinds of foams – without any problem – using all types of polyols.
- The CO2 equipment has been returned to Air Liquide Co. on their request.

With best regards

A. Bouzmane  
Technical Manager

DOW EUROPE S.A.  
International Development Center  
PO Box 3  
13, rue de Veynot  
CH-1217 Meyrin 2



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**F A X   M E S S A G E**

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To: Mr. Bouzmane / Sodiflex  
From: Hervé Wullay / Dow Europe SA  
Date: 16 July 2001

Dear Mr. Bouzmane,

We carried out tests on CarDio at our laboratories, in Meyrin, using Voralux HL106 and Voralux HL109. These tests did not show any difference in the cell structure.

We need to ensure different settings (adjustments) for HL106 and HL109. As we have different viscosity grades, it is therefore necessary to have a higher shim for HL109 in order to adjust the head pressures to the same values as for HL106.

I look forward to being updated on the tests you are undertaking.

Yours truly,

Hervé Wullay / Dow Europe SA  
(signed)

**Annex III (c)**

**Results of Foam Trials at Sodiflex**  
(Official Translation)

**SODIFLEX**

Ministry of Industry  
Trade and Crafts

2nd November 2000

Attention: Mr. SAFI

Please find listed hereunder the interventions made by Cannon technicians at our premises: SODIFLEX:

- 13th September, morning, the Cannon technician dropped in at SODIFLEX
- 15th September, he stayed the whole day; in the afternoon we received a visit from another technician
- 16th September, both technicians came to SODIFLEX
- 18th September, one technician came to SODIFLEX, there was an electrical problem
- 21st September, at 15.00 the technician wanted to carry out a test but he was unable to do so due to a pressure problem
- 22nd September, the pressure problem persisted. That afternoon the technician left for Fès
- 25th September, he carried out two tests, the first of 2mn 01s and the second one, in the afternoon lasted 2mns 18s
- 26th September, the technician carried out two tests: the first test in the morning lasting 2mn 43s and the second in the afternoon lasting 2mn 08s
- 27th September, he carried out another two tests: the first test in the morning lasting 2mn 33s and the second in the afternoon lasting 2mn 14s
- 28th September, there was a problem with the CO2 pump
- 29th September, a 2mn 43s test was carried out
- 2nd October, a 4mn 18s test was carried out
- 3rd October, a 5mn 02s test was carried out

There is a problem with the machine; the technician has to change the joints of the CO2 pump. While waiting for the joints to arrive from the UK, the technician went to Meknès.

- 16th October, the two technicians came to SODIFLEX to change the joints of the CO2 pump
- 17th October, they carried out a 36s test
- 18th October, they carried out a test in the morning that lasted 2mn 25s and another one in the afternoon that lasted 2mn 02s

N.B. All the tests were non conclusive and were of the same density.

- 19th October, the technician carried out two tests of a different density: one test lasting 1mn 2s and another of 1mn 13s, but the density obtained is not ideal: therefore, there is a problem with the dosage of CO<sub>2</sub>. During the second test, the TDI pipe of the high-pressure pump burst. Technician ordered an olive moulding from the UK.
- 24th October, the olive moulding arrived. We connected it and ran two tests of 1mn 12s each. There are still density problems.

N.B. A new problem has just emerged: the Cannon technician says that with this system we cannot exceed 6 parts of CO<sub>2</sub> per 100kg of polyol.

- 27th October, ran a test lasting 1mn 16s
- 30th October, in the morning ran a test lasting 2mn 30s, but in the afternoon the technicians encountered a problem, the machine would not start.
- 31st October, the machine still would not start
- 1st November, the technician did not turn up, he went to DOLIDOL

We trust the above is clear.

Kind regards,

A. BOUZMANE





**Annex IV (a)**  
**PROPOSED SETTLEMENT FOR THE CLOSURE OF**  
**MOR/97/G62 - RICHBOND**

**INTRODUCTION**

Richbond has voiced its dissatisfaction with the quality, reproducibility and trial cost related to the installation of an LCD conversion of its existing foaming unit as part of the abovementioned CFC-phaseout project.

UNOPS, on the other hand, emphasizes that the project document, which is accepted in writing by Richbond as well as by the Moroccan Government clearly showed that Richbond should expect a considerable cost sharing as follows:

• Incremental Capital Costs	US\$ 627,500
• Incremental Operating benefits	US\$ 156,875
• Approved MLF Grant	US\$ 470,625
• Cost sharing by Richbond	US\$ 156,875

After thorough discussions of the issues at hand with the supplier of the LCD system, Cannon Viking, the parties agree as follows:

1. Richbond accepts an invitation by Cannon-Viking to visit two foam manufacturers in Argentina to see LCD technology working in a production setting. Cannon-Viking will bear the costs of this visit.
2. UNOPS will compensate Richbond for past trial costs immediately after acceptance in writing of this settlement as follows:

**10 t @ 2,000 US\$ 20,000**

3. Cannon-Viking will re-visit the Richbond plant for a complete checkup of the equipment and for the provision of training as per schedule to be provided by Cannon-Viking, not later than the end of June 2001.
4. As the current LCD block shape is considered not optimal, Cannon-Viking will perform shape optimization trials with the RS system. The liability of the costs of these trials will be carried by Cannon-Viking up to an amount of **US\$ 4,500**.
5. UNOPS will arrange for and assume financial liability for trials to develop Richbond's standard foams using LCD. The liability is restricted to **US\$ 20,000**.

In agreement:

UNOPS

Richbond

Cannon-Viking

Annex IV (b)  
Results of Formulation Trials

<b>MEMORANDUM</b>	
<b>BERT VEENENDAAL</b> <b>PROCESS EXPERT</b> <b>"FOAMS"</b>	<b>Date:</b> June 22, 2001 <b>To:</b> Richbond, Mr. Anouch Cannon-Viking, Mr. Stuart <b>Copy:</b> Mr. Jnloui, Ms. Cauvin
<b>MOR/97/G62 – RICHBOND – CARDIO FORMULATION TRIALS</b>	

Trials at Richbond were conducted on June 19 and 20, 2001. They served the development of formulations that would match to the extent possible current foam types in production at Richbond. This memorandum serves to

- Assess the general implementation status
- Report on the result of the trials
- Provide suggestions for further development
- Set a date for project completion.

We are grateful for the cooperation of the foam production management and personnel for their assistance in the trials that came after and on top of a full production schedule.

#### IMPLEMENTATION STATUS

Cannon-Viking (CV) completed training on the use of Cardio as well as the RS system. While the training as such is completed to satisfaction, it is important that CV continues hands-on instruction of the operators in the preparation and operation of the Cardio unit. CV technicians should do this by as much as possible supervising and encourage the operators do the actual work. This is the best way to get them familiarized with the process that they have to operate subsequently themselves. It is also suggested that CV spends some time on providing guidelines for maintenance.

CV conducted a thorough overhaul of the Cardio system equal to a re-commissioning and is of the opinion that the reliability of the equipment is proven. During the trials only one Cardio-related defect appeared—shut-down of the TDI metering pump. This was corrected. The equipment tests will be concluded next week.

It is expected that the “re-commissioning” can be finalized before the end of the next week (June 30). It will overlap with further formulation development.

#### FORMULATION DEVELOPMENT

Two series with a total of 6 trials were conducted. Annex-1 shows the relevant formulations, predicted physical data and measured results. The goal was to produce a foam quality with a 17-18 kg/m<sup>3</sup> density and a hardness of 165 N (ILD at 40%). While the ILD goal was not yet quite achieved, there was significant progress—from 112 n to 155 N! The last trial was not performed based on TDI pump problems and needs to be redone. Based on previous results, a hardness of around 160 is expected. Guidelines for further trials using the same basic system have been provided. In case the results would fall short, the use of a polyol with higher polymer content is recommended—such as the Voralux HL-120. The predictions show that the use of formulations based on this polyol would meet or exceed the earmarked ILD target. Annex-2 shows two proposed formulations.

## **PROJECT COMPLETION**

After re-commissioning and completion of initial formulation development, the project can be closed. A "Certificate of Completion" is to be issued by the expert-in-charge and final disbursement arranged. The latter includes collection, review and endorsement of trial cost and any remaining uncompensated local works. Any compensation is limited by the remaining available project funds and applicable eligibility criteria. If everything goes as planned, project completion could take place mid-July. CV and/or Richbond are to contact UNOPS on or before June 29 to inform on the status.

Mr Anouch emphasized that with these trials, the conversion is not complete. There are more trials to be done/foam types to be converted. He solicits the assistance from CV when in Morocco for work on other projects. It was agreed upon that CV would inform Richbond before every visit and inquire if help is needed.

Annexes:      Annex-1:      Test results and guidelines for further trials  
                 Annex-2:      Recommended formulations based on HL-120

COMPANY: RICHBOND  
FOAM TYPE: 17/170  
DATE: JUNE 19/20, 2001

TRIALS WITH HL 109/MD 145

PARAMETER	SPECIFICATION	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4	TRIAL 5	TRIAL 6	TRIAL 7	TRIAL 8	TRIAL 9	TRIAL 10
POLYOL 1	HL 109	100	95	90	90	90	90	90			
T <sub>POLYOL 1</sub>	°C	26	26	26	26	22	22	22			
POLYOL 2	MD 145	--	5	10	10	10	10	15			
T <sub>POLYOL 2</sub>	°C										
WATER		4.3	4.3	4.3	4.5	4.5	4.6	4.6			
LCD		3.0	3.0	3.0	2.5	2.5	2.0	2.0			
GFC-11		--									
TDI	80/20	55.5	56.4	57.3	60.6	60.6	61.7	62.6			
INDEX		115	115	115	117	117	117	117			
T <sub>TDI</sub>	°C	24	23	23	23	22	22	22			
SILICONE	L-580										
AMINE 1	A1										
AMINE 2	A33										
TIN OCTOATE	ACIMA S25										
FORECAST											
DENSITY	ISON	17.3	17.3	17.3	17.3	17.3	17.7	17.7			
ILD	ISON	112	116	119	134	134	147	151			
T <sub>FORECAST</sub>	°C	165	166	166	170	170	169	169			
ACTUAL											
DENSITY	ISON	17.0	15.7	16.0	16.7/17.2	17.5	18.2				
ILD	ISON	122	126	137	136/146	155	152				
T <sub>ACTUAL</sub>	°C	165	166.7	167.4	170.8						

SUGGESTIONS FOR FURTHER TRIALS:

1. Operate with chemical temperatures of ~18-20 °C
2. Trial # 7 was not run and should be the next trial. Based on previous data, an ILD of ~160-165 N may be expected
3. Increase tin until the same closed cell structure is obtained as for the baseline quality
4. Decrease MH pressure → larger cell size → increased hardness
5. Use a polyol with higher solid content (i.e. HL 120 or HL 109 with HS 100)
6. Increase MID 140 to 20 %





**Annex V**

**Specifications for the Supply of Three Cardio Equipment  
To Bonbino Confort, Mousse d'Or and Salidor  
(Official Translation)**

Fez, 19<sup>th</sup> December 1998

<b>COMPONENT</b>	<b>CANNON/ VIKING AGREEMENT</b>	<b>AGREEMENT SOCIETE</b>
<b>Equipment:</b>		
List of spare parts in sufficient number and quantity; their stock supply will remain the same for the first year in order to ensure the proper functioning of the Cardio system.	OK <i>(illegible)</i>	
Cannon will grant individual payment facilities to each corporation according to their financial difficulties.	OK <i>(illegible)</i>	
Cannon will draw up a step-by-step plan for the installation of the three machines in order to avoid any risk of having these three machines breaking down at the same time.	OK	
<b>Results:</b>		
Cannon will use the chemicals available on the Moroccan market, namely standard polyols, copolymers HL 106 or the equivalent, paste dyes and mineral fillers.		
With the Cardio system, Cannon will produce, in an acceptable and, at least, identical manner, three grades of foam for each company: Grade 1.... Grade 2.... Grade 3....	OK	
Cannon will modify, without charge, any flaw found in the Cardio system in all three companies. These will also have the opportunity to benefit from the improvements (upgrades) and novelties of Cardio system both in Morocco and abroad.	OK	
<b>Miscellaneous</b>		
Cannon is committed to solving the problem, with the least possible delay, and will send an engineer within eight days at the maximum.	OK	

*Signature:*

*Signature:*

Company:

Supplier:

### Summary of the outcome of the mission of Cannon Viking's engineer's at SALIDOR

<b>DATE</b>	<b>Measures implemented</b>
09/04/03	Arrival of CV engineers. Checking of machine. Problem with main computer-the keys do not work.
10/04/03	Replacement of main computer. The keys are working.
11/04/04	Dismantling of mixer's safety disc. Problem on the disc. Probable cause of the problems encountered with the machine from the beginning. Disc replaced. Visit to Bonbino.
12/04/04	Paul falls ill and the two engineers return to hotel.
14/04/03	Start-up of CO2 unit. Problem with dosage pump. Need to change joints. Could not find the replacement kit for the joints. Another problem with octoate dosage pump. Problem is resolved in the afternoon.
15/04/03	Problem with octoate dosage pump is resolved. Departure to SODIFLEX to pick up new joint kits for CO2 pump.
16/04/03	Joints found at SODIFLEX and installed on SALIDOR's CO2 pump. Pump is working well. Replacement of air regulator of bypass valve. Departure to Fez airport to collect a package containing the new valve of gate bar.
17/04/03	Assembling of gate bar and head of mixer. Machine ready for test run. Production at SALIDOR. Test postponed to the next day.
18/04/03	First test of 4 minutes. Machine is working well. Foam is of bad quality; large cells all along the block. Gravity lower than expected.
19/04/03	Second test. Cracks on the blocks. Striations as well as holes all along every block.
21/04/03	Adjusting of water pumps, amine, silicon...etc. Preparation of machine for the following day.
22/04/03	Third test. Foam extremely bad; with circles resembling tree trunks. Holes as well as cracks at the bottom of the block.
23/04/03	Fourth test. Modification of the machine settings. Same result. Problem found at the level of TDI bypass. Replacement of defective part.
24/04/03	Preparation of machine for tests scheduled for the following week.
25/04/03	Departure of both engineers for Casablanca. Kyle leaves.
28/04/03	Paul's return to SALIDOR. Fifth test (duration: 5 minutes). Foam is of better quality. There are still larger than desired cells.
29/04/03	Cleaning and preparation of machine for the following test.
30/04/03	Sixth test (duration: 4 minutes). Good quality foam.
01/05/03	Public Holiday
02/05/03	Seventh test (duration: 5 minutes). Holes with the size of eggs caused by CO2 leaking from the solution.
03/05/03	Eighth test. Foam with the same defects like in the seventh test.
05/05/03	Ninth test. Holes are eliminated by modifying the level of the gate-bar. But cell structure still not satisfactory.
06/05/03	Cleaning and preparation of machine for a following test.
07/05/03	Tenth test. Problem with constriction of the foam. Visible striations.
10/05/03	Eleventh test. There is still constriction of the foam. Satisfactory cell structure, but foam is a little bit more clogged than desired.
12/05/03	Twelfth test.
15/05/03	Thirteenth test
19/05/03	Fourteenth test
22/05/03	Fifteenth test. First test of gravity 20. Bubbles on parts of block.
26/05/03	Seventeenth test
29/05/03	Roy's arrival. Test no. 14a. Holes at the bottom of the block. Hand-over from Paul to Roy.
30/05/03	Paul's departure. Roy accompanies him to airport.
02/05/03	Eighteenth test. The same problem as previously encountered.
03/06/03	Nineteenth test: no improvement. Discussion on the possible postponing of tests.
04/06/03	Signing of agreement to postpone tests until machine is Maxfoam machine is adjusted (see agreement attached hereto). Roy Stewart leaves.



## Annex VI

### Technical Installation Contract Proposals Presented to the Mission by the Casablanca Group of Moroccan Foam Manufacturers on 11 September 2003 (Official Translation)

Considering that:

- UNOPS insists that LCD technology is suitable for the foam manufacturing machines available in Morocco, irrespective of their type ( PLANIBLOCK, MAXFOAM, etc.)
- Industrialists seek to have machinery that functions reliably for each one has only one production line,
- UNOPS undertakes to successfully convert to LCD,

The industrialists recommend the following contractual steps to follow through the procedure:

#### 1. Satisfactory completion of works

- Watertight circuits
- Reliable control of flows and pumps
- Reliable solenoid control valve and pneumatic control panels
- Position control of the gate-bar (depending on block size)
- Computerized control and CLP saving device
- Stock of basic spare parts that might be required for all tests

#### 2. Preliminary Tests

- Raw materials supplied by UNOPS
- Non interference with production cycle

#### 3. Production Performance Test

##### - Duration

8 x 2 hr tests/day with no interruptions or breakdowns, to check replicability

##### - Type of foam:

14 kg/m<sup>3</sup> to 30 kg/m<sup>3</sup> according to the industrialist's choice

##### - Quality criteria:

- Foam of homogenous thickness, hardness according to market demands, regular sized cells, matching sample
- Good and regular block profile, according to established practice

Every production performance test that fails shall be considered as a preliminary test, and UNOPS shall pay for the raw materials.

**4. CONSTRAINTS TO BE ADDRESSED**

- Process that simultaneously utilizes all types of polyols even when filled with calcium carbonate
- Preparation and cleaning time identical to current standards.

**5. TRAINING AND DOCUMENTATION**

- Instructions manual for operation and maintenance in the French language
- Training offered in French, for a sufficient length of time
- Formalisation of instructions and parameters for each type of foam

**6. MECHANICAL GUARANTEE**

- One year guarantee following successful production performance test, and solving recurrent problems (deterioration of parts)

**7. SPARE PARTS**

- Guarantee to supply spare parts within acceptable time frames.