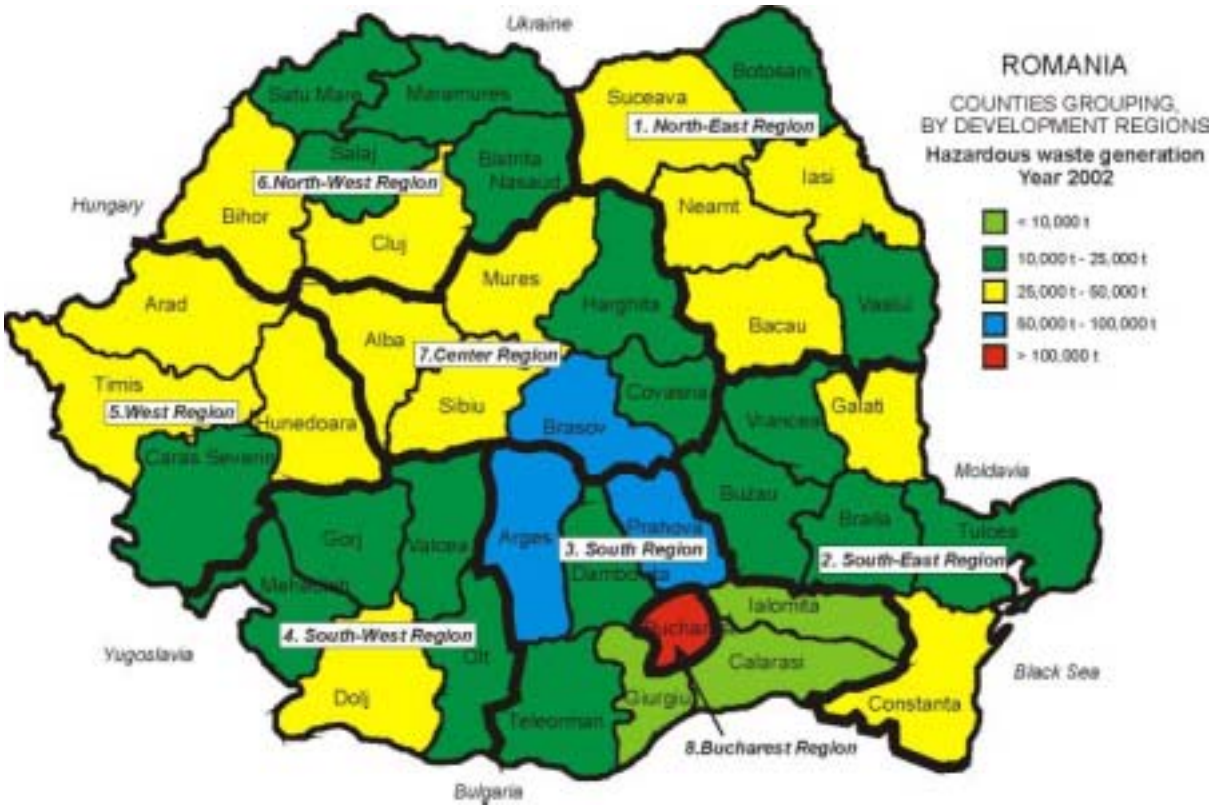
Japan International Cooperation Agency – JICA
Ministry of Waters and Environmental Protection – MWEP
Romania

The Study on
Master Plan for Hazardous Waste Management
in Romania

Technology Transfer Report



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1. Introduction - The Study, Pilot Projects and Technology Transfer

This study "Study on Master Plan for Hazardous Waste Management in Romania" had the following two main activities:

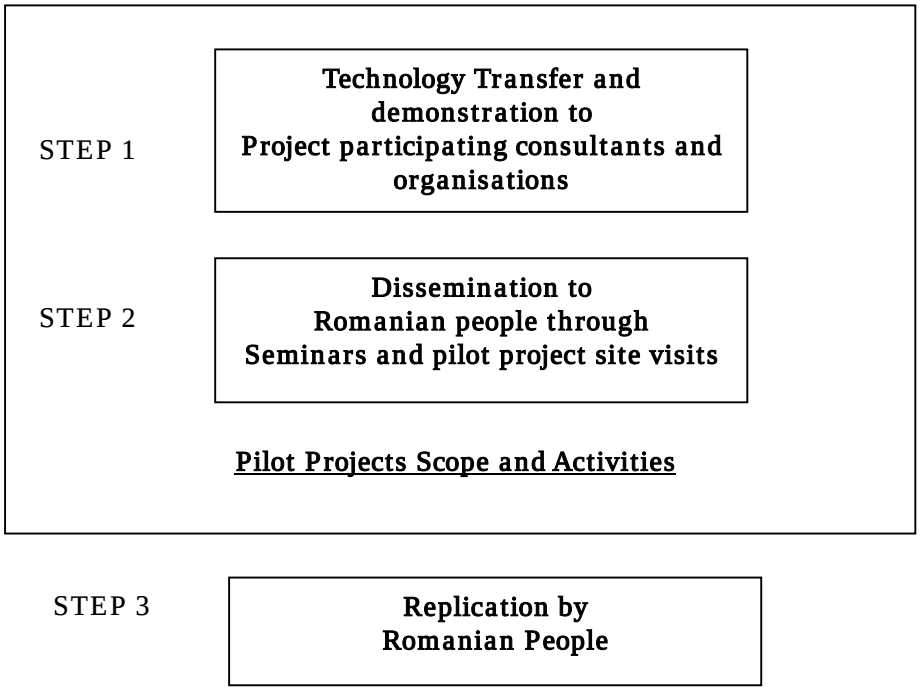
Activity 1: Elaboration of a national strategy and action plan for hazardous waste management in Romania
Activity 2: Implementation of pilot projects

The objective of the above Activity 1 was to produce "Strategy and Action Plan, which is the direct output of the activity. The Study Team believes that the Romanian counterpart, especially, Ministry of Waters and Environmental Protection (now within MAFWE – Ministry of Agriculture Forests Water & Environmental Protection) have learned methodology and usefulness of elaboration of hazardous waste strategy and action plan by participating in the process of the elaboration.

In terms of technology transfer, the above Activity 2, ie. implementation of pilot projects, provided more direct and substantial contribution because technology transfer was one of the direct objectives of the pilot projects.

Generally speaking, "technology transfer" is done from experts to some specific persons or specific group of people. In the process of implementation of the pilot projects, the study team transferred relevant knowledge and technology directly to Romanian consultants and organisations that participated in the pilot projects.

However, ultimate objective of the pilot projects is diffusion/replication, in Romania as a whole, of good practice, know-how and technology demonstrated through the pilot projects. In this sense, the pilot projects must go beyond simple technology transfer. Technology transfer is only the first step of the pilot projects. Second step is diffusion and third step is replication by Romanian people themselves. The pilot projects covered the first two steps as illustrated below.



The JICA Study included a component "strengthening laboratory analytical capacity at national level". This component provided ICIM –the National Institute for Environmental Research and Development, with an atomic absorption spectrometer (AAS) and relevant training needed to analyse hazardous waste – particularly heavy metals contained in hazardous waste. The Study Team member provided ICIM with advice with respect to use of AAS for waste analysis. ICIM has already been using AAS for waste analysis.

2. Pilot Projects

2.1 Objectives

We have carried out the following 4 pilot projects:

Pilot Project 1: Promotion of heavy metal recycling using existing smelting facility
Pilot Project 2: Improvement of hazardous waste treatment in metal plating and surface treatment
Pilot Project 3: Promotion of voluntary actions and pro-active waste management within chemical and petro-chemical industries
Pilot Project 4: Strengthening hazardous waste management capacity

Pilot Projects 1, 2 and 3 focused on practical application of best available technology in hazardous waste management at factory level. A component of Pilot Project 3 aimed at awareness raising for "Responsible Care" in the chemical and petro-chemical industry.

Pilot Project 4 focused on introduction of improved hazardous waste information and inspection system by working with major stakeholders and developing and diffusing the following guidance note and formats:

1) Guidance note for identification and classification of hazardous waste
2) Guidance note and format for company waste management plan
3) Format for inventory of contaminated sites, and suggested method for prioritisation of contaminated sites
4) Guidance note for waste inspection by EPA / NEG

2.2 Methodology and Activities

Generally, target people who apply some technology must be convinced of usefulness and effectiveness of the technology. Considering this point, the Study Team has carried out the pilot projects with the following activities and procedures:

a) Identification of opportunities and technology and relevant fields where effective improvements can be expected in connection with hazardous waste management. The following criteria were used for identification and selection of opportunities and technologies:

- Useful for Romania
- Effective for improvement of hazardous waste management, and bringing about economic benefits
- Low implementation / operational costs
- High applicability and replicability

b) Designing, manufacturing, installation, operation, monitoring and evaluation of the pilot projects

c) Awareness-raising and dissemination of the pilot projects to Romania through seminars.

We have designed the pilot projects in such a way that the pilot projects activities will be largely carried out by Romanian consultants and engineers so that pilot projects themselves could be replicated by Romanian people in future. The Study Team believes that the Team has achieved a substantial technology transfer to the Romanian consultants and engineers and participating companies through the pilot projects.

In order to disseminate the result of pilot projects and awareness rising, we held seminars from June 24, 2003 to July 1, 2003. The following table shows the total number of participants to each seminar. In total nearly 500 persons participated in the seminar. Of the 42 county EPAs, 39 EPA sent representatives to the seminars.

Number of Seminar Participants (excluding seminar presentators)

	TOTAL	EPIs	Enterprises	Other
Seminar 1 (6/24)	**56**	15	32	9
Seminar 2 (6/25)	**89**	-	38	51
Seminar 3 (6/26)	**86**	5	53	28
Seminar 4&5 (6/28)	**167**	55	63	49
Seminar 6 (7/1)	**40**	6	28	6
Seminar 7 (7/1)	**48**	1	16	31
TOTAL	**486**	67	230	174

In the seminars, we have presented results of the pilot projects as well as Hazardous Waste Management Strategy and Action Plan. Seminar handouts we delivered to the seminar participants include reports on the pilot projects (Volumes 6 – 9) containing pilot projects results, guidance notes, manuals and formats in addition to Volume 1 (Strategy and Action Plan). We have delivered both in hard copy (Book) and electronic files (CD Rom). We have also produced and delivered posters (2 kinds) and leaflets (2 kinds) to the seminar audience. See Appendix 3.

We believe the seminars ware successful and effective. Appendix 2 shows participants' responses to the questionnaires on the seminar.

However, it remains to be seen how Romanian people will actually replicate the technology and good practices disseminated through these seminars, leaflets and posters.

2.3 Description of the Pilot Projects

The following table summarises the objectives, participants, facilities installed in connection with the pilot projects described in this report.

Description of the Pilot Projects, Objectives, Technology Transferred, Participants and Equipment Installed

Project Name/ Objective	Participants (Signer of Agreement)	Other Participants	Facilities Provided	Facility cost (US$)
1) Promotion of heavy metal recycling using existing smelting facility	a. Sometra S.A. b. Romplum c. Phoenix	d. Copsa Mica municipality e. EPI Sibiu f. EPI Baia Mare	Briquette machine installed at Sometra	60,000
2) Improvement of hazardous waste treatment in metal plating and surface treatment	a. Direct Auto b. Timpuri Noi SA	c. EPI Arges d. EPI Bucharest	Zinc plating lines of cleaner production type	72,000
3) Promotion of voluntary actions and pro-active waste management within chemical and petro-chemical industries	a. FEPACHIM b. FEA S.A. c. AMCO d. Koyo	5 FEPACHIM Member Firms which participate in making "Company Voluntary Environment Management Plan": e. Petromidia S.A. (refinery) f. SC Uzinele Sodice g. Govora S.A (soda, ammonia) h. Azo-Mures (fertilizer) i. Sicomed S.A. (pharmaceutical) j. PoliColor	Closed solvent degreasing and recovery systems (Recipients are b, c & d)	76,000
4) Strengthening an EPI Capacity in Hazardous Waste Management	a. EPI Arges	Companies which participate in making enterprise waste management plan: b. Dacia (automobile manufacturer) c. Arpechim (refinery) d. Presate Dacia (car spare parts manufacturer) e. Ana Imep (electric motors) f. Direct Auto Rom (car spare parts)	Analytical equipment for hazardous waste for Arges EPI	38,000
				246,000

See Appendix 1 for programmes for each seminar.

3. Pilot Project 1 – Waste Minimisation in the Non-Ferrous Metals' Sector

3.1 Introduction and scope

The objectives of this pilot project are:

- support to three Romanian non-ferrous smelters in terms of internal HW management and minimisation, and
- indicate ways in which the three Romanian non-ferrous smelters can accept hazardous waste from external sources and recover valuable heavy metals from that waste.

3.2 Results and technologies transferred

3.2.1 Minimisation of internal hazardous wastes generated by the non-ferrous metal smelters

A highly experienced Japanese non-ferrous smelting engineer with support of local consultants carried out this component of the pilot project. Recommended measures to minimize internal waste are as follows:

- SC.ROMPLUMB S.A. - slag management and utilization
- RBG PHOENIX S.A. - improvement of management method of historical sludge generated from flue gas washing process of sulfuric acid plant
- SOMETRA S.A. - technical study of sulfuric acid production (Improvement of flue gas from ISP Furnace); reduction of Zinc-Lead dross; reduction of blue powder (Blue powder is generated in the zinc condenser exhaust gas cleaning process. It is the largest waste in quantity in SOMETRA S.A.); reduction of Cu-Pb dross; improvement of handling of powder materials (Reduction of dust); ISP slag management and utilization

Planned outputs of this component are:

- Technical recommendations for three smelters which are summarized in Table 3.1, and
- Introduction of the following items
  - Japanese elution test
  - Roasting arsenic containing sludge test
  - Hot briquette plant (See Table 3.2)

Report Volume 6 contains comprehensive documents produced through Pilot Project 1.

3.2.2 Market and waste collection study

Utilising the ISP smelter as a model case, the amount and composition of external wastes were investigated and samples taken. Based on these data and operating data of the smelter, the possibility and direction of external HW recycling by using non-ferrous metal smelting facilities were studied.

Planned outputs of this component are:

- Report regarding evaluation and possibility of external waste recycling by using non-ferrous smelting facilities. (See Report Volume 6 for detail.)

3.2.3 Provision of briquette machine for preparation of HW recycling in the non-ferrous metal smelting process

In order to promote external waste recycling, mixing and briquetting of wastes would be necessary. The component of this project is to provide the briquette machine for testing waste samples in terms of suitability for recovering non-ferrous metals.

Planned outputs of this component are (see Report Volume 6 for more detail):

- Test scale briquette machine
- Report of briquette test of external waste samples.

3.2.4 Participants in project

In addition to the JICA Study team the participants in this pilot project were:

- S.C. SOMETRA S.A.
- S.C. LOMPLUMB S.A.
- RBG PHOENIX S.A.
- Institute for Nonferrous and Rare metals (IMNR S.A.)

3.3 Dissemination of results

In order to report the result of pilot project and disseminate the minimisation technology of hazardous wastes, the team has conducted the seminar on July 1st, 2003. Total number of participants was 50 approximately including non-ferrous metal generators, smelters, recyclers and researchers. According to evaluation of the participants, it was said that the seminar provided useful information.

3.4 Application and replicability of PP1 in Romania

SOMETRA has conducted briquette test under normal temperature condition called “Cold Briquette Test”. Produced briquette shows quite good hardness for ISP furnace. SOMETRA together with IMNR continue to conduct “Hot Briquette Test” which is more suitable for wastes recycling. The progress and result of above test may refer to the other smelters.

Follow up actions required for development of the pilot project

1) Low-grade wastes recycling system

Technically, some kind of low-grade non-ferrous metal wastes can be recycled by blending them with raw materials, internal wastes and/or external wastes in the non-ferrous metal smelters. However, following items should be examined to promote the recycling of low-grade non-ferrous metal wastes.

- Reverse logistics system
- Awareness raising of generators
- Incentives of wastes recycling for non-ferrous smelters
- Fostering of mediator, blender or collector
- Intermediate storage

2) Potential recyclable non-ferrous metal wastes

Following table shows an example of electric arc furnace dust analysis in Japan. Electric arc furnace is commonly used in the waste iron recycling. Because steel materials are galvanised electroplated in many cases, the dust from waste iron recycling process contains more than 20 % of zinc. Since composition of electric arc furnace is not so complex and amount of this dust is large, this dust is one of the big sources for secondary zinc. As mentioned before, this dust may be not captured and scattered in Romania at this moment. It is desirable that market study of these potential recyclable wastes should be carried out.

An Example of Electric Arc Furnace Dust Analysis in Japan

Element	Content (%)	Element	Content (%)
Zn	22.5	Fe	32.0
C	3.6	Cr	0.36
Cu	0.2	Pb	2.2
Ca	2.6	Cl	3.1
Cd	0.02	F	0.25
Si	1.6	O	24.9

3) Sustainability of non-ferrous smelting industry

Without primary source (concentrates), non-ferrous metal smelter cannot continue the operation. This means they cannot recycle external wastes in the smelter. In order to promote HM containing wastes by using existing non-ferrous smelting facilities, their sustainability is important. In this sense, promotion and revitalization of non-ferrous metal industry in Romania is also necessary.

Table 3.1 Recommendation of 3 R in the Non-Ferrous Metal Smelters

Companies	Issues	Recommendation	Cost (Million US$)	Remarks
S.C. ROMPLUMB S.A.	Slag management & utilization	Slag management Check the elution in compliance with EU standards Slag utilization Raw material for steel and cement Substitute material for sand blasting Construction material Filling of caisson	—	Amount of generation in 2001;Approximately 30,000 ton Slag is inert glass substance. There are several utilization applications shown in left column. However social barrier and cost competitiveness exists for utilization. If official organization cooperates with non-ferrous metal smelters for technology deve
RBG PHOENIX S.A.	Wastewater treatment sludge storage management	Check the elution in compliance with EU standards Improvement of storage facility Reduction of sludge generation in case of re-start of the smelting process Introduction of heavy metals fixing by roasting the sludge	—	It is not generated yet. (Historical wastes), Storage quantity; Approximately 4,000 ton Roof, wall and pit of storage pond 1st stage neutralization pH;3 (1st stage; Gypsum, 2nd stage; Sludge) Roasting condition;>900ºC,>10 min
S.C. SOMETRA S.A.	Reduction of Zn-Pb dross	Improvement of ISF operation Check below items Cokes strength Charging height of ISF Proper size of sinter lump	—	Amount of generation in 2001;12,200 ton
	Reduction of blue powder	Proper rotor immersion depth Flow gas modification	0.4	Amount of generation in 2001;11,343 ton
	Reduction of Pb-Cu dross	Shortening the de-copperization time Elemental sulpher copperization Treatment of speiss	0.1	Amount of generation in 2000;6,100 ton
	Improvement of powder product handling	Mixing of dxry and wet powder Moisture content adjustment improvement	1.5	

Companies	Issues	Recommendation	Cost (Million US$)	Remarks
S.C. SOMETRA S.A.	Slag management & utilization	See S.C.ROMPLUMB S.A.	—	
	SO_2 emission improvement (Sulphric acid production)	Cosntruction of sulphuric acid plant	32	Rough estimation of initial cost; 32 Mill. US$ Modification of sintering machine; 1.5 Dry electric precipitator; 3.5 Sulphuric acid plant; 24 Cooling facility; 1 Waste acid treatment; 2

Table 3.2 Provision of Briquette machine

1. Type of technology	Description of type of technology: Making briquette for the preparation of waste recycling		
	Purpose for supply: Conduct applicability test for waste recycling in the non-ferrous smelters		
	Results to be expected (generic): Promotion of waste recycling in the non-ferrous smelters		
2. Specification (Detailed list and specification of equipment supplied)	Item	Specification	Application
	Briquette machine	・ Three row cylindrical rolls with dimples ・ Power;1.8 kW ・ Revolution,1,385 rot/min ・ Pressing force,250 kg/cm^2 ・ Expected capacity, 1 ton/hour	・ Making briquette and preparation for waste feed of furnace to recycle HW
3. Overall cost (Euros)	JICA funding support for briquette machine was $48,000 The SOMETRA smelter installed peripheral equipment and facilities like feeding conveyer, mixer and so on. Also the enterprise .		
4. Delivery date	December 2002		
5. Beneficiary (ies)	Name of organisation: SOMETRA S.A. Address: Str. Fabricilor Nr.1 3158 Copsa Mica, Jud. Sibiu, Romania Contact person(s):Mr. Leonidas Koudoumogiannakis Mr. Bela Balazs	Type of organisation: Non-ferrous(Pb,Zn) smelter Public/private sector: Private NACE code	
6. Project duration	Start: October 2002	Finish: March 2003	
7. Results achieved	Results achieved:	JICA Study Report reference: Final Report Volume 6	
8. Dissemination of results	Date: 1/7/2003	Method: Dissemination Seminar / Workshop Bucharest Dissemination Video (Briquette machine and briquette test)	

4. Pilot Project 2 – An Integrated Approach to Waste Management in Metal Plating Sector

4.1 Introduction and scope

The MWEP, EPI and JICA study hazardous waste survey identified the metal plating industry waste as a priority sector. Stockpiling of hazardous acid wastes, cyanide wastes and "galvanic" waste (sludges from the treatment of plating wastes and wastewater) is common practice at Romanian plating enterprises because of low awareness and availability of appropriate sludge treatment and disposal methods. In addition, many metal finishing enterprises have no wastewater treatment plant or plant that has been allowed to fall into disrepair. The objective of Pilot Project 2 was to promote and demonstrate effective hazardous waste management in the Romanian metal plating industry.

4.2 Results and technologies transferred (see summary Tables 4.2.1 and 4.2.2 below)

Best practice was developed and implemented for two metal plating enterprises using an Integrated Pollution Prevention and Control (IPPC) approach. Sustainability of PP2 was ensured by involving all stakeholders, with a role to play in promoting and disseminating best waste management practice within the metal plating industry, in developing best practice work programmes at the enterprises. This involvement raised awareness of Best Available Techniques (BAT), the approach taken to identify BAT and of the issues affecting the implementation of BAT in Romania. Organisations currently offering technology advice to enterprises on plating processes, wastewater treatment and sludge treatment technologies were actively involved and were recognised as an excellent route for the dissemination of PP2 results

In line with the IPPC approach the scope of PP2 examined, developed and implemented best practice for the whole enterprise plating installation including plating processes, wastewater treatment, sludge treatment and sludge disposal. The approach required by IPPC legislation and the PP2 work programme where designed to replace hazardous raw materials with less hazardous raw materials, minimise process inputs and waste at source, reuse / recycle waste where possible, reduce the amount of waste to be treated, reduce the size of treatment facilities, reduce chemicals and energy used for treatment, improve the performance of waste treatment facilities, and ensure a safe disposal route for treated wastes to suit Romanian waste disposal circumstances.

Identifying issues associated with implementing best waste management practice at pilot enterprises supported the development and implementation of the Strategy and Action Plan for Hazardous Waste Management in Romania.

A Best Practice Guidance note with case study examples and results was produced to support the dissemination and implementation of best practice.

4.3 Dissemination of results

In order to disseminate results two seminars were held, one in Cluj-Napoca and one in Bucharest. The table (Table 5.1) below shows the number of participants at each seminar.

Participants at PP2 Seminar

	Cluj-Napoca 24/6/2003	Bucharest 26/6/2003
Ministry / EPI	15	5
Enterprise representatives	32	53
Others	9	28
TOTAL	56	86

The seminar content was largely presented by the Romanian team members and the participating enterprises. The objectives, activities and results were presented in some detail. The presentations were supplemented by two video presentations, one for each pilot enterprise. Following each seminar time was allocated for participants to discuss the seminar results and their needs in informal session with the pilot project team.

Feedback from participants was very encouraging indicating that the content was highly relevant to them, that they were impressed with the results and keen to obtain the same benefits. The project team was approached during the seminars by several companies wishing to undertake similar activities at their enterprises. Following the seminars visits were made to two enterprises to discuss issues and opportunities for undertaking similar activities.

Several participants commented particularly on the relevance to their activities, specifically mentioning the minimisation of wastewater, the improved treatment systems and the need to solve problems related to the disposal of treatment plant sludges. The latter is known to be a major issue in Romania with many enterprises stockpiling such wastes. Enterprises very much appreciated the integrated focus with attention to technological efficiency.

In order to assist with on-going dissemination of results a poster and leaflet were prepared for distribution via County EPIs.

4.4 Application and replicability of PP2 in Romania

Accurate and detailed information on the number and operating conditions of Romanian enterprise plating lines and wastewater treatment facilities was not readily available from official sources. An assessment of the number and operating conditions of Romanian plating lines was made by the PP2 team through; a limited number of visits to plating enterprises, discussions with EPIs in the pilot regions, discussions with Romanian plating process and wastewater treatment equipment suppliers, discussions with plating process chemical suppliers and discussions with plating enterprises and EPI's from outside the pilot regions attending JICA seminars.

The findings from these discussions are that:

- There are over 500 plating enterprises in Romania.
- The majority of the plating lines and wastewater treatment facilities are in poor condition, are operated inefficiently and are in need of replacement.
- Many plating companies do not have a satisfactory route for the disposal of their wastewater and sludge.
- The scope of work undertaken and technology transferred within PP2 is necessary at the majority of Romanian plating enterprises
- The level of awareness of the techniques and technologies implemented in PP2 is low.

The conclusion drawn and confirmed during the JICA dissemination seminars, by discussion with participating companies, is that the replication potential of PP2 is vast with hundreds of enterprises in directly analogous situations. Indeed, the team were approached by a number of companies with similar problems expressing desire to participate in any further programmes. In addition, the integrated approach demonstrated can be applied to **any** type of process in **any** industrial sector. The scope for replication to other polluting activities is tremendous.

Capacity for replication has been increased in ICIM and with some suppliers; nevertheless, the JICA foreign consultants believe that further programmes with the assistance of foreign consultants are necessary to complete the capacity building and to demonstrate applicability of similar techniques to other industrial sectors and other polluting activities / processes.

The pilot projects have resulted in large reductions in waste/wastewater requiring off-site disposal, indeed, the volumes of ongoing sludge generation are greatly reduced. The stabilisation recipes developed should allow the final disposal of such wastes as NON-hazardous residues for simple landfill. It is important that the application of these stabilisation and disposal techniques is encouraged. The Strategy and Action Plan developed by the JICA project recommends the development of small, regional facilities for physical/chemical treatment and stabilisation, the latter being an important part of replication of the results of this pilot project activity.

Follow up actions required for development of the pilot project

Continued Integrated Waste Management Pilot Project Programme

Objective(s): To continue developing capabilities within Romania to implement improved waste management in enterprises by adopting an integrated approach focussing on the complete waste management hierarchy.

Activities:

(a) Improving waste management in metal finishing processes - this would be aimed at replication of PP2 activities to additional similar enterprises (more than 500 such enterprises in Romania. This would leverage the "local" capabilities already partially built during PP2. It is recommended that the programme includes a further 5 enterprises with galvanic processes.

(b) To apply the same methodologies and techniques (avoidance and minimisation, process efficiency, improved waste recovery, treatment and disposal) to other processes and other industrial sectors. It is recommended that a further 10 to 15

enterprises participate in these activities.

Results:

(a) Improved waste avoidance and minimisation and waste management in selected enterprises.
(b) Improved environmental performance within the selected enterprises.
(c) Improved process efficiency and use of resources in selected enterprises.
(d) Consolidate capability within Romania for provision of such support to industry.

2) Feasibility Study for Regional Hazardous Waste Treatment and Disposal Facility

Objective(s): To undertake a feasibility study for development of a regional hazardous waste treatment and disposal facility to promote the "fast-track" development of such facilities within Romania.

Activities:

(a) Selection of a pilot region(s) for facility development.
(b) Selection of Romanian waste management company to participate
(c) To prepare an indicative waste inventory for the region (both stockpiled waste and ongoing waste generation) and identify potential market for provision of merchant waste treatment and disposal service.
(d) To prepare preliminary design for centralised waste treatment and disposal facilities to include process flows and mass balances.
(e) To undertake preliminary site selection.
(f) To estimate capital and operating costs and prepare cash flow analyses to identify necessary charges to give an appropriate return on investment.
(g) To assist in preparation of application(s) for necessary funding for facility construction and operation.

Results:

(a) Feasibility study enabling application for investment funding.
(b) Promotion of the development of necessary hazardous waste management infrastructure in Romania.

(Notes: Several companies have expressed interest in the development of such facilities. The project could potentially be designed to support the development of more than one facility in more than one region by selecting two or three participating Romanian waste management companies and supporting their activities with a centralised "pool" of foreign and local experts who would assist these companies in implementing the project activities through common seminars, workshops and specific targeted activities. The participating companies would be expected to contribute their own time and expenses.)

3) Development of Integrated Waste Management Information System (WMIS)

Objective(s): To build upon work undertaken by the JICA project and the REPIs project to actually develop a modern WMIS designed to support Romania's regulatory and national / international data reporting needs.

Activities:

(a) Preparation of conceptual design for WMIS for consultation based on needs assessment
(b) Preparation of detailed design for WMIS for approval by Ministry

(c) Development of equipment and software specifications
(d) Procurement of necessary information system hardware and system software
(e) Development of application software
(f) System installation and training of system administrator(s)
(g) Training of system users.

Results:
(a) Improved regulation and control with more efficient inspection
(b) Improved data collection and national reporting
(c) Improved international reporting

(Notes: Such a system could be low cost and be internet-based using "public domain" open-source technologies enabling the system to be supported at very low cost. System could also be developed in such a way as to incorporate information dissemination to help industry by dissemination of good practice information and raising awareness of environmental performance requirements and standards.)

Table 4.2.1 Provision of Zinc Plating Lines

1. Type of technology	Description of type of technology: Zinc plating from acid solutions		
	Purpose for supply: Improve technology and refurbish plating workshop		
	Results to be expected (generic): Improved waste management system, including hazardous waste avoidance and minimisation		
2. Specification (Detailed list and specification of equipment supplied)	Item	Specification	Application
	1. Alkaline degreasing	Hot chemical alkaline degreasing	1. Energy efficiency – insulated tank and lids give reduced warm up time 2. Energy efficiency – covers enable extract ventilation to be switched off when not processing – less evaporation
	2 Multi-stage counter-current rinsing	2-3 stages counter-current rinsing	1. Applicable to All rinse stages 2. Massive reductions in water use and wastewater volumes 3. Significant reduction in size and cost of wastewater treatment plant 4. Significant reduction of chemical use and treatment costs at wastewater treatment
	3. Zinc plating using zinc plating solution filter	Acid Zinc plating using solution filter	Replacement of cyanide cadmium plating Life of zinc plating solution prolonged less spent solutions to treat/discharge of
	4. Allow for future Zinc Plating solution tank	Acid Zinc plating	1 Opportunity to double capacity without additional rinse tank provisions
	5. Extract Ventilation	Local Extract ventilation	1 Advice given on which baths require extract ventilation 2 Advice on max ventilation rates to prevent heat extraction from the room
	6. Energy efficiency	Energy saving	Advice given on where energy is used
3. Overall cost (Euros)	JICA funding support for Timpuri Noi was $26,000 The enterprise invested finance of its own and the cost of the installations were kept as low as possible through the use of in house labour for building refurbishment and plant installations.		
4. Delivery date	March 2003		
5. Beneficiary (ies)	Name of organisation: Timpuri Noi Address: Bucharest-3; Splaiul Unirii 165, Romania Contact person(s): Mr. Valentin Ionescu.	Type of organisation: Compressor / generator manufacturer Public/private sector: Private NACE code	

6. Project duration	Start: October 2002	Finish: March 2003	
7. Results achieved	Results achieved (quantitative): - Replace cadmium plating from cyanide solutions, resulting in wastes / wastewaters which are easier to treat enabling compliance with discharge standards. - Water consumption minimisation – from 1.17 m^3/m^2 to 0,07 m^3/m^2	JICA Study Report reference: Final Report Volume 4	
8. Dissemination of results	Date: 24/6/2003 26/6/2003 26/6/2003 26/6/2003	Method: Dissemination Seminar / Workshop Cluj-Napoca Dissemination Seminar / Workshop Bucharest Distribution of dissemination leaflets to Ministries / EPIs/Enterprises Distribution of awareness raising posters to Ministries / EPIs/Enterprises	JICA Study Report reference: Final Report Volume 7 - Best practice manual for waste minimisation and treatment in metal surface treatment processes - awareness raising leaflet - awareness raising poster

Table 4.2.2 Provision of Zinc Plating Lines and Wastewater Treatment Plant

1. Type of technology	Description of type of technology: Zinc plating from alkaline solutions and wastewater treatment plant		
	Purpose for supply: Improve technology and refurbish plating workshop		
	Results to be expected (generic): Improved waste management system, including hazardous waste avoidance and minimisation		
2. Specification (Detailed list and specification of equipment supplied)	Item	Specification	Application
	1.Alkaline degreasing system	Hot chemical alkaline degreasing system	1. Replaces perchlorethylene degreasing system with most efficient form of alkali cleaning 2. Improved working conditions, no manual handling, no solvent vapours, no solvent discharging, no solvent sludge wastes. 3. Energy efficiency – insulated tank and lids give reduced warm up time 4. Energy efficiency – covers enable extract ventilation to be switched off when not processing – less evaporation
	2. Multi-stage counter-current rinsing	2-3 stages counter-current rinsing tanks and piping	1. Applicable to All rinse stages 2. Massive reductions in water use and wastewater volumes 3. Significant reduction of chemical use and treatment costs at wastewater treatment
	3. Zinc plating using separate zinc dissolution tank	Alkaline zinc plating	1. Life time of zinc plating solution prolonged less spent solutions to treat/ discharge of
	4. Allow for future zinc plating solution tank	Alkaline zinc plating	1. Opportunity to double capacity without additional rinse tank provisions
	5. Zinc plating solution filter	Solution filter	1. Life of zinc plating solution prolonged less spent solution to treat/dispose of
	6. Final warm rinse	Warm rinse tank and piping	1. Rinse waters from passivation contain Cr^{6+} which must be reduced by treatment to Cr^{3+}. The treatment facility and treatment costs are reduced considerably if this wastewater volume is minimised to concentrate the Cr^{6+}.Other wastewater streams are kept separate from this stream until after Cr^{6+}treatment. Reducing the flow rate through the warm rinse reduces energy loss. Warm rinse assists drying . Rinse temperature is thermostatically controlled below 60 ^{0}C to prevent bleaching of certain passivates, to save energy and eliminate the need for local extract ventilation and associated energy loss.
	Extract ventilation	Local ventilation	1. Advice given which baths require extract ventilation 2. Advice given on max ventilation rates to prevent heat extraction from room
	Energy efficiency	Energy saving	1. Advice given on where energy is used
	Wastewater Treatment	Waste and wastewater treatment plant	1. Package waste and water treatment plant designed, installed and commissioned to process all wastes and wastewaters from the galvanic processes. 2. Stabilisation trials on treatment plant sludge undertaken, recipe developed.

3. Overall cost (Euros)	Direct Auto Rom was $42,000. The enterprise input finance of their own and the cost of the installations were kept as low as possible through the use of in house labour for building refurbishment and plant installations.			
4. Delivery date	March 2003			
5. Beneficiary (ies)	Name of organisation: Direct Auto Rom Address: Stefanesti; Arges; Romania Contact person(s): Mr. Bogdan Radulescu		Type of organisation: Automotive parts manufacturer Public/private sector: Private NACE code	
6. Project duration	Start: October 2002		Finish: March 2003	
7. Results achieved	Results achieved (quantitative): - Replace chlorinated solvent degreasing - Chemical consumption minimisation – with about 60 % for zinc plating solution - Waste and wastewater treatment to Romanian and EU standards - Enterprise received Environmental Authorisation.		JICA Study Report reference: Final Report Volume 4	
8. Dissemination of results	Date: 24/6/2003 26/6/2003 246/2003 26/6/2003	Method: Dissemination Seminar / Workshop Cluj-Napoca Dissemination Seminar / Workshop Bucharest Distribution of dissemination leaflets to Ministries / EPIs/enterprises Distribution of awareness raising posters to Ministries / EPIs/enterprises	JICA Study Report reference: Final Report Volume 7: - Best practice manual for waste minimisation and treatment in metal surface treatment processes - awareness raising leaflet - awareness raising poster	

5. Pilot Project 3 – Chemical Sector – Responsible Care & Chlorinated Solvent Reduction

5.1 Introduction and scope

PP3 has two components as follows.

- Promotion of voluntary environmental management activity of chemical industry:

This component lead to the initiation, in Romania, of "Responsible Care" program which is a global activity of chemical industry. "Responsible Care" has much comprehensive scope of activity in the filed of environment, safety and health. The activity in the project is the parts of such comprehensive activity, focused on environmental aspects. For this purpose, environmental reports of the five chemical companies were formulated.

- Demonstration of chlorinated solvent reduction at degreasing facility:

This component demonstrates the low-cost methodology of reduction of chlorinated solvent from degreasing unit. It is also considered as a part of "Responsible Care". The activity includes investigation of existing units and design, engineering, fabrication of new closed-type unit as well as improvement on the existing unit.

5.2 Results and technologies transferred

5.2.1 Promotion of voluntary environmental management activity of chemical industry

Environmental management activity is based on the understanding of the total environmental load by the production activity. Chemical companies, with the assistance of local consultant, have first implemented material balance study of their production process and identified the environmental load to air, water and waste in each process of their operation. Based on the study, the companies prepared the environmental management reports.

At national level, FEPACHIM (Federation of Romanian Petrochemical and Chemical Industry) has initiated the preparation for the establishment of Romanian Council of Responsible Care. To support their effort, and to raise awareness in the industry, a seminar for Responsible Care was organized in June 25, 2003 at Bucharest. Nearly 90 participants, mainly from the chemical industry as well as various organization related to chemical industry attended the seminar. High rank officials from the Ministry of Industry and Resources also present in the seminar and gave strong support to the program. Representative from TACM (Turkish Association of Chemical Manufactures)/CEFIC (European Council of Chemical Industry Federation) also participated in the seminar and welcomed the initiative in Romania.

In the questionnaire distributed in the seminar, almost all of 52 companies answered that they will positively consider the participation in the Responsible Care program. It is expected similar preparation of voluntary environmental management plan will be replicated in many of the companies participated in the seminar.

5.2.2 Demonstration of chlorinated solvent reduction at degreasing facility (see summary Tables 5.2.1, 5.2.2a, and 5.2.2b below)

Chlorinated solvent reduction was demonstrated in three factories using degreasing units. One of the three operated open-top type vapor degreasing units (at FEA) while two others operated conveyor type multi-bath degreasing units (AMCO and KOYO).

For the open-top type, complete new unit was designed and fabricated in Romania. Romanian consultant has designed the unit with limited technical support of the international expert, except initial transfer of concept and technical documents. Local suppliers also proved themselves capable of fabricating the unit according to the new design.

For modification of the existing units, first step in engineering consideration was measurement of ventilation rate and vapor concentration to estimate the solvent loss by vapor. Such investigations were done by an international expert together with a local consultant. Based on the measurement data, improvement were designed. Detail of the design were then explained and discussed with the factory personnel. For all the process, transfer of know-how were in account.

5.3 Dissemination of results

Dissemination seminars were held twice, at Cluji-Napoca on June 24th and at Bucharest on June 25th . At Cluji-Napoca, there were 56 participants including 15 from 6 EPI office. There are representative from approx. 25 companies. 9 companies were using solvent degreasing unit in their factories. 4 out of 9 companies showed good intention to improve their facility as pilot project presented in the seminar. Others felt it is difficult for them because of financial constrains.

At Bucharest, factories visit to AMCO, FEA were organized with 58 participants, prior to the seminar. There were 88 participants for the seminar including the representative from over 30 companies. 13 companies were using solvent degreasing unit in their factories. 8 out of 13 companies showed good intention to improve their facility as pilot project presented in the seminar. Others felt it is difficult for them because of financial constrains and lack of technology.

5.4 Application and replicability of PP3 in Romania

Responsible Care program can be disseminated to all chemical industry in Romania. However for the first step, it is more practical to disseminate the activity to those 52 companies attended in the seminar who showed strong interest in the program.

As noted in the report of chlorinated solvent survey, it is estimated 500 – 1,000 factories are using chlorinated solvent for degreasing. Many of these factories shall get benefit in the solvent reduction in terms of both cost and environment.

Follow up actions required for dissemination of the pilot project

- Support to FEPACHIM for the establishment of Romanian Council of Responsible

Care

- Monitoring of the equipment at FEA, AMCO and KOYO. Improvement if necessary and possible.
- Further dissemination of solvent reduction technology by follow up individual factory visits (who replied positive in the seminar questionnaire) and consulting/engineering for improvement of existing unit.
- Training workshop for consultant and engineer.
- Further dissemination through the seminar.

Table 5.2.1 Provision of Solvent degreasing unit

1. Type of technology	Description of type of technology: Closed-type vapor degreasing unit		
	Purpose for supply: Demonstration of solvent reduction		
	Results to be expected (generic): Reduction of solvent loss and emission to environment		
2. Specification (Detailed list and specification of equipment supplied)	Item	Specification	Application
	1.Closed-type vapor degreasing unit 2.Solvent distillation unit	• Vapor degreasing bath • Automatic sliding rid and ventilation system • Automatic hoist and parts loading system • Temperature and solvent level control system • Solvent distillation & recovery system	Degreasing of metal parts before electroplating process
3. Overall cost (Euros)	Approx. 35,000 Euro		
4. Delivery date	March, 2003		
5. Beneficiary (ies)	Name of organisation: FEA S.A. Address: 242, Calea Floreasca, Bucharest, R-72321 Contact person(s) Grigore NELEPCUF	Type of organisation: Manufacturing companies for automatic process Public/private sector: Private company NACE code	
6. Project duration	Start: Oct. 2002	Finish: March 2003	
7. Results achieved	Results achieved (quantitative): Unit is still under testing.	JICA Study Report reference: Volume 8A	
8. Dissemination of results	Date: June 24, 2003 June 26, 2003	Method: Seminar at Cluji-Napoca Seminar at Buhcarest Leaflet and poster	JICA Study Report reference: Volume 8A

Table 5.2.2a Modification of Solvent degreasing unit

1. Type of technology	Description of type of technology: Modified ventilation system of solvent degreasing unit			
	Purpose for supply: Demonstration of solvent reduction			
	Results to be expected (generic): Reduction of solvent loss and emission to environment			
2. Specification (Detailed list and specification of equipment supplied)	Item	Specification	Application	
	1. Flow rate adjustment (inverter) 2. Exhaust pipe 3. Condensation coil 4. Vapor detection tube and pump	Refer to Volume 8A	Degreasing of metal parts	
3. Overall cost (Euros)	5,000 EURO			
4. Delivery date	February 2003			
5. Beneficiary(ies)	Name of organisation: S.C. AMCO S.A. Address: Otopeni, Contact person(s): Gheorghe SORESCU	Type of organisation: Manufacturing companies for valve fitting Public/private sector: Private sector NACE code		
6. Project duration	Start: October, 2003	Finish: March, 2003		
7. Results achieved	Results achieved (quantitative): Solvent reduction up to 85%	JICA Study Report reference: Volume 8A		
8. Dissemination of results	Date: June 24, 2003 June 26, 2003	Method: Seminar at Cluji-Napoca Seminar at Buhcarest Leaflet and poster	JICA Study Report reference: Volume 8A	

Table 5.2.2b Modification of Solvent degreasing unit

1. Type of technology	Description of type of technology: Modified ventilation system of solvent degreasing unit		
	Purpose for supply: Demonstration of solvent reduction		
	Results to be expected (generic): Reduction of solvent loss and emission to environment		
2. Specification (Detailed list and specification of equipment supplied)	Item	Specification	Application
	1. Flow rate adjustment (inverter) 2. Exhaust pipe 3. Vapor detection tube and pump	Refer to Volume 8A	Degreasing of metal parts
3. Overall cost (Euros)	5,000 EURO		
4. Delivery date	February 2003		
5. Beneficiary (ies)	Name of organisation: KOYO Romania S.A. Address: Alexsandria Contact person(s): Florin Radulescu	Type of organisation: Manufacturing companies for bearing Public/private sector: Private sector NACE code	
6. Project duration	Start: October, 2003	Finish: March, 2003	
7. Results achieved	Results achieved (quantitative): Solvent reduction up to 35%	JICA Study Report reference: Volume 8A	
8. Dissemination of results	Date: June 24, 2003 June 26, 2003	Method: Seminar at Cluji-Napoca Seminar at Buhcarest Leaflet and poster	JICA Study Report reference: Volume 8A

6. Pilot Project 4 – Strengthening Hazardous Waste Management Capacity

6.1 Introduction and scope

Pilot Project 4 aimed at strengthening hazardous waste management capacity at both EPI and company level with particular focus on introduction of improved hazardous waste management planning and information system. Some laboratory analytical equipment was provided through this pilot project in order to strengthen analytical capacity of an EPA in connection with hazardous waste management.

Main participants of the pilot project were as follows:

1) EPA Arges
2) Companies that participated in elaboration of company waste management plan:
   a. Dacia (automobile manufacturer)
   b. Arpechim (refinery)
   c. Presate Dacia (car spare parts manufacturer)
   d. Ana Imep (electric motors)
   e. Direct Auto Rom (car spare parts, etc.)

Pilot Project 4 was a communication-orientated project. The Study Team and its Romanian consultants (researchers from ICIM Waste Department) had many meetings with EPA / NEG Arges to discuss problems with roles of EPA / NEG Arges to be played in connection with hazardous waste management and inspection.

EPA Arges and the Study Team jointly visited existing contaminated sites to prepare an inventory of contaminated sites in Arges county. With this experience and information obtained, the Study Team has developed an inventory format and site assessment / prioritisation method with which contaminated sites were categorised and roughly assessed. Final objective of this component of the pilot project is that all EPAs will make inventory of contaminated sites within each county using the format and method developed thorough this pilot project.

The above listed 5 companies have prepared company waste management plan respectively using a format developed through this pilot project. Final objective of this component of the pilot project is that all EPAs will require companies to prepare and submit a company waste management plan as part of application documents for environmental permit, and company will prepare such plan based on the developed format.

6.2 Results and technologies transferred

Pilot Project 4 generated the following outputs:

A. Guidance notes and Formats

1) Guidance note for identification and classification of hazardous waste
2) Guidance note and format for company waste management plan
3) Format for inventory of contaminated sites, and suggested method for prioritisation of contaminated sites
4) Guidance note for waste inspection by EPA / NEG

B. Actual Company Waste Management Plan (CWMP)

5) CWMP elaborated by Dacia (automobile manufacturer)
6) CWMP elaborated by Arpechim (refinery)
7) CWMP elaborated by Presate Dacia (car spare parts manufacturer)
8) CWMP elaborated by Ana Imep (electric motors)
9) CWMP elaborated by Direct Auto Rom (car spare parts, etc.)

C. Actual Inventory of Contaminated Sites

10) Inventory of contaminated sites in Arges county

D. Analysis of hazardous waste

11) Implementation of hazardous waste sampling and analysis using equipment (VOC analyser, oil content analyser, and digester for sample making equipment) provided through the pilot project

6.3 Dissemination of results

On 30 June 2003, we held a seminar in Bucharest to disseminate results of the pilot project 4. We delivered guidance notes and other documents as listed in the above to all the seminar participants (160 approximately). The seminar participants included representatives of 39 EPIs (out of 42), and enterprises.

Most seminar presentations were given by the participants of the pilot project 4, ie, Romanian consultants (ICIM researchers) and staff of EPA Arges.

6.4 Application and replicability of PP4 in Romania

Through the PP4 seminar, we have proposed that all EPAs and enterprises to take the following actions. The Ministry of Waters and Environmental Protection expressed its full support for the proposal.

1) All EPI should prepare an inventory of contaminated sites at each county.
2) Enterprises will formulate respective company waste management plan, and submit it to EPI as part of application documents for environmental permit. (EPAs should require enterprises to formulate such plan.)
3) Enterprises and EPAs should use the delivered guidance note for better identification and classification of hazardous waste.

The above actions do not require much capital investment for implementation. Whether or not EPAs and enterprises would implement the above actions depends much on strength of enforcement and willingness on the part of the new Environment Ministry (MAFWEP), and EPIs. The Ministry and EPAs are urged to implement these actions. ICIM could provide support in the technical aspect of the implementation.

Appendix 1

Seminar Programmes

Appendix 1 Seminar Programmes

Seminar 1 on Improving waste management in metal finishing processes (PP2 & 3)
June 24, CLUJI NAPOCA – Transylvanian Hotel

08:30 - 09:00 Participants registration
09:00 - 09:15 Opening speeches (Chairperson Ms. Florina Mirescu)
- JICA (Kiichiro Sakaguchi, Leader, JICA Study Team)

Pilot Project 2
09:15 – 09:20 Introduction to PP2 (JICA - Mr. Colin Woods) (5)
09:20 – 09:35 Film presentation of PP2 (15)
09:35 – 10:25 Presentation of PP2 activities and results (50)
Ms. Ileana Mîțiu (10)
Ms. Brinduşa Petroaica (10)
Timpuri Noi results, Mr. Ionescu (10)
Direct Auto Rom results, Mr. Valeriu Pop (10)
Supply of package metal finishing wastewater treatment system, CAST (10)
10:25 - 10:35 Q & A session (Chairperson Ms. Florina Mirescu) (10)
10:35 - 11:00 Coffee break (20)

Pilot Project 3
11:00 - 11:05 Introduction to PP3 (JICA - Mr. Munehiro Fukuda) (5)
11:05 - 11:20 Film presentation of PP3 activities (15)
11:20 - 12:00 Presentation of PP3 activities and result (Mr. Adrian Diaconu-Consultant)(40)
12:00 - 12:10 Presentation of company report 1 (Mr. Sorescu Gheorghe - AMCO S.A).(10)
12:10 – 12:20 Q & A session (Chairperson Ms. Florina Mirescu) (10)
12:20 – 12:30 Concluding remarks (JICA – Mr. David Newby) (10)
12:30 – 14:00 Informal session

Seminar 2 on Responsible care (Voluntary environmental management plan) of chemical companies – 25 June, BUCHAREST – MARRIOTT HOTEL

09:00 – 09:15 Participants Registration
09:15 – 09:35 Opening Speeches (Chairperson: Dr. Ioan Cezar Coraci)

- Representative of JICA (5)
- Representative of MIR (5)

Representative of MWEP (Mr Iulian Rusu – participation only)
09:35 – 09:50 Presentation of FEPACHIM plan (Dr. I. C. Coraci Mr. Traian Vulpe) (15)
09:50 – 10:00 Presentation by TCMA/CEFIC representative (Dr. Caner Zanbak) (10)
10:00 – 10:40 Presentation of company environmental plan

- U.S.Govora (Ms. Subtirelu Doina) (7)
- Rompetrol (Ms. Luminita Zamfirescu)(7)
- AzoMures (Ms. Mariana Haseganu) (7)
- Policolor (Ms. Liliana Anton) (7)
- Sicomed (Ms. Carmexi Popescu)(7)

10:40 – 10:55 Discussions (Chairperson: Dr. I.C. Coraci) (15)
10:55 – 11:00 Concluding remarks (Mr. Munehiro Fukuda JICA team) (5)
11:00 – 13:00 Coffee break & informal session
11:30 12:15 Press conference
FEPACHIM (Federation of Romanian Chemical and Petrochemical Industry)
TCMA (Turkish Chemical Manufacturer's Association)
CEFIC (European Council of Chemical Industry)

Seminar 3 on Improving waste management in metal finishing processes (PP2 & 3)
June 26, BUCHAREST – Marriott Hotel

08:00	Meet at Entrance to Herestrau Park by Piata Presei Libere (Participants will be divided into Groups A and B)	
	Group A (30 persons)	Group B (30 persons)
09:00	Visit to Timpuri Noi (PP2)	Visit to AMCO (PP3)
10:00	Visit to AMCO (PP3)	Visit to FEA (PP3)
11:00	Visit to FEA (PP3)	Visit to Timpuri Noi (PP2)

12:00 – 13:30 Lunch for tour participants

14:30 – 14:45 Opening speeches (Chairperson Ms. Florina Mirescu)

- JICA (Kiichiro Sakaguchi, Leader, JICA Study Team)

Participation by MoWEP (Mr. Iulian Rusu and Ms Alina Istodor, experts, Waste and dangerous materials Directorate)

Pilot Project 2

14:45 – 14:50	Introduction to PP2 (JICA - Mr. Colin Woods) (5)
14:55 – 15:10	Film presentation of PP2 (15)
15:10 – 16:00	Presentation of PP2 activities and results (50) Ms. Ileana Mîțiu (10) Ms. Brinduşa Petroaica (10) Timpuri Noi results, Mr. Ionescu (10) Direct Auto Rom results, Mr. Valeriu Pop (10) Supply of package metal finishing wastewater treatment system, CAST (10)
16:00 – 16:10	Q & A session (Chairperson Ms. Florina Mirescu) (10)
16:10 – 16:30	Coffee break (20)

Pilot Project 3

16:30 – 16:35	Introduction to PP3 (JICA - Mr. Munehiro Fukuda) (5)
16:35 – 16:49	Film presentation of PP3 activities) (14)
16:49 – 17:19	Presentation of PP3 activities and result (Mr. Adrian Diaconu-Consultant) (30)
17:19 – 17:26	Presentation of company report 1 (Mr. Sorescu Gheorghe - AMCO S.A).(7)
17:26 – 17:33	Presentation of company report 2 (Mr. Cristian Cristea - FEA S.A.) (7)
17:33 – 17:40	Presentation of company report 2 (Mr. Virgil Luca - KOYO S.A.) (7)
17:40 – 17:50	Q & A session (Chairperson Ms. Florina Mirescu) (10)
17:50 – 18:00	Concluding remarks (JICA – Mr. David Newby) (10)
18:00 – 19:30	Informal session

Seminar 4 on Hazardous Waste management strategy and action plan
Seminar 5 on Strengthening of hazardous waste management capacity at EPIs and enterprises
30 June, BUCHAREST – MARRIOTT HOTEL

Seminar 4

08:30 – 09:00 Participants Registration

09:00 – 09:25 Opening Speeches (Chairperson – Mrs. Elena Dumitru, Director General, Ministry of Waters and Environmental Protection - MoWEP)
Mr. Ioan Jelev – Secretary of State, MoWEP (15 minutes)
Mr. Naotoshi Sugiuchi - Ambassador Extraordinary and Plenipotentiary, Japan (10)

09:25 – 09:40 Presentation by Mrs. Cristiana Ion, Director, Directorate Accreditation, Quality, Environmental Protection, MIR

09:40 – 09:55 Outline of JICA Study
Mr Sakaguchi, leader, JICA Study Team - (15)

09:55 – 10:10 Main Points of the Strategy and Action Plan
Mrs Ghineraru – Director of Waste/Hazardous Substances Directorate - MoWEP(15)

10:10 – 10:30 Coffee Break

10:30 – 11:15 Presentation of the Strategy and Action Plan
(Mrs Ghineraru – MoWEP)(45)

11:15 – 12:20 Questions and comments from participants preceded by comments from international assistance agencies

12:20 – 12:30 Conclusions
(MoWEP – Mrs Ghineraru) (5)
(MIR – Mrs Ion) (5)

12:30 – 13:30 Informal session

Seminar 5 **Pilot Project 4 (PP4)**

12.30 – 14.00 Participants registration

14:00 – 14:20 Opening Speech (Chairperson) Mrs. Mariana Ghineraru, Director, *Waste and Hazardous Substances Directorate,* Ministry of Waters and Environmental Protection (10)

Opening Speech – Mr. Kenichi Tanaka, Senior expert, JICA (10)

14:20 – 15:25 Presentation by PP4 consultants and Argeş EPI representatives:

Introduction to PP4 – Mr Drewett (JICA Study Team) (5)

Summary review of outputs of project (Mrs Stefanescu - ICIM) (10)

Arges county and issues related to hazardous waste management– Mrs Anca Albu (Arges EPI – Chief Inspector) (15)

Project objectives in the field of hazardous waste management (Chimist Delia Udristeanu) (15)

Results of project in the field of monitoring by using laboratory equipment from JICA (Ing Silvia Nichifor - Arges EPI) (10)

Results of project for improving the authorising of economic activities that generate hazardous waste and/or use hazardous substances (Arges EPI – Ing Nicoleta Popescu) (10)

15:25 – 15:45 Coffee break

15:45 – 16:30 Presentations continued by PP4 consultants and Argeş EPI representatives:

Results of project for improving inspection of hazardous waste and substances management (Chimist Delia Udristeanu)(15)

Results of project for identification of contaminated sites (Ing Marius Dumitru)(15)

Identification and classification of hazardous waste (Mrs M. Chiriac - ICIM) (15)

16:30 – 16:50 Question & discussion period

16:50 – 17:00 Comments and concluding remarks *(MoWEP – Mrs Ghineraru, Director, MoWEP)*

Seminar 6 on Hazardous Waste Management Facilities Development and Funding
1 July, BUCHAREST – MARRIOTT HOTEL

08:30 – 09:00	Participants Registration
09:00 – 09:10	Opening Speeches *(Convenor Mr J Warford, JICA study team member)*
	JICA Welcome – Mr Sakaguchi, JICA study team leader (2)
	Ministry of Waters & Environmental Protection – Mrs Ghineraru, director, Waste and Dangerous Substances Directorate (3)
	Ministry of Industry & Resources – Mr. Belinda, State Secretary (to be confirmed)
09:10 – 09:20	Introduction (JICA – J Warford, study team member) (10)
09:20 – 09:50	JICA Study team presentation
	Hazardous Waste Management: Principles, Components & Quantities (JICA – Mr R Drewett, study team member) (15)
	Developing the hazardous waste infrastructure – (JICA - Mr D Newby, study team member) (15)
09:50 – 10:05	Ministry contributions to the issues of facility development
	MWEP – Mrs Ghineraru (5)
	MIR – (5)
10:05 – 10:25	Coffee break
10:25 – 10:55	Presentation by potential interested companies in facility development
	CIROM - Ion Crangasu / Oana Dinu (15)
	Iridex - Dr Mihai Moisa (15)
10:55 - 11:20	Informal questions and/or presentations by other companies / organisations
11:20 – 11:35	Funding aspects and cost recovery
	(JICA – Mr J Warford) (15)
11:35 – 12:05	Comments from international assistance agencies
	EBRD - Mr Alex Tanase (15)
	WB – Mrs Doina Rachita (15)
12:05 – 12:20	Closing comments from each Ministry representative
	MWEP – Mrs Ghineraru (5)
	MIR – (5)
12:20 – 12:30	Concluding remarks (Convened by Mr J Warford – JICA study team) (10)
12:30 - 13:30	Informal session

Seminar 7 on Recycling of heavy metals using smelters (PP1results)–
1 July, BUCHAREST – MARRIOTT HOTEL

13:30 - 14:00 – Participants Registration

14:00 – 14:30 Opening Speeches (Chairperson; Dr Teodor Velea, IMNR)
(Mr. Adrian Grigorescu , Secretary of State of MIR) (to be confirmed later)
Mr. Petru Ianc, Director General of department of political industry, MIR
Participation by Mr. Iulian Rusu, expert, Waste/Hazardous Chemical Directorate, MoWEP

14:30 – 15:00 Outline of Pilot Project 1
Mr. Shoji Nakamura, JICA Study Team

15:00– 15:30 Generation of target non-ferrous metal containing wastes
Dr. Teodor Velea, IMNR

15:30 – 15:45 Coffee Break

15:45 – 16:15 Presentation by participating company of pilot project 1,
Mr. Leonidas Koudoumogiannakis, SOMETRA

16:15 – 16:30 Concluding remarks
Mr. Shoji Nakamura, JICA Study Team

16:30 – 17:30 Informal session

Appendix 2

Participants' Responses to the Questionnaires on the Seminar

Appendix 2 Participants' Responses to the Questionnaires on the Seminar

SEMINAR QUESTIONNAIRES – Seminar 1

(6 questions/ answers)

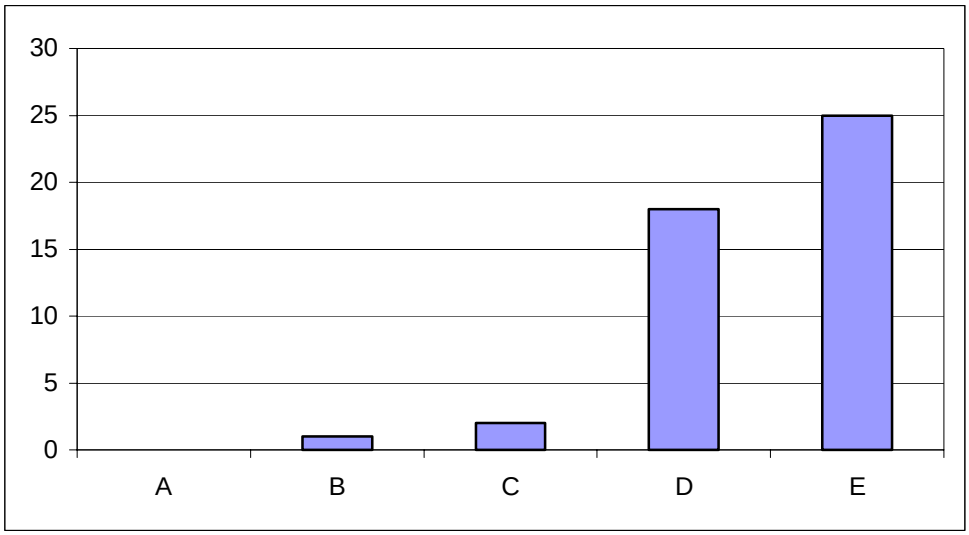
Seminar 1: Improving Waste management in metal finishing processes (Pilot Project - PP2 & 3 results)
Date: 24 June, 2003
Location:Cluji-Napoca, Transylvania Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses for each score is given for a total of 38 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
0	1	2	18	25

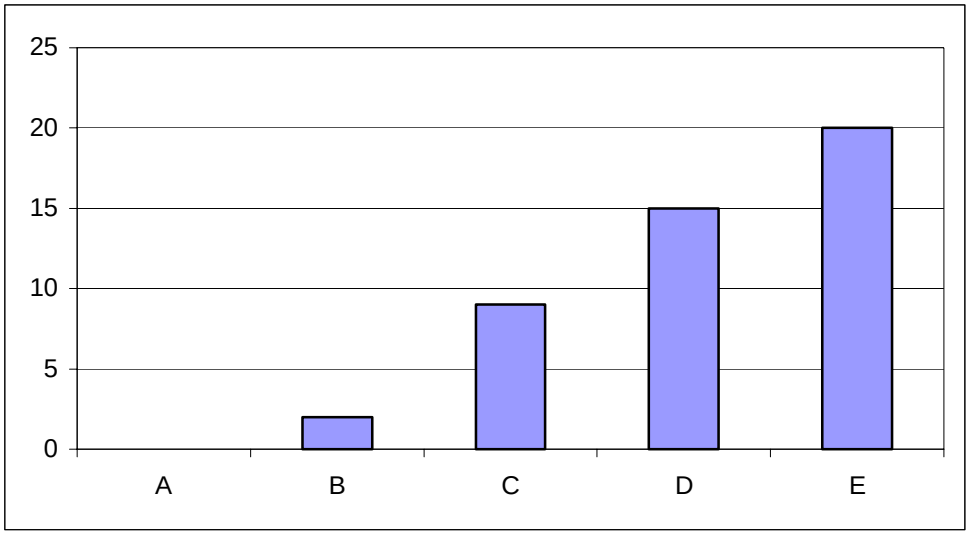
Average: 89%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	2	9	15	20

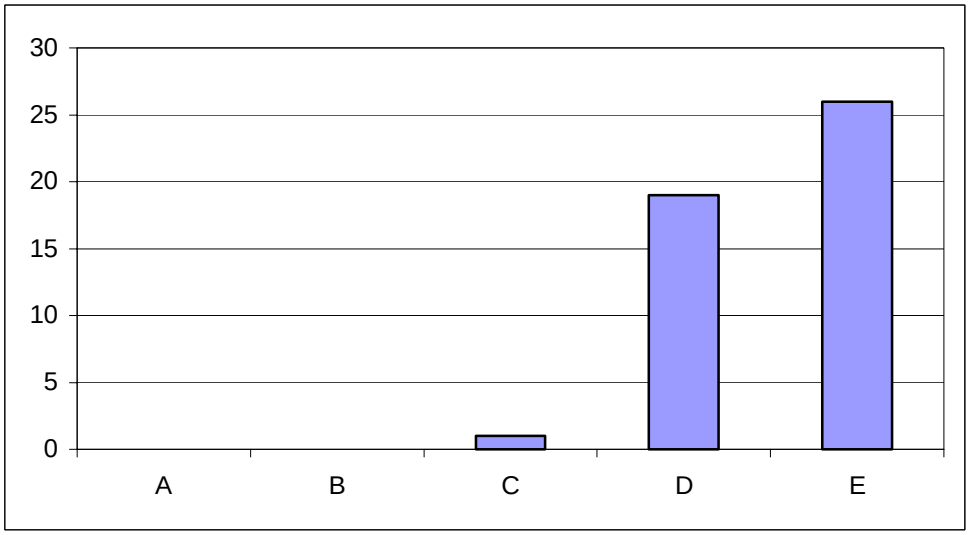
Average: 83%



3. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	1	19	26

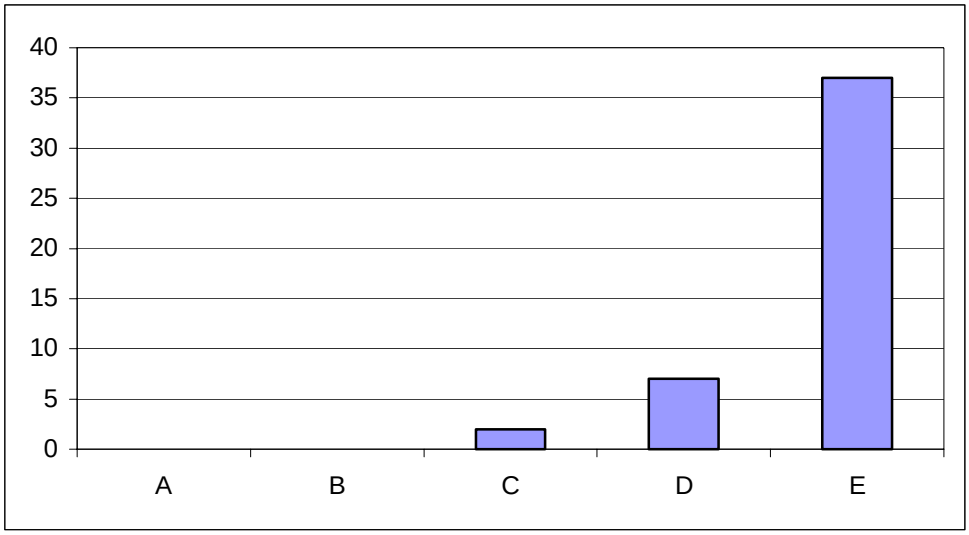
Average: 91%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	2	7	37

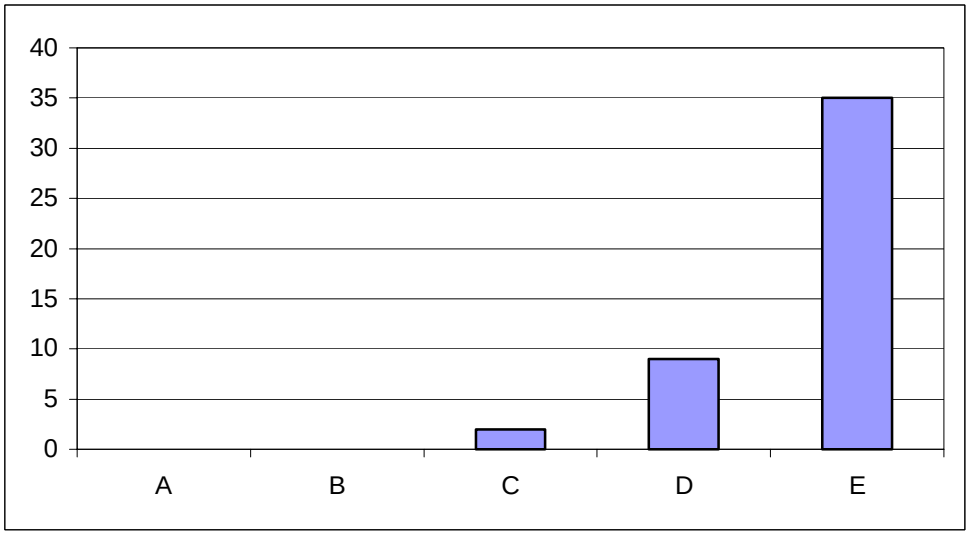
Average: 95%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
0	0	2	9	35

Average: 94%



6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Video and slides presentations very much appreciated.
b. Some more details about cost efficiency are needed.
c. Sludge disposal on landfill sites still remains a problem in Romania
d. Minimization of waste water flow rate represent an important solutions for cost reduction
e. Very good presentation of the conclusions
f. More active participation (questions, comments) coming from production operators

g. Large interest for information dissemination; many requests for documentation presented within the other seminaries (taking place in Bucharest)
h. Appreciations for the job well done
i. The level of presentation was not the same; presentation in Power Point were appreciated
j. Requests for more details regarding BAT and their application in foreign countries
k. Good presentation of IPPC issues

SEMINAR QUESTIONNAIRES – Seminar 2

(6 questions/ answers)

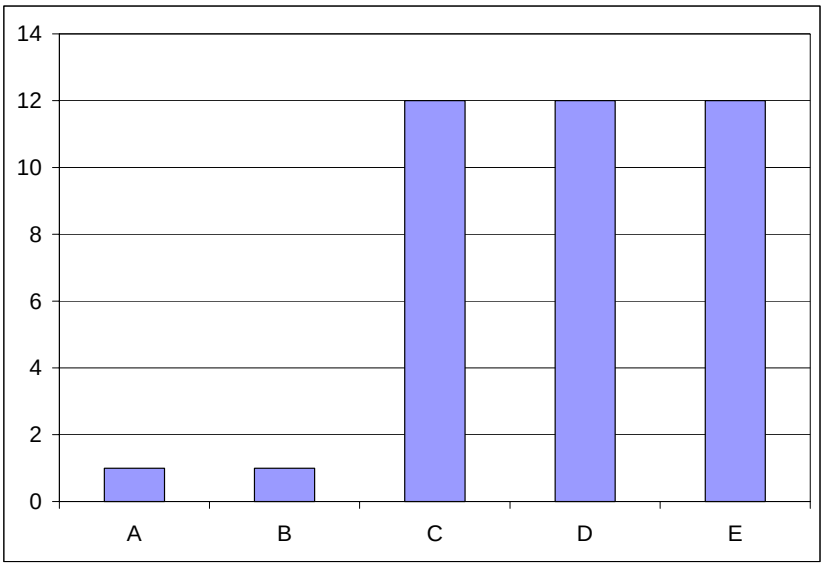
Seminar 2: Responsible Care (Voluntary environmental management plan) of chemical companies
Date: 25 June, 2003
Location: Bucharest, Marriott Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses for each score is given for a total of 38 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
1	1	12	12	12

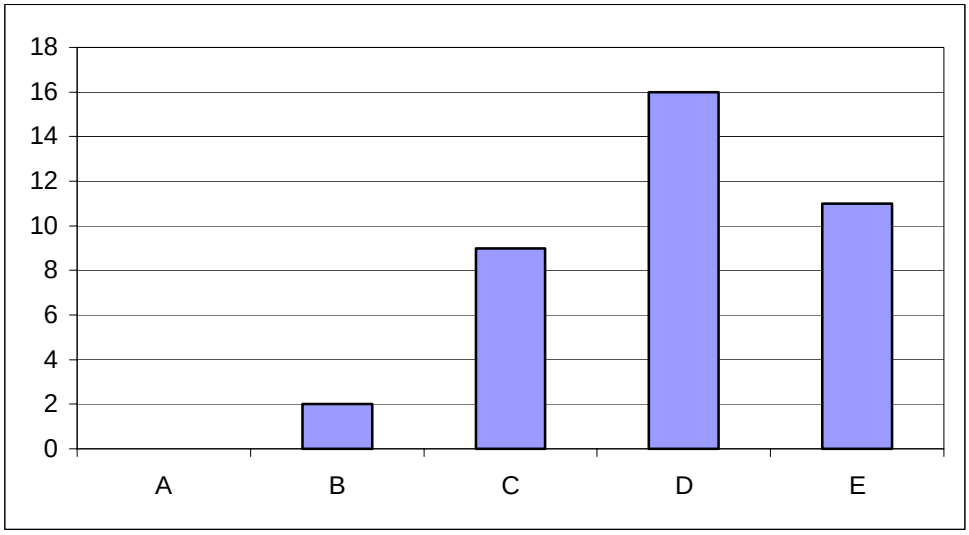
Average: 77%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	2	9	16	11

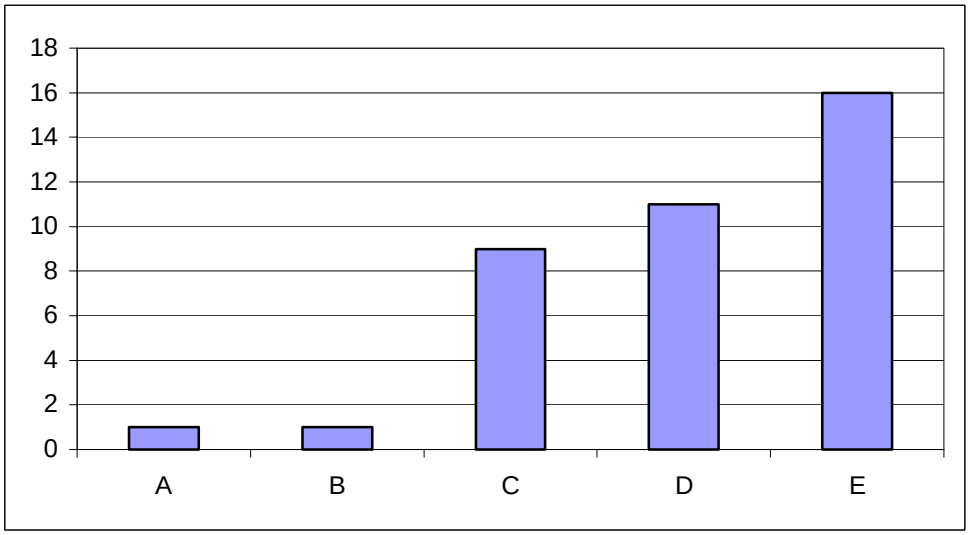
Average: 74%



3. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
1	1	9	11	16

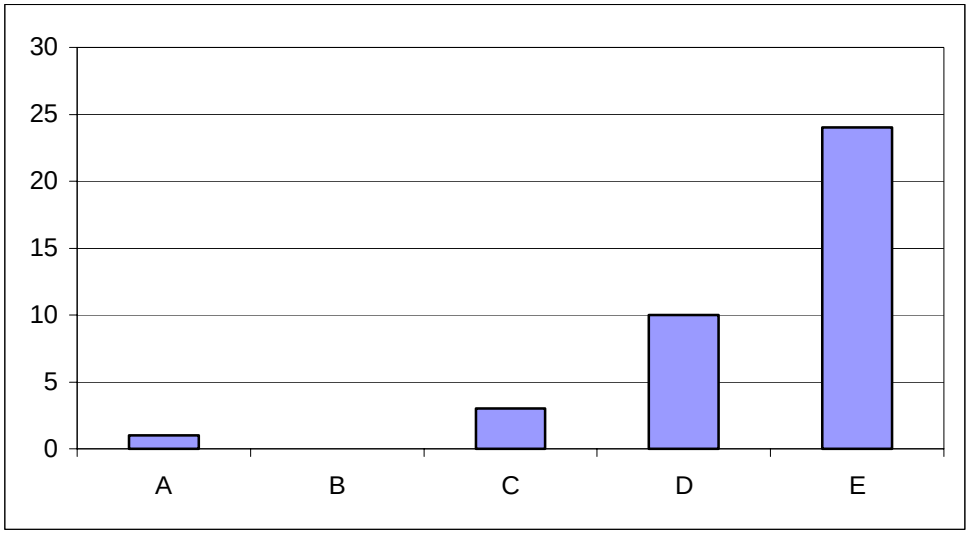
Average: 81%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
1	0	3	10	24

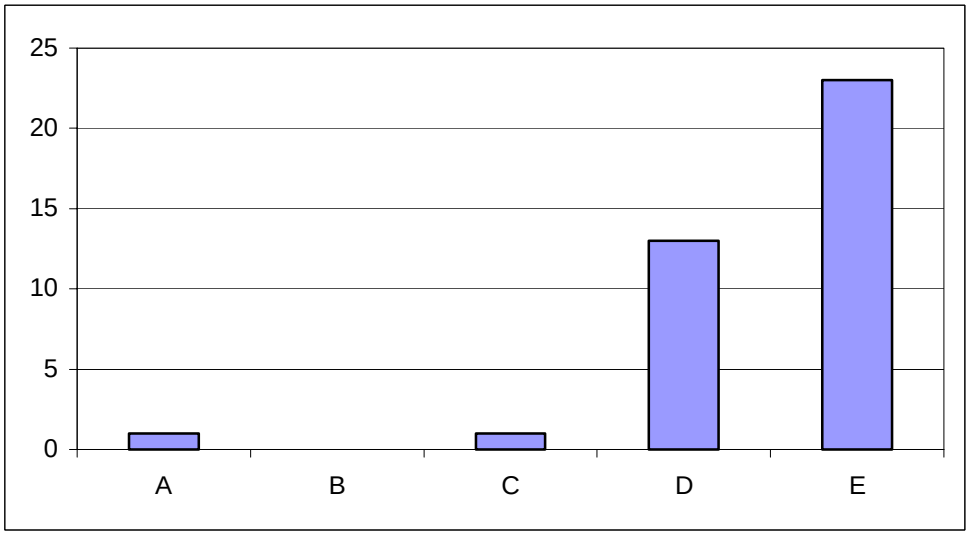
Average: 89%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
1	0	1	13	23

Average: 90%



6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Some opinions that not only waste generators should be involved in this action but also the waste users, such as users of waste batteries, spent oils, etc.
b. The companies should have given details on waste management, waste recovery/reuse.
c. Many companies have already storage and minimization plans but there is a need of reuse/destruction solutions of HW.
d. Some upgrading solutions for technologies should have been presented compared with classic technologies.
e. The information was too brief and not convincing for the importance of the subject and for the awareness of participants.

SEMINAR QUESTIONNAIRES – Seminar 3

(6 questions/ answers)

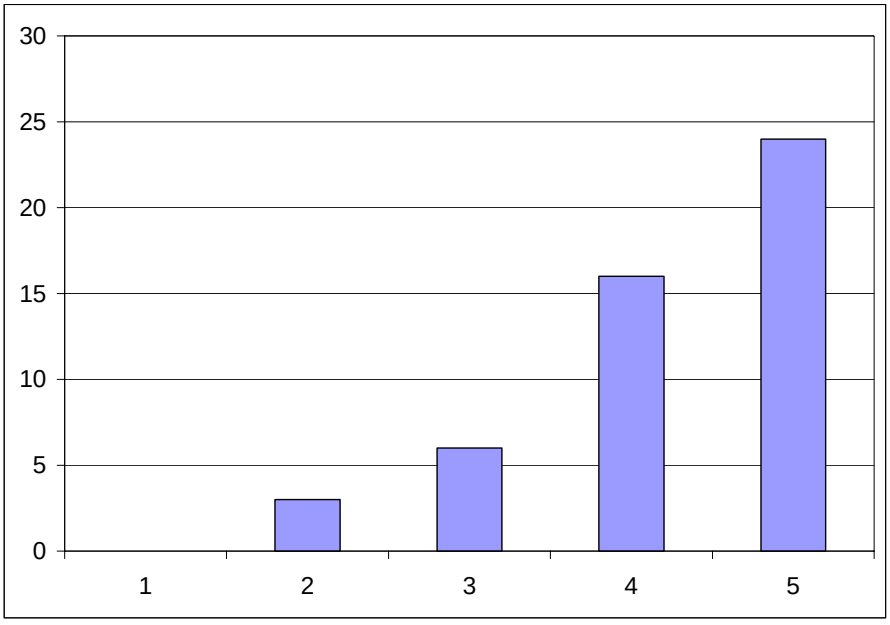
Seminar 3: AM: Tour to AMCO FEA, Timpuri Noi by bus
PM: Seminar 3: Improving Waste management in metal finishing processes (Pilot Project - PP2 & 3 results)
Date: 26 June, 2003
Location: Bucharest, Marriott Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses for each score re given for a total of 49 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
0	3	6	16	24

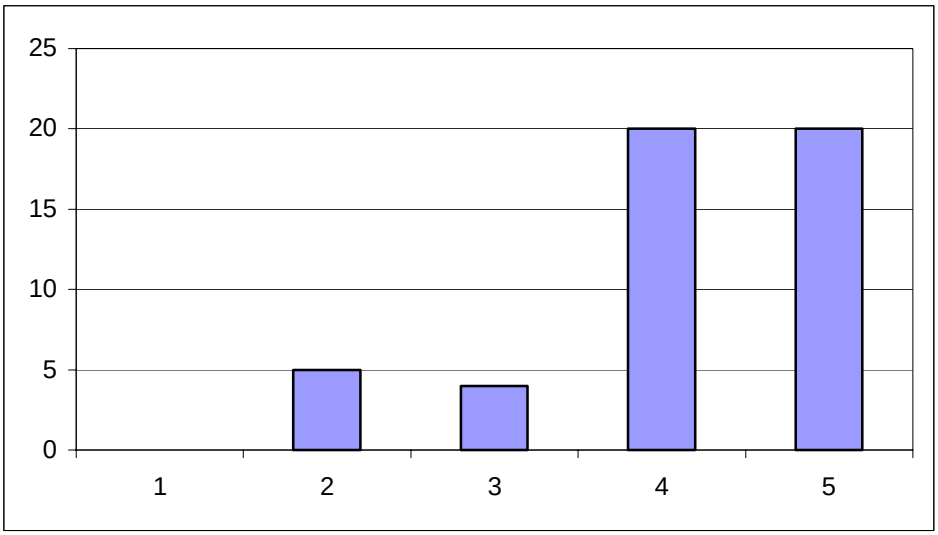
Average: 85%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	5	4	20	20

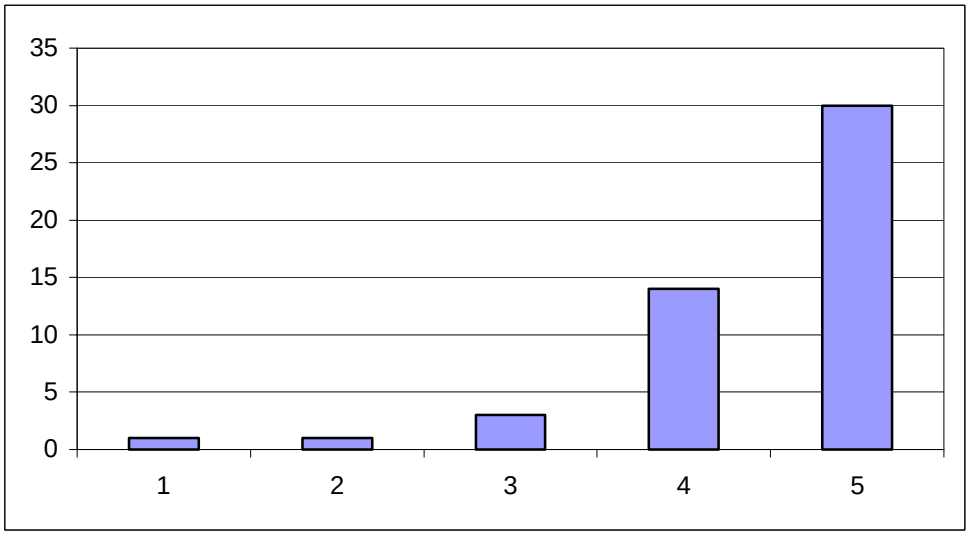
Average: 82%



2. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
1	1	3	14	30

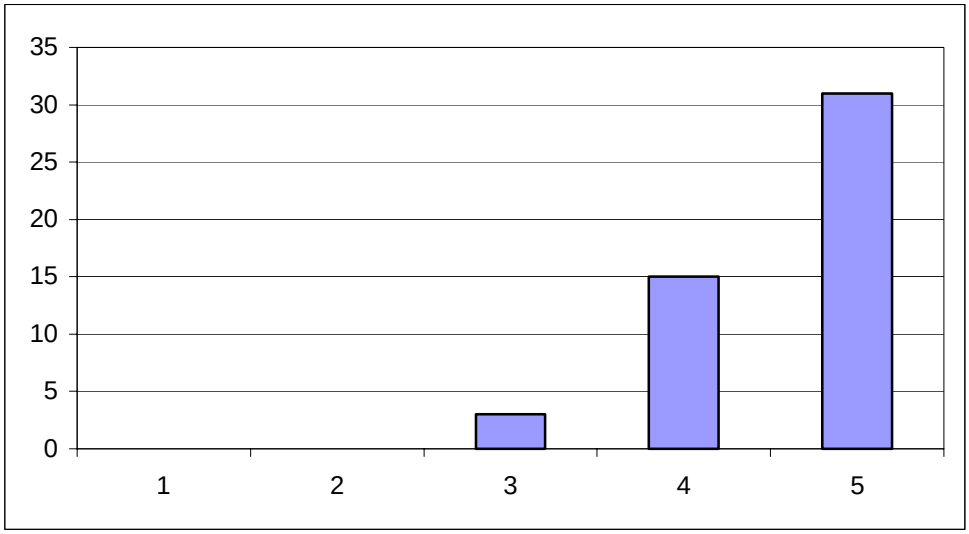
Average: 89%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	3	15	31

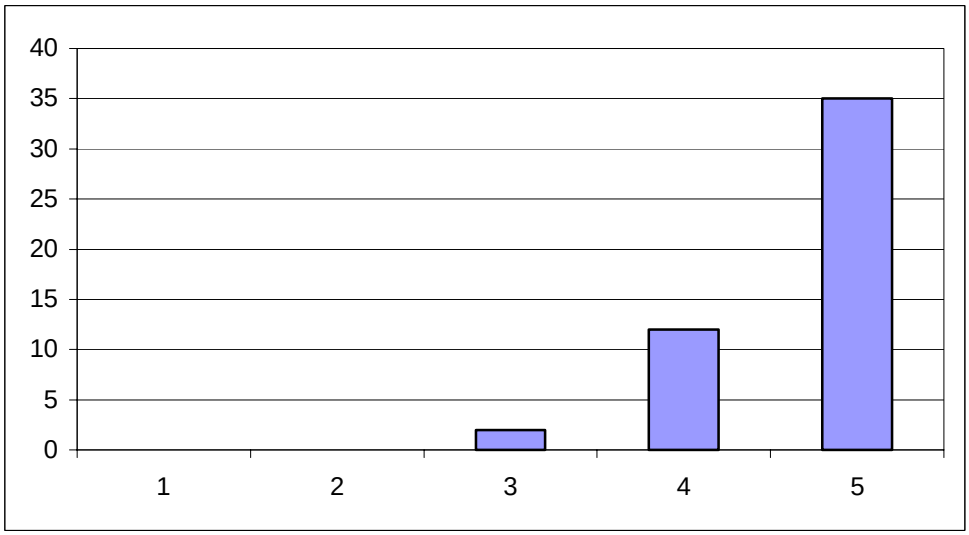
Average: 91%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
0	0	2	12	35

Average: 93%



6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Technological efficiency represents the most important way for waste minimization
b. Very good video presentation
c. Very good results of the PP; should be duplicated for other economical agents
d. It is still not clear the solution for heavy metals based sludge final disposal
e. The proposed technologies are classic ones, may be some new technologies should be presented
f. Appreciation for power point presentations

SEMINAR QUESTIONNAIRES – Seminar 3

(6 questions/ answers)

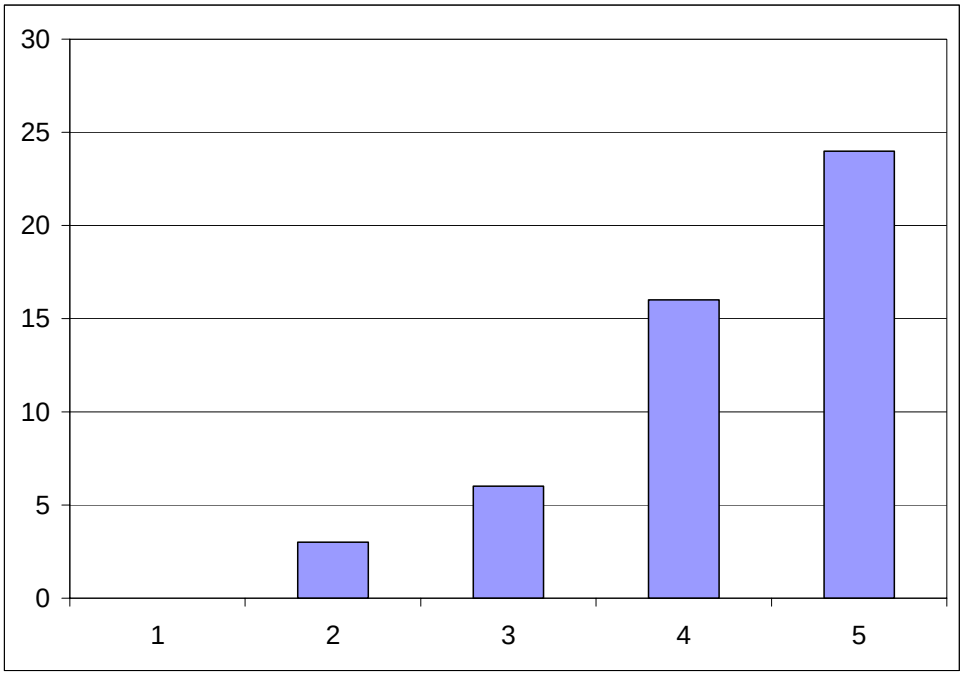
Seminar 3: AM: Tour to AMCO FEA, Timpuri Noi by bus
PM: Seminar 3: Improving Waste management in metal finishing processes (Pilot Project - PP2 & 3 results)
Date: 26 June, 2003
Location: Bucharest, Marriott Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses fr each score re given for a total of 49 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
0	3	6	16	24

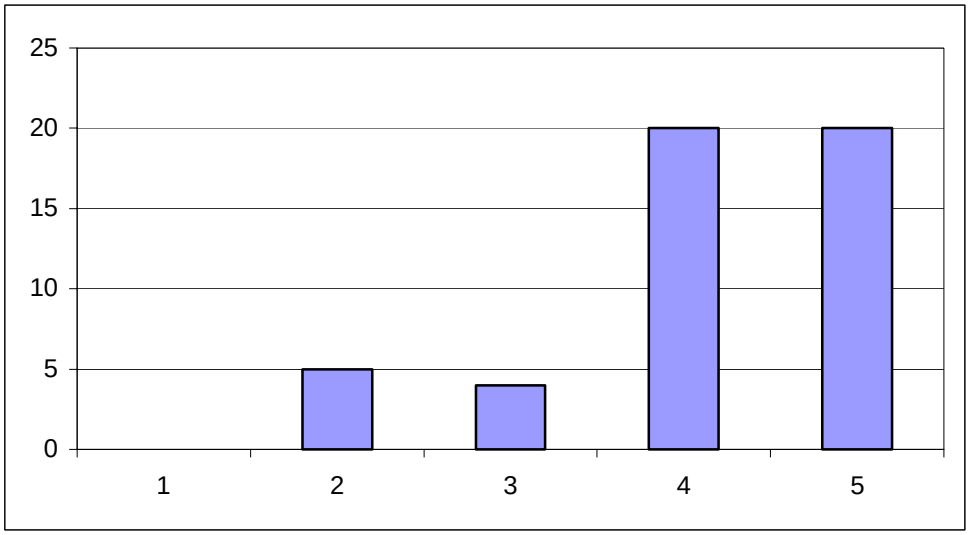
Average: 85%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	5	4	20	20

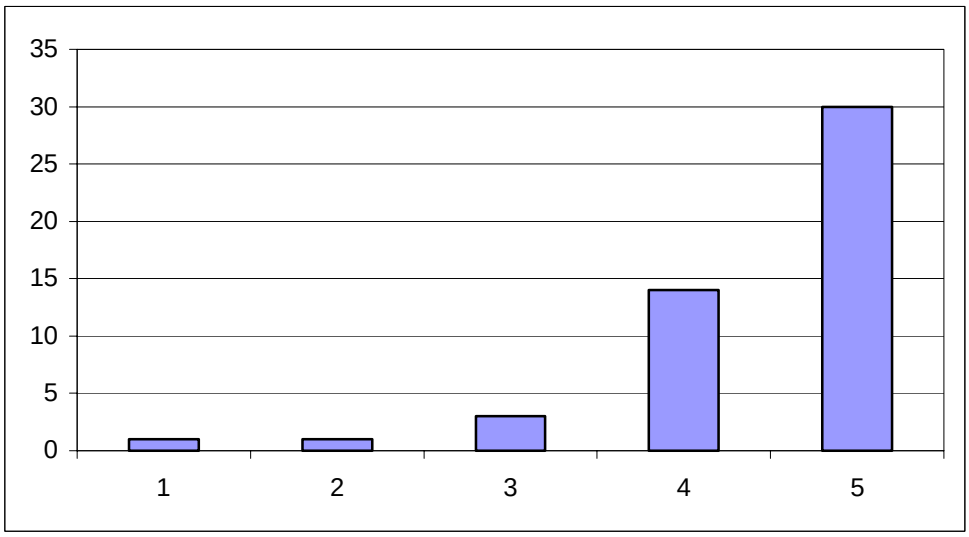
Average: 82%



2. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
1	1	3	14	30

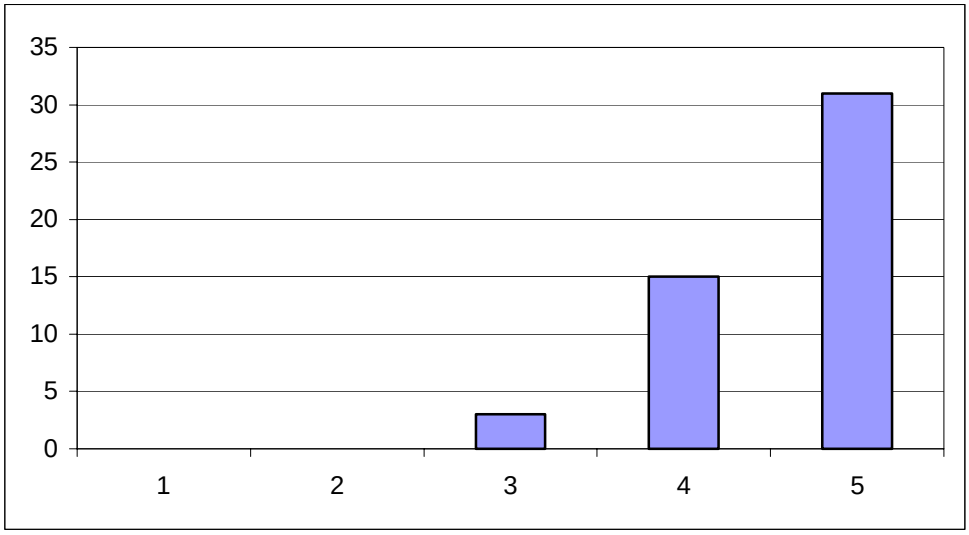
Average: 89%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	3	15	31

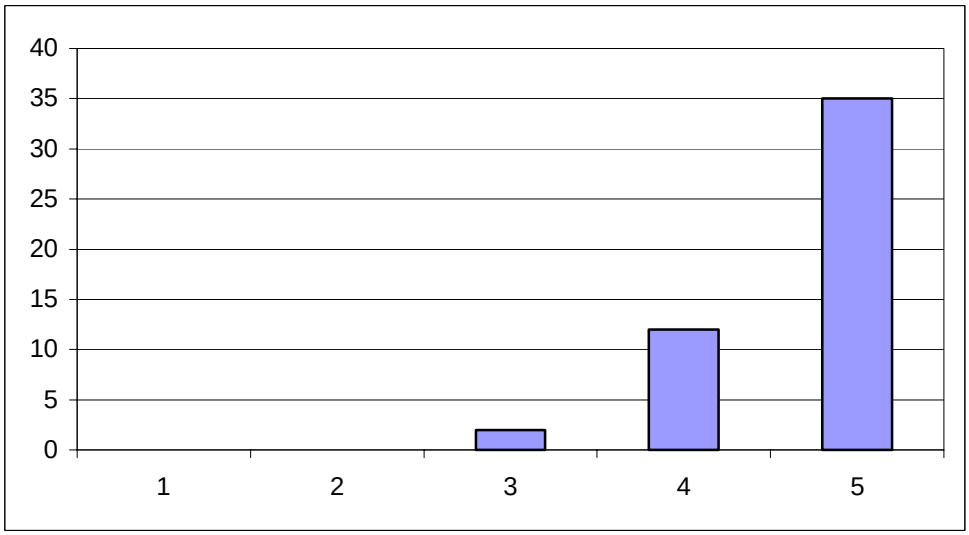
Average: 91%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
0	0	2	12	35

Average: 93%



6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Technological efficiency represents the most important way for waste minimization
b. Very good video presentation
c. Very good results of the PP; should be duplicated for other economical agents
d. It is still not clear the solution for heavy metals based sludge final disposal
e. The proposed technologies are classic ones, may be some new technologies should be presented
f. Appreciation for power point presentations

SEMINAR QUESTIONNAIRES – Seminar 4&5

(6 questions/ answers)

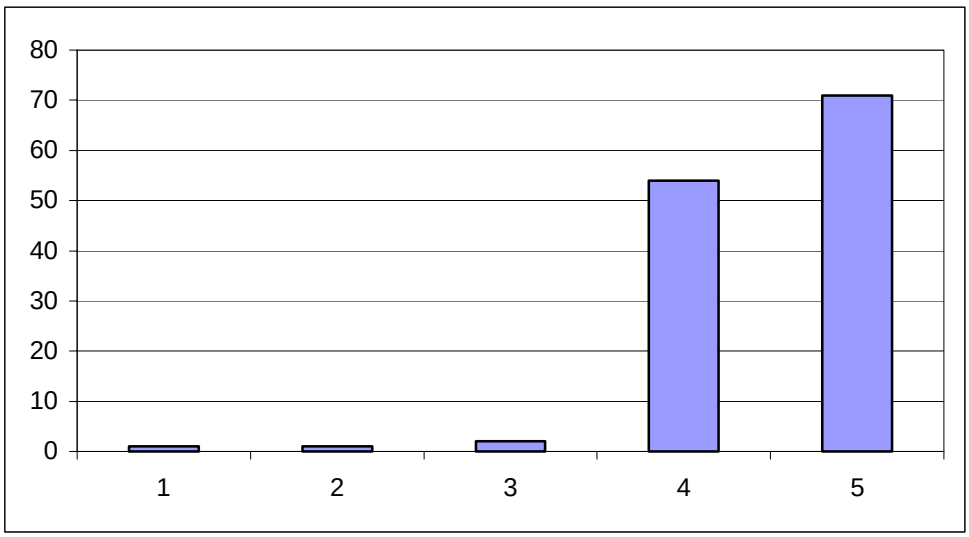
Seminar 4&5: Seminar 4: Hazardous waste management strategy and action plan
Seminar 5: Strengthening of hazardous waste management capacity at EPIs and enterprises
Date: 30 June, 2003
Location: Bucharest, Marriott Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses fr each score re given for a total of 129 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
1	1	2	54	71

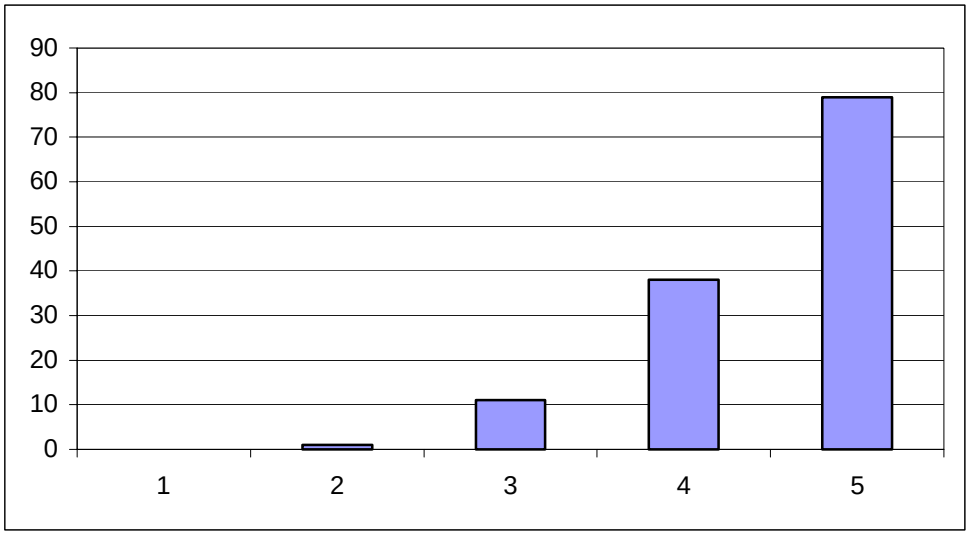
Average: 90%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	1	11	38	79

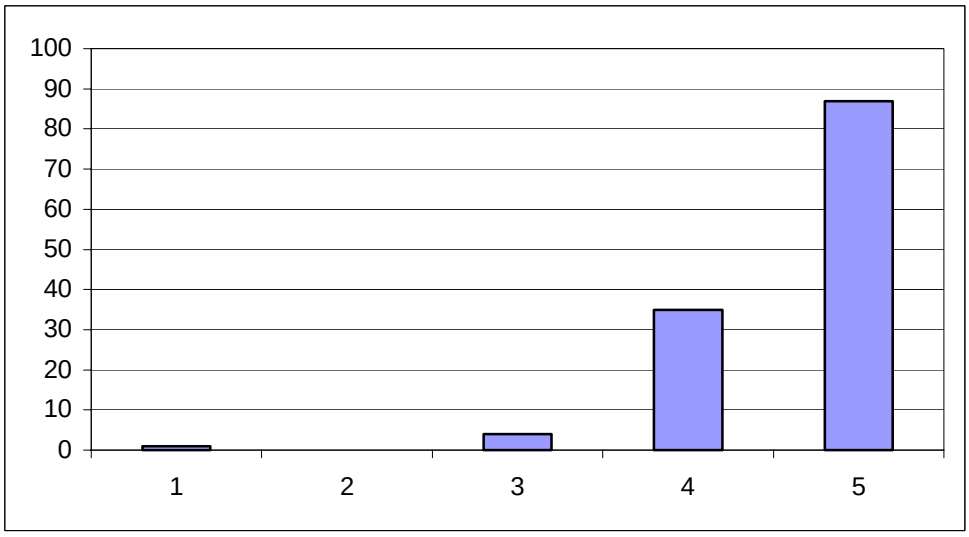
Average: 90%



3. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
1	0	4	35	87

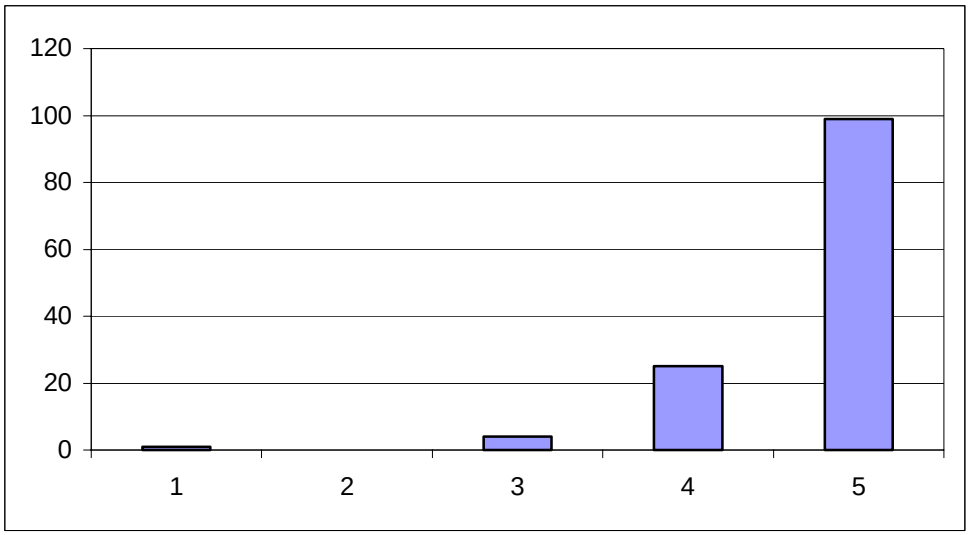
Average: 93%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
1	0	4	25	99

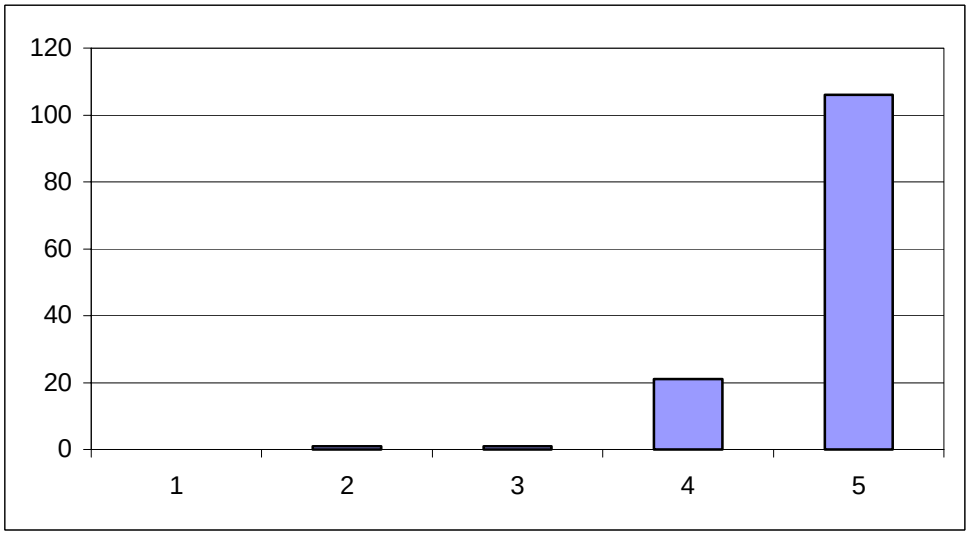
Average: 94%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
0	1	1	21	106

Average: 96%



6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Request for dissemination of Vol. 1 and Vol. 9 in electronic format
b. The seminar offers answers for a national problem
c. Necessity for more practical information for economic agents
d. It would be useful to continue the dissemination of the subject of Seminar 5 (in other locations within the country)
e. The involvement of the Romanian research activities in environmental actions
f. Appreciation for good organizations and for the documentation disseminated
g. Complains about the fact that no coordinates of JICA Study team were written on the documentation
h. Request for the list of participants for further identification of possible cooperation
i. Well organized and interesting subjects
j. Guidance books for all EPIs

SEMINAR QUESTIONNAIRES – Seminar 6

(6 questions/ answers)

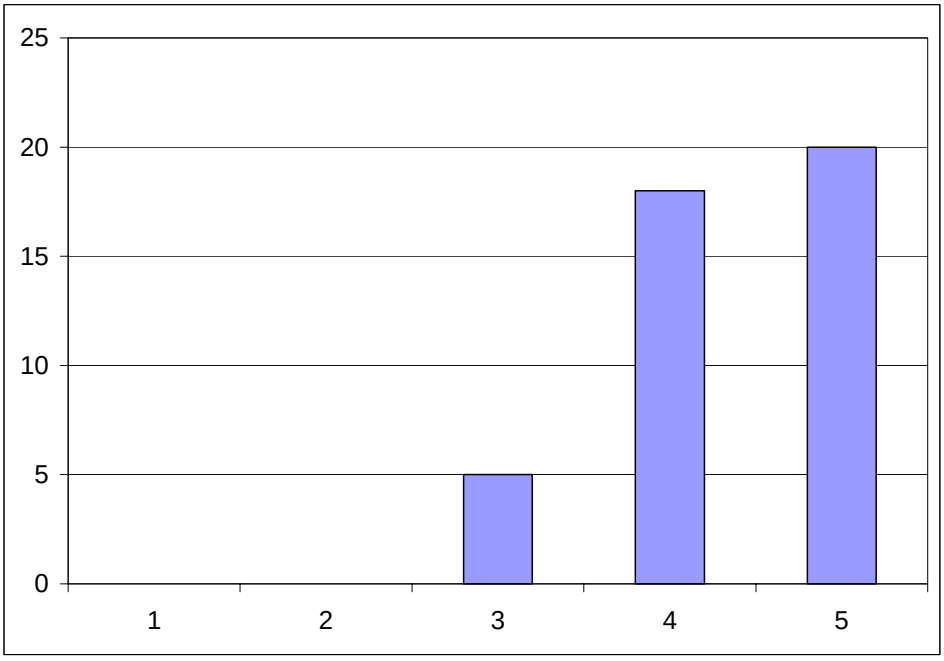
Seminar 6: Hazardous Waste Management Facilities Development and Funding
Date: 1 July, 2003
Location: Bucharest, Marriott Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses fr each score re given for a total of 43 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
0	0	5	18	20

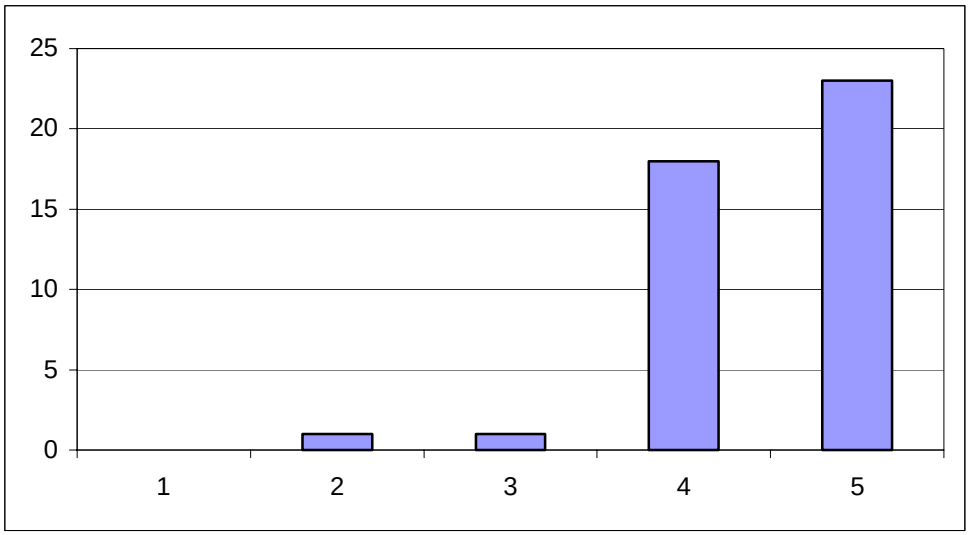
Average: 87%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	1	1	18	23

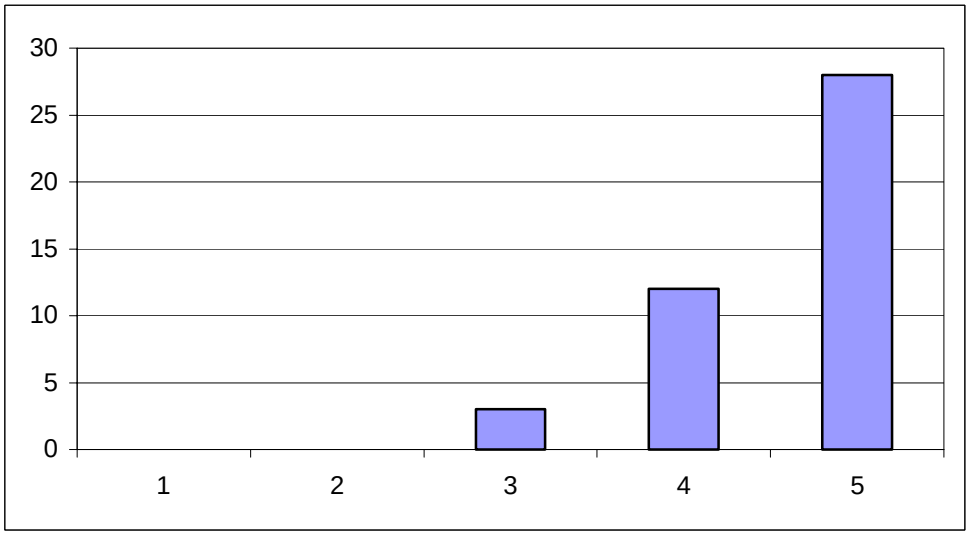
Average: 89%



3. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	3	12	28

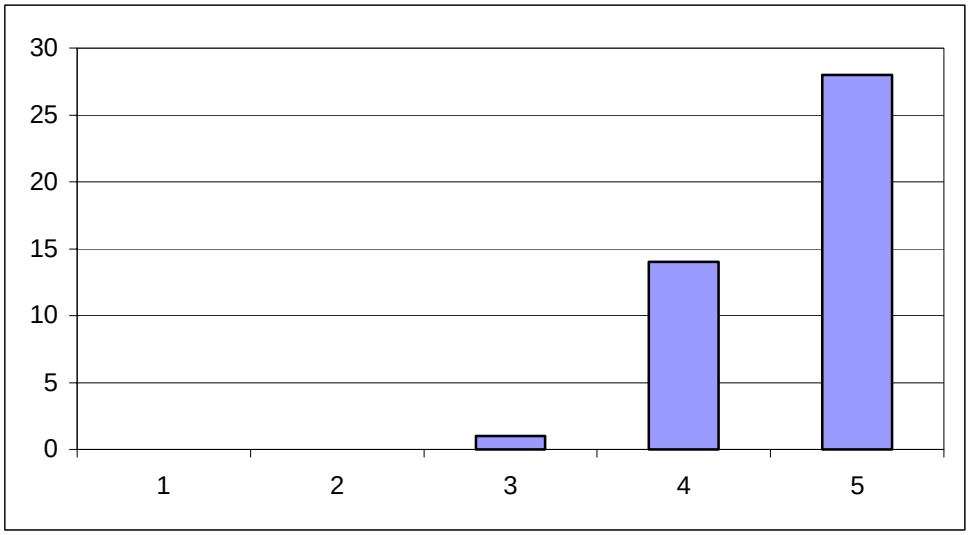
Average: 92%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	1	14	28

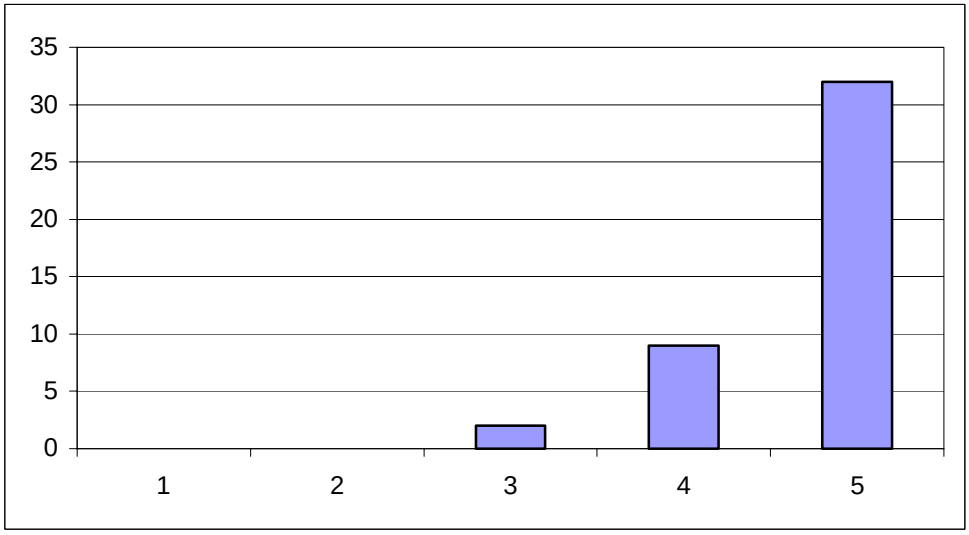
Average: 93%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
0	0	2	9	32

Average: 94%



6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Interest for acquisition of equipment for HW processing facilities (SC Tracon SRL Braila)

SEMINAR QESTIONNAIRES – Seminar 7

(6 questions/ answers)

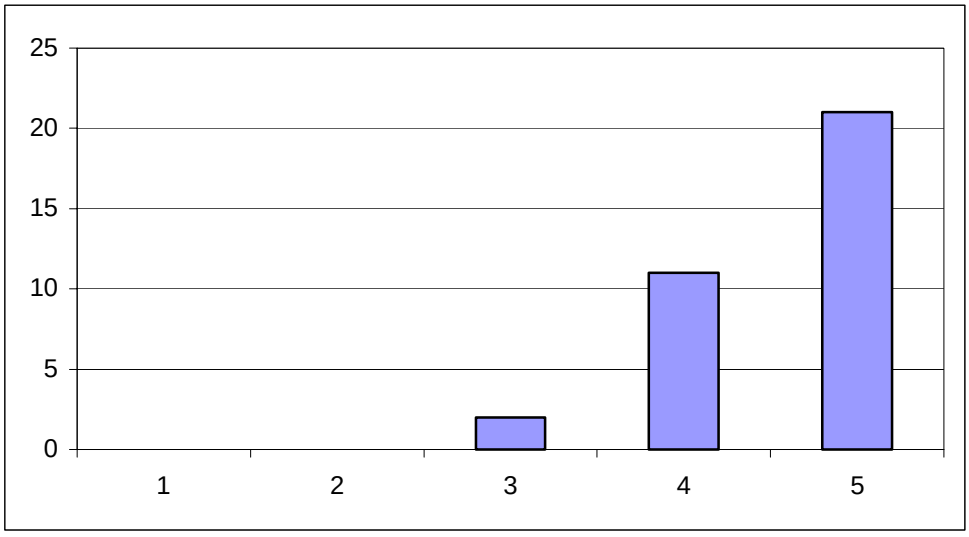
Seminar 7: Recycling of heavy metals using smelters (PP1 result)
Date: 1 July, 2003
Location: Bucharest, Marriott Hotel

The participants were requested to assess the Seminar by marking from 1 (poor) to 5 (excellent) the aspects detailed bellow. The number of responses fr each score re given for a total of 34 forms returned.

1. To what extent did the Seminar meet your expectations?

1	*2*	*3*	*4*	*5*
0	0	2	11	21

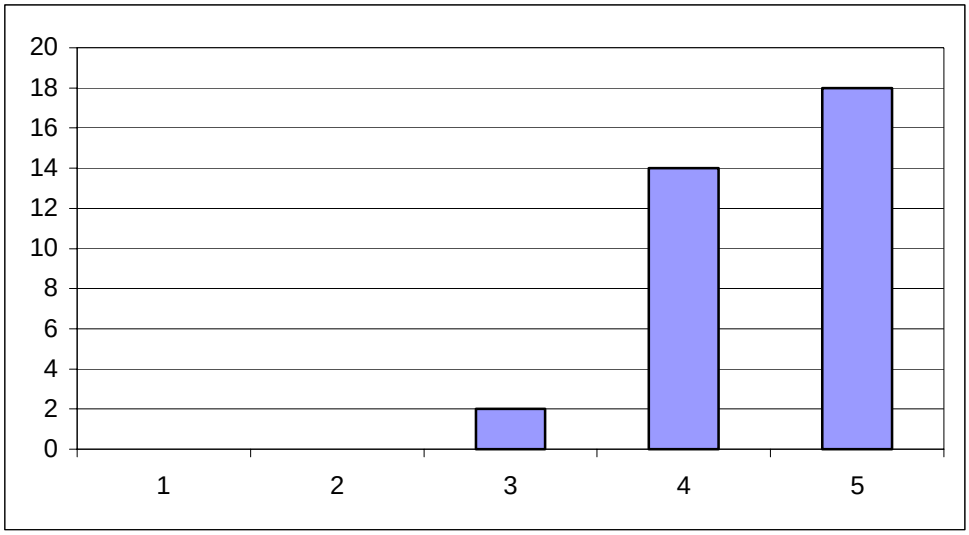
Average: 91%



2. To what extent is this Seminar useful to your activities?

1	*2*	*3*	*4*	*5*
0	0	2	14	18

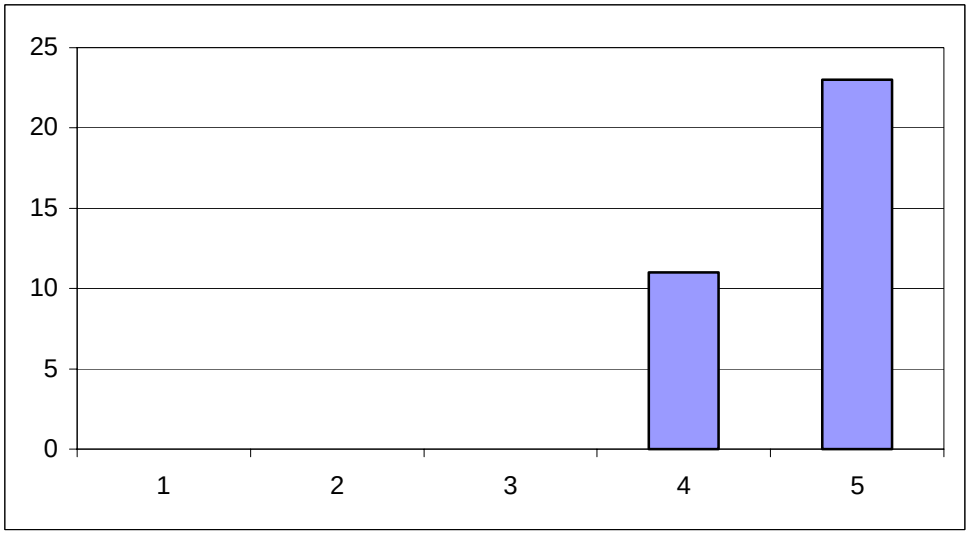
Average: 89%



3. How do you appreciate the information presented in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	0	11	23

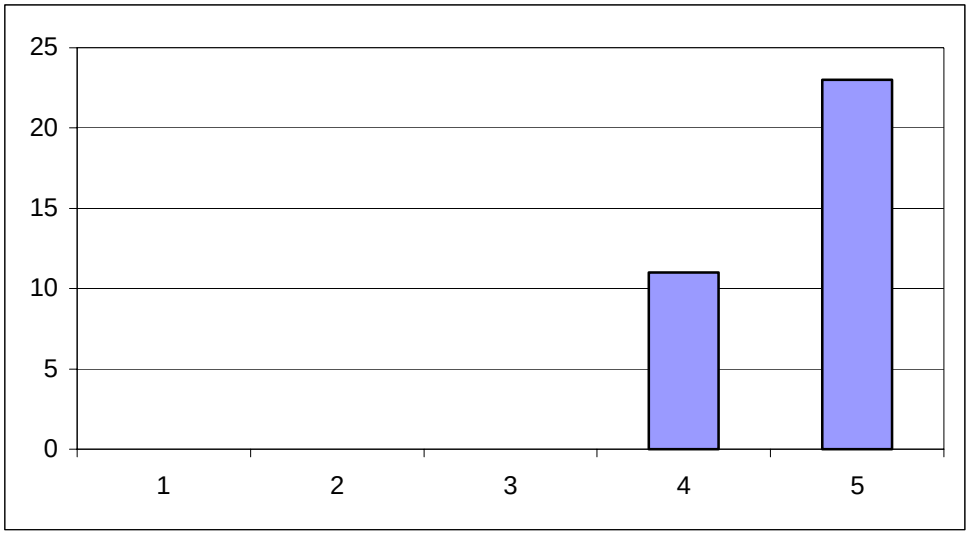
Average: 94%



4. How do you appreciate the presentation methods used in this Seminar?

1	*2*	*3*	*4*	*5*
0	0	0	11	23

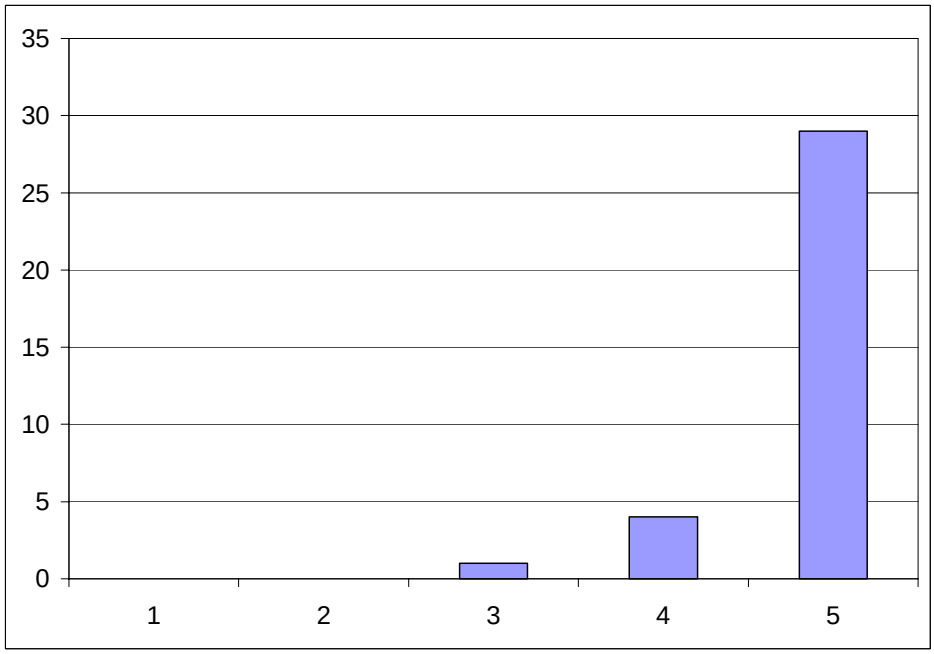
Average: 94%



5. How do you appreciate the presentation materials and the Seminar support documents?

1	*2*	*3*	*4*	*5*
0	0	1	4	29

Average: 97%



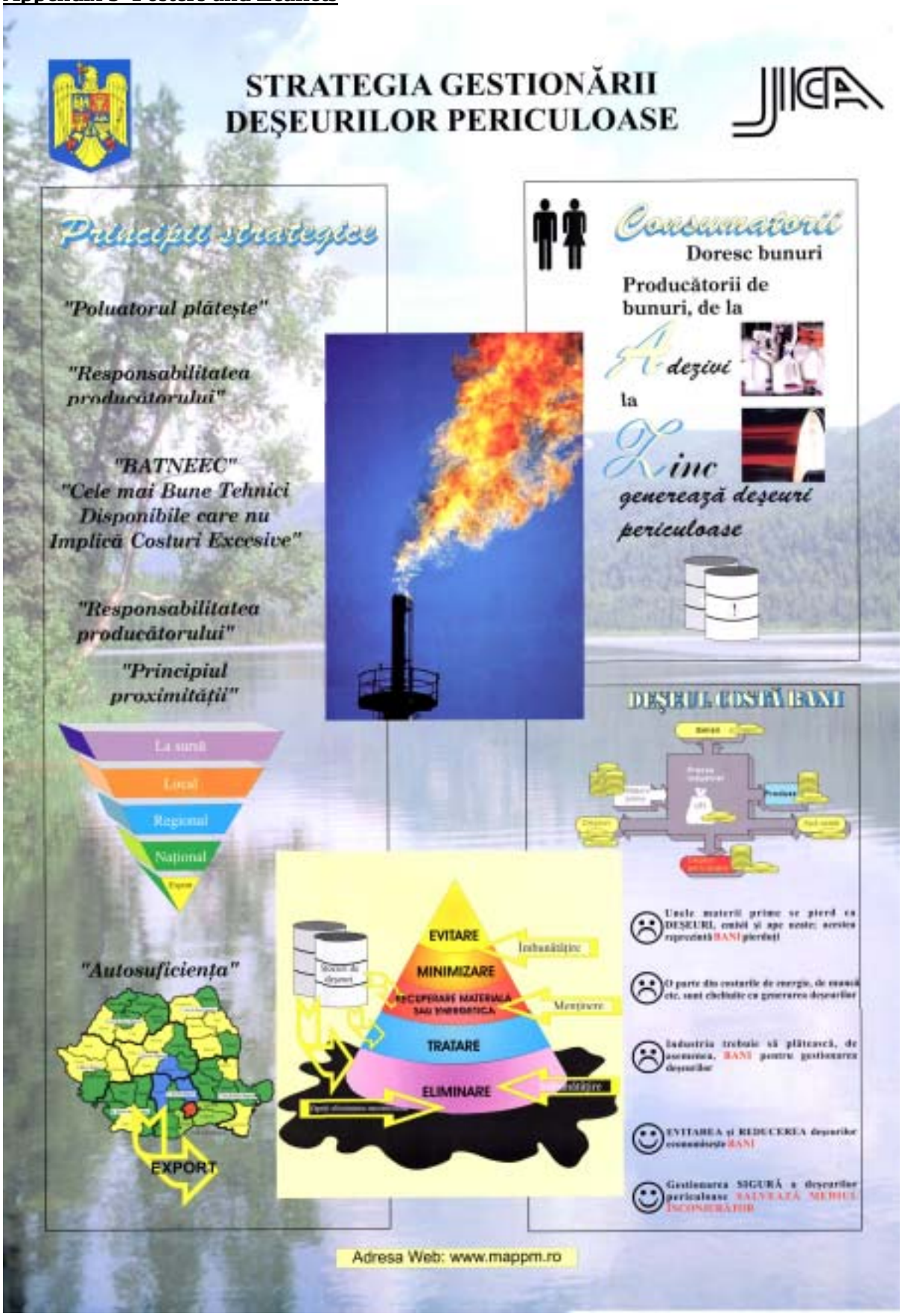
6. Please indicate below any other impressions, comments or suggestions related to this Seminar:

a. Interest for PP1 and in the identification of some solutions for recycling the Zn dust resulted from electric kilns (Targoviste and Hunedoara siderurgical complexes)
b. Useful information and well disseminated

Appendix 3

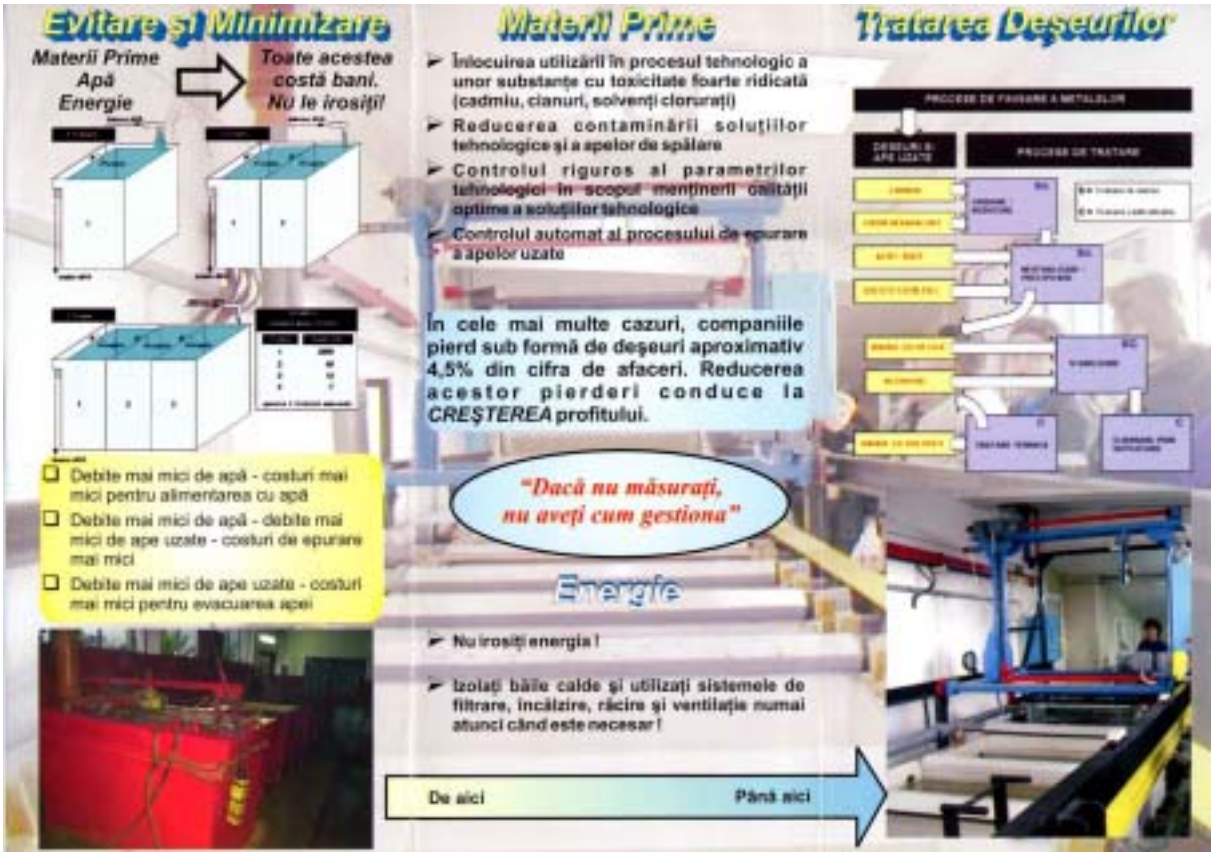
Posters and Leaflets

Appendix 3 Posters and Leaflets



Poster 1: Desirable Hazardous Waste Management

Poster 2: Diffusion of Pilot Projects 2 & 3



Leaflet 1: Pilot Project 2 (Integrated waste management in metal plating industry)

Leaflet 2: Pilot Project 3 (Reduction of organic solvent)