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Department of Administration (DA/GS/CONTR)
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Unser Zeichen 90/122

Our Ref

Datum/Date 21.11.90

FINAL REPORT

UNIDO CONTRACT NO. 90/122

**Project: High Level Advisory Assistance in
Environment Monitoring for Aluminium
Casts Plant in Pleven, People's Republic
of Bulgaria
SI/BUL/90/801**



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I INTRODUCTION

The order for the provision of services related to the "High Level Advisory Assistance in Monitoring for Aluminium Casts Plant in the People's Republic of Bulgaria, Proj. No. SI/BUL/90/801 was given by :

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION
Acting Chief, Contracts Section
General Services Division
Department of Administration (DA/GS/CONTR)
P.O. Box 300
1400 W i e n

with contract No. 90/122.

ALPENCONSULT performed in the time between 27 August 1990 and 31 August 1990 the direct measurements of the pollution factors caused by the activity of the Aluminium Casts Plant in Pleven.

During the measurements in Bulgaria and the visit of a bulgarian expert team in Vienna and Munich (08.11. - 18.11.90) Alpenconsult makes the bulgarian experts acquainted with operational facilities of measuring equipment and with methodologies of the data processing. Alpenconsult shows the bulgarian experts also an automotiv plant (MAN) in Munich and a wheel rim production in Ranshofen (Austria Alu-Guß).

In the time from 12.11.90 to 15.11.90 (during the Unido-meeting) Alpenconsult assists in elaboration of final guidelines (recommendations) to increase the working place and environment situation for the plant management.

II MEASUREMENTS

II/1 General remarks

The UNIDO Experts recommend after their first fact finding mission in Pleven August 1990 24 measuring points.

Measurements were performed on the following places :

Measuring Point	description of the measuring points
A	working place in the cole machine section
B	working place in the cole machine section
C	working place at core dryer section
D	in front of melting furnace section
E	working place in front of the mixer, wheel rim furnace section
F	working place in casting section VP 1300
G	working place between casting machines VP 100/3
H	working place between casting machines for wheel rims (strontium !)
I	working place beside high pressure casting machine Pollak 1000
J	working place in casting machine section VP 400/40
K	Aspirator of VP 400 casting machine section
L	BMD-Filter
M	wo-king place in thermic treatment section in front of Ebner
N	working place in thermic treatment section
O1	fitter's shop
O2	saw machine
O3	saw machine
O4	radial saw machine
P1	working place sand blasting machine fitter's shop
P 2	working place sand blasting machine wheel rim production
Q	working places product finishing beside welding section
R	working place welding section
S	diesel high lift truck
T	ventilator near computer room
U	Laboratory : working place
V	Sporting area
X	Area between mainbuilding and electro plating plant
Y	in front of building, where painting was performed in the past
Z	ground water analysis

Appendix 1 in the Interim Report of AlpenConsult shows a plan of the plant with the measuring points.

The table of measuring points shows that mostly "working place conditions" measurements were performed. There were only one typical emission measurement (Point L - BMD filter) and three immission measurements outside of the plant (Point V, X and Y).

For the evaluation of the measurement results it is important to know the capacity of the plant during the measurements and the raw materials used. The capacity of the plant was during the measurements appr. 70 %. Most of the aluminium used during the measurements was of Swiss origin. The phenol-formaldehydesin which was used, was also at low temperatures very easily to crack into small compounds.

Information of the measuring methods, the measurement equipment and the measuring range (limits of detection and accuracy of measurement) can be found in AlpenConsult Interim Report, chapter IV, V and VI.

II/2 Measurement results

II/2/1 Measuring point A

The following measurements were performed at measuring point A, a working place in the cole machine section:

- measurement of temperature
- measurement of dust immission
- analysis of dust
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission

During performance of the measurements six cole machines were operating. There was no operating aspiration.

Records of sampling at this measuring point are part of appendix 14.A of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date	:	90-08-27
Time	:	16.00
Measurement result	:	33,0 °C

b) Dust Immission

Time of measurement:

Date : 90-08-27
Time : 16.00 - 17.00

Measurement result : 1,68 mg/Nm³

c) Analysis of Dust

Time of measurement:

Date : 90-08-27
Time : 16.00 - 17.00

Measurement result :
Aluminium (Al) : 0,212 mg/filter
Manganese (Mn) tot. : 0,08 mg/filter
Magnesium (Mg) : 0,098 mg/filter
Chrome (Cr) : < 0,01 mg/filter
Copper (Cu) : 0,001 mg/filter
Nickel (Ni) : 0,001 mg/filter
Iron (Fe) tot. : 0,077 mg/filter

d) TOC Immission

Time of measurement:

Date : 90-08-27
 Time : 16.00 - 16.30

Measurement result :

Mean value	:	3,4	ppm	C ₃
		10,2	ppm	C ₁
		5,5	mg	C/m ³
Minimum value	:	1,7	ppm	C ₃
		5,1	ppm	C ₁
		2,7	mg	C/m ³
Peak value	:	6,2	ppm	C ₃
		18,6	ppm	C ₁
		9,9	mg	C/m ³

e) Phenol Immission

Time of measurement:

Date : 90-08-27
 Time : 16.00 - 17.00

Measurement result : 12 µg/m³

f) Formaldehyde Immission

Time of measurement:

Date : 90-08-27
 Time : 16.00 - 17.00

Measurement result : 2.318,5 µg/m³

II/2/2

Measuring point B

The following measurements were performed at measuring point B, a working place in the cole machine section:

- measurement of temperature
- measurement of dust immission
- analysis of dust
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission

During performance of the measurements six cole machines were working. There was no aspiration operating.

Records of measurements at this measuring points are part of appendix 14.B of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date	:	90-08-27
Time	:	16.40
Measurement result	:	32,8 °C

b) Dust Immission

Time of measurement:

Date : 90-08-27
Time : 12.00 - 16.05

Measurement result : 1,67 mg m³

c) Analysis of Dust

Time of measurement:

Date : 90-08-27
Time : 12.00 - 16.05

Measurement result :

Aluminium (Al)	:	0,56 mg/filter
Manganese (Mn) tot.	:	0,003 mg/filter
Magnesium (Mg)	:	0,004 mg/filter
Chrome (Cr)	:	0,005 mg/filter
Copper (Cu)	:	0,004 mg/filter
Nickel (Ni)	:	0,002 mg/filter
Iron (Fe) tot.	:	0,975 mg/filter
Silicium (Si)	:	0,073 mg/filter

d) TOC Immission

Time of measurement:

Date : 90-08-07
 Time : 16.40 - 17.10

Measurement result :

Mean value	:	3,7	ppm	C ₃
		11,1	ppm	C ₁
		5,9	mg	C/m ³
Minimum	:	1,8	ppm	C ₃
		5,4	ppm	C ₁
		2,9	mg	C/m ³
Peak value	:	9,1	ppm	C ₃
		28,8	ppm	C ₁
		15,4	mg	C ₁ m ³

e) Phenol Immission

Time of measurement:

Date : 90-08-27
 Time : 16.30 - 17.00

Measurement result : < 12 µg/m³

f) Formaldehyde Immission

Time of measurement:

Date : 90-08-27
 Time : 16.30 - 16.50

Measurement result : 2.310 µg/m³

II/2/3

Measuring point C

The following measurements were performed at measuring point C, a working place at the core dryer section:

- measurement of temperature
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission

During performance of the measurements only one core dryer was operating. Measurements were performed in front of the operating core dryer.

Records of measurements at this measuring point are part of appendix 14.C of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - d.

a) Temperature

Time of measurement:

Date : 90-08-27

Time : 17.15

Measurement result : 33,0 °C

b) TOC Immission

Time of measurement:

Date : 90-08-27
 Time : 17.15 - 17.45

Measurement result :

Mean value	:	3,7	ppm	C ₃
		11,1	ppm	C ₁
		5,9	mg	C/m ³
Minimum value	:	3,0	ppm	C ₃
		9,0	ppm	C ₁
		4,8	mg	C/m ³
Peak value	:	7,2	ppm	C ₃
		21,6	ppm	C ₁
		11,6	mg	C/m ³

c) Phenol Immission

Time of measurement:

Date : 90-08-27
 Time : 17.34 - 17.45

Measurement result : $\leq 12 \mu\text{g}/\text{m}^3$

d) Formaldehyde Immission

Time of measurement:

Date : 90-08-27
 Time : 17.57 - 18.20

Measurement result : $167 \mu\text{g}/\text{m}^3$

II/2/4

Measuring point D

The following measurements were performed at measuring point D in front of the melting furnaces:

- measurement of temperature
- measurement of dust immissions
- analysis of dust
- measurement of TOC immission
- measurement of chloride immission
- measurement of fluorid immission
- measurement of noise immission

During performance of the measurements only one melting furnace was operating.

Records of measurements at this measuring point are part of appendix 14.D of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - g.

a) Temperature

Time of measurement:

Date : 90-08-27
Time : 7.50

Measurement result : 28,2 °C

b) Dust Immission

Time of measurement:

Date : 90-08-27
Time : 20.45 - 7.40

Measurement result : 0,36 mg/m³

c) Analysis of Dust

Time of measurement:

Date : 90-08-27
Time : 20.45 - 7.40

Measurement result :
Aluminium (Al) : 0,222 mg/filter
Manganese (Mn) tot. : 0,031 mg/filter
Magnesium (Mg) : 0,104 mg/filter
Chrome (Cr) : 0,02 mg/filter
Copper (Cu) : 0,004 mg/filter
Nickel (Ni) : 0,002 mg/filter
Iron (Fe) tot. : 0,236 mg/filter

d) TOC Immission

Time of measurement:

Date : 90-08-28
Time : 7.20 - 7.50

Measurement result	:			
Mean value	:	0,6	ppm	C ₃
		1,8	ppm	C ₁
		1,0	mg	C/m ³
Minimum value	:	0,4	ppm	C ₃
		1,2	ppm	C ₁
		4,6	mg	C/m ³
Peak value	:	0,7	ppm	C ₃
		2,1	ppm	C ₁
		1,1	mg	C/m ³

e) Chloride Immission

Time of measurement:

Date : 90-08-28
 Time : 7.45 - 8.05

Measurement result :
 Chlorid (Cl) : < 2,5 mg/m³

f) Fluoride Immission

Time of measurement:

Date : 90-08-28
 Time : 7.45 - 8.05

Measurement result :
 Fluorid (F) : < 1,0 µg/m³

g) Noise Immission

Time of measurement:

Date : 90-08-28
Time : 7.50 - 8.20

Measurement result :

Type of noise : constant background level
and impulses
Minimum value : 70 dB(A)
Peak value : 108 dB(A)
Equivalent sound pressure
level (30 min) : 79,4 dB(A)

II/2/5

Measuring point E

The following measurements were performed at measuring point E, a working place in front of the mixer in the wheel rim furnace section:

- measurement of temperature
- measurement of dust immission
- measurement of TOC immission
- measurement of noise immission

During performance of measurements only one mixer and one of the nearby casting machines were operating.

Records of measurements at this measuring point are part of appendix 14.E of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - d.

a) Temperature

Time of measurement:

Date : 90-08-29
Time : 11.00

Measurement result : 28,2 °C

b) Dust Immission

Time of measurement:

Date : 90-08-29
Time : 11.00 - 11.30

Measurement result : dust concentration below
limit of detection

c) TOC Immission

Time of measurement:

Date : 90-08-29
Time : 11.00 - 11.30

Measurement result :

Mean value	:	1,0 ppm C ₃
		3,0 ppm C ₁
		1,6 mg C/m ³
Minimum value	:	0,8 ppm C ₃
		2,4 ppm C ₁
		1,3 mg C/m ³
Peak value	:	1,2 ppm C ₃
		3,6 ppm C ₁
		1,9 mg C/m ³

d) Noise Immission

Time of measurement:

Date : 90-08-29
Time : 11.30 - 12.00

Measurement result :

Type of noise : fluctuating background
level and impulses
Minimum value : 71 dB(A)
Peak value : 97 dB(A)
Equivalent sound pressure
level (30 min) : 80,2 dB(A)

II/2/6

Measuring point F

The following measurements were performed at measuring point F, a working place in VP 1300 casting section:

- measurement of temperature
- measurement of dust immission
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission
- measurement of noise immission

During performance of the measurements one of the furnaces was in operation. Measurements were performed in front of the operating furnace.

Records of measurements at this measuring point are part of appendix 14.F of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date : 90-08-27
 Time : 18.40

Measurement result : 35,2°C

b) Dust Immission

Time of measurement:

Date : 90-08-27
 Time : 18.50 - 20.04

Measurement result : dust concentration below
 limit of detection

c) TOC Immission

Time of measurement:

Date : 90-08-27
 Time : 18.40 - 19.10

Measurement result :

Mean value : 1,4 ppm C₃
 4,2 ppm C₁
 2,3 mg C/m³

Minimum value	:	1,2	ppm	C ₃
		3,6	ppm	C ₁
		1,9	mg	C/m ³
Peak value	:	3,4	ppm	C ₃
		10,2	ppm	C ₁
		5,5	mg	C/m ³

Note : Peak values with a few seconds duration occurred during the process of degasing, but due to the efficient aspiration there is no influence on the working place condition.

d) Phenol Immission

Time of measurement:

Date : 90-08-27
Time : 18.50 - 19.20

Measurement result : < 12 µg/m³

e) Formaldehyde Immission

Time of measurement:

Date : 90-08-27
Time : 19.20 - 19.50

Measurement result : 103 µg/m³

f) Noise Immission

Time of measurement:

Date	:	90-08-27
Time	:	18.10 - 18.40
Type of noise	:	constant background level and impulses
Minimum value	:	69,0 dB(A)
Peak value	:	84,0 dB(A)
Equivalent sound pressure level (30 min)	:	71,2 dB(A)

Notes : During the performance of noise immission measurement no work was done in the finishing section, which is the main source of impulse noise.

II/2/7

Measuring Point G

The following measurements were performed at measuring point G between casting machines VP 100/3:

- measurement of temperature
- measurement of dust immission
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission
- measurement of noise immission

During performance of the measurements five of the casting machines in this section were operating.

Records of measurements at this measuring point are part of appendix 14.G of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date : 90-08-28
Time : 10.25

Measurement result : 35,0 °C

b) Dust Immission

Time of measurement:

Date : 90-08-28
Time : 10.45 - 11.15

Measurement result : 0,93 mg/m³

c) TOC Immission

Time of measurement:

Date : 90-08-28
Time : 10.20 - 10.50

Measurement result	:		
Mean value	:	2,5 ppm	C ₃
		7,5 ppm	C ₁
		4,0 mg	C/m ³
Minimum value	:	1,6 ppm	C ₃
		4,8 ppm	C ₁
		2,6 mg	C/m ³
Peak value	:	10,0 ppm	C ₃
		30,0 ppm	C ₁
		16,1 n.g	C/m ³

Note : Peak values of TOC immission at the working place occurred when cores were heated shortly after closing the casting machine.

d) Phenol Immission

Time of measurement:

Date : 90-08-28
Time : 9.55 - 10.15

Measurement result : < 12 µg/m³

e) Formaldehyde Immission

Time of measurement:

Date : 90-08-28
Time : 10.25 - 10.40

Measurement result : 165,2 µg/m³

f) Noise Immission

Time of measurement:

Date : 90-08-28
Time : 10.50 - 11.20

Type of noise : fluctuating background and impulses
Minimum value : 74,0 dB(A)
Peak value : 94,0 dB(A)
Equivalent sound pressure level (30 min) : 80,8 dB(A)

II/2/8

Measuring point H

The following measurements were performed at measuring point H, a working place between casting machines for wheel rims:

- measurement of temperature
- measurement of dust immission
- analysis of dust
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission
- measurement of noise immission

During performance of the measurements only one of the casting machines in this section was operating and produced due to problems only 4 wheel rims. Measurements were performed in front of the operating machine.

Records of measurements at this measuring point are part of appendix 14.H of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - g.

a) Temperature

Time of measurement:

Date : 90-08-29
Time : 10.00

Measurement result : 28,5 °C

b) Dust Immission

Time of measurement:

Date : 90-08-29
Time : 10.08 - 10.27

Measurement result : dust concentration below
limit of detection

c) Analysis of Dust

Time of measurement:

Date : 90-08-29
Time : 10.08 - 10.27

Measurement result : below limit of detection

d) TOC Immission

Time of measurement:

Date : 90-08-29
Time : 10.00 - 10.30

Measurement result	:		
Mean value	:	0,6 ppm	C ₃
		1,8 ppm	C ₁
		1,0 mg	C/m ³
Minimum value	:	0,2 ppm	C ₃
		0,6 ppm	C ₁
		0,3 mg	C/m ³
Peak value	:	3,0 ppm	C ₃
		9,0 ppm	C ₁
		4,8 mg	C/m ³

Note : Peak values of TOC immission at the working place occurred when cores were heated shortly after closing the casting machine.

e) Phenol Immission

Time of measurement:

Date : 90-08-29
Time : 9.45 - 10.05

Measurement result : < 12 µg/m³

f) Formaldehyde Immission

Time of measurement:

Date : 90-08-29
Time : 10.08 - 10.24

Measurement result : 101,3 µg/Nm³

g) Noise Immission

Time of measurement:

Date	:	90-08-29
Time	:	10.30 - 11.00
Type of noise	:	impulse noise and constant noise
Minimum value	:	72,0 dB(A)
Peak value	:	100,0 dB(A)
Equivalent sound pressure level (30 min)	:	90,2 dB(A)

Note : During performance of the measurement compressed air was used for cleaning purposes because of problems with the castings. The use of compressed air caused constant sound levels up to 97 dB(A)

These high sound levels, which were the dominating contribution to the equivalent sound pressure level during the measurement, do not occur during normal operating conditions of the casting machines. Under normal conditions the dominating noise is impulse noise from the nearby finishing and welding section.

11/2/9

Measuring point I

The following measurements were performed at measuring point I, the working place beside the high pressure casting machine Pollak 1000:

- measurement of temperature
- measurement of dust immission
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission
- measurement of SO₂ immission
- measurement of NO_x immission
- measurement of noise immission

During performance of the measurements only one of the casting machines in this section was operating.

Records of measurements at this measuring point are part of appendix 14.I of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - h.

a) Temperature

Time of measurement:

Date	:	90-08-28
Time	:	13.45
Measurement result	:	27,2°C

b) Dust Immission

Time of measurement:

Date : 90-08-28
 Time : 13.45 - 14.15

Measurement result : dust concentration below
 limit of detection

c) TOC Immission

Time of measurement:

Date : 90-08-28
 Time : 13.45 - 14.15

Measurement result :

Mean value	:	0,8 ppm C ₃
		2,4 ppm C ₁
		1,3 mg C/m ³
Minimum value	:	0,4 ppm C ₃
		1,2 ppm C ₁
		0,6 mg C/m ³
Peak value	:	1,2 ppm C ₃
		3,6 ppm C ₁
		1,9 mg C/m ³

d) Phenol Immission

Time of measurement:

Date : 90-08-28
 Time : 13.45 - 14.00

Measurement result : < 12 µg/m³

e) Formaldehyde Immission

Time of measurement:

Date : 90-08-28
Time : 14.05 - 14.25

Measurement result : 189,5 $\mu\text{g}/\text{m}^3$

f) SO₂ Immission

Time of measurement:

Date : 90-08-28
Time : 13.50

Measurement result : SO₂ concentration below
limit of detection

g) NO_x Immission

Time of measurement:

Date : 90-08-28
Time : 13.15 - 17.15

Measurement result : NO_x concentration below
limit of detection

h) Noise Immission

Time of measurement:

Date	:	90-08-28
Time	:	14.15 - 14.45
Type of noise	:	constant background level and impulses
Minimum value	:	72 dB(A)
Peak value	:	94 dB(A)
Equivalent sound pressure level (30 min)	:	79,8 dB(A)

II/2/10

Measuring point J

The following measurements were performed at measuring point J, a working place in the VP 400/40 casting machine section:

- measurement of temperature
- measurement of dust immission
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission
- measurement of noise immission

During performance of the measurements three of the neighbouring casting machines were operating.

Records of measurements at this measuring point are part of appendix 14.J of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date : 90-08-29
Time : 14.00

Measurement result : 30.0°C

b) Dust Immission

Time of measurement:

Date : 90-08-29
Time : 17.20 - 7.55

Measurement result : 0,39 mg/m³

c) TOC Immission

Time of measurement:

Date : 90-08-29
Time : 14.00 - 14.30

Measurement result :

Mean value	:	1,3 ppm C ₃
		3,9 ppm C ₁
		2,1 mg C/m ³
Minimum value	:	0,6 ppm C ₃
		1,8 ppm C ₁
		1,0 mg C/m ³
Peak value	:	3,4 ppm C ₃
		10,2 ppm C ₁
		5,5 mg C/m ³

d) Phenol Immission

Time of measurement:

Date : 90-08-29
Time : 14.30 - 14.30

Measurement result : phenol concentration below
limit of detection

e) Formaldehyde Immission

Time of measurement:

Date : 90-08-28
Time : 14.30 - 15.00

Measurement result : formaldehyde concentration
below limit of detection

f) Noise Immission

Time of measurement:

Date : 90-08-29
Time : 14.30 - 15.00

Type of noise : fluctuating background
level and impulses

Minimum value : 74,8 dB(A)

Peak value : 103,0 dB(A)

Equivalent sound pressure
level (30 min) : 86,1 dB(A)

II/2/11

Measuring point K

The following measurements were performed at measuring point K, the aspirator of the VP 400/40 casting machine section:

- measurement of temperature
- measurement of dust emission
- measurement of TOC emission
- measurement of phenol emission
- measurement of formaldehyde emission
- measurement of SO₂ emission

During performance of the measurements six of the machines in this section were operating. The aspiration of this section was not working continuously.

The measured value of the air evacuation speed was :

$$- \quad v \quad = \quad 2,1 - 16 \text{ m/s}$$

The measured value of the volume flow was in the range:

$$- \quad V \quad = \quad 59 - 425 \text{ m}^3/\text{h}$$

Records of measurements at this measuring point are part of appendix 14.K of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date : 90-08-28
Time : 15.20

Measurement result : 30°C

b) Dust Emission

Time of measurement:

Date : 90-08-28
Time : 15.00- 16.00

Measurement result : 22,61 mg/Nm³

c) TOC Emission

Time of measurement:

Date : 90-08-28
Time : 15.20 - 15.50

Measurement result :

Mean value	:	78,0 ppm	C ₃
		234,0 ppm	C ₁
		125,4 mg	C/m ³
Minimum value	:	20,0 ppm	C ₃
		60,0 ppm	C ₁
		32,1 mg	C/m ³
Peak value	:	420,0 ppm	C ₃
		1260,0 ppm	C ₁
		675,0 mg	C/m ³

d) Phenol Emission

Time of measurement:

Date : 90-08-28
Time : 15.10 - 15.30

Measurement result : 22,2 $\mu\text{g}/\text{m}^3$

e) Formaldehyde Emission

Time of measurement:

Date : 90-08-28
Time : 15.40 - 16.00

Measurement result : 253,3 $\mu\text{g}/\text{m}^3$

f) SO₂ Emission

Time of measurement:

Date : 29-08-28
Time : 15.30

Measurement result : SO₂ concentration below
limit of detection

11/2/12

Measuring point L

The following measurements were performed at measuring point L, the BMD filter:

- measurement of temperature
- measurement of dust emission
- dust analysis
- measurement of TOC emission
- measurement of chloride emission
- measurement of fluoride emission

During the measurements degasing processes were performed.

The measured value of the air evacuation speed was :

$$- \quad v \quad = \quad 11,2 \text{ m/s}$$

The measured value of the volume flow was :

$$- \quad V \quad = \quad 11400 \text{ m}^3/\text{h}$$

Records of measurements at this measuring point are part of appendix 14.L of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - f.

a) Temperature

Time of measurement:

Date	:	90-08-28
Time	:	9.00
Measurement result	:	33,5°C

b) Dust Emission

Time of measurement:

Date : 90-08-28
Time : 9.00 - 12.00

Measurement result : 49,91 mg/m³

c) Analysis of Dust

Time of measurement:

Date : 90-08-28
Time : 9.00 - 12.00

Measurement result :

Aluminium (Al)	:	0,018 mg/filter
Manganese (Mn) tot.	:	0,014 mg/filter
Magnesium (Mg)	:	0,001 mg/filter
Chrome (Cr)	:	< 0,001 mg/filter
Copper (Cu)	:	0,001 mg/filter
Nickel (Ni)	:	0,002 mg/filter
Iron (Fe) tot.	:	0,09 mg/filter
Silicium (Si)	:	0,137 mg/filter

d) TOC Emission

Time of measurement:

Date : 90-08-28
 Time : 8.50 - 9.20

Measurement result :

Mean value	:	1,5 ppm C ₃
		4,5 ppm C ₁
		2,4 mg C/m ³
Minimum value	:	0,8 ppm C ₃
		2,4 ppm C ₁
		1,3 mg C/m ³
Peak value	:	3,0 ppm C ₃
		9,0 ppm C ₁
		4,8 mg C/m ³

Note : Maxima of TOC-emissions occurred during degasing processes.

e) Chloride Emission

Time of measurement:

Date : 90-08-28
 Time : 9.10 - 9.25

Measurement result :

Chlorid (Cl) : 7,4 mg/m³

f) Fluoride Emission

Time of measurement:

Date : 90-08-28
Time : 9.10 - 9.25

Measurement result :
Fluorid (F) : < 1,0 µg/m³

II/2/13

Measuring point M

The following measurements were performed at measuring point M, the working place in the thermic treatment facility in front of the Ebner machine:

- measurement of temperature
- measurement of TOC immission
- measurement of noise immission

Records of measurements at this measuring point are part of appendix 14.M of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - c.

a) Temperature

Time of measurement:

Date : 90-08-28
Time : 19.00

Measurement result : 31.0°C

b) TOC Immission

Time of measurement:

Date : 90-08-28
 Time : 17.30 - 18.00

Measurement result :

Mean value	:	1,7 ppm C ₃
		5,1 ppm C ₁
		2,7 mg C/m ³
Minimum value	:	0,3 ppm C ₃
		0,9 ppm C ₁
		0,5 mg C/m ³
Peak value	:	2,3 ppm C ₃
		6,9 ppm C ₁
		3,7 mg C/m ³

Note : The measurement of TOC immission was performed when the door of the thermic treatment facility was opened. TOC concentration rose from 0,9 ppm C₁ to 7,8 ppm C₁ after opening of the door.

c) Noise Immission

Time of measurement:

Date : 90-08-29
 Time : 17.15 - 17.45

Type of noise	:	constant background level and impulses
Minimum value	:	68,2 dB(A)
Peak value	:	84,0 dB(A)
Equivalent sound pressure level (30 min):	:	70,2 dB(A)

II/2/14

Measuring point N

The following measurements were performed at measuring point N, a working place in thermic treatment section:

- measurement of temperature
- measurement of dust immission
- measurement of TOC immission
- measurement of phenol immission
- measurement of formaldehyde immission

During performance of the measurements two of the thermic treatment facilities were operating. The measurements were performed within 2 m distance of one of the operating facilities.

Records of measurements at this measuring point are part of appendix 14.N of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - e.

a) Temperature

Time of measurement:

Date	:	90-08-27
Time	:	20.00
Measurement result	:	30°C

b) Dust Immission

Time of measurement:

Date : 90-08-27
 Time : 20.00 - 20.30

Measurement result : dust concentration below
 limit of detection

c) TOC Immission

Time of measurement:

Date : 90-08-27
 Time : 20.10 - 20.40

Measurement result :

Mean value	:	4,1 ppm C ₃
		12,3 ppm C ₁
		6,6 mg C/m ³
Minimum value	:	1,0 ppm C ₃
		3,0 ppm C ₁
		1,6 mg C/m ³
Peak value	:	6,0 ppm C ₃
		18,0 ppm C ₁
		9,6 mg C/m ³

Note : Maxima of TOC concentrations at the thermic treatment facilities coincided with temperature maxima during the thermic treatment process.

d) Phenol Immission

Time of measurement:

Date : 90-08-29
Time : 9.45 - 10.05
Measurement result : < 12 µg/m³

e) Formaldehyde Immission

Time of measurement:

Date : 90-08-29
Time : 10.08 - 10.24
Measurement result : 163,1 µg/m³

II/2/15

Measuring point O1

The following measurements were performed at measuring point O1, a working place at the fitter's shop:

- measurement of temperature
- measurement of TOC immission
- measurement of noise immission

During performance of the measurements the sand blasting machine and two turning lathes were operating.

Records of measurements at this measuring point are part of appendix 14.O1 of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - c.

a) Temperature

Time of measurement:

Date : 90-08-28
 Time : 16.30

Measurement result : 29,3 °C

b) TOC Immission

Time of measurement:

Date : 90-08-28
 Time : 16.00 - 16.30

Measurement result :

Mean value	:	1,9 ppm C ₃
		5,7 ppm C ₁
		3,1 mg C/m ³
Minimum value	:	0,8 ppm C ₃
		2,4 ppm C ₁
		1,3 mg C/m ³
Peak value	:	7,8 ppm C ₃
		23,4 ppm C ₁
		12,5 mg C/m ³

Note : During the period of measurement irregular maxima of TOC immission were observed. According to the management of the plant these maxima are caused by leakages of gas cylinders in a neighbouring section.

c) Noise Immission

Time of measurement:

Date	:	90-08-28
Time	:	16.30 - 17.00
Type of noise	:	fluctuating noise
Minimum value	:	< 70 dB(A)
Peak value	:	86 dB(A)
Equivalent sound pressure level (30 min)	:	79,8 dB(A)

Note : Noise immission at this measuring point is dominated by the fluctuating noise from the sand blasting machine.

11/2/16

Measuring point O2

The following measurements were performed at measuring point O2, a working place at a saw machine:

- measurement of temperature
- measurement of noise immission

During performance of the measurement first the saw near the measuring point was operating for 10 minutes, then no saw machine at all was operating and finally only the neighbouring saw was operating.

Records of measurements at this measuring point are part of appendix 14.O2 of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - b.

a) Temperatur

Time of measurement:

Date : 90-08-29
Time : 15.10

Measurement result : 28,3 °C

b) Noise Immission

Time of measurement:

Date : 90-08-29
Time : 15.00 - 15.30

Measurement result:

Type of noise : periodic noise from sawing process

Minimum value : < 70 dB(A) (no saw machine operating)

Peak value : 102,2 dB(A) (saw machine operating)

Equivalent sound pressure level (30 min) : 91,2 dB(A)

Note : During noise immission measurements the saw at the measuring point was operating for about 10 minutes. The equivalent sound pressure level within this period was about 96 dB(A).

11/2/17

Measuring point O3

The following measurements were performed at measuring point O3, a working place at a saw machine:

- measurement of temperature
- measurement of noise immission

During performance of the measurement only the saw near the measuring point was operating for about 20 minutes.

Records of measurements at this measuring point are part of appendix 14.03 of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - b.

a) Temperature

Time of measurement:

Date : 90-08-29
Time : 15.40

Measurement result : 28,1 °C

b) Noise Immission

Time of measurement:

Date : 90-08-29
Time : 15.30 - 16.00

Measurement result:

Type of noise	:	periodic noise from sawing process
Minimum value	:	< 70 dB(A) (no saw machine operating)
Peak value	:	108,0 dB(A) (saw machine operating)
Equivalent sound pressure level (30 min)	:	93,2 dB(A)

II/2/18

Measuring point O4

The following measurements were performed at measuring point O4, a working place at a radial saw machine:

- measurement of temperature
- measurement of noise immission

During performance of the measurement only one radial saw was operating.

Records of measurements at this measuring point are part of appendix 14.O4 of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - b.

a) Temperature

Time of measurement:

Date	:	90-08-29
Time	:	17.50
Measurement result	:	28,9 °C

b) Noise Immission

Time of measurement:

Date : 90-08-29
Time : 17.50 - 18.20

Measurement result:

Type of noise : fluctuating noise
Minimum value : 75,5 dB(A)
Peak value : 97,1 dB(A)
Equivalent sound pressure
level (30 min) : 80,2 dB(A)

11/2/19

Measuring point P1

The following measurements were performed at measuring point P1, a working place at a sand blasting machine in the fitter's shop:

- measurement of temperature
- measurement of dust immission
- measurement of noise immission

Measurements were performed in 1,5 m distance from the sand blasting machine.

Records of measurements at this measuring point are part of appendix 14.P1 of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - c.

a) Temperature

Time of measurement:

Date : 90-08-28
Time : 17.10

Measurement result : 28,3 °C

b) Dust Immission

Time of measurement:

Date : 90-08-28
Time : 16.30 - 17.30

Measurement result : 4,16 mg/m³

c) Noise Immission

Time of measurement:

Date : 90-08-28
Time : 17.00 - 17.30

Measurement result :

Type of noise : constant
Minimum value : < 70 dB(A) (sand
blasting machine was not
operating)
Peak value : 88,1 dB(A)
Equivalent sound pressure
level (30 min) : 83,8 dB(A)

Note : Directly to the sand blasting machine a constant noise level of 93,5 dB(A) was measured during the machine operation.

II/2/20 Measuring point P2

The following measurements were performed at measuring point P2, a working place at a sand blasting machine in the wheel rim section:

- measurement of temperature
- measurement of dust immission
- measurement of noise immission

Measurements were performed in 1 m distance from the sand blasting machine.

Records of measurements at this measuring point are part of appendix 14.P2 of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - c.

a) Temperature

Time of measurement:

Date : 90-08-29
Time : 11.30

Measurement result : 29,0 °C

b) Dust Immission

Time of measurement:

Date : 90-08-29
Time : 11.30 - 11.45

Measurement result : 4,45 mg/m³

c) Noise Immission

Time of measurement:

Date : 90-08-29
Time : 12.00 - 12.30

Measurement result :

Type of noise : constant
Minimum value : 78,5 dB(A) (sand
blasting machine was not
operating)
Peak value : 83,2 dB(A)
Equivalent sound pressure
level (30 min) : 79,9 dB(A)

Note : Directly to the sand blasting
machine a constant noise level of
83,5 dB(A) was measured during
the machine operation.

c) Noise Immission

Time of measurement:

Date : 90-08-28
Time : 9.20 - 9.50

Measurement result :

Type of noise : impulses
Minimum value : 81,0 dB(A)
Peak value : 104,0 dB(A)
Equivalent sound pressure
level (30 min) : 92,9 dB(A)

II/2/22

Measuring point R

The following measurements were performed at measuring point R, a working place in the welding section:

- measurement of temperature
- measurement of dust immission
- analysis of dust
- measurement of TOC immission
- measurement of noise immission

Records of measurements at this measuring point are part of appendix 14.R of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - e.

a) Temperature

Time of measurement:

Date : 90-08-28
 Time : 11.30

Measurement result : 29,0 ° C

b) Dust Immission

Time of measurement:

Date : 90-08-28
 Time : 12.00 - 15.40

Measurement result : 1,41 mg/m³

c) Analysis of Dust

Time of measurement:

Date : 90-08-28
 Time : 12.00 - 15.40

Measurement result :

Aluminium (Al)	:	0,284 mg/filter
Manganese (Mn) tot.	:	0,007 mg/filter
Magnesium (Mg)	:	0,088 mg/filter
Chrome (Cr)	:	< 0,01 mg/filter
Copper (Cu)	:	0,010 mg/filter
Nickel (Ni)	:	0,002 mg/filter
Iron (Fe) tot.	:	0,139 mg/filter

d) TQC Immission

Time of measurement:

Date : 90-08-28
 Time : 11.20 - 11.50

Measurement result :

Mean value	:	0,9	ppm	C ₃
		2,7	ppm	C ₁
		1,5	mg	C/m ³
Minimum value	:	0,7	ppm	C ₃
		2,1	ppm	C ₁
		1,1	mg	C/m ³
Peak value	:	2,2	ppm	C ₃
		6,6	ppm	C ₁
		3,5	mg	C/m ³

e) Noise Immission

Time of measurement:

Date : 90-08-28
 Time : 11.50 - 12.20

Type of noise : fluctuating noise from
 welding and impulses from
 product finishing section

Minimum value : 71,5 dB(A)

Peak value : 100,2 dB(A)

Equivalent sound pressure
 level (30 min) : 84,5 dB(A)

11/2/23

Measuring point S

At this measuring point measurements were performed of the TOC - immissions caused by diesel high lift trucks. At the beginning of the measurement no high lift truck was present, later on two diesel high lift trucks were waiting with started motors in 5 m distance from the measuring point and finally they were driving in 2 m distance to the measuring point.

A record of the measurement is part of appendix 14.S of the Interim Report of AlpenConsult.

The result of the measurement is summarized in the following section a.

a) TOC Immission

Time of measurement:

Date	:	90-08-29
Time	:	16.00 - 16.30

Measurement result :

Mean value	:	1,3 ppm C ₃
		3,9 ppm C ₁
		2,1 mg C/m ³
Minimum value	:	0,6 ppm C ₃
		1,8 ppm C ₁
		1,0 mg C/m ³
Peak value	:	6,0 ppm C ₃
		18,0 ppm C ₁
		9,6 mg C/m ³

Note : The record of the measurement shows that diesel high lift trucks increase the TOC - immissions observed. Peak values up to 18,0 ppm C₁ occurred, when diesel high lift trucks crossed past the measuring point in 2 m distance.

II/2/24 Measuring point T

At measuring point T, where a computer room is projected near an existing ventilator, noise immission measurements were made.

A record of the measurement is part of appendix 14.T of the Interim Report of AlpenConsult.

The result of the measurement is summarized in the following section a.

a) Noise Immission

Time of measurement:

Date : 90-08-29
 Time : 12.30 - 13.00

Measurement results :

Type of noise : constant noise from ventilator
 Minimum value : 70,0 dB(A) (ventilator was not operating)
 Peak value : 89,5 dB(A)
 Equivalent sound pressure level (30 min) : 82,8 dB(A)

Note : The ventilator was the dominant noise source causing a constant sound level of about 82-83 dB(A). When the ventilator was turned off at the end of the measurement, the sound level decreased to the background level of about 70 dB(A).

II/2/25 Measuring point U

The following measurements were performed at measuring point U, a working place in the chemical laboratory of the plant:

- measurement of temperature
- measurement of TOC immission
- measurement of chloride immission
- measurement of fluoride immission
- measurement of NO₂ immission

Records of measurements at this measuring point are part of appendix 14.U of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - e.

a) Temperature

Time of measurement:

Date : 90-08-29
Time : 8.20

Measurement result : 26,2 °C

b) TOC Immission

Time of measurement:

Date : 90-08-29
Time : 8.30 - 9.00

Measurement result :

constant value : 0,4 ppm C₃
1,2 ppm C₁
0,6 mg C/m³

c) Chloride Immission

Time of measurement:

Date : 90-08-29
Time : 8.30 - 8.50

Measurement result : 2,5 mg/m³

d) Fluoride Immission

Time of measurement:

Date : 90-08-29
Time : 8.30 - 8.50

Measurement result : < 1,0 µg/m³

e) NO_x Immission

Time of measurement:

Date : 90-08-29
 Time : 8.30 - 16.30

Measurement result : below limit of detection

II.2,26

Measuring point V

The following measurements were performed at measuring point V, the sporting area:

- measurement of dust immission
- measurement of noise immission

Records of measurements at this measuring point are part of appendix 14.V of the Interim Report of AlpenConsult..

The results of the measurements are summarized in the following sections a - b.

a) Dust Immission

Time of measurement:

Date : 90-08-27
 Time : 15.00 - 16.00

Measurement result : 0,02 mg/m³

b) Noise Immission

Time of measurement:

Date : 90-08-27
Time : 15.10 - 15.40

Measurement result :

Type of noise : constant
Minimum value : 56,0 dB(A)
Peak value : 72,6 dB(A) (due to traffic)
Equivalent sound pressure level (30 min) : 59,2 dB(A)

Note : The main source of noise was a damaged steam piping in the vicinity of the measuring point.

11/2/27

Measuring point X

The following measurements were performed at measuring point X, the area between the main building of the plant and the electro plating plant building.

- measurement of dust immission
- measurement of TOC immission
- measurement of phenole immission
- measurement of formaldehyde immission
- measurement of noise immission

Records of measurements at this measuring point are part of appendix 14.X of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following sections a - e.

a) Dust Immission

Time of measurement:

Date : 90-08-27
Time : 14.32 - 18.49

Measurement result : 0,02 mg/m³

b) TOC Immission

Time of measurement:

Date : 90-08-27
Time : 11.20 - 11.50

Measurement result :

constant value : 0,7 ppm C₃
2,1 ppm C₁
1,1 mg C₁/m³

c) Phenol Immission

Time of measurement:

Date : 90-08-27
Time : 11.43 - 12.13

Measurement result : < 12 µg/m³

d) Formaldehyde Immission

Time of measurement:

Date : 90-08-27
 Time : 12.44 - 13.05

Measurement result : 0,1388 mg/m³

e) Noise Immission

Time of measurement:

Date : 90-08-27
 Time : 11.50 - 12.20

Measurement result :

Type of noise : constant background and
 impulses from traffic
 Minimum value : 55,5 dB(A)
 Peak value : 77,1 dB(A)
 Equivalent sound pressure
 level (30 min) : 63,8 dB(A)

Note : The main source of noise was a ventilator at the main building causing a sound level of about 64 dB(A). When the ventilator was turned off at the end of the measurement period, the sound level decreased to about 57 dB(A).

11/2/28

Measuring point Y

The following measurements were performed at measuring point Y, in front of the building where painting was performed in the past:

- measurement of dust immissions
- measurement of TOC immission
- measurement of noise immission

Records of measurements at this measuring point are part of appendix 14.Y of the Interim Report of AlpenConsult.

The results of the measurements are summarized in the following section a - c.

a) Dust Immission

Time of measurement:

Date : 90-08-27
 Time : 12.11 - 14.09

Measurement result : 0,25 mg/m³

b) TOC Immission

Time of measurement:

Date : 90-08-27
 Time : 14.10 - 14.40

Measurement result :

constant value : 0,6 ppm C₃
 1,8 ppm C₁
 1,0 mg C/m³

c) Noise Immission

Time of measurement:

Date : 90-08-27
 Time : 14.40 - 15.10

Measurement result :

Type of noise : fluctuating
 Minimum value : 62,1 dB(A)
 Peak value : 90,0 dB(A) (high lift truck)
 Equivalent sound pressure level (30 min) : 68,8 dB(A)

Note : Main sources of noise were operating compressors and the traffic of high lift trucks.

II/2/79

Groundwater Analysis

* pH-Value : 7,2
 * Conductivity : 780 µS/m
 * Hydrocarbon : < 0,1 mg/l
 * Frigen 11 : < 0,1 µg/l
 * Frigen 113 : 9,5 µg/l
 * Dichloromethane : < 5,0 µg/l
 * Trichloromethane : < 0,1 µg/l
 * 1,1,1-Trichloroethane : 0,1 µg/l
 * Tetrachloromethane : < 0,1 µg/l
 * Trichloroethene : < 0,1 µg/l
 * Tetrachloroethene : < 0,1 µg/l
 * Coli Titer : > 1000
 * Iron : < 0,1 mg/l

* Manganese	:	< 0,5 mg/l
* Chrome tot.	:	< 0,05 mg/l
* Ammonium	:	< 0,1 mg/l
* Calcium	:	45 mg/l
* Chloride	:	42 mg/l
* Sulfate	:	182 mg/l
* Nitrate	:	48 mg/l
* Nitrite	:	< 2 mg/l
* Phosphate	:	< 0,01 mg/l

Water samples were taken by AlpenConsult on the 31st of August 1990 and by Dr. Gaubinger on the 26th of October from the well of the plant after > 10 hours of pumping. The groundwater is situated 130 m below the plant.

III VALUATION AND DISCUSSION OF THE MEASUREMENT RESULTS

In comparison with bulgarian and western european standards concerning working place conditions, the measurement results show technically high pollutions of dust, formaldehyde and/or noise, especially in the following areas :

- * cole machines
- * core dryer section
- * product finishing and welding section and
- * in parts of the mechanical workshop (sand blasting equipment and saw machines)

The counter-pressure casting machines of bulgarian origin are, concerning environmental status, comparable with western-european, american or japanese equipment.

The groundwater analysis show that according to the WHO guidelines the groundwater can be used as **potable water**.

As a result of the analyses of the aluminium cast plant in Pleven it may be stated, that from the view of environmental status **this plant ist not a main producer of dangerous pollutants in the Pleven area.**

Calculated on the basis of the AlpenConsult-measurement the emission going out of the plant at full capacity (100 %) and under the condition that all pollutants are collected and conducted to the atmosphere with an airexchange rate of 10 h^{-1} , the environmental datas concerning air pollution would be :

kg/y	dust	TOC	formaldehyd	phenol
old production plant	4.500	16.000	2.400	<<
new painting section	<<	13.000	<<	<<
future wheelrim painting	<<	13.000	<<	<<

IV

TRAINING OF THE BULGARIAN EXPERTS

During the dust-, TOC-, formaldehyde-, phenol-, chlorine-, fluoride- and noise-measurements of AlpenConsult at the Pleven Plant a local supporting team got the opportunity to work with the following analytical equipments :

- * Dust-immission sampler Desaga GS050
- * Hygrometer
- * Barometer
- * Dust emission sampler Stroehlein
- * Testotherm 9010
- * Atomic absorptionspectrometer Thermo Jarrell ASH
- * Dionnex-HPLC
- * Flame ionizations detector Ratfisch RS 53
- * Prandtl's Pitot tube
- * Gassampler Desaga 312
- * Photometer Beckmann Model 25
- * Dräger gasdetectorsystem
- * Sound Level Detector Brüel & Kjaer 312
- * Calibrator Brüel & Kjaer 4230
- * Chart-Recorder ABB Goerz SE 430

Appendix 2 - 13 of the interim report of AlpenConsult specifies all analytical methods used during the measurements.

During the visit of the Bulgarian expert-team in Munich and Vienna AlpenConsult was able to show the following environmental laboratory equipment :

- * HPLC - Ion Chromatograph Dionnex
- * Gas-Chromatograph HP 5890
- * Mass-Spectrometer
- * IR and UV-Photometer Perkin Elmer

During the visit of the Bulgarian expert group in Germany and Austria they were visiting together with AlpenConsult experts the following soil sanitation and production plants :

- * a soil sanitation project in Munich
- * the production of MAN - Munich and
- * the wheel rim production of Austria Alu-Guß in Ranshofen.

V RECOMMENDATIONS

AlpenConsult supports, because of our knowledge of the Pleven plant and the performed measurements, the technical recommendations of the Unido-experts.

Before performing these recommendations, the production flow in the Pleven plant should be improved and a market study should determine the most marketable products.

The following recommendations are divided - as discussed during the Unido meeting - in three priorities :

V/I Priority I :

- * To get a general impression of all facilities of the plant a detailed lay out, including all aspirators, ventilators and stacks, has to be worked out.
- * Modification and improvement of present aspirators and ventilators with central control host at :
 - core machines
 - core drying facilities
 - core casting machines
 - melting furnaces.

The height of the stacks should not be more than 10 m above ground level, because in case of higher stacks, the emitted pollutants are directly transmitted at the level of housing area.

- * Personal noise protection in areas with high noise level.
- * Replace of fock-trucks by electro driven vehicles.
- * Permanent control of working place conditions and emissions by use of analysing tubes (DRÄGER or equivalent) and photometric measurement device.
- * Personal protection by wearing working clothes and safety protection tools (glasses, respiratory filters etc.) of high standard, quality and function.
- * Considerations on the replacement of resin bound core sand by alternative products.
- * Repair of sand blasting machines by renewing the sealings.
- * Automatic lock at sand blasting machines to increase the time between finishing work and opening of the machine.
- * Regarding to the planned facilities for car wheel rim painting the use of powder coating should be considered.
- * Measurements of soil contamination should be done because of waste management.

V/2

Priority II

- * Separation of plant sections with different operations by high brick walls to decrease dust and noise transmission specially in the area of :
 - core section
 - core drying section
 - core casting section (Pollak machines)
 - counter pressure cast section with use of core
 - welding section (with noise reducing roof)
 - finishing section (with noise reducing roof)

- * Installation of new aspiration and ventilation systems with central control host to collect the pollutants at the place of generation and exhaust them into the atmosphere.

- * Noise reduction device at machines and tools with high noise generation as :
 - saw machines
 - core machines.

- * Transportation and storage of mould and core sand in closed systems and tanks - "no open handling".

- * Permanent control of the waste water treatment facility in respect of the purification efficiency.

V/3

Priority III

- * Installation of emission reducing systems to cut down emissions into the atmosphere in accordance to emission substances and regulations :
 - core section : dust filter.

 - core drying section : adsorption or after burning facility to reduce organic emissions.
heat recovery systems.

core cast section:	dust filter. adsorption or after burning facility to reduce organic emissions.
welding section :	dust filter.
melting section :	dust filter. heat recovery system.
painting section :	after burning units against solvent emissions with heat recovery system.

The height of the stacks should not be more than 10 m above ground level, because in case of higher stacks, the emitted pollutants are directly transmitted at the level of housing area.

- * Automation of product transport between the several stages of production.

VI EXECUTIVE SUMMARY

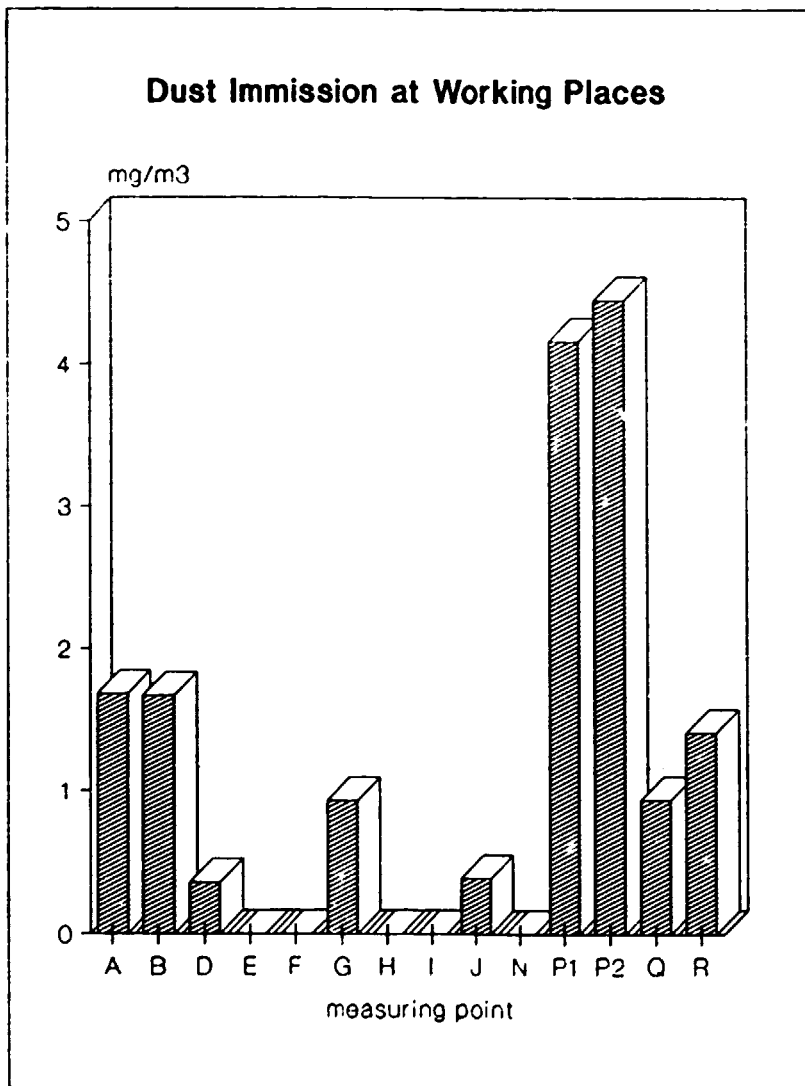
End of August AlpenConsult performed all necessary environmental measurements at the Pleven plant. During the measurements the plant was working with 70 % capacity.

The following graphical survey of the measurements results shows problems especially at the following places :

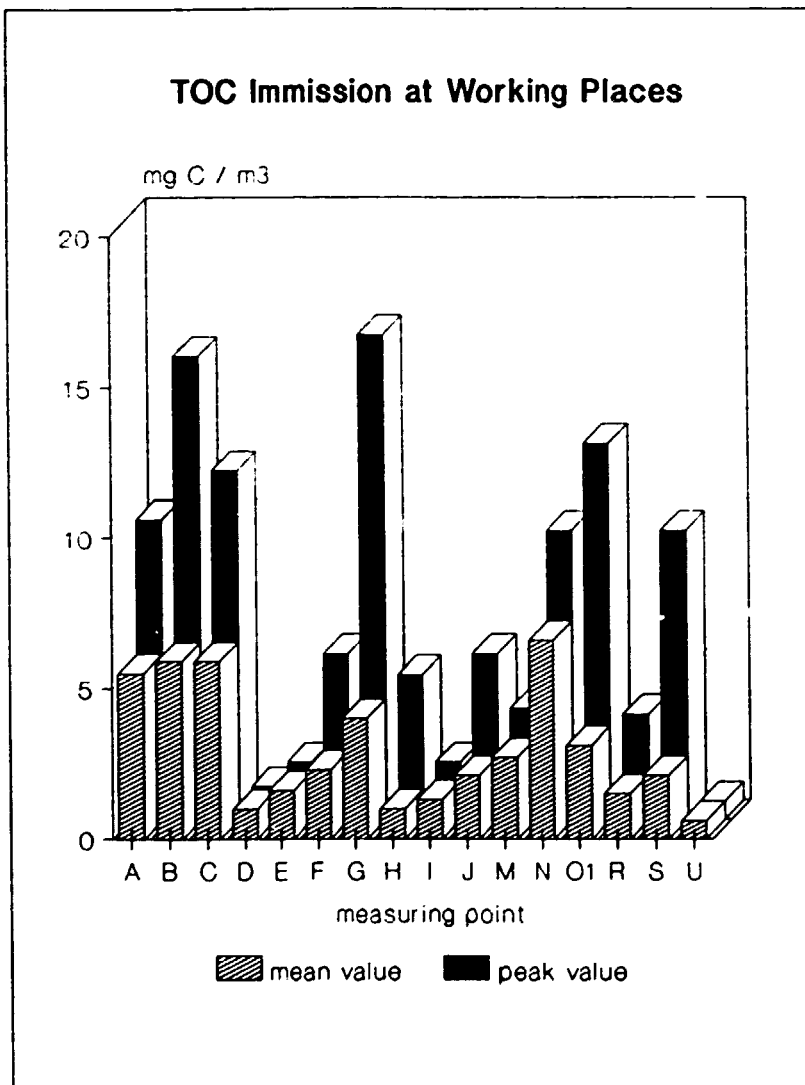
- * cole machines
- * core dryer section
- * product finishing and welding section and
- * in parts of the mechanical workshop.

Graphic survey of the measurement results

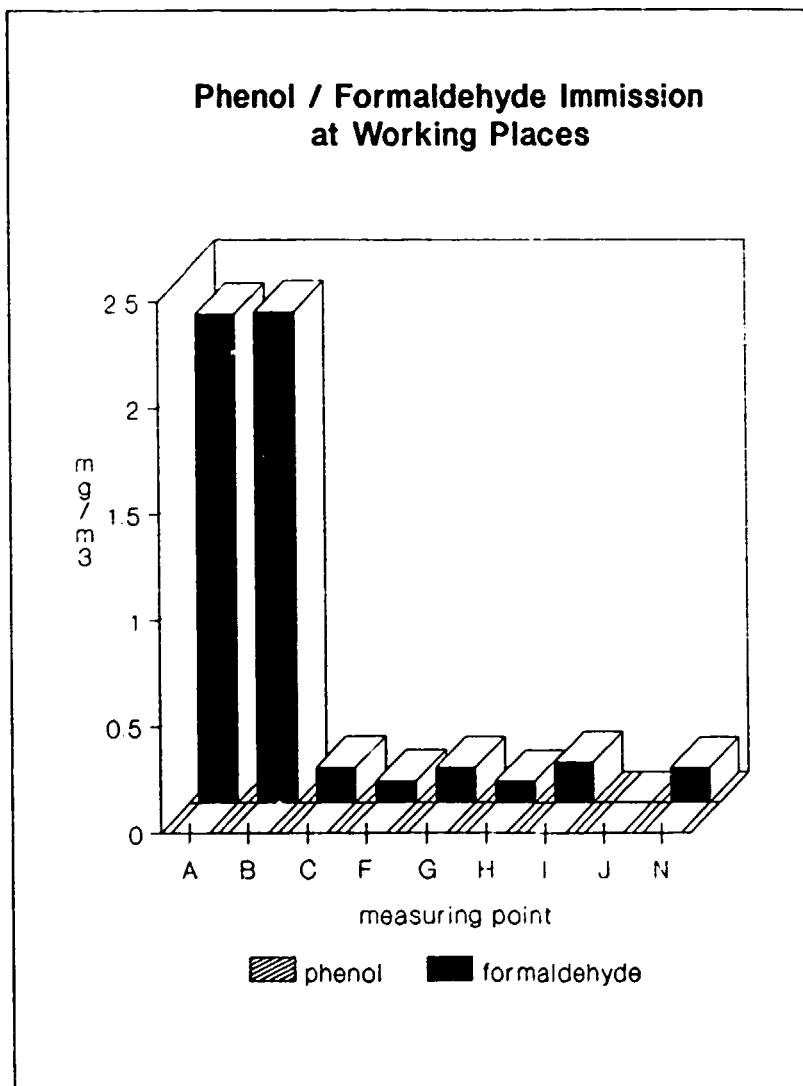
D u s t



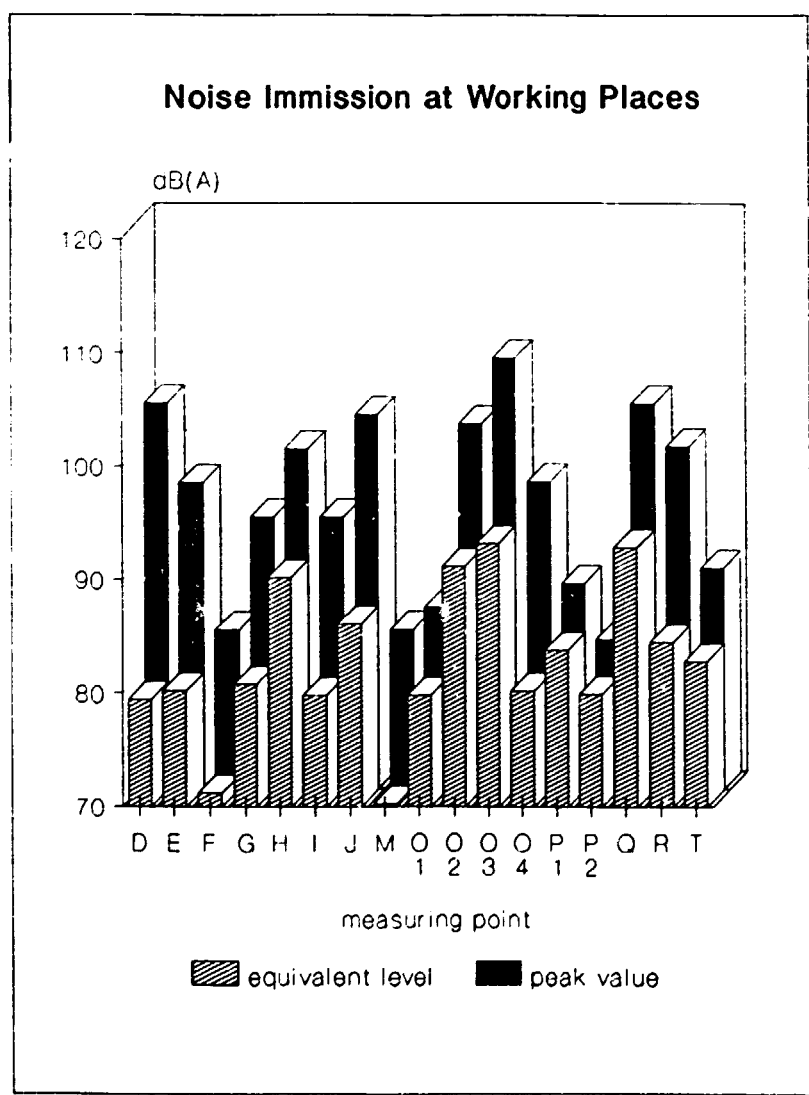
Hydrocarbons (TOC)



Phenol and Formaldehyde



Noise



In Bulgaria and in AlpenConsult-laboratories in Munich and Vienna the members of the bulgarian environmental supporting group were trained in environmental monitoring methods, and they visited together with AlpenConsult a competition plant in Austria (Austria Alu-Guß) and a automotive plant in Germany (MAN).

AlpenConsult supports the recommendations of the Unido-experts found in the Unido-meeting in November 1990. These recommendations (divided in three priorities) are :

Priority I

- * To get a general impression of all facilities of the plant a detailed lay out, including all aspirators, ventilators and stacks, has to be worked out.
- * Modification and improvement of present aspirators and ventilators with central control host at :
 - core machines
 - core drying facilities
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- * Personal noise protection in areas with high noise level.
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- * Personal protection by wearing working clothes and safety protection tools (glasses, respiratory filters etc.) of high standard, quality and function.
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- * Separation of plant sections with different operations by high brick walls to decrease dust and noise transmission specially in the area of :
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core cast section:	dust filter. adsorption or after burning facility to reduce organic emissions.
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The height of the stacks should not be more than 10 m above ground level, because of higher stacks, the emitted pollutants are directly transmitted at the level of housing area.

- * Automation of product transport between the several stages of production.



Dr. Hermann Meisterhofer

21.11.1990

VII

LITERATURE

- Bulgarian regulations concerning working place conditions
- Austrian, Swiss and West-Germany regulations concerning working place conditions
- TA-Luft, Stand 1986
- WHO Guidelines concerning potable water
- Kühn Birett - Merkblätter gefährliche Arbeitsstoffe, Ecomed Verlag
- VDI 2266, Blatt 3
- VDI 2066, Blatt 1
- VDI 2066, Blatt 2
- VDI 2066, Blatt 3
- VDI 2268, Blatt 1
- VDI 3481, Blatt 1 - 3
- VDI 3485, Blatt 1
- VDI 3484, Blatt 1
- VDI 3480, Blatt 1
- VDI 2452, Blatt 1
- Dräger Test-Method
- ÖNORM S 5004
- DEV