2. チェッコ電力庁作成　T／R

TECHNICAL COOPERATION BY THE GOVERNMENT OF JAPAN

1. PROJECT DIGEST

(1) Project Title : Environmental Rehabilitation Programme Focused on PS Melnik

(2) Location : Melnik (near Prague)

(3) -1 Responsible Agency : CEZ (Czech Energy Enterprize)
-2 Executing Agendy : CEZ - EME

(4) Justification of the Project

In the National Energy Programme the Development Project for the PS Melnik - unit No III (500 MWe) occupies the 1st priority in terms of the Czechoslovak Electrical Grid needs, and in the CEZ - Energy Programme the Projects for PS Melnik-stage I and II occupy the 1st priority as far as the needs of the Czechoslovak Capital Prague in heat deliveries are concerned (1260 MW t/h).

The ecological benefits should be seen in: shifting the outputs of the old heating sources in Prague towards covering only peek load, putting a great deal of very old local boiler houses out of operation, achieving significant savings in the total primary fuel consumption and finally reducing the impacts on the environment and people living in the Capital as well as in the Central Bohemian Region.

(5) Desirable Time of Commencement of the Project

According to the new Czechoslovak Clean Air Law it is prescribed to accomplish all the needed rehabilitations within five years, which means for PS Melnik not later then by 1996.

(6) Prospective Funding Assistance

The Japan Grant Aid for undertaking a Feasibility Study on Steps for Desulphurization as well as connected Rehabilitation of the Coal Fired Power Station Melnik.

(7) Other relevant Projects

There is an information of bid invitation process preparation in Chapter No. 3.34 of the Terms of Reference.

Date of elaboration: August 1991

CZECH ENERGY ENTERPRISE
POWER STATION MĚLNIK
277 03 HORNÍ POČAPLY

2 TERMS OF REFERENCE

(elaborated for JICA MISSION 3.-11.9.1991)

Date : 20.8.1991

Presented by: Ing. Josef UHER

Power Station MANAGER

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CHAPTER III CONTENTS OF THE STUDY

CHAPTER I: PURPOSE OF STUDY

1.1. Introduction

This material is presented by the representatives of Power Station Mělník as TERMS OF REFERENCE and should serve as a basic agenda for common dealings with the Japanese mission JICA in the days 3.-11.9.1991 in Prague and in Mělník.
The Mělník power station faces an important task to complete the reconstruction of the energy production and the achievement of the clean environment of the power plant. And this resulted in the necessity to manage a highly exacting investment and reconstruction arrangement. This process requires the sources for financing of investments. The supplying the capital Prague with heat from Mělník power station is under construction and the management continues to negotiate the possibility of foreign capital participation to find the financial means for the implementation of the project. The ecologization of the power station is fixed, the individual actions are technically solved, but the course of realization is not yet decided owing to the lack of financial means,what still remains unclear.

1.1.1. Why the removal of SO_2 and NO_x and other ecological actions at power station Mělník?

- the conversion of Mělník power station to a combined heat and power plant extends the service life of the power station for 30 years at least.
- the new ecological standards charge the power plants operaters of output more than 5 MW_e with the duty to arrange for a desulpurization plant in the next 5 years
- the necessary ecologization of all power station equipment

1.2. Regional relations.

1.2.1. Introduction

Due to its geographical situation and favourable climatic conditions the Mělnik and its surrounding territory belongs to the important agricultural areas of the Czech republic.A long tradition has especially growing of vegetables and vine.

Nevertheless, the vast development of heavy chemical industry and power plants in the 1960s and 1970s had changed the former agricultural character of the region and made int one of the most industrialized area of the country.

The district of Mělnik itself participates with 23% on the industrial production of the whole Middle Bohemian region, being thus far ahead of other districts. The production of power in Mělnik districts makes 10% of the country output.

The big industrial and power producing potential (chémical complex Spolana Neratovice, petrochemical plant Kaučuk Kralupy, power plant EMĚ Horní Počaply, pulp and paper mill SEPAP Štětí).

The Government of the Czech republic defined newly the afflicted regions in the middle of 1990. Substantial part of the Mělnik district was again included among them. An unfavourable trend of the development of ecological factors has several other reasons. The situation of the district between the Prague residential and industrial area and the coal mining region of North Bohemia brings about negative influence on the air quality during most part of the year.

1.2.2. The polluting sources.

The main reason for high content of pollutants in the ambient air is the big concentration of chemical industry and power plants throughout the district, which makes for more than 90% of its overall emissions.

As to the amount of emissions the dominant position belongs to the Power plant Mělník (EMĚ), which is the 4th greatest source of SO_2 and 2nd of fly ash (particulates) in the Czech republic. The Power plant EMĚ together with Kaučuk plant in Kralupy and with Spolana plant in Neratovice are the greatest pollutants of the Middle Bohemian region, coming from the Mělník district (see diagram No 1). Power plant Mělnik is also to a great extent responsible for the pollution of the capital of Prague.

For comparison of the usually measured emissions in various districts of the Middle Bohemian region see diagram No 2,3.

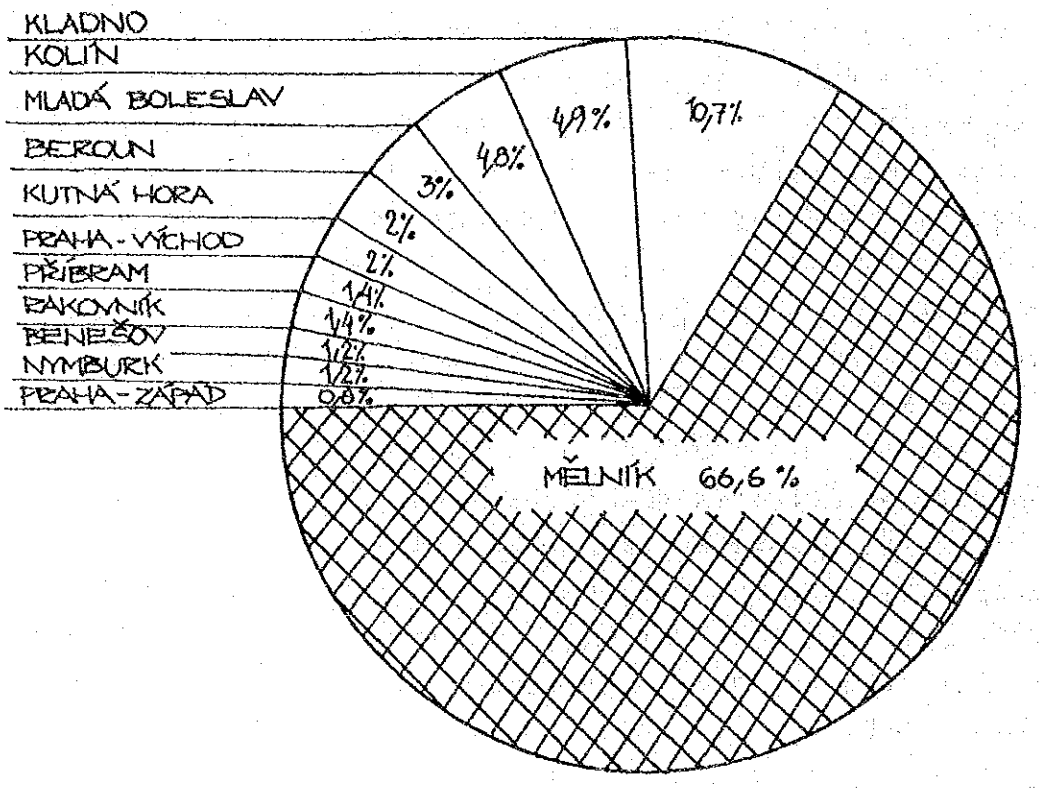
The data gethered in the Register of Emissions and Sources of Air Pollutions (Czech abbreviation - REZZO), which is managed by the Czech Technical Control Board of Air (the Czech abbreviation - ČTIOO), disclose the Mělník district as the second most pollution loaded district in the Czech republic, following the district of Chomutov.

NO. 1

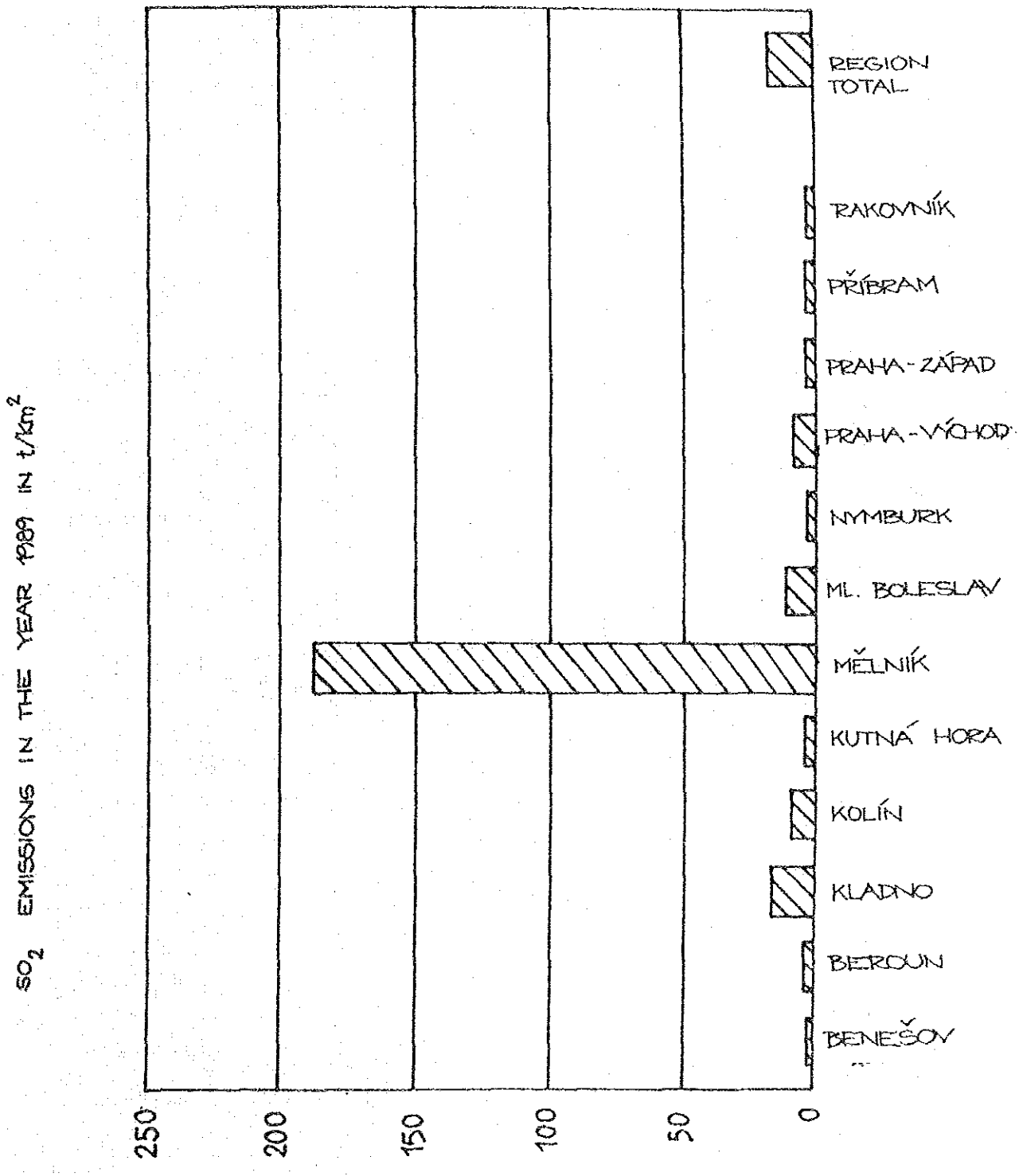
ABSOLUTE EMISSIONS RELATION IN THE REGION OF CENTRAL BOHEMIA IN THE YEAR 1988

DEVIDED ACCORDING TO THE DISTRICTS - EXPRESSED ING %

ACCORDING TO THE INFORMATION OF REZZO 1 - TOTAL OF SO_2 NO_x CO, C_xN_y AND SOLID EMISSON

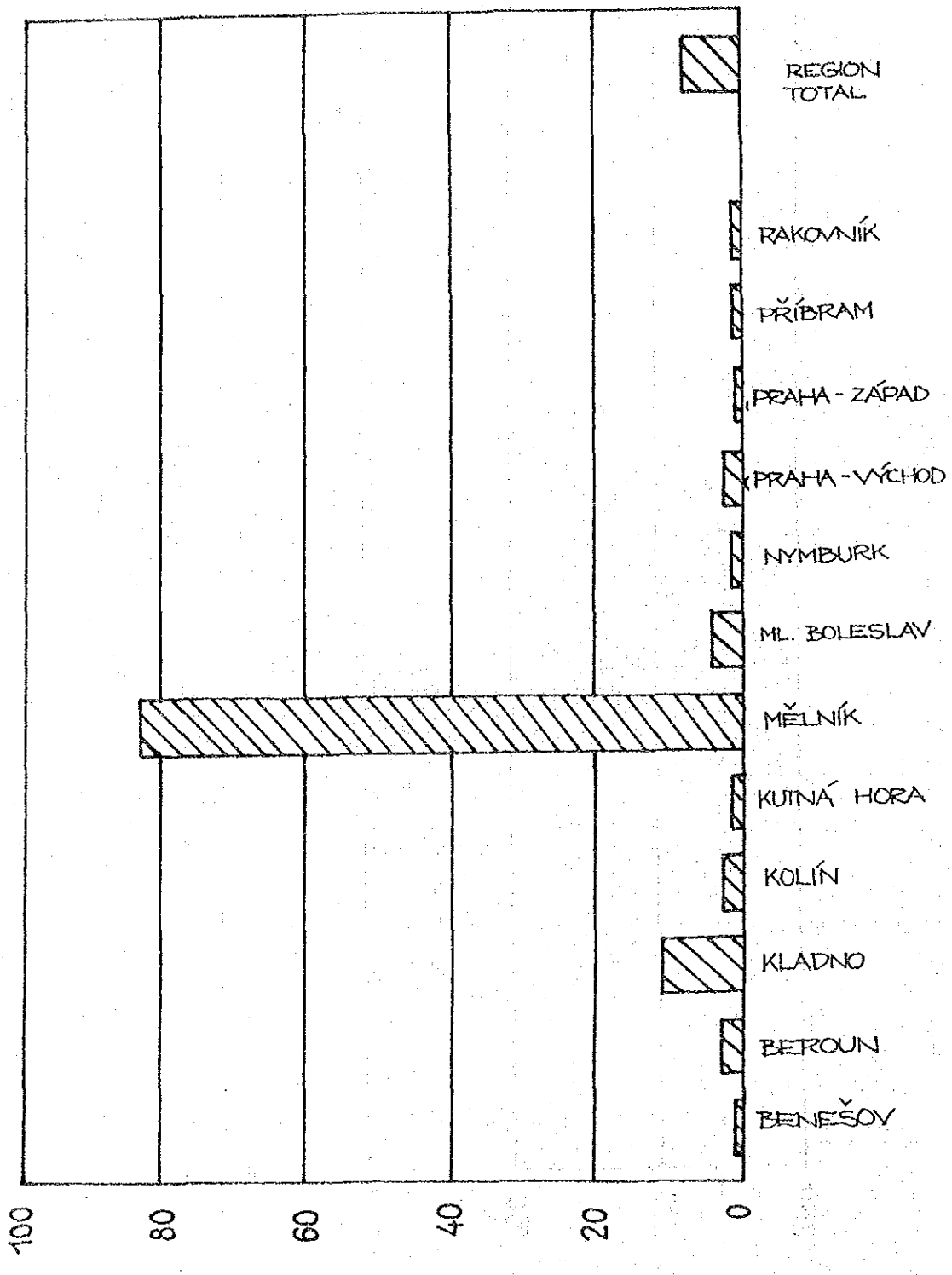


REZZO I INCLUDES ALL THE SOURCES EXCEDING 5 MW_t


SO_2 EMISSIONS IN THE YEAR 1989 IN t/km^2
250
200
150
100
50
0
REGION TOTAL
RAKOVNÍK
PŘÍBRAM
PRAHA-ZÁPAD
PRAHA-VÝCHOD
NYMBURK
ML. BOLESLAV
MĚLNÍK
KUTNÁ HORA
KOLÍN
KLADNO
BEROUN
BENEŠOV

NO. 3

NO_x EMISSIONE IN THE YEAR 1989 IN t/km²



For the comparison see the next table:

succession in CR	district	emissions in 1989/t.year $^{-1}$/ particulates	gaseous	
		total	SO_2	NO_x
1.	Chomutov	27 216	631 283	476 001	144 855
2.	Mělník	40 249	218 478	144 602	63 919
3.	Louny	14 733	227 777	152 405	70 105

On the territory of Mělník district is emitted more than 40% of the particulate pollutants and almost three fouorth of the overall gaseous emissions of the Midddle Bohemians region.

The surface emission rate of the district can be made more evident in comparison with other most important districts of the Middle Bohemian region. To make possible the comparison with other regions the districts of Chomutov and the town of Ostrava are added.

district	surface sq.km	emission rate t/y, sq.km particulate	SO_2	NO_x
Mělník	712	56,5	203,1	89,8
Kladno	692	33,9	25,2	9,6
Ml. Boleslav	1067	4,5	14,4	3,5
Kolín	812	10,8	11,8	2,5
Beroun	662	8,5	10,7	2,6
Chomutov	936	29,1	508,5	154,7
Ostrava - town	215	137,8	212,3	84,3

1.2.3. The state of pollutants concentration in the ambient air.

The massive concentration of industrial and power producing potential causing high air pollution influences unfavourably the ambient air quality on almost all the district territory.

In spite of the fact that most of the district has the character of an open landscape, its climate is districtly influenced by two big invers that flow through the region and create frequent morning fogs, contributing to worsened dissipation conditions, mainly in the morning hours.

The polluting sources of the district has been emitting approx.30 different pollutants. Judged from the point of view of the concentration intensity, the most dangerous are: hydrogen sulphide, carbon disulphide, chlorinated hydrocarbons, methylmercaptan, ethylbenzene, styrene.
These pollutants exceed many times the allowed concentration level in air during periods of unfavourable dissipating conditions. This survey resulted from a dissipation study of pollutant concentrations in air which was worked out by the design and consulting company Chemoprojekt Praha in June 1990. The attached maps show graphic representation of separate pollutants in the called III. stability class at the wind velocity of 1,7 m/s. The III. stability class is characterized by the vertical exchange of air mass.

1.3. Relation to the new legislation.

In June 1990 the Federal Assembly approved the Wastes Law and in July the Ambient Air Protection Law. Within 5 years Czechoslovakia should regain almost clean air and all its dump sites should be cleaned - up. Dangerous chemicals should not threaten the underground and surface water.

According to the Register of Sources of Air Pollutions with the thermal output bigger than 5 MW (REZZO I) the all Czechoslovakia emission of SO_2 reached in 1980 the value of 2697 thousand tons. The approved Ambient Air Protection Law supposes reducing the SO_2 emissions from sources over 5 MW by 85 to 90%. There are about 2500 registered sources above 5 MW according to REZZO I, which are responsible for 87% of the overall SO_2 emissions.

The approved law should enforce installation of desulphuration (FGD) on approx. 10.000 MW before the end of 1996. Estimated budget capital costs would be 100 billion Kčs (Czechoslovak crowns) and at the end of this construction period approx. 20 billion Kčs/y would be needed to cover the running costs, interest on capital and installments.

Considering certain inaccuracy of the linear estimate the Power plant Mělnik would have to ask for or would need to create financial sources approaching the sum of 10 bilion Kčs. The plant is just standing at the very beginning of the flue gas desulphurasition project without any financial resources.

1.3.1. Law measures on air protection in Czechoslovakia.

Table No. 1 pressents a proposal of the specific SO_2 emission limits to be applied on the production of thermal energy, steam and power, which depend on the output of the plant. In addition to the emission limits there is the concept of the minimum efficiency of desulphnurazition process implemented.
Analogically to the limits for SO_2 the emission limits for flying ash were stipulated: Maximum value of 100 mg/cu m (n) by boilers over 50 MW/thermal output/ and 250 mg/cu (n) by boilers from 2 to 50 MW (thermal).

The nitrogen oxides limits are stipulated at the value of 650 mg/cu m (n) counted as the nitric oxide, by coal boilers over 5 MW (thermal) and 200 mg/cu m (n) for gaseous fuels.

At the present time it is important to comment on the European Community emission limits, which are being considered as one of the many assumptions necessary to be fulfilled by Czechoslovakia before entering the EC.

Table No.1 Czechoslovak proposal for SO_2 emission limits on new boiler installations. c)

	Coal		Fuel oils		Gaseous fuels
	emis.lim.(a) (mg.m-3 /n/)	min.FGD efficiency (%)	emis.lim (b) (mg.m-3 /n/)	min.FGD efficiency (%)	emis.lim (mg.m-3/n/)
300 MW_t	500	85	500	85	35
50 to 300 MW_t	1700	70	1700	70	35
5 to 50 MW_t	1700	-	1750	-	35
5 MW_t and less	-	-	fuel oil 1%S	-	35

a) at 8% O_2 content in flue gas, b) at 3% O_2 content in flue gas
c) It is a proposal to be discussed with the legislative authorities of Czechoslovakia

1.4. Relation to the ČEZ programme.

The SO_2 emissions originated from the extensive use of lignite filed Czecholsovakia at the head of SO_2 emitting countries. As CEZ company is the leading producer of SO_2 emissions, it has prepared a project for reducing the existing emissions. The reduction of SO_2 is of both national and international interest. Therefore, an activity schedule has been created in cooperation with the World Bank, including the important power plants, (with the exception of the Power Plant Mělník, see table No.3.)

Table No.3 SO_2 reduction through various projects

	1991	92	93	94	95	96	97	98	99	2000
W.B.										
FGD projects										
ETU II	-	-	-	-	-	22,9	22,9	22,9	22,9	22,9
EPR I	-	-	-	-	29,3	58,6	58,6	58,6	58,6	58,6
EPR II	-	-	-	-	76,0	198,9	189,9	189,9	189,9	189,9
ETU II	-	-	-	-	-	24,4	24,4	24,4	24,4	24,4
(St.by)										
subsummary	-	-	-	-	105,3	296,8	295,8	295,8	295,8	295,8
FGD others	33,6	33,6	33,6	33,6	33,6	67,3	67,3	67,3	67,3	67,3
EPOC				21,2	21,2	63,6	63,6	63,6	63,6	63,6
subsummary	33,6	33,6	33,6	54,8	54,8	130,9	130,9	130,9	130,9	130,9
Reduction of power production										
TU I	51,2	51,2	51,2	76,7	76,7	76,7	76,7	102,3	102,3	102,3
PR I (2 units)	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2
subsum.	82,4	82,4	82,4	107,9	107,9	107,9	107,9	133,5	133,5	133,5
total	-	-	-	-	105,3	299,8	295,8	295,8	295,8	295,8
W.B.project total	116,0	116,0	116,0	162,7	162,7	238,8	238,8	264,4	264,4	264,4
other acitivities total										
activity schedule total	116,0	116,0	116,0	162,7	268,0	534,8	534,8	560,2	560,2	560,2
W.B.project total SO_2 reduction	0,0%	0,0%	,0,0%	0,0%	39,3%	55,3%	55,3%	52,8%	52,8%	52,8%

The reducing of SO_2 emission from the Power Plant Mělník is therefore included among other projects, leading to the SO_2 emission reduction.

The Power Plant Mělník was included in first considerations of the World Bank study (see COST ESTIMATION FOR INSTALLATION OF FGD - EQUIPMENT). Nevertheless it is not included in the schedule and the attention of World Bank is concentrated in the first phase on the North Bohemian region.

APPENDIX I COST ESTIMATION FOR INSTALLATION OF FGD-EQUIPMENT

Assuming that the investment is 240 US$/kW, the foreign part maximum 30% and the domestic part 20% lower than in Europe the following estimation can be done:

PHASE I	PLANT	UNITS	CAPACITY MW	FOREIGN PART	DOMESTIC PART	TOTAL
	Prunerov I		4x110=440	31680	59136	90816
	"each unit		1x110=110	7920	23100	31020
	Prunerov II		5x210=1050	75600	141120	216720
	"each unit		1x210=210	15120	28224	43344
	Tusimice II		1x200=200	30000	5000	35000(MgO)
PHASE II	Tusimice II		2x200=400	28800	53760	82560
	"each unit		1x200=200	14400	26880	41280
	Pocerady		6x200=1200	86400	161280	247680
	"each unit		1x200=200	14400	26800	41280
	Melnik I		6x55=330	23760	44352	68112
	"each unit		1x55=55	3960	7392	11352
	Melnik II		4x110=440	31680	59136	90816
	"each unit		1x110=110	7920	231100	31020
	Ledvice		1x200=200	14400	26880	41280
	Ledvice		2x110=220	15840	46200	62040
	Chvaletice					
	INVESTMENTS PHASE I			137280	148808	286088
	INVESTMENTS TOTAL			338160	625088	963248

The district of Mělník is open and provides opportunities for Japanese financial intentions

II. CHAPTER : BACKGROUND OF STUDY

2.10. Problems connected with the project "Heating energy for Prague from the Power Station Mělník".

2.11. Historical background.

The energy development study for the capital Prague dated 1983 looked for alternative possibilities of heating energy supplies to the northeast part of Prague. The study aimed at solutions which could:

- improve the ecological situation from the ambient pollution view
- improve the energetic efficiency of heating energy system
- improve the reliability of the heating energy supplies

Combined heat and power production in the Power Station Mělník I has been designed for the basic output necessary for the supplies to the district heating network of the northeastern parts of Prague. By full implementation the system will make for several existing heat and power plants (burning coal or gas) supplying district heating networks in Prague and in addition should create sufficient output for extension of those networks, replacing thus the local heat plants in the region.

Project for heating energy supplies Mělník - Praha has been selected from several alternative possibilities and its construction began at the end of 80 s.

2.12. The existing situation.

Part of the project has been abready realized, but due to the leok of oapital resources the construction is now being stopped.

According to the project schedule phase I should be the first four of six 55 MW turbine sets reconstructed and upgraded to 220 MW power output in backpressure turbines and reconstruction of boilers 710 MW thermal energy output.Further on, there should be the reconstruction of boilers the installation of FGD equipment and the upgrading of the control system oarried out so that the operation needs and the ecology demands could be satisfied.
As an alternative to the old boiler reconstruction in the replacement of old boilers by new fluidized bed boilere units (CFB).
The total length of the huge pipeline for the hot water supply from Mělnik to Prague is 50 km. The full transfer capacity of the pipeline is 1260 MW of thermal energy. The energy is destinated for both the heating of residential areas and of industrial plants.

The phase I of the project began in 1987, until nowadays about 30% of total pipeline length has been laid, two of the new steam turbines for the Power plant Mělník I are delivered and two boilers and their auxilliaries are reconstructed.

2.13. The purpose of the project

- the production of heat and power in the existing energy plants (Michle, Malešice, Třeboradice) will be substantially reduced and shifted to the peak demand periods

- the existing district heating networks will be fully utilized

- smaller heating plants on the right bank part of Prague will be dismantled

- new heating energy consumers will be satisfied along the pipeline route

- savings on the primary energy source (fuels) will be brought about by the combined heat and power production

- lower fuel consume in the heating and power plants of Prague implies reduced air pollution and overall ecological load on the citizens of Prague.

2.14. Contribution to ecology

Emmisions of the main pollutants in Prague 3,4,7 a 10 (eastern and northeast parts of Prague) - (%)

	SO_3	NO_x	fly ash	CO
emissions in 1988	100	100	100	100
1. stage of construction	28,4	32,1	65,4	52,0
2. stage of construction	12,9	25,3	42,2	23,2

The load on Prague citizens in expozition units EU:
(EU are defined as the product of nomber of people, time and concentration equivalent to one person, inhaling 1 mg of pollutant in 1 m³ of air during the time span of 1 year).

	fly ash	SO_2	NOx	CO	total
year 1988	37,7	157	175	0,489	370,-
2. stage of constr.	3,99	11,6	48,9	0,067	64,6

2.15. Possibilities for finalizing the project.

As the only way for financing the completion of the project seems to be foreign capital resources.

Common procedure, used by international financial institutions at the decision - making process demands to elaborate and present a feasibility study for checking what will be the economical effectiveness of the project in the condition of market economy on the world market.

To ensure that the feasibility study will be worked out as soon as possible the underlying date on the ZTMP complex (Heating Energy for Prague from Power Station Mělník) together with the analysis of the existing state of the projects construction and with informations about the prices liberalization were sent to the following institutions and companies:

- FICHTNER company
- WORLD BANK - COWI CONSULT 01
- IVO company

Besides a.m. most important negotiations there were established many further informative contacts with representatives of financial and business circles from EBRD, EIB, Foster Wheeler, Holter and others) can be negotiated closer cooperation after the feasibility of the project will be considered.

2.16. Conclusions and recommendations.

As well as athe preceding studies and analyses alsoa the foreign consulting and business companies draw positive conclusions about the affectiveness of the ZTMP project and recommend its completion and setting into operation. The studies confirmed that it is possible to suppose positive effectiveness of the project in contemporary transient economic conditions as well as with world energy prices applied in West European market economy.

1. According to the submitted analyses and conclusions of foreign partners it is economically more profitable to get the project ZTMP completed. They consider the possibility to gain participation of foreign capital for the completion of the project as real one.

2. According to the experience gathered until now the conclusion of final binding contract with foreign company about its financial participation on the ZTMP project is not be expected sooner than at the end of 1991 due to the rather complicated legislative situation in Czechoslovakia. Also the financial means for the project could be released only in the first half-year of 1992.

3. With regard to the revenue situation of ČEZ company it is desirable to minimize the capital resources of ČEZ company expended on the ZTMP project in 1991 and 1992.

This limitation should be applied even at the price of further delay of construction and operation of ZTMP project.

4. The quest for an appropriate foreing financial partner is being forwarded until the end of October 1991.

2.17. Capital cost for completion, interruption, liquidation of the project.

a) Capital cost for completion of the project (price level 1991) - in million Kčs (Czechoslovak crowns)

	total	1991	1992	1993
the total amount needed	3 314,1	1 575,9	1 158,0	580,2
self financing of ČEZ	488,9	158,1	159,5	171,3
associated contributions	152,0	152,0	-	-
bank loan	133,0	100,0	33,0	-
failing financial means	2 540,2	1 165,9	965,7	408,6

b) Capital cost for interruption and conservation of the project include the settlement of costs that has risen until now to all suppliers, conservation of all parts of the project, the maintenance of the construction site etc.:

1991 - 906 million Kčs
1992 - 78 -"-
1993 and following years to millions Kčs

c) The costs of liquidation of the project are estimated at 2.184 millions Kčs.

2.20. Problems of ash deposit treatment plant.

The Power Station Mělnik produces annually about 2 mil.ton of ashes, which are still deposited at the original locality established in the year 1954.But the possibility to deposit ashes at this area ends in the year 1996.
The project of the new ash deposit treatment plant is ready so far, but it represents the occupation of a fertil agriculture land (an area 256 hectare) and represents at the same time an amount of 4 milliard Kčs.
The new law of ecological impacts imposes upon the operators resp.the waste producers the duty to take advantage of the old colliary areas for the deposition of ashes.
And so the Power Station Mělnik is at the beginning of this extensive action which impacts with its consequencies all power station departments and furthermore it is under a time pressure due to the decreasing capacity of the old existing ash deposit area.

2.21. Dry take-off of ash.

As an alternative to complicated and costly construction of a new ash settling pond there is a new idea examined to transport all unutilized ash and slag back to coal pits, from where the coal for EMĚ is mined. The ash should be transported back by the same railway waggons had brought coal to EMĚ. The mining companies agree with backfilling of ash in the exhausted areas of mines. There are now considered the technical problems connested with ecology protection by the back transport of ash.The preliminary show economic and ecological advantage of this alternative.

In case the dry ash transport (2 million t/y) back to the mines will be implemented, there has to be a switch real from the hydraulic take-off of ash from the electric precipitators to a dry pneumatic transport system. The ash would be stored in big central loading silos prior to the transportation. This alternative of dry ash take - off will enable to satisfy the demands on ash for its further economical utilization by other potential consumers, what has been not possible until now.

The investment costs of the dry ash handling system has been preliminary estimated to 1/4 of the investment costs needed for the build up of the new ash settling pond (i.e.approx. 1 billion Kčs).

2.22. Complex of measures for implementation of the dry ash railway transportion:

- reconstruction of the wet take - off to dry take - off of ash
- pneumatic haulage of dry ash into the loading silos
- build - up of the loading silos
- new central compressed air station
- build- up of the new unloading equipment on the mine site and of the equipment for the backfilling of ash in the exhausted mines

2.23. State of preparation.

The project organization Báňské projekty is preparing a special study for the dry take-off of ash from the whole power station Mělník. Its railway vaggons loading, transport and deposit into the coal mines. The company ABB - Flakt is coooperating an the preparation of this alternative.

The problems of practical technology connected with the ecology of this alternative are beind solved, too.
The final decision about the alternative - whether the building of a new ash deposit area ar the ash transportation to the exhausted areas of mines-is to be made until November 1991

2.30. British gypsum factory of plasterboards

It has been decided together with the directorship of Czech Energy Enterprise that one plant of Mělnik Power Station will be provided with the wet flue gas desulphurization system with a special process technology to obtain an end product, high quality crystallic gypsum, which could be utilized by the building material industry.

In the last year the Mělnik Power Station has achieved an agreement with an English company British Gypsum Ltd /BPB/ about the construction of a plant manufacturing gypsum plaster boards in the locality of the Power Station Mělnik. This agreement,design and cooperation between BPB and EMĚ have been approved by Czech Energy Enterprise.It is expected that the production of this plant will reach 80.000-180.000t of gypsum plasterboards per year.

BPB is an international group of companies principally engaged in the manufacture of gypsum-based products and other buildings materials, paperboard and packaging, BPB is the leading plaster board supplier to the world market outside the USA and is one of Britain s top 100 and Europe s top 200 companies.

The final decision about the technology of the wet limestone desulphurization method has to fulfil the BPB requirement about the quality of the gypsum which is the final product of the FGD process.

CHAPTER III: CONTENTS OF THE STUDY

3.10. Description of the existing power plant complex.

Power plant Mělník is a thermal power plant burning the lignite of North Bohemian region. It belongs to the most important and biggest power plants in Czechoslovakia. Its output covers approx. 10% of the power demand in Czechoslovakia.

The plant was built in three stages:
EMĚ I - output 6x55 MW, in operation from 1961
EMĚ II- output 4x110 MW, in operation from 1971
EMĚ III- output 1x500 MW, in operation from 1981

EMĚ was designed and built as condensation power plant with block arrangement of boilers and turbines and with direct river water cooling system, using water of the river Labe. EMĚ III uses for cooling returned cooling water from the plants EMĚ I and EMĚ II.

EMĚ I and EMĚ II supply their power output into the 110 kV distribution grid.
EMĚ III is connected to the superior transmission grid with voltage of 400 kV. EMĚ is used also for frequency control in the power distribution system and its block outputs are quided from the central control room of the national energy system situated in Prague.

Lignite fuel is delivered to EMĚ in railway cars from two inland coal mining districts.
The lignite has very variable quality:
Cower heating value 9 - 11 MJ/kg
ash content 25 - 42 %
sulphur content 0,8-1,5 %

Fuel is delivered to the plant from the distance of 60 to 120 km. Alongside the power plant there is a storage coalyard with the capacity of 1 million tons.
The storage coalyard serves as a balance for irregular and limited deliveries of coal in the winter period.
The annual consumption of coal reaches 6 million tons. EMĚ is equipped by two defrosting halls(each with the capacity for the whole train of coal laden railway cars) that enable free unloading of frozen wagon lads of coal in winter period. The ash from the boilers of EMĚ is precipitated in the electric precipitators and then promped as a water-ash slurry to the ash deposit (dump) situated in the distance of 1,5 km from the power plant. The annual production of ashes makes about 2 to 2,5 million tons. About 80 thousand tons of ash is annualy delivered in dry condition to the plant producing concrete panels. Ash is of good quality and that makes EMĚ to consider further possibilities of utilizing it commercially.

The boilers are started with fuel-oil. In EMĚ I light - fuel - oil is used in annual consumption of approx. 300 tons. Heavy fuel-oil is used for starting boilers of EMĚII and EMĚ III. The annual consumption of heavy fuel-oil makes about 8000 tons. There is enough storage capacity in the plant for both starting fuels.

The main equipment of all three power plants was delivered by inland manufacturers. All turbine sets were manufactured in Škoda works. The boilers were manufactured in different companies:

EMĚ I - Vítkovice ironworks
EMĚ II-First Brno works
EMĚ III-consorcium of First Brno, Vítkovice ironworks and Boiler Works Tlmače.

The electric precipitators were supplied by the ZVVZ Milevsko company. The control and measuring equipment was inland produced, too.

The turbine sets are equipped with impulse stages and incontrolled extractions. Part of the extraction steam is used for heating of water from district heating system of the town of Mělník, heating of the power plant and heating system of the village of Horní Počaply. There is also a small quantity of process steam delivered to the Prefa plant.

The boilers are designed and built as so called granulating, dry bottom boilers. They are drum type in EMĚ I and EMĚ II with natural circulation in the evaporator part. The boiler for EMĚ III is equipped with added forced circulation provided by circulating pumps. The coal grinding mills in EMĚ I are of hammer type, in EMĚ II and EMĚ III the mills are of the so called "fan" type. The boilers in EMĚ I and EMĚ II are two - draught types, while EMĚ III are two - draught types, while EMĚ III boiler is one-draught, co-called tower type.

EMĚIII was equipped with direct coaling with river water as well as with natural draught cooling tower, which should be used in case river water would be warmed - up above 25 deg Centigrade by the return cooling water from EMĚ. The return cooling water pipes from all three power plants of EMĚ are niterconnected.
The feed water makeup is produced by two water treatment plants with the respective capacity of 100 and 70 t/h. EMĚ III has in addition to this a separate package water treatment plant for the full scale treatment of 100% of condensate from the 500 MW turbine condenser. The compressed air for the needs of the power plant is produced in the central compressor station.

There are 1620 people employed in EMĚ, including personal of the schooling and recreation centre. Maintenance in EMĚ is provided partly by its own maintenance division in cooperation with suppliers people, who are responsible mainly for major overhauls and reconstructions or upgrading of equipment. There is a mechanical workshop as part of the maintenance facilities in EMĚ, that provides for renewing of spare parts and manufactures some of them.

3.11. Technical data of the individual plants of Power plant EMĚ.

EMĚ I:	single block output	55 MW
	boiler nominal rating	230 t/h
	live steam pressure	9,32 MPa
	live steam temperature	540°C
	feed water temperature	210°C
	combustion gases quantity	350 000 Nm³/h
	specific fuel consumption on delivered power unit	12,7 GJ/MWh (28.30 %)
EMĚ II:	single block output	110 MW
	boiler nominal rating	350 t/h
	live steam pressure	13,24 MPa
	live steam temperature	540°C
	feed water temperature	225°C
	reheated steam pressure	3,53 MPa
	reheated steam temperature	540°C
	combustion gases quantity	630 000 Nm³/h
	specific fuel consumption on delivered power unit	12,0 GJ/MWh (26.99 %)
EMĚ III:	single block output	500 MW
	boiler nominal rating	1670 t/h
	live steam pressure	17,45 MPa
	live steam temperature	540°C
	feed water temperature	230°C

reheated steam pressure	4,27 MPa
reheated steam temperature	540°C
combustion gases quantity	3 088 800 Nm³/h
specific fuel consumption on delivered power unit	11,7 GJ/MWh (92,5%)

3.20. The reconstruction of the power station equipment with relation to the extension of the power station service life.

The Czech Energy Enterprise is in the stage of gradual recostructualization of electric energy sources. There is an evolution of nuclear power stations that successively cover the consumption of the electric energy increase and in the same time they push back the coal fired power stations. Accordingly the Czech Energy Enterprise has worked out a special programme to suppress the electric energy production in the coal fired power stations. The gradual shutting down of steam units is taking place especially in the Northern Bohemia, where is the highest emission concentration.

Originally the Power Station Mělnik was included in the scope of these projects and its units should be gradually closed down at the end of their service - life.
But in the new conception of ČEZ some of the remaining coal fired units are to be converted to the combined heat and power plants. The aim of this action is to meet the demand of ecological improvement of the living invironment within the towns and villages, that will get the heat supply from these sources. Furthermore it will bring the energy efficiency increase due to the convertion to combined heat and power production.

The power station Mělnik has been selected and included in the scope of those projects as a heat feeder to Prague and other places close to the power station.
Necessary adaptations of individual plants for the service life extension of the existing equipment.

3.21. Power Station Mělnik (EME I)

The present situation - the technology is at the margin of its service life. The turbines, the boilers and the coal handling plant are worn down. As the stage I of the power plant is to be converted to the heating plant in will gain another 25 - 30 years of service life. Ale the buildings with the production technology will remain without any particular change.

Following power units are to be adopted completly:

- 6 condensing turbines 55 MW each, will be replaced by 4 heat turbines
  2 back pressure turbines - each with output 55 MW
  2 extraction turbines with regulated extractions each 55 MWe
  These turbines will process the steam from all six boilers.
- generators - after the overhaul the generators remain original, there is no change in the electric ouput of the turbosets
  The electric output of EMĚ I will decrease from existing 330 MWe to 220 MWe and 600 MWt for the heating due to couvertion to the combined heat and power production.

- the boilers - the basic supporting structure will remain, the modification will be applied to the heating tubes, mills, fans-the boilers will be provided with the new slag removing equipment and the water seal.

This modification will improve the technical quality of the boilers and will increase the combustion efficiency.

There are 2 alternatives to match the standard emission limits:

a) The actual overhaul of the boilers provided additionally with the efficient desulphurization project and the NO_x removal through the innovation in the combustion process.

b) To solve the problem with the installation of the fluidized bed boilers, which in the same time comprise the reduction of SO_2 emission and NO_x removal. This alternative is now carefully checked and the German company Fichtner will prepare an analysis and comparison between the modification of the boilers with the desulphurization method and the replacement by the new fluidized bed boilers.
The simple overhaul of the boilers has been allready carried out on two blocks and the third one is under construction. In the case that the alterenative with the fluidized bed boilers will be selected, the replacement will take place at the units No 6. The reconstruction of units No 1-4 will willow.
With the reconstruction of the boilers is also connected the replacement of the electrostatic precipitators, which are worn down and do not comply any more with the new ecological standards. The precipitators will be replaced at all events, it is for both alternatives a) and b).

Switch yards - 0,4 kV, 6,0 kV and 110 kV
All switch yards are at the end of their service -life and are under reconstruction at this time. The modification of these equipments are 50% ready. Even the block transformers are replaced.

- Coal handling plant - The large belt conveyer coal transportation is also at the end of the service life after 30 years of running. There are plans for gradual renovation of belt conveyers since the year 1992. The convertion project is allready prepared.

- Chemical water treatment plant- It serves for the equipment of EMĚ I and II and approches to its viability. The output of it is 100t/h. After the year 1994, this equipment will be replaced by a new plant attached to the chem.water treatment plant of EMĚ III and the original one will be cancelled.

- Measurment and control system - A complete replacement of these systems is included in the scope of the technology modification.

3.22. Power Station Mělnik II - 4x110MW.

This power plant was never seleoted in the scope of the coal fired power plants to be closed down and theritore it will be reconstructed even if the heating supply for Prague will not be realized.

The reconstruction will start in the year 1994 with the unit No 9 and other 3 units will be gradually modified. This reconstruction is supposed to end in the year 1999. All the buildings of the Power station EMĚ IIwill remain unchanged, only the technological equipment is to be replaced.

The scope of the reconstruction of individual aggregates:

- Turbines - All the turbines will be gradually replaced by the new turbosets with regulated steam extraction for the heat supply to Prague which will represent 600 MWt. The electrical output of the power station II will be reduced from existing 440 MWe to 280 MWe.

- Generators - will remain after the overhaul in original state.

- Boilers - The pressure parts of the boilers will be replaced by the new pressure system on a higher technical level to assure the peak combustion efficiency and the relialibity.
  The basic supporting structure will remain. For the SO_2 emission reduction it is supposed to install a desulphurization plant either the wet limestone desulphurazition method or the regeneration method with the SO_2 final product to be used in the chemical industry.
  The electrostatic precipitators are completely new on all the boilers and fulfil the requirement of ecological standard limits. For the installation of FGD is not necessary any reconstruction of these precipitators.
  There was an alternative to solve this problem with the installation of the fluidized bed boilers. But the negotiation had no effect, first of all because of a small space in the boiler house EMĚ II.
  In the scope of the renovation it comes in to consideration also the amendment of electrical switch yards 0,4 kV, 6,0 kV and 110 kV. The measurement and control systems are to be replaced by the equipment on a higher technical standart.

- Coal handling plant - The renovation of the belt conveyer transport is being prepared as the old one will be in 1994 at the end of its service life.

Heat outlet from EMĚ II

Heat outlet is prepared in 2 alternatives:

a) Block No 9 and 10 will be connected by a steamduct to the heat exchanger station for Prague and steam will be supplied to cover the lack of heat from EMĚ I just to keep the necessary output 600 MWt for Prague (stage No 1).

b) In the years 1996-98 the technology EMĚ II will be completed with heat exchangers and the steam from EMĚ II turbines will be the second stage of the heating supply to Prague. In this way the heat output for Prague will be increased to 1200 MWt and so will be assured the maximum economical efficiency of the heating reote to Prague.

3.23. Mělnik Power Station III - 1x500 MW.

EMĚ III is a modern energetic block in a good condition with a long service life. One does not suppose any larger overhaul during its operation, only an usual maintenance will be needed.
The emission reduction will be realized by the installation of a desulphurization plant (probably wet limestone desulphurization method) NOx removal is to be arranged through the realization of primary measures, which represent a special modification of the combustion process.
A special arrangement is also under action to prepare the possibility of steam extraction from 500 MW unit to cover eventual drop out of steam supply from power stations I and II.

3.30. Power station property according to the balance

Balance of assets and debits of Power Station Melnik in mil. Kčs

Item /year	real.to 31.12.89	real.to 31.12.90	plan 31.12.91
Foundation means.	5277.6	5325.1	5430.2
Rectifications	-2894.0	-3087.8	-3353.8
Investment	11.6	20.7	14.2
Accepted part payments	47.6	55.6	0.0
Money, stamps	18.1	21.0	3.5
Outstanding debts	5.0	-37.3	177.4
Other claims	-29.9	0.0	0.0
Reserves	236.4	313.8	313.8
NPO	0.0	0.0	0.0
Deliveries and	26.0	0.0	49.9
ASSETS TOTAL	2698.4	2611.1	2635.2
Basic property	2515.1	2515.1	2515.1
Issued obligations	0.0	0.0	0.0
Fonds	27.3	0.8	0.5
Time differentiation	30.0	-24.7	1.0
Constant debits	1.3	-16.0	4.0
Bank credits	60.3	47.8	47.4
Current year profit	26.0	16.6	33.3
Undistributed last year profit	0.0	0.0	16.6
Investment debits sphere	7.5	9.8	0.0
Other sources	30.9	61.7	17.3
DEBITS TOTAL	2698.4	2611.1	2635.2

3.31. CALCULATION SHEET OF ELECTRIC ENERGY PRODUCTION-EMĚ I

in thousand Kčs

Index	MJ	Real. 1989	Real. 1990	Real. 1991
1.Power production	MWh	1 514 160	1 433 790	908 920
2.Internal energy consumption	MWh	137 113	128 892	81 877
3.Supply of energy	MWh	1 377 047	1 304 898	827 043
4.Energy consumption in fuel	GJ	17 336 711	16 319 649	10 393 318
5.Energetic fuel	th Kčs	278 358	300 237	290 029
6.Material	"	1 465	1 245	2 711
7.Wages	"	8 955	8 147	7 034
8.Water	"	63 975	62 287	37 556
9.Repairs and maintenance	"	76 632	53 581	129 998
10.Depreciations of basic property	"	18 228	15 411	16 169
11.Other expenses	"	8 883	8 686	13 297
12.Overhead expenses total	"	5 292	7 664	6 811
Ontput proper expenses	th Kčs	461 788	457 258	503 605
Unit proper expenses	Kčs/MWh	335.35	350.42	608.92

3.32. CALCULATION SHEET OF EL.ENERGY PRODUCTION-EMĚ II

in thousand Kčs

Index	MJ	Real. 1989	Real. 1990	Plan. 1991
1.Power production	MWh	1 563 100	2 076 470	2 115 167
2.Internal energy consumption	MWh	137 997	175 382	176 425
3.Supply of energy	MWh	1 425 103	1 901 088	1 938 742
4.Energy consumption in fuel	GJ	17 327 916	22 789 652	23 202 959
5.Energetic fuel	th.Kčs	271 431	401 959	630 804
6.Material	"	2 158	1 783	5 973
7.Wages	"	10 862	10 663	12 294
8.Water	"	55 871	72 811	74 552
9.Repairs and maintenance	"	140 812	115 371	148 809
10.Depreciations of basic property	"	56 709	52 768	68 195
11.Other expenses	"	8 844	9 661	15 714
12.Overhead expenses total	"	10 718	20 631	23 512
Ontput proper expenses	th.Kčs	557 405	685 647	979 853
Unit proper expenses	Kčs/MWh	391.13	360.66	505.41

3.33.CALCULATION SHEET FOR DISTRIBUTION AND SUPPLY OF HEAT ENERGY - EMĚ III

on thousand Kčs

INDEX	MJ	Real. 1989	Real. 1990	Plan 1991
1.Heat production in boiler house	GJ	x	x	x
2.Internal energy consump. and losses	GJ	x	x	x
3.Heat supply	GJ	9 502	0	20 000
4.Energy consumption in fuel	GJ	12 224	0	25 070
5.Energetic fuel	th.Kčs	85	0	420
6.Material	"	11	11	8
7.Wages	"	55	49	13
8.Water	"	2	0	3
9.Repair sand maintenance	"	161	800	62
10.Depreciations of basic property	"	581	536	155
11.Other expenses	"	41	40	91
12.Overhead expenses total	"	111	138	49
Output proper expenses	th.Kčs	1 047	1 574	801
Unit proper expenses	Kčs/GJ	110.19	x	40.05

3.34. CALCULATION SHEET FOR DISTRIBUTION AND SUPPLY OF HEAT ENERGY - EMĚ I

in thousand Kčs

INDEX	MJ	Real. 1989	Real. 1990	Plan 1991
1.Heal production in boiler house	GJ	x	x	x
2.Internal energy consump. and losses	GJ	x	x	x
3.Heat supply	GJ	932 157	957 823	920 000
4.Energy consumption in fuell	GJ	1 120 679	1 145 603	1 100 168
5.Energetic fuel	th.Kčs	7 678	8 693	15 897
6.Material	"	81	69	251
7.Wages	"	1 075	1 003	1 262
8.Water	"	124	126	179
9.Repairs and maintenance	"	5 647	3 035	14 900
10.Depreciations of basic property	"	4 955	5 167	5 862
11.Other expenses	"	2 820	3 052	6 918
12.Overhead expenses total	"	1 046	1 768	2 064
13.Extra products	"	- 942	- 809	- 977
Output proper expenses	th.Kčs	22 484	22 104	46 356
Unit proper expenses	Kčs/GJ	16.57	14.31	37.35

3.35. CALCULATION SHEET FOR DISTRIBUTION AND SUPPLY OF HEAT ENERGY -EMĚ II

in thousand Kčs

INDEX	MJ	Real. 1989	Real. 1990	Plan 1991
1.Heat production in boiler house	GJ	x	x	x
2.Internal energy consump.and losses	GJ	x	x	x
3.Heat supply	GJ	152 802	179 228	380 000
4.Energy consumption in fuel	GJ	194 485	223 781	472 684
5.Energetic fuel	th.Kčs	1 930	2 896	8 698
6.Material	"	19	22	125
7.Wages	"	101	121	247
8.Water	"	15	17	42
9.Repairsand maintenance	"	1 238	1 183	2 648
10.Depreciations of basic property	"	414	456	1 114
11.Other expenses	"	419	376	1 698
12.Overhead expenses total	"	81	200	398
Output proper expenses	th.Kčs	4 217	5 271	14 970
Unit proper expenses	Kčs/GJ	27.60	29.41	39.39

3.36.CALCULATION SHEET OF ELECTRIC ENERGY PRODUCTION-EMĚ III

in thousand Kčs

Index	MJ	Realization 1989	Realization 1990	Plan 1991
1.Power production	MWh	2 007 260	348 900	2 383 422
2.Internal energy consumption	MWh	108 442	17 791	124 254
3.Supply of energy	MWh	1 898 818	331 109	2 259 168
4.Energy consumption in fuel	GJ	21 903 457	3 793 256	25 954 036
5.Energetic fuel	th.Kčs	342 682	67 248	700 700
6.Material	"	2 184	2 795	6 873
7.Wages	"	11 415	10 314	12 787
8.Water	"	4 114	785	13 318
9.Repairsand maintenance	"	36 211	187 596	61 301
10.Depreciations of basic property	"	132 863	128 343	155 186
11.Other expenses	"	11 834	11 410	45 125
12.Overhead expenses total	"	24 673	33 955	48 801
Output proper expenses	th.Kčs	565 976	442 446	1 044 091
Unit proper expenses	Kčs/MWh	298.07	1 336.25	462.16

3.40. Power plant goals in elimination of SO_2,NOx and fly ash.

The state and development of pollutant emissions from the Power plant Mělník can be seen on tables No 1 adn No 2 - see chapter 3.50.

The principles of the solution of emission reducing are derived from the suggested provisions in execution of an Ambient Air Protection Law.

3.41.Particulates emissions.

These emissions have not been monitored yet . They are defined by calculation only.

Goals: innovation of electric precipitators by replacing old mes by the most modern types.

EMĚ III - the innovation has been carried out already, reducing of particulate emissions depends now only don high quality maintenance.

EMĚ II - the inovation was carried out in 1990 already, now reducing of particulate emissions depens on high quality maintenance.

EMĚ I - new electric precipitators shall be installed, bids on their delivery are evaluated at present, beginning of execution period of the project - 1994 end of orecution period - 1998 (related to the time schedule of ZTMP project.

Ash settling pond - dust nuisance of its dried banks was eliminated in 1990 now improvements in the operational management, construction of new dams and monitoring service of polluting in the area have to be implemented.

3.42. NOx emissions.

These emissions have not been monitored yet. They are defined by calculation.

Goal : reaching emission value of 300 mg/Nm^3 max. value (the goal representing reduction by approx. 60 %.)

Goal solution: exclusively by primary measures - improvements in the combustion process.

The execution of these measures was ordered in 1990 at the First Brno company (Czechoslovakian cooperation with foreign companies) for boileres of the power plant EMĚ II (4x110 MWe) and of the power plant EMĚ III (1x600 MWe). The execution of the project is scheduled in the period 1994-1997.

The procedure of deNOx measures for boilers in the power plant EMĚ I has not been established yet. The decision is related to the time schedule of the ZTMP project.

3.43. SO_2 emissions.

The new law provisions related to the emission limits have to be implemented within 5 years. The implementation of FGD process in the power plant Mělník is inevitable.

The emissions of SO_2 have not been monitored yet, either. They are defined by calculation from the sulphur content in the fuel.

Goals:
- reaching emission limit of 500 mg/Nm^3 max. value
- finding utilization of the FGD product
- keeping the capital costs and operating costs (fixed and variable) as low as possible
- finding the most advantageous space arrangement for the FGD equipment

The emission limit of 500 mg/Nm³ can be reached by every FGD method used (with the exception of the dry addative method). The final products of FGD can be utilised in the area:

gypsum - processed by BPB British Gypsum
SO_2 - in the chemical complex Spolana Neratovice

There was a preliminary agreement reached about the take - off of SO_2 between the Power plant Mělnik and Spolana Neratovice company at the beginning of 1991.
The method with the final product SO_2 presents more favourable producing costs.
There is enough place on the site build either process in EMĚ. Both processes could be applied for FGD in EMĚ II and EMĚ III the FGD in EMĚ I can be solved by the installation of fluidized bed boilers im relation with the ZTMP project.

3.44. Contemporary situation of calls and bids

There are calls for bids on the wet limestone method placed at present.
Following preliminary bids are at disposal:

from the company:	process:
SGP - VA	Mitsubishi
Wagner-Biro	Geesi-Ifo
Babcock	Hitashi
CHepos (Czechoslovakia)	Chiyoda CT - 121
CHepos (Czechoslovakia)	KRC
Vitkovice (Czechoslovakia)	Bischoff (Joy Technologies)
Mitsui	Mitsui

The FGD method producing SO_2:
there were discussions with. UNION CARBIDE Calgary - process CANSOLV/LAVALIN (thermically recoverable organic amines are used for washing process).

Bids on fluidized bed boilers came from:
Babcock/First Brno Works
EVT/Vitkkovice Steel Works
Lurgi/ Boiler manufacturing company Tlmače

3.45. General information.
No final decision about the FGD conception has been made as yet. There are not sufficient financial means at disposal. The development schedule of Power plant Mělník suggest the execution of the FGD projects in the period 1993-1996.

3.50. Reality and assumptions (before and after).
Tab.1 REAL YEAR EMISSION OF HARMFUL SUBSTANCES.

in the years 1981 - 1990

oonsump. Sulphur			emission	emission	emission	duty
year	coal in coal		ash	SO_2	NO_x	total
	<ton >	S^r <%>	<ton >	<ton >	<ton >	Kčs
1981	5694650	1,39	38783	155904	21924	13907830
1982	5561522	1,32	51120	146119	21412	12392904
1983	6257999	1,04	72423	122681	24093	13352220
1984	6855754	1,05	47764	127321	23395	18211772
1985	5721529	0,99	38562	111418	22028	10594245
1986	6429480	1,05	25683	126502	24753	6761070
1987	5904680	1,03	25601	113969	22733	6076280
1988	6215609	0,91	36184	105410	23931	8531600
1989	5337860	0,99	30274	108539	20551	7327740
1990	4131300	1,01	13449	79252	16711	6132140

Tab.2 PRESUMED EMISSION DEVELOPMENT

during the gradual realiziation of retaining measures in the individual plants of power station (recounted according to the coal consumption 6 mil. t/year).

year	emission					
	ash		SO_2		NO_x	
	<ton>	<%>	<ton>	<%>	<ton>	<%>
1993	19534	100	115108	100	24272	100
1994	17659	90	115108	100	23120	95
1995	17659	90	115108	100	17356	72
1996	12558	64	78657	68	16204	67
1997	12558	64	78657	68	15052	62
1998	7457	38	42206	37	15052	62
1999	7044	36	5755	5	12706	52(A)

3.51. Reality and assumptions (commentary)

Commentary to the table No 2 -Presumed emission development

1. Presumed time-course of the realization of measures for reduction of emission quantity:

a) Desulphurization

		output(e)	output total(e)
1996 -	desulphurization EMĚ 3 (gypsum)	500 MW	500 MW
1998 -	-"- EMĚ 2 (regenerative)?	440 MW	940 MW
1999 -	-"- EMĚ 1 (depends on Heat energy for Prague)	330 MW	1270 MW

b) EMISSION REDUCTION NO_x

1994 -	Unit No 1 EMĚ 2 type "A"	110 MW	110 MW
1995 -	Unit No 2 EMĚ 2 and 3 type "A"	610 MW	720 MW
1996 -	Unit No 3 EMĚ 2, type "A"	110 MW	830 MW
1997 -	Unit No 4 EMĚ 2, type "A"	110 MW	940 MW
	- EMĚ 1 depends on the Heat energy for Prague, in positive case		
1999 -	EMĚ 1, type"B"	330 MW	1270 MW

c) ASH EMISSION REDUCTION

1996 -	desulphurization EMĚ 3	500 MW	500 MW
1998 -	-"- EMĚ 2	440 MW	940 MW
1994 -	reconstruction of electrostatic precipitators for B 5,6 (EMĚ 1)	110 MW	
1996 -	-"- for B 1,2 (EMĚ 1)	110 MW	
1998 -	-"- for B 3,4 (EMĚ 1)	110 MW	
1999 -	desulphurization EMĚ 1	330 MW	1270 MW

2. General assumptions and explanations:

- For basis have been taken emissions in the year 1990, recounted to the quanety of 6 mil. ton fired coal, which represents the maximum of the year consumption

- the efficiency of FGD is 95% (min.)

- ash emission reduction with FGD about 50% (min)

- ash emission reduction after the reconstruction of electrostatic precipitators (EMĚ 1) to 83% (600 mg - 100mg/m^3

- NO_x emission reduction through the primary measures type A - boiler s adaptation - 57% (700 mg-300 mg/m^3)

Type B - modification of the combustion process without boiler s adaptation - 29% (700 mg-500 mg/m³)

- the arraugement for emission reduction EMĚ 1 depends on the final decision about the Heating plaut for Prague. With the positive decision one can suppose a faster realization

- NO_x removal of 57% the concentration reduction from 700 mg to 300 mg/m³ of waste gases.

3.52. Pressumed development of the Power Station Mělnik part in the imissions to Mělnik and Neratovice

a) IMISE SO_2 (year average) x/

emission EMĚ		MĚLNÍK			NERATOVICE		
		immis.tot.	part from EMĚ		immis.tot.	part from EMĚ	
year	<%>	ug/m³	ug/m³	%	ug/m³	ug/m³	%
1990	100	80,31	16,1	20,0	45,93	6,2	13,5
1996	68	75,1	10,9	14,5	43,9	4,2	9,6
1998	37	70,1	5,9	8,4	42,0	2,3	5,5
1999	5	65,0	0,8	2,3	40,0	0,3	0,8

b) IMISE NO_x (year average) x/

emission EMĚ		MĚLNÍK			NERATOVICE		
		im.tot.	part from EMĚ		im.tot.	part from EMĚ	
year	<%>	ug/m³	ug/m³	%	ug/m³	ug/m³	%
1990	100	19,57	7,4	37,7	17,39	3,6	20,7
1994	95	19,1	7,0	36,5	17,2	3,4	19,8
1995	72	17,5	5,3	30,3	16,4	2,6	15,9
1996	67	17,1	4,9	28,7	16,2	2,4	14,8
1997	62	16,8	4,6	27,4	16,0	2,2	13,8
1999	52	16,0	3,8	23,8	15,7	1,9	12,1

x/ The Material has been provided by the District hygienic Institution.

3.53. Tab. 1 A Recompense for emissions in the years 1981 - 1990

year	recompense in Kčs
1981	4 857 351
1982	-
1983	2 413 960
1984	8 597 265
1985	31 693 926
1986	22 160 361
1987	26 847 787
1988	28 012 520
1989	29 375 784
1990	11 568 414

3. Questionnair 回答

MELNIK POWER STATION

1) Location.

2) General layout.

3) Organization and staff allocation.

4) Operation and maintenance system.

5) Capacity and system output performance.

6) Actual performance and future plan of the distribution and supply of heat energy.

7) Main equipment layout of power house.

8) Specification of main equipments.

9) Flow diagram of coal, water, steam and air.

10) Water treatment system and site drainage system.

11) Temperature and flowing water amount of the river near by.

12) Ash disposal system.

13) Air quality monitoring system in the power plant and nearby.

14) Air flow rate and wind direction around the Melnik power plant.

15) Concentration of SOx, NOx and solid particles in the power plant and nearby.

16) Emission quantity of solid particles, SOx, and NOx.

17) Coal quality (Proximate analysis, ultimate analysis and chlorine content) and quality control measures.

18) Consumption amount, price, supply source and transportation method of coal.

19) Generation cost and basis for the calculation.

20) Claims raised by inhabitants.

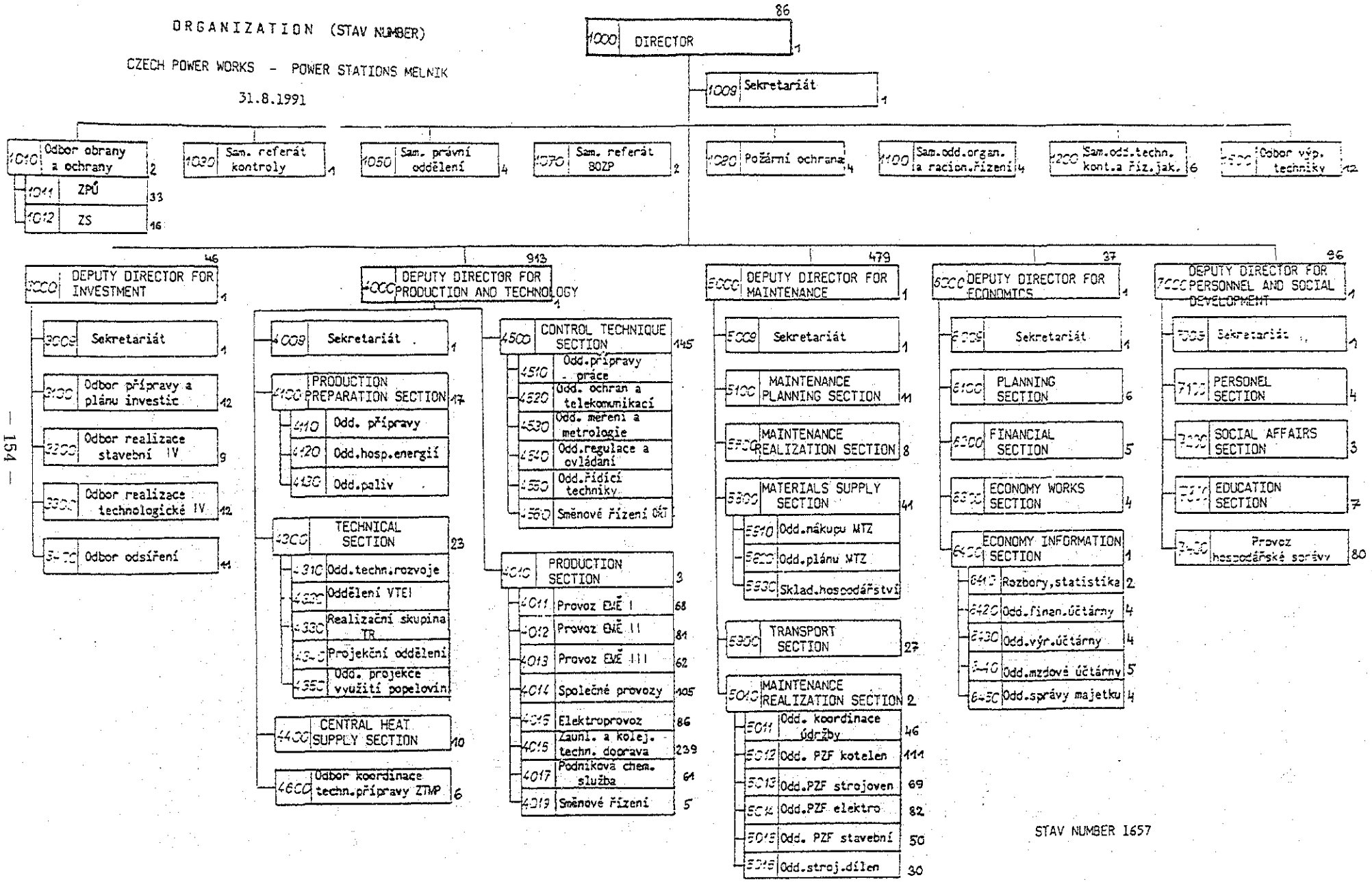
21) Rehabilitation and replacement plan.

22) Possible measures for environment protection assisted by JICA

ORGANIZATION (STAV NUMBER)

CZECH POWER WORKS - POWER STATIONS MELNIK

31.8.1991



STAV NUMBER 1657

Point 4

Organisation of Division of maintenance

Deputy manager

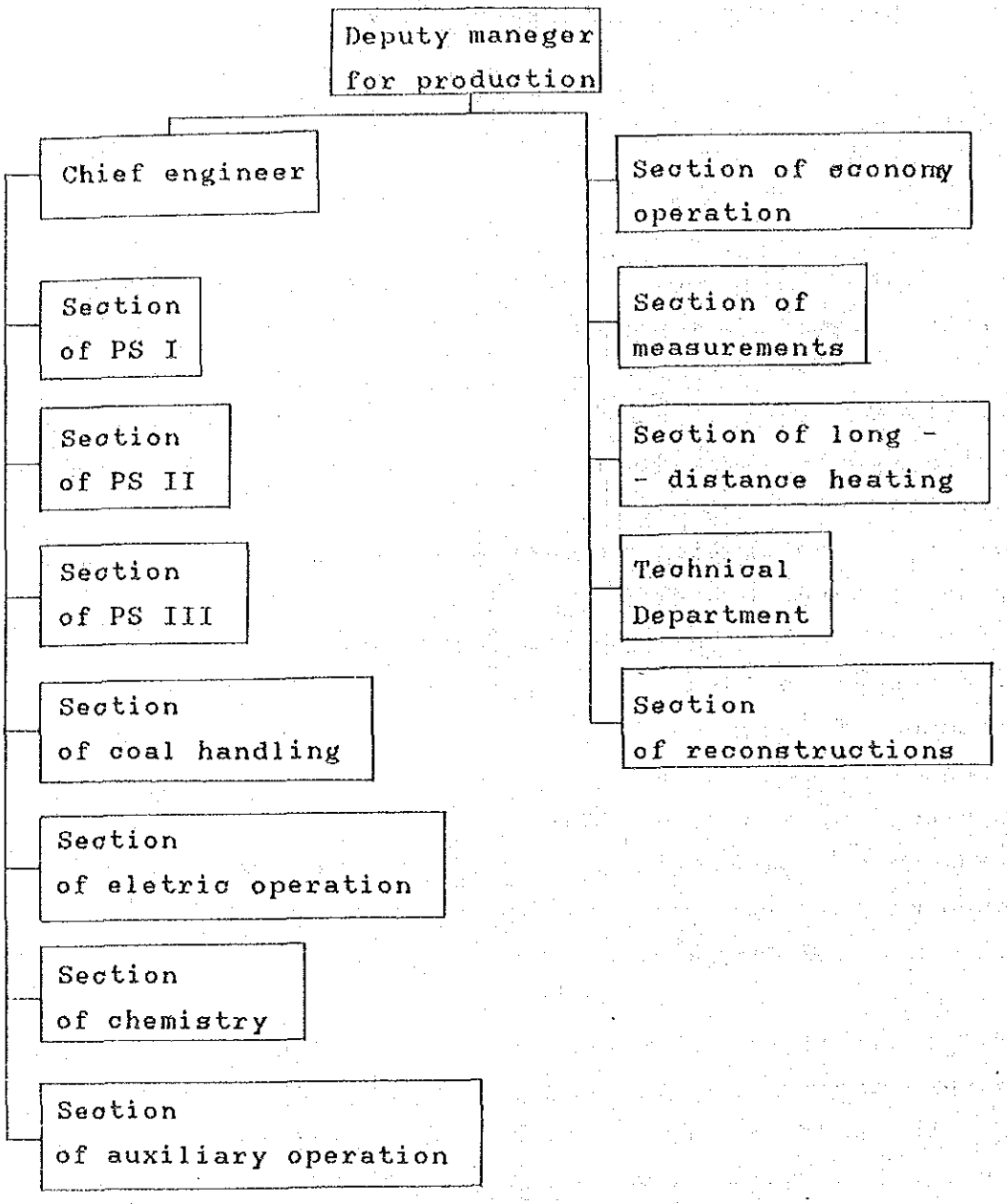
Section for planning	S.of. realization	S.of.material supply	S.of.transport	S.of.rationalization

The division of maintenance is devided into five sections stated up. General maintenance and reconstructions are prepared in the section of planing.
The section of realization is directed by the chief engineer and is the most extensive section.
It consists of following separated sections:

- maintenance of boilers
- maintenance of turbines
- maintenance for elektrical devices
- maintenance for elektrical devices
- maintenance of buildings
- workshop maintenance
- a group for coordination.

The preparations of systematic and current maintenance are made in this section incl.providing of waterial, the realizations of all the actions and technical operations of general maintenances. The section of materials supply provides materials and spare parts for all the divisions. The section of transport arranges for personal transport and haul transport for all the divisions. Working progresses are made in the section of rationalization.

POINT 4


Deputy maneger for production
Chief engineer
Section of PS I
Section of PS II
Section of PS III
Section of coal handling
Section of eletric operation
Section of chemistry
Section of auxiliary operation
Section of economy operation
Section of measurements
Section of long - - distance heating
Technical Department
Section of reconstructions

Point 5

5.1 Outputs and capacities of the PS Mělník

a) Outputs given by projects:

EME I - 6 units a· 55 MWe.
After the reconstructions the total intalled heat outputs of 154,7 MW_t was gaubed mainly in hot vaater for the town of Mělník, the village of Horní Počaply. The units have the installed steam toutput 230 t/h each.

EME II - 4 units a· 110 MWe.
The heat output is 23 MW_t for a plant in neighbourhood. The steam output is 350 t/h per one unit.

EME III - 1 unit a· 500 MWe. The steam output is 1600 t/h.

b) Prospects

EME I - Six boiler ceonnected with steam line on the side of high pressute with the output of 230 t/h per 1 unit.
Four heating turbines with a total heating output 600 MW_t.

EME II - It will be kept in the block arrangement.
The innovation the present boiler plants is prognosticated. With the help of this the heat output of 600 MT_t will be obtained for the secoud stage ot the installation of long - distance heating.

EME III - No substantal changes are expected. Affer the year 2000 the unit may be connected into the heating system of the PS 1 and PS 2.

5.2 Power Plants outlets.

EME I - The electrical outlet is taken into the switching station of 110 kV and then to the distribution aetwork.
The heating outlet is taken mainly in hot water with the help of the feeders:

Point 5 - 2

- The town of Mělnik - 122,5/58,5 °C, DN = 600 mm,
  J_t = 1 - 1,2 MPa, P_t = 120 MW_t,
  1 = 9,2 km

- The village of Horni Počaply - 130/70 °C, DN = 250 mm,
  J_t = 2,5 MPa, P_t = 14 MW_t, = 2,1 km

- The prospect for the long-distance heating of the Capital -
  160/70 °C, DN = 1200 mm, J_t = 2,5 MPa,
  P_t = 610 MW_t - in the first stage,
  P_t = 1240 MW_t - in the second stage,
  1 = 34 km.

Point 6

Topical and future heat distribution.
The total annual heat supplies from the P.S. are:

Year	EMĚ I	EMĚ II	EMĚ III	EMĚ
1989	932157	15282	9502	1094461
1990	957823	179228	-	1137051
1991	920000	380000	20000	1320000

The total annual supply of heat of 12800 TJ/year is expected according fo the project for the 1 st. stage of the long - dostance hegnting.

Point 7,8

The complex of Power Station

The Power Station Mělník has been constructed gradually in three stages with three generations of energy equipment.

The Power Station Mělník I - The federal authorities decided about the construction of this project in the year 1957. The actual construction started in 1957 with the nominal output 6x55MW. For the first time it was decided to use the classical blok system in the Power Station.

The first unit was put into operation on 30.9.1960, the last one on 27.9.1961 that is 95 days before the target date.

The turbosets were manufactured in SKODA Works, the boilers with the output 230 t/h in VŽ Vítkovice, nat. enterprise, the control and measurement system KOMEGA imported from USSR.
(See page No.19 "Terms of reference" and picture No.1).

Installed output	6x55 MW
Nominal steam output	6x230 t/h
Steam pressure	96 kp/cm^2
Steam temperature	535 °C
Design fuel lignite	2500 Gcal/kg
Ash content	23%
Designed specific consumption	0,434 tmp/MWh dod.

Power Station Mělník II - The government decree for installation of the power station issued in 1964, the construction started in 1967. The nominal output 4x110 MW blocks were installed. The first unit has been put into operation on 30.12.1970 and the last one on 27.11.1991. The turbosets were manufactured in SKODA Works, the boilers with the output 350 t/h

in IBS Brno.
(See page No.19 "Terms of reference" and picture No.2).

Installed output	4x110 MW
Installed steam output	4x350 t/h
Steam pressure	135 kp/cm²
Steam temperature	540°C
Designed fuel - lignite	2500 kcal/kg
Ash content	23%
Watere content	35%
Designed specific consumption	0,4186 tmp/MWh dod.

Power Station Mělník III - The government decree for intallation of power station issued in 1970. The construction started in 1976 and has been put into operation in 1981. The nominal output of the unit is 500 MW.
The turboset is manufactured in SKODA Works, the boiler is a product of the consortium IBS Brno, SES Tlmače and VŽ Vitkovice.

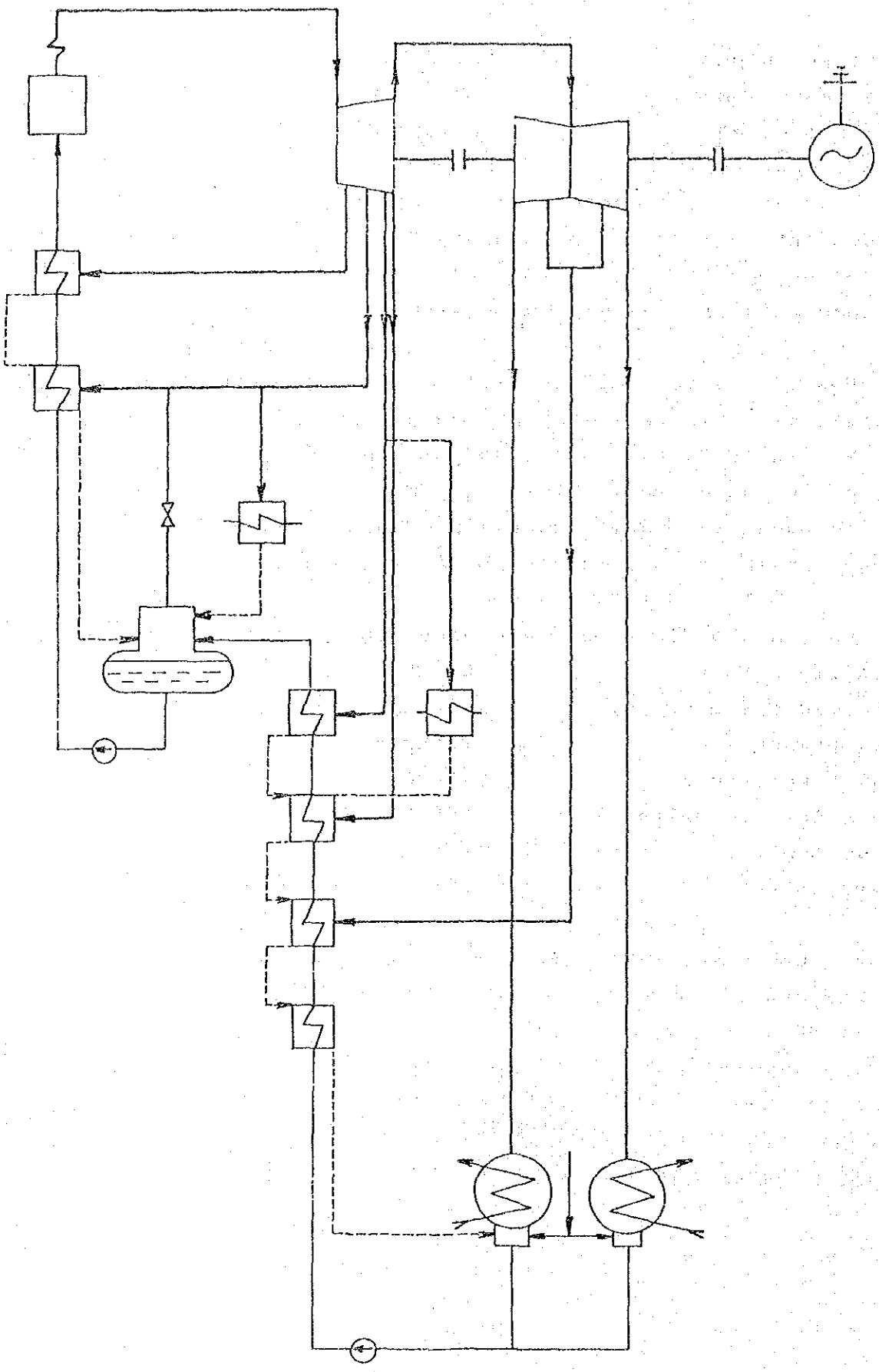
(See page No.19 "Terms of reference" and picture No.3).

Installed output	500 MW
Installed steam output	1600 t/h
Steam pressure	178 kp/cm²
Steam temperature	540 °C
Fuel calorific value	2500 kcal/kg
Ash content	44%
Water content	25%

Summer operation with cooling tower, winter operation - open cooling cycle.

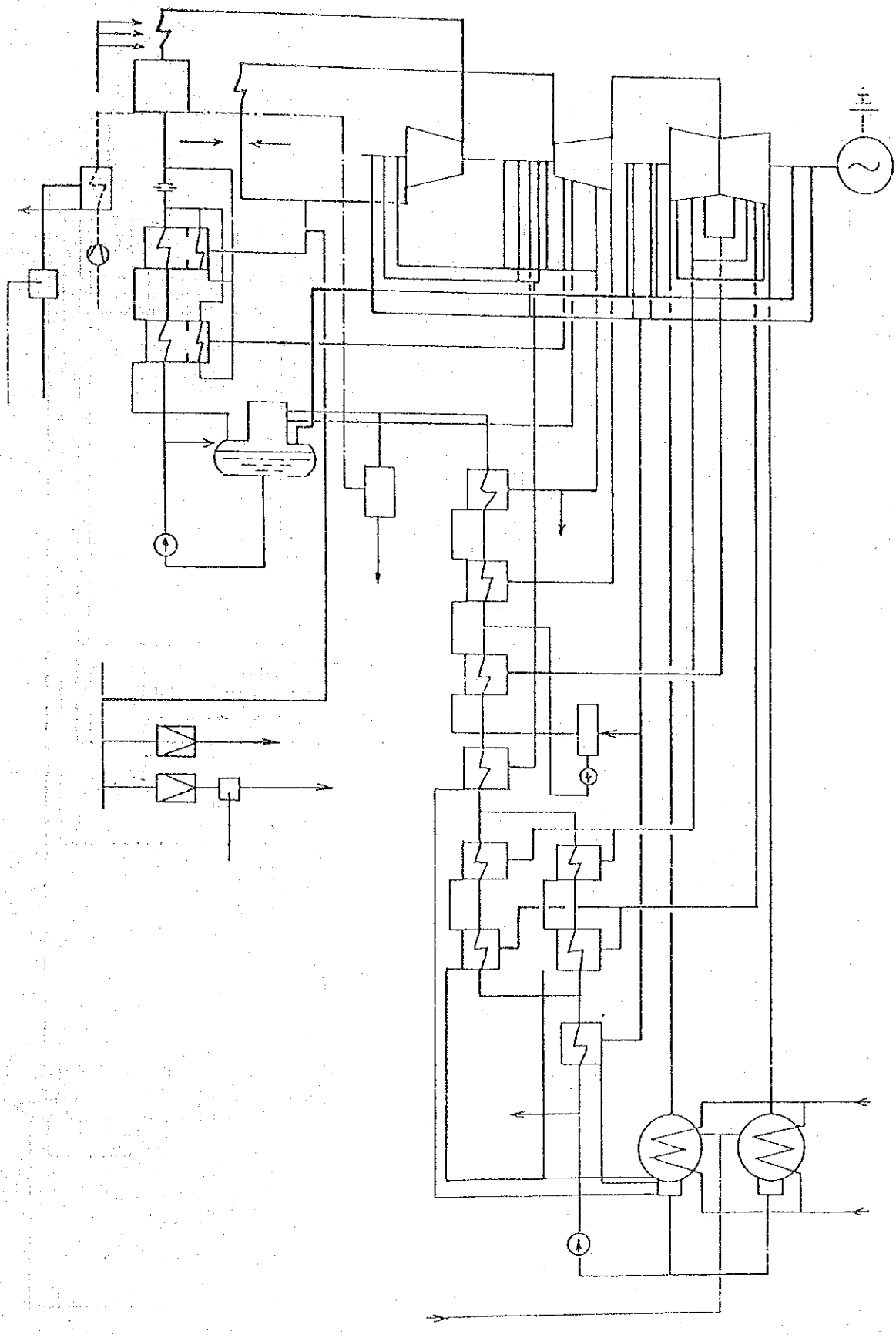
EMĚ I

PICTURE No. 1



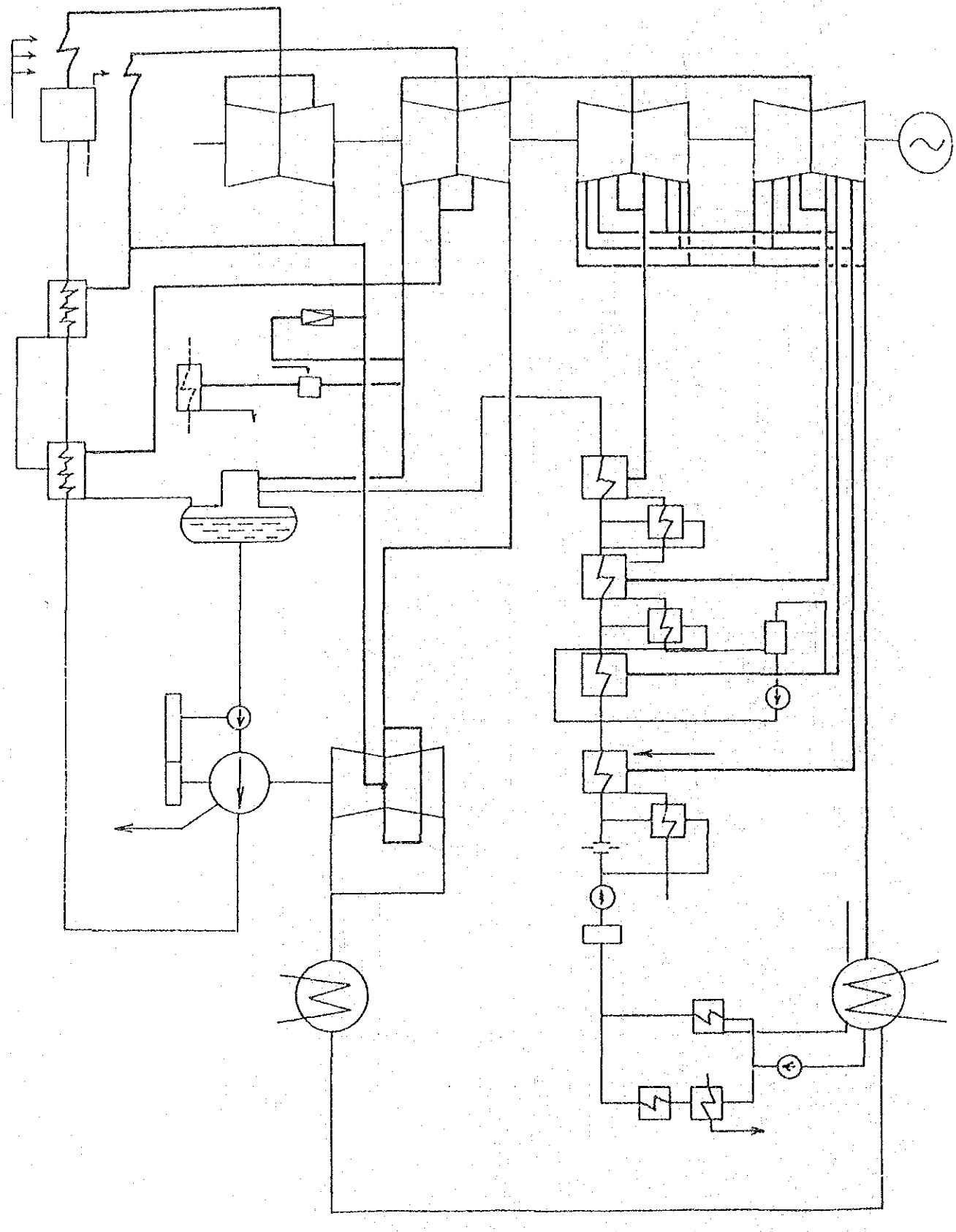
EMĚ II

PICTURE No. 2



EMĚ III

PICTURE No. 3



Point 9

9.1 Coal parameters (acc. the projects)

		PS 1	PS 2	PS 3
- calorigic value	Q^{r}_{i} (GJ/kg	10,47	10,47	10,72 - 1,26
- water	W^{r}_{t} (%)	30,0-38,0	35,0	22,0 - 31,0
- ash	A^{r} (%)	23,8-27,1	23,0	28,5 - 36,8
- granularity	(mm)	0-20	0-20	0-40
- sulphur	S^{a} (%)	-	1,2-2,8	1,5

9.2 Media parameters

The steam and water conditions ave givm in the Termus of Reference (p.19).

- the temperature of combustion air behind air preheaters (°C) 420 260 275
- the pressure of combustion air behind air preheaters (kPa) o,88-1,47 o,58-1,20 1,40

Point 11

Cooling water data.

The cooling water is taken for the PS 1 and PS 2 from the river of the Elb directly. The unit of 500 MW utilizes for coolling the warm water from the PS 1 and 2. It is possible due to ecological reasons to get to the closed kooling system with the cooling tower in summer.

The extraction of the cooling water capacity from the river depends on the units of the PS 1 and 2 in operation and must respect the consumption of the 500 MW unit.

Aunual temperature of the cooling water from the river:

	1989	1990
- average input temperature pper year	11,6	11,7
- max. temperature	22,9	22,4
- min. temperature	3,7	3,0

Nominal capacity of cooling water passage:

- steam condenser of 500 MW unit	8 300 m^3/h
- steam condenser of 110 MW unit	11 500 m^3/h
- steam condenser of 500 MW unit incl. turbo feeding pump	53 350 m^3/h

Physico - c-hemical gualities of inlet water from the river:

- total salinity	val/m^3	4 - 5
- total alkality (m)	val/m^3	0,9 - 1,8
- Ca^{2+} + Mg^{2+}	val/m^3	2,5 - 3,0
- Na^+ + K^+	val/m^3	0,8
- Cl^-	val/m^3	0,9
- SO^{2-}	val/m^3	1,4
- CO_2 free	g/m^3	11,0
- CHSK	gO_2/m^3	10 - 30
- suspend. matters	g/m^3	20 - 30 (max. 1000)

Evidenční list popílku 1989

(výpis ze zprávy ORGREZ Ostrava)

		EMĚ 1			EMĚ 2			EMĚ 3		
		X(0)	xmin	xmax	X(0)	xmin	xmax	X(0)	xmin	xmax
	ÚDAJE O SPALOVANÉM UHLÍ:									
1	měs.spotřeba uhlí t/měs	149400	112100	182800	140300	75450	203200	175500	11220	262100
2	výhřevnost uhlí kJ/kg	10300	10010	10630	10360	9828	10710	10210	9670	10650
3	voda vešk. %	29,53	28,21	32,50	29,20	27,04	30,93	29,31	25,69	30,98
4	popel v uhlí %	28,67	24,74	30,30	28,83	26,45	30,21	29,27	27,17	33,59
5	síra vešk. %	1,00	0,67	1,29	1,04	0,64	1,31	0,97	0,68	1,23
6	PRŮM.MĚS.PRODUKCE TUHÝCH ZBYTKŮ:									
7	popel T/měs	43520	34640	50660	41160	22320	58170	50660	2851	74080
8	škvára T/měs	9574	7622	11150	9055	4911	12800	11150	627	16300
9	popílek T/měs	33940	27020	39520	32100	17410	45370	39510	2224	57780
10	VLASTNOSTI POPÍLKU:									
11	tepl.měknutí T1 st.C	1248	1245	1250	1210	1160	1260	1265	1250	1280
12	tepl.tání T2 st.C	1443	1415	1470	1440	1400	1480	1415	1410	1420
13	tepl.tečení T3 st.C	1513	1495	1530	1515	1505	1525	1513	1505	1520
14	FYZIKÁLNÍ VLASTNOSTI POPÍLKU:									
15	voda původní %	0,118	0,070	0,170	0,175	0,120	0,250	0,117	0,080	0,150
16	spalit.látky an. %	0,568	0,470	0,780	1,473	1,100	1,680	0,890	0,770	1,090
17	ztráta žíháním an. %	0,698	0,600	0,870	1,708	1,330	2,020	1,037	0,850	1,290
18	pH vodního výluhu	7,433	5,200	10,200	4,850	4,200	5,800	4,433	4,300	4,500
19	obsah vodorozp.solí %	0,238	0,190	0,360	0,423	0,400	0,450	0,433	0,290	0,540
20	sypná hmotnost pop.kg/m3	847,5	767,0	953,0	721,0	664,0	760,0	685,3	556,0	793,0
21	setřes. hmot. pop. kg/m3	1062	938	1242	1024	922	1094	988	939	1070
22	hustota popílku kg/m3	2087	-	-	1975	-	-	1863	-	-
23	úhel skluzu st.	30,83	26,00	34,00	31,00	30,00	33,00	29,00	27,00	32,00
24	sypný úhel st.	42,50	36,00	45,00	44,00	40,00	46,00	41,67	40,00	44,00
25	GRANULOMETRIE POPÍLKU SÍTOVÁ METODA:									
26	nadsítné 0,050 zrno mm %	38,95	31,38	43,16	52,27	50,32	56,53	53,64	46,16	58,24
27	nadsítné 0,030 zrno mm %	46,11	39,41	51,64	58,42	56,26	61,36	60,05	52,81	64,48
28	nadsítné 0,015 zrno mm %	56,62	51,09	61,56	67,10	65,44	69,18	68,56	63,10	72,64
29	nadsítné 0,011 zrno mm %	80,74	76,64	84,50	85,84	84,34	87,12	88,07	83,36	88,48
30	nadsítné 0,008 zrno mm %	88,64	84,67	91,94	91,18	90,28	91,95	91,07	89,11	93,04
31	nadsítné 0,006 zrno mm %	94,03	91,24	95,97	94,98	94,60	95,40	94,72	93,65	96,16
32	nadsítné 0,005 zrno mm %	97,06	95,26	98,14	97,37	97,03	97,92	97,18	96,48	98,08
33	nadsítné 0,004 zrno mm %	98,31	97,08	99,04	98,21	97,84	98,44	98,21	97,65	98,80
34	ZÁKLADNÍ CHEMICKÉ SLOŽENÍ POPÍLKU:									
35	S veškerá %	0,08	0,08	0,08	0,15	0,15	0,15	0,14	0,11	0,16
36	SiO2 %	54,49	53,86	55,12	54,17	53,56	54,77	54,09	54,03	54,14
37	Al2O3 %	27,52	26,36	28,68	28,31	27,70	28,91	28,15	27,28	29,01
38	CaO %	2,06	1,94	2,18	2,21	2,18	2,24	2,05	2,00	2,10
39	MgO %	1,44	1,40	1,48	1,50	1,48	1,50	1,48	1,46	1,50
40	TiO2 %	2,92	2,87	2,97	2,84	2,83	2,84	3,17	3,06	3,28
41	Fe2O3 %	8,38	8,18	8,57	8,36	8,14	8,57	7,99	7,81	8,17
42	SO3 %	0,19	0,18	0,20	0,38	0,37	0,38	0,35	0,29	0,40
43	Na2O %	0,30	0,30	0,30	0,31	0,28	0,33	0,33	0,33	0,33
44	K2O %	1,26	1,21	1,31	1,33	1,30	1,35	1,42	1,41	1,43

TOXICKÉ STOPOVÉ PRVKY V POPÍLKU:

			EMĚ 1			EMĚ 2			EMĚ 3	
		X(0)	xmin	xmax	X(0)	xmin	xmax	x(0)	xmin	xmax
As	ppm	129,0	105,0	153,0	169,0	139,0	199,0	192,5	144,0	241,0
Be	ppm	24,00	19,00	29,00	22,00	7,00	37,00	21,00	19,00	23,00
Co	ppm	41,00	38,00	44,00	39,00	36,00	42,00	40,60	39,00	42,00
Cr	ppm	125,0	120,0	130,0	160,0	110,0	210,0	115,0	110,0	120,0
Cu	ppm	135,5	129,0	142,0	123,5	119,0	128,0	131,5	119,0	144,0
Mn	ppm	560,0	490,0	630,0	835,0	820,0	850,0	480,0	390,0	570,0
Ni	ppm	112,5	110,0	115,0	123,5	121,0	126,0	122,0	122,0	122,0
Pb	ppm	42,00	40,00	44,00	47,00	42,00	52,00	43,50	42,00	45,00
Zn	ppm	154,5	148,0	161,0	174,5	173,0	176,0	181,5	176,0	187,0
Mo	ppm	3,000	3,000	3,000	5,5	4,0	7,0	4,0	4,0	4,0
Hg	ppm	0,0050	-	-	0,0050	-	-	0,0050	-	-
RADIOMETRICKÝ ROZBOR POPÍLKU:										
měrná aktivita Ra 226	Bq/kg	93,50	91,00	96,00	85,50	83,00	88,00	94,50	93,00	96,00
měrná aktivita Th 220	Bq/kg	75,00	70,00	80,00	74,50	74,00	75,00	79,50	74.00	85,00
měrná aktivita K 40	Bq/kg	335,0	334,0	336,0	347,0	323,0	371,0	401,5	335,0	468,0
U	g/l	7,700	7,500	7,900	7,000	6,800	7,200	7,750	7,600	7,900
Th	g/l	18,55	17,30	19,80	18,40	18,30	18,50	19,65	19,30	21,00
Rn výdejnost	mikro Bq/kg.s	1,600	-	-	4,600	-				
ZÁKLADNÍ ROZBOR VODNÍHO VÝLUHU POPÍLKU: (50g pop./l po 7 dnech).										
pH		10,60			6,70	-	-	5,60	-	-
acidita celková	mval	-	-	-	0,04	-	-	0,15	-	-
alkalita zjevná	mval	0,70	-	-	-	-	-	-	-	-
alkalita celk	mval	1,30	-	-	0,10	-	-	0,15	-	-
mangan. číslo	gO2/m3	3,60	-	-	5,50	-	-	1,20	-	-
el. vodivost	uS/cm	316,0	-	-	341,0	-	-	315,0	-	-
odparek 105°C	g/m3	220,0	-	-	249,0	-	-	251,0	-	-
odparek žíh.	g/m3	151,0	-	-	143,0	-	-	150,0	-	-
tvrdost	st.N	6,2	-	-	26,3	-	-	5,5	-	-
SO4	g/m3	105,0	-	-	188,0	-	-	142,0	-	-
Cl	g/m3	4,0	-	-	3,0	-	-	4,0	-	-
F	g/m3	-	-	-	2,8	-	-	-	-	-
NO2	g/m3	0,008	-	-	0,02	-	-	0,004	-	-
PO4	g/m3	0,86	-	-	0,07	-	-	0,03	-	-
Ca	g/m3	44,0	-	-	13,2	-	-	32,0	-	-
Mg	g/m3	0,5	-	-	3,4	-	-	4,6	-	-
NH4	g/m3	0,40	-	-	1,30	-	-	2,10	-	-
Na	g/m3	1,7	-	-	5,8	-	-	10,4	-	-
K	g/m3	2,7	-	-	2,0	-	-	7,7	-	-
OBSAH STOPOVÝCH PRVKŮ VE VÝLUHU POPÍLKU V 2 M HNO3										
Be	mg/kg	1,60	-	-	2,64	-	-	2,13	-	-
Cd	mg/kg	0,031	-	-	0,036	-	-	0,028	-	-
Co	mg/kg	2,300	-	-	2,400	-	-	2,150	-	-
Cr	mg/kg	2,20	-	-	2,400	-	-	2,300	-	-
Cu	mg/kg	27,30	-	-	36,00	-	-	35,60	-	-
Mn	mg/kg	50,80	-	-	46,10	-	-	48,80	-	-
Ni	mg/kg	7,100	-	-	5,950	-	-	6,53	-	-
Pb	mg/kg	2,000	-	-	4,000	-	-	4,00	-	-
Zn	mg/kg	10,70	-	-	19,20	-	-	20,40	-	-

Dle podkladů zpracovala: J.Třešňáková, 12/90.

Evidence list of fly ash 1990.
(extract from ORGREZ report)

Combusted coal data:

1 monthly coal consumption t/month
2 coal calorific value kJ/kg
3 complet water consumption
4 ash in coal
5 all sulphur
6 avarage monthly production of solid residue
7 ash
8 cinder
9 fly ash
10 Flyash characteristics:
11 softening temperature T1
12 melting temperature T2
13 flowing temperature T3
14 Physical Ash characteristics:
15 original water
16 combustible matters anal.
17 loss by ignition anal:
18 ph of water leach
19 content of soluble salts
20 fly ash specific weight kg/m³
21 vibr. fly ash specific weight kg/m³
22 fly ash density
23 slip angle
24 ash loose angle
25 Granulometric fly ash screen method:
26 above screen 0,050 mm granule
27 " 0,020 "
28 " 0,015 "
29 " 0,010 "
30 " 0,005 "

31 above screen 0,006 granule (core) mm
32 " 0,005 "
33 " 0,004 "
34 The basic chemical fly ash composition:
35 S complete
36 SiO_2
37 Al_2O_3
38 CaO
39 MgO
40 TiO_2
41 Fe_2O_3
42 SO_2
43 Na_2O
44 K_2O
45-55 chemical elements As-Hg.
56 Radiometric fly ash analysis:
1 specific activity of Ra 226
2 specific activity of Th 220
3 specific activity of K 40
62
63 The basic analysis of fly ash water extract (leach) (50g fly ash/l)
64 pH
65 total acidity
66 visible alkalinity
67 total alkalinity
68 manganum number
69 el. conductivity
70 evaporation residue 105°C
71 annealed evaporation residue
72 hardness
73-82 chemical elements SO_4 – K
83 The volume of trace elements in fly ash leach in 2 HNO3
84-92 chemical elements Be – Zn

Point 13

Monitoring system in the Power Station of Mëlnik, quality analysis

1. Emission measuring

The measurement of emissions is installed on the units No 11 (500 MW) and that in the range:

fly ash - 2 analysers on 2 flow gas pipes (beta dust measurer) they are not in operation nowadaysdue to difficulties with the extraction of the samples

SO_2 - 1 analyser on 1 flow gas pipe

Others units are without the measurings, emissions are determined by non - direct method - by computation.

fly ash - according the operation of separate sections of the precipitators (the measuring of currents)

SO_2 - by computation acc. the content of sulphur in lignite

NO_x - by computation acc. the single, easurements on the units

There are some other measurements to determine the recompenses for the pollution (SO_2, NO_x, fly ash, CO O_2).

The measuring systeme should be instelled on the separate sources - chimneys (boilers ?)

2. Immision measuring

The telemetric network is for watching the flying ash given into operation in the Power Station at present. This network was preparing in connection with the project of the new ash deposit. Nowadays it is incluleded into the completed monitoring system for the air watching system of the district of Mělník. It will be made up of three parts in the end, each of them will be controlled by one of the more important pollution sources of the district (Spolana Neratovice, Kaučuk Kralupy, PS Mělník).

	location	quantity wetched /precipitations/
01	ash deposit	MET, PP, precipitations
02	Horní Počaply	MET, PP, SO_2
03	Křivenice	MET, PP
04	D. Beřkovice	MET, PP, SO_2
05	Bechlín	MET, PP
06	Libkovice	MET, PP
07	Mělník	MET, PP, SO_2, NO_x
08	Lužec	SO_2 - original location

MET - temperature direction and speed of wind, flying ash

Analyser quality:

SO_2 - out-of-date types of the inland production - COULOGRAFY

NO_x - there are no means to buy analysers

PP - beta dust measurers, inland production in a licence, no experience so far.

Point 15

Immision in enviroas of PS, part of PS - winter 1988

	Immission SO_2 ug/m³			part %			Immission NO_x ug/m³			part %	
		EMĚ 1	EMĚ 2	EMĚ 3	EMĚ		EMĚ 1	EMĚ 2	EMĚ 3	EMĚ
Mělník	70,07	11,09	4,94	2,45	18,48	21,79	19,37	7,85	4,04	31,26
Kralupy	65,39	2,45	1,42	0,98	4,83	18,59	4,87	2,70	1,78	9,35
Neratovice	54,79	4,54	2,79	1,93	9,27	19,15	7,93	4,49	3,16	15,58
Vysoká	60,06	21,58	7,56	4,70	33,83	21,43	28,00	9,32	7,02	45,34
Chorušice	44,79	10,31	4,87	3,42	18,60	15,26	17,76	7,62	5,53	30,91
Byšice	42,39	5,73	3,70	2,67	12,08	14,09	10,66	6,23	4,59	21,48
Citov	51,56	12,57	4,69	2,31	19,59	17,82	20,06	6,41	3,56	30,03
Dřínov	53,84	4,74	2,73	1,73	9,21	17,30	9,18	4,84	3,08	17,10

Dust tall - out g/m² within 30 dayes - 1990

location	average	max.	min.
ash deposit - right	25,6	87,2	3,1
ash deposit - leff	22,9	101,3	4,3
ash deposit - middle	70,2	162,8	14,2
ash deposit - road	22,4	68,8	2,6
ash deposit - pumping stat	80,3	120,5	4,9
Podvlčí	42,5	176,1	3,2
Křivenice	17,0	40,8	4,9
D.Beřkovice	10,4	42,6	2,8
Citov	69,9	362,9	5,6
Bechlín	13,5	52,5	2,9
Horní Počaply	13,7	92,6	4,3
Libkovice	9,9	15,8	5,2
EMĚ - BČ	8,8	13,2	4,1

Point 16

Real annual emission of harmful matters in the years 1981-1990

(volume efemissions determined by computation)

consumpt year	coal tons	sulphur in coal tons	emission of ash tons	emission SO_2 tons	emission NO_x tons	taxes total Kčs
1981	5 694 650	1,39	38783	155904	21924	13 907 830
1982	5 561 522	1,32	51120	146119	21412	12 392 904
1983	6 257 999	1,04	72423	122681	24093	13 352 220
1984	6 855 754	1,05	47764	127321	23395	18 211 772
1985	5 721 529	0,99	38562	111418	22028	10 594 245
1986	6 429 480	1,05	25683	126502	24753	6 761 070
1987	5 904 680	1,03	25601	113969	22733	6 076 280
1988	6 215 609	0,91	36184	105410	23931	8 531 600
1989	5 337 860	0,99	30274	108539	20551	7 327 740
1990	4 131 300	1.01	13449	79252	16711	6 132 140

Average concentration of hermful matter in flow gas (derived)

		1989	1990
SO_2	mg/m^3	3674	3488
fly ash	mg/m^3	1031	591
NO_x	mg/m^3	700	700

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Combusted coal - 1990

mont	W (%)	A (%)	S (%)	Q (MJ/kg)
01	29,65	27,23	0,97	10,79
02	30,20	27,11	1,01	10,56
03	29,01	26,62	1,09	11,13
04	28,83	27,26	0,93	10,92
05	29,61	27,70	0,97	10,40
06	28,68	27,74	1,13	10,70
07	27,91	26,58	1,15	11,45
08	28,93	26,92	1,10	11,03
09	28,96	28,31	1,15	10,45
10	28,08	29,01	0,83	10,55
11	29,66	28,79	0,91	10,30
12	29,30	28,59	1,02	10,47
year	29,16	27,71	1,01	10,69

Coal analysis - consumption samples from january 1991

1. Results - avernge coal analysis from consuption per day:

			EMĚ 1	EMĚ 2	EMĚ 3
water	Wtr	%	28,25	31,25	32,06
ash	Ar	%	26,22	26,70	25,23
e. effiecienoy	Qir	MJ/kg	11,28	10,39	10,56
sulphur	Str	%	0,93	1,50	1,38

2. Consituant coal analysis (ar Research Inst. of Fuel)

(d) - sample withont water

			EMĚ 1	EMĚ 2	EMĚ 3
ash	A	%	37,32	39,16	37,50
hydrogen	Ht	%	3,30	3,56	3,61
carbon	Ct	%	42,01	40,96	41,97
nitrogen	N	%	0,51	0,86	0,87
oxygen	O	%	16,01	14,84	15,41
sulph.org.	So	%	0,51	0,62	0,63
sulph.tot.	St	%	1,36	2,09	1,75
sulph.in. sulphides	SsO_4	%	0,042	0,084	0,031
sulph.in.pyrites	Sp	%	0,81	1,38	1,09
chlorine	Cl	%	0,006	0,005	0,002
fluorine	F	%	0,027	0,036	0,032
arsenic	As	g/t	26,76	40,29	28,57
mercury	Hg	g/t	0,212	0,271	0,228
mercury (PS Man.)	Hg	g/t	0,279	0,308	0,279
(r) - original sample					
hydrogen	Ht	%	2,37	2,44	2,45
carbon	Ct	%	30,14	28,16	28,52
nitrogen	N	%	0,58	0,59	0,59
oxygen	O	%	11,52	10,20	10,47
sulph.org.	SO	%	0,37	0,43	0,43
sulph.tot.	St	%	0,98	1,43	1,19
sulph.in sulphides	SsO_4	%	0,03	0,06	0,02
sulph.in pyrites	Sp	%	0,58	0,95	0,74
chlorine	Cl	%	0,005	0,004	0,001
fluorine	F	%	0,020	0,024	0,022
arsenic	As	g/t	18,49	27,69	19,41
mercury	Hg	g/t	0,152	0,186	0,155

mercury (PS Man)Hg	g/t	0,201	0,212	0,190

Point 17, p.3

Measurement system and evalnation of coal samples only quality of combusted coal is watched, daily samples from the separate power stations (1,2,3).
The content of sulphur is determined everey ten days from all the daily samples.
Consttant coal analysis from ontside bussiness, one tenes per year. Sample extractions: automatic samples
Coal detiveri ist not watched in quality.

Point 18

Data of coal

18.1 Coal consumption.

	Mu (+J)	Q^r_i (GJ/t)	A^r (%J)	W^r_t (%)
EMĚ I				
1989	1793030	10,33	28,50	29,66
1990	1637760	10,68	28,00	28,92
1991 (1-8)	823360	10,60	27,24	29,58
EMĚ II				
1989	1681960	10,35	28,65	29,38
1990	2137890	10,72	27,55	29,19
1991 (1-8)	1463790	10,74	26,66	29,95
EMĚ III				
1989	2106350	10,27	28,43	29,95
1990	355650	10,37	28,49	29,44
1991(1-8)	1433650	10,78	26,06	30,48

18.2. Coal Supply

The PS of Mělník is suplied with lignite form the Most and Sokolov areas.

- The Most are delivers lignite from the mines:

Mine	Number of kinds	Norm. calorific value (MJ/kg)	Transport distance (km)
Komořany	7	9,25 - 11,60	100
Herkules	2	10,70 - 11,10	100
Paliv.kombinát	2	9,70 - 10,60	52
Vršany	4	9,40 - 11,20	99
Merkur	1	10,25	124

- The Sokolov area delivers lignite from the mines_

Tisová	6	9,25 - 11,50	201
Jiři	6	9,05 - 11,50	189
Družba	6	9,40 - 11,60	189

The lignite is transported by railway in rolling stocks with 30 railways carriages. The materiality of every one is about 1600 tons.

Price developement

The accounting and payments is made in franco prices and that is uhy the price developement is put this way.

1989	157,79 Kčs/t	that is	15,07 Kčs/GJ
1990	182,19 Kčs/t	that is	17,04 Kčs/GJ
1991 (1-5)	237,40 Kčs/t	that is	22,58 Kčs/GJ
1991 (6-7)	279,80 Kčs/t	that is	26,62 Kčs/GJ

Transporting charges

The present charges are accounted in valid franco prices nowadays.

The franco price icludes the transport charges and doesnt depend on the distance.

When the loko prices will be in introduced, as it is expected, the price of coal will get down a little but the transporting charges will sstart to be accounted and will range from 56-68 Kčs/t according the distance (52 - 201 km).

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The explenation of the calculation items in the "STUDY"

There ary plente of activities above the scope ot the main production (submitted calculazions), which are connected with energy and heat production (maintenance and overhaul - oca 400 mil. Kčs per year, the transportm some small business activities and actions for social arrangement in the favour of employees).

These activities are calculated separately and enter the submitted calculation as a part of one item (the internal subsupply).

In this calculation are not included uncalculatable items as emissions recompenses, demages consed throng air pollution, interests a.s.o.

Line 5. Energetic fuel - includes the complete consumption of high - grade fuel in the boiler houses inchuding the fuel transport costs.

Line 6. Materials - includes the consuption of the technological material used for the energy and heat production (consuption of chemikals in the water treatment plant, turbine oils and other lubricants).
The maintenance and overhead materials are not included.

Line 7. wages - in cludes the wages of service workers (starting with fuel unloading and the service in control rooms). Again the wages of the maintenanoe workers and overhead charges are not included.

Line 8. Water - includes the consumption of technological water (for the production of demi water, cooling, transport of slag and ash). It doesnt include drinking water.

Line 9. Repairs and maintenance - includes the total costs for the maintenance of the technological plants. It means all the repairs provided both in view of suppliers and by our workers.

Line 10. Depreciation - includes the depreciations of technological plants for production and distribution el. energy and heat from the railway transport in the P.S. to the switching station and the heating feeder. Administration buildings, roads, transport, maintenance and other attendant activities are not included.

Line 11. Other costs of activities - include all other direct costs in technological part (heat and el. consumption, taxes from wages, services, transport of fuel etc.).

Line 12. Over-head expanses - includes budget volumes of general expanse, production overhead and supply overhead referring to the technological part of the P.S. (production preparation, administration, Technical Division, Section of material supply, coumputing centre, serevice given to the workers).

Point 21

Planed maintenance and reconstructions

The plans of curnent maintenance thet is the manthly plans of repaires and revisions are prepared in the separate sections (see point 4).
Reconstrukcions and general maintenances are ensured by the outside enterprices and the preparations for them are arranged for by the Section for planing.
The technical scheme of general maintenance (repair) or reconstruction is created in connection with the Division of production five years beforehand. This scheme is approved by the headquarter (SP ČEZ) and given to the competant suppliers.
General maintenance and reconstructions have been ordered in the producers of original supplies so far where the documentation of devices is in disposal. Now the tender selection is being prefered.
The scheme of G.M. and orders were made by OKPP Liberec. On the base of it the G.M. war ordered in the producer who provided the documentation, production and mostly the assembly in the P.S.
The tender selection is passed into when the demand is made according the technical scheme by various auppliers.

Point 22

The measurement of the environment pollution protection

1. Emission measurement.

Ti find aut the recompense for the environment pollution, it is necessary to measure: SO_2, NO_x, fly ash, CO_2, O_2.

It is necessary to install the measuring instruments on the individual sources: chimneys (boilers?).

Actual state:

EMĚ 1 - no measuring equipment, at present in reconstruction and therefore not necessary.

EMĚ 2 - has no emission measurement instrumentation and the present O_2 measurement in problematic.

EMĚ 3 - installed measuring equipment:

fly ash - 2 analysers (Beta dust measurers on 2 flue gasducts). The actual resultscannot be used due to wrong off tokes.

SO_2 - 1 analyser Siemens (IR) in one flue gasduct

O_2 - 1 analyser on one flue gasduct

The NO_x emission reduction comes into causideration in the first stege as a combustiion úrocess adaptation (till the new DENOX instalation). For this arrangement it will be necesary to install the measuring of NO_x and CO on the boilers. (enclosed the scheme of the gasducts connexion).

2. Emission measuring.

Described in point No.13.

Under consideration in the renovation of the SO_2 analysers, but the purchase of NO_x analysers is notyet clear. In the sphere of measurement these possibilities are discussed:

- licence analysers
- an offer of French company EMISSION
- a special negotiation with the Japan company MITSURI is

under preparation (on 13.9.1991).

3. The evaluation of the immission measurement results and the control of immission network is directed by a technological computor, the oullet of which will be passed to the district centre. The same computor will be used for the emission evaluation up to the calculation of the recompenses. In the same time wiht the emissons the operation of individual EP sections will also be evaluated.

4. The surface water protection.
   Upto now even the problem of the turbine oil leakagl into the cooling water and thus into the river water has not been solved. It is the question of great dauger and practially not detectable leakage aof oil coolers (open cooling cycle).
   It is difficult to select a snitable indicator for the quantity of coolers, where the leakage should be indikated.