2．質問項目及びメルニック発電所による回答

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.

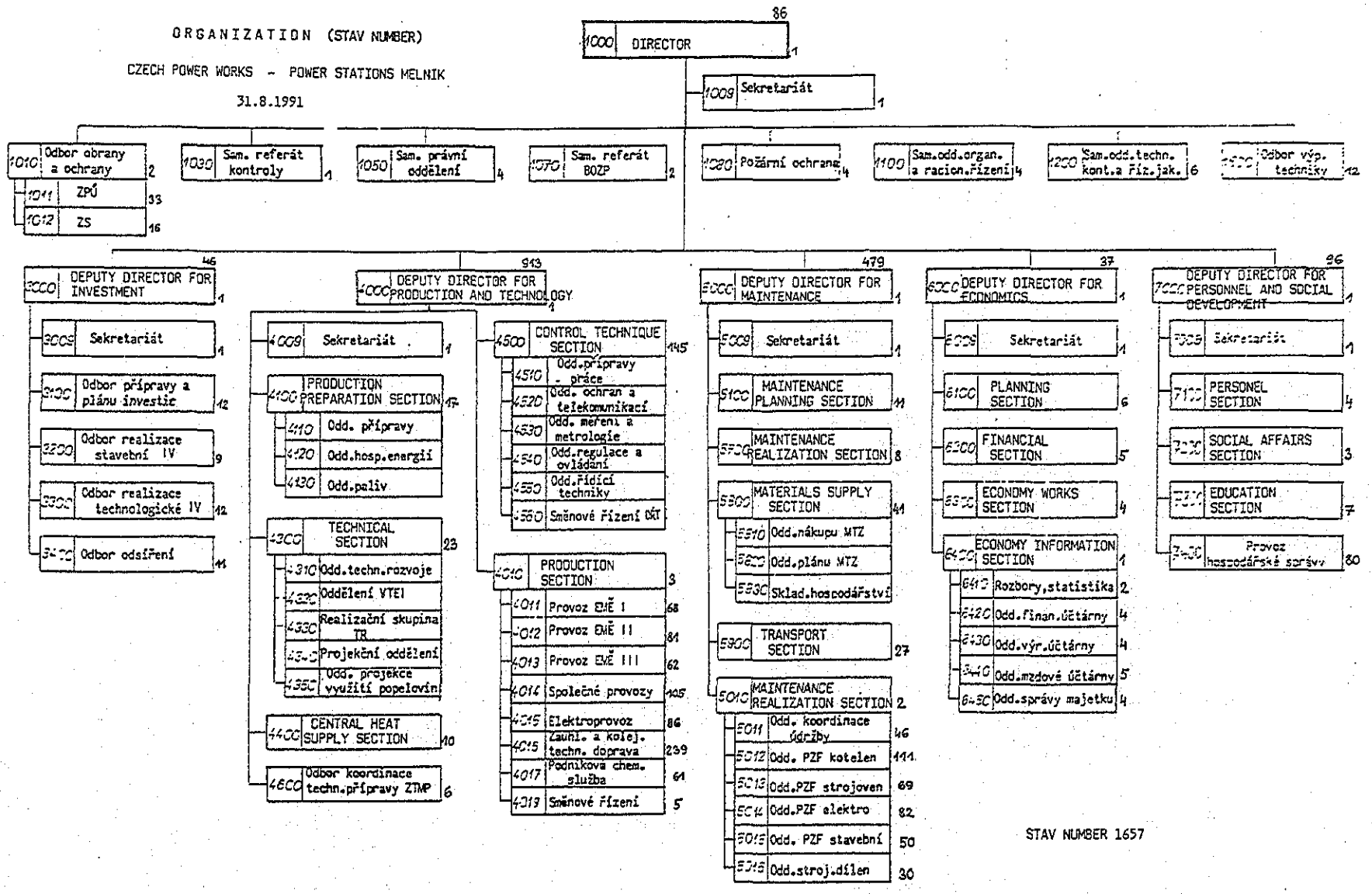
18) Consumption amount, price, supply source and transportation method of coal.

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
86
1000 DIRECTOR 1
1009 Sekretariát 1
1010 Odbor obrany a ochrany 2
1011 ZPÚ 33
1012 ZS 16
1030 Sam. referát kontroly 1
1050 Sam. právní oddělení 4
1070 Sam. referát BOZP 2
1080 Požární ochrana 4
1100 Sam.odd.organ. a racion.řízení 4
1200 Sam.odd.techn. kont.a říz.jak. 6
1300 Odbor výp. techniky 12
3000 DEPUTY DIRECTOR FOR INVESTMENT 46 1
3009 Sekretariát 1
3100 Odbor přípravy a plánu investic 12
3200 Odbor realizace stavební IV 9
3300 Odbor realizace technologické IV 12
3400 Odbor odsíření 11
4000 DEPUTY DIRECTOR FOR PRODUCTION AND TECHNOLOGY 913 1
4009 Sekretariát 1
4100 PRODUCTION PREPARATION SECTION 17
4110 Odd. přípravy
4120 Odd.hosp.energií
4130 Odd.paliv
4300 TECHNICAL SECTION 23
4310 Odd.techn.rozvoje
4320 Oddělení VTEI
4330 Realizační skupina TR
4340 Projekční oddělení
4350 Odd. projekce využití popelovin
4400 CENTRAL HEAT SUPPLY SECTION 10
4600 Odbor koordinace techn.přípravy ZTMP 6
4500 CONTROL TECHNIQUE SECTION 145
4510 Odd.přípravy - práce
4520 Odd. ochran a telekomunikací
4530 Odd. měření a metrologie
4540 Odd.regulace a ovládání
4550 Odd.řídicí techniky
4560 Směnové řízení ÚKT
4010 PRODUCTION SECTION 3
4011 Provoz EMĚ I 68
4012 Provoz EMĚ II 81
4013 Provoz EMĚ III 62
4014 Společné provozy 105
4015 Elektroprovoz 86
4016 Zaučil. a kolej. techn. doprava 239
4017 Podniková chem. služba 61
4018 Směnové řízení 5
5000 DEPUTY DIRECTOR FOR MAINTENANCE 479 1
5009 Sekretariát 1
5100 MAINTENANCE PLANNING SECTION 11
5200 MAINTENANCE REALIZATION SECTION 8
5300 MATERIALS SUPPLY SECTION 41
5310 Odd.nákupu MTZ
5320 Odd.plánu MTZ
5330 Sklad.hospodářství
5900 TRANSPORT SECTION 27
5010 MAINTENANCE REALIZATION SECTION 2
5011 Odd. koordinace údržby 46
5012 Odd. PZF kotelen 111
5013 Odd.PZF strojoven 69
5014 Odd.PZF elektro 82
5015 Odd. PZF stavební 50
5016 Odd.stroj.dílen 30
6000 DEPUTY DIRECTOR FOR ECONOMICS 37 1
6009 Sekretariát 1
6100 PLANNING SECTION 6
6200 FINANCIAL SECTION 5
6300 ECONOMY WORKS SECTION 4
6400 ECONOMY INFORMATION SECTION 1
6410 Rozbory,statistika 2
6420 Odd.finan.účtárny 4
6430 Odd.výr.účtárny 4
6440 Odd.mzdové účtárny 5
6450 Odd.správy majetku 4
7000 DEPUTY DIRECTOR FOR PERSONNEL AND SOCIAL DEVELOPMENT 96 1
7009 Sekretariát 1
7100 PERSONEL SECTION 4
7200 SOCIAL AFFAIRS SECTION 3
7300 EDUCATION SECTION 7
7400 Provoz hospodářské správy 80
STAV NUMBER 1657

Point 4

Organisation of Division of maintenance

Deputy manager

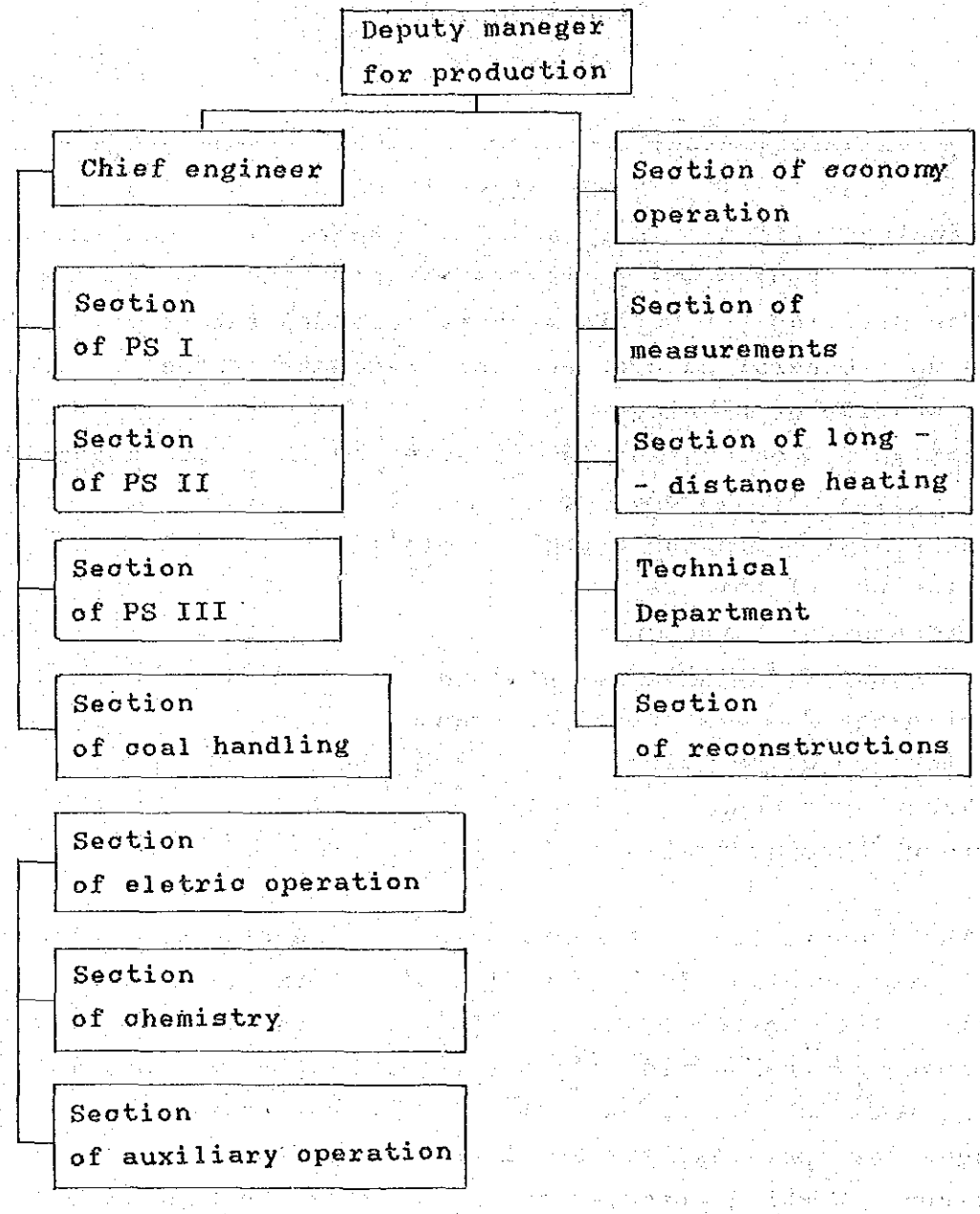
Section for planning	S.of. realization	S.of.material supply	S.of.transport	S.of.rationalization

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 economy operation
Section of PS I
Section of measurements
Section of PS II
Section of long - - distance heating
Section of PS III
Technical Department
Section of coal handling
Section of reconstructions
Section of eletric operation
Section of chemistry
Section of auxiliary operation

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 network.
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 Vitkovice, 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.

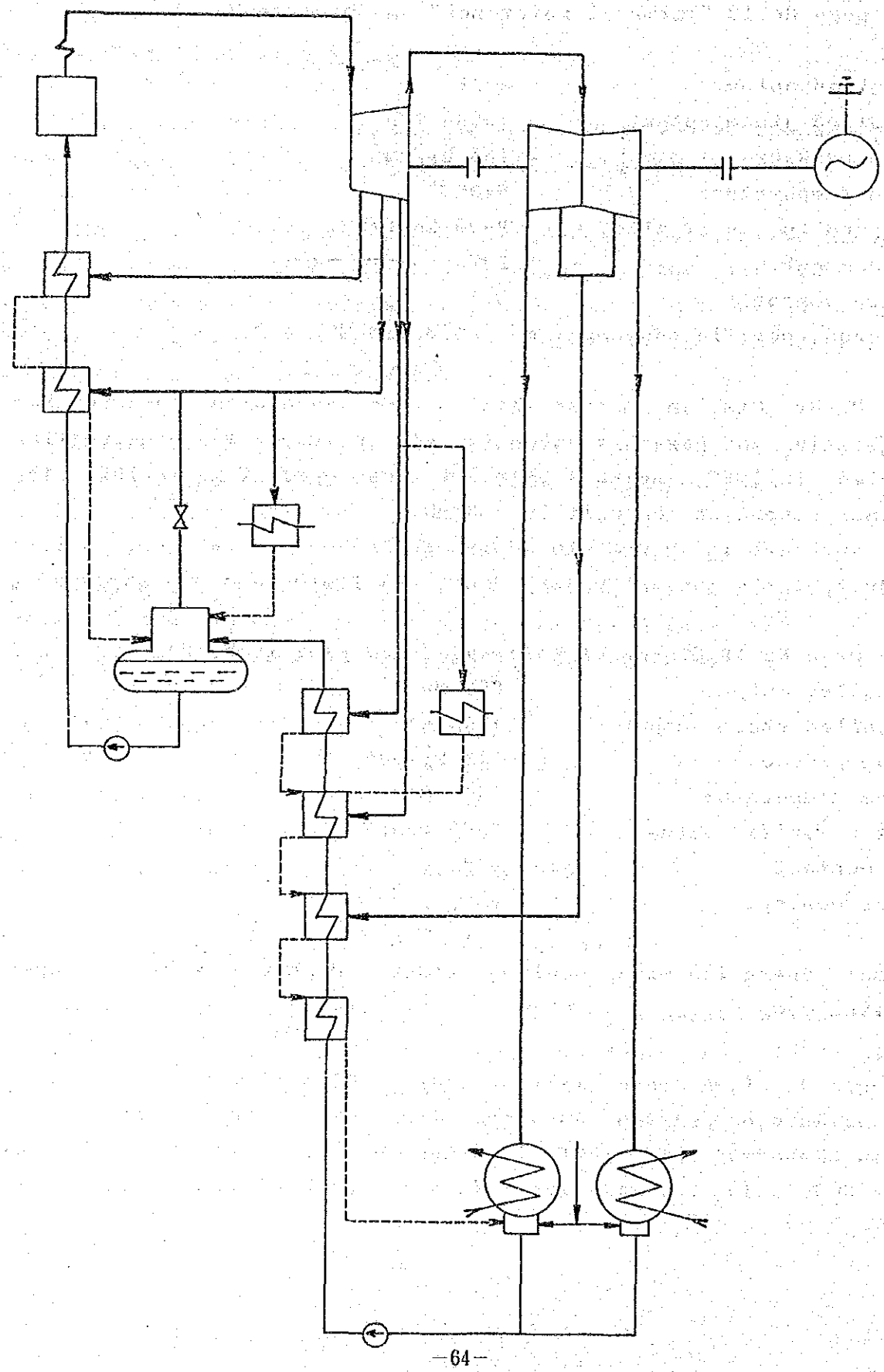
(See page No.19 "Terms of reference" and picture No.3).

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.

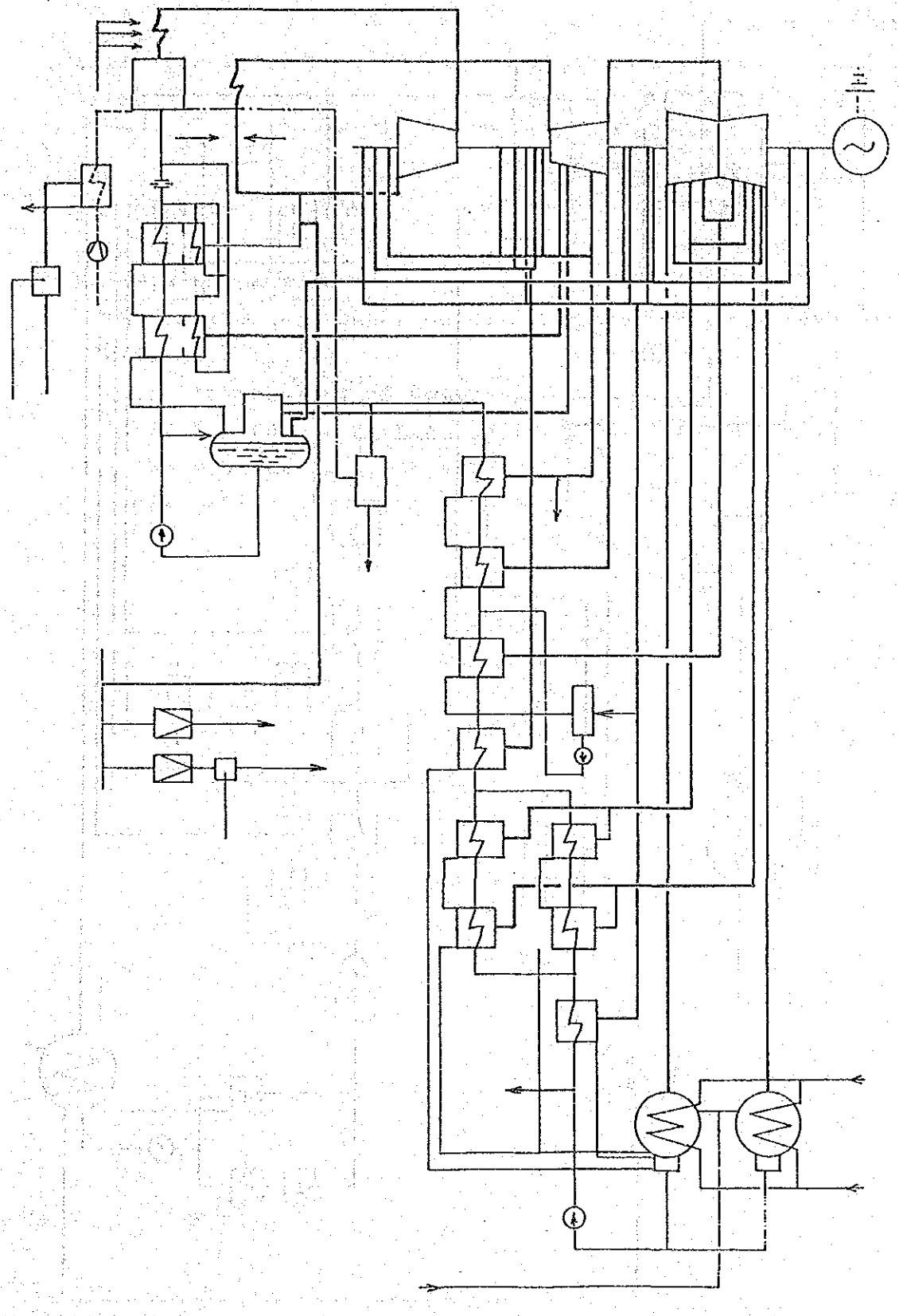
EMĚ I

PICTURE No. 1



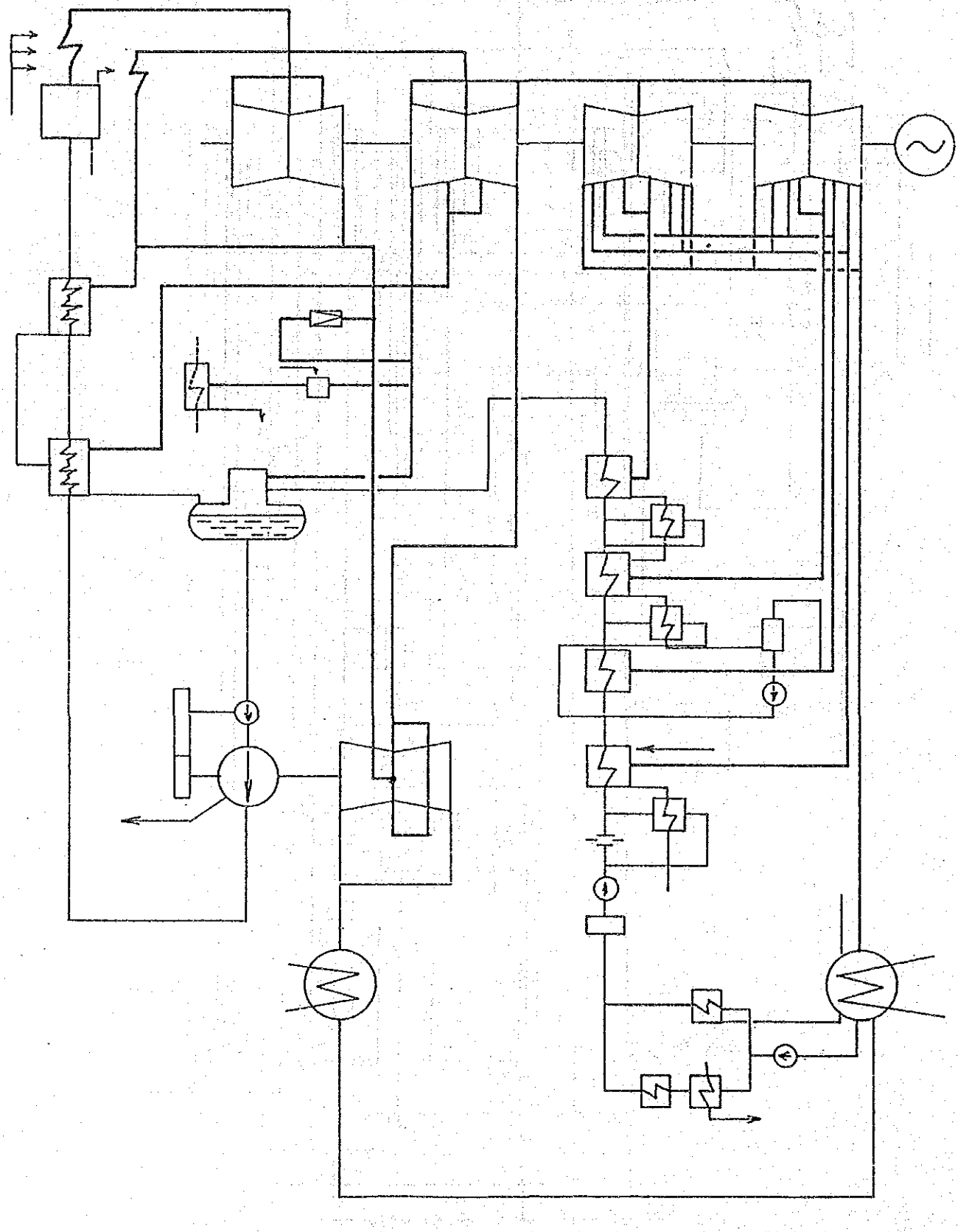
EMĚ II

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^{d} (%)	-	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 - chemical qualities 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)

Point 13

Monitoring system in the Power Station of Mělník, 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 % EMĚ 1	part % EMĚ 2	part % EMĚ 3	Immission NO_x ug/m³			part % EMĚ 1	part % EMĚ 2	part % EMĚ 3
Mělnik	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	
Nerato-vice	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	
Choru-šice	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

Point 17, p.1

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. effiecicency	Qir	MJ/kg	11,28	10,39	10,56
sulphur	Str	%	0,93	1,50	1,38

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 17,p.2

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

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
Jiří	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).

Point 19,p.1

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 - cca 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 maintenance 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.

Point 19,p.2

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 Libereo. 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 seleotion 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: ohimneys (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 Frenoh 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.

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:

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

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

Evidence list of fly. ash 1990.

(extract from ORGREZ report)

Combusted coal data :

1. monthly coal comsuption t/month
2. coal calorific value kJ/kg
3. complete water consumption
4. ash in coal
5. all sulphur
6. Avarage monthly production of solid residue
7. ash
8. cinder
9. fly ash
10. Fly ash characteristics :
11. softerning 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. contend of soluble salts
20. fly ash specific weight kg/m³
21. fiber, fly ash specific weight kg/m³
22. fly ash deusing
23. slip angle
24. ash loose angle
25. Granulomebric fly ash screen method :
26. above screen 0.050mm granule
27. 〃 0.030 〃
28. 〃 0.075 〃
29. 〃 0.077 〃
30. 〃 0.008 〃

31. above screen 0.006 granule (coru) 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_3

43. Na_2O

44. K_2O

45-55 chemical elements As-Hg

56. Radiometric fly ash analysis :

57. specific activity of Ra 226

58. specific activity of Th 220

59. specific activity of R 40

62.

63. The basic analysis of fly ash water extract reach (50a/F after)

64. pH

65. total acidity

66. visible alkalinity

67. total alkalinity

68. maugan number

69. el. conductivity

70. evaporation residue 105 ℃

71. annealed evaporation resdue

72. hardness

73-82 chemical elements SO_4-K

83. The volume of trace elements in fly ash leach in 2, HNO

84-92 chemical elements Be-Zn