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CENTRAL MAINE POWER COMPANY

UTILITY CONSULTANCY PROGRAM

USAID Cooperative Agreement
EUR-0030-A-4057-00

FINAL REPORT

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I. INTRODUCTION

The United States Agency for International Development (USAID) awarded a Regional Energy Efficiency Cooperative Agreement (EUR-0030-A-00-4057-00) to Central Maine Power Company (CMP) on September 6, 1994 to provide in-depth assistance to the Natsionalna Elektricheska Kompania (NEK) in Bulgaria. Total estimated program amount was $1,374,937 of which USAID agreed to fund $963,000 and CMP agreed to provide a match of $411,937. The original program period, September 1, 1994 to August 31, 1996, was extended by USAID to March 31, 1997. A copy of the project work plan is provided in Appendix A.

This Final Report summarizes the work that has been completed by CMP and NEK over the last 2½ years. The expected results as outlined in the original work plan, accomplishments, and recommendations for future work are presented for each task. As part of the preparation for putting together this Final Report, a Wrap Up Meeting was held on March 26, 1997 in Sofia, Bulgaria to discuss the results of the work done under this program. NEK task managers presented a summary of the work completed under each task and subtask. They also described how this work has impacted the daily operations of NEK and made recommendations for follow on work to continue the process of improving their planning and operational capabilities. A copy of NEK's written report is contained in Appendix B. Their comments are also included along with CMP's comments in this report.

The cooperative agreement included four major tasks:

Task A - Least-Cost and Integrated Resources Planning
Task B - Financial/Accounting System Design and Management
Task C - Competitive Bid Systems and Independent Power Procurement
Task D - Environmental Technology Assessment and Financing

Several expert subcontractors assisted CMP in the delivery of these services. In particular, Richard Spellman from GDS Associates, John Locher from Electric Power Software, and Jeff Amlin from Systematic Solutions assisted with Task A. John Gulliver, Catherine Connors and Louise Thomas from Pierce Atwood assisted in Task C. John Bastey from Weil and Howe and Daniel Boxer from Pierce Atwood assisted with Task D. All of these subcontractors contributed to the cost sharing match.

The overall objectives of the workplan have been met, but there are still significant changes which must be made by NEK as it completes its transition to the new market conditions. Under Task A, NEK staff have implemented tools for performing integrated resources planning , including: a production cost model, IRP manager; a demand side management tool, DSManager; and a load forecasting model, Energy 2020. NEK staff is expert in the use of IRP Manager. They are trained, but not yet expert in the use of DSManager and Energy 2020. As the economy stabilizes in Bulgaria, NEK should put more emphasis on the use of these tools and integrate their use with the Finance and Budgeting Departments.

Under Task B, NEK management personnel have been trained in the goals and objectives process used at CMP. Due to management turnover during the course of this work, not all of NEK's management team has received this training. However, enough of those trained remain at NEK so that they should be able to implement a system similar to CMP's. Also, significant financial models were customized to NEK's situation. NEK staff provided valuable assistance in this effort and is fully knowledgeable about the model's use. The models include a Monthly Financial Model, a Buyer's Report to track payments due and made, and a 5-week Cash Forecasting Model. These tools should help NEK better plan for contingencies and predict financing needs. NEK should strengthen the links to the Budget Department and Branch offices both for providing data to and using results from these models.

NEK and CMP successfully developed a Standard Power Purchase Agreement for purchase of power from private suppliers under Task C. NEK's next step should be to use this standard agreement as the basis of specific negotiations with an independent supplier. The standard agreement is most applicable for a short-term (1-3 years) arrangement. Work should continue to modify the document to apply to longer-term contracts.

Under Task D, CMP has provided NEK with an environmental standards database and assisted in the evaluation of Bulgarian environmental regulations and policy. Importantly, an environmental management system has been put in place at Maritsa East 3 TPP. A consultant for the European Bank for Reconstruction and Development (EBRD) has said " ...the programme could provide a basis for environmental management at the plant...[the environmental management program] is a step towards environmental improvement and its further development should be encouraged and, if possible, assisted." This environmental management system should be transferred to NEK's other plants. Monitoring equipment should be installed at NEK's plants and a periodic auditing process should be established to ensure continued environmental improvement.

II. DETAILED STATUS REPORT

A. Least-cost and Integrated Resources Planning

Task A.1 Production Cost Software Implementation
Task A.6 IRP Optimization and Plan Development

Expected Results:

NEK will establish the software, data, user base, and procedures necessary to have a self-sufficient production cost model analysis capability. They will complete a base case database for 1995 and 1996 and annual forecasts of marginal cost, energy balances, and fuel costs. (Task A.1)

NEK will complete two annual versions of their energy resource plan and will receive training in fundamental integrated resource planning methods. (Task A.6)

Accomplishments:

IRP Manager is a production cost simulation model that can be used for long-term power supply planning. The model, the basic tool needed to develop a least cost and integrated resources plan, has been installed and adapted to conditions facing NEK. CMPI staff worked with NEK staff responsible for production cost analysis on modeling issues and reviewed model results. NEK staff is fully trained in the use of IRP Manager software installed earlier with assistance from CMPI staff. They have been using this program to develop least cost plans for presentation to NEK management, the Committee of Energy and the World Bank since 1995. A copy of a Least Cost Development Plan for the Electric Power Sector of Bulgaria is contained in Appendix C. The World Bank has provided written commendation about NEK's use of this tool.

Recently, IRP Manager was used to develop a new least cost plan for Bulgaria. A number of different scenarios were presented to NEK's management for consideration. Three scenarios were selected as the basis for future policy and strategy decisions within the company. NEK management has decided to update the plan annually with projections through the year 2010. The results of the plan have been presented to the World Bank and EBRD as part of the preparations for new loans. (See Appendix D for a copy of the Strategy and Least-Cost Planning of the Power Sector of the Republic of Bulgaria.) The Least-Cost Plan has also been provided to the European Union as part of Bulgaria's presentation for membership into that organization.

Mr. Kaloferov reported the following results of this work:

1. Using the model to analyze various scenarios, the company has formulated an investment program through the year 2010. This program is used as the basis for short term investments within the company.

2. The model provides optimal loading for existing facilities used by the Budget and Finance Departments and by the Dispatch Center for short term planning.
3. The model can provide a forecast for reasonable and adequate electric prices, which are further refined by the Finance Department.

Recommendations:

1. NEK Research and Development Department staff should participate periodically (perhaps once a year) in user group meetings regarding IRP Manager, or have advanced training provided in Sofia, to stay abreast of new developments with the software.
2. NEK should more fully integrate the results from the Research and Development Department into the budgeting and financial planning processes.

Task A.2 Load Forecasting Methods

Expected Results:

NEK will receive training on alternative forecasting methods, develop enhanced long term load forecasts for 1995 and 1996, and create an action plan for developing models and data collection systems needed for further development of their load forecasting capabilities.

Accomplishments:

In September 1995 NEK chose to use the Energy 2020 model to do load-forecasting. A key advantage of Energy 2020 is that it performs an energy use simulation to do load-forecasting rather than depending on econometric techniques. Therefore, it can operate successfully with limited historic data, as is the case with NEK. The model was installed and customized to simulate the Bulgarian economy. Revisions included a constraint on the amount of district heating, especially water heat, and the construction of an interface between the Excel input spreadsheet and the Energy 2020 model. The user's guide was also revised to include instructions on how to input data into the model.

A Load Forecasting Seminar was presented in Sofia and attended by approximately twenty (20) NEK staff from the budgeting, finance and planning departments. Four trips (3 to Sofia, 1 to Dayton, Ohio) were related to the delivery and installation of Energy 2020 at NEK. Jeff Amlin from Systematic Solutions also provided training and hands-on instruction on the use of the model. The training emphasized the "how-to's" of using the model and preparing a forecast. The training included going through the process of constructing a load forecast. Steps included reviewing the initial draft forecast; reviewing and resolving data issues and preparing a list of data needs; calibrating the model and setting parameters; producing and reviewing a new forecast; and revising the forecast by adjusting input data and calibration parameters. As a result, NEK staff now has an operational load-forecasting tool that can forecast energy consumption by customer category and can also consider economic factors such as income.

Recommendations:

Severe economic conditions in Bulgaria dictate that caution must be exercised in the application of any load-forecasting tool. Factors, which would be reliable controlling parameters for a forecasting tool under relatively stable economic conditions, can lose validity under the extreme condition now being experienced in Bulgaria.

1. NEK staff should continue to customize the data in Energy 2020 for Bulgaria's conditions and test the model with different assumptions. NEK would like to continue working with CMP and Systematic Solutions in this regard.
2. The model should be updated as new versions are produced. When Bulgaria's economy stabilizes somewhat, Energy 2020 should be a valuable tool to help NEK predict what its sales will be.

Task A.3 DSM Planning Methods and Software

Expected Results:

NEK will have a proven DSM planning model for use in DSM planning, be trained in the fundamentals of DSM planning and models, and will have a plan for establishing a data collection system for DSM planning.

Accomplishments:

Richard Spellman from GDS Associates in Marietta, Georgia presented demand-side management techniques used in the United States to NEK personnel during a seminar held in Sofia, April 3-7, 1995. Topics discussed at the seminar included: Introduction to DSM; Basics of Benefit/Cost Analysis and Review of Techniques Used, DSM Program Implementation and Marketing; and Information Needed for DSM Program Planning and End-Use Forecasting.

The DSManager software program, by EPS Solutions in Minneapolis, Minnesota used for demand-side planning, was installed and demonstrated during the same week. DSManager identifies DSM measures that will provide low-cost, reliable service and help utilities meet energy efficiency goals and lower environmental impact. Mark Germer, Vice President, EPS Solutions, also spent one day at NEK answering questions regarding the use of DSManager.

John Locher, Jr., Vice President, EPS Solutions provided additional training on DSManager in the United States, July 17-21, 1995. Lyubomir Kaloferov, Pancho Sipkov, Nikolay Iliev, and Stefan Kanchovski from NEK participated in the week long training. The training included a review of NEK case studies on compact florescent light bulbs, sodium street lighting and the use of gas for heating, cooking and water heating. Other topics addressed at the session included developing price elasticity equations, marginal cost and avoided cost calculation techniques, load and customer research techniques,

validation of DSM assumptions, and the interaction between marginal costs and pumped storage dispatch.

In October 1995, Timothy Clark of CMPI and Richard Spellman of GDS Associates conducted a DSM Planning Methods Workshop for NEK. The workshop included the following:

- Discussions on energy efficiency projects in Eastern and Central Europe;
- Summary of eight industrial audits conducted by IRG in 1991-1992 in Bulgaria;
- Energy efficiency programs at Central Maine Power Company;
- Demand-Side Management Action Plan for NEK;
- DSManager data used in the Bulgarian model;
- International DSM and DSM Program Evaluation information provided by the International Database on Energy Efficiency Programs Project sponsored by Lawrence Berkeley Laboratory in Berkeley California;
- NEK was also provided with a list of data sources in Eastern and Central Europe for energy efficiency projects and emissions reduction projects.

The Demand-Side Management Action Plan provided to NEK presents methods for data collection and development of a comprehensive demand-side management database for the NEK. The action plan presents a method for identifying the NEK's DSM objectives and data needs and developing a comprehensive, up-to-date, database on DSM measures suitable for implementation in Bulgaria. It also presents a method for collecting necessary market research data, load research data, and customer energy usage data for DSM planning and a methodology for DSM planning. The action plan is comprised of fifteen tasks. As a follow-up to the plan NEK was provided with a summary of NEK responsibilities relating to the DSM Action Plan and time requirements for the NEK Staff.

CMPI and GDS Associates also assisted NEK in developing a residential consumer survey which included a statistical analysis for determination of sample size, possible sample implementation techniques, post-stratification techniques, sample design statistics, analysis of sample data, and future use of sample statistics.

In November 1996 Tim Clark and Dick Spellman traveled to Sofia to introduce the concept of a low-cost, no-cost energy efficiency information program in Bulgaria. NEK was provided with brochures from the United States and Central and Eastern Europe as examples of low-cost information programs. Discussions were held with representatives from the Information and Public Relations Department regarding the benefits of these types of programs for customers and the utility.

Recommendations:

1. NEK should complete the survey sampling plan and conduct the residential consumer survey. Results should be used to develop a comprehensive energy efficiency information program and to develop future load forecasts for the NEK service area.

2. NEK should develop a comprehensive energy efficiency information program for all classes of customers, as suggested during our visit in November 1996.
3. NEK should conduct energy audits for major customers who have not yet had an audit.
4. NEK should explore financing of energy efficiency improvements for large commercial and industrial customers with international lending sources (IBRD, IFC, World Bank, etc.).
5. The Hagler Bailly DSM technical potential study of 1993 needs to be updated with the steps described in the DSM plan developed by CMPI. These steps include development of an up-to-date database of energy efficiency options (including costs and load impacts), phase 1 and phase 2 economic screening, and then program design and implementation.
6. NEK should develop a booklet for customers listing the most efficient household appliances.
7. Further training should be conducted by CMPI, targeted at NEK Planning and District Office staff on how to implement energy efficiency information programs. NEK will need CMPI's assistance to get an energy efficiency information program off the ground.

Task A.4 Customer Energy Efficiency Collaboration

Expected Results:

NEK will establish a process for working collaboratively with customers on energy efficiency and plan for future actions with the participating customer. This task will also provide tangible examples of programs and data that will be useful in Tasks A.2 and A.3.

Accomplishments:

During a trip to Sofia in October 1995, Stefan Kanchovski, Ivan Shishkov, Yulia Yurukova, Richard Spellman, and Timothy Clark traveled to Kazanlak to visit Katex, an industrial textile manufacturing company. NEK chose Katex to participate in this task. The group met with Anko Azalov, the Managing Director of Katex. Mr. Azalov provided a tour of the facility and then discussed the possibility of participating in this project. Mr. Azalov agreed to participate as long as the training was results oriented.

In April 1996, Tim Clark, CMPI and John Rasmussen, Central Maine Power Company, traveled to Sofia to provide a training seminar on "Industrial Customer Service". The training consisted of the following topics:

<u>Section I:</u>

Overview of Central Maine Power
Review of Energy Services and Sales Department
The Teaming Approach

Section II:

Customer Service in the Past
The Current Approach to Customer Service
Services Under Development

Section III:

A Detailed Review of Energy Management Services
The Industrial Services Team

Section IV:

Developing Positive Customer Relationships
Wrap-up and Feedback Discussion

Lyubomir Kaloferov and eleven NEK employees attended the training seminar from the Headquarters and the Sofia branch office. The seminar was repeated in Stara Zagora, the district in which Katex, the target industrial customer, was located. Gocho Chemshirov, head of department, and twelve NEK employees attended the seminar from the Stara Zagora headquarters and its five branch offices.

Following the seminar, a meeting was held with Mr. Anko Azalov, Managing Director of Katex, Mr. Nickola Dimitrov, Facility Manager, Katex, Mr. Gocho Chemshirov, NEK and John Rasmussen, CMP. The discussion focused on Katex's current energy service needs and concerns and ways in which NEK could provide value-added services to Katex. This involved an overview tour followed by investigations of specific systems and equipment and an analysis and status report. A report was produced documenting energy efficient opportunities both short term and long term.

In March 1996, Lyubomir Kaloferov, NEK, Ivan Shishkov, NEK, Gocho Chemshirov, NEK, and Nicola Dimitrov, Katex, traveled to Maine. The objective of their visit was to learn how CMP forms partnerships with its industrial customers. The visit consisted of various site visits to industrial customers and in-class training on the team approach. The structure and responsibilities of CMP's Major Accounts Team, which works exclusively with industrial customers, was also discussed in detail.

Part of this task was to try to secure outside funding sources for a pilot project with Katex. Meetings were held with the World Bank and the European Bank for Reconstruction and Development to discuss this issue. It was found that these institutions were interested in providing funds for much larger projects then we were proposing. The search for funding fell short of its goal, but should not be abandoned.

Recommendations:

1. Work with NEK to identify and secure funding sources to implement a pilot energy efficiency project at Katex.
2. Develop a database to collect energy information on industrial customers to better target energy efficiency activities.
3. Develop an industrial department that focuses exclusively on the needs of NEK's industrial customers.

Task A.5 Investment Analysis Training and Case Study

Expected Results:

NEK employees will be trained on application of IRP models and methods of analysis of investments and will complete an investment analysis case study.

Accomplishments:

An economic analysis course was presented twice, once in Sofia to 19 NEK Headquarters and Power Plant staff and once in Stara Zagora to 18 NEK Power Plant employees.

The course focused on comparing alternatives for a given objective and determining if a cost-saving capital project is economically feasible. Two computer models were demonstrated. The primary model was "Revenue Requirements" model, which is appropriate for a regulated utility that operates under a traditional rate-base/rate-of-return system. The other model was a "Discounted Cash Flow" model, suitable for a deregulated generating company operating in a competitive environment. Copies of the Excel models were left with NEK personnel.

Two members of NEK's Investment Department staff visited CMP to study, in more depth, how CMP makes investment decisions. Topics covered during the visit included generation planning process, capital budgeting process, and deregulation. Past investment analyses for a balanced draft converter at the Wyman Thermal Power Plant and turbine upgrades and new condenser for the Maine Yankee Nuclear Power Plant were reviewed in detail with NEK. In addition, CMP worked with NEK on an analysis of the economics of a bid evaluation related to a scrubber for the Maritsa East 2 Power Plant.

Recommendations:

1. NEK's Investment Department staff should continue to use the sophisticated tools, which it has for making investment decisions.
2. The use of these tools should be promulgated to the Supply Branches decision making process as well as to the Power Plant and Investment Branches.

B. Financial/Accounting System Design and Management

Task B.1 ***Establish a Multi-Year Corporate Planning System***
Task B.2 ***Design and Implement a Budgeting Process***

Expected Results:

NEK will be capable of developing short and long term goals and objectives and a multi-year budgeting process. An operating budget system will be developed which may include the design of a budget model that would be programmed by NEK.

Accomplishments:

Meetings were held in November 1994 with Len Rogers, USAID; Connie Irland, CMPI; and Damien Hristov, NEK to discuss the work plan for subtasks B.1 and B.2. At the outset Tasks B.1 and B.2 were combined under the Corporate Planning System (Goals & Objectives) heading. NEK's major concerns in 1994 included a lack of coordinated integrated planning and a formal goals process. CMP representatives met with Mr. Hristov and his staff in Sofia in January 1995 to exchange information and clarify the next actions. The results of the week's work were summarized and presented to Mr. Anastassov, who at the time was the Executive Director responsible for Electricity Supply and Budget. CMP agreed to begin work immediately on developing a Goals program and comparisons of budget forecasting processes.

An Interim Report was provided to NEK and USAID on March 31, 1995. (See Appendix E.) This report discussed the development of a Goals & Objectives program within CMP and NEK and the role of organizational structure and communication in implementing a G&O program. It also outlined the next steps for establishing a G&O program at NEK.

During July 1995 NEK representatives visited CMP as the second official trip associated with Task B. Work efforts focused on developing draft Goals & Objectives for NEK and beginning consultative work on cash management. The week began with a discussion of the overall direction of the task and a review of deliverables. The group agreed that, by the end of the week, it would produce draft goals, a draft communication plan and a draft implementation plan. NEK representatives would review the G&O program proposal with its management and determine the next step.

CMP representatives visited Sofia in March 1996 and held extensive discussions with the lead management team at that time. As of April 1996, this cooperative effort had strong momentum. Unfortunately, management changes and other external realities have beset NEK in recent months and effectively slowed any progress. (See Appendix F, Memorandum and Trip Report, May1996, for a complete summary of the discussions with NEK management.)

Recommendations:

1. CMP recommends that a formal Goals & Objectives program be implemented at NEK.

Task B.3 Design a Cash Management System

Expected Results:

NEK will establish a cash management system, including 12-month cash forecasts and short term financial strategies.

Accomplishments:

The process of forecasting cash availability at NEK was reviewed and management's needs were defined. In order to provide NEK management with an improved process for forecasting cash needs and availability, three computer models were developed which can be used jointly to project cash needs. These models include a monthly financial model, a five week cash forecasting model and a model to be used by each of the buyers in the Procurement Department to record future cash commitments associated with contracts made by NEK and its vendors for materials, supplies and services.

These models generate numerous reports and graphs that provide information to management about future cash availability and utilization. The models have been constructed in a way to accommodate reporting and accounting methods that are unique to Bulgaria. For example, one calculation determines the amount of value-added tax received and paid and the amount due to the government, if any. Another feature allows selection of an option to capitalize interest on construction, which is done on projects financed by foreign sources but not on projects financed domestically. Forecasted purchases in the procurement model can record payments in seven different currencies, all of which is automatically converted into Bulgarian leva. Features were also included in the models to help minimize the amount of data input required.

A presentation was made in March 1997 to the management of NEK's Finance Department which discussed the features and applications of the models. A comprehensive final report on the project was also provided to NEK management. (See Appendix G.)

The 5 week cash flow model is currently being used by the Finance Department to forecast cash requirements. It assists the department in planning for large purchases requiring significant cash outlays and assists in decisions concerning investment of cash when there is a temporary surplus. The annual financial model has been used to present reports to the World Bank on the financial status and obligations of the company. However, the volatile economic conditions in Bulgaria make it difficult to use the models to forecast with confidence. NEK has suggested that another model be developed which

uses cash as a basis and is linked to the corporate financial model. This will allow the Finance Department to compare indirect and direct methods of forecasting.

Recommendations:

1. Develop a way to classify variances as temporary or permanent, so that longer-term forecasts are not influenced by temporary conditions.

2. Develop a way to adjust the forecast to a rolling 12 month forecast.

3. The process of gathering and inputting data on a timely basis should be reviewed and streamlined wherever possible in order for cash forecasts to be useful.

4. Efforts by NEK to network the Branches with Headquarters so that cash data can be transmitted quickly and with minimum manual intervention should be supported.

5. Branch personnel should receive training on the importance of cash forecasting and the best methods to use, so that there is consistency among them.

6. Stronger information links should be established between the Finance Department and the Research and Development and Budget Departments.

C. Competitive Bid Systems and Independent Power Procurement

Frederick Woodruff and Robert Gasper of Central Maine Power Company and John Gulliver of Pierce Atwood, a Portland, Maine law firm, comprise the Independent Power Procurement team. The team made visits to Sofia, Bulgaria in March and July 1995. In July 1996, the NEK team visited Central Maine Power's headquarters in Augusta, Maine.

During each trip, the group reviewed the status of the proposed energy legislation for Bulgaria as well as the issues necessary for the development of a standard power purchase agreement for purchase of power from private suppliers.

There was also discussion regarding the negotiation of an agreement with private suppliers using the newly developed model power purchase agreement. The parties agree that this idea has merit. However, Bulgaria will need to get itself much further along in the privatization process in order for this effort to be fruitful.

Task C.1 Assist NEK in its Evaluation of Evolving Bulgarian Regulations and Policy

Expected Results:

NEK will receive assistance from U.S. experts in independent power issues in formulating policy positions and action plans on independent power development in Bulgaria. Recommendations will be documented in a report to NEK and USAID.

Accomplishments:

During CMP's first trip to Sofia in March 1995, CMP conducted a detailed workshop to review the evolution of the laws and regulations surrounding the development of the independent power production industry in the United States. John Gulliver, Frederick Woodruff, and Robert Gasper described the Public Utilities Regulatory Policies Act (PURPA) and the Energy Policy Act of 1992 and the resultant regulations that were promulgated within the state of Maine.

CMP and NEK team members participated in a vigorous exchange of ideas and questions surrounding the pending energy legislation under consideration by the Committee on Energy and how it sounded strikingly similar to that in the United States. However, unlike in the United States, there appeared to be very limited opportunity for NEK to make or suggest changes during the development process.

CMP requested translated copies of the proposed legislation. However, the document was so large and so preliminary that NEK recommended against a copy at the time. Additional versions were about to be released that would hopefully reflect some of the suggestions of NEK. The final legislation was expected to be issued during the summer of 1995.

During our discussion of the legislation, CMP emphasized to NEK that certain issues of the final legislation would be critically important to NEK's negotiating flexibility. Contract pricing, term of the agreement, unit dispatchability, and early termination provisions are among the most critical areas where NEK will want to focus its efforts. Failure to achieve flexibility in these areas will result in problems similar to those being experienced in the United States.

There was a detailed discussion regarding the instability of the infrastructure of Bulgaria. In order to attract private investment to the country, it will be necessary for the Bulgarian government to provide for a stable financial and regulatory environment so that IPP's and NEK will have a foundation for the assessment and allocation of risks among parties. On the legal front, it will be necessary to ensure that contract provisions will be enforceable. It was also stressed that the Bulgarian government will need to improve its monetary policies. Stability of the currency (leva) will need to be established before private investors will consider investment in the country.

Boyan Dimitrov, Committee of Energy, made a presentation to the working group regarding the proposed energy legislation. It was troubling that the explanation sounded remarkably similar to the regulations that were in effect in the United States. After the presentation, CMP personnel again stressed to the NEK staff the importance of flexibility in the final energy regulations and sent excerpts of contract language to NEK to illustrate the kinds of flexibility that is needed to succeed in contracting with private developers.

During CMP's second trip in July 1995, this area was reviewed again. There was very little progress in the Parliament with the energy legislation between the March and July visits. Between the July 1995 and July 1996 visits, the legislation still was not finalized.

Task C.2 Develop Standard Purchased Power Contract Principles &
Task C.3 Review other Legal Issues

Expected Results:

NEK will develop standard contract terms for use in market-based independent power projects. NEK's Legal Department will gain an understanding of the different types of contracts typically used in the U.S. utility industry and will be able to assess whether to adopt some of the same contract principles at NEK.

Accomplishments:

These tasks represented the primary effort of the CMP and NEK teams in Task C. At our initial visit in March 1995, the CMP team conducted a presentation aimed at familiarizing the NEK team with the history of the IPP industry in the United States. We also described the fundamentals required to attract capital investment from outside sources.

Among the issues discussed was the need for stable legal, economic, and political environments within Bulgaria. This includes the need for the regulatory agency to be

clear in setting policy that will encourage independent power producers to consider development within the country.

During this visit, there was considerable discussion about the kinds of contract terms that needed to be included in a standard power agreement. CMP shared a copy of its standard agreement and requested the NEK team to propose an outline of terms that they felt were appropriate to be included in their agreement. CMP felt strongly that NEK had to work through this process on their own in order to feel ownership of the final product.

Between the March 1995 and July 1995 visits, CMP and NEK exchanged proposed outlines of contract terms. In addition, CMP provided a memorandum of suggested price protection mechanisms that should be considered in drafting an agreement. We also encouraged NEK staff to suggest changes to the proposed legislation reflecting the ideas of the memorandum.

There was discussion about the need to develop standardized requirements for electrical interconnection with private power producers. CMP briefly reviewed its current interconnection standards with technical staff of NEK. The teams decided that the production of such a manual would be useful and should be developed at a later date. CMP offered to assist with this when the NEK team felt the time was appropriate.

During this week the attendance was good and interest was very enthusiastic. NEK had personnel representing all facets of the business. To list a few of the principles, there was Dobreva, Head of Legal, Stoimenov of Budget and Finance, Kaloferov of the Research area, Stoikov of Engineering, Popova of Power Supply, Mechkarski of Generation, and Petkova, Tomov, Bratovanova, Arshinkova, and Simeonov of the Legal Staff. At the conclusion of the March 1995 meeting, the teams agreed to a schedule for the development of the desired document.
In July 1995, CMP made a second trip to Sofia. The primary purpose of this trip was to receive an update on the proposed energy legislation and begin finalizing the principle terms to be included in the draft agreement. There was basic agreement on the areas that should be included in the draft agreement. Team members discussed specific language and the reason for its inclusion in the NEK version. CMP provided many examples of disagreements with parties resulting from unclear contract language and recommended ways to avoid these difficulties.

Overall, good progress was made during the week. Particular emphasis was given to the areas relating to delivery incentives, contract extensions, term, early termination, defaults and cure provisions, and damages and dispute resolution. NEK then began composing a full-text draft for the CMP team to review.

This visit was attended by three principals: Michail Stoikov, Nadka Popova, and Dimitrina Petkova. Mrs. Popova and Mrs. Petkova were assigned the principle responsibility of preparing the first full-text draft agreement.

On the last day of this visit, CMP met with U.S. AID representatives Lada Stoyanova and John Tennant to review the progress to date. During this visit, there was continued

interest in pursuing a pilot negotiation with a privatization project. CMP discussed this option with Shishov who felt it was a good idea. He pledged to contact us as the privatization effort unfolded and the right project presented itself.
During late fall of 1995, CMP contacted NEK to encourage them to forward draft sections for review as they were completed. NEK agreed to do so. As a result, the first half of the agreement was received on January 12, 1996, and the second half on March 29, 1996.

CMP staff met to discuss the draft and prepare comments. The comments were sent to NEK on June 12, 1996, along with an invitation for the NEK team to come to the United States to continue work on the model agreement. The team agreed to come to CMP's offices during the week of July 15-19, 1996.

During the July 1996 visit, CMP and NEK completed a comprehensive review of the latest draft model agreement. It was quickly taking final form with the exception of a few areas that needed research back in Sofia. This contract, when completed, would be applicable to short-term purchases only. In order to be applicable for long-term purchases, additional sections will be necessary to allow financing of the projects by investors.

During this visit, CMP invited two of John Gulliver's colleagues to give brief presentations. Cathy Connors discussed her experiences with the privatization efforts in other Eastern European countries. She reviewed some of the differences and similarities between progress in Hungary, Romania, Czech Republic, and Bulgaria. It became clear that the successes of the other countries was due to the desire of the political leadership and the people to move forward aggressively with privatization.

Another colleague, Louise Thomas, gave a presentation concerning the potential for litigation that can result from third party contract agreements. She emphasized that NEK's willingness to re-negotiate agreements will not always provide a solution to language disputes. She stressed that contract language should be prepared very clearly and carefully with the intent of minimizing ambiguities. Various dispute scenarios were discussed.

The team agreed that NEK would prepare a final draft for CMP's review, which was forwarded on August 23, 1996. CMP reviewed the document and on December 23, 1996 offered a few final suggestions for improvement. A copy of the model Power Purchase Agreement is included as Appendix H.

The CMP working group feels that this project was very successful. It is apparent that the NEK staff is capable and desirous of proceeding with independent power negotiations given the proper political and regulatory infrastructure.

Recommendations:

1. As the parties worked through the language of the draft agreement, it became clear that it would be very worthwhile to take the final product and assist NEK in

negotiating a contract with an independent supplier. This issue was discussed at length during each of the visits. NEK staff had suggested one or more small hydro power plants in the Rhodes Group that have recently privatized as candidates for contract negotiations. CMP currently stands ready to pursue this course of action when the conditions in Bulgaria are right.

2. The model power purchase agreement that was developed should only be used for short-term arrangements (1-3 years). At the appropriate time, work should continue to modify this model to include the necessary language to make it applicable for long-term supply arrangements. This will primarily require development of language provisions that will make the document financeable.

3. It is highly recommended that a pilot contract negotiation process be considered. It would prove highly beneficial to the NEK staff and would broaden their appreciation for the difficulties that can arise during bilateral negotiations.

4. NEK should develop a manual for IPP developers which contains interconnection standards.

D. Environmental Technology Assessment and Financing

The Natsionalna Elektricheska Kompania and Central Maine Power Company developed and implemented management methods and tools to manage better the environmental operation of the Thermal Power Plants (TPPs) in the NEK system. NEK and CMP accomplished this by reviewing NEK's current system, reviewing CMP's system and working together to develop environmental management systems that are similar to those of companies in the U.S. but serve the needs of NEK in meeting its requirements for the future.

The Natsionalna Elektricheska Kompania continues to face more and more stringent environmental standards, both Bulgarian and international. The practical effect of these regulations is to begin bringing the NEK power plants up to the operational standards of other European countries. In some respects, the lack of clean fuels and available funds will prevent many of the facilities from achieving these standards. NEK and its power plants will likely continue to seek funds from international sources to improve the environmental performance of their power plants. International lenders, such as the World Bank and the European Bank for Reconstruction and Development, each have their own environmental policies and requirements. They are used in loan decisions and must be followed by the loan recipients. From a practical standpoint, they are the equivalent of another set of regulations. In addition, the ISO 14001 Environmental Management Standard is now final.

The most studied and the most apparent environmental effect of the TPPs is air emissions, especially sulfur dioxide that is due chiefly to the burning of high sulfur fuel, the locally mined lignites. Without significant investment in control technology such as scrubbers, this fuel will continue to result in high sulfur dioxide emissions. Other airborne pollutants such as particulates are controlled to a significant degree through the use of electrostatic precipitators. The NEK air emission control technology needs have been the subject of many studies and reports which have led to the installation of scrubbers at one unit of the Maritsa East 2 facility. Other such installations are anticipated.

The air emission issue is not the only environmental problem facing NEK. In fact, all media including air, water, and soil are affected by the operation of the TPPs. There is a need to manage the environmental performance of these facilities to minimize the adverse environmental effects for all media. The basis of this management is a comprehensive program that can be applied to all TPPs. For this task, NEK and CMP selected one of the major TPPs in Bulgaria to use as the example facility for an environmental management system. The Maritsa East 3 facility was chosen for several reasons including its location in the heavily developed Maritsa East Complex, its environmental characteristics, and its operation is typical of other large TPPs. The idea was to develop management techniques and tools that could be transferred to other TPPs in the NEK system. This, in fact, has been accomplished, but the continued use and improvement of the system will depend on the importance attached to the concept of environmental management by NEK management and staff. In addition, the management of the plant must reinforce this commitment on a regular basis. The transfer of this technology to other TPPs and HPPs will only take place with a commitment on the part of corporate management and plant management at the particular facility.

The Methods Used

NEK and CMP assigned individuals with significant management, operational, and environmental experience. Representatives from each company were selected for this project based on similar roles within the respective company. NEK provided the services of their Head of Generation and Environmental Specialist from headquarters. The Maritsa East 3 TPP provided the services of their Plant Manager, Chief Engineer, Environmental Manager, and other senior management and technical staff. CMP provided its Manager of Environmental Compliance, Plant Environmental Engineer, Regulatory Consultant and other senior management and technical staff.

CMP met in Bulgaria with NEK headquarters and plant staff to understand the NEK system and the Bulgarian environmental regulatory system. NEK met in the U.S. with these CMP counterparts as well as those from other electric companies. In this way we were able to compare our existing systems and better understand those of the other company. CMP joined NEK several times in Bulgaria to review plant systems, emissions, discharges, and management systems. In addition, CMP and NEK jointly met with the Ministry of the Environment at the regional and headquarters level. NEK also had the opportunity to meet with the U.S. counterparts of these regulators.

Once the respective systems were understood, CMP developed management methods and tools based on U.S. operating experience that would apply to the NEK facilities. These were then brought to the Maritsa East 3 TPP where they were explained, reviewed, reworked and then implemented by TPP and headquarters management and staff. The activities included monitoring sessions, database reviews, plant walkdowns, pollution prevention management techniques, project financial analysis methods and workshops. In addition, organization, communication, monitoring and record keeping methods were developed. These cover areas including environmental management committee, technician level communication, and training needs.

At each step, both plant and headquarters were represented. NEK and CMP held a final meeting to promote the work to the other TPPs in the NEK system. This included a multi day workshop with environmental and management representatives from each of the TPPs. The entire environmental management system was explained to these representatives. These representatives were encouraged to begin using the techniques and to look to their associates at Maritsa East 3 and headquarters for advice and assistance. The Maritsa East 3 environmental staff shared their experiences in implementing some of these methods.

Description of the Task and Subtasks

The environmental management system for Maritsa East 3, developed as the prototype for the NEK system, has been issued in several draft forms during 1996. The Plan includes all of the subtask products:

1. Design and Implement an Environmental Performance Management System.
2. Establish an Environmental Standards Database at NEK.

3. Design and Implement an Environmental Performance Monitoring and Reporting System.
4. Develop an Environmental Compliance Plan.
5. Evaluate Evolving Bulgarian Environmental Regulations and Policy.

As we developed the project with NEK staff and management, we began shaping the entire effort as an environmental compliance program. Once developed for a particular power plant, it could serve as the template for use at other TPPs or HPPs. The Maritsa East 3 TPP is the facility used for the initial environmental compliance process that includes a useable environmental compliance program. The program is as complete a program as is used by similar companies in the U.S. However, because the existing environmental management program at Maritsa East 3 is not as mature as one in the U.S., we developed a customized program rather than simply transferring an identical one to Maritsa East 3 and NEK. The following subtasks are included in the Environmental Management Program for Maritsa East 3 and all are transferable to other TPPs, HPPs and headquarters:

Task D.1 ***Design and Implement an Environmental Performance Management System.***

Task D.3 ***Design and Implement an Environmental Performance Monitoring and Reporting System***

Task D.4 ***Develop an Environmental Compliance Plan***

Expected Results:

NEK will develop an environmental performance organizational structure and performance management system. An environmental performance monitoring and reporting system will be designed and implemented. An environmental compliance plan will be completed.

Accomplishments:

The Environmental Management Program is actually the beginning of one that will mature to those used throughout Western Europe and the U.S. The structure of this product is in the form of a manual but the essence of the product is in the form of the processes which we developed with NEK and which should be exercised on a consistent basis. In addition, this process is the beginning of a system that must continue to grow in concert with the TPP's and NEK's increase in environmental management sophistication, with the issuance of more stringent regulations, and with the requirements imposed upon NEK by its lenders.

For each part of this program, NEK and CMP conducted work in both the U.S. and Bulgaria. In the U.S. an exercise of nearly two weeks included a weeklong hands on demonstration of the system by CMP staff, regulators and international lenders. In addition, specialists from the legal/regulatory profession and from other utility companies contributed to this exercise.

The Environmental Management Program includes the following:

- Statement of Environmental Policy
- Facility Description
- NEK Environmental Goal and Objectives
- Maritsa East 3 Environmental Objectives
- Environmental Organization
- Environmental Communications
- Environmental Audit
- Environmental Training
- Definitions
- Wastewater Management
- Air Quality Management
- Non-Combustion Waste Management

For each of these general areas, CMP spent considerable time and effort in explaining how these are developed by western utility companies and then worked with NEK to develop initial versions of these specific to the NEK system and specific to the TPPs. The details of the program are in the attached documents. A copy of the Program is attached as Appendix I.

Task D.2 Establish An Environmental Standards Database At NEK

Expected Results:

A database of environmental standards applicable to NEK will be completed.

Accomplishments:

CMP worked with headquarters staff and the Maritsa East 3 Power Plant to develop a database of environmental standards. The product delivered is an *Access* based system that is similar to those used by CMP and other companies in the U.S. The prime purpose of such a database is to ensure that all environmental requirements - laws, regulations, administrative orders, and license conditions are cataloged and available to key staff at the power plant and at headquarters. Such a database is a basic management tool that helps assure that environmental standards are known, not forgotten, and that required compliance methods and times are documented. The basic goal of complying with all laws and regulations begins with the identification of the various standards.

The Standards database provided to NEK is one that needs to be updated regularly and issued to key staff on a monthly or quarterly basis. Each listing provides:

- The law, regulation, license condition
- The numerical or descriptive requirement
- The person responsible for the compliance action

- The frequency of the compliance action
- The date and time of the actual compliance

By reducing the various and sometimes complex requirements into an easy to read listing, the responsible specialist or manager will better understand his or her environmental responsibilities. This database must be maintained and issued on a regular basis to all appropriate staff and management. A copy of the database manual is attached as Appendix J.

Task D.5 Evaluate Evolving Bulgarian Environmental Regulations And Policy

Expected Results:

CMP will work with NEK on evaluation of any new environmental laws or regulations being developed in Bulgaria to determine their impact on the Company's operations.

Accomplishments:

Environmental laws and regulations are promulgated by national and regional jurisdictions, in Bulgaria, by the Parliament, Ministry of the Environment (MOE) and the MOE Regional Inspectorate. This is similar to the regulatory arena in the U.S. CMP and NEK used a practical approach to further understanding of this issue and how this part of the environmental business is managed in the U.S.

During their visit to the U.S., NEK met with Daniel Boxer of the CMP team. Mr. Boxer is one of the leading environmental attorneys in the United States and has represented many companies before the federal and state courts as well as before the USEPA and the several state environmental agencies. In a full day meeting Mr. Boxer explained the lobbying process to NEK representatives.

Mr. Bryce Sproule of the Maine Department of Environmental Protection explained the complex environmental laws and regulations on the State level and offered advice and information on how the regulated community can affect the content and the enforcement of these laws.

Mr. Ian Cohen of the USEPA spoke about some of the topics faced by industries in the US regarding acid rain laws and the enforcement of the Clean Air Act of 1990 which is one of the most important environmental laws ever passed in the U.S. In particular, he described strategies that are required for companies to comply with this law including the concept of emissions trading and banking.

Mr. Aantonasis Kocic of the World Bank met with NEK and CMP representatives to discuss some of the Bank's environmental requirements and to be available to answer questions of NEK and CMP. In particular, Mr. Kocic stressed the practical benefits of the environmental audit as a tool that the Bank relies on to ascertain the environmental performance of the loan recipient.

In Bulgaria, we arranged a meeting with the regional MOE Inspectorate in Stara Zagora to try to begin a process of regular meetings between regulators and the NEK. During that meeting, Dr. Barakova, Chief of the Inspectorate, convened a well attended meeting with her staff and NEK/CMP. We then met with Dr. Pevlovsky, Deputy Minister, MOE Headquarters Sofia. We conducted these meetings, in part, to learn more about the similarities and differences with the MOE and the USEPA. However, an important reason for these meetings is to foster a more familiar relationship between regulators and NEK. This theme was carried through in other work at the TPPs when a representative from the regional inspectorate was a participant in many of our meetings.

Over-all Accomplishments:

The success of the effort by NEK and CMP will be measured over the next few years and will really depend on whether or not NEK can sustain what was begun during this project. A few demonstrable gains were made which include:

1. A plant level environmental committee has been established. This committee, officially chartered by the Plant Manager, meets regularly and has begun to deal with those environmental issues that it can affect. As a direct result of this contract, the plant manager has commissioned the Energoproekt engineering and design organization to analyze and propose specific design and operational improvements to several of the environmental systems of the power plant.
2. There is now a titled Environmental Department Manager at the Maritsa East 3 TPP. He has a staff of a size appropriate to a major power plant. In addition, he appears to have the confidence of top management.
3. There is now an environmental management system in place at the Maritsa East 3 TPP. If maintained and improved, it will help set baselines for evaluating environmental improvements. Very importantly, it can be adapted for use at the other TPPs and the HPPs.
4. The European Bank for Reconstruction and Development (EBRD) has been in negotiation with NEK for a major loan for improvements to the system including the Maritsa East 3 TPP. The EBRD conducted an environmental audit and, of course, made a number of findings. Very importantly, they did recognize that NEK had developed an environmental management system and considered that real progress. According to the EBRD's consultant, "...the programme could provide a basis for environmental management at the plant...it (the environmental management program) is a step towards environmental improvement and its further development should be encouraged and, if possible, assisted."
5. The report further credits the work of NEK and CMP for several other improvements including organizational ones developed for the Program.
6. As a result of this work, Maritsa East 3 TPP has worked more closely with the Regional Ministry of the Environment leading to a better understanding of plant operations related to environmental improvements.

Recommendations:

During the process of developing the various management tools with the NEK staff we enjoyed a good working relationship with all levels at both the Plant and headquarters. However, the change in key management players at the headquarters level has made it difficult to focus on broader management issues including organization. Of course, the TPP representatives do well with the resources they have.

We believe that there are many worthwhile projects that should be of interest to USAID and to NEK. These include the following projects and programs that USAID should strongly consider for further funding.

1. ***Pollution Prevention Projects*** An initial audit of the Maritsa East 3 TPP by CMP and by NEK revealed several environmental projects that are low cost and can be replicated at other TPPs. (See Appendices K and L.) These include improvements to the wastewater discharge system including reducing the ash transport water and treatment of excess, installation of modern sanitary wastewater systems, and the clean up of hazardous waste and oil storage areas. Each of these projects provides substantial environmental benefit at modest cost. USAID should consider funding these projects.

2. ***Training*** NEK and the TPPs need to reaffirm their commitment to environmental improvement. This must be done on a consistent continuous basis. In the U.S. companies such as CMP perform frequent environmental activities ranging from audits of environmental systems to frequent training. USAID should consider a modest funding for continuous training of NEK staff and managers in the environmental area for 1997 through 1999.

3. ***Equipment*** Monitoring equipment is needed at the TPPs. Regular and frequent monitoring of wastewater discharges provides feedback to plant operators who can make operational changes. Sound information from modern monitoring equipment will very importantly provide the basis for making design improvements in the wastewater systems. Air emission monitoring equipment is needed at the TPPs. Portable equipment could be shared by all of the TPPs in the Maritsa East complex. This equipment would allow plant operators to evaluate how operational changes effect emission rates.

4. ***Audit*** NEK and CMP agree that an audit on an annual basis would be beneficial to allow NEK to see whether progress is being made in improving environmental performance. USAID should consider funding an annual environmental audit and performance review for 1997 and 1998. This would help focus NEK on improvements to the environmental management program.

APPENDIX A

UTILITY CONSULTANCY PROGRAM

USAID Cooperative Agreement No.: EUR-0030-A-00-4057-00

WORK PLAN

A. Least-cost and Integrated Resources Planning

Objectives and Tasks

CMP will conduct training and provide assistance to NEK to develop IRP models, methods, and results. These tasks will focus on producing an energy resource plan and related forecasts which are required inputs to NEK's investment planning (supply and demand), financial planning, budgeting, and pricing.

This activity also includes tasks focused on key inputs to the IRP process, particularly in the areas of load forecasting, demand side management, market research and customer requirements. Certain aspects of this process are addressed in other activities in this work plan, including financial planning and independent power. Information that results from work on these projects will be incorporated into the tasks described here, as appropriate.

This activity is designed to complement and parallel the Least Cost Planning activities already funded by US AID and the European Community and to expand NEK's planning skills developed under USEA program[1]. CMP's proposed activities will develop NEK's capabilities to:

- participate effectively in the Least Cost Planning work being conducted by US AID and EC contractors,
- review and adopt that work when complete, and
- conduct integrated planning analyses at NEK as follow-up to that work.

Task A.1 Production Cost Software Implementation

Production cost simulation is a key function within NEK's budgeting process. Budget personnel have participated in much of the general training on production cost simulation conducted during the past year, but the IRP-Manager model has not been implemented for budget applications. CMP will work with NEK's Budget department to evaluate the IRP-Manager production cost model's

[1]In 1993, CMP and USEA established a one year agreement in which Daniel Peaco of CMP worked with NEK and Bechtel in Least Cost Planning. The Least Cost Planning Tasks in this proposal build on the work previously completed under the Loaned Executive program.

suitability for use in budget applications and assist with training and implementation of the model for this function. This activity will be coordinated with the budgeting systems developed in Tasks B.1 and B.2 of the Financial /Accounting System Design and Management activity.

The production cost simulation model within IRP-Manager has been installed for use in the long term power supply planning and financial planning functions at NEK. CMP will provide assistance and advanced training to these groups as needed to support the application of this model to long term planning and finance applications.

CMP Task Manager:

To be determined

NEK Task Manager:

Damyan Christov, Head of Economics and Budget Department

Expected Results:

NEK will establish the software, data, user base, and procedures necessary to have a self-sufficient production cost model analysis capability. They will complete a base case data base for 1995 and 1996 and annual forecasts of marginal cost, energy balances, and fuel costs.

Task A.2 Load Forecasting Methods

NEK's current load forecasting method uses an econometric approach. NEK recognizes that this approach has limitations, especially in times of fundamental economic restructuring, and that an alternative approach should be developed.

In this task, CMP will provide training and assistance to NEK in their load forecast analysis and in their assessment and implementation of new load forecasting techniques. CMP will train NEK on alternative load forecasting methods and on market and load research techniques. Recommendations for load forecasting models and data systems will be developed and assistance provided to NEK in the development of forecasts for the 1995 and 1996 planning cycles.

CMP Task Manager:

John Davulis, Director of Economic and Load Forecasting

NEK Task Manager:

Ljubomir Kaloferov, Head of Electricity Forecasting & Development

Expected Results:

NEK will receive training on alternative forecasting methods, develop enhanced long term loan forecasts for 1995 and 1996, and create an action plan for developing models and data collection systems needed for further development of their load forecasting capabilities.

Task A.3 DSM Planning Methods and Software

In this task, CMP will provide training and assistance to NEK on Demand-Side Management planning, implementation and evaluation. NEK's capabilities to conduct DSM related functions will be enhanced by establishing methods of collecting and analyzing energy use and customer data, by developing skills and software to conduct DSM planning and program design, and by establishing methods for program evaluation. This training will be integrated with the load forecasting activities in Task A.2.

CMP will conduct a training workshop on the fundamentals of DSM planning, implementation and evaluation, assist NEK in developing an action plan for developing the necessary information for effective DSM planning, and procure the EPRI DSManager software and training for NEK's use in DSM planning. Like IRP-Manager, DSManager is an EPRI-sponsored software package produced by Electric Power Software and is designed to add DSM planning capabilities to the IRP-Manager system. DSManager provides an organized database of DSM planning information and software for economic analysis of DSM programs, for program design and for input to the integrated planning process. NEK staff will be trained on the use of the software, methods for developing data and application to a selected case study.

CMP Task Manager:

To be determined

NEK Task Manager:

Ljubomir Kaloferov, Head of Electricity Forecasting & Development

Expected Results:

NEK will have a proven DSM planning model for use in DSM planning, be trained in the fundamentals of DSM planning and models , and will have a plan for establishing a data collection system for DSM planning.

Task A.4 Customer Energy Efficiency Collaboration

Energy cost and utilization is a significant issue for many of NEK's industrial customers. As Bulgaria's industries work to compete in global markets, their success and viability as NEK customers will require cost control and efficient utilization of energy. CMP actively works with many of its large commercial and industrial customers to develop pricing, energy efficiency and related measures that are mutually beneficial to the utility and its customers.

In this task, CMP staff and energy efficiency experts who work for CMP's commercial and industrial customers will work with a team from NEK and one or more of its commercial or industrial customers to identify opportunities for energy efficiency improvement projects and ways in which NEK and its customers can implement those projects. Work on this task is not expected to begin until Task A.3 is completed.

Training will be conducted in Maine for NEK and one of their customers on industrial energy efficiency and the teaming approach between utility and customer. Following this training, CMP will work on site in Bulgaria with the NEK/customer team to assess opportunities for joint energy efficiency programs at the Bulgarian customer's facility.

CMP Task Manager:

To be determined

NEK Task Manager:

Ljubomir Kaloferov, Head of Electricity Forecasting & Development

Expected Results:

NEK will establish a process for working collaboratively with customers on energy efficiency and a plan for future actions with the participating customer. This task will also provide tangible examples of programs and data that will be useful in Tasks A.2 and A.3.

Task A.5 Investment Analysis Training and Case Study

NEK has a number of investment options under consideration as part of its least cost plan. An analysis of these options within an IRP framework is necessary to obtain financing for those projects. CMP will provide training and assistance to NEK's Investment Department in developing their investment analysis capabilities, including an understanding of rate of return and net present value. CMP will also work with the Finance Department on more complex cost/benefit analysis

techniques. This task will focus on reviewing financial analysis models, including IRP-Manager, and applying a model and cost/benefit analysis principles to a specific investment decision. CMP will work with NEK personnel in a case study approach to apply those methods to a project chosen by NEK, such as a power plant rehabilitation project or a new power project.

CMP Task Manager:

To be determined

NEK Task Manager:

Krassimir Kanev, Head of Corporate Finance
Mr. Ivanov, Head of Investment Department

Expected Results:

NEK employees will be trained on application of IRP models and methods of analysis of investments and will complete an investment analysis case study.

Task A.6 IRP Optimization and Plan Development

NEK must prepare an optimal least cost plan for power sector planning in Bulgaria in order to meet the requirements of the international banks for existing and future loans. Over the past year, NEK has been working with World Bank staff and others to develop such a plan. During this process, a number of methodological concerns have been raised by the banks. NEK has conducted analyses using its own linear programming model as well as the WASP model, which the World Bank has made available. With IRP-Manager now in place, NEK is beginning to use it for this analysis to overcome concerns on methodology.

In this task, CMP will assist NEK in the development of its least cost plan and related optimization analysis. This will focus on developing NEK's capabilities to apply IRP-Manager in producing the planning analysis required by the banks. It will include optimization and financial analysis of the power sector investment program and the calculation of long run marginal costs for pricing and investment analysis. Integration of the components of the IRP process will be incorporated, particularly economic and financial considerations

CMP Task Manager:

To be determined

NEK Task Manager:

Ljubomir Kaloferov, Head of Electricity Forecasting & Development

Expected Results:

NEK will complete two annual versions of their energy resource plan and will receive training in fundamental integrated resource planning methods.

B. Financial/Accounting System Design and Management

Objectives and Tasks

The objectives of this program are to assist NEK in the development of corporate planning capabilities by integrating the essential components of budgeting and cash management. The development of models to support planning efforts will be included as necessary. As a result of this project, NEK will develop a multi-year planning and budgeting process. NEK will acquire the skills necessary to analyze inputs/outputs of the planning process and improve their planning and budgeting processes.

Task B.1 Establish a Multi-Year Corporate Planning System

CMP will consult with NEK to develop a corporate planning and budgeting process that integrates corporate level management decisions with planning and budgeting activities conducted by the Economic and Budget Department. Working with CMP, NEK will review their organizational structure to determine the appropriate alignment and linkage between departments for budgeting purposes. CMP staff will provide training to facilitate NEK's analysis of its present situation and undertake new methods to improve its planning and budgeting activities.

NEK will work with CMP to enhance its capability to develop corporate near-term and long-term objectives and budgets. This process will emphasize the management structures needed for budget development and approval, as well as controls to monitor the system. Training will focus on developing analytical skills required for decision-making as well as practical methods for implementing the process. CMP will assist NEK's Economic and Budget Department to : 1) develop corporate objectives to achieve long term goals; 2) devise strategies to achieve both long and near-term objectives; and 3) develop a multi-year budgeting process.

CMP Task Manager:

Joseph Gasbarrone, Budget Supervisor

NEK Task Manager:

Damyan Christov, Head of Economics and Budget Department

Expected Results:

NEK will be capable of developing short and log term goals and objectives and a multi-year budgeting process.

Task B.2 Design and Implement a Budgeting Process

In this task, CMP will train NEK Economic and Budget Department personnel in the fundamentals of building the key ingredients of management planning and accountability: an operating budget. Training will include development of a process flowchart that depicts the necessary inputs from the different functions at NEK, including:

* Load forecast
* Production and operating schedules
* Revenue forecast
* Relations between the Head Office and Branches in the budget process

CMP will provide NEK with tools and techniques to develop operating budgets. After an initial seminar and review of NEK's current system, specialists from NEK will receive more specific training and information on CMP's processes through training in Maine. CMP will then consult with NEK as they develop a methodology to collect, process and analyze information about operational budgets. NEK staff from the planning and budgeting function will receive classroom instruction combined with hands-on learning. Procedures for review and approval of departmental budgets and the aggregated corporate budget will be devised. The principles of developing a management reporting system will be discussed, with focus on variance analysis. Design and/or development of a budget model may also be included. CMP will consult with NEK as they develop the software needed to implement this design in their system.

NEK will develop analytical skills to assess the impact of operating conditions on financial integrity. Using a financial planning model customized to fit NEK's financial environment, NEK will assess financial results under varying capital and operating and budget assumptions and develop plans to deal with different outcomes. The model will produce annual outputs including:

* Income statement
* Balance sheet
* Sources and Uses statement
* Cash flow
* Plant Accounting
* Planned finance
* Tax Detail
* Total revenue and fuel expense reports
* Key financial ratios

NEK will extend its planning horizon to do multi-year planning to achieve financial targets and to develop long-term pricing strategies. NEK staff will receive classroom training and observe CMP operations in the U.S. CMP staff will work

with NEK staff in Bulgaria to apply the skills they learn at CMP to develop a multi-year planning/budgeting process and to assess its impact on financial targets.

Topics to be included in the training are:

* Setting and achieving financial targets in the long-run: capital structure, cash flow, and coverage ratios
* Establishing a long term planning process
* Planning long-term pricing strategies to achieve financial targets
* Using models to assess:
  - impacts of capital spending on financial targets
  - price levels
  - tradeoffs and impacts of capital structure on financial targets
  - impact of expense and capital spending decisions on targets
  - tradeoffs when targets cannot be achieved

CMP Task Manager:

Joseph Gasbarrone, Budget Supervisor

NEK Task Manager:

Mr. Damyan Christov, Head of Economics and Budget Department

Expected Results:

An operating budget system will be developed which may include the design of a budget model that would be programmed by NEK.

Task B.3 Design a Cash Management System

NEK will learn how to do daily, 30 day and rolling 12 month cash forecasts, manage bank relations, and manage interest rate risk. The ability to manage cash flow is an essential element to NEK's overall pricing strategies. CMP will provide classroom instruction to Corporate Finance personnel at NEK, followed by hands-on training and an exchange of information. Some of the topics that will be covered in this module include:

* objective of the cash management function
* integration of cash management function with other departments
* cash collection systems
* cash disbursement systems
* managing liquidity: borrowing and investing facilities
* fiduciary responsibility, compliance and control
* managing interest rate risk

NEK will use information from the 12 month cash forecast to develop short-term financing strategies.

CMP Task Manager:

David Trunnell, Manager of Corporate Finance and Investor Relations

NEK Task Manager:

Krassimir Kanev, Head of Corporate Finance

Expected Results:

NEK will establish a cash management system, including 12 month cash forecasts and short term financial strategies.

C. Competitive Bid Systems and Independent Power Procurement

Objectives and Tasks

The objectives of this activity are to assist NEK in evaluating and implementing the evolving Bulgarian regulations and policy regarding independent power and in assessing the risks and opportunities of independent power development. CMP will conduct workshops and provide assistance to NEK to develop independent power policies and procedures consistent with financial and least cost planning objectives.

Task C.1 Assist NEK in its Evaluation of Evolving Bulgarian Regulations and Policy

The Bulgarian laws and regulatory policies related to independent power are currently under development. CMP will assist NEK in assessing current and proposed policies as they affect the ability of NEK to pursue independent power in a least cost planning context.

In this task, CMP will conduct a workshop with NEK personnel and other Bulgarian participants identified by NEK focused on evaluating proposed legislation and regulations pertaining to independent power policy and implementation issues. A team of CMP personnel and representatives of regulatory, legal, and developer interests will be used to conduct this workshop. .

The workshop will focus on issues including legislative and regulatory policy, the financial and least-cost planning implications of independent power to NEK, contract pricing and operations, relationship between IPPs, NEK and the State, competitive bidding systems, incentives for attracting IPPs and procurement procedures. The workshop will be organized to produce analysis of specific proposals and issues and recommend future actions. The results and recommendations will be documented in a report to NEK and US AID. In addition to the workshop, CMP will provide on-call support to NEK to provide review of proposed legislation or regulations.

CMP Task Manager:

Arthur Adelberg, Vice President, Law and Power Supply

NEK Task Manager:

Dobrinka Dobreva, Head of the Legal Department

Expected Results:

NEK will receive assistance from US experts in independent power issues in formulating policy positions and action plans on independent power development in Bulgaria. Recommendations will be documented in a report to NEK and USAID.

Task C.2 Develop Standard Purchased Power Contract Principles[2]

In addition to legislative and regulatory policy, the international financing of independent power will require purchased power contracts which provide the economic, financial, and operational terms necessary to make a project viable for NEK and the project developer.

To this end, CMP will work with NEK to develop a set of procedures and principles and standard contract language that NEK can use in its purchased power contracts. A team of CMP personnel and representatives from project development and contract law disciplines will work with NEK on this task. These principles will provide a basis for developing contracts for small and large independent power contracts when legislation and regulations governing independent power are finalized.

CMP Task Manager:

Arthur Adelberg, Vice President, Law and Power Supply

NEK Task Manager:

Dobrinka Dobreva, Head of the Legal Department

Expected Results:

NEK will develop standard contract terms for use in market-based independent power projects.

Task C.3 Review of Other Legal Issues

CMP will provide information to NEK on other types of contracts that it has including contracts for buying and selling electricity and contracts with industrial customers. CMP will also work with NEK's Legal Department to identify the issues involved in a decision to purchase or lease land for the construction of new facilities.

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[2]This was originally Task 3. It was re-numbered as a result of the elimination of the task related to an independent power rehabilitation case study.

CMP Task Manager:

Arthur Adelberg, Vice President of Law and Power Supply

NEK Task Manager:

Dobrinka Dobreva, Head of Legal Department

Expected Results:

NEK's Legal Department will gain an understanding of the different types of contracts typically used in the U.S. utility industry and will be able to assess whether to adopt some of the same contract principles at NEK.

D. Environmental Technology Assessment and Financing

Objectives and Tasks

CMP proposes to assist NEK in developing its own systems which will allow the Company to assess its facilities and operations, monitor these operations, report environmental performance, and choose appropriate technology to achieve environmental standards. Because the environmental regulatory framework is now developing in Bulgaria, CMP will assist NEK in affecting regulatory development so that adopted regulations will consider the special needs of the electric power industry including the financing of selected technology.

Financial analyses are commonly employed by CMP in evaluating environmental controls and new systems. Strategic decisions related to facility retirement, which encompass major environmental decisions such as control technology options versus alternative power supply options, are made in an integrated least cost planning context.

Given these requirements for operating in a more sophisticated environmental setting, NEK will need to meet the following objectives:

- Organize the Company to incorporate the environmental function in operations
- Establish baseline data on environmental performance
- Identify standards of environmental performance
- Routinely monitor and report on environmental performance
- Identify non-complying operations and develop a financially sound plan for compliance
- Negotiate environmental standards that consider the electric power industry's needs

CMP will assist NEK in meeting the stated objectives by completing the following tasks which will establish NEK's own systems for meeting stringent environmental standards:

Task D.1 Design and Implement an Environmental Performance Management System

NEK has a newly created environmental group and is beginning the process of identifying the responsibilities of the group and its relationship to the power supply branches. Under this task CMP will advise NEK in developing an environmental performance organizational structure and performance management system. This will include setting up the organizational framework within NEK to routinely obtain environmental performance information through effective staffing, testing, and reporting. CMP's assistance to NEK will cover the areas of air emissions, waste water discharges, waste disposal, and water quality. CMP proposes to

adapt and transfer the environmental management systems in place at CMP which would allow NEK to better understand and manage its environmental performance at any given time.

CMP will provide training to NEK on environmental management systems and the management of environmental information related to its power plants and other facilities. The first training session will provide basic concepts and principles to NEK in Sofia. A second training session will be held in Maine to provide an NEK team more detailed training on environmental management systems and to observe CMP operations and management systems.

Following the training, CMP will assist NEK in the design of an environmental management system and structure that is appropriate for NEK and develop a plan for implementing that design. CMP will conduct follow-up work at NEK to supplement the training and assist with implementation.

CMP Task Manager:

James Wazlaw, Director of Environmental Compliance

NEK Task Manager:

Ivan Dichev, Environmental Protection Expert

Expected Résults:

NEK will develop an environmental performance organizational structure and performance management system.

Task D.2 Establish an Environmental Standards Database at NEK

CMP will assist NEK in establishing a database of applicable laws, regulations, and other standards applicable to power plant operation in Bulgaria and in the EC. CMP has established its own database for identifying regulatory requirements in order for CMP to maintain compliance with standards and will adapt this database software for use at NEK. The requirements of the 1991 Environmental Protection Act, European Community, environmental requirements, applicable portions of the Helsinki, Montreal, and Sofia Protocols related to air emissions, and recognized industry standards will be catalogued. This task will establish a database at NEK that will track regulatory requirements so that facility operators will have information on the standards and targets which they must manage.

CMP will provide training to NEK on environmental standards database systems and the use of that information in the environmental management of their company. The first training session will provide basic concepts and principles to

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NEK in Sofia. A second training session will be held in Maine to provide an NEK team more detailed training on CMP's environmental standards database and to observe how the database is used at CMP.

Following the training, CMP will assist NEK in developing specifications for a database at NEK, modifying CMP's software in accordance with those specifications, and developing a plan for implementing the software and developing the data. CMP will conduct follow-up work at NEK to supplement the training and assist with implementation.

CMP Task Manager:

James Wazlaw, Director of Environmental Compliance

NEK Task Manager:

Mr. Ivan Dichev, Environmental Protection Expert

Expected Results:

A database of environmental standards applicable to NEK will be completed.

Task D.3 Design and Implement an Environmental Performance Monitoring and Reporting System

CMP will assist NEK in establishing a program of measurements of air emissions, waste water discharge, and appropriate solid streams, and a method to record information monthly or quarterly as a check on plant performance and to meet regulatory requirements, as well as meet internal and external reporting requirements. CMP has systems in place to report on specific parameters both internally and externally. CMP will work with NEK in developing similar systems and methods so that accurate and meaningful reporting is done on a regular basis.

To accomplish this task, CMP will visit the staff and operations of NEK to perform an initial evaluation of its current system to provide CMP with a baseline understanding on which to build a recommended monitoring system. Likewise, the appropriate NEK staff will visit CMP's system to observe and better understand why certain environmental systems are in place and how they are implemented.

CMP Task Manager:

James Wazlaw, Director of Environmental Compliance

NEK Task Manager:

Ivan Dichev, Environmental Protection Expert

Expected Results:

An environmental performance monitoring and reporting system will be designed and implemented.

Task D.4 Develop an Environmental Compliance Plan

CMP will assist NEK in developing an environmental compliance plan and processes to monitor and update the plan. A system will be developed to review environmental performance against standards and identify non-complying operations through the regular reporting system developed in Task D.3. By comparing plant performance with known standards, NEK will be in a position to identify those non-complying operations which will enable NEK to devote additional attention to them and to develop methods to improve performance.

These methods may range from simple operational changes to expensive pollution control equipment. Methods to finance environmental control technology will also be identified. Because CMP has worked with NEK in the area of Least Cost Planning, CMP proposes to advise NEK on major environmental decisions consistent with least cost planning. This would include major pollution control equipment decisions and plant retirement decisions related to environmental matters. Ultimately, NEK will be able to demonstrate that investment in environmental controls is or is not necessary and whether such investments is cost effective. This will, in effect, establish priorities driven by environmental standards and financial considerations.

CMP Task Manager:

James Wazlaw, Director of Environmental Compliance

NEK Task Manager:

Ivan Dichev, Environmental Protection Expert

Expected Results:

An environmental compliance plan will be completed.

Task D.5 Evaluate Evolving Bulgarian Environmental Regulations and Policy

As environmental laws and regulations are promulgated and subsequently amended, there is opportunity to affect how specific sectors, such as the power industry are regulated. By assuring that regulators understand the electric power

industry, NEK will benefit from rules that consider the special needs of the industry. CMP actively meets with its environmental regulators developing a relationship where the industry's views are considered during rule making and the legislative process. CMP will assist NEK in understanding the rule making process and such concepts as negotiated regulations

CMP Task Manager:

James Wazlaw, Director of Environmental Compliance

NEK Task Manager:

Ivan Dichev, Environmental Protection Expert

Expected Results:

CMP will work with NEK on evaluation of any new environmental laws or regulations being developed in Bulgaria to determine their impact on the Company's operations.

APPENDIX B

NEK
ELECTRICITY
FORECASTING & DEVELOPMENT DEPARTMENT
REPORT
ON THE RESULTS
FROM THE COLLABORATION ACTIVITY IN 1995-1996
WITH CMP REPRESENTATIVES
IN THE FRAME OF
CONTRACT N EUR-00-30-A-004057-00
FINANCED THROUGH USAID

The collaboration activity performed in 1995-1996 with CMPI representatives by the NEK Electricity Forecasting & Development Department in the frame of Contract N EUR-00-30-A-004057-00 was over the topic A - Least Cost and Integrated Resources Planning, focused on the following tasks:

- **A. 2 - Load Forecasting Methods;**
- **A. 3 - DSM Planning Methods and Software**
- **A. 4 - Customer Energy Efficiency Collaboration;**
- **A. 6 - IRP Optimization and Plan Development**

In 1995 collaboration attention was centered basically on **Task A. 6.** By the help of the IRP-Manager bought in 1994 on means of the USAID, various scenarious of the Least Cost Development Plan for Energy Sector in the Republic of Bulgaria have been developed. Results obtained have been discussed several times at NEK Technical Council Meetings, where a couple of base scenarios have been adopted and submitted to the NEK management for setting the long term company development strategy. Some of the Least Cost Development Plan scenarios have been discussed and were highly appreciated by the World Bank experts.

Our proposals for further collaboration in the frame of the above quoted task are as follows:

- **Adopting the IRP-Manager tariff module, which will provide us the possibility to set the optimum electricity pay tariffs for the main types of consumers;**
- **Receiving the new IRP-Manager version, which operates under Windows and will provide us the possibility to convert the model results in**

electronic tables, easier to be understood by more specialists in different fields.

At the second place by its importance in the collaboration of the Department with the CMPI representatives is ranked **Task A.2 - load Forecasting Methods.** In the frame of this task and following a proposal made by the American side, the ENERGY 2020 program product was purchased and it implementation in the NEK began. By now three work meetings took place at which a considerable amount input statistic information about the energy sector and the other most important Bulgarian industries were put in the data base. But there are still some topics concerning the inner links and the operation of the model in general which need to be clarified. The model is too big size and has got quite a lot of complex inner dependencies. In aim to clarify them supplementary consultancy is needed .

With regard to the above mentioned it is necessary that full implementation of the model in the NEK should be provided by representatives of the program product producer, who are Systematic Solutions, Inc.

The third line of collaboration for the Department with the CMPI representatives were topics about improving the energy efficiency of different kind consumers - tasks A.3 and A.4.

In the frame of **Task A. 3 - DSM Planning Methods and Software** - we have been provided for free with the software program product DSManager, developed by the same company, who made the IRP-Manager, who are Electric Power Software. By means of this model it is possible to make a detailed economy analyze about efficiency from introducing of each energy economizing program.

As the financial status of our company is not good at the present moment, the NEK is not able to finance some attractive DSM programs. The problem about management of energy demand and it efficient use is a live question all over the world and especially for Bulgaria. Once the NEK will get financial stabilization, our department has to be ready to answer the management questions about which programs could be efficient for the NEK.

With regard to this our third proposal for future collaboration is the development of a well shaped methodology for economical estimation of the DSM programs implementation.

In the frame of **Task A. 4 - Industrial Customer Energy Efficiency Collaboration** - we made possible for CMPI representatives to visit the Katex textile enterprise in the city of Kazanlak and at a tripartite meeting several efficient programs were set to enhance energy efficiency. The idea

was that next step should be the American party to try to raise funds for the implementation of some of the most efficient programs. Regretfully, in the frame of the contract quoted this second part of the task was not realized because of lack of means.

In this regard our forth proposal for the future collaboration is to seek a way for implementation at least of one pilot program to enhance the energy efficiency at the Katex enterprise in Kazanlak.

It would be very useful for NEK to learn on the experience of CMP and of other utilities in the USA too, about energy statistics organization, continual control over representative consumers from different economy and social sectors, information systematization for providing true data to the forecasting, tariffs improvement and company services for the clients extension.

PROJECT: Development of Cash Flow Management Models

The theme is part of the two-year cooperation programme between CMP and NEK, which was adopted in 1994 and more specifically was developed in connection with the implementation of the following tasks:

B1. Creation of a system for the development of a long-term financial plan;

B.2.Design and implementation of a Budget Development system.

Work on the theme started in December 1995 and will be accomplished at the end of March 1997. When work started the goal was set to develop models of one-year and short term cash flow planning. The idea was to enable NEK to forecast its cash flows, which in turn had to create the conditions for their effective management.

The following models were developed as a result of the joint efforts of CMP and NEK:

- One-year monthly financial model of cash flows;
- Short-term five-week cash flows forecasting model.

The One-year monthly model generates information needed for the functioning of the five-week model. The input consist of a starting balance, forecast macroframe, monthly production budget forecasts (revenues and expenses), the cash flows (cash inflows and cash outflows), planned construction and financing sources. As a result the model generates monthly forecasting accounting reports - Balance Sheet, Revenue and Expenses Report, Sources and Uses of Funds Report, Cash Flows by the Indirect Method Report, as well as Balance Sheet Variance and Income Statement Variance Reports, Cash Flow Variance Report. The model also calculates the basic financial ratios that, in combination with the macroframe utilized and data on average sale prices, revenues received, net profit and return on assets, form the basic management summary. The one-year monthly model also generates various data the five-week model needs for its functioning: payment of interest and principals on loans, VAT payments, income tax and other taxes.

Besides being the source of input information for the five-month model, the one-year monthly model provides substantial opportunities of financial planning for a period of several months to one year. It enables the study of changes in the macroeconomic frame and in the other initially accepted conditions on the company's financial status and the respective plan updating. In this sense it may be used to play different scenarios of variations in the prices of electric and thermal power and to change a number of parameters of the company's activities with the aim of their optimization.

The short-term five-week cash flows model is used in forecasting the revenue inflows and the outflows at the NEK HQ for a period of five weeks. It provides the opportunity of forecasting periods of cash shortage

or surplus and to take timely measures for the provision or beneficial investment of cash funds. Data is put into it concerning all cash revenues and payments executed at the HQ: money transfers from electricity supply branches to HQ, revenues from electric power exports and loans received, payments for the purchase of fuels, materials and goods, for investments, salaries and social security, taxes, interest and principals on loans, money transfers from the HQ to electricity generation branches, etc.

Inflows are forecasted in conformity with the concluded contracts of electrict power export and loan contracts, whereas four levels of accuracy are envisaged for transfers from electricity supply branches depending on the information available at the moment of making the forecast - by monthly revenues from sales - actual report or forecast. If no such is available - by actual report or forecast for the electric power sold during the month where the daily allocation of the sums received at HQ is forecasted on basis of historical information.

A 'Buyers information' module was developed to ensure information on payments under delivery contracts concluded by the Trade and Procurement Department at the NEK HQ. Provision is made in it for each specialist of the Trade and Procurement Department to feed in the contracts concluded by him/her by indicating subject of the contract, supplier company, use meant for the supplied good or service, total contract value, dates and amount of payments, currency of the contract and currency of payment and Leva equivalent of the payments. A possibility also exists to update payment dates and sums. The model sorts payments according to currencies and dates by working out a schedule of the sums needed in each day of the five-week period in the respective payment currencies. This information is summarized and can be represented by weeks. The model maintains an exchange rates table of all currencies of payments or contracts; it is accepted that their number should not exceed seven. The 'Buyers information' model is a major source of data on payments in the five-week model, as the supply contracts for nuclear fuel and imported coal, an extensive part of the deliveries of goods and materials, equipment for construction purposes, are concluded and paid by the NEK HQ. The respective information from this model is fed in directly into the short-term five-week model. Provision is made for cash transfers from HQ to electricity generation branches to be forecasted on basis of the limits imposed on these branches by the Budgeting Department. Payments on principals and interest on credits, VAT, tax on revenue and other taxes are fed in directly from the exit of the One-year monthly cash-flow model. The Short-term five-week model produces a forecast distribution for a period of five weeks of the NEK cash inflows and of the funds NEK HQ needs to cover the current payments. The model was developed so that it displays the above indicated information on the current week on a daily basis. Provision is also made for comparison between planned and actual data and analysis of deviations. Thus the model enables the efficient management of the company's funds and this in turn allows to forecast possible shortage of cash and to estimate whether this is a momentary occurrence or a trend,

and eventually to take decisions on financing through loans or for delaying certain payments. It is possible to expand the model to a level of performing daily forecasts for the five weeks and prioritizing payments.

The development of models has been accomplished by the present moment and to a maximum extent they conform to the needs of NEK and the specifics of its functioning (organizational structure, accounting policy, etc.) as well as to the legislatory framework in Bulgaria (tax laws, accounting standards, etc.). Tests with actual data have demonstrated high levels of conformity of generated results with 1996 financial reports.

On basis of the work performed to date and the experience with these models we believe that reliability and well-timed input data are specifically important in producing dependable results such as to allow the detailed analysis of causes behind forecasting deviations from actual results and the introduction of necessary adjustments in forecasts.

For this reason we propose that the cooperation between CMP and NEK should continue in the following main directions:

1. Organization and software for linking the models with the Accounting Department, Budgeting Department and Trade and Procurement Department;

2. Development of a methodology and software for automatic updating of plans on basis of deviations resulting between planned and report data;

3. Development of methodology of cost allocation according to the functional field of their occurrence (electricity generation, transmission and distribution) and by other customer classes and utilization of information with the goal of refining the process of planning and analysis of causes behind deviations between plan and report.

Head Corporate Finance Department: sgd
/Kr.D.Kunev/

HL/hr/plan/cashflow.doc

REPORT

on the tasks performed by CMP and NEK under the Utility Consultancy Program sponsored by USAID

D. Hristov
Head of Economics and Budget Dept.

Task B1: Establish a Multi-Year Corporate Planning System

The objective of this task was to train specialists of NEK to develop and implement new budget planning and designing models.

The first step was to prepare and submit a Goals and Objectives Program for NEK. In March 1996 specialists from CMP conducted meetings with NEK's executive directors and the chairman of the Board of Directors where they presented the Program. In June CMP presented an updated version of the goals and objectives program, along with the relevant steps for their implementation. The idea was to start implementing the goals program with the commencement of the 97' budget process. However, at that time certain negative processes developed in the country's economy and in particular in our company that prevented the actual implementation of the project. NEK fell into the list of isolated enterprises, and the budget procedure broke.

I propose that the project should continue till its finalization and implementation into the company as integral part and preceding step of the budget process.

Task B2: Design and Implement a Budgeting Process

This task is consistent with the goals and objectives program.

Little is done about this task except for the discussions and exchange of experience on some principle matters related to the budget process in NEK and CMP.

I propose that this task should continue by developing adequate models for planning, reporting and control of the operating budget and their consistence with the financial model in order to optimize cash flow planning and management process.

REPORT

of the Task Group
set up pursuant to Order N 39 / 30.01.1995
of the NEK General Director

Pursuant to the cooperation programme between CENTRAL MAINE COMPANY and NEK which started in March 1995, the Task Group drafted a model agreement for the purchase of power from an independent power producer.

We were pleased to work jointly with experts from CMP on the generation of electric power by independent producers and we took into consideration their recommendations in working out the final version of the agreement.

Several meetings were held in 1995 - 1996 with Mr.F.Woodruff - Managing Director of Power Generation for CMP, Mr. R.Gasper - CMP Manager Power Purchase from IPP, and J.Gulliver - Legal Advisor to CMP. A time schedule was agreed at the meetings for the order of drafting the agreement - in chronological sequence by sections, as follows:

from Section I to Section VIII - untill 15.01.1996, and
from Section IX to Section XVI - untill 01.03.1996.

Our Task Group observed the deadlines, while at the same time providing continuous information to the gentlemen from CMP on work progress and, taking into account their remarks in formulating the text of the agreement.

On 15.08.1996 the CMP experts received from our Task Group a finalized text of model agreement for the purchase of power from independent power producers (from existing capacities). The work schedule and the agreement concluded were thus complied with. The final draft of this agreement was received with positive evaluation by the specialists in CMP.

In conclusion, we consider the task accomplished and have no suggestions on continuing or changing the theme. The cooperation with CMP and the assistance we were rendered are of importance to our company. After NEK Management approval, the model agreement we prepared could be used with the contracting parties in the future, should the necessary economic conditions set in.

12.03.1997 Head of Task Group: sgd
/D.Dobreva/

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REPORT

on the work done by CMP and NEK on the Environmental Management Program

Hristo Svabski
Environmental Specialists
Power Generation Dept.

The teamwork of NEK and CMP on environmental protection issues was part of the USAID Utility Consultancy Program.

The task performed in the area of environmental protection was entitled „NEK Environmental Management Program". The main activity was focused on developing a draft Environmental Management Program for Maritsa East 3 TPP.

This program outlines an environmental protection system for a TPP. Goals and objectives on a corporate level and a plant level were set. Ways of communication on routine environmental issues and emergency environmental cases were proposed. The program includes an environmental audit procedure and environmental training techniques. Special consideration was given to the wastewater management, air quality management and non-combustion wastes management. The types and condition of wastes and emissions as well as their location, discharge and disposal rates were specified. The standards set by the Bulgarian environmental laws were presented by environmental component. Gas emission and wastewater sampling and analysis parameters were defined. A concise software program was developed to this Program that runs on „Access" of Windows for reporting and compliance purposes.

The draft Environmental Management Program on a plant level by its scope and content provides a basis for monitoring and taking environmental protection actions during operation of the thermal power plant. The project was drawn up in accordance with the international standard ISO 14001 „Environmental Management System - Specification and Manual" and could be used as guidance for the activity related to the environmental protection.

Within the framework of the joint activities between CMP and NEK on environmental protection two seminars were conducted. The first seminar held on January 30-31, 1995, was on „Environmental Technology Assessment and Financing". There CMP's representatives presented their environmental organization, the role of environmental compliance plans and economic analysis of environmental technology assessment. The final version of the Environmental Management Program supplemented with specific examples of its application to the Maritsa East 3 TPP was presented at the second seminar held on July 10-11, 1996 in Galabovo. Possibilities of introducing that program into other TPPs of NEK were discussed at that time.

The teamwork between NEK and CMP on the Environmental Management Program for NEK could proceed by developing the program on a corporate level and adjusting it for another TPP of NEK.

APPENDIX C

COMMITTEE OF ENERGY

NATSIONALNA ELEKTRICHESKA KOMPANIA

For Official Use Only!

LEAST COST DEVELOPMENT PLAN FOR THE ELECTRIC POWER SECTOR OF THE REPUBLIC OF BULGARIA

November, 1994

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CONCLUSION

SUMMARY

The present long-term development plan for the electric power sector of the country is completely built upon an economic basis and is organized around the following topics:

a) national long-term development forecast;

b) realistic pricing strategy for a viable electric power sector;

c) actual opportunities for attracting liability capital for the investment projects;

The financial and organizational limiters have been recognized.

The plan was developed during the period September 1993 - October 1994 under the directions of the Executive Director of NEK for Research, Development and Investment, Research Associate Dipl.Eng. Bojan Siromahov, Ph.D. by a team consisting of:

Lubomir Kaloferov, Project Manager;

Dimcho Kanev	Plamen Stoimenov
Stefan Kanchovski	Nikodim Stamov
Nikolay Iliev	Damyan Hristov
Krassimir D. Kanev	Michail Stoykov - members.

The authors of the project express their deep gratitude for the support and direct assistance extended by:

- Mr. Robert Archer, Deputy Division Head, USAID;
- Mr. Daniel Peaco, Central Maine Power Company, USA;
- Mr. Floyd Davis, Bechtel Corporation, USA;
- Mr. Steven Bob, President of Electric Power Software, USA.

We particularly appreciate the highly competent and friendly professional help of Messrs. James Moose, head of the Bulgaria Energy Mission and Anastasje Kocic, both from the World Bank who made the development of this plan possible.

We thank all colleagues and officials from the Committee of Energy, NEK, and Energoproject for their assistance, valuable comments and critical remarks.

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INTRODUCTION

1.1 Essence of the Least-Cost Development Plan

The electric power sector is large, heavy and slow in its development. Any drastic changes in the pace of its development are impossible, while the compulsory, relatively fast changes are quite difficult to implement and involve vast efforts and heavy financial losses.

The development costs, and more particularly those in the electric power sector, are minimized for the public when, at any time, a positive difference between supply and demand is guaranteed and the cost of that positive difference is kept to the minimum. A beneficial prerequisite for realization of that requirement towards the electric power industry is that electricity demand changes smoothly and with a certain lag from the general economic development which, as a rule, is also slow. It is an unfavourable circumstance that meeting the demand in the field of energy requires large-scale resources and time for their mobilization and putting into operation.

The intent of the least-cost development plan is to systematize a set of time-phased actions making available electricity generating, transmission, and distribution capacities of an optimal size and at the optimal time, guaranteeing a minimal positive differential between electricity supply and demand. The minimum of total costs maintained while observing a number of limiting conditions - technical, economic, financial, and organizational - are a criterion of optimization.

1.2 Functions of the Plan

It is obvious that the very essence of the least-cost development plan which builds upon the long-term forecasts of the development of economy, electricity consumption, fuel and power equipment markets, determines its strategic significance, that is, it can be used to outline tentatively the long-term objectives of the investment policy and to define more closely its shorter-term objectives only. Another reason to utilize the developed plan,

even in the short term, to set the reference points of investment policy, is the prevailing high uncertainty of economic development in the country.

The sensitivity analyses carried out demonstrated that , in the specific case, the input parameters of the energy sources included in the optimization study do not affect the end results essentially.

The essence and functions of the plan as set out above, as well as the specific economic conditions require its regular updating at least every two years, especially during the period before the 2000.

According to the Credit Agreement signed with the World Bank on 21.03.1993 (Section 5.05, c) NEK has undertaken to establish, before the 30.09.1994, the long-term price limits of electricity which had to be based on the least-cost development plan. The international financial institutions insist that this plan should be the ground for justification of all future credit agreements.

1.3 Scope of the Plan

In compliance with the recommendations of World Bank, EBRD and EIB experts, the plan encompasses the total electricity sector of the country during the period 1995 - 2010. For the purposes of NEK, only the investment costs allocated to it have been defined. The pricing strategy and all financial indicators apply to the overall electric power sector.

2. PREREQUISITES

2.1 Electricity Demand Forecast

The plan was drawn up on the basis of the forecast on the gross electricity demand development and the maximum EPS loads up to 2010, prepared jointly with World Bank experts (Table 1, Fig. 1). The work on that forecast started as early as the spring of 1992.

In order to achieve the best possible reliability of the forecast having in mind the current dynamics of economic processes and the drastic changes in the living standard of the public, an attempt was made to forecast the development of 18 major branches of industry as well as of agriculture, forestry, transport, communications, commerce and services. For that purpose, analysis of GNP (Gross National Product) and GDP (Gross Domestic Product) variations in the branches referred to was made for the period 1988 - 1993 using information supplied by the National Institute of Statistics. Several previous forecasts of our economic development were studied (NIS, the Institutes of Economy and Foreign Trade Relations of the Bulgarian Academy of Science, the World Bank, etc.). On the basis of that analysis, and the trends observed, a forecast of GDP development till 2010 was drawn up in two versions - optimistic and pessimistic. Both scenarios assume that in 1994 the economic recession in the country will stop, and from 1995 on the growth of GDP will start. That is supported by the developments in our economy during the recent months. The optimistic scenario foresees about 75 billion Levs GDP for 2010, and the pessimistic one - about 69 billion Levs at 1990 prices.

Both scenarios of the economic forecast envisage faster development of the light and food-processing industries, services (commercial, small repairs, intellectual services, transport, communications, etc.) and of the agriculture. Moderate development is foreseen for certain electricity-intensive industries which have, however, a reliable domestic and, in particular, international market such as metallurgy and chemical industry. The share of industry of GDP according to the first scenario decreases from

54% in 1989 to 37% in 2010, and according to the second scenario - down to 33% compared to the growth of the GDP shares of agriculture and services.

At the same time, an electricity intensity analysis was made of the 18 major branches of industry, services and agriculture, and the real opportunities for its reduction were assessed. Even provided that the electricity intensity of the individual branches and subsectors does not decrease, the indicated structural changes in GDP result in overall reduction of GDP electricity intensity by about 3.5 to 5% for the period considered. In Section 2.2, the specific possibilities for reducing the energy intensity of subsectors and branches are discussed. As a result, a forecast of GDP electricity intensity was prepared.

On the basis of economic development forecasts and GDP electricity intensity forecasts, a forecast was developed on electricity consumption in the sector of agriculture.

Residential electricity consumption is subject of a separate analysis. It should be noted here that , compared to the industrially developed West European and North American countries, an average Bulgarian household consumes 2.6 to 4 times less electricity per annum. In spite of that, as the actual income drastically decreased, to which several electricity price increases during 1990 - 1992 partly contributed, electricity consumption per household decreased by 13 %. It seems, however, that it reached the admissible minimum and, from 1993 on, demonstrated about 4% growth. It should be defined here that the cited reduction of residential electricity consumption is not due to electricity efficiency measures taken by the residents such as use of electricity saving household appliances, improved wall insulation, etc. The now prevailing portion of the population does not have sufficient funds for purchase of such appliances and is forced to cut down consumption at the expense of its comfort. That is why in the short term up to the 2000, a growth of residential electricity consumption should be expected. On a later stage, the growth rate will decrease due to more efficient electricity utilization. During the period considered one cannot expect absolute decrease of residential energy consumption, because with the foreseen economic growth, although with 1 - 2 years' delay, the living

standard will become higher, and therefore - residential energy demand of the average Bulgarian household will increase.

A residential demand forecast was developed considering possibilities for more efficient power consumption (item 2.2).

The gross power consumption forecast up to 2010 shown on table 1 and Fig. 1 was a result of the general conclusion made on the basis of the analyses and different forecasts. It was developed in three scenarios - maximum, medium and minimum - defining the area of reliable power demand development during this period.

The maximum scenario reflects the optimistic scenario of economic development, variation of power intensity of GNP as a result mainly of the structural changes in production and faster increase of the residential consumption without notable development of the gasification of households.

The medium scenario is based on an economic development similar to the optimistic one and reflects the real possibilities for reducing power intensity of GNP produced by different industries and subindustries (item 2.2.1), direct gasification of households (about 180 000 households until 2010) that is feasible according to us, together with after 2000 the restraining influence of some essential measures for reducing power consumption from households (item 2.2.2).

The minimum scenario of the forecast is based on a more pessimistic economic development, widely carried out activity concerning power intensity reduction in the industrial sectors, including also technological restructuring even during the period until 2000 and achieving a maximum extent of direct gasification of households (about 400 000 households). To this effect, it presents to a certain extent the theoretical minimum of power demand development.

The medium scenario appears to be the most probable. Because of this fact it was assumed as a base for further studies.

The respective scenarios for maximum load development and typical daily load curves during the respective years were developed on the basis of the analysis of load curves for the past 15 years and especially for the last 4 years considering the variations occurred in the consumption structure.

It should be noticed that the demand forecast for 1993 according to the medium scenario deviates from the real demand only by 0.4%, and foreseen loads for different months - by about 2%.

2.2 OPPORTUNITIES FOR EFFICIENT ELECTRICITY CONSUMPTION

During the past years considerable interest expressed by utilities throughout the world has been shown towards these possibilities. Main reasons for this interest are the following:

- Utilities' ambition to delay the construction of new generating sources, which together with deferment and reduction of investments, saves big troubles in view of continuously increasing environmental requirements;
- Regulating authorities' policy on power consumption stimulation;
- Opportunities for new employment by introducing various programmes for energy saving in production.

In the future efficient power and capacity consumption of the power energy system in order to reduce the power intensity of GNP and households will be of interest to NEK as well because of the reasons indicated above. During the period under consideration, especially till 2000 however the Company may hardly have significant funds to invest in programmes about efficient power consumption outside its system. Our country has not developed the normative base (laws and regulatory acts) making such activity efficient and attractive. Electricity prices and tariff structure improvement as the only, but the most powerful incentive concerning it.

2.2.1 ENERGY SAVING PROGRAMMES IN INDUSTRY

The economy and particularly the industrial sector is more flexible and of bigger capacity regarding the efficient power consumption. These possibilities for reducing power intensity may be grouped in three main directions:

A. Introduction of measuring and control devices that does not require funds of minimum investments:

These are measures designed mainly to eliminate certain organisational and technological disadvantages in enterprises such as:

- introduction of strict and continuous control on power consumption in the basic industries by installing relevant measuring devices;

- development and application of optimum technological modes of electricity consumption and capacity use by determining the respective standards of energy consumption per unit of product which complying has to be bound with payment;

- elimination of omissions and maintaining the required minimum pressure of industrial compressed air, hydrogen and other process gases supply systems;

- improvement of the operation and maintenance of power supplied facilities;

- modernization of lighting by introducing minimum automation;

- development and application of optimum operating mode of industrial transformers by avoiding idle operation and low loads;

- improvement of staff qualification regarding efficient energy consumption, etc.

It is evident that these are activities, which may be carried out with least investments during the period of 1995 to 1998. As a result of their consistent application, a reduction of industrial power intensity by more than 4% and a decrease in peak loads by about 50 MW of the power system could be expected. Pay back time of investments is shorter than a year.

B. Measures requiring moderate investments:

These measures require relatively bigger investments than the above-listed. Their pay back time is 2 or 3 years with significantly higher effect. Such are the following:

- reconstruction of industrial power distribution systems completed with relevant automatic load optimization devices to transformers;

- introduction of asynchronous motor automatic control (e.g. thyristored control)

- implementation of power consumption programmed control for non-motor needs - electrochemical, electroheating, etc. installations;

- restructuring and automation of lighting installations;

- modernization and automation of water, compressed air, hydrogen and other process gases supply systems;

- introduction of automatic systems for on-line complex control and optimization of electricity consumption and electric capacity load, etc.

The consecutive introduction of these measures may reduce industrial electricity intensity by no less than 10% and cut loads of the power system by about 250 MW. This can be achieved during the period until 2000.

C. Introduction of new technologies and reconstructions requiring significant investments, which development can be expected after 2000, mainly in industries of high development rates, as well as in the most power intensive sectors. They are specific for each sector and type of production and depend on technical advance in the respective area. Thus, by a general assessment, 25% reduction of industrial electricity intensity and 550 MW decrease of power system loads will be achieved at pay back time of investments for 5 to 7 years on the average.

The possible technical effects on reducing power intensity and capacity use, especially in case of applying the second and the third group of measures on a large scale are considerably higher than the indicated ones. By using the method, applied by RCG/Hagler, Bailly, Inc. in their Power Consumption Forecast Study, evaluating the effects of potential to be realized, when a correct price policy and well developed tariff system is in place the indicated effects can be reached within respective terms. These effects are set forth under the medium scenario of the forecast.

It is presumed that the development of agriculture and commercial sector would result in increase of their power consumption, but at lower rate than the GNP produced by these sectors. As a result their power intensity will decrease. This fact is also reflected under the medium scenario of the forecast in conformity with the supposed development of these sectors.

2.2.2. ELECTRICITY SAVING PROGRAMMES IN HOUSEHOLDS

As it was mentioned during the beginning of the considered time period (until 2000) it could not be expected the population to invest money specially for electricity saving. In fact, during this period modern and efficient

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utensils will find their place in the Bulgarian homes, but this efficiency will not compensate their total scope. By the end of the period it is expected wider use of air conditioners by households. In parallel with this even now a tendency of expanding the floorage per household is presented that leads to additional increase of electricity consumption, especially in case of electric heating. For this reason during this period under the forecast residential consumption growth is about 2% annually on the average. During the period until 2005 it is expected to have enough utensils in households. Then the population can on a large scale undertakes electricity efficient measures in the following directions mainly:

- use of efficient lighting devices, including automatic control of lighting;
- use of highly efficient and programmed control cooking devices;
- use of boilers, water heaters and refrigerators with improved isolation and programmed control;
- improvement of building heat insulation electrically heated and automation of heating;
- increase in ready to cook prepared food thus reducing electricity consumption for this purpose by households, etc.

During this period it is expected to be felt the perceptible effect of direct gasification of households. For these reasons under the residential consumption the average annual growth decrease by about 1.0% during the period of 2000-2005.

The indicated effects resulted of electricity saving measures in industry and residential sector could be implemented when there is a correct price and tariff policy, but first of all it is necessary to increase the electricity price for the households up to level corresponding to the full production and franco end-user supply costs. This means that electricity price for households has to increase considerably faster than the average price. Only in this case it is possible and economically advisable the implementation of a more complex tariff system allowing people to select the most convenient and favourable way of electricity consumption. Here comes one more condition that should be met: price ratio of one and the same amount of electricity supplied by

different power carriers to reflect also the comfort that they will provide. In this sense power energy should be the most expensive.

As it was mentioned above we do not have a normative framework stimulating and regulating the business activities of NEK as a trade company, to make investments in measures and activities for electricity consumption reduction. At the same time each of the described under item 2.2 measures needs a special study on consumption scope, its development in time and its impact on load curves. Practically this requires development of a national programme about efficient electricity consumption supported with a consistent normative base. The absence of such a programme does not allow the respective specific activities to be included in the optimization process of electricity supply in further studies.

2.3. Load Profile Curves

Till 2000, the peak load factor (minimum to peak load ratio) of the daily load curve for an average week day in December is assumed to be 0,75, and after that - 0,80. These relatively high values are typical of the present load curve. According to estimates, they shall be maintained within the limits indicated through efficient utilization of the pumped-storage stations and by means of an appropriate tariffing policy in demand-side management.

2.4. Initial Indicators of the Generating Capacities

The technical and economic indicators of existing and potential new power generating capacities are shown in Tables 2 and 3. The indicators of existing NEK power plants have been coordinated with those of the Power Generation and Economics & Budgeting departments. The data on district heating plants belonging to district heating commercial companies were obtained from the Committee of Energy. The indicators of large industrial electricity supplying plants have been submitted by their respective associations.

Twenty-two (22) potential new electric power sources have been considered: rehabilitation of existing thermal power plants (Maritsa East 2 & 3, Bobov

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Dol and Varna); refurbishment of NPP Kozloduy Units 5 & 6; possible extensions of the existing Maritsa East power plants; two new types of thermal power plants in that region - burning lignite on the basis of a new combustion technology - circulating fluidized bed and the relevant flue-gas desulphurization facilities; TPP burning imported low-sulphur coal; expansions and redesign of district heating and industrial auxiliary plants on a combined-cycle basis using natural gas; new combined-cycle capacities; new peaking gas turbine TPP burning natural gas or diesel oil; the studied hydro-power cascades. Particular attention has been paid to defining the specific investments for construction of the Belene Nuclear Power Plant. Together with representatives of the project investors, a detailed analysis of the actual expenses made so far was carried out, both separately for each of the two units, and a general one for the plant. It was found that the specific capital investments for Unit 1 amount to 2700 US$/kW, out of which 1000 US$/kW has already been invested, so that the completion of that capacity would cost 1700 US$/kW. Estimates of the specific investments for Unit 2 of the plant have been made in a similar manner.

The indicators of the new electric power sources were subject of several discussions by specialists of NEK and the Committee of Energy, and were harmonized with the latest study of Energoproject. They were analyzed comprehensively together with a team of the World Bank.

The indicators of the rehabilitated capacities were assumed on the basis of the study of BECHTEL, updated by means of the latest studies of TOTEMA and of the Power Generation Department. The specific investments into expansions of existing power plants were estimated on the basis of already existing components of the infrastructure such as coal handling facilities, water supply, part of the switchyards, vertical planning, roads, sewerage, on-site water line, etc. The indicators of hydro-power projects have been taken from the latest project studies. Data from bids and from the studies of POWERGEN and GILBERT have also been used.

The existing hydro-power plants (HPP) are grouped into cascades assuming an operation mode corresponding to a dry year.

Due to the specificities of its operating mode, the Pumped-storage HPP Chaira is discussed separately and participates in the capacity balances

only. Since the WASP model is not adapted to the specific features of the pumped-storage HPP, the study makes use of load curves transformed in advance with the utilized capacities of the pumped-storage HPP, implementing preliminary optimization studies by means of a linear optimization model. The electricity import-export balance is considered as generating capacity with maximum output 600 MW, technical minimum 50% and price 0,07$/kWh.

2.5. Decommissioning of Generating Capacities

During the period under consideration, the following thermal capacities are to be decommissioned:

- TPP Maritsa East 1	- end of 1998;
- TPP Maritsa 3, Dimitrovgrad	- end of 2000
- the first four 150 MW units of TPP Maritsa East 2	- within the period 2002 - 2003.

2.6. Forced Investment Schedule

A group of investment projects - rehabilitations of thermal power plants and upgrading of Units 5 & 6 of Kozloduy - are of markedly higher priority than the rest, due to their low specific capital investment costs. The studies of all scenarios showed that , in order to minimize the total power generation costs, these capacities should be commissioned during the first 2 years of the period under consideration. That is impossible both from organizational point of view, as well as due to the shortage of investment funds during that period. Besides, serious obstacles are met in establishing a reliable electricity supply for the country. For that reason, these facilities have been included in the investment schedule according to their organisational feasibility and the opportunities for their financial support.

The rehabilitation of TPP Varna and TPP Bobov Dol has a significant effect consisting of increasing their output and capacity factor. Besides, the design service life of the first three units at TPP Varna expires about 2000. The

rehabilitation of these two plants is bound up with their switching to another fuel basis:

- for TPP Varna - to use a wider variety of low-sulphur steam coal;
- for TPP Bobov Dol - a mix of imported low-sulphur coal and domestic coal.

Due to some uncertainties and the larger scope of redesigns involved in the fuel basis change, rehabilitation of the units at these plants should be carried out after 1996, 2 years per unit.

Rehabilitation of the 210 MW units of Maritsa East 3 is envisaged for the period 1995-1999, and those of Maritsa East 2 - for the period 1999-2002, one year for the rehabilitatioin of each unit.

In all scenarios developed, the rehabilitation program of existing thermal power plants is the same. It is shown in Table 4.

Investments into upgrading and safety improvement of Units 1 - 4 of NPP Kozloduy have been included in the plan in compliance with the assessments in the World Bank report for the G-7, depending on their decommissioning times. Part of them have been indicated as costs for specific facilities on that for the G-7, depending on their decommissioning times. Part of them have been indicated as costs for specific facilities on that for the G-7, depending on their decommissioning times. Part of them have been indicated as costs for specific facilities on that for the G-7, depending on their decommission t for the G-7, depending on their decommissioning times. Part of them have been it for the G-7, depending on their decommissioning times. Part of them have been indicated as costs for specific facilities on thtrol included.

2.7. Forced Expediting of the Mar. East-1 Replacement Capacity Project

The study of scenarios for meeting the energy and power demand envisages forced (non-optimized) commissioning of a replacement 165 MW capacity at TPP Maritsa East 1 in the beginning of 1999. Given an equal footing with all other candidates, that capacity will become eligible later on (the second 165 MW unit will be available in 2000 according to Scenario 1, in 2003 -

according to Scenario 2, in 2006 according to Scenario 2a, and in 2004 - according to Scenario 3). The reason of that are the comparatively high specific capital investments for that project.

The arguments in favour of speeding up the commissioning of 165 MW Unit 1 at TPP Maritsa East 1 are:

- the heat energy consumed by the operating briquette factory determines the maximum electric power output of the existing Maritsa East 1 plant, about 120 MW. On the other hand, the specific costs of briquette production with the current technology demonstrate its absolute inefficiency. It can be said with confidence that after termination of all subsidies that production will be discontinued, and thereafter the 120 MW power generation capacity of TPP Maritsa East 1 will be shut down. Therefore, the market for about 7,5 million tons of coal produced annually by the Troyanovo-North coal pit will be lost with all unfavourable social consequences. Even protection of the jobs at those locations in itself is sufficient reason for speeding up that project as far as possible.

Another very important argument in favour of that forced implementation is substitution of about 40 million US dollars annual electricity import foreign costs for local costs.

2.8. Other Prerequisites

The economic indicators and analyses have been shown in US $ in order to overcome the uncertainty of inflation in the country. Optimization is carried out on the basis of actual production costs of coal obtained from the Committee of Energy. It is supposed that the prices of imported coal (as shown in Tables 2 and 3) will not change significantly over the period under consideration. The outputs from all scenarios are shown as 1994 US$ value.

2.9. Studied Scenarios

Depending on the length of service of units 1 to 4 at NPP Kozloduy and the contribution of non-NEK thermal power plants in the development of power generation, the following major Scenarios of the plan were developed:

SCENARIO 1. In line with the Nuclear Safety Account (NSA) Agreement with the European Community of June 1993 for a 24,5 mln ECU grant administered by the European Bank for Reconstruction and Development, Units 1 and 2 of Kozloduy are to be shut down in the end of 1997, and Units 3 and 4 - in the end of 1998. The remaining capacities at that plant shall operate till the end of the examined period.

SCENARIO 2. In the end of 1997, Units 1 and 2 of NPP Kozloduy shall be decommissioned. That corresponds to the first phase of the abovementioned agreement. The remaining capacities of the plant shall operate till the end of the period considered.

SCENARIO 3. Units 1 and 2 of NPP Kozloduy shall be decommissioned in 2004 or 2005 after expiration of their design service life. The remaining capacities of the plant operate till the end of the examined period.

The preliminary studies demonstrated that the total annual operation costs and more particularly, investment costs are strongly influenced by the time of decommissioning of Units 3 & 4 of NPP Kozloduy. That is why, after several iterations, an intermediate scenario (between Scenarios 2 and 3) was studied, namely:

SCENARIO 2A. Units 1 & 2 of NPP Kozloduy are decommissioned within the period 2001 - 2002. The remaining capacities of the plant operate till the end of the examined period.

2.10. Optimization Model Used

Upon the request of the World Bank and the European Banks, the software product WASP was used for develop of Bulgarian power sector least cost plan.

The financial plan and its characteristics have been obtained by means of NEK's financial model developed together with experts from Central Maine Power Company of USA, in 1993. On the basis of the optimization data obtained through the financial model, the major financial indicators, such as:

- current assets / current liabilities ratio;
- debt to equity ratio;

- debt servicing ratio;
- net income to total revenues;
- return on common equity

are computed. The major indicators of the macro-economic framework used to develop the plan are indicated below:

- US$ inflation rate - 3%;
- short-term credit interest rate - 12%;
- investment credit interest rate - 10%;
- average depreciation rate on fixed assets - 5%;
- tax depreciation equal to accounting depreciation;
- average tax rate - 52%.

The following indicators have been used to define working capital changes:

- stock turnover - 0,136;
- receivables turnover - from 0,19 gradually decreasing to 0,12;
- debt turnover - from 0,19 gradually decreasing to 0,145;
- salary costs decrease in actual terms is 10% per annum;
- material and service costs remain constant in actual terms;
- contingencies increase is 0.6% per annum.

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3. RESULTS

On the basis of the preconditions set out the following generating sources have been input in all scenarios, as shown in the outputs:

- the 7 units 210 MW each at Maritsa East 2 and Maritsa East 3 to be rehabilitated during 1996 - 2002;
- the 3 units to be rehabilitated at TPP Bobov Dol during 1998 - 2000;
- the 6 units of TPP Varna to be rehabilitated during 1998 - 2004;
- units 5 & 6 of NPP Kozloduy to be refurbished by 1998;
- one 165 MW fluidized-bed combustion unit as replacement capacity for TPP Maritsa East-1 to be commissioned in 1999.

The results of commissioning sequence optimization for the new generating capacities are summarized in Table 4. In the individual scenarios they are:

Scenario 1:

- combined-cycle repowering of TPP Sofia by 240 MW in 1998;
- combined-cycle repowering of TPP Burgas by 500 MW in 1999;
- a new gas-turbine TPP with two 150 MW units in 1999 and 2005 respectively;
- the Sreden Iskar 44 mW cascade in 2000;
- the Sredna Vacha 120 MW cascade in 2003;
- a new combined-cycle TPP burning natural gas with two 450 MW units in 2001 and 2008 respectively;
- another 165 MW unit at TPP Maritsa East 1 in 2007.

The total capacity of rehabilitated and new generating sources will amount to 7694 MW during the period considered according to this Scenario.

Scenario 2:

As only units 1 and 2 at Kozloduy NPP will be decommissioned under this scenario the new capacities are smaller, namely:

- New TPP with gas turbines having two units of 150 MW each in 1998 and 2007, respectively;
- Sreden Iskar Cascade of 44 MW capacity in 2000;
- Repowering of Bourgas TPP by a combined cycle of 500 MW capacity in 2001;

- Repowering of Sofia TPP by a combined cycle of 240 MW capacity in 2005;
- Gorna Arda Cascade of 156 MW capacity in 2008;
- Another unit of 165 MW at Maritsa East 1 TPP in 2009;

Total capacity of the rehabilitated and the new power generating sources during the concerned period under this scenario is 6830 MW.

Scenario 2A:

Later decommissioning of units 1 and 2 at Kozloduy NPP results in the necessity of the following new sources:

- Sreden Iskar Cascade of 44 MW capacity in 2000;
- Repowering of Bourgas TPP by a combined cycle of 500 MW in 2002;
- New TPP with gas turbines firing natural gas having two units of 150 MW each in 2002 and 2010, respectively;
- Repowering of Sofia TPP by a combined cycle of 240 MW in 2003;
- Sredna Vatcha Cascade of 120 MW capacity in 2006;
- Gorna Arda Cascade of 156 MW capacity in 2008;
- Another unit of 165 MW at Maritsa East 1 TPP in 2008.

Total capacity of the rehabilitated and the new power generating sources during the concerned period under this scenario is 6950 MW.

Scenario 3:

The need for new capacities under this scenario arises during the second half of the concerned period. The new capacities are:

- Sreden Iskar Cascade of 44 MW capacity in 2002;
- New TPP with gas turbines firing natural gas having two units of 150 MW in 2004 and 2009, respectively;
- Repowering of Bourgas TPP by a combined cycle of 500 MW capacity in 2005;
- Repowering of Sofia TPP by a combined cycle of 240 MW capacity in 2005;
- Another unit of 165 MW at Maritsa East 1 TPP in 2006;
- Gorna Arda Cascade of 156 MW capacity in 2008.

Total capacity of the rehabilitated and the new power generating sources during the concerned period under this scenario is 6830 MW.

4. RESULTS ANALYSIS

4.1. Total Production Costs

The annual production costs under each scenario are shown on Table 5 and in Fig. 2. Their sum during the entire concerned period varies from $14,81 to $15,63 milliard. They are lowest under scenario 3, where until 2004 decommissioning of units at Kozloduy NPP is not envisaged. This is a result of the fact that electricity generated by NPP is of lowest costs.

After 2005 scenarios 2, 2A and 3 have almost the same costs determined by the identical structure of the generating sources.

Scenario 1 is characterised with the highest annual production costs during the entire concerned period because of the decommissioning of all old units at Kozloduy NPP till the end of 1998.

4.2 INVESTMENT COSTS

Total investments required for the implementation of the examined scenarios are compared on Table 6, while the respective investment programmes project by project - on Tables 7 to 10. Their timing is shown in Fig. 3 and 4. These results show that scenario 1 is practically unfeasible as it requires during the first 5 years of the concerned period (1995-2000) NEK to invest US$1,7 milliard. This amount can neither be provided by International banks, nor be realised for such a short time because of organisational reasons. Total investments under this scenario during the entire concerned period amounts to US$ 3,1 milliard.

Regarding total investments scenarios 2, 2A and 3 are almost of equal worth. Each of them requires for its implementation about US$ 2,5 milliard. The difference among them is that with scenario 2 they are concentrated mainly in 2000, under scenario 3 - during the periods of 1995 to 1998 and 2002 to 2005, while under scenario 2A they are most even distributed during the concerned period. During the period of 1996-1998 under all scenarios a need for more or less maximum of required investments appears.

4.3 Energy, Capacity and Fuel Balances

Energy and capacity balances for each of the scenarios are shown on Tables 11 to 18. From the balance point of view the period till 2000 appears to be unfavourable when a significant part of the existing units at Maritsa East 2 TPP, Maritsa East 3 TPP, Varna TPP and Bobov Dol TPP have to be consecutively shut down for rehabilitation without new capacities being installed. Under the assumed outage rate of the units at TPPs and NPP, however, only under scenarios 1 and 2 a more significant electricity deficit appears which during the separate years of the concerned period reaches the figure of about 800 mln. kWh. Under the remaining scenarios local generating sources are sufficient to cover the foreseen electricity demand.
This problem can be solved by timely provision of additional planned import of the said amount.
Until 1998 (before rehabilitation) units 5 and 6 at Kozloduy NPP participate in the energy balances with utmost annual capacity factor of 4000 hours. After 1998 the said units can increase their capacity factor to 5500 hours.
The required fuel amounts under each scenario are shown on Table 19 and in Fig. 5 and 5a.

4.4. Financial Analysis and Price Strategy

In order to compare financial indicators of the examined scenarios an acceptable and feasible model of electricity sale price development strategy during the concerned period was assumed (Fig. 7 - outlines the strategy). For each of the scenarios energy basic financial indicators development was calculated during the period up to 2010 (Table 20).
Long-Term Liabilities (Fig. 8) are within normal limits (below 45%) for all scenarios except for the first one under which their figures become critical after 2001.
Equity Financing of Investments (Fig. 9) reaches the amount of 30% satisfactory for the bank requirements after 1997 for all scenarios but the first.

Debt Service (Fig. 10) also demonstrates satisfactory values after 1997 and the advantages of scenarios 2A and 3 are obvious.

Current Assets to Current Liabilities (Fig. 11) have unsatisfactory values until 1997-2001. However, the indicated figures do not include non-collecting and with difficulties collecting receivables.

Net Income to Total Revenues (Fig. 12) should have values above 3-4%, which might cover temporary unfavourable influence of external factors. Negative values are not acceptable, therefore the entire scenario 1 and scenario 2 - until 2002 have to be thrown aside. The same conclusions come out of the values of the return on common equity (Fig. 13) - for scenario 1 decapitalization comprises the entire investigated period. Even the values of scenario 3, which are below the level of the inter-bank rate of interest, do not seem to be acceptable.

Considering the financial indicators the general evaluation of the proposed price strategy (Fig. 7) concludes that it is unacceptable during the period till 1997, unsatisfactory (of compromise) for the entire period and excludes the implementation of scenarios 1 and 2. On the other hand, during the period until 2000 it appears to be feasible regarding macroeconomic and social situation in the country unless a strong political will on the national level does not disprove this forecast.

Another price strategy of higher position (indicated in Fig. 7 as conventionally satisfying all scenarios) is analysed on Table 20a and shown in Fig. 8a to 13a. This strategy improves more sensibly the financial indicators of scenarios 1 and 2 although not to the sufficient extent, they still possess unacceptable values. Improvement of the financial indicators of scenarios 2A and 3 is relatively smaller.

Apparently, both analysed price strategies make practically unacceptable scenarios 1 and 2 and do not eliminate the difficult financial problems of power sector until 2000, but only lay a positive base for financial recovery during the period of 1998-2000. They could not have any positive effect through prices on electricity saving and electricity intensity. Furthermore, they do not meet the requirements of EBRD and EIB for electricity tariffs increase ahead of the inflation rate and of the World Bank - for reaching a price of 3,5 cents/kWh in 1993.

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This presentation draws up the thesis that the analysed price strategies are to a great extent of compromise and could place the power sector into a very difficult financial position till 2000, do not stimulate electricity saving and lead to non-execution of the assumed obligations to International banks financing the power sector. However, the decision on selecting a price strategy for the power sector cannot be justified outside and independently from the general economic strategy of the country and therefore has to be taken by the Government.

CONCLUSION

1. Within this presentation optimisation studies, comparisons and assessments are made using generally adopted approaches, methods and models ensuring purpose achievement - to provide organisational and economic justification of the strategic long-term least cost development planning of power sector in the country.

2. The four scenarios for least cost development of the national power sector consider all main possibilities determined by the existing conditions and prerequisites. In view of this, validity of the plan has to be considered as limited in time and requiring from time to time to be updated.

3. The first possible scenario of the plan envisages decommissioning of the first four units of 440 MW each at Kozloduy NPP in 1997-98 provided that (as it is agreed under the agreement with the Nuclear Safety Account to EU) a number of rehabilitation projects would be implemented and the energy balance of the country would allow it, appears to be already unrealisable because of:

- organisational reasons - implementation terms of rehabilitation projects already cannot be met as the difficulties concerning their technical and organisational arrangement proved to be greater than the expected ones, which makes impossible to cover the energy balance of the country during this period;
- impossibility to provide the required financial sources;
- intolerable deterioration of the economic and financial parameters of power sector and real threat to its viability as selffinancing economic unit in case that this scenario would be realised.

4. As a matter of fact, the third scenario is the most favourable as with it the production and investment costs are the smallest.

5. According to these indicators scenario 2A is very close to scenario 3. Furthermore, it gives opportunity for more even distribution of the investments, especially within the NEK system. Therefore, future development of the power sector in the country has to be based on these scenarios.

6. Scenario 2 involving decommissioning of units 1 and 2 at Kozloduy NPP in 1998, although of compromise, meets the obligations undertaken to the Nuclear Safety Account to EU. On the other hand, its financial and economic indicators are worse than those of scenario 2A that also envisages shutting down of the first two units at Kozloduy NPP but three years later. Moreover, certain organisational, technical and financial factors will get scenario 2 difficult for realisation and with significant negative effects.

As far as scenario 2 is of less compromise in relation to the assumed obligations to EU, it seems acceptable to try hard in order to implement it, if they are accompanied by higher rates of electricity price increase than the price proposed under the price strategy.

7. The suggested low price strategy would have heavy negative consequences for the power sector of the country and would not correspond to the assumed obligations to EBRD, EIB and the World Bank. Although, to an insufficient extent, the higher price strategy indicated in this presentation provides faster initial financial recovery of the national power sector.

The Government of the country has to be proposed to decide whether an adequate electricity price strategy could be applied under the existing and the envisaged future macroeconomic and social situation in Bulgaria.

FORECAST OF THE ELECTRIC DEMAND AND THE PEAK LOAD FOR BULGARIA UP TO 2010

Table 1

SCENARIOS						
YEARS	MAXIMUM		MEDIUM		MINIMUM	
	TWH	MW	TWH	MW	TWH	MW
1985	45.9		45.9		45.9	
1986	45.8		45.8		45.8	
1987	47.8		47.8		47.8	
1988	49.2		49.2		49.2	
1989	48.7		48.7		48.7	
1990	45.9		45.9		45.9	
1991	41.0		41.0		41.0	
1992	38.2		38.2		38.2	
1993	38.1	7160	38.1	7100	38.1	7050
1994	39.0	7290	38.5	7100	38.0	7100
1995	40.5	7360	39.5	7180	38.5	7000
1996	42.2	7670	40.7	7400	38.8	7050
1997	43.9	7980	42.0	7640	39.1	7110
1998	45.7	8310	43.3	7870	39.4	7160
1999	47.6	8650	44.6	8110	39.7	7220
2000	49.6	9020	46.0	8360	40.0	7270
2001	50.4	9160	46.6	8470	40.4	7350
2002	51.2	9310	47.2	8580	40.8	7420
2003	52.1	9470	47.8	8690	41.2	7490
2004	52.9	9620	48.4	8800	41.6	7560
2005	53.8	9780	49.0	8910	42.0	7640
2006	54.2	9850	49.6	9020	42.4	7710
2007	54.7	9950	50.2	9130	42.8	7780
2008	55.1	10020	50.8	9240	43.2	7850
2009	55.5	10090	51.4	9350	43.6	7930
2010	56.0	10180	52.0	9450	44.0	8000

Technical And Economical Data Of Existing Power Plants

Table 2

Plant / Index	unit	ME1	ME2	ME3	Varna	Bobov dol	Ruse	Maritza3	Sofia	Sofia east	Pernik	Plovdiv	Other District Heating	Burgas	Devnja Generat. Unit	Devnja Cogen. Units	Sviloza	Chimko	Other Industr. Plants	Kozloduy	Existing Hydro Plants	Pumpe Storage Chaira
Available Capacity	MW	180	1120	780	1230	570	190	80	70	80	40	50	100	130	90	60	100	50	100	3400	1600	800
Technical Minimum	%	75	75	75	70	70	80	85	90	90	90	90	90	90	70	90	90	90	90	100	-	-
Type of Fuel	-	lignite	lignite	lignite	imp.coal	br. coal	imp.coal	lignite	nat. gas fuel oil	nat. gas fuel oil	br. coal fuel oil	fuel oil	fuel oil	fuel oil nat. gas	imp.coal	nat. gas	imp.coal	nat. gas	fuel oil	nuclear	-	-
Calorific Value	Kcal/kg	1500	1500	1500	5600	2560	5600	1500	7960 9500	7960 9500	2560 9500	9500	9500	9500 7960	5600	7960	6200	7960	9500		-	-
Fuel Price	$/tonn	8.7	8.7	8.7	35.0	17.7	38.0	8.7	105.0 88.0	105.0 88.0	17.7 88.0	88.0	88.0	88.0 105.0	35.0	105.0	38.0	105.0	88.0	4.3 $/thouskWh	-	-
	$/tce	40.6	40.6	40.6	43.8	48.4	47.5	40.6	92.3 64.8	92.3 64.8	48.4 64.8	64.8	64.8	64.8 92.3	43.8	92.3	42.9	92.3	64.8		-	-
	$/Gcal	5.8	5.8	5.8	6.3	6.9	6.8	5.8	13.2 9.3	13.2 9.3	6.9 9.3	9.3	9.3	9.3 13.2	6.3	13.2	6.1	13.2	9.3		-	-
Real Production Cost of Fuel	$/tonn	6.4	6.4	6.4	33.0	33.0	36.0	14.5	105.0 83.0	105.0 83.0	33.0 83.0	83.0	83.0	83.0 105.0	33.0	105.0	36.0	105.0	83.0	4.1 $/thouskWh	-	-
	$/tce	29.9	29.9	29.9	41.3	90.2	45.0	67.7	92.3 61.2	92.3 61.2	90.2 61.2	61.2	61.2	61.2 92.3	41.3	92.3	40.6	92.3	61.2	-	-	-
	$/Gcal	4.3	4.3	4.3	5.9	12.9	6.4	9.7	13.2 8.7	13.2 8.7	12.9 8.7	8.7	8.7	8.7 13.2	5.9	13.2	5.8	13.2	8.7	-	-	-
Heat Rate	grce/kWh	404	404	407	351	400	392	500	282	245	417	235	205	299	390	245	375	240	235	-	-	-
	kcal/kWh	2828	2828	2849	2457	2800	2744	3500	1974	1715	2919	1645	1435	2093	2730	1715	2625	1680	1645	-	-	-
Fixed O&M Cost	$/kW	31.7	35.0	33.1	22.4	22.5	52.1	71.3	21.4	23.8	120.0	12.0	18.0	17.7	7.8	15.0	3.0	13.0	3.0	30.1	7.9	10.0
for Electricity Generation	MUS$/Year	5.7	39.2	25.8	27.6	12.8	9.9	5.7	1.5	1.9	4.8	0.6	1.8	2.3	0.7	0.9	0.3	0.7	0.3	102.5	12.6	8.0
Salaries	$/kW	13.2	6.6	6.7	2.6	6.0	8.8	13.1												7.9	1.8	
and Social Security	MUS$/Year	2.38	7.37	5.22	3.23	3.42	1.67	1.05												26.95	2.89	

Technical And Economical Data Of New Power Plants

Table 3

Plant dex	unit	Imported Coal Plant	Domestic Coal Plant - A	Domestic Coal Plant - B	Combined Cicle Nat. Gas	Combust Turbine Plant	NPP Belene Unit 1	NPP Belene Unit 2	New NPP	Repowering in Maritza East	Rehab. ME 2 and ME 3	Rehab. Varna	Rehab. Bobov Dol	Rehab. NPP	Repower. Sofia	Repower. Sofia East	Repower. Plovdiv	Sreden Iskar	Sredna Vacha	Gorna Arda	Dunav	Repower. Burgas	Repo Dev
vailable Capacity	MW	1200	900	660	1350	300	1000	1000	1800	660	1470	675	600	1900	240	240	360	44	120	175	400	480	
chnical Minimum	%	70	75	50	60	0	100	100	100	50	70	70	70	100	50	50	50	-	-	-	-	50	
pe of el	-	imported coal	lignite	lignite	natural gas	natural gas	nuclear	nuclear	nuclear	lignite	lignite	imported coal	br. coal imp. coal	nuclear	natural gas	natural gas	natural gas	-	-	-	-	natural gas	nat ga
alorific alue	kcal/kg	5600	1500	1500	7960	7960	-	-	-	1500	1500	5600	2560 5600	-	7960	7960	7960	-	-	-	-	7960	
el Price	$/tonn	42.0	9.0	9.0	105.0	105.0	4.3 $/thouskWh	4.3 $/thouskWh	4.3 $/thouskWh	9.0	9.0	50.0	17.7 52.0	4.3 $/thouskWh	105.0	105.0	105.0	-	-	-	-	105.0	
	$/tce	52.5	42.0	42.0	92.3	92.3				42.0	42.0	62.5	48.4 65.0		92.3	92.3	92.3	-	-	-	-	92.3	
	$/Gcal	7.5	6.0	6.0	13.2	13.2	0.0	0.0	0.0	6.0	6.0	8.9	6.9 9.3	0.0	13.2	13.2	13.2	-	-	-	-	13.2	
eal Production Cost Fuel	$/tonn	40.0	7.0	7.0	105.0	105.0	4.1 $/thouskWh	4.1 $/thouskWh	4.1 $/thouskWh	7.0	7.0	48.0	33.0 50.0	4.1 $/thouskWh	105.0	105.0	105.0	-	-	-	-	105.0	
	$/tce	50.0	32.7	32.7	92.3	92.3				32.7	32.7	60.0	90.2 62.5		92.3	92.3	92.3	-	-	-	-	92.3	
	$/Gcal	7.1	4.7	4.7	13.2	13.2	0.0	0.0	0.0	4.7	4.7	8.6	12.9 8.9	0.0	13.2	13.2	13.2	-	-	-	-	13.2	
at	grce/kWh	320	380	380	250	380	-	-	-	380	380	320	380	-	205	205	205	-	-	-	-	205	
ate	kcal/kWh	2240	2660	2660	1750	2660	-	-	-	2660	2660	2240	2660	-	1435	1435	1435	-	-	-	-	1435	
ed O&M Cost for	$/kW	17.1	21.4	21.4	12.0	9.4	16.0	16.0	15.0	21.4	21.4	17.1	18.0	30.1	10.2	8.4	5.0	6.3	6.3	6.3	7.2	6.8	
ectricity Generation	MUS$/year	20.5	19.3	14.1	16.2	2.8	16.0	16.0	27.0	14.1	31.5	11.5	10.8	57.2	2.4	2.0	1.8	0.3	0.8	1.1	2.9	3.3	
urning chnology	-	normal type	normal type	fluidized bed	combined cycle	normal type	nuclear cycle	nuclear cycle	nuclear cycle	fluidized bed	normal type	normal type	normal type	nuclear cycle	combined cycle	combined cycle	combined cycle	-	-	-	-	combined cycle	combi cyc
ecific vestment Costs	$/kW	1200	1600	1400	800	400	1600	1830	2200	1200	65	135	105	87	520	520	520	990	760	938	1750	520	
nnuity	MUS$/year	234.4	234.4	150.4	175.8	19.5	260.4	297.8	644.5	128.9	15.6	14.8	10.3	26.9	20.3	20.3	30.5	7.1	14.8	26.7	113.9	40.6	
ossible Year Service	-	1998	1998	1998	1998	1998	2000	2005	2010	1998	1996	1998	1998	1998	1998	1998	1998	2000	2000	2000	2006	1998	199

OPTIMUM SOLUTION ADDITIONS

Table 4

YEAR	SCENARIO 1		SCENARIO 2		SCENARIO 2A		SCENARIO 3	
	PLANT	CAPACITY (MW)	PLANT	CAPACITY (MW)	PLANT	CAPACITY (MW)	PLANT	CAPACITY (MW)
1996	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
1997	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
1998	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210
	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210
	Kozloduy - rehabil.	2 X 950	Kozloduy - rehabil.	2 X 950	Kozloduy - rehabil.	2 X 950	Kozloduy - rehabil.	2 X 950
	Sofia - combined cycle	1 X 240	New combust turbine	1 X 150				
1999	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210
	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210
	M.East - fluidized bed	1 X 165	M.East - fluidized bed	1 X 165	M.East - fluidized bed	1 X 165	M.East - fluidized bed	1 X 165
	Burgas - combined cycle	1 X 500						
	New combust turbine	1 X 150						
2000	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210	Bobov dol - rehabil.	1 X 210
	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210
	Sreden Iskar	1 X 44	Sreden Iskar	1 X 44	Sreden Iskar	1 X 44		
2001	New combined cycle	1 X 450	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
	M. East - rehabil.	1 X 210	Burgas - combined cycle	1 X 500				
2002	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210	M. East - rehabil.	1 X 210
	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210
					Burgas - combined cycle	1 X 500	Sreden Iskar	1 X 44
					New combust turbine	1 X 150		
2003	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210
	Sredna Vacha	1 X 120			Sofia - combined cycle	1 X 240		
2004	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210	Varna - rehabil.	1 X 210
							New combust turbine	1 X 150
2005	New combust turbine	1 X 150	Sofia - combined cycle	1 X 240			Burgas - combined cycle	1 X 500
							Sofia - combined cycle	1 X 240
2006					Sredna Vacha	1 X 120	M.East - fluidized bed	1 X 165
2007	M.East - fluidized bed	1 X 165	New combust turbine	1 X 150				
2008	New combined cycle	1 X 450	Gorna Arda	1 X 156	M.East - fluidized bed	1 X 165	Gorna Arda	1 X 156
					Gorna Arda	1 X 156		
2009			M.East - fluidized bed	1 X 165			New combust turbine	1 X 150
2010					New combust turbine	1 X 150		
TOTAL		7694		6830		6950		6830

ANNUAL PRODUCTION COSTS, THOUSAND US $

Table 5

YEAR	SCENARIO 1			SCENARIO 2			SCENARIO 2A			SCENARIO 3		
	FUEL COST	O & M COST	TOTAL	FUEL COST	O & M COST	TOTAL	FUEL COST	O & M COST	TOTAL	FUEL COST	O & M COST	TOTAL
1995	499524	249076	748600	499524	249076	748600	499524	249076	748600	499524	249076	748600
1996	520580	245143	765723	520580	245143	765723	520580	245143	765723	520580	245143	765723
1997	549339	236122	785461	549339	236122	785461	549339	236122	785461	549339	236122	785461
1998	608982	237924	846906	600605	267908	868513	583120	231924	815044	583120	231924	815044
1999	697584	227368	924952	656775	235148	891923	628516	234844	863360	628516	234844	863360
2000	747473	222199	969672	706219	232735	938954	670459	235710	906169	674641	235367	910008
2001	783963	198158	982121	727915	209921	937836	701051	222952	924003	686253	223286	909539
2002	800017	204420	1004437	743037	210199	953236	743037	210199	953236	691705	219887	911592
2003	816421	209174	1025595	764088	217368	981456	770156	202819	972975	715623	217812	933435
2004	831240	199928	1031168	777489	209662	987151	780977	203553	984530	747086	227495	974581
2005	841249	210781	1052030	792977	205878	998855	792977	205878	998855	792977	205878	998855
2006	849407	226237	1075644	803654	211386	1015040	800058	209582	1009640	803428	208160	1011588
2007	863599	215156	1078755	815720	224599	1040319	813536	216408	1029944	817932	211124	1029056
2008	897004	198249	1095253	819366	221329	1040695	815541	213232	1028773	819351	213708	1033059
2009	907943	203466	1111409	829611	224458	1054069	826000	221112	1047112	829611	224458	1054069
2010	918040	210166	1128206	839465	232153	1071618	836121	229828	1065949	839465	232153	1071618
TOTAL	**12132365**	**3493567**	**15625932**	**11446364**	**3633085**	**15079449**	**11330992**	**3568382**	**14899374**	**11199151**	**3616437**	**14815588**

INVESTMENT PROGRAMMES FOR BULGARIAN POWER SECTOR DEVELOPMENT, MUS$

Table 6

YEARS	SCENARIO 1		SCENARIO 2		SCENARIO 2A		SCENARIO 3	
	NEK	TOTAL	NEK	TOTAL	NEK	TOTAL	NEK	TOTAL
1995	118.68	118.68	120.00	120.00	120.00	120.00	120.00	120.00
1996	360.27	399.17	376.26	376.26	357.96	357.96	357.96	357.96
1997	323.91	490.11	340.78	340.78	300.28	300.28	300.28	300.28
1998	271.04	448.24	186.90	186.90	183.40	183.40	169.80	169.80
1999	373.01	373.01	140.16	221.26	136.66	136.66	106.96	106.96
2000	232.67	232.67	82.31	259.51	100.11	181.21	92.41	92.41
2001	105.14	105.14	77.86	77.86	122.36	338.46	105.06	105.06
2002	78.23	78.23	71.24	71.24	94.44	179.54	100.64	100.64
2003	102.93	102.93	81.82	120.72	118.32	118.32	174.02	294.02
2004	151.53	151.53	87.91	173.01	113.31	113.31	181.61	443.91
2005	125.81	125.81	110.88	110.88	101.08	101.08	125.58	125.58
2006	102.54	102.54	152.19	152.19	111.19	111.19	64.49	64.49
2007	223.57	223.57	116.51	116.51	116.51	116.51	46.11	46.11
2008	127.80	127.80	53.43	53.43	72.23	72.23	57.83	57.83
2009	15.84	15.84	13.85	13.85	54.85	54.85	13.85	13.85
2010	15.87	15.87	13.87	13.87	13.87	13.87	13.87	13.87
TOTAL	**2728.84**	**3111.14**	**2025.97**	**2408.27**	**2116.57**	**2498.87**	**2030.47**	**2412.77**

INVESTMENT COSTS FOR SCENARIO 1, MUS $

Table 7

	1995	1996	1997	1998	1999	2000	to 2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL
TOTAL	118.68	399.17	490.11	448.24	373.01	232.67	2061.89	105.14	78.23	102.93	151.53	125.81	102.54	223.57	127.80	15.84	15.87	3111.16
NEK	118.68	360.27	323.91	271.04	373.01	232.67	1679.59	105.14	78.23	102.93	151.53	125.81	102.54	223.57	127.80	15.84	15.87	2728.86
Nuclear Plants	26.05	123.20	91.91	29.11	22.11	17.11	309.49	13.52	9.53	6.53	6.54	6.54	6.55	6.55	6.55	6.56	6.56	384.93
Kozloduy	26.05	123.20	91.91	29.11	22.11	17.11	309.49	13.52	9.53	6.53	6.54	6.54	6.55	6.55	6.55	6.56	6.56	384.93
Unit 1 and 2	1.00	0.50					1.50											1.50
Unit 3 and 4	1.00	1.00	0.50				2.50											2.50
Unit 5 and 6	22.95	100.60	56.30	4.00	3.00	3.00	189.85	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	219.85
Modernization	15.90	95.10	51.30	3.00	3.00	3.00	171.30	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	201.30
Rezerve supply	5.30						5.30											5.30
Diesel - generator	1.00						1.00											1.00
Autotransformer	0.75	1.50					2.25											2.25
Simulator		4.00	5.00	1.00			10.00											10.00
Common for Plant	1.10	21.10	35.11	21.11	11.11	6.11	95.64	3.52	3.53	3.53	3.54	3.54	3.55	3.55	3.55	3.56	3.56	131.08
Radioactive waste Processing Instal.		10.00					10.00											10.00
Wet Spent Fuel Storage		5.00	4.00				9.00											9.00
Dry Spent Fuel Storage		5.00	30.00	20.00	10.00	5.00	70.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	90.00
Costs for Safety	1.10	1.10	1.11	1.11	1.11	1.11	6.64	1.52	1.53	1.53	1.54	1.54	1.55	1.55	1.55	1.56	1.56	22.08
Costs After Shut-down	0.00	0.00	0.00	4.00	8.00	8.00	20.00	7.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
Unit 1 and 2				4.00	4.00	4.00	12.00	3.00										15.00
Unit 3 and 4					4.00	4.00	8.00	4.00	3.00									15.00
Termal Plants	68.70	196.01	362.63	365.39	263.65	139.42	1395.80	46.18	32.70	53.05	97.15	98.67	79.90	213.32	117.55	5.57	5.60	2145.49
NEK	68.70	157.11	196.43	188.19	263.65	139.42	1013.50	46.18	32.70	53.05	97.15	98.67	79.90	213.32	117.55	5.57	5.60	1763.19
- Rehabilitation	22.50	35.81	79.16	67.50	50.53	22.08	277.58	40.81	27.31	18.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364.42
"Maritza-East 2 " - 3 Units					13.50	13.50	27.00	13.50										40.50
"Maritza-East 3 " - 4 Units	13.50	13.50	13.50	13.50			54.00											54.00
"Bobov dol"		6.60	21.00	21.00	14.40		63.00											63.00
"Varna"	9.00	15.71	44.66	33.00	22.63	8.58	133.58	27.31	27.31	18.73								206.92
- Repowering	45.10	116.06	93.20	39.60	0.00	0.00	293.96	0.00	0.00	10.10	50.70	93.20	39.60	0.00	0.00	0.00	0.00	487.56
"Maritza-East 2 " - Unit8	35.00	65.36					100.36											100.36
Substitution Units of "M. East 1	10.10	50.70	93.20	39.60			193.60			10.10	50.70	93.20	39.60					387.20
- New Plants	0.00	0.00	18.80	75.80	207.80	112.00	414.40	0.00	0.00	18.80	41.00	0.00	34.80	207.80	112.00	0.00	0.00	828.80
Combust Turbine			18.80	41.00			59.80			18.80	41.00							119.60
Combined Cycle				34.80	207.80	112.00	354.60						34.80	207.80	112.00			709.20
Other	1.10	5.24	5.27	5.29	5.32	5.34	27.57	5.37	5.39	5.42	5.45	5.47	5.50	5.52	5.55	5.57	5.60	82.41
Cogeneration Plants																		
District Heating	0.00	38.90	85.10	0.00	0.00	0.00	124.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.00
- Repowering	0.00	38.90	85.10	0.00	0.00	0.00	124.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.00
"Sofia" - combined cycle		38.90	85.10				124.00											124.00
Industrial	0.00	0.00	81.10	177.20	0.00	0.00	258.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.30
- Repowering	0.00	0.00	81.10	177.20	0.00	0.00	258.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.30
"Burgas" - combined cycle			81.10	177.20			258.30											258.30
Hydro Plants	10.95	42.15	3.26	20.36	49.16	32.76	158.64	22.17	6.77	0.77	0.77	0.78	0.78	0.78	0.78	0.79	0.79	193.82
- New Plants	10.20	41.40	2.50	19.60	48.40	32.00	154.10	21.40	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	181.50
Pumpe Storage "Chaira"	10.20	41.40					51.60											51.60
"Sredna Vacha"			2.50	6.00	18.70	32.00	59.20	21.40	6.00									86.60
"Sreden Iskar"				13.60	29.70		43.30											43.30
Other	0.75	0.75	0.76	0.76	0.76	0.76	4.54	0.77	0.77	0.77	0.77	0.78	0.78	0.78	0.78	0.79	0.79	12.32
Transmission & Distribution	12.98	37.81	32.32	33.38	38.09	43.37	197.95	23.27	29.23	42.57	47.08	19.82	15.32	2.92	2.92	2.92	2.92	386.92
- Rehabilitation	7.89	27.47	24.18	27.03	27.36	34.58	148.51	18.14	17.92	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	204.56
High Voltage	6.84	17.88	17.89	20.74	19.61	24.63	107.59	15.64	15.42									138.64
Medium Voltage	1.05	9.59	6.29	6.28	7.75	9.95	40.92	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	65.92
- Repowering	0.96	0.41	1.27	5.94	10.25	8.38	27.23	4.73	10.90	39.66	44.16	16.91	12.40	0.00	0.00	0.00	0.00	155.99
High Voltage	0.96	0.41	1.27	5.94	10.25	8.38	27.23	4.73	10.90	39.66	44.16	16.91	12.40					155.99
Modernization Of Metering	3.97	9.48	6.50	0.00	0.00	0.00	19.95											19.95
Other	0.15	0.45	0.37	0.41	0.48	0.41	2.27	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42	0.42	6.43

INVESTMENT COSTS FOR SCENARIO 2, MUS $

Table 8

	1995	1996	1997	1998	1999	2000	до 2000 г.	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	ПЕРИОД
TOTAL	120.00	376.26	340.78	186.90	221.26	259.51	1504.71	77.86	71.24	120.72	173.01	110.88	152.19	116.51	53.43	13.85	13.87	2408.28
NEK	120.00	376.26	340.78	186.90	140.16	82.31	1246.41	77.86	71.24	81.82	87.91	110.88	152.19	116.51	53.43	13.85	13.87	2025.98
Nuclear Plants	26.05	123.20	91.91	29.61	18.61	13.61	302.99	10.52	7.53	7.53	7.54	7.54	7.55	7.55	7.55	7.56	7.56	381.43
Kozloduy	26.05	123.20	91.91	29.61	18.61	13.61	302.99	10.52	7.53	7.53	7.54	7.54	7.55	7.55	7.55	7.56	7.56	381.43
Unit 1 and 2	1.00	0.50					1.50											1.50
Unit 3 and 4	1.00	1.00	0.50	0.50	0.50	0.50	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.00
Unit 5 and 6	22.95	100.60	56.30	4.00	3.00	3.00	189.85	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	219.85
Modernization	15.90	95.10	51.30	3.00	3.00	3.00	171.30	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	201.30
Rezerve supply	5.30						5.30											5.30
Diesel - generator	1.00						1.00											1.00
Autotransformer	0.75	1.50					2.25											2.25
Simulator		4.00	5.00	1.00			10.00											10.00
Common for Plant	1.10	21.10	35.11	21.11	11.11	6.11	95.64	3.52	3.53	3.53	3.54	3.54	3.55	3.55	3.55	3.56	3.56	131.08
Radioactive waste Processing Instal.		10.00					10.00											10.00
Wet Spent Fuel Storage		5.00	4.00				9.00											9.00
Dry Spent Fuel Storage		5.00	30.00	20.00	10.00	5.00	70.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	90.00
Costs for Safety	1.10	1.10	1.11	1.11	1.11	1.11	6.64	1.52	1.53	1.53	1.54	1.54	1.55	1.55	1.55	1.56	1.56	22.08
Costs After Shut-down	0.00	0.00	0.00	4.00	4.00	4.00	12.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
Unit 1 and 2				4.00	4.00	4.00	12.00	3.00										15.00
Unit 3 and 4							0.00											0.00
Termal Plants	70.11	173.19	215.89	109.64	134.19	201.85	904.87	43.39	29.90	60.24	87.72	31.53	94.34	95.86	42.27	2.68	2.69	1395.49
NEK	70.11	173.19	215.89	109.64	53.09	24.65	646.57	43.39	29.90	21.34	2.62	31.53	94.34	95.86	42.27	2.68	2.69	1013.19
- Rehabilitation	22.50	35.81	79.16	67.50	50.53	22.08	277.58	40.81	27.31	18.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364.42
"Maritza-East 2 " - 3 Units					13.50	13.50	27.00	13.50										40.50
"Maritza-East 3 " - 4 Units	13.5	13.5	13.5	13.50			54.00											54.00
"Bobov dol"		6.60	21.00	21.00	14.40		63.00											63.00
"Varna"	9.00	15.71	44.66	33.00	22.63	8.58	133.58	27.31	27.31	18.73								206.92
- Repowering	45.10	116.06	93.20	39.60	0.00	0.00	293.96	0.00	0.00	0.00	0.00	10.10	50.70	93.20	39.60	0.00	0.00	487.56
"Maritza-East 2 " - Unit8	35.00	65.36					100.36											100.36
Substitution Units of "M. East 1"	10.10	50.70	93.20	39.60			193.60					10.10	50.70	93.20	39.60			387.20
- New Plants	0.00	18.80	41.00	0.00	0.00	0.00	59.80	0.00	0.00	0.00	0.00	18.80	41.00	0.00	0.00	0.00	0.00	119.60
Combust Turbine		18.80	41.00				59.80					18.80	41.00					119.60
Other	2.51	2.52	2.53	2.55	2.56	2.57	15.24	2.58	2.59	2.61	2.62	2.63	2.64	2.66	2.67	2.68	2.69	41.61
Cogeneration Plants																		
District Heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.90	85.10	0.00	0.00	0.00	0.00	0.00	0.00	124.00
- Repowering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.90	85.10	0.00	0.00	0.00	0.00	0.00	0.00	124.00
"Sofia" - combined cycle							0.00			38.90	85.10							124.00
Industrial	0.00	0.00	0.00	0.00	81.10	177.20	258.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.30
- Repowering	0.00	0.00	0.00	0.00	81.10	177.20	258.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.30
"Burgas" - combined cycle					81.10	177.20	258.30											258.30
Hydro Plants	10.86	42.06	0.66	14.27	30.37	0.67	98.89	0.67	4.58	10.38	30.68	51.98	34.99	10.19	0.69	0.69	0.70	244.44
- New Plants	10.20	41.40	0.00	13.60	29.70	0.00	94.90	0.00	3.90	9.70	30.00	51.30	34.30	9.50	0.00	0.00	0.00	233.60
Pumpe Storage "Chaira"	10.20	41.40					51.60											51.60
"Sreden Iskar"				13.60	29.70		43.30											43.30
"Sredna Vacha"																		0.00
"Gorna Arda"							0.00		3.90	9.70	30.00	51.30	34.30	9.50				138.70
Other	0.66	0.66	0.66	0.67	0.67	0.67	3.99	0.67	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.69	0.70	10.84
Transmission & Distribution	12.98	37.81	32.32	33.38	38.09	43.37	197.95	23.27	29.23	42.57	47.08	19.82	15.32	2.92	2.92	2.92	2.92	386.92
- Rehabilitation	7.89	27.47	24.18	27.03	27.36	34.58	148.51	18.14	17.92	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	204.56
High Voltage	6.84	17.88	17.89	20.74	19.61	24.63	107.59	15.64	15.42									138.64
Medium Voltage	1.05	9.59	6.29	6.28	7.75	9.95	40.92	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	65.92
- Repowering	0.96	0.41	1.27	5.94	10.25	8.38	27.23	4.73	10.90	39.66	44.16	16.91	12.40					155.99
High Voltage	0.96	0.41	1.27	5.94	10.25	8.38	27.23	4.73	10.90	39.66	44.16	16.91	12.40					155.99
Modernization Of Metering	3.97	9.48	6.50	0.00	0.00	0.00	19.95											19.95
Other	0.15	0.45	0.37	0.41	0.48	0.41	2.27	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42	0.42	6.43

INVESTMENT COSTS FOR SCENARIO 2A, MUS $

Table 9

	1995	1996	1997	1998	1999	2000	to 2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL
TOTAL	120.00	357.96	300.28	183.40	136.66	181.21	1279.51	338.46	179.54	118.32	113.31	101.08	111.19	116.51	72.23	54.85	13.87	2498.88
NEK	120.00	357.96	300.28	183.40	136.66	100.11	1198.41	122.36	94.44	118.32	113.31	101.08	111.19	116.51	72.23	54.85	13.87	2116.58
Nuclear Plants	26.05	123.70	92.41	26.11	15.11	10.11	293.49	8.02	12.03	12.03	11.54	10.54	7.55	7.55	7.55	7.56	7.56	385.43
Kozloduy	26.05	123.70	92.41	26.11	15.11	10.11	293.49	8.02	12.03	12.03	11.54	10.54	7.55	7.55	7.55	7.56	7.56	385.43
Unit 1 and 2	1.00	1.00	0.50	0.50	0.50	0.50	4.00	0.50	0.50	0.50								5.50
Unit 3 and 4	1.00	1.00	0.50	0.50	0.50	0.50	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.00
Unit 5 and 6	22.95	100.60	56.30	4.00	3.00	3.00	189.85	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	219.85
Modernization	15.90	95.10	51.30	3.00	3.00	3.00	171.30	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	201.30
Rezerve supply	5.30						5.30											5.30
Diesel - generator	1.00						1.00											1.00
Autotransformer	0.75	1.50					2.25											2.25
Simulator		4.00	5.00	1.00			10.00											10.00
Common for Plant	1.10	21.10	35.11	21.11	11.11	6.11	95.64	3.52	3.53	3.53	3.54	3.54	3.55	3.55	3.55	3.56	3.56	131.08
Radioactive waste Processing Instal.		10.00					10.00											10.00
Wet Spent Fuel Storage		5.00	4.00				9.00											9.00
Dry Spent Fuel Storage		5.00	30.00	20.00	10.00	5.00	70.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	90.00
Costs for Safety	1.10	1.10	1.11	1.11	1.11	1.11	6.64	1.52	1.53	1.53	1.54	1.54	1.55	1.55	1.55	1.56	1.56	22.08
Costs After Shut-down	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	4.00	3.00	0.00	0.00	0.00	0.00	0.00	15.00
Unit 1 and 2							0.00		4.00	4.00	4.00	3.00						15.00
Unit 3 and 4							0.00											0.00
Termal Plants	70.11	154.39	174.89	109.64	53.09	124.55	686.67	300.49	115.00	21.34	2.62	12.73	53.34	95.86	61.07	43.68	2.69	1395.49
NEK	70.11	154.39	174.89	109.64	53.09	43.45	605.57	84.39	29.90	21.34	2.62	12.73	53.34	95.86	61.07	43.68	2.69	1013.19
- Rehabilitation	22.50	35.81	79.16	67.50	50.53	22.08	277.58	40.81	27.31	18.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364.42
"Maritza-East 2 " - 3 Units					13.50	13.50	27.00	13.50										40.50
"Maritza-East 3 " - 4 Units	13.5	13.5	13.5	13.50			54.00											54.00
"Bobov dol"		6.60	21.00	21.00	14.40		63.00											63.00
"Varna"	9.00	15.71	44.66	33.00	22.63	8.58	133.58	27.31	27.31	18.73								206.92
- Repowering	45.10	116.06	93.20	39.60	0.00	0.00	293.96	0.00	0.00	0.00	0.00	10.10	50.70	93.20	39.60	0.00	0.00	487.56
"Maritza-East 2 " - Unit8	35.00	65.36					100.36											100.36
Substitution Units of "M. East 1"	10.10	50.70	93.20	39.60			193.60					10.10	50.70	93.20	39.60			387.20
- New Plants	0.00	0.00	0.00	0.00	0.00	18.80	18.80	41.00	0.00	0.00	0.00	0.00	0.00	0.00	18.80	41.00	0.00	119.60
Combust Turbine						18.80	18.80	41.00							18.80	41.00		119.60
Other	2.51	2.52	2.53	2.55	2.56	2.57	15.24	2.58	2.59	2.61	2.62	2.63	2.64	2.66	2.67	2.68	2.69	41.61
Cogeneration Plants																		
District Heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.90	85.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.00
- Repowering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.90	85.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.00
"Sofia" - combined cycle							0.00	38.90	85.10									124.00
Industrial	0.00	0.00	0.00	0.00	0.00	81.10	81.10	177.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.30
- Repowering	0.00	0.00	0.00	0.00	0.00	81.10	81.10	177.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.30
"Burgas" - combined cycle						81.10	81.10	177.20										258.30
Hydro Plants	10.86	42.06	0.66	14.27	30.37	3.17	101.39	6.67	23.28	42.38	52.08	57.98	34.99	10.19	0.69	0.69	0.70	331.04
- New Plants	10.20	41.40	0.00	13.60	29.70	2.50	97.40	6.00	22.60	41.70	51.40	57.30	34.30	9.50	0.00	0.00	0.00	320.20
Pumpe Storage "Chaira"	10.2	41.4					51.60											51.60
"Sreden Iskar"				13.60	29.70		43.30											43.30
"Sredna Vacha"						2.50	2.50	6.00	18.70	32.00	21.40	6.00						86.60
"Gorna Arda"							0.00		3.90	9.70	30.00	51.30	34.30	9.50				138.70
Other	0.66	0.66	0.66	0.67	0.67	0.67	3.99	0.67	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.69	0.70	10.84
Transmission & Distribution	13.0	37.8	32.3	33.4	38.1	43.4	198.0	23.3	29.2	42.6	47.1	19.8	15.3	2.9	2.9	2.9	2.9	386.9
- Rehabilitation	7.9	27.5	24.2	27.0	27.4	34.6	148.5	18.1	17.9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	204.6
High Voltage	6.8	17.9	17.9	20.7	19.6	24.6	107.6	15.6	15.4									138.6
Medium Voltage	1.0	9.6	6.3	6.3	7.8	10.0	40.9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	65.9
- Repowering	1.0	0.4	1.3	5.9	10.2	8.4	27.2	4.7	10.9	39.7	44.2	16.9	12.4	0.0	0.0	0.0	0.0	156.0
High Voltage	1.0	0.4	1.3	5.9	10.2	8.4	27.2	4.7	10.9	39.7	44.2	16.9	12.4					156.0
Modernization Of Metering	4.0	9.5	6.5	0.0	0.0	0.0	20.0											20.0
Other	0.2	0.5	0.4	0.4	0.5	0.4	2.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	6.4

INVESTMENT COSTS FOR SCENARIO 3, MUS $

Table 10

	1995	1996	1997	1998	1999	2000	to 2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL
TOTAL	120.00	357.96	300.28	169.80	106.96	92.41	1147.41	105.06	100.64	294.02	443.91	125.58	64.49	46.11	57.83	13.85	13.87	2412.78
NEK	120.00	357.96	300.28	169.80	106.96	92.41	1147.41	105.06	100.64	174.02	181.61	125.58	64.49	46.11	57.83	13.85	13.87	2030.48
Nuclear Plants	26.05	123.70	92.41	26.11	15.11	10.11	293.49	8.02	8.03	8.03	8.04	11.54	11.55	11.55	10.55	7.56	7.56	385.93
Kozloduy	26.05	123.70	92.41	26.11	15.11	10.11	293.49	8.02	8.03	8.03	8.04	11.54	11.55	11.55	10.55	7.56	7.56	385.93
Unit 1 and 2	1.00	1.00	0.50	0.50	0.50	0.50	4.00	0.50	0.50	0.50	0.50							6.00
Unit 3 and 4	1.00	1.00	0.50	0.50	0.50	0.50	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.00
Unit 5 and 6	22.95	100.60	56.30	4.00	3.00	3.00	189.85	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	219.85
Modernization	15.90	95.10	51.30	3.00	3.00	3.00	171.30	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	201.30
Rezerve supply	5.30						5.30											5.30
Diesel - generator	1.00						1.00											1.00
Autotransformer	0.75	1.50					2.25											2.25
Simulator		4.00	5.00	1.00			10.00											10.00
Common for Plant	1.10	21.10	35.11	21.11	11.11	6.11	95.64	3.52	3.53	3.53	3.54	3.54	3.55	3.55	3.55	3.56	3.56	131.08
Radioactive waste Processing Instal.		10.00					10.00											10.00
Wet Spent Fuel Storage		5.00	4.00				9.00											9.00
Dry Spent Fuel Storage		5.00	30.00	20.00	10.00	5.00	70.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	90.00
Costs for Safety	1.10	1.10	1.11	1.11	1.11	1.11	6.64	1.52	1.53	1.53	1.54	1.54	1.55	1.55	1.55	1.56	1.56	22.08
Costs After Shut-down	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	4.00	3.00	0.00	0.00	15.00
Unit 1 and 2							0.00					4.00	4.00	3.00				11.00
Unit 3 and 4							0.00											0.00
							0.00											0.00
Termal Plants	70.11	154.39	174.89	109.64	53.09	24.65	586.77	43.39	58.80	233.04	358.12	42.23	2.64	21.46	43.67	2.68	2.69	1395.49
NEK	70.11	154.39	174.89	109.64	53.09	24.65	586.77	43.39	58.80	113.04	95.82	42.23	2.64	21.46	43.67	2.68	2.69	1013.19
- Rehabilitation	22.50	35.81	79.16	67.50	50.53	22.08	277.58	40.81	27.31	18.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364.42
"Maritza-East 2 " - 3 Units					13.50	13.50	27.00	13.50										40.50
"Maritza-East 3 " - 4 Units	13.50	13.50	13.50	13.50			54.00											54.00
"Bobov dol"		6.60	21.00	21.00	14.40		63.00											63.00
"Varna"	9.00	15.71	44.66	33.00	22.63	8.58	133.58	27.31	27.31	18.73								206.92
- Repowering	45.10	116.06	93.20	39.60	0.00	0.00	293.96	0.00	10.10	50.70	93.20	39.60	0.00	0.00	0.00	0.00	0.00	487.56
"Maritza-East 2 " - Unit8	35.00	65.36					100.36											100.36
Substitution Units of "M. East 1"	10.10	50.70	93.20	39.60			193.60		10.10	50.70	93.20	39.60						387.20
- New Plants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.80	41.00	0.00	0.00	0.00	18.80	41.00	0.00	0.00	119.60
							0.00											0.00
Combust Turbine							0.00		18.80	41.00				18.80	41.00			119.60
Other	2.51	2.52	2.53	2.55	2.56	2.57	15.24	2.58	2.59	2.61	2.62	2.63	2.64	2.66	2.67	2.68	2.69	41.61
Cogeneration Plants																		
District Heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.90	85.10	0.00	0.00	0.00	0.00	0.00	0.00	124.00
- Repowering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.90	85.10	0.00	0.00	0.00	0.00	0.00	0.00	124.00
"Sofia" - combined cycle							0.00			38.90	85.10							124.00
							0.00											0.00
							0.00											0.00
Industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	81.10	177.20	0.00	0.00	0.00	0.00	0.00	0.00	258.30
- Repowering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	81.10	177.20	0.00	0.00	0.00	0.00	0.00	0.00	258.30
"Burgas" - combined cycle							0.00			81.10	177.20							258.30
							0.00											0.00
Hydro Plants	10.86	42.06	0.66	0.67	0.67	14.27	69.19	30.37	4.58	10.38	30.68	51.98	34.99	10.19	0.69	0.69	0.70	244.44
- New Plants	10.20	41.40	0.00	0.00	0.00	13.60	65.20	29.70	3.90	9.70	30.00	51.30	34.30	9.50	0.00	0.00	0.00	233.60
Pumpe Storage "Chaira"	10.2	41.4					51.60											51.60
"Sreden Iskar"						13.60	13.60	29.70										43.30
"Gorna Arda"							0.00		3.90	9.70	30.00	51.30	34.30	9.50				138.70
Other	0.66	0.66	0.66	0.67	0.67	0.67	3.99	0.67	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.69	0.70	10.84
Transmission & Distribution	13.0	37.8	32.3	33.4	38.1	43.4	198.0	23.3	29.2	42.6	47.1	19.8	15.3	2.9	2.9	2.9	2.9	386.9
- Rehabilitation	7.9	27.5	24.2	27.0	27.4	34.6	148.5	18.1	17.9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	204.6
High Voltage	6.8	17.9	17.9	20.7	19.6	24.6	107.6	15.6	15.4									138.6
Medium Voltage	1.0	9.6	6.3	6.3	7.8	10.0	40.9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	65.9
- Repowering	1.0	0.4	1.3	5.9	10.2	8.4	27.2	4.7	10.9	39.7	44.2	16.9	12.4					156.0
High Voltage	1.0	0.4	1.3	5.9	10.2	8.4	27.2	4.7	10.9	39.7	44.2	16.9	12.4					156.0
Modernization Of Metering	4.0	9.5	6.5	0.0	0.0	0.0	20.0											20.0
Other	0.2	0.5	0.4	0.4	0.5	0.4	2.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	6.4

ENERGY OUTPUT BY PLANT - SCENARIO 1, GWh

Table 11

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	201(
Bobov dol	5	75	277	0	0	0	0	0	0	0	0	0	0	0	0	
Bobov dol - Rehabilitation	0	0	0	1432	2882	4323	4323	4324	4324	4323	4324	4324	4323	4323	4323	43
Varna	4821	4255	3915	3540	3833	2535	1282	0	0	0	0	0	0	0	0	
Varna - Rehabilitation	0	0	0	1441	2882	4323	4323	5764	7205	8646	8646	8646	8646	8646	8646	86
Maritza - East 1	590	566	787	1071	0	0	0	0	0	0	0	0	0	0	0	
Maritza - East 1	2780	2708	2911	3232	3259	3257	3259	1630	0	0	0	0	0	0	0	
Maritza - East 2 (150 MWt units)	3905	5265	5314	5354	4030	2707	1383	1383	1383	1383	1383	1383	1383	1383	1383	13
Maritza - East 2 (210 MWt units)	4050	2707	1353	0	0	0	0	0	0	0	0	0	0	0	0	
Maritza - East 3	0	1426	2875	4323	5764	7205	8646	10087	10087	10087	10087	10087	10087	10087	10087	100
Maritza 3	115	124	166	221	253	213	0	0	0	0	0	0	0	0	0	
Ruse	0	1	127	388	434	411	348	374	440	404	430	518	364	173	253	2
NPP "Kozloduy" - unit 1 and 2	5256	5256	5256	0	0	0	0	0	0	0	0	0	0	0	0	
NPP "Kozloduy" - unit 3 and 4	5256	5256	5256	5256	0	0	0	0	0	0	0	0	0	0	0	
NPP "Kozloduy" - unit 5 and 6	10218	10218	10218	0	0	0	0	0	0	0	0	0	0	0	0	
NPP "Kozloduy" - Rehabilitation	0	0	0	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179	111
Sofia and Sofia - East	0	1	80	288	329	314	260	310	349	296	338	368	310	111	186	2
Plovdiv	2	29	85	179	277	280	265	264	270	274	273	277	288	249	255	2
Other District Heating Plants	613	613	613	613	613	613	613	613	613	613	613	613	613	613	613	61
Burgas, Devnja and Chimko	148	402	757	1185	1807	1780	1895	1920	1918	1882	1907	1919	1943	1948	1953	19
Sviloza	109	167	265	459	570	562	579	579	579	577	579	579	579	579	579	5
Other Industrial Plants	91	147	243	438	565	556	577	578	578	575	578	578	580	579	579	57
Import of Electricity	1	1	14	393	482	395	155	307	431	249	385	602	394	77	149	2
Hydro - Base	419	419	419	419	419	636	636	636	636	636	636	636	636	636	636	6
Hydro - Peak	1215	1215	1215	1215	1215	1215	1215	1215	1428	1428	1428	1428	1428	1428	1428	14
Repowering in M. East - FBD	0	0	0	0	517	505	345	479	572	420	478	509	1117	713	786	8
Repow. Cogen. - Combined Cycle	0	0	0	831	3455	3286	2728	2986	3254	2899	3139	3283	3657	2672	2861	30
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
New TPP - Combined Cycle	0	0	0	0	0	0	2735	2768	2809	2725	2791	2841	2925	5602	5702	57
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
New Combust Turbine Plant	0	0	0	0	4	1	1	1	2	1	4	20	7	1	2	
TOTAL	**39595**	**40851**	**42147**	**43459**	**44770**	**46296**	**46749**	**47397**	**48059**	**48597**	**49197**	**49791**	**50459**	**51001**	**51599**	**52189**

ENERGY OUTPUT BY PLANT - SCENARIO 2, GWh

Table 12

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bobov dol	5	75	277	0	0	0	0	0	0	0	0	0	0	0	0	0
Bobov dol - Rehabilitation	0	0	0	1433	2852	4161	4233	4097	4171	4101	4129	4153	4239	4239	4275	4292
Varna	4821	4255	3915	3546	3424	2105	1141	0	0	0	0	0	0	0	0	0
Varna - Rehabilitation	0	0	0	1442	2883	4323	4324	5759	7196	8621	8635	8633	8647	8647	8647	8647
Maritza - East 1	590	566	787	1077	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 1	2780	2708	2911	3232	3203	3175	3203	1623	0	0	0	0	0	0	0	0
Maritza - East 2 (150 MWt units)	3905	5265	5314	5354	4030	2707	1383	1383	1383	1383	1383	1383	1383	1383	1383	1383
Maritza - East 2 (210 MWt units)	4050	2707	1353	0	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 3	0	1426	2875	4323	5764	7205	8646	10087	10087	10087	10087	10087	10087	10087	10087	10087
Maritza 3	115	124	166	239	224	188	0	0	0	0	0	0	0	0	0	0
Ruse	0	1	127	531	403	380	241	307	399	318	228	273	381	334	308	366
NPP "Kozloduy" - unit 1 and 2	5256	5256	5256	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - unit 3 and 4	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256
NPP "Kozloduy" - unit 5 and 6	10218	10218	10218	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - Rehabilitation	0	0	0	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179	11179
Sofia and Sofia - East	0	1	80	413	285	292	194	258	295	233	150	212	265	266	238	281
Plovdiv	2	29	85	178	186	148	210	217	255	237	239	262	251	260	270	276
Other District Heating Plants	613	613	613	613	613	613	613	613	613	613	613	613	613	613	613	613
Burgas, Devnja and Chimko	148	402	757	1240	1095	1130	1416	1471	1576	1461	1511	1567	1656	1675	1721	1759
Sviloza	109	167	265	469	447	437	506	527	533	511	520	530	548	551	555	561
Other Industrial Plants	91	147	243	449	421	407	491	516	522	497	506	520	540	544	548	555
Import of Electricity	1	1	14	825	333	285	88	159	329	170	82	159	326	262	253	363
Hydro - Base	419	419	419	419	419	636	636	636	636	636	636	636	636	1061	1061	1061
Hydro - Peak	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215
Repowering in M. East - FBD	0	0	0	0	535	453	354	483	520	472	367	443	402	444	849	923
Repow. Cogen. - Combined Cycle	0	0	0	0	0	0	1418	1612	1892	1604	2459	2670	2831	2980	3138	3364
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Combust Turbine Plant	0	0	0	24	2	1	1	1	2	1	1	1	3	3	2	5
TOTAL	**39595**	**40851**	**42147**	**43457**	**44769**	**46295**	**46748**	**47396**	**48058**	**48597**	**49197**	**49791**	**50459**	**51000**	**51599**	**52188**

ENERGY OUTPUT BY PLANT - SCENARIO 2A, GWh

Table 13

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	201(
Bobov dol	5	75	277	0	0	0	0	0	0	0	0	0	0	0	0	
Bobov dol - Rehabilitation	0	0	0	1247	2360	3273	3860	4097	4146	4085	4129	4153	4237	4239	4274	42
Varna	4821	4255	3915	2399	2048	1037	925	0	0	0	0	0	0	0	0	
Varna - Rehabilitation	0	0	0	1376	2803	4183	4296	5759	7193	8622	8635	8633	8646	8647	8647	86
Maritza - East 1	590	566	787	696	0	0	0	0	0	0	0	0	0	0	0	
Maritza - East 1	2780	2708	2911	2905	2816	2759	3054	1623	0	0	0	0	0	0	0	
Maritza - East 2 (150 MWt units)	3905	5265	5314	5354	4030	2707	1383	1383	1383	1383	1383	1383	1383	1383	1383	13
Maritza - East 2 (210 MWt units)	4050	2707	1353	0	0	0	0	0	0	0	0	0	0	0	0	
Maritza - East 3	0	1426	2875	4323	5764	7205	8646	10087	10087	10087	10087	10087	10087	10087	10087	100
Maritza 3	115	124	166	148	116	136	0	0	0	0	0	0	0	0	0	
Ruse	0	1	127	75	17	2	332	307	250	163	228	247	342	198	287	3
NPP "Kozloduy" - unit 1 and 2	5256	5256	5256	5256	5256	5256	2628	0	0	0	0	0	0	0	0	
NPP "Kozloduy" - unit 3 and 4	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	52
NPP "Kozloduy" - unit 5 and 6	10218	10218	10218	0	0	0	0	0	0	0	0	0	0	0	0	
NPP "Kozloduy" - Rehabilitation	0	0	0	11155	11168	11168	11180	11179	11179	11179	11179	11179	11179	11179	11179	111
Sofia and Sofia - East	0	1	80	56	4	1	255	258	212	107	150	180	270	126	205	2
Plovdiv	2	29	85	48	34	40	169	217	251	201	239	248	249	260	267	2
Other District Heating Plants	613	613	613	613	613	613	613	613	613	613	613	613	613	613	613	6
Burgas, Devnja and Chimko	148	402	757	482	374	376	972	1471	1565	1467	1511	1568	1665	1678	1721	17
Sviloza	109	167	265	228	192	182	385	527	531	520	520	530	547	550	554	5
Other Industrial Plants	91	147	243	204	170	167	354	516	522	507	506	520	539	543	546	5
Import of Electricity	1	1	14	4	1	1	170	159	88	47	82	121	216	106	213	3
Hydro - Base	419	419	419	419	419	636	636	636	636	636	636	636	636	1061	1061	10
Hydro - Peak	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1428	1428	1428	1428	14
Repowering in M. East - FBD	0	0	0	0	114	82	418	483	349	330	367	440	440	782	842	9
Repow. Cogen. - Combined Cycle	0	0	0	0	0	0	0	1612	2582	2180	2459	2569	2725	2864	3034	32
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
New TPP - Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
New Combust Turbine Plant	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
TOTAL	**39595**	**40851**	**42147**	**43460**	**44769**	**46295**	**46747**	**47396**	**48059**	**48597**	**49197**	**49791**	**50459**	**51000**	**51599**	**5218**

ENERGY OUTPUT BY PLANT - SCENARIO 3, GWh

Table 14

ɜar	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
bov dol	5	75	277	0	0	0	0	0	0	0	0	0	0	0	0	
ɔbov dol - Rehabilitation	0	0	0	1247	2360	3311	3425	2946	3172	3594	4129	4156	4239	4239	4275	429
rna	4821	4255	3915	2399	2048	1120	677	0	0	0	0	0	0	0	0	
.rna - Rehabilitation	0	0	0	1376	2803	4189	4205	5445	6858	8440	8635	8635	8647	8647	8647	864
aritza - East 1	590	566	787	696	0	0	0	0	0	0	0	0	0	0	0	
aritza - East 1	2780	2708	2911	2905	2816	2756	2839	1500	0	0	0	0	0	0	0	
ɜritza - East 2 (150 MWt units)	3905	5265	5314	5354	4030	2707	1383	1383	1383	1383	1383	1383	1383	1383	1383	138
aritza - East 2 (210 MWt units)	4050	2707	1353	0	0	0	0	0	0	0	0	0	0	0	0	
aritza - East 3	0	1426	2875	4323	5764	7205	8646	10087	10087	10087	10087	10087	10087	10087	10087	1008
aritza 3	115	124	166	148	116	148	0	0	0	0	0	0	0	0	0	
ɪse	0	1	127	75	17	9	101	133	233	379	228	198	230	220	308	36
?P "Kozloduy" - unit 1 and 2	5256	5256	5256	5256	5256	5256	5256	5256	5256	2628	0	0	0	0	0	
?P "Kozloduy" - unit 3 and 4	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	5256	525
?P "Kozloduy" - unit 5 and 6	10218	10218	10218	0	0	0	0	0	0	0	0	0	0	0	0	
?P "Kozloduy" - Rehabilitation	0	0	0	11155	11168	11168	11170	11157	11165	11180	11179	11179	11179	11179	11179	1117
fia and Sofia - East	0	1	80	56	4	1	48	74	163	288	150	131	211	167	238	28
ovdiv	2	29	85	48	34	40	95	109	121	150	239	249	260	263	270	27
;her District Heating Plants	613	613	613	613	613	613	613	613	613	613	613	613	613	613	613	61
ɪrgas, Devnja and Chimko	148	402	757	482	374	402	608	702	785	1109	1511	1574	1660	1675	1721	175
'iloza	109	167	265	228	192	193	275	291	330	399	520	536	549	550	555	56
.her Industrial Plants	91	147	243	204	170	172	254	271	307	381	506	527	540	542	548	55
ɪport of Electricity	1	1	14	4	1	1	7	23	62	299	82	63	103	124	253	36
ydro - Base	419	419	419	419	419	419	419	636	636	636	636	636	636	1061	1061	106
ydro - Peak	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	121
ɜpowering in M. East - FBD	0	0	0	0	114	114	257	301	416	558	367	749	770	824	849	92
ɜpow. Cogen. - Combined Cycle	0	0	0	0	0	0	0	0	0	0	2459	2604	2880	2955	3138	336
ew TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ɜw TPP - Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ew TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
?P Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ew Combust Turbine Plant	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	
OTAL	**39595**	**40851**	**42147**	**43460**	**44769**	**46295**	**46748**	**47397**	**48058**	**48596**	**49197**	**49791**	**50459**	**51000**	**51599**	**52188**

CAPACITY BALANCE - SCENARIO 1, MW

Table 15

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bobov dol	570	380	190	0	0	0	0	0	0	0	0	0	0	0	0	0
Bobov dol - Rehabilitation	0	0	0	210	420	630	630	630	630	630	630	630	630	630	630	630
Varna	1170	975	780	585	585	390	195	0	0	0	0	0	0	0	0	0
Varna - Rehabilitation	0	0	0	210	420	630	630	840	1050	1260	1260	1260	1260	1260	1260	1260
Maritza - East 1	180	180	180	180	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 1	480	480	480	480	480	480	480	240	0	0	0	0	0	0	0	0
Maritza - East 2 (150 MWt units)	585	780	780	780	585	390	195	195	195	195	195	195	195	195	195	195
Maritza - East 2 (210 MWt units)	585	390	195	0	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 3	0	210	420	630	840	1050	1260	1470	1470	1470	1470	1470	1470	1470	1470	1470
Maritza 3	80	80	80	80	80	80	0	0	0	0	0	0	0	0	0	0
Ruse	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
NPP "Kozloduy" - unit 1 and 2	800	800	800	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - unit 3 and 4	800	800	800	800	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - unit 5 and 6	1900	1900	1900	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - Rehabilitation	0	0	0	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Sofia and Sofia - East	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Plovdiv	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Other District Heating Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Burgas, Devnja and Chimko	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
Sviloza	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Other Industrial Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Import of Electricity	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Hydro - Base	210	210	210	210	210	254	254	254	254	254	254	254	254	254	254	254
Hydro - Peak	1592	1592	1592	1592	1592	1592	1592	1592	1712	1712	1712	1712	1712	1712	1712	1712
Pumpe Storage "Chaira"	400	400	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Repowering in M. East - FBD	0	0	0	0	165	165	165	165	165	165	165	165	330	330	330	330
Repow. Cogen. - Combined Cycle	0	0	0	240	740	740	740	740	740	740	740	740	740	740	740	740
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Combined Cycle	0	0	0	0	0	0	450	450	450	450	450	450	450	900	900	900
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Combust Turbine Plant	0	0	0	0	150	150	150	150	150	150	300	300	300	300	300	300
TOTAL	**10962**	**10787**	**10817**	**10307**	**10577**	**10861**	**11051**	**11036**	**11126**	**11336**	**11486**	**11486**	**11651**	**12101**	**12101**	**12101**
Peak Load	**7180**	**7400**	**7640**	**7870**	**8110**	**8360**	**8470**	**8580**	**8690**	**8800**	**8910**	**9020**	**9130**	**9240**	**9350**	**9450**
Reserve Margine, %	**52.7**	**45.8**	**41.6**	**31.0**	**30.4**	**29.9**	**30.5**	**28.6**	**28.0**	**28.8**	**28.9**	**27.3**	**27.6**	**31.0**	**29.4**	**28.1**

CAPACITY BALANCE - SCENARIO 2, MW

Table 16

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bobov dol	570	380	190	0	0	0	0	0	0	0	0	0	0	0	0	0
Bobov dol - Rehabilitation	0	0	0	210	420	630	630	630	630	630	630	630	630	630	630	630
Varna	1170	975	780	585	585	390	195	0	0	0	0	0	0	0	0	0
Varna - Rehabilitation	0	0	0	210	420	630	630	840	1050	1260	1260	1260	1260	1260	1260	1260
Maritza - East 1	180	180	180	180	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 1	480	480	480	480	480	480	480	240	0	0	0	0	0	0	0	0
Maritza - East 2 (150 MWt units)	585	780	780	780	585	390	195	195	195	195	195	195	195	195	195	195
Maritza - East 2 (210 MWt units)	585	390	195	0	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 3	0	210	420	630	840	1050	1260	1470	1470	1470	1470	1470	1470	1470	1470	1470
Maritza 3	80	80	80	80	80	80	0	0	0	0	0	0	0	0	0	0
Ruse	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
NPP "Kozloduy" - unit 1 and 2	800	800	800	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - unit 3 and 4	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
NPP "Kozloduy" - unit 5 and 6	1900	1900	1900	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - Rehabilitation	0	0	0	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Sofia and Sofia - East	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Plovdiv	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Other District Heating Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Burgas, Devnja and Chimko	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
Sviloza	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Other Industrial Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Import of Electricity	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Hydro - Base	210	210	210	210	210	254	254	254	254	254	254	254	254	410	410	410
Hydro - Peak	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592
Pumpe Storage "Chaira"	400	400	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Repowering in M. East - FBD	0	0	0	0	165	165	165	165	165	165	165	165	165	165	330	330
Repow. Cogen. - Combined Cycle	0	0	0	0	0	0	500	500	500	500	740	740	740	740	740	740
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Combust Turbine Plant	0	0	0	150	150	150	150	150	150	150	150	150	300	300	300	300
TOTAL	**10962**	**10787**	**10817**	**10217**	**10637**	**10921**	**11161**	**11146**	**11116**	**11326**	**11566**	**11566**	**11716**	**11872**	**12037**	**12037**
Peak Load	**7180**	**7400**	**7640**	**7870**	**8110**	**8360**	**8470**	**8580**	**8690**	**8800**	**8910**	**9020**	**9130**	**9240**	**9350**	**9450**
Reserve Margine, %	**52.7**	**45.8**	**41.6**	**29.8**	**31.2**	**30.6**	**31.8**	**29.9**	**27.9**	**28.7**	**29.8**	**28.2**	**28.3**	**28.5**	**28.7**	**27.4**

CAPACITY BALANCE - SCENARIO 2A, MW

Table 17

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bobov dol	570	380	190	0	0	0	0	0	0	0	0	0	0	0	0	0
Bobov dol - Rehabilitation	0	0	0	210	420	630	630	630	630	630	630	630	630	630	630	630
Varna	1170	975	780	585	585	390	195	0	0	0	0	0	0	0	0	0
Varna - Rehabilitation	0	0	0	210	420	630	630	840	1050	1260	1260	1260	1260	1260	1260	1260
Maritza - East 1	180	180	180	180	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 1	480	480	480	480	480	480	480	240	0	0	0	0	0	0	0	0
Maritza - East 2 (150 MWt units)	585	780	780	780	585	390	195	195	195	195	195	195	195	195	195	195
Maritza - East 2 (210 MWt units)	585	390	195	0	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 3	0	210	420	630	840	1050	1260	1470	1470	1470	1470	1470	1470	1470	1470	1470
Maritza 3	80	80	80	80	80	80	0	0	0	0	0	0	0	0	0	0
Ruse	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
NPP "Kozloduy" - unit 1 and 2	800	800	800	800	800	800	400	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - unit 3 and 4	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
NPP "Kozloduy" - unit 5 and 6	1900	1900	1900	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - Rehabilitation	0	0	0	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Sofia and Sofia - East	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Plovdiv	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Other District Heating Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Burgas, Devnja and Chimko	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
Sviloza	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Other Industrial Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Import of Electricity	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Hydro - Base	210	210	210	210	210	254	254	254	254	254	254	254	254	410	410	410
Hydro - Peak	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1712	1712	1712	1712	1712
Pumpe Storage "Chaira"	400	400	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Repowering in M. East - FBD	0	0	0	0	165	165	165	165	165	165	165	165	165	330	330	330
Repow. Cogen. - Combined Cycle	0	0	0	0	0	0	0	500	740	740	740	740	740	740	740	740
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Combust Turbine Plant	0	0	0	0	0	0	0	150	150	150	150	150	150	150	150	300
TOTAL	**10962**	**10787**	**10817**	**10867**	**11287**	**11571**	**10911**	**11146**	**11356**	**11566**	**11566**	**11686**	**11686**	**12007**	**12007**	**12157**
Peak Load	**7180**	**7400**	**7640**	**7870**	**8110**	**8360**	**8470**	**8580**	**8690**	**8800**	**8910**	**9020**	**9130**	**9240**	**9350**	**9450**
Reserve Margine, %	**52.7**	**45.8**	**41.6**	**38.1**	**39.2**	**38.4**	**28.8**	**29.9**	**30.7**	**31.4**	**29.8**	**29.6**	**28.0**	**29.9**	**28.4**	**28.6**

CAPACITY BALANCE - SCENARIO 3, MW

Table 18

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bobov dol	570	380	190	0	0	0	0	0	0	0	0	0	0	0	0	0
Bobov dol - Rehabilitation	0	0	0	210	420	630	630	630	630	630	630	630	630	630	630	630
Varna	1170	975	780	585	585	390	195	0	0	0	0	0	0	0	0	0
Varna - Rehabilitation	0	0	0	210	420	630	630	840	1050	1260	1260	1260	1260	1260	1260	1260
Maritza - East 1	180	180	180	180	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 1	480	480	480	480	480	480	480	240	0	0	0	0	0	0	0	0
Maritza - East 2 (150 MWt units)	585	780	780	780	585	390	195	195	195	195	195	195	195	195	195	195
Maritza - East 2 (210 MWt units)	585	390	195	0	0	0	0	0	0	0	0	0	0	0	0	0
Maritza - East 3	0	210	420	630	840	1050	1260	1470	1470	1470	1470	1470	1470	1470	1470	1470
Maritza 3	80	80	80	80	80	80	0	0	0	0	0	0	0	0	0	0
Ruse	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
NPP "Kozloduy" - unit 1 and 2	800	800	800	800	800	800	800	800	800	400	0	0	0	0	0	0
NPP "Kozloduy" - unit 3 and 4	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
NPP "Kozloduy" - unit 5 and 6	1900	1900	1900	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP "Kozloduy" - Rehabilitation	0	0	0	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Sofia and Sofia - East	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Plovdiv	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Other District Heating Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Burgas, Devnja and Chimko	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
Sviloza	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Other Industrial Plants	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Import of Electricity	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Hydro - Base	210	210	210	210	210	210	210	254	254	254	254	254	254	410	410	410
Hydro - Peak	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592	1592
Pumpe Storage "Chaira"	400	400	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Repowering in M. East - FBD	0	0	0	0	165	165	165	165	165	165	165	330	330	330	330	330
Repow. Cogen. - Combined Cycle	0	0	0	0	0	0	0	0	0	0	740	740	740	740	740	740
New TPP - Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New TPP - Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPP Belene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Combust Turbine Plant	0	0	0	0	0	0	0	0	0	150	150	150	150	150	300	300
TOTAL	**10962**	**10787**	**10817**	**10867**	**11287**	**11527**	**11267**	**11296**	**11266**	**11226**	**11566**	**11731**	**11731**	**11887**	**12037**	**12037**
Peak Load	**7180**	**7400**	**7640**	**7870**	**8110**	**8360**	**8470**	**8580**	**8690**	**8800**	**8910**	**9020**	**9130**	**9240**	**9350**	**9450**
Reserve Margine, %	**52.7**	**45.8**	**41.6**	**38.1**	**39.2**	**37.9**	**33.0**	**31.7**	**29.6**	**27.6**	**29.8**	**30.1**	**28.5**	**28.6**	**28.7**	**27.4**

Fuel requirements by type of fuel

Table 19

Year	Domestic coal, Thousands of tonnes				Imported coal, Thousands of tonnes				Natural gas, million m**3				Fuel oill, Thousands of tonnes			
	Scen.1	Scen.2	Scen. 2A	Scen. 3	Scen.1	Scen.2	Scen. 2A	Scen. 3	Scen.1	Scen.2	Scen. 2A	Scen. 3	Scen.1	Scen.2	Scen. 2A	Scen. 3
1995	21634	21634	21634	21634	2145	2145	2145	2145	41	41	41	41	201	201	201	201
1996	24088	24088	24088	24088	1913	1913	1913	1913	116	116	116	116	211	211	211	211
1997	25280	25280	25280	25280	1852	1852	1852	1852	243	243	243	243	227	227	227	227
1998	27036	27083	25481	25481	2627	2520	1701	1701	578	479	155	155	261	263	221	221
1999	26858	26713	24777	24777	3571	2974	2080	2080	1252	405	110	110	283	258	215	215
2000	27567	27188	25186	25280	3748	2957	2179	2223	1210	407	111	118	282	256	215	215
2001	26941	26805	26444	25525	3172	2486	2391	2103	1727	732	360	197	285	270	229	229
2002	26663	26539	26539	25387	3199	2596	2596	2322	1799	798	798	232	285	275	232	232
2003	23756	23584	23267	22880	3808	3218	3144	2947	1866	894	995	278	285	276	238	238
2004	23486	23462	23202	23351	4366	3743	3669	3670	1762	792	861	402	285	271	251	251
2005	23589	23291	23291	23291	4379	3707	3707	3707	1837	941	941	941	285	273	273	273
2006	23645	23437	23432	23983	4422	3731	3718	3696	1891	1013	985	982	285	275	276	276
2007	24720	23411	23475	24063	4347	3794	3775	3720	1968	1077	1061	1076	286	279	279	279
2008	24004	23484	24083	24159	4253	3772	3705	3715	2324	1112	1059	1084	286	279	279	279
2009	24134	24221	24208	24221	4293	3760	3750	3760	2400	1148	1121	1148	286	280	280	280
2010	24289	24361	24320	24361	4314	3790	3776	3790	2471	1212	1189	1212	286	281	281	281

APPENDIX D

STRATEGY AND LEAST-COST PLANNING OF THE POWER SECTOR IN THE REPUBLIC OF BULGARIA

In correspondence with the "Strategical points for the Development of the Power sector in the Republic of Bulgaria in the period 1995-2010 and in perspective to year 2020", approved by the Council of Ministers, the strategy for the development of the Power sector is based on the following issues:

- stimulation and bettering of the conditions for more effective power demand;
- lengthening of the life period of the existing power-generating units throughout reasonable modernisation and rehabilitation;
- optimum utilisation of the cheap local coal and nuclear energy as a base load, which will ensure the energy independence of the country and will give the possibility for an active export policy;
- adequate development of the peak and near-peak power generating units for a stable and sure power supply, based on the international standarts;
- reaching a higher and better safety level in the nuclear power sector, corresponding to the international standarts;
- ecological issues in the power generation and a decrease in the thermal plant emmissions to a level and standarts, adequate to the international obligations of the country;

A forecast of the gross demand and peak loads till 2010 and in perspective to 2020 was worked-out and later several times actualised in the period after 1993. This forecast was based on the main tendencies in the strategy and the latest forecasts for the social and economical development of the country, worked-out by a number of local economic research institutes and organisations. The power sector forecast reflects also the possibilities for a better effectiveness and power intensity decrease in the industry and residential sector, for the purpose of reaching the level of the more developed countries. The tendencies in the changes of the standart of living and the cultural activities are also accounted for.

The gross demand and the peak load forecast is done in three scenarios - high, medium and low (Table 1), in which are shown the next quantities in TWh:

Year	2000	2005	2010	2020
High scenario	50.8	56.9	64.1	68.8
Medium scenario	50.8	55.8	59.1	64.7
Low scenario	46.8	49.9	53.0	57.5

The increased effectivity of the power demand, which is reflected in the forecast, will result in the following percentage of the power intensity decrease of the GDP (on the bases of 1995):

	2000	2005	2010	2020
High scenario	2,3	20,5	38,6	58,6
Medium scenario	2,3	22,1	40,8	61,0
Low scenario	10,0	30,3	46,8	65,4.

Different scenarios were worked out on the bases of the different strategic goals and the gross power demand, with the help of the Least-cost planning and the Integrated resource planning.

Beginning from 1995 the Least-cost planning activities are done, using the software program IRP-manager of the american company Electric Power Software.

IRP-manager was introduced in the National Electric Company during our mutual activities with the american companies Bechtel and CMP, financed by USAID.

As a first priority and as the most effective future plan is considered the rehabilitation of the existing plans. The research activities of some well-known companies as Bechtel, Gilbert, Westinghouse (USA), Powergen (Britain), Elektrowatt (Switzerland), EDF (France) etc., together with the activities of some local research and project organisations, proved the high efficiency of these actions.

In the total scope of the rehabilitation as a first objective should be mentioned the modernisation of the power units 5 and 6 in NPP "Kozloduy" - 1000 MW each. Radical modernisation of the safety systems is planned for the purpose of reaching the level of the international standarts. The modernisation also has the objective to raise the load factor of the units up to 6500 hours/annually, in which the biggest part of the basic demand will be covered by NPP "Kozloduy". Modernisation of the units will be done in the period of 1998-

2002, for which purpose it has been already signed a general agreement with Westinghouse Co (USA) and with a consortium, in which participate Framatom, Siemens and some russian companies. The investment, necessary for it, will ammount to more than $ 250 mln.

The rehabilitation of the thermal stations is not less important. 4 units of 150 MW each in TPP "Marica-east 2", another 4 blocks of 210 MW in the same plant and 4 units of 210 MW in TPP "Marica east 3" will be rahablitated up to 2005. The life period of the equipment will be prolonged with another 15 years, their efficiency will be raised with 7-10 % and the load factor will be increased up to 6500 hours/annually. These units will be also basic capacities.

The power units in TPP Varna (6 units of 210 MW) and in TPP Bobov dol (3 units of 210 MW) will also be rehabilitated. The rehabilitation of these plants aims also at the increased flexibility of the units, because they will be the basic near-peak capacities of the system. The rehabilitation will also ensure the diversification of the fuels (coal), which will benefit the energy independence of the country and the steadiness of the supply. The detailed rehabilitaion program is shown on Table 4. The average investment ammounts to 183 USD/kW and is much less than the figures, necessary for the corresponding new capacities.

The basic capacities in HPP, which are the basic peak capacities, will also be rehabilitated.

The units in "Marica east 1" (200 MW) and in "Marica 3" (170 MW) will not be rehabilitated and will be decommissioned. In 2004 - 2005 will be decommissioned the units 1 and 2 in NPP Kozloduy (880 MW total capacity).

On the bases of the Medium scenario of the forecast, the Least-cost plan of the Bulgarian power sector determines the new capacities, which should be built in the period up to 2010. The basic capacities are:

- two lignite coal units of 230 MW each on the place of the TPP "Marica East 1", based on an ecological burning technology in the period of 2001-2002;

- one unit of 1000 MW in NPP "Belene" in the period 2004-2005, built on the bases of the already delivered equipment and complying to the latest safety and flexibility standarts. The last estimations, made by "Atompromproekt" - Moscow and "Energoproject"

Sofia ammount to a cost of about 1 billion USD and for the completion it will be necessary about 1300 USD/MW, which corresponds to the investments for a new lignite coal plant.

- second unit of NPP Belene up to 2010 with a capacity of 600 MW with a new generation reactor with internal safety;

The perspective plan foresees a new near-peak capacity of one 450 MW CCYCLE module on natural gas in 2010. The new peak capacities are as follows:

- 3 and 4 block of 210 MW in the Pump storage Plant "Chaira";
- 8-10 gas turbines of 25 MW each in the period of 2000-2004;
- HPP "Gorna Arda" with 160 MW in 2005 and HPP "Sredna Vacha" with 120 MW in 2008. The detailed plan for commissioning and decommissioning is shown on Table 2. The period after 2010 it is informative only.

Thus a diversified structure of the power generating capacities is formed and it ensures the optimum structure of the power generation in the country:

Power generation structure	**2000**	**2005**	**2010**
TPP on local coal	31%	32%	30%
TPP on import coal	23%	21%	22%
NPP	42%	42%	43%
Hydro	4%	5%	5%

The detailed investment plan is shown on Table 3. The investment, necessary for the period up to 2010, ammounts to 8190 mln USD. For the period up to 2000 it is 2412 mln USD. The investment is distributed as follows:

- reconstruction and modernisation of NPP Kozloduy, units 5 and 6, and the expenses after the decommissioning of units 1 and 2 - 743 mln USD;
- for the rehabilitation of the TPP - 631 mln USD;
- for the new capacities in NPP - 3880 mlon USD;
- for the new hydro capacities - 2082 mln USD;
- for the transmission and distribution network, including rehabilitation and new installations - 449 mln USD;

As a complex indicator for the comparison of the scenarios is taken the "medium price" of electricity, because it reflects the direct costs: - fuel expenses and other O&M costs in the power generating utilities, as well as the financial costs, including the management of the short and long-term (investment) loans of the NEK, finding the best ratio between internal and external financing.

Lower price shows better financial and economical effectiveness of the scenario.

Based on the medium price (Table 4), are defined the scenarios, which are the most effective for the development of the Bulgarian power sector, and they can be used by the NEK management for the definition of the perspective strategy of the company. The most effective scenario AMN-2.230 is shown above.

FORECAST OF THE ELECTRIC DEMAND AND THE PEAK LOAD FOR BULGARIA UP TO 2020						
					Table 1	
Years	Maximum		Medium		Minimum	
	GWh	MW	GWh	MW	GWh	MW
1985			45900	7878		
1986			45800	7514		
1987			47800	7853		
1988			49200	8114		
1989			48700	8332		
1990			45900	8111		
1991			41000	7489		
1992			38274	7193		
1993			38018	7100		
1994			38032	7100		
1995			41500	7545		
1996			42358	7923		
1997	46065	8375	46065	8375	44241	8048
1998	47783	8688	47783	8688	45126	8202
1999	49370	8976	49370	8976	45983	8362
2000	50801	9237	50801	9237	46811	8497
2001	52275	9504	52056	9465	47513	8636
2002	53634	9752	53175	9668	48083	8741
2003	54814	9966	54148	9845	48695	8853
2004	55910	10165	55012	10002	49306	8965
2005	56916	10348	55789	10144	49917	9077
2006	57827	10514	56506	10274	50528	9189
2007	58694	10672	57183	10397	51139	9301
2008	59516	10801	57828	10495	51751	9413
2009	60290	10922	58450	10589	52362	9525
2010	61074	11044	59057	10679	52973	9627
2011	61867	11167	59647	10767	53482	9729
2012	62672	11292	60228	10852	54094	9831
2013	63486	11418	60800	10935	54603	9922
2014	64312	11546	61365	11017	55112	10024
2015	65084	11664	61928	11098	55724	10126
2020	68811	12222	64717	11495	57455	10442

ADDITIONS AND RETIREMENTS PLAN								
					Table 2			
Years	ADDITIONS				RETIREMENTS			
	Plant	Capacity, MW			Plant	Capacity, MW		
1998	Pumpe Stoarage Chaira	2	x	215				
1999	Combust Turbine	8	x	25	TPP M. East 1	4	x	50
2000					TPP Maritsa 3	1	x	170
2001	stituted Capacity in M.	1	x	230				
2002	stituted Capacity in M.	1	x	230				
2004	NPP Belene - Unit 1	1	x	1000	NPP Kozloduy	1	x	440
2005	Hydro Plant Gorna Arda	1	x	156	NPP Kozloduy	1	x	440
2008	ydro Plant Sredna Vach	1	x	120	TPP Ruse	2	x	30
2010	NPP Belene - Unit 2	1	x	600	NPP Kozloduy	1	x	440
	Combined Cycle Plant	1	x	450				

INVESTMENT COSTS, MUS $	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	až 2000	2001-2010
TOTAL	189.51	415.43	674.02	522.71	610.26	914.41	917.33	665.77	92.35	198.56	431.97	568.59	483.24	649.06	855.40	998.44	885.40	939.97	941.68	506.39	200.36	362.35	258.50	15.55	15.57	2411.92	5776.69
Nuclear Plants	78.94	70.80	101.30	203.11	408.11	545.52	307.53	176.53	8.54	175.43	413.32	557.32	456.53	586.13	534.45	431.15	560.76	554.35	309.55	223.16	27.48	27.48	4.60	4.60	4.60	862.27	3761.31
Kozloduy	70.24	61.40	86.90	63.11	58.11	55.52	55.53	8.53	8.54	31.43	53.32	53.32	53.33	53.33	30.45	27.95	27.96	50.35	50.35	50.36	27.48	27.48	4.60	4.60	4.60	339.77	403.31
Unit 1 and 2	2.15	2.50	3.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00																9.75	5.00
Unit 3 and 4	17.45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50									21.45	10.00
Unit 5 and 6	15.00	27.60	50.50	50.00	50.00	50.00	50.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	193.10	124.00
Rehabilitations	8.70	25.00	50.00	50.00	50.00	50.00	50.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	183.70	124.00
Simulator	6.30	2.60	0.50																							9.40	0.00
Common for Plant	35.65	30.30	32.30	11.11	6.11	3.52	3.53	3.53	3.54	3.54	3.55	3.55	3.55	3.56	3.56	1.57	1.57	1.57	1.58	1.58	1.59	1.59	1.60	1.60	1.60	115.48	35.43
Radioactive Waste Processing Instal.	11.95	4.80	1.90																							18.65	0.00
Wet Spent Fuel Storage	3.60	1.70	0.40																							5.70	0.00
Dry Spent Fuel Storage	3.00	12.50	12.50	10.00	5.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00											43.00	20.00
Costs for Safety	17.10	11.30	17.50	1.11	1.11	1.52	1.53	1.53	1.54	1.54	1.55	1.55	1.55	1.56	1.56	1.57	1.57	1.57	1.58	1.58	1.59	1.59	1.60	1.60	1.60	48.13	15.43
Costs after Shut-down	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.89	45.78	45.78	45.78	45.78	22.89	22.89	22.89	45.78	45.78	45.78	22.89	22.89	0.00	0.00	0.00	0.00	228.88
Unit 1 and 2										22.89	45.78	45.78	45.78	45.78	22.89											0.00	228.88
Unit 3 and 4																22.89	22.89	45.78	45.78	45.78	22.89	22.89				0.00	0.00
NPP Belene	8.70	9.40	14.40	140.00	350.00	490.00	252.00	168.00		144.00	360.00	504.00	403.20	532.80	504.00	403.20	532.80	504.00	259.20	172.80						522.50	3358.00
Thermal Plants	57.73	292.70	535.80	253.74	123.38	265.00	466.95	361.20	2.62	2.63	2.64	2.66	18.11	54.31	312.34	559.17	316.52	377.49	623.99	275.10	164.75	326.73	245.76	2.81	2.82	1263.35	1488.45
- Rehabilitations	7.70	56.96	89.38	92.84	87.04	91.20	147.84	24.00	0.00	0.00	0.00	0.00	0.00	0.00	33.50	58.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	333.92	296.54
TPP Maritza East 2 - 4 Units			25.84	25.84	25.84	32.00	74.84	24.00																		77.52	130.84
TPP Maritza East 3 - 4 Units		12.8	10.84	23.80	21.00	31.00	54.00																			68.40	85.00
TPP Bobov Dol - 3 Units		30.50	35.50	25.50																						91.50	0.00
TPP Varna - 6 Units	7.70	13.70	17.20	17.70	40.20	28.20	19.00																			96.50	47.20
TPP Ruse - East - 4 Units															33.50	58.60										0.00	92.10
- Repowering	47.50	205.85	380.03	158.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	239.71	497.87	241.80	248.76	459.25	272.34	161.98	323.95	242.96	0.00	0.00	791.74	239.71
Substituted Capacity in TPP M. East	47.50	205.85	380.03	158.35											239.71	497.87	241.80	248.76	459.25	191.35						791.74	239.71
Substituted Capacity in TPP Varna																				80.99	161.98	323.95	242.96			0.00	0.00
- New Plants	0.00	27.36	63.84	0.00	33.77	171.22	316.52	334.59	0.00	0.00	0.00	0.00	15.44	51.63	36.43	0.00	72.00	126.00	162.00	0.00	0.00	0.00	0.00	0.00	0.00	124.97	925.83
Combined Cycle						103.68	181.44	233.28									72.00	126.00	162.00							0.00	518.40
Imported Coal					33.77	67.54	135.08	101.31																		33.77	303.93
Combuste Turbine		27.36	63.84										15.44	51.63	36.43											91.20	103.50
Others	2.52	2.53	2.55	2.56	2.57	2.58	2.59	2.61	2.62	2.63	2.64	2.66	2.67	2.68	2.69	2.71	2.72	2.73	2.74	2.76	2.77	2.78	2.80	2.81	2.82	12.73	26.37
Hydro Plants	15.04	19.60	3.54	16.71	24.34	69.56	102.57	74.42	34.12	0.68	0.69	0.69	0.69	0.69	0.70	0.70	0.70	0.70	0.71	0.71	0.71	0.71	0.72	0.72	0.72	79.24	284.81
- New Plants	14.38	18.94	2.88	16.05	23.67	68.89	101.90	73.74	33.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.90	277.96
Pumpe Stoarage Chaira	14.38	18.94	2.88																							36.19	0.00
Hydro Plant Sredna Vacha						23.21	34.81	34.81	23.21																	0.00	116.04
Hydro Plant Gorna Arda				4.39	10.23	32.16	54.08	35.08	10.23																	14.62	131.55
Jadenitsa				11.66	13.44	13.52	13.00	3.85																		25.10	30.37
Others	0.66	0.66	0.67	0.67	0.67	0.67	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.69	0.70	0.70	0.70	0.70	0.71	0.71	0.71	0.71	0.72	0.72	0.72	3.33	6.85
Transmission & Distribution	37.81	32.32	33.38	49.14	54.42	34.32	40.28	53.62	47.08	19.82	15.32	7.92	7.92	7.92	7.92	7.42	7.42	7.42	7.42	7.42	7.42	7.43	7.43	7.43	7.43	207.07	242.11
- Rehabilitations	27.47	24.18	27.03	27.36	34.58	18.14	17.92	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	140.61	56.05
High Voltage	17.88	17.89	20.74	19.61	24.63	15.64	15.42																			100.75	31.05
Medium Voltage	9.59	6.29	6.28	7.75	9.95	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	39.87	25.00
- Repowering	0.41	1.27	5.94	21.30	19.43	15.77	21.95	50.71	44.16	16.91	12.40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	48.36	181.91
High Voltage	0.41	1.27	5.94	21.30	19.43	15.77	21.95	50.71	44.16	16.91	12.40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	48.36	181.91
Modernization of Metering	9.48	6.50	0.00	0.00	0.00																					15.98	0.00
Others	0.45	0.37	0.41	0.48	0.41	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	2.12	4.16

INVESTMENT COSTS, M			
		Òàáëèöà 3	
		1996-2010	2011-2015
TOTAL		**8188.61**	**4271.88**
Nuclear Plants		**4623.58**	**2078.98**
	Kozloduy	**743.08**	**206.98**
	Unit 1 and 2	14.75	0.00
	Unit 3 and 4	31.45	1.00
	Unit 5 and 6	**317.10**	**15.00**
	Rehabilitations	307.70	15.00
	Simulator	9.40	0.00
	Common for Plant	**150.91**	**7.87**
Radioactive Waste Processing Instal.		18.65	0.00
	Wet Spent Fuel Storage	5.70	0.00
	Dry Spent Fuel Storage	63.00	0.00
	Costs for Safety	63.56	7.87
	Costs after Shut-down	**228.88**	**183.10**
	Unit 1 and 2	228.88	0.00
	Unit 3 and 4	0.00	183.10
	NPP Belene	**3880.50**	**1872.00**
Thermal Plants		**2751.80**	**2152.28**
	- Rehabilitations	**630.46**	**58.60**
	TPP Maritza East 2 - 4 Units	208.36	0.00
	TPP Maritza East 3 - 4 Units	153.40	0.00
	TPP Bobov Dol - 3 Units	91.50	0.00
	TPP Varna - 6 Units	143.70	0.00
	TPP Ruse - East - 4 Units	92.10	58.60
	- Repowering	**1031.45**	**1720.02**
Substituted Capacity in TPP M. East		1031.45	1639.03
Substituted Capacity in TPP Varna		0.00	80.99
	- New Plants	**1050.80**	**360.00**
	Combined Cycle	518.40	360.00
	Imported Coal	337.70	0.00
	Combuste Turbine	194.70	0.00
	Others	**39.10**	**13.66**
Hydro Plants		**364.05**	**3.51**
	- New Plants	**353.87**	**0.00**
	Pumpe Stoarage Chaira	36.19	0.00
	Hydro Plant Sredna Vacha	116.04	0.00
	Hydro Plant Gorna Arda	146.17	0.00
	Jadenitsa	55.47	0.00
	Others	**10.18**	**3.51**
Transmission & Distribution		**449.18**	**37.11**
	- Rehabilitations	**196.66**	**10.00**
	High Voltage	131.80	0.00
	Medium Voltage	64.87	10.00
	- Repowering	**230.26**	**25.00**
	High Voltage	230.26	25.00
	Modernization of Metering	15.98	0.00
	Others	**6.28**	**2.11**

APPENDIX E

B.1. - Establish a Multi-Year Planning System

Central Maine Power Company has observed with interest the many changes that NEK has undergone over the past few years. As each day passes, NEK recognizes the need for change and improvement along many fronts. Central among those needs is a more formal approach to longer-term thinking, strategy and multi-year goals.

In late-January of 1995, representatives from Central Maine Power Company began assessment of the needed action steps that NEK should undertake along the road to a successful Goals and Objectives program. This report documents CMP's initial commentary regarding Tasks B.1 and B.2, and offers critical points that NEK should consider as we proceed.

The original workplan is included in this report as Attachment I., along with a workplan timeline, Attachment II.

An Effective Goals Program Matures Slowly.

Central Maine Power Company believes that its successful Goals & Objectives program will be a good model for NEK to follow. NEK should be reminded, however, that there is no fast and easy way to implement a goals program. CMP's program has been evolving for approximately 10 years and is just now reaching a mature status.

Management processes, like any other sophisticated process, usually go through distinct levels of maturity. Before problem detection and corrective solutions for managing information can be developed and implemented, strong disciplines must be established. Corporations that reach performance maturity with their goals process have an advantage over their competition.

There are five logical stages that identify the degree of maturity in any performance management process. These stages are;

1. Reaction
2. Recognition *(NEK's goals process is now in this phase.)*
3. Planning
4. Maturity *(CMP's Goals & Objectives program is now in this phase.)*

During the first stage, little is done about a performance problem until complaints from a user community reach such a level that management must take drastic remedial action. Management takes a 'hit-or-miss' approach to performance and few or no tools are available to solve problems. *In our view, NEK is well past this early phase.*

During the recognition stage, attempts are made to use performance tools such as goals, targets or incentives for monitoring progress and determining the cause of performance problems. Little thought is given to the future impact of solutions. Performance problems are prioritized for solution based on the loudest complaint, and there is little coordination between groups.

With regard to a formal goals process, NEK can be categorized somewhere between recognition and the next stage (planning). Progression from here into the planning stage requires little more than solid support from upper management, some organizational changes and some overall effort.

When the process reaches the planning stage, the performance management system becomes more formalized and a performance coordinator may be appointed. Policies and procedures for monitoring and reporting performance are established. *Central Maine Power Company expects that if Task B.1 is successful, NEK's goals process should reach this stage of maturity.*

During the maturity stage, a systems approach is applied to performance management and service level commitments are made for various applications. System performance is based on user requirements and inter-communication is high. A teamwork approach to performance management is taken and service levels are jointly defined by providers and end-users. *Central Maine Power Company has reached this stage of development with its Goals and Objectives Program.*

CMP's History and Experience with Goals and Objectives

Central Maine Power Company realizes the benefits of a mature goals process and can be categorized between the maturity stage and the next stage. The evolution to this point though, has been slow (over 10 years). The process itself has been subjected to ongoing evaluation and refinement. A brief chronology of CMP's experience has been chronicled below in order to provide a relative perspective for NEK.

In December of 1985, CMP's President drafted its first formal Goals for the next year. The document was little more than two pages consisting of general statements. The Board of Directors discussed the proposed goals at their December meeting.

At this time many fundamental problems existed with the early process. The goals program lacked almost all of the essential elements that make up a sound process. There was no input from the organization's managers; there was no integration with manager's budgets and there was no method to monitor progress.

During 1986-7, all of upper management was asked to recommend themes for the goals. Increasing the involvement and commitment of all top management improved the quality of the goals program. Also during this time period, CMP adopted a consistent style and format for the presentation of goals attainment progress. Top management was encouraged to discuss goals attainment progress throughout the year. The Board of Directors continued to address the Goals program at their December meetings

In 1988, CMP began to integrate the Goals & Objectives process with the budget process. Top management provided 'guiding goals' for the upcoming year at the outset of the formal budget process (July).

During 1989, CMP took a big step in budget planning when the President directed development of 'draft' goals and objectives during that summer in preparation for 1990's budget. Goals setting began to be performed prior to the budgeting process. CMP also encouraged full participation on the part of all management in the goal-setting process. In fact, it was about this time that CMP's Executive Committee began a practice that has become a management custom. The Senior Officers of the company pledged to hold a planning retreat. The purpose of the annual retreat was simple; develop long-term strategic goals and communicate the goals to the organization **prior** to budget preparation.

Central Maine Power Company feels that NEK's Board of Executive Directors should consider a similar annual planning meeting dedicated entirely to setting long-term strategy and goals. This type of meeting was, and still is considered critical to CMP's success.

From 1990 to 1993, CMP's goals program became very detailed and specific, with more than 100 various objectives and initiatives that support six major goals. The goals were;

- Public and Workplace Safety
- Services that Satisfy Customers
- Environmental Commitment
- Balance in Energy Resources
- A Skilled and Motivated Workforce
- Competitive Financial Position

The Goals process became more sophisticated and complex. Objectives became more specifically oriented to day-to-day work, and communication of directions to all employees was improved. Monitoring of progress was directed more specifically to areas vulnerable to non-attainment, rather than on accomplishments.

By 1994, CMP had a mature management process in place. Corporate goals and objectives identified the direction for the Company and indicate where priorities and resources should be focused. The process enhanced company-wide coordination of efforts and provided a means for measuring progress and achievement.

For 1995, CMP continued to make the goals program more effective and efficient. Ironically, the final publication was similar in size to the original goals drafted by the Company's president ten years earlier. It is there that the similarities end, however. CMP's goals for 1995, *Earn Customer Loyalty*, and *Improve Financial Health* echo the critical successes needed to move the Company forward into the next century.

CMP's 1995 Goals and Objectives package is included as Attachment III. All Central Maine Power Company employees receive a copy.

Organizational structure and communication are critical.

Organizational structure plays a major role in the facilitation of effective management communication. One must recognize the type of structure, and how it works, before understanding the communication process.

NEK is a fully decentralized organization, with distinct investment centers (branches) that have their own accounting for revenues and expenses. The use of accounting information and results in measuring the performance of each branch can be important in assisting managers to reach operational goals. NEK branch managers have considerable authority and responsibility. Decision-making, for their own operations, is also fully decentralized.

Being already a functioning decentralized operation should work to NEK's advantage with regard to goals setting and strategic planning. The delegation of responsibility for day-to-day operations that already exists at NEK should allow top management to concentrate more on strategic planning.

NEK's Management Communication Process

Central Maine Power Company has reviewed NEK's management communication process and has attempted to draw comparisons with its own process. The review compared six general categories;

- Organizational Structure
- Primary Management Responsibilities
- Decision-Making Roles
- Vertical Reporting Relationship (Reports to:)
- Frequency of Meetings
- Goals Process Responsibilities

A full comparison of the two companies is included in Attachment IV - Central Maine Power Company's process and Attachment V - NEK's process. As this project proceeds, the team members will attempt to address weaknesses that may exist in the communication process.

Management Organizational structure comparison.

CMP		NEK
Board of Directors	→	Committee of Energy
Executive Committee	→	Board of Directors (9 members)
Operating Committee	→	Department Heads, Branch Managers

The design of NEK's vertical management structure is somewhat similar to Central Maine Power Company. There are, however, obvious differences in the make-up of NEK's General Assembly - Committee of Energy and CMP's shareholder-represented Board of Directors.

There is a direct parallel when comparing the Board of Directors with CMP's Executive Committee.

Another difference is the existence of CMP's Operating Committee (which is made up of department heads). This cross-functional committee at Central Maine Power Company has regularly scheduled meetings every other week. The group confronts many operational issues as a team. Such an approach may be beneficial to NEK's management communication process.

Central Maine Power Company also has an established Quality Performance Department that is responsible for coordinating the Goals and Objective process at the corporate level. Central Maine Power Company considers the existence of a 'control' group to be an integral part of the goals process.

The Next Step in Goals Program Development

In January 1995, Central Maine Power Company representatives were told that NEK has set goals for the upcoming year, but that there was little or no formal process. The Goals are as follows;

1 - Answer the Needs of the Customer
2 - Lower Costs
3 - Price of Product
4 - Resource Planning

NEK should recognize that a sophisticated program, such as CMP's would require extensive training and education. The first step would be to secure the support of the Board of Directors, then the HQ managers, and then the Branch managers. The change would be a significant one for management to implement.

The goals program needs full support and understandingof everyone , and therefore cannot be imposed upon management, or the employees. For example, a formal 'order' from the Directors on its own would not work when implementing the goals program.

Fundamentals of successful programs include, planning conversations, management accounting, performance monitoring systems and accountability. NEK may need to change its way of thinking, improve the overall understanding (education), and clearly define managers rights and responsibilities.

An effective Goals Program establishes a platform for integrated planning.

The Goals & Objectives process at CMP is the platform for management communication. The existence of, and the on-going attention to pre-set goals, provides management with a constant reminder and focus. It is easy for management to be overwhelmed by the constant problems and pressures that result from the day-to-day operations of the business. An effective goals program provides a 'blueprint' that management could refer to throughout the year.

Planning and goal setting enables a manager to affect rather than accept the future. By setting goals and charting a course of action, the organization commits itself to making the desired actions happen. An effective goals program also provides a means for actively involving personnel from all areas of the organization in the management process.

B. 2. - Design and Implement a Budgeting Process

The workplan items that were identified as part of Task B.2 during CMP's visit to NEK in late-January 1995 can be segregated into three major categories: budget process comparison, enhancement of NEK's financial modeling, and recommendations and advice regarding management responsibility reporting (budget variance analysis).

Budget Process Comparison

During March and April of 1995, Central Maine Power Company representatives have been discussing CMP's methods of forecasting customer usage, details of CMP's rate structure and the pricing of revenues from electricity sales. Central Maine Power Company task managers currently working on projects included under Task A. of this contract wish to ensure that there will be no duplication of effort as we proceed with Task B.2.

Representatives from CMP International discussed the inter-relation of these tasks with NEK during the April 3-7, 1995 visit. Also during the April visit Central Maine Power Company officials discussed a proposed agenda for a visit to the US by NEK Budget and Finance representatives that is now scheduled for late-July.

A proposed agenda for the July visit is included as Attachment VI.

Central Maine Power Company representatives will continue to analyze information received from NEK during the January, 1995 visit and forward any analysis to NEK upon completion.

Enhancement of NEK's Financial Modeling

The existence and potential enhanced use of the IRP Manager could have an impact on the Financial Accounting System Design tasks. As noted in the least-cost planning project report dated July of 1994, an important secondary consideration was the capability to integrate the production cost model into other planning models and systems at NEK. CMP needs to identify what, if any, progress has been made as a follow-up to the Least Cost Planning project. The report mentions an action plan step for developing additional capabilities using IRP Manager.

The report also mentions that NEK investigate the use of the IRP Manager financial model. Some changes would be required to adapt the IRP Manager financial model for NEK use.

This topic should be discussed with NEK as it relates to Task B.1. and 2. We feel that some of the issues requested by NEK as part of this task can be discussed during CMP's visit to NEK in early April, and also during NEK's potential visit to Maine in late-July.

The IRP Manager also has an obvious impact on Task A. - Least-cost and Integrated Resource Planning.

Management Responsibility Reporting

CMP's cost management and reporting system design was directly related to the goals program efforts in the late 1980's. Many of the principles that are in place today were put in place in 1987, when Central Maine Power Company upgraded its accounting system. Any advice or recommendation that CMP could provide to NEK regarding budget variance and responsibility reporting should be in context with NEK's accounting system upgrade project.

Central Maine Power Company representatives wish to review the progress of NEK's General Ledger (Accounting) system upgrade. The comments of NEK's Budget and Finance Departments would be most helpful in determining the next step to be taken under this part of Task B.2.

Attachment I. - Original Workplan

B.1. Establish a Multi-Year Corporate Planning System

1. Flowchart the existing management communication process and evaluate how well it works. (Feb-Apr)
   - corporate guidance
   - resource allocation and re-allocation
   - performance monitoring
   - budgets and plans

2. Assist NEK Senior Management in defining longer-term goals (for example 1996-1999). (May-Aug)
   - discussion of process recommendation
   - define goals, articulate
   - Executive Management meeting to form Goals Program

3. Assist NEK in defining a management communication process for disseminating goals, targets. (May-Aug)
   - expectations of managers to respond with initiatives and budgets
   - evaluation and acceptance of proposals, budgets
   - monitoring of performance
   - tie-in to incentives

4. Monitor implementation of Goals Program for 1996. (Sep-Dec)

5. Formally integrate multi-year plans with Goals Program. (Sep-Dec)
   - Maintenance, investment, financial plans, demand forecast, sales

B.2. Design and Implement a Budgeting Process

1. Compare budget forecasting processes, evaluate and provide suggestions for improvement. (Feb-Apr)
   - sales & revenues
   - generation & fuel costs
   - operating costs

2. Upgrade 5YR financial model. (May-Jun)

3. Compare budget reporting systems, evaluate and provide suggestions for improvement that could be implemented with the new G/L system. (Feb-Jun)

Attachment II - Timeline and Travel

Travel Plans and Actions	Tasks, Topics	Support Staff
January visit to NEK	Initial visit to discuss the overall tasks (B1 and B2) and to finalize a workplan	D. Stevenson J. Gasbarrone
February visit to NEK	Information exchange re: rates and pricing (related but not part of Task B).	F. Anderson S. Garwood
March	Project progress report for NEK review	J. Gasbarrone D. Stevenson W. Whittier
April visit to NEK	Discuss sales and revenue forecasting in conjunction with Task A and the IRP Manager	W. Whittier J. Davulis
July NEK visit to US	5Yr Financial Model consistency with budgets and other planning. Establish protocol for the meeting with NEK Executive Directors (re: Goals)	W. Whittier J. Gasbarrone D. Stevenson B. Quinsey
Sept/Oct. visit to NEK	Goals Program discussions - (B1), Management Reporting System suggestions - (B2).	D. Stevenson J. Gasbarrone B. Quinsey W. Whittier
Follow-up visits	To monitor implementation	CMPI staff J. Gasbarrone

Goal: Earn Customer Loyalty

TARGET: Increase the number of customers who say that they would choose CMP over another electric company 20 percentage points by January 1, 1997.

OBJECTIVE A

Create an environment that places the customer's satisfaction first.

TARGET: Increase customer quality rating by 20 percent by January 1, 1996.

KEY ACTIONS

1. Make it easier for customers to do business with CMP by re-engineering aspects of its customer service, communications, and service delivery processes.

2. Use direct and personal communication to demonstrate to customers that CMP is customer focused and to reinforce the perception that a positive change is occurring.

3. Advance a corporate culture that supports a quality workforce and maximizes communication with all employees.

OBJECTIVE B

Develop and deliver flexible, competitive, and understandable products and services that meet or exceed customers' needs and expectations of value.

TARGET: Increase customer perceived value rating by 20 percent by January 1, 1996.

KEY ACTIONS

1. Restore customer confidence in the Company's billing process.

2. Assess the customer's power-quality expectations, establish power-quality objectives and implement a plan to meet the objectives.

3. Use direct customer input to determine needs and expectations that will drive programs, policy changes and service improvements.

4. Deliver choices in prices, products and services that respond to customer needs and expectations in targeted segments.

5. Meet or exceed baselines for the five indicators included in the ARP customer-service and reliability index.

Goal: Improve Financial Health

TARGET: Achieve a total shareholder return that places CMP in the top half of electric utilities in 1995, and in the top 25 percent by 1998.

OBJECTIVE A

Lower costs to competitive-market levels.

TARGET: Achieve the 1995 operating and capital resource targets of O & M: $179m; capital investment: $56m; fuel and purchased-power: $369m.

KEY ACTIONS

1. Achieve a BBB or equivalent investment-grade bond rating on CMP's senior securities from all three major credit rating services.

2. Develop a business process review methodology, and implement it in three areas of major business processes that will improve customer service and reduce operating and/or capital costs.

3. Reduce administrative and operating overheads by $8 million annually.

4. Achieve reductions in fuel and purchased power costs through enhanced operating practices, fuel procurement practices, purchased power contract restructuring, and legislative and regulatory actions.

5. Expand ancillary business efforts related to the core business.

OBJECTIVE B

Promote the use of electricity to fully apply available resources.

TARGET: 1995 revenues from electricity sales to be equal to or greater than 1994 actual revenues.

KEY ACTIONS

1. Offer competitive prices and service options to maximize the retention and profitability of existing market segments and expand sales to new profitable market segments.

2. Pursue the establishment of a partnership program for economic development with Maine's business and government leaders that will encourage the creation of new jobs and stimulate the Maine economy providing an expansion of electric sales opportunities.

3. Complete and implement the regional marketing plan to maximize net revenues from the purchase and sale of wholesale electricity.

OBJECTIVE C

Implement changes to address competitive-market forces with policy makers and regulators.

TARGET: Achieve satisfactory results on regulatory and legislative issues affecting competitiveness.

KEY ACTIONS

1. Pursue with public policy makers the reduction in regulatory and legal mandates as a means of improving the competitiveness of Maine's electric industry.

2. Maximize the value of the Company's investment in generation assets.

3. Obtain favorable legislative and regulatory treatment of competitive transition issues including stranded costs and service territory integrity.

4. Develop and advocate a corporate position on restructuring of the electric utility industry in Maine.

1995 Goals & Objectives Development Process

ROLES AND RESPONSIBILITIES

Corporate goals and objectives identify the direction for the Company and indicate where priorities and resources should be focused. The goals and objectives process enhances company-wide coordination of efforts and provides a means for measuring progress and achievement. It is an integral part of CMP's Total Quality Management system.

Executive Committee:

- Formulate strategy, corporate goals and objectives, and their targets.
- Report progress of goal attainment to Board of Directors.

Operating Committee and EC Direct Reports:

- Develop key actions to support corporate objectives.
- Monitor and report on progress toward goals, objectives and key actions throughout the year.
- Monitor progress of his/her departmental actions.
- Initiate the development of supporting departmental actions and plans.

Departments:

- Develop actions or plans to support corporate goals and objectives.
- Track and report progress of these actions or plans to their next-level supervisor.
- Include adequate resources for departmental actions or plans in the departmental budget.

Human Resources:

- Coordinate the goals and objectives process at the corporate level.
- Support the Executive and Operating Committees and EC Direct Reports in carrying out their responsibilities.
- Assist in developing departmental plans, as requested.

All Employees:

- Participate in developing departmental and work-group level actions.

Management Communication Process Comparison

Attachment IV.

Central Maine Power Company

Organization Structure	Primary Management Responsibilities	Decision-Making Role	Reports to:	Frequency of Meetings	Goals Process Responsibilities
Board of Directors (BoD)	Interests of company shareholders.	Oversees the EC.	Shareholder	Monthly	Final approval of all actions.
Executive Committee (EC)	Strategic and tactical planning. Organizing. Set policy	Develops a course of action.	Board of Directors	Weekly	Define strategy and set goals.
Operating Committee (OC)	Organizing and directing.	Assign Responsibilities. Day-to-day operations.	Executive Committee	Bi-weekly	Develops objectives. Monitors progress.
Department Heads	Supervise work. Implement policy.	Day-to-day operations.	Operating Committee	As needed.	Implements actions.
Quality Performance	Monitor and control.	Identify variations and exceptions.	Executive Committee	As needed.	Compile and report.

↑ ↑

CMP's Strengths

Management Communication Process Comparison

Attachment V.

Natsionalna Elecktricheska Kompania

Revised 5/1/95

Organization Structure	Primary Management Responsibilities	Decision-Making Role	Reports to:	Frequency of Meetings	Goals Process Responsibilities
Committee of Energy	Defines the charter	Oversees the ED	State		Sets national energy policy.
Board of Directors 9 Members	Defines strategy. Sets policy. Approves annual and outyear plans.	Develops a course of action.	Comm. of Energy	Quarterly (law) Weekly (in practice)	Sets goals and one-year targets. Issues Co.-wide orders.
NEK Department Heads	Organizing and directing.	Assign Responsibilities. Day-to-day Operations.	Executive Directors	Weekly (with Executive Directors)	Supplied their business programs for 1995 upon request of ED.
Branch Managers	Supervise work. Implement policy	Day-to-day operations.	Board of Directors	As needed.	(not clear, if any)
Budget, Investment, Finance.	Monitor and control.	Identify variations and exceptions.	Executive Directors	As needed.	(not clear, if any).

↑ ↑

NEK's Opportunity for Improvement

Attachment VI.

Proposed Agenda for NEK Visit to Central Maine Power Company
July 24-28, 1995

To be held at the Company's General Office, 4th Floor Presentation Room.

AM Sessions	9:00 - 12:00
Lunch	12:00 - 1:00
PM Sessions	1:00 - 4:00

CMP Co. Participants:	Mr. Douglas Stevenson, Treasurer
	Waine Whittier, CMPInternational
	Joseph Gasbarrone, Budget
	Brigitte O. Quinsey, Quality Performance
	Kathleen G. Powers, Cash Management
Day 1 - AM:	Introduction - Mr. Stevenson
	NEK's Comments concerning Task B.
	Lunch
PM:	General Group Discussion of Task B.
Day 2 - AM:	Goals & Objectives Work Session
	Lunch
PM:	Goals & Objectives (continued)
Day 3 - AM:	Discussion of NEK's Financial Model
	Role of IRP Manager
	Lunch
PM:	Review CMP's Cash Management System
	Control and Management of Cash Management Function
	Review of Hardware and Software
Day 4 - AM:	Cash Management Job Shadowing
	Review of Central Maine Power Company Cash Reports
	Open Discussion of Next Actions
	Lunch
PM:	Discussion of Management Reporting Systems
	Accounting System Conversion
Day 5 - AM:	Open Issues Work Session
	Lunch
PM:	Adjournment - Mr. Stevenson

APPENDIX F

Central Maine Power Company
Memorandum

For Company Business Only **Financial Planning & Budget**

To: Trifon Tsvetkov, Executive Director, NEK
Vasil Anastassov, Executive Director, NEK
Nakita Nabatov, Executive Director, NEK

From: Joseph Gasbarrone, Budget Supervisor
Brigitte O. Quinsey, Organizational Development Administrator

Date: May 13, 1996

Subject: Goals and Objectives Program

This memorandum is a follow-up to our visit with you at NEK last March and our subsequent report forwarded to you in April.

With your and the Chairman's concurrence, a direction for moving ahead with the goals program was formulated with your staff during the visit. Specific next actions and tasks were outlined, one of the earliest being a discussion about the goals program with your full Board of Directors at a meeting this summer.

In our meetings last March, it was indicated that during the initial implementation steps, possible further support and guidance by CMP may be beneficial. To help us determine what kind of further support we may be able to offer, it would be helpful to know NEK's plans for moving the goals program forward this summer and autumn.

cc: Pavlin Nesterov, Chairman of the Board
Damien Hristov, Department Head, Economic and Budget Department
Krassimer Kanev, Department Head, Finance

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Central Maine Power Company
Memorandum

For Company Business Only **Financial Planning & Budget**

To: Damien Hristov, Department Head, Economic and Budget Department, NEK
Krassimer D. Kanev, Department Head, Finance

From: Joseph Gasbarrone, Budget Supervisor, CMP
Brigitte O. Quinsey, Organizational Development Administrator, CMP

Date: April 1, 1996

Re: Proposal for a Goals and Objectives Program at NEK

Enclosed is the trip report from our March visit to NEK. Copies have been provided to the Executive Directors and Chairman Nesterov.

We were very encouraged with the results of this recent visit. We believe that with your help and expertise, and the sponsorship and support of Mr. Anastassov, we will be able to produce a program of value for NEK. The Executive Team at NEK all expressed a great deal of interest in this project and we hope that this report will help continue that momentum.

However, as we've commented in earlier reports (5/1/95), the program will require time and patience before results are realized. CMP learned that results are not immediate but, once achieved, well worth the effort.

It is important that you review the enclosures and perhaps apply a timetable to the steps (Attachment III) that would fit into NEK's planning and budgeting schedule for the upcoming year. We will plan on a follow-up communication to the Executive Directors on May 15th, requesting further instructions.

As always, fell free to call on us any time, Tel. (207) 623-3521, Fax. (207) 626-9576.

enclosure

cc: Vasil Anastasov, Executive Director, Electricity Supply and Budgeting
Trifon Tsvetkov, Executive Director, Operations and Acting General Director
Radka Iaramova, Economist

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Central Maine Power Company
Memorandum

For Company Business Only **Financial Planning & Budget**

To: NEK Executive Directors

From: Joseph Gasbarrone, Budget Supervisor, CMP
Brigitte O. Quinsey, Organizational Development Administrator, CMP

Date: April 1, 1995

Re: Proposal for a Goals and Objectives Program at NEK

Thank you for your attention to this project during our recent visit to NEK. A full report is enclosed for your review. CMP remains convinced that a formal management guidance program, such as this proposal, could be beneficial to NEK.

The Executive Summary of the trip report contains a discussion on process implementation and a review of the DRAFT NEK Goals and Objectives. A list of specific next actions is detailed in the report.

Our best recollection of your comments have been summarized in Attachment I. Please review for inaccuracies. We have revised the DRAFT Goals (Attachment II) to incorporate new objectives associated with "revenue metering problems" and also "maintaining a qualified workforce". We have intentionally removed the specific tasks and actions included in earlier drafts. It is our hope that Department Heads and Branch Managers will now develop NEK specific tasks and quantifiable actions that support the goals and objectives.

We believe that at this point you have the process knowledge and material you need as Executive Team in order to finalize the DRAFT Goals and ~~being~~ begin to direct the implementation of the process.

As always, we are available to provide you with our full support and guidance.

enclosure

cc: Pavlin Nesterov, Chairman of the Board, NEK

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Central Maine Power Company
Memorandum

For Company Business Only **Financial Planning & Budget**

To: Serguey Shishov, Department Head, Foreign Relations - NEK

From: Joseph Gasbarrone, Budget Supervisor, CMP
Brigitte O. Quinsey, Organizational Development Administrator, CMP

Date: April 1, 1996

Re: Proposal for a Goals and Objectives Program at NEK

A complete report of the Goals & Objectives program discussions held in Sofia, March 6-8, 1996 is enclosed for your information.

Your attention in arranging the discussions was essential to the success of the visit. If you would kindly distribute the enclosed packages to the participants of those discussions we would be most grateful.

Thank you again for your assistance and kindness.

enclosure

cc: Connie J. Irland, President, CMP International

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Executive Summary

Participants and Schedule
Meetings were arranged with the help and encouragement of Mr. Serguey Shishov, Head of the Foreign Relations Department. The schedule was as follows:

NEK was represented by the following individuals:

Day 1	Mr. Nakita Nabatov, Executive Director, Research, Development and Investment Mr. Krassimer D. Kanev, Head of the Finance Department Mr. Trifon Tsvetkov, Executive Director, Operations, and Acting General Director
Day 2	Mr. Vasil Anastassov, Executive Director, Electricity Supply and Budgeting Mr. Pavlin Nesterov, Chairman of the Board, NEK
Day 3	Mr. Damien Hristov, Head of the Economic & Budgeting Department

CMP was represented by the following individuals:

Day 1-3	Mr. Joseph Gasbarrone, Budget Supervisor Mrs. Brigitte Quinsey, Organizational Development Administrator
Day 3	Mr. Douglas Stevenson, Energy Consultant, (formerly with CMP, and the principal architect of CMP's Goals & Objectives Program)

CMP representatives also met with Lada Stoyanova, Program Specialist for the United States Agency for International Development.

Trip Objective
The purpose of this trip was to advance the project of developing a goals program for NEK begun in the summer of 1995. Specifically, this visit was to:

1) further the support and acceptance of such a management program by NEK's Executive Managment, and
2) provide CMP with information on key company issues and priorities to assist in finalizing goals & objectives and in developing a process suitable to NEK's operating and management environment.

The prescribed objectives for this trip were met. There seems to be strong momentum for this program among the Executive Directors and Chairman Nesterov. There is time within the original CMP contract timeframe to assist NEK in implementing this program for the upcoming budget year (1997).

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Discussions
Translated materials, including an implementation plan and process steps had been forwarded to NEK in late February. It was evident that the materials had been reviewed by interview participants prior to the meetings with CMP representatives.

The interview process was fluid. Each Executive Director and the Chairman of the Board:

- articulated his perception of critical company priorities,
- gave insight into problems specific to their area of responsibility, and
- commented on the value a Goals program brings to NEK and on key points regarding the program's implementation.

The discussions were well-conceived and covered a full spectrum of issues facing the company. Comments and responses to questions were frank, far-ranging and often visionary in nature. The meeting participants clearly supported the need for a management guidance technique such as this proposed program. When asked specifically if such a program as the CMP model could be useful to NEK, the response was, "yes, of course, but the approach and process will need to be Bulgarian in nature".

The Executive Directors pointed out that the style and method of management at NEK may inhibit successes from the goals program initially. NEK managers are not used to the "profit and loss" environment required in a market economy. They manage as much through intuition than the use of analysis and would, at least initially, place little value on a formal management process. CMP pointed out that this situation is similar to its own in the mid-1980's, prior to the inception of its successful goal program.

Several common issues and problems were brought up by each participant interviewed. The following central themes emerged as critical problems:

- economic difficulties of NEK and its customers that have resulted from the transition to a market economy.
- rehabilitation and modernization of existing generating assets in order to meet growing demand.
- problems in the revenue cycle, primarily metering (sales losses) and cash collection.
- needed improvements in the power delivery systems (transmission , transformation, and distribution).
- the cost of meeting stringent national and international environmental standards.

These issues, together with other concerns, problems, and priorities facing the company were discussed in detail during the interviews. A summary of each conversation (Attachment I) is included in this report. CMP's paraphrasing and interpretation of each participant's comments will require their review.

Program Development - Next Actions
CMP representatives are convinced that NEK management now has a good understanding of CMP's model for goals setting and is prepared to develop a system that would work at NEK for the upcoming budget year and beyond.

After the Executive Directors' and Chairman's comments have been reviewed, NEK staff, with CMP's assistance, will need to finalize the formal business program proposal for presentation to the full Board of Directors this summer.

Steps necessary to complete the business program proposal

1. **Review and finalize long-term goals & objectives** (now in draft form, Attachment II; responsibility of Executive Managment).
2. **Identify and articulate specific measurable tasks** to accomplish over a 12-months period that will help achieve the long-term goals. (Responsibility of senior level staff.)
3. **Revise and finalize work plan** with project dates and assigned responsibilities to implement the program (draft Implementation Plan, Attachment III).

Following is a more detailed discussion of each step:

Review and Finalization of the DRAFT Goals
The discussions with the Executive Directors and Chairman Nesterov provided CMP representatives with specific problems that NEK must address as priorities. Based on this information, CMP representatives have updated the DRAFT NEK Goals and Objectives. *Prior to the end of June, the DRAFT provided as Attachment II in this report should be reviewed, finalized and adopted by the Executive Directors as senior management's long-term priorities for NEK.*

It is important that the DRAFT receive the attention of the Executive Directors because the company's goals and objectives must be *their* statements of what the organization wants to achieve over the next 2 - 5 years. Formulating goals is an integral part of the planning process and the articulation of goals defines and communicates the company's priorities for the coming year and beyond. Goals should be ambitious in scope. They should represent a challenge in effort for the organization, yet be attainable. It is therefore necessary to involve high-level corporate strategy when choosing the goals and objectives.

The Goals must be fully supported and accepted by all levels of management and that support begins with the Executive group. The Goals must also directly relate to and reflect the organization's mission or purpose.

Each Branch Company should develop their own objectives and tasks that are relevant to its operation and management yet also support the corporate-wide Goals & Objectives. They may

have additional goals and objectives to support their specific initiatives as well, but Branch-level management should be sure that their objectives step the organization closer to meeting corporate goals.

Quantifyable Tasks to Support the Objectives
Please note that the DRAFT NEK Goals and Objectives (Attachment II) no longer lists specific tasks under the Objectives. The tasks listed in the first DRAFT NEK Goals were initially developed to provide examples of specific, measureable activities that might support an objective. At that time, they represented relevant activities for NEK to undertake. However, current NEK priorities and issues revealed in the March discussions clearly show that many of these task items, even as draft statements, are no longer appropriate and need to be redefined.

Additionally, it is important that these specific task items are identified and articulated by key staff who will most likely be responsible for achieving them. This will generate the support and commitment necessary for accomplishing these activities successfully.

CMP suggests that a corps of expert staff from areas addressed by the goals & objectives, identify specific actionable tasks under each objective. These tasks must be articulated as measurable statements and be able to be accomplished over a 12-months period.

Work Plan and Process Implementation
The Goals and Objectives process involves coordinating responsibility to ensure that the process is communicated and completed. Because of the close relationship between goals setting and the budget process we suggest that the compilation and reporting responsibilities fall under Mr. Anastassov and his staff. The Economic & Budget Department could address the role of coordination, tabulation and monitoring of progress toward achieving the goals and objectives.

At CMP, the timetable for completion of goals setting runs concurrent with the budget process, and we feel that such a schedule would also work for NEK. Once again, the precise dates, steps and other requirements should now be developed by NEK (with the help of CMP representatives) prior to the presentation to the full Board of Directors.

CMP provided a plan for implementation (Attachment III) with materials in advance of the March 6-8 discussions. While this implementation plan now needs to be refined and adapted to NEK's requirements, we would like to revisit the major steps needed to make the process work.

There are five essential elements in the process:
1. *The organization articulates what it wants to achieve* (Attachment II - DRAFT Goals and Objectives). These goal statements are brief, and precise, usually reflecting a perceived problem or opportunity. The number of Goals should be limited and focus on important corporate issues. (NEK is well on its way to completing this first step as a result of earlier work on this cooperative task. The enclosed DRAFT is the result of many conversations and meetings and should reflect NEK's comments.)

2. *Communicating the goals and resulting performance expectations.* After the Board is in agreement, the Goals & Objectives then require communication to managers with a clear expression of executive support. The goals setting process really begins here with a clear statement of what the organization wants to achieve.

3. *Involving lower management.* Lower management at Branches and operating departments define specific tasks and initiatives to be accomplished in their areas that will help achieve the goals & objective.. The initiatives should be measurable and quantifiable, ambitious, yet attainable, and have a clear relationship to goals achievement. Also, budget decisions (financial and political issues) should be made consistent with the goals, or the goals setting process will be undermined and ineffective.

4. Development of an effective monitoring process. Each Department Head and Branch Manager should be prepared to report on the activities that support goals and objectives attainment. Reporting could occur on a quarterly and annual basis.

5. Adjustments based on performance. Monitoring the progress of achieving the tasks and objectives provides valuable feedback on the company's performance. This information should be used by management to adjust the direction of the organization based on performance.. The goals process is a dynamic process and most valuable when the information from it is used to guide managament decisions.

Conclusion

As previously mentioned, CMP representatives asked each interview participant to comment on their perception and understanding of the Goals and Objectives process. The Executive Directors and Mr. Nesterov were of the opinion that some kind of formal management guidance process would be beneficial to NEK, with the caveat that any realistic prospect for success requires the process to be attuned to the social and economic environment of NEK and Bulgaria.It is the opinion of CMP representatives that NEK considers the CMP goals and objectives model adaptable to NEK's needs.

CMP hopes to assist NEK management in implementing a business program that meets NEK requirements and results in formal goals setting and monitoring.

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Summary of the conversation with Mr. Nabatov held at CMP Monday, February 5, 1996.

Mr. Nabatov reviewed the current status of NEK's organizational structure. There are three Executive Directors. Mr. Nabatov replaced Mr. Siromahov and is primarily responsible for Research, Development and Investment; Mr. Anastassov, who is primarily responsible for Transmission and Distribution; and Mr. Tsvetkov who is primarily responsible for Electricity Generation. Mr. Tsvetkov is currently serving as acting General Director.

Short and medium-term Objectives
Mr. Nabatov's major concerns revolve around replacing capacity through the upgrading of technical services and the modernization and rehabilitation of generating capabilities. Consumption of electricity is increasing (15-20% last year) because of colder weather, fuel switching and greater requirements to meet basic needs. Commercial & industrial customers show a greater increase in consumption than residential customers. NEK must ensure that there is a reliable source of electricity. Mr. Nabatov cited three major means to meet that end:

- keep thermal production running
- modernize existing nuclear assets
- modernize hydro asset capability

The thermal power plants must operate in order to meet the rising demand for electricity, while dealing with certain environmental issues resulting from their use of high-sulfur native coal. The cost of desulfurization is also a major factor in thermal production costs.

Rehabilitation and modernization of existing nuclear capacity is a priority. Energy from the nuclear plant at Kozloduy is essential Recent problems with Units 1-4 went from technical to political in nature. NEK feels that the four units will soon be operating within the framework of their design. NEK plans to begin some modernization work on Units 5-6 in 1996.

Other short-term goals mentioned by Mr. Nabatov were:

- improvements and betterment's to the power delivery system.
- addressing line losses
- addressing the replacement of electric meters

Long-term Objectives
Mr. Nabatov then discussed his view of the long-term strategies and objectives:

- finalize an energy resource plan through 2010-2015
- environmental priorities need to be met

- decommission the small, older plants and replacing them with new generation
- maximize hydro generating capacity

Also in the long term, NEK wishes to resume construction of the Belene nuclear facility (2 1000 mw units) located on the Danube, 150 miles southeast of Kozloduy. Construction was halted in 1990 for financial reasons. A redesign requiring about 2 years is needed to continue the project. According to Mr. Nabatov, a second nuclear generating facility would play a major role in meeting the Company's long term reliability commitments. Nuclear power in Bulgaria compares favorably to other alternatives in both cost and the impact on the environment.

Hydro production currently is at less than capacity due to chronic and severe water shortages. Hydro generation has great potential but requires major construction and capital investment. (The Danube is not considered a hydro potential.) Projects on the Mesta River are considered, but they are controversial and disputed by Greece based on water supply issues. Some research has been done on the upper part of the Arda River. In addition, several smaller hydros could be utilized on the Vacha River.

Mr. Nabatov mentioned a new hydro project below Chiarra, with 2 existing and 2 new units. A new reservoir is being built on a neighboring river and connected to Chiarra, therefore improving the supply of water.

Mr. Nabatov mentioned a major problem with NEK's ability to accurately forecast demand and peaks for the Bulgarian power system. Consumption, which had been declining since 1990, is now on the rise. Changes in the living standard of the population and economic growth have resulted in higher than expected electric use. The existing forecast for the year 2000 was reached last year. The issue is under scrutiny by the Company and the Council of Ministers.

Another problem exists with the price of electricity. Current rates are less than cost. The Company is not profitable, and a combination of cost reductions and price increases are needed to turn the situation around. NEK needs to achieve financial viability in order to be able to set aside funds for investment and construction.

Environmental issues are of concern with Bulgaria just having passed more stringent environmental standards than the EEU's.

Summary of conversation with Mr. Nabatov, held at NEK
Wednesday, March 6, 1996

Mr. Nabatov clarified several statements in the summary of his comments made at a meeting on February 5, 1996 which took place at CMP. These clarifications are reflected in the revised Summary of the February 5 meeting and are attached.

Mr. Nabatov explained that a long-term environmental strategy has been submitted to the government to reduce the level of sulfur emissions and bring them in line with international standards. The cost of desulfurization must be carried by NEK.

The European Financial Institution is providing funds for upgrading and reconstruction of generation assets. Documents are expected to be signed in April to start upgrades at Maritsa E 3 and replacement of TPP Maritsa E1.

US and Swiss financial institutions are providing some support for modernization and rehabilitation of smaller sites. Additional loans will be required to upgrade the Transmission, Distribution and Metering systems.

Negotiations are underway with Russia to finance upgrading a large nuclear project. Westinghouse is a strong contender for the contract.

Commenting on the draft goals, Mr. Nabatov pointed out that "reducing and controlling costs" should address overhead as well as direct operating costs. Overhead expenses are increasing because of NEK's greater public relations efforts and work with the community to counteract the negative impact of price increases.

The Committee on Energy has approved a policy which, as of November 15, 1995, allows for a quarterly adjustment in the price of electricity. NEK requests these price adjustments by filing quarterly revenue requirements with the Commission for Price Regulation. The aim is to move toward an automatic rate adjustment mechanism to correct the price of electricity.

The long-term asset depreciation factor is very low. There is a need to re-value assets.

Mr. Nabatov then mentioned three key issues for improving NEK's financial health:

- The formulation of prices
- Re-valuation of assets
- Level of debt:
  - Short-term: Finance no more than working capital
  - Long-term: Increase to 30-40% of assets.

Referring to the draft goal of offering high quality service, Mr. Nabatov stressed that appropriate management decisions must be reached now in preparation of an anticipated major reliability and capacity problem by the year 2004.

In the past, Bulgaria used to have planned interruptible electricity with great negative impact on farms, industry, hospitals, etc. While the Company still does voluntary interruption occasionally, DSM actions such as decreasing transmission losses should still be undertaken in order to lower demand. The country has an obligation to demand energy efficiency. A DSM strategy should be adopted as the first priority in managing the capacity and reliability issue because it is the low-cost option. After possible gains are exhausted through DSM, capacity should be increased to meet any remaining unmet demand.

Summary of conversation with Mr.Tsvetkov held at NEK
Wednesday, March 6, 1996

Mr. Tsvetkov spoke about the technical and financial issues confronting NEK.

Short-term problems are:

1. The efficiency of generation, transmission and distribution, including
   - improving the efficiency and operating availability of power plants, and
   - the rehabilitation of existing facilities

2. Determining measures to improve transmission, distribution and generation indicators. These measures must economic, technical, organizational and administrative in nature:

   Specific areas are:
   - rehabilitation and upgrades of existing facilities, administrative and organizational restructuring, and decreasing sales losses on the metering side.
   - technical measures are needed to increase production capacity. Replacing capacity is not an answer in the short-term. But in the long-term, rehabilitation alone won't be enough.
   - financial problems such as cash flow difficulties stemming from collection and metering problems, and length of time for funds collected by the Branches to be transmitted to NEK.
   - retaining a qualified workforce and motivating them to change their work methods.

3. Addressing environmental concerns
   - decreasing emissions to meet international standards

Long-term concerns:
Using least cost development strategy, NEK must invest in developing generation, transmission & distribution systems that follow the forecast strategy already developed. This includes building new capacity through nuclear facility at Belene by 2003-2005.

Discussion of specific short-term issues:
Sale losses on the metering side: NEK experiences a substantial loss of revenue due to meters that either malfunction or have been tampered with. Currently, the customer owns the meter and often buys the cheapest one. This results in difficulty for NEK to read the meters, check for possible diversion of electricity, or adjust any malfunction. NEK will work with regulators to affect change that will have NEK provide and own all meters eventually. The Company calculates a one-year payback per meter investment.

Bill collection and payment: NEK has a 20% uncollectible revenue rate. This requires short-term loans at high interest rates to manage cash flow. More than 90% of customers pay cash.

Staffing issues and relationship with Branches: The relationship between NEK and its branches is regulated by statute. Increasingly, branches are growing more independent. However, no clear mechanism

exists for distributing financial gains and losses. A recent reorganization and merging of some branches was undertaken to eliminate some of the differences and create more equal conditions in areas such as types and numbers of customers, volume and scope of sales, material requirements, staffing needs, operating costs and budgets, etc. The number of Branches has gone from 28 to 15. With more equal conditions it will be easier for NEK to set common targets and requirements that fairly apply to all Branches.

Environmental protection: Bulgaria must meet European standards; however, this is a very complex financial and technical task. NEK has developed a program to meet international standards within 10 years. Meeting standards will apply to new generating capacity.

Price Changes: The Council of Ministers has adopted a price increase as of April 1, 1996.

Summary of conversation with Mr. Anastassov held at NEK Thursday, March 7, 1996:

Mr. Anastassov spoke specifically about the immediate problems and concerns associated with the Electricity Supply Branches and customer related issues.

Discussion of specific short-term issues:
Cost Control: Cost control efforts are ongoing at NEK. Department Heads and Branch Managers are very much aware of costs. The problem remains however that the cost of providing electricity continues to be more than what is reflected in rates.

Line Losses: Generally, the systems for the transmission, transformation and distribution of electricity are in need of capital investment and repair. The technical systems that are in place however work as well as can be expected, given the conditions, and line losses from that equipment are predictable.

Sales Losses from Metering: There is a large disparity between energy delivered to the customer and the amount of sales that are metered. Metering technology is old. Bulgarian meters are old and faulty. The meter testing process proves that sales are lost at the meter. Also, the meters are customer owned, often mounted inside, and therefore hard to service and, in some cases, very difficult to read. Theft of electricity is common. The Company supports regulation changes that would transfer the ownership of the meter assets to the Company.

The problem was worsened this past winter by increasing demand for residential heating. Electricity is an economical alternative because of low price.

Improving the Quality of Service: NEK is committed to providing better service to customers. Once again the social and economic concerns of Bulgaria create obstacles to providing good service. For example payment processing and collection is made difficult because of the high percentage of customers that pay in cash. Banking systems are inadequate, and even if they were adequate, many residents would not trust the bank with their money.

There will be a CMP-NEK customer service (communications) seminar in April.

Customer Reaction to Metering Problem Resolutions: NEK needs a strategy to deal with negative customer reaction to the changeout of meter assets. The meters are old (1950's) and the Company hopes that the Council will allow NEK to replace them. Replacement of all meters (3.5 million) may take up to ten years. NEK should target the oldest and most damaged meters (approximately 800,000), with the biggest losses. for first reprelacements. In parallel with the replacement program, NEK could address electricity theft and diversion. Locate the replacement meters outside the premises. Lobby for Government support for the changeout problem. Sales losses due to metering is one of the biggest financial and customer related problems facing NEK. A 1% changeout would result in increased sales of 3-400,000 kWh a year.

Metering concerns at the generation source: Addressing the problem of sales losses from metering would involve both the Generation and the Supply branches. Power generation as it is measured at the source is not always measured consistently (plant versus plant). Accurate and consistent metering is required because line losses are a primary performance measurement for the branches.

The scope of the sales loss problem is rather enormous. Any resolution should begin with the metering problem at the customer premise. The power delivery network is reasonably well built all the way to the distribution transformer, that is why NEK's efforts are aimed at the customer site.

Supply Branch Reorganization: Merging of a number of Distribution Supply branches recently has reduced the number of branches from 28 to 15. The purpose was to create more equal conditions among the branches, such as similar staffing level rquirements, quantity of equipment, sales volume and mix. Improvements should be realized, in areas such as inventory management, management efficiency, and productivity of staff. The purpose is to optimize resources and eliminate wasted effort.

There should be a positive financial impact as well. Once the branches are formed the Company plans to optimize its cash flow. There are currently 158 accounts in approximately 30 different banks. In the future, this banking activity could be consolidated and improve "days" of cash flow. There would be an immediate financial gain.

NEK is an important banking customer (because of its cash-flow).

Energy Demand: Daily load has been constant. Electricity is the fuel of choice for residential heating, because of its low price. Cold winter weather and the high price of coal has resulted in fuel-switching to electricity.

DSM is a very broad energy issue in Bulgaria. Applying new technologies means capital investment and the Company is hurting financially already. DSM should be more of a public policy issue and NEK should instead focus on promoting the efficient use of energy as opposed to conservation.

Non-utility generation: Cogeneration and District Heating supply NEK with about 10% of overall power generation. In 1995 there is a balance for NEK. The existence of fixed price contracts somewhat protects the Company. The local cogenerators are not necessarily pleased with this arrangement. They normally produce enough for there own needs and then they are willing to sell.

Summary of conversation with Mr.Nesterov held at NEK Thursday, March 7, 1996:

Mr. Nesterov spoke about the social and cultural impact of the opening of Eastern Europe. The economic and political environment in Bulgaria has been difficult. The population is growing poorer. NEK has a strong social role in the country's economy in that electricity prices are high for the consumer and represent a substantial part of the people's budgets.

Two months ago, a strategy for developing the national energy sector until the year 2010 was submitted to the government and is now being discussed by the General Assembly. The strategy addresses the role of gas, electricity and heating within a competitive framework. It also looks at restructuring Bulgaria's entire energy sector, including NEK. Several directions are possible and being looked at: The British model with its separate transmission/distribution and for profit generation companies and the German model based on regional companies. NEK has a free choice whether to participate in this discussion; however, the government will ultimately decide on the direction.

Bulgaria is involved in a gas pipeline project from Russia and discussions are underway whether NEK should become an active participant in the business of gasification. The government supports the idea.

Prior to restructuring, it is important for NEK to strengthen the areas of finance. staffing and management.

Mr. Nesterov mentioned common concerns and priorities. In his view, critical issues for NEK are:

- controlling costs and improving the Company's financial health
- stemming sales losses as a result of metering problems
- technical improvements in the power delivery systems
- rehabilitating and repairing existing generating facilities
- meeting international environmental standards

Improving the company's financial health: Mr. Nesterov views this a priority and it is directly tied to the company's organizational structure. A new approach by management toward controlling and managing costs is required. Managers need additional knowledge and new proficiencies to handle the requirements of a profit and loss environment. The recent reorganization - consolidating 28 branches into 15 - will help optimize the use of materials and improve technology efficiencies, however, Mr. Nesterov did not anticipate substantial change until management deficiencies are resolved and a new working style is adopted.

Although branches are programmatically closely linked with NEK and dependent on NEK's leadership, they are gaining greater financial independence as a result of corporate reform. This means NEK will make funds available for specific expense categories such as equipment purchases,

maintenance, etc. and the Branches will be responsible for staying within these budgetary limits. Until now, Branches have not been held responsible for their cost overruns which are often the result of poor planning or maintaining inadequate inventory levels.

Mr. Nesterov listed three main factors as contributors to the Company's poor financial status:

- Lack of control and management of cost
- The fixed price of electricity
- The international economic environment in which NEK now exists (banks, foreign currency debt, fluctuating exchange rate, financing, etc.)

Technical improvements. A concentrated effort to upgrade and improve the system is currently underway. Replacement of old equipment and automation of plants has been slow but is moving ahead. Plans have also been formulated and tasks defined to modernize under-producing thermal, nuclear and large hydro power plants. Financing is being sought. Transmission system improvements are underway under Mr. Anastassov's leadership.

Mr. Nesterov considers the losses in the distribution (low voltage) system the biggest problem. The age and small size of the conductors, the substandard condition of substations and half of the 28,000 distribution line transformers outdated with low efficiency greatly contribute to the 70% of power losses. Currently, there is no effective replacement program for changing-out the distribution line transformers. They are replaced only when they break down, even though the payback period for a new transformer is only 2-3 years.

Rehabilitation and new generation assets: Mr. Nesterov does not perceive a critical need for building new generation. Existing capacity can meet the need for the next 15 years, providing that plants work to capacity. To do this will require better plant equipment and a reduction in the number of emergencies due to equipment failure or fuel shortage. Coal reserves must also be increased. (Coal production fell from 28 million to 23 million tons.) Instead of building new capacity, financial resources should be focused on rehabilitation.

Sale losses from metering: This is an urgent problem to be resolved. 90% of all meters are out of calibration. Theft plays a significant role in these losses and even with an aggressive program to solve the metering losses, it may take up to 5 years to reduce the level of electricity theft. NEK has been working to resolve this problem, unfortunately with varying degrees of success. Branches are technically not well equipped. The government does not yet fully accept the significance and urgency of this problem.

Compliance with environmental regulations: New emission standards have been set by the government and achieving these will come at a very high cost. For thermal plants, the greatest problem is the high-sulfur domestic coal as fuel. It will be impossible from a cost standpoint, to bring all existing plants fully up to standard. The government cannot afford it. For example, we already know that the Maritsa Unit 8 will not be able to achieve the new standard. Operating costs there are 1.1 to 1.2 cents per kwh. The kwh sales price is 2.6 cents. This kind of profit margin

simply will not cover the cost of $65 million per unit to install environmental equipment. NEK is asking the government to exempt existing plants or at least lower the standards. New generation plants will fully comply with standards. Hydro plants are less costly to retro fit to meet new environmental standards.

Training and qualification of staff: At a time when it is more important than ever to have a highly qualified staff, NEK is experiencing a "brain drain" problem. Many of its most knowledgeable and experienced staff members are leaving the company for financial reasons. NEK needs a corporate goal to keep and attract qualified staff.

Attachment II

NEK Goals & Objectives

DRAFT

Mission: To provide uninterruptible supply of electricity with high quality service, at the lowest possible cost, while maintaining acceptable safety and environmental standards and financial viability.

Goal: Improve Financial Health

Objective: Reduce and control costs
Objective: Eliminate the financial deficit by end-of-year 2000 while keeping price increases at less than inflation

Goal: Offer high quality service that meets the needs of the customers

Objective: Improve customer communication and understanding of customer needs
Objective: Improve the reliability of electric service
Objective: Resolve revenue metering (sales losses) problems with minimal impact on the customer
Objective: Retain a qualified and motivated workforce

Goal: Protect the Environment

Objective: Identify, prioritize and reduce negative impacts on the environment
Objective: Focus on the importance of environmental value in the assessment of energy resources
Objective: Maximize workplace safety and minimize exposure to hazards
Objective: Develop innovative ideas and technologies that improve the quality of the environment.

Attatchment III

Implementation Plan Steps

Step	Action	Key Support	Date
1.	Formal presentation to the Executive Directors.	Executive Directors CMP	March 96
2.	Draft multi-year Goals & Objectives are prepared by the Economic and Budget Department, after consultation with the Executive Directors, Branch Management and planners	Executive Directors	May 96
3.	The Executive Directors meet in a **formal retreat** to review the draft and finalize the G&O.	Executive Directors CMP	June 96
4.	The goals are formally communicated to the Branch Managers and the Department Heads; also to the general public.	Executive Directors	July 96
5.	The budget process for 1997 begins.		August 96
6.	Key Actions that support the Goals & Objectives are prepared by management and compiled by the Economic and Budget Department.	All levels of management	Aug. and Sep. 96
7.	Key Actions are reviewed by the full Board of Directors.		Oct. 96
8.	The Board of Directors communicates the approved Key Actions to the Company.		Dec. 96
9.	The Public Relation Department communicates the program to external parties; media, government and the general public.	Executive Directors	Dec. 96
10.	Progress toward goals is monitored by the Economic and Budget Department. A quarterly report is prepared for Executive Board review.	Executive Directors Economic & Budget Department	Quarterly

APPENDIX G

Cash Flow Forecasting Project

For

The Natsionalna Elektricheska Kompania AD (NEK)

Funded By
The United States Agency For International Development

Completed Through The Cooperative Efforts of :

CMP International Consultants, a Subsidiary of Central Maine Power Company, and

The Corporate Finance Department of NEK

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Cash Flow Forecasting Project

Prepared by CMP International Consultants
With the Assistance of the NEK Corporate Finance Staff

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INTRODUCTION

During the past year representatives from CMP International Consultants (CMPI) and the employees of the Corporate Finance Department of the Natsionalna Electricheska Kompania (NEK) have worked to develop ways to enable NEK to improve its short term cash forecasting capabilities. This work was funded through cooperative agreement #EUR-0030-A-00-4057 between Central Maine Power Company, of which CMP International Consultants is a wholly-owned subsidiary, and the United States Agency For International Development.

These efforts have produced a monthly financial planning model, a five week cash planning model, and a model to be used by the Procurement Department to identify the estimated amounts and dates of expenditures for materials, supplies and services. Each of these models have been tailored to meet NEK's specific information and reporting needs; the models are described on the following pages. These models were developed using Microsoft's EXCEL software, which NEK personnel are very adept at using. Application and maintenance of the software can therefore be done with relative ease by the employees who are using it.

CMP International Consultants would like to express its sincere appreciation for the cooperation and input provided to us during our visits to Bulgaria. On a personal note, we feel that an important by-product of our work in Bulgaria is the new friendships that we have formed. Thank you to all of those at NEK who assisted us in our work and took some time to show us your country.

PURPOSE OF PROJECT

The purpose of this project was to improve the process by which NEK's cash availability is monitored and forecasted.

The current shortage of cash experienced by NEK requires that cash needs be forecasted quickly and accurately in order to use available cash to maximum advantage and to meet important financial obligations and satisfy vendor requirements. The cash forecasting models should help to reduce some of the manual effort involved in the process as well as provide data not now readily available for an improved assessment of current and future cash needs. In the future when cash is more plentiful, the cash planning model can be used to help to obtain increased returns on surplus cash through efficient cash management.

Specific project deliverables defined before, and revised during, the project were as follows:

1. A flow chart and description of the NEK cash flow process will be written. This will identify areas where existing procedures are either inadequate or overly complex. Cash flow processes between various Branches and the Head Office as well as outside of NEK will be documented.

2. Based on the cash flow description developed in step 1, a one year cash flow financial model which shows cash flow by month will be developed. This model will be driven by a detailed cash flow section which will tie into all the other financial statements. All Branches and the Head Office will provide forecasts of monthly cash flows to be used as input to the model. This model will also be coordinated with the Budget Department's annual budget.

3. A five week cash flow forecasting model will be developed. This model will produce a forecast of weekly cash sources and uses which will aid decision making for payment of bills and raising of new funds. Input to this model will be from the monthly financial model and from Headquarters' short range cash flow forecasts.

4. A forecasting system will be developed, for Headquarters staff use, to estimate the transfer of funds from Electricity Supply Branches to Headquarters. This forecast will be based on historical experience, prior month sales, and known upcoming events.

5. The existing system of cash reporting will be expanded to include a cash variance report to compare actual cash movements to predicted. This report will differentiate between timing differences and permanent differences. It will include a database of both forecasted and actual cash flows. This report will expedite the analysis of variances and will identify areas where forecasting efforts are insufficient or possibly more complex than needed.

BENEFITS OF USING THE MODELS

Why Use These Models?

There are several reasons why these models will be a useful tool to aid NEK in developing short term cash flow forecasts. Reasons include the ability to:

- formalize the short term cash flow forecasting process
- obtain projected financial information quickly
- perform "what if" scenarios
- integrate accrual and cash accounting data
- link the Annual Financial Model to Monthly Financial Model and to the Five Week Cash Flow Forecast Model for coordinated forecasts
- using input from NEK employees, address the financial reporting needs unique to NEK
- modify model programs easily to recognize changes in tax laws, price increases, cost increases, and other changes. This can be done by the NEK staff, as needed

What Kinds Of Issues Will These Models Help To Resolve?

These models should be useful in resolving many different types of short and medium term financial issues. Some of these issues may include:

- estimating NEK's cash flow and cash balances for the near term
- identifying the amount of funds that will have to be borrowed/invested
- estimating the effects of different rates of inflation on NEK's financial position
- estimating the effects of different exchange rates on NEK's financial position
- estimating the effects of price changes on NEK's financial position
- estimating the effects of delaying (or accelerating) payments to vendors
- estimating the level of costs that can be supported by a certain level of revenue
- identifying the optimum combination of key variables that will allow maximization of net income

HIGHLIGHTS OF MODEL FEATURES

Monthly Financial Model

- A Control schedule was created which has buttons that permit the user to quickly move to the desired schedule and/or print one or a series of the schedules, all with one click of the button
- Shaded cells are designated to facilitate data input. Unshaded cells contain formulas and are automatically filled in.
- Many of the most important variables, such as inflation rate, exchange rate, interest rates, etc. are grouped on one schedule ("Basic Input")
- All schedules have available a column (column "D") in which rows may be labeled in Bulgarian as well as English
- The effects of forecast revisions on key financial ratios are calculated instantaneously, allowing management to know immediately what the financial implications of the new forecast are on the Company
- Toggle switch is available to indicate whether or not interest is charged on unpaid and overdue accounts receivable
- Provision made to allow different VAT rates for different classes of revenue
- Toggle switch is available to allow manual input of tax payments to the State
- Minimum acceptable cash balances can be entered as a requirement
- Income statements, balance sheets and source and use statements are all calculated automatically from input data on other schedules. Balance sheet amounts that are calculated include such interactive accounts as NEK's cumulative loss and nuclear fuel prepayments
- Variance reports which compare original and revised forecast data are provided
- Graphs of data are automatically created to help to identify trends
- Inventory balances are calculated automatically using cash outflow, expense, and delivery input data
- Construction Work in Progress amounts are calculated for projects financed in US dollars as well as for projects financed in leva. A toggle switch is available to indicate whether or not to capitalize interest
- Book and tax depreciation are computed for all new property that is placed into service
- Income taxes and VAT are automatically calculated
- A Transfer File of data to be used as input in the Five Week Model is automatically created.

Five Week Cash Forecast Model

- Like the Monthly Model, this model also has a Control schedule for easy access to schedules and printing
- On the Input Schedule, amounts of revenue and expenses incurred by Headquarters by day can be entered in random order by date

- The projected amounts of cash to be transferred from the Supply Branches to Headquarters are forecasted by day by the model based on the historical relationship of amounts transferred to monthly sales
    - An iteration feature is used to identify the best available monthly sales data. The model selects actual data first, if available. If not, the model uses current month sales data to estimate cash levels for the current month. If no such data is available, the model uses the original sales forecast.
- A Transfer File exists to receive data transferred from the Monthly Model
- The five week cash forecast period is readily defined by entering the beginning date of the period and the starting cash balance
- A graph of data is automatically created to help to identify trends and/or unusual variations

Buyers Report Model

- Like the other models, this model also has a Control schedule for easy schedule access and printing
- Schedules are included on which each buyer in the Procurement Department can record all relevant financial data associated with future purchases
- Estimated payments show on each buyer schedule in the currency in which the contract was established as well as the currency in which payment will be made, since they may be different. Provision is made for an original plan and a revised plan of expenditures, and a variance report is automatically prepared.
- Total payments are summarized by currency type, by each buyer, and for all buyers together
- This payment data is transferred to the Five Week Model to develop cash forecasts.
- A graph of data is automatically created to help to identify trends and/or unusual variations

FINANCIAL PLANNING MODELS INTERACTION

General

Four computer models are used in the process of developing NEK's cash flow forecast:

Annual financial model
Monthly financial model
Five week cash flow model
Buyers model of cash expenditures

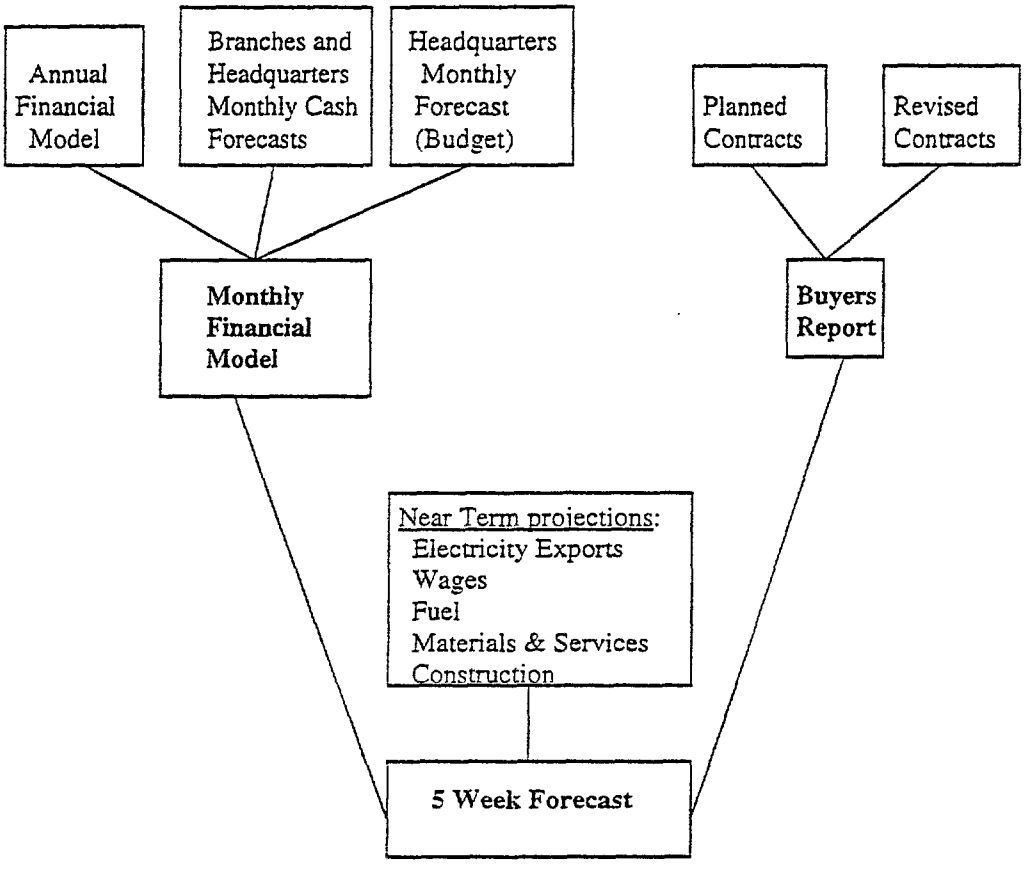
With assistance from Central Maine Power Company, NEK developed and implemented an annual financial model several years ago. This model has been expanded and modified by NEK to meet changing information needs but continues to be an integral component of NEK's long range financial planning process.

Because of its long range horizon, the annual model is not well suited to short term forecasting. Additionally, the input for this model is accrued revenue and expenses; that is, revenues and expenses are recognized when services have been rendered and goods and services used by NEK have been provided, regardless of when cash has been received or spent. For these reasons, the annual model does not produce data that is directly useful in the short term for forecasting cash availability.

To assist with forecasting the availability of cash in the near term, other tools were developed by NEK, consisting mainly of daily cash status reports from the Branches and an annual projection of cash inflow and outflow. NEK asked CMPI to work with them to enhance their short term cash forecasting tools and process.

The outcome of this effort is the development of a monthly financial model, a five week cash flow model, and a procurement model, each containing multiple components. The Monthly Model consists of accrued financial data drawn largely from the annual financial model. The primary purpose of the Monthly Model is to provide a basis to compute certain cash flow data that is derived from accrued financial Statements. This cash flow data consists of interest expense for long term loans, repayment of loan principal, income taxes, amelioration tax, re-employment taxes, municipal taxes, value added taxes, and dividends, where applicable. This cash inflow and outflow data is entered into the Five Week Cash Flow Model, supplementing data input from other sources, such as Headquarters, the Procurement Department, the Branches, and the Investment Department.

Overview of Financial Models Interaction



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MONTHLY FINANCIAL PLANNING MODEL

Purpose

As mentioned earlier in this report, the main purpose of the Monthly Cash Flow Model is to generate certain cash flow data that is needed in the Five Week Cash Flow Model. This cash flow data consists of interest expense for long term loans, repayment of loan principal, income taxes, amelioration tax, re-employment taxes, municipal taxes, value added taxes, and dividends, where applicable. This model also has the potential to provide an interim view of NEK's finances that is longer than five weeks but less than one year; and if properly maintained with current data, it could be of value to those in management concerned with this mid-term financial horizon.

Input Requirements

Reliability of Data

The reliability of the model results is directly related to the accuracy and timeliness of the input data. It is important to review the accuracy of the data used in the model on a regular basis to ensure that the reasons for variances from actual data are understood, and where possible changes are made to the methods used to derive this data in order to continuously improve the reliability of the model results. Similarly, revised data should be input on a regular and timely basis so that the model results are based on the latest known information and may be relied upon for decision-making. We would recommend establishing a regular schedule for the updating of data used in the models. It is especially important in a dynamic financial environment like that which exists in Bulgaria that decisions are based on model results that are derived only from current data. Decisions based on stale data could possibly lead to actions that are inappropriate, or even damaging.

Types of Input Data

Two types of data are input into the Monthly Model: 1) accrued revenues and expenses and 2) revenues and expenses on a cash basis. Currently, accrued revenues and expenses data is derived from the annual model, allocating amounts to each month. For some items on the financial statements, equal amounts can be assigned to each month. Other items for which the specific transaction dates are known, such as scheduled loan repayments, should be input into the Monthly Model using the known dates. To the extent that specific dates differ from the assumptions used in the annual model, the output from the Monthly Model will differ from the output of the annual model.

Cash inflow and expense data is also input into the monthly financial model. Currently the Branches prepare an annual cash forecast, which can serve as the input data to the Monthly Model. Cash receipts data is used as the source of funds to support the operation of the company while cash payment data is used to offset the liabilities created by expenditures included in the financial statements. It is important that the basic assumptions used in both the accrued and cash basis data are essentially the same. If they are not the same, the resulting financial statements may not portray an accurate picture of the company's future financial position.

COMPONENTS OF THE MONTHLY MODEL

The monthly financial model consists of ten schedules used for inputting data as well as six schedules which are the financial reports generated by the input data. Some of the data input schedules also are used to create forecast data used in the financial reports generated by the Monthly Model. An example is the input of customer billing rate data which in turn is used to calculate revenues. Both the input data (i.e., rates and gigawatt-hour sales) and the revenues are included within the Rate and Revenue model component. Samples of each of these schedules are attached at the end of this section of this report.

The schedules included in the Monthly Model are as follows:

Data Input Schedules	Report Schedules (Output)
Control	
Basic Input	Balance Sheet
Cash Flow (Data Input Sheets)	Income Statement
Rates and Revenues	Sources and Uses of Funds
Operation and Maintenance	Management Summary
Purchased Power	Balance Sheet Variance
Planned Construction	Income Statement Variance
Financings	Cash Flow Variance
Taxes	Graphs
Transfer File	

A brief discussion of each of these schedules follows.

Control

This schedule allows the user to go directly to the component of the model which he/she wants to use. The user selects the schedule that is desired and the program automatically moves to that schedule. The user may also choose to print all schedules or just certain ones.

Basic Input

This schedule is used to update most of the basic assumptions and model parameters contained within the monthly financial model. Because they are grouped together within one schedule, they are relatively easy to identify and to change, as needed. For example, to see the effect of different levels of inflation and exchange rates, the user can simply enter the new assumed rates and the model will automatically recompute the impact on the company's income statement and balance sheet within minutes. This format also lends itself to efficient updating of all the model assumptions on a regular basis.

Cash Flow Data Input Sheets

Forecasted cash from revenues and cash to be paid out for expenditures is input into this component of the Monthly Model. In the same way that cash is used to pay off liabilities

incurred by the company in the real world, cash data within the model is used to reduce liabilities resulting from accrued expenditures recorded within the model. Similarly, forecasted cash receipts are used to reduce accounts receivable and increase the model's cash balance.

The shaded areas identify the fields that require data to be input. Areas that are not shaded reflect data that is automatically derived from another schedule or that is generated by a formula.

Rates and Revenues

Forecasted billing rates and gigawatt-hour sales are input into this model component. From this data the model computes forecasted revenues as well as changes in the company's accounts receivable balance for each month. Revenues are calculated without value-added taxes; these amounts are calculated separately within the Taxes Model component.

Operation and Maintenance

Accrued operation and maintenance expenditures, including fuel, are input into this component of the model. Also applied to this schedule are the value of fuel deliveries by type of fuel. This data is needed in order to derive the value of fuel inventories. Another section of this schedule is used to calculate various payroll and property taxes. The final section of this schedule is used to calculate the changes in the accounts payable balance.

Purchased Power

This schedule is used to record the value of power purchased from sources external to NEK. The amount of energy and capacity acquired is multiplied by the unit cost of the purchased power to derive the total cost of the purchased power. The quantities and unit costs of each type of purchased power are entered by the user onto this schedule.

Planned Construction

This schedule consists of two parts: 1) major projects with dedicated financing from foreign sources and 2) other projects financed by domestic banks. In both cases the model escalates the monthly forecasted construction expenditures, and calculates interest expense associated with the construction costs, deferred income taxes associated with new plant closings, and the monthly construction-work-in-progress balances. In the Project Financing section, construction costs are input in US dollars and then converted to leva. The user can elect to adjust the expenditures in the General Financing section by a different inflation rate than used elsewhere in the model, if desired. Also in both sections the user can elect to have the interest costs associated with the construction expenditures accumulated as part of the project costs. This is the normal accounting treatment for projects financed by foreign sources while the interest costs for projects financed domestically are charged to expense in the current period.

Financings

This schedule is used to compute accrued interest amounts and related cash payments for each issue of long term debt. Monthly balances of each debt issue after any debt retirement is also computed. Debt issues in a foreign currency are shown in that currency and are then converted to leva using input exchange rates.

Taxes

Income taxes and value-added taxes are computed on this schedule. Current income taxes, deferred income taxes and any income tax loss carryforward balances are combined to derive total income taxes. Value-added taxes are computed both on an accrued basis and on a cash basis.

Transfer File

Data to be transferred to the Five Week Cash Flow Model are automatically recorded within this schedule. This data includes income tax payments, municipal tax payments, re-employment tax payments, amelioration tax payments, value-added tax payments, interest payments related to long term debt, debt retirements and new issues, revenues from the sale of electricity, and dividends.

Report Schedules

Balance Sheet

The balance sheet is one of the key outputs of the monthly financial model. It reflects the financial position of the company as of the month being forecasted and includes all assets and liabilities of the company and any equity ownership interests in it. This schedule is automatically calculated from input data on other schedules.

Income Statement

This is another key output report from the monthly financial model. This report reflects the revenues, expenses and net income of the company by month for one year. This report is also calculated automatically from input data on other schedules.

Sources and Uses of Funds

This report shows the movement of all company funds, including within the balance sheet as well as in the income statement, during the period covered by the income statement. Review of this statement indicates where funds will come from and where they will go during the forecast period.

Management Summary

This schedule provides management with a quick overview of the company's financial performance during the forecast period. Included on this schedule are key assumptions, such as the inflation rate, short term interest rate, and exchange rates; financial performance, including such data as total revenues and net income; financial ratios ; and

financing information, such as amounts of construction costs to be incurred and debt issued and retired during the forecast period, and short term debt and investment balances. The items on this schedule may be changed or supplemented, depending on the needs of management for different information.

Balance Sheet Variance/Income Statement Variance Reports

Management needs to know how accurate the forecast data is and where differences from the forecast are occurring. With this information the sources of variations can be identified and understood, and possibly improvements can be made in developing the forecast data. This is an on-going process of learning and refining forecasting methods. The quarterly balance sheet and income statement variance reports assist with the identification of variances.

Graphs of Trends

Trend line graphs can be very useful to assist in putting model results into perspective. Graphs are automatically created for the following reports:

Report	Graphed Data
Cash Flow	Cash Inflow Cash Outlflow Net Cash Flow
Balance Sheet	Total Plant Property and Equipment Total Current Assets Total Assets
Income Statement	Total Revenue Total Operating Expenses Net Income
Revenues	Industrials Households Total Revenue
Operations and Maintenance Expenses	Total Fuel Total Purchased Power Services Wages and Social Security
Planned Construction	Total Construction Expenditures-Projects Total Construction Expenditures-General Total Construction Expenditures
Financial Performance Summary in %	Return on Common Equity Debt to Equity Ratio Net Income to Total Revenue
Financial Performance in Leva	Total Revenue Net Income Short Term Debt Balance Temporary Cash Balance

Other Possible Applications of the Monthly Model

As mentioned earlier, the primary purpose of the Monthly Financial Model is to generate certain data for the Five Week Cash Flow Model. The availability of the Monthly Model offers an opportunity to also look for other ways for it to be useful. One of the ways in which it might be useful would be to perform short term forecasts for several months. This planning horizon allows management to plan for a period less than a year and measure its progress monthly as compared to the plan, if desired. The Monthly Model also offers the opportunity to quickly observe the effects of changes in assumptions, such as the inflation rate, the exchange rate, interest rates, changes in revenue and expense levels, etc. There may be other applications that involve one or more of the model components that if utilized could save the user time and provide management with information more quickly than is possible without the use of the model.

Five Week Cash Flow Forecast Model

Purpose

The purpose of developing the Five Week Cash Flow Model, as mentioned earlier in this report, was to provide a tool to help to improve the process by which cash availability is monitored and forecasted. This is especially important in the near term, to ensure that there is sufficient cash available to meet upcoming payment requirements. If cash is not forecasted to be sufficient to meet these requirements, then other alternatives will have to be explored, such as borrowing funds. Since it may take some time to determine the best alternative to obtain funds, the cash forecast can be very useful in identifying cash shortfalls early, providing the necessary time for analysis and decision-making.

Input Requirements

An important consideration in the assembly of data used to generate the Five Week Cash Flow Model is to minimize the number of sources of data and to avoid a lot of extra work to prepare the data; yet it is also important that sufficient data is supplied to produce a reliable forecast. For this reason, much of the data supplied in this model forecast is provided by Headquarters or is generated by the model. Also, expenditure forecast data is received from the Procurement Department on the Buyers Report. The Branches are required to submit only a five week forecast (approximately monthly) and an annual forecast of the cash that will be sent to Headquarters

Components

There are five input components to this model and one output report:

Input	Output
Input Data	Five Week Model
Supply Branches Data	Graph of Data
Worksheet	
Transfer File	
Buyers Report:	

Input Data

This schedule is used to record certain revenue and expense data submitted as input to the Five Week Model. Fifteen categories of revenues and expenses are entered onto this schedule with the projected date of the transactions. The date which represents the start of the five week period and the starting cash balance are also entered on this schedule.

Supply Branches Data
This schedule is used as the model's source of cash flow from the Branches. Cash inflow data is generated from the ratio of historical cash received by day to total revenues from the prior month. If more recent data is available, it is automatically selected in lieu of the original forecast data and used in the model.

Worksheet
Cash inflow and outflow at Headquarters by day is applied to this schedule.

Transfer File
This schedule is used to receive the data which is generated in the Monthly Model and is transferred to the Five Week Model. See the discussion of "Transfer File" under the Monthly Model for a description of the data which is transferred to this schedule. In order to update the Five Week Model with the most current data from the Monthly Model, both models must be open and the 'links " option selected.

Buyers Report
See discussion of Buyers Report below.

Output Report

Five Week Forecast
All cash forecast data for the five week forecast period is included on this schedule. Data is displayed by week. Actual data may be filled in as each week passes for comparison with the forecast; the difference between forecast and actual is automatically calculated. The net cash inflow (outflow) for each week and the resulting forecasted cash balance are also calculated by the model.

Performing the comparison of forecast and actual amounts is important in order to see where major variances are occurring and then to take steps to improve forecasting methods, or at least be aware of the sensitivity or unpredictability of certain variables. This knowledge is useful in establishing expected, minimum and maximum forecast outcomes and how large the band width of possible outcomes is. Forecasts will necessarily always be inaccurate to some degree since no one can predict the future with complete accuracy; but one goal of continued use of the forecast model should be to shrink the band width of outcomes over time. Use of the model makes development of different scenarios caused by different independent variables a relatively simple and quick process.

Graphs of Trends
A graph of data is automatically created showing trends in Cash on Hand, Net Cash Inflow, Total Cash Outflow, and Total Cash Inflow.

Buyers Report

The Buyers Report will be used by the Procurement Department to record significant information about NEK's future cash expenditures. Using this report, each of the buyers in the Procurement Department can maintain a record of the value of all contracts, the amount that is expected to be paid to vendors, the dates payments are expected to be paid, the amount of the payments in the designated currency, revisions to this data, and other information.. This data will be provided monthly to the Finance Department in disk form (or on paper, although this is obviously less efficient) , and uploaded into the five week model.

The Buyers Report contains four modules: Control, Total Payments, Exchange Rates and Buyer Input Forms.

Control

This schedule provides a menu which allows the user to select one of the Procurement Department schedules and automatically view the schedule. The Procurement Department schedules include Total Payments, Exchange Rates, and ten Buyer Input schedules on which cash payment data is recorded from records maintained by each Buyer. The Control schedule also allows the user to select one or all schedules to be printed.

Total Payments

All forecasted cash payments within the specified time period are compiled into this schedule, for transfer to the Five Week Cash Flow Model. Payments to be made in foreign currency are automatically converted into leva.

Exchange Rates

Forecasted exchange rates are entered in this schedule for each date of the ensuing year on which a change is predicted. A separate table shows the applicable exchange rate for each day of the forecast year also. Exchange rates for seven different currencies can currently be entered. The currencies included are Bulgarian leva, US dollars, Deutchemarks, French Francs, Swiss Francs, Swedish Crowns, and Austrian Shillings.

Buyer Input Forms

Because many of the payment dates for large purchases are known to the Buyers well in advance, these dates and corresponding payment amounts provide very important input to the Five Week Cash Flow Model. A form was developed on which each Buyer can enter all projected payment data. It is hoped that the Buyers will maintain these schedules on their computers, allowing quick updating of data and transfer of the data to the cash flow model; however, the form may also be printed and written on manually, if desired. For each item listed on the form the currency in which payment is to be made is noted by the Buyer and will be automatically converted to leva based on the exchange rates forecasted for that payment date.

Graphs of Trends

A graph of trends in future cash commitments for the next five weeks is automatically produced.

Suggested Action Steps For the Future

1. Establish a regular schedule of dates for updating model data, and adhere to the schedule. If all participants in the forecast process become used to supplying data on a regular scheduled basis, forecast data should be reliable and available when needed. We recommend that the Monthly Model be updated quarterly, that the Buyers Report be updated daily and data provided to the Five Week Model each time it is revised, and that the Five Week Model input data be updated every two to three weeks.

2. Continue to develop expeditious ways to collect cash input data from the Branches and others. If collection of data to update the models is too burdensome for the data suppliers, it likely will not get done or at least will not be done timely. Since the time horizon for the cash flow model is very short, it is extremely important that data is supplied on time.

3. Ensure that the assumptions and transactions used by the Branches and others when preparing the annual forecasted cash flow data are directly related to the ones that support the preparation of the annual financial model.

4. Assist the Branches with the preparation of cash flow input data. To ensure the relative uniformity, accuracy and timeliness of input data for the cash flow model, existing data preparation and submittal procedures should be reviewed with the Branches and revised where necessary to produce thorough and efficient cash forecasts routinely. Possibly a computer template could be developed for all to use.

5. Define the revenue and cost items that most significantly affect the cash flow forecast due to volume and/or variability. Concentrate efforts on improving the forecasting of these items.

6. As the forecasting process evolves, consider having the Branches prepare and submit their forecasts in more detail and transmitted via computer connection to Headquarters. In addition to enhancing the cash flow forecast process, automatic transmission of data from the Branches to Headquarters should allow time now spent entering data at Headquarters to be re-allocated to data analysis and other productive activities.
   - As needed, acquire a personal computer for each position at the Branches that will prepare and submit cash flow data
   - Provide training in EXCEL software as needed
   - Provide training on the preparation of cash flow data

7. Explore alternative uses of the Monthly Financial Model for short term budgeting, preparing "what if" analyses of different independent variables, and other uses.

8. Be sure to document all changes made to each of the models

Copyright

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APPENDIX

Software Specifications

Models were created using EXCEL 95 Version 5.0

Model Iterations: 12 (can be changed)

Required ROM (approximately):

Monthly Model	.9 MB
Five Week Model	.4 MB
Buyers Report Model	1.7 MB
Total	3.0 MB

Guidelines For Using the Models

Key Factors For Using The Models Successfully For Maximum Benefit

- Keep input data current. Inflation rates, exchange rates, prices, etc., change frequently. Changes in tax rates, billing rates, accounting laws, etc., are also important and should be changed on a timely basis. Data that is out of date will produce results that are misleading.

- Prepare input data on a consistent basis. With multiple data sources, the possibility of data being prepared using different assumptions increases significantly. Verification should be made periodically that existing written guidelines that describe how data should be reported are adhered to by all data preparers in order to insure that their data is prepared on a consistent basis.

- Develop and maintain an efficient information pipeline. In a dynamic economy such as exists now in Bulgaria, quick reaction to new events that have financial implications is essential. Periodic reviews of the methods used to gather and input data into the models should be conducted to assure quick responses to changes in financial conditions.

- Ensure that Model users are experienced in financial analysis and in using EXCEL.

- Ensure that Model reports are analyzed and the implications of the reports are understood.

- Use the "paste link" feature in EXCEL to transfer updated data to the Five Week Model from the transfer file in the Monthly Financial Model.

- Base decisions on the results of at least three different scenarios: optimistic, pessimistic, and expected results. In this way, management is aware of the possible positive and negative outcomes of their decisions.

- As changes are made to the models either due to revised input data or formula changes (required due to changes in tax laws, accounting policy, etc.), document such changes. Also, ensure that backup copies are regularly maintained.

- Once model credibility is verified, use the model results to make important financial decisions

List of Model Schedules Requiring Input

Monthly Model

Schedule	Schedules Requiring Manual Input
Control	
Basic Input	X
Cash Flow	X
Balance Sheet	
Income Statement	
Sources and Uses of Funds	
Rates and Revenues	X
Operation and Maintenance	X
Purchased Power	X
Planned Construction	X
Financings	X
Taxes	X
Management Summary	
Balance Sheet Variance Report	X
Income Statement Variance Report	X
Cash Flow Variance Report	X
Transfer File	

Five Week Cash Flow Model

Schedule	Schedules Requiring Manual Input
Control	
Five Week Forecast	X
Supply Branches Forecast	X
Worksheet	
Transfer File	

Buyers Report Model

Schedule	Schedules Requiring Manual Input
Control	
Total Payments	X
Exchange Rates	X
Buyers Report 1	X
Buyers Report 2	X
Buyers Report 3	X
Buyers Report 4	X
Buyers Report 5	X
Buyers Report 6	X
Buyers Report 7	X
Buyers Report 8	X
Buyers Report 9	X
Buyers Report 10	X

FIVE WEEK CASH FLOW MODEL
Description of Selected Input Data

From Electricity Supply Branches: This line item includes all cash inflow to Branches, including customer payments, connection deposits, late payment interest payments, proceeds from loans initiated by the Branches and value-added taxes. Factors that affect the level of this item include the dates that wages are paid, wage rate increases, customer rate increases, dates that bills are prepared, payment guidelines between the Branches and Headquarters that require Branches to pay by the 15th of each month, changes in collection procedures, significant changes in the numbers of industrial and household customers, withholding of cash at the Branches, and other factors.

When the cash inflow for all Branches is combined, it is assumed that there is a consistent pattern of payments in general within each month, and that the level of payments (in constant value) maintains the same pattern over the course of the year. Years in which prices to customers are changed on any date other than January 1 (or the first day of the month) require an adjustment to the historical cash pattern %.

To estimate sales revenue for the month, the Model looks first for an entry of actual revenue, then, if none shown, the Model looks for generation data for the month adjusts the original forecast amount. If no generation data is available either, the Model uses the original forecast of revenue for the month. The Model then multiplies the monthly revenue amount times a daily factor that represents the amount of cash transferred to Headquarters on that day in past years.

From Loan Proceeds: This item is forecasted by Headquarters.

From Other Revenues: includes such transactions as the return of money deposited with vendors, money from tenders that are sold, etc. All other revenue categories are derived either from the Monthly Model or from the Supply Branches.

To Power Plant Branches: Includes payments made by Headquarters to each power plant for operation and maintenance and other types of actual cash expenditures made by the plants. This item should not include construction expenditures, since they are included in a separate item. Payments should not include non-cash expenses such as depreciation or any profit. Payments also exclude any expenditures made by Headquarters on behalf of the plants, such as nuclear and other fuel expenses and the costs of overhauls or construction costs paid by Headquarters.

- Maintenance expenses can be forecasted based on the information available from the weekly meetings of the NEK executives at which time work on large maintenance jobs is discussed.
- Forecasted monthly construction expenditures are supplied by the Investment Department.

To Investment Branch: includes construction charges for all of NEK except Headquarters (which is shown on a separate line below).

Nuclear fuel: data is supplied by the Procurement Department.

Imported coal: most of the expenses is paid by Headquarters, but Russe Power Plant may also pay for some imported coal. Data is supplied by the Procurement Department. Amount depends on outages, weather, etc.

Local coal: is paid by Headquarters. Some forecast data may be available in the Dispatch Department. This expense tends to be fairly stable except at year end, especially at the Russe Power Plant.

Gas: is used at the Varna Power Plant and is paid for by Headquarters. Varna Power Plant is large and has 1,260 MW. Gas is purchased from Russia and is very expensive. Forecast data can likely come from the plant itself. Because the Varna plant is used primarily to cover peak loads, it is difficult to forecast how much coal will be needed.

Imported electricity: All contracts are listed at the beginning of the year by the Procurement Department. New contracts are approved by the Corporate Finance Department and can be added to the list a that time. All projected payments and dates are listed on the Procurement Department list. Some of the imported electricity is delivered in accordance with contracts while some is obtained only when there is an emergency, and therefore is not predictable in advance.

Private Power: the Accounting Department can supply forecast data for this expense.

Materials, Supplies and Services: This line item includes the cash expenses incurred by Headquarters for the cost of materials, supplies and services for itself and in some cases for all of NEK. Excluded from this item are construction expenditures, fuel payments made on behalf of the power plants, wages and social security, taxes, or loan payments, since these are included in other line items. The Procurement Department can supply the necessary data on the Buyers Report. Some materials are purchased by other departments within Headquarters without using the Procurement Department; so that forecast data must come from those departments directly (example: Foreign Relations, Supply Planning, etc.)

Wages and Social Security: forecast data will be supplied by the Accounting and Budget Departments

Construction (Headquarters only): data is derived from the Investment Department report for all of NEK

Other Expenses: penalties, bus trips (domestic), bank fees, etc.

CASH FLOW MODELS

Project Schedule

1. Develop a one year cash flow based monthly financial model

A.	Flow chart cash flow process • Identify information sources • Identify users of information	Done
B.	NEK review flow charts	Done
C.	Revise flow chart	Done
D.	Write a description of the cash flow process	Done
E.	NEK review process description	Done
F.	Revise process description	Done
G.	Code a draft version of model and send to NEK	Done
H.	Travel to NEK to revise model and gather more information	Done
I.	Revise model and send to NEK	Done
J.	Travel to NEK for model review & process discussions	Done
K.	Make final revisions to Monthly Model	March

2. Develop a 5 week, weekly cash flow forecasting model

A.	Define format of model and identify information sources	Done
B.	Create a draft model and send to NEK for review	Done
C.	Travel to NEK for model review	Done
D.	Make revisions to weekly model	Done
E.	NEK staff travel to Maine for model testing	Done
F.	Make final revisions to models	March

3. Develop a cash variance report — Done

4. NEK test models for one month — March

5. Travel to NEK for enhancements to models and review of documentation — Done

Revised February 18, 1997

CASH FLOW COMPONENTS: WHICH ONES WILL AFFECT THE FORECAST THE MOST?

The purpose of this analysis was to identify those revenue and expense categories that could have the most impact of the reliability of the model results. Analysis results shown below represent the average of responses prepared independently by Albena Valkatchovska, Waine Whittier and Charles Bonney. In the "Ranking" column, "1" represents the category considered to be the most important to the cash forecast while "11" was considered to be the least important.

COMPONENT	VOLUME	UNPREDICTABILITY/VOLATILITY	RATING	RANKING
REVENUE				
INDUSTRIAL	3	2	6	1
HOUSEHOLDS	3	1.4	4.3	5
HEAT SALES	1	1	1	11
FINANCING PROCEEDS	3	1.6	4.7	4
BARTER	1	2.5	2.5	8
EXPENSES				
NUCLEAR FUEL	3	1	3	7
PAYROLL	2	1	2	9
INTEREST ON LOANS	2	1.6	3.3	6
TAXES-INCOME	2	1.6	3.3	6
TAXES-PROPERTY	1	1	1	11
TAXES-VAT	1.7	1	1.7	10
MATERIALS	2	2.6	5.3	3
COAL-IMPORTED	2	2.1	4.3	5
COAL-DOMESTIC	3	1.4	4.3	5
LEASE/RENT	1	1	1	11
CONSTRUCTION EXPENDITURES	3	1.9	5.7	2
LOAN REPAYMENT	2	1	2	9

NOTES OF MEETINGS

NEK/CMPI

DEVELOPMENT OF CASH MANAGEMENT PROCESS

NOTES FROM INTERVIEWS WITH COMPANY PERSONNEL

12/5-12/14/95

CMPI Interviewers: Charles Bonney
Waine Whittier

NEK Personnel Interviewed:

Albena Valkatchovska	Corporate Finance Department
Maria Gencheva	Trade and Procurement Department
Carmelita Goycheva	TPP Russe Branch Accounting Department
Radka Iramova	Corporate Budget Department
Dimtcho Ivanov	Investment Activity Department
Iordanka Ivanova	Corporate Accounting Department
Lilly Ivanova	Corporate Budget Department
Krassimir Kanev	Corporate Finance Department
Dobrinka Ovtcharova	Plovdiv Electric Supply Branch
Nikodim Stamov	Corporate Finance Department
Mihail Stoikov	Corporate Budget Department
Plamen Stoimenov	Corporate Finance Department

Krassimir Kanev-Corporate Finance

Desired Results

- Wants full scope cash management system, including computer model, reporting and forecasting process and procedures, and recommendations as to any new computer systems that may be needed. Results will be presented to the Board of Directors.
- Perhaps have DSS (Decision Support System)
- Cash management system will come as part of new MIS system, but NEK doesn't want to wait for that-could be five years before it is implemented.
- New cash management system must have the five important features: software, hardware, database, procedures, and management system
- Want to identify what money is being spent on in the Branches
- New system must work closely with the existing accounting system.

- Wants new procedures written-may result in changes to the way things are done currently
- Ability to convert accrued accounting to cash basis accounting is needed
- Expect that cash model results will look very different from accrued accounting results as shown in the financial model and in the actual accounting reports
- NEK would like a twelve month cash forecast
- Should document what was done
- Establish links between NEK's goals and objectives and the application of this new process
- Reports:
    - Identify at high level what cash was used for
    - Link cash and financial (i.e., accrued) reports
    - Reconcile cash reports, income statement and balance sheet monthly
    - Include sources and uses of funds statements
    - Identify cash used for O&M expenses separately from that used for capital investments
    - Consolidate cash reports from all locations automatically
    - Allow for changes in cash plan due to timing differences
- May be able to assist Procurement Department to develop and maintain a computer file of invoices to be paid in the future, by contract, date to be paid, amount. Has been tried before, but was not maintained
- "Need accrual 'leg' and cash 'leg'-need both legs to walk"
- Should do the program in EXCEL

Explanation of NEK Current Situation

- Budget Department receives actual expenses by profit center-all Branches are profit centers. NEK is a decentralized company
- There are three ways to finance: internal cash generation, loans, and "stretching"-taking longer to pay
- Billing:
    - Industrial Customers (50% of revenue in winter; 60% in summer)
        - They pay NEK three times each month: 15th, 27th, and the 5th of the next month after the month in which the energy was delivered
        - The last payment (on the 5th) is intended to reconcile any differences between the sum of the first two payments and the actual amount due
    - Households (45% of revenue in winter; 55% in summer)
        - They generally are billed and pay about one month after the end of the month in which the energy was delivered
    - Public Sector and Street Lighting (5-10% of revenue)
- It is believed that ESB's can accurately forecast cash revenue

- New accounting system has been set up, with a new chart of accounts
- Power Plant Branches (PPB) "sell" electricity to Headquarters (HQ); latter "sells" generation to Electricity Supply Branches (ESB)
- ESB uses own cash to pay for its expenses
- There are currently 28 ESB's; plan to reduce number to 15
- There are 10 PPB's: 7 thermal, 2 hydro, and 1 nuclear
- Including all Branches, NEK has approximately 700 bank accounts
- Regarding expenses, HQ spends the most (50%), then the PPB's (30-40%), then the ESB's (10-20%)
- HQ incurs some of the largest charges of the company
    - Borrows money to buy nuclear fuel
    - Borrows money to buy imported coal for the PPB's
    - For economies of scale, HQ buys some of the largest cost items and spare parts
    - Buys nuclear fuel
- Excess cash in the Branches is sent to HQ whenever it is available
- NEK has 2 billion leva on hand
- NEK prepares consolidated financial statements monthly
- Some regions within Branches have no bank accounts. All Branches should have bank accounts and regions should have none
- HQ can instruct Branches to use certain guidelines in processing, reporting and managing cash
- Current interest rates:
    - 34 % is prime rate
    - Loans may be obtained at rates of prime plus some % (4-5%)
    - Interest earned on current available cash accounts is 14%
    - If money can be invested for 3 days or more, then can earn prime rate less 1-2 %
- Inflation rate is currently about 2.5-3% per month
- No one bank has enough resources to serve NEK by itself; multiple banks must be used
- Care must be used when changing banks in order not to put the original bank out of business
- NEK is considering reducing the number of banks used from 13 to 5
- NEK gives large advance payments to fuel vendors in order to ensure the fuel delivery
- Loans for investment projects are kept separate from other loans. Foreign loans are used only for specific plant sites and expenses using these funds are closely monitored
- Both the World Bank and the EBRD require that interest on debt used to finance construction of new plant be capitalized and charged to the cost of the project

Albena Valkatchovska- Corporate Finance

- Customers pay for electric service by paying the ESB's. Residential customers pay in cash and industrial customers initiate a bank transfer.
- Industrial customers pay some of their bills to the regions in advance. The railroad and the Army pay an advance directly to HQ. Industrial customers must pay a penalty charge if payment is late.
- Residential customers can pay their bills in various ways:
    - No payments are made by mail
    - Most people pay at NEK office locations-is a place to pay in every town
    - About 10% pay using payroll deduction
    - Some pay their NEK bills at the bank
    - In remote areas, meters may be read and customer billed once every 3 months
- ESB's consist of several regions (average = 3)
- Cash flow diagram

Notes about cash flow diagram:

- HQ pays for nuclear fuel directly
- HQ sometimes pays PPB for imported coal, but usually HQ pays vendor directly
- HQ pays certain major suppliers for material purchases
- HQ pays for some plant overhauls and some local coal purchases when PPB does not have sufficient cash
- HQ pays for the purchase of some power from external supplier
- Regions receive customer payments and forward to ESB
- Regions and ESB's pay vendors for purchases of goods and services
- HQ buys all power from outside suppliers
- ESB's may buy power directly from PPB's occasionally

- Currently ESB's sometime report both power purchases from PPB's and outside power purchases in the same account-causes some problems
- Investment Department is responsible for planning the construction of large facilities
- Per banking rules, transfers of money from one bank to another can take no more than 2 days. Within NEK, it appears that an average of one day is actually occurring. If transfer is within the same bank, it occurs immediately (i.e., it does not go through the National Bank)
- Payments from customers must clear the bank and be available to NEK within 2 days of receipt by the bank.
- Banking regulations do not allow cash payments over 100,000 leva (as of January, 1996); otherwise, payments must be made using a payment order.
- NEK has an account at most banks that the Branches do

- Payment to the suppliers is made separately for each item purchased. A payment order is completed, including such data as NEK account #, account # of payee, purpose of payment, authorization, etc. Uses multi-part form.
- Residential customers tend to pay on time; industrial customers do not.
- Income tax rate is 40% for State, 10% for municipal, and 2% for land improvement ("amelioration")
- Value-added tax (VAT) rate is 18% and is applied only on the industrial customer revenue, less all VAT paid to other vendors (regardless of whether or not the expenses were related to industrial revenue)
- A tax of 5% is applied to payroll expenses for prequalification (i.e., training) and unemployment expense funding. This amount is withheld from employee pay and submitted to the State by NEK
- On monthly cash balance reports from the Branches, some additional categories are needed for the separation of purchases of power from NEK and purchases from external vendors; environmental penalties; business trips; etc.
- Monthly cash reports are in the same format as provided on the annual cash forecast
- Cash forecast is permitted to be revised during the year, if needed
- Nuclear plants do not fill out a cash report
- So far, cash reports have been received and summarized only for the month of September. HQ has not been submitting monthly reports since then. Cash reports are supposed to be received at HQ by the 12th or 13th of the month after the month which the report covers
- Reconciliation of the cash reports summation for September with the financial statements left an unexplained variance of about 500,000,000 leva (app. 10%)
- All locations have cash boxes. Large amounts of cash are held on paydays (approximately 10th and 24th of each month)
- No noticeable losses of cash have occurred due to theft, fraud, etc., as far as anyone has detected
- Cash accounts
    - Cash accounts used on NEK's books, per the chart of accounts, are as follows:
        - 501 Cash on hand at all locations, in leva
        - 502 Cash on hand at all locations, in foreign currency
        - 503 Cash in bank accounts, in leva
        - 504 Cash in bank accounts, in foreign currency
        - 505 Letters of credit, in leva
        - 506 Letters of credit, in foreign currency
        - 507 Deposits (not used)
        - 508 Checks (not used
        - 509 Other currency
            - 50901 Money in bank that must wait 2 days before using

- It takes 2-4 weeks to obtain loans from local banks.
- NEK has no line of credit on which it can draw funds as needed

- There are always more bills than there is cash available to pay them
- Payment priority is given to interest on bank loans, employee payroll, and to advance payments to suppliers; other bills are paid based on decision of Mr. Vladev and Mr. Tsvetkov daily

Cash Management Issues:

- Lack of money to pay bills
- Cash planning
- Cash reporting
- Management of cash by the Branches
- Multiple bank accounts; reducing the number of bank accounts
- Effect on banks of consolidating accounts
- Cash in transit (float)
- Documentation of procedures and process
- Reconciliation of cash reports to accounting reports
- Inflation
- Minimizing cash balances
- Cash receipts during a holiday period (i.e., lack of people to read meters, issue bills, etc.)
- Advance payments to vendors required in part to protect against default on bill
- Penalties (e.g., higher prices, late payment interest charge, etc.) due to efficient cash utilization not being maximized
- Distribution of money-who gets paid, and when
- Branch personnel need to understand the importance of good cash management and cash forecasting
- Big, unforecasted fluctuations in receipts
- Unquantified penalty of higher prices from vendors due to late payment of their invoices
- Records of unpaid invoices not easily accessible to people who need it
- No monthly financial model exists
- Possible value of sources and uses of funds statement in cash management
- Timely and accurate input of data into accounting/cash system
- Planning of major expenditures by HQ on behalf of Branches for economies of scale-how is it done, by whom, is it done too much or too little, effect of inflation and timing delays, etc.
- Branch personnel have had difficulty in forecasting and reporting cash correctly.
- Instruction to Branches for reporting cash is being re-written.
- HQ can determine from entries within certain accounts the amount of cash movement between the Branches. Additional programming could make this process easier
- Training for Branch accountants

- Cash Reporting
  - Each month Branch representatives bring to HQ their monthly financial statements, budget reports and cash reports for the preceding month.
  - Branches prepare a cash plan for the next year, showing each month separately
  - Branches may shift cash amounts in the cash plan from one month to another but cannot change the annual total cash amount
  - Every quarter, Branches report to Executive Director and Department Heads over a two day period
  - Has been some reporting problems associated with cash. Instructions are being re-written to help Branches.
  - Occasional use of barter as payment also adds to the complexity of determining cash balances and the company's financial position
  - Industrial customers which have not paid their electric bills may be taken to court by NEK. When this occurs, the unpaid accounts receivable is moved from the customer's active accounts receivable to a special accounts receivable for amounts in dispute in court.
- NEK financial statements do not normally include a Sources And Uses Of Funds Statement. The latter is not required by the National Accounting Standards.
- Current cash reporting instructions tell Branches to exclude transfers of funds within NEK. But some Branches include internal transfers. Internal transfers probably should be reported but using another account.
- Some thermal power plants have not reported oil and gas as fuel, but instead as material in stock.
- Nearly all Branches use the general ledger processing software developed in Bulgaria called "Adjour-L". (Sofia uses "Konto" software and the Maritsa East 2, Unit #8 construction project prepares its accounting records manually.)
- NEK is initiating a large new MIS project sponsored by the World Bank which may link the accounting system, an inventory control system and others. Project completion is several years away.
- There is a need to help the Branches to develop a cash plan which forecasts cash movement to and from the Branches. Control of cash may also require some review although existing forms provide some means of control.
- No work has been done yet to have the Branches submit planned cash inflows and outflows over the next few days, weeks, month.
- Currently cash is managed by prioritizing invoices for payment, paying those deemed most urgent, and not paying those for which cash is currently unavailable and which seem to be able to be delayed without severe consequences.
- Branches need to see how doing cash planning will be of benefit to NEK and, if possible, how it can benefit them directly.
- Branches often feel that they already have more work than they can reasonably do.
- Branches currently call HQ daily to indicate the amount of money that is received into and issued from each bank account.

- Purpose of the daily sheet is to ensure that Branches transfer to HQ sizable balances of cash, if any.
- At end of each day, cash balances at all locations is normally small, except on the day before payday (employees are paid twice a month).
- Some payments are made directly from the cash boxes for unusual items.
- Branch employees go to their banks each day and find out how much cash is available; then they pay bills, using payment orders, up to the limit of the cash balance.
- Most Branches send excess cash to HQ in the morning, and the cash inflow during the day awaits transfer to HQ on the next day. One branch waits until the end of the day to send all excess cash to HQ
- Some Branches receive high interest rates on deposits, possibly even higher than HQ.
- Interest rates on loans are usually 4-5 % over prime. Deposits of 3 days or more earn interest at prime or prime minus 1-2%. For less than 3 days, deposits earn interest at a rate of about 14% currently.
- Vendors can charge interest on overdue accounts at prime plus 10%.
- Only ESB's are calling daily with cash balances; power plants are not. Some ESB's are using E-mail to report daily.
- Daily cash reports are useful in determining how long it takes money to move from one location to another.
- Cash inflow and outflow amounts are reported by the Branches, but no cash balances. HQ obtains bank account balances directly from the banks at month end. But money is gone by the time the report is available. Report may be discontinued.
- Any foreign currency is received and spent only by HQ-tend to be small amounts. Maritsa East 2, Unit #8 construction project, has a loan from EBRD, which deals in US dollars.
- Procurement Department is under the Commercial Department. Possibly Procurement Department should have a system by which it compiles future payments on all contracts.
- No total record exists of invoices received by NEK but not yet paid. Because of the shortage of cash, invoices may not be paid on the date due. At HQ, Mr. Vladev and Mr. Tsvetkov daily decide which invoices to pay. Then it may take from 1-3 days for bank to actually make the payment to the vendor. Bank sends a notice to the Accounting Department to notify them that the invoice was paid.
- Branches are limited in the amount that they can borrow from banks.
- NEK has 25-30 loans outstanding, with average terms of from a few months to 11/2 years. NEK has about 15-25 of these loans per year. There is a State fund available that offers loans terms of up to 3 years

Iordanka Ivanova-Corporate Accounting Department

- # of payment orders per day at HQ is about 20-30
- # of receipts from banks (from payments by customers) and from Branches per day is about 45 (receive more than one from most Branches daily) plus payments from the railroad and from the Army
- The Chief Accountant (Mr. Vladev) has the list of amounts to be paid in the next month. The Accounting Department does not have this list. The Procurement Department provides large amounts to be spent while smaller invoices are received in the mail
- Power plants submit one bill to HQ at the end of each month but payments from HQ may also be made during the month, as needed
- Branches purchase smaller items but many more of these than does HQ
- The recently-installed accounting system does not have an accounts payable module, and there are no plans in the near future to implement one
- When an invoice is received, the liability is entered into the accounting system. When the invoice is paid, the account is debited and the item is netted to zero. It appears that this list should resemble the list that Mr. Vladev uses, although Mr. Vladev's list may have more items on it if the Procurement Department has identified for payment some expenses for which an invoice has not been received.
    - Data which is recorded in the liability account includes the cost amount, invoice #, invoice date, name of vendor, currency type, exchange rate, amount of foreign currency, description of item, and bank -if connected to a bank for payment
    - Data does not include estimated date of payment of an invoice
    - Date of payment for smaller purchases could possibly be computed using average historical lag
    - Date of payment may not be needed for large payments since they should be paid on the date on the invoice
    - Data in this account at HQ is currently sorted by vendor. At other locations, data may be sorted differently. Possibly could have data sorted by invoice date; only problem is that invoice date is now part of the description field and may not always be entered in a standard manner
- If goods have been delivered but no invoice has been received, the Accounting Department will use either the receiving documents (for purchases made within Bulgaria) or the customs documents (for purchases from outside of Bulgaria) to enter into their ledger (liability account) the value of the goods for which payment is required. [So at any one time, this liability account should include an accrual of the value of all goods and services received but not paid for]
- Payment is made 5-10 days after receiving the invoice, not after the invoice date
- It is possible to have a list of the contents of this liability account printed daily
- If accountants do not always process invoices in a timely manner, the liability account could be understated. [Will be a training issue]
- HQ purchases some imported coal

Maria Gencheva-Corporate Procurement Department

- At end of month, Procurement Department (PD) submits to Accounting Department all known types of purchases and maximum allowed amounts that can be bought in the next month. Vendors are not necessarily specified
- At end of quarter, PD submits to Finance Department some, but not all (?), known payments to be made for some period into the future
- Fuel purchasing:
    - PD is provided a forecast of electricity sales for the next year, which is subject to change. Using the forecast, PD knows what type of fuel and how much is needed.
    - Price for some fuel is firm, but it is not for coal. Coal plants were designed to use Russian and Ukrainian coal and their prices have been high; so NEK has been importing coal from other locations (e.g., China, Vietnam, etc.)
    - Fuel invoices are paid about 5-10 days after receipt of invoices and regulatory (customs) certificates. Longest delay recalled was 20 days
- Branches submit requests for new equipment; so PD knows how much is needed for the next year and contracts are signed , so prices are known.
- Prices are firm for spare parts, also
- Banking regulations require payments to be made within 10 days of receipt of an invoice
- Vendors want quick payment due to inflation
- Only 2 vendors currently charge interest for invoices that are paid late. NEK has a bill for interest that they have not paid yet

Lilly Ivanova-Corporate Budget Department

- Coal purchasing:
  - Purchased quantities are nearly level for each quarter
  - In summer plants store coal in inventory-can store up to 11/2 months of coal-normally about 15 days of coal is in stock
  - If there is an outage at a plant, NEK normally imports electricity.
    - Done to help in an emergency
    - Since there are no prior contracts, prices paid for imported electricity are higher than for long term agreements
    - Local mines have limits on their production
  - Budget Department gives a report at end of each month to the owner of Bulgarian coal mine holding company showing existing coal balances, amount planned to be burned in the next month, and the projected ending coal balances on hand. Holding company uses these reports as the basis for the next month's production level. Deliveries are made daily. Coal mines have little or no storage capacity
- Budget Department does not budget for construction costs; this is done by the Investment Department
- Budget:
  - Serves as the basis for the first year of the financial model
  - NEK consolidated budget is prepared for whole year-is not separated into months.
  - Actual expenses are compared to prior year expenses, not to current year budget, for analysis purposes
  - A written analysis actual versus prior year expenses is prepared quarterly
  - Budgets are also prepared for each branch and shown by quarters. These budgets serve as the basis for computing transfer prices between the Branches and HQ. Branches can change quarterly budgets; but NEK consolidated budget does not change
  - Budget assumes inflation will be at the level forecasted by the government
  - Budget is completed in November of each year
- Transfer prices:
  - For power plants = budgeted expenses less depreciation
  - For ESB's = budgeted expenses less miscellaneous revenues
- Frequency of cash transfers:
  - From HQ to power plants is about once per week
  - From ESB's to HQ is daily

Plamen Stoimenov/Nikodim Stamov-Corporate Finance Department

- Model works "...from the top down"
- There are two classes of rates, Industrial and Households
    - Within these rate classes, there are different rates for summer and winter and rates for high, medium and low voltage levels
- Branches forecast revenues for their areas
- Fuel cost data comes from Budget Department
    - 10-11 different kinds of coal
    - Characteristics of fuel to be used varies by heat content, price, etc.
    - Mix of fuel differs each month
    - Coal payments may be made over period of time
    - Coal purchases in the financial model represent accrued values, not cash payments
    - 4.472 tons of coal are needed to produce one ton of coal with standard heat content
    - Considerable variance has occurred between budgeted and actual coal expenses
    - Radka Iramova develops the calorific value of coal
    - Government sets the price of coal and electricity
- Large customers incur a cost penalty if their energy usage is significantly more or less than projected
- Investment Department is responsible for building high voltage substations and transmission lines
- Discussed possibility that salaries of NEK personnel might be included in budgeted O&M as well as construction costs. Later learned that there appears to be no duplication
- Salaries budgeted at 90% inflation
- Financial model assumes average depreciation of all plant to be 20 years (actual is 19.6 years)
- Interest on construction is budgeted as a current expense and is not capitalized for most construction projects. Interest on loans from foreign banks is generally capitalized; the interest is added to the loan principal for future repayment
- Tax depreciation is a % of book depreciation. Expect in 1997 that tax and book depreciation will be the same
- Tax payments are made every month
- Tax model is high level and avoids dealing with many special tax deductions and other effects that would make the calculation more complicated
- Government is paid a "dividend" of 50% of any profits
- Nuclear fuel decommissioning and spent fuel reserves are not yet funded

- Sources and Uses statement reflects an inflow and outflow of 1,000,000 leva of short term debt, with a balance of zero at year end, in order to show the source of related short term interest
- World Bank financial ratio requirements (loan term is 17 years) :
    - Debt/equity-maximum 40%
    - Internal cash generation-minimum 30%
    - Net revenue to debt service-minimum 1.50
    - Current assets/current liabilities-minimum 1.2
    - Net income/total revenue-minimum ?
- European Bank loan term is 15 years
- IRP Manager and the financial model will be used together in the future. IRP Manager has less detail
- Value added tax (VAT)
    - 73% of full tax credit is used since households do not pay VAT
    - VAT is paid every month to government

Carmelita Goycheva-Accountant, Russe Power Plant

- Coal Purchasing:
  - Coal is largest plant cost and is supplied by two coal suppliers
  - Thermal plant in Russe burns only coal from a certain region in Russia and Ukraine
  - Coal is transported by ship to within 3-4 kilometers of Russe plant
  - Invoice is sent to NEK the day that the ship arrives at the Bulgarian dock
    - Payment is due 15 days after receipt of invoice from one supplier, and within 7 days from the other supplier
    - Supplier of Russian coal sends an advance invoice
    - Coal is 2-3 days in transit
  - Russe has the capacity to store about 40,000-45,000 tons of coal
  - The plant uses about 2,500 tons of coal per day when operating at maximum capacity; so the plant keeps about 15 days of coal on hand if operating at maximum capacity
  - Russe keeps a one month supply of coal on hand for normal operating levels
    - In January, plant may use less than normal amounts of coal in order to keep operating
  - There are 22-30 coal deliveries per month at Russe
  - Russe can change the amount scheduled to be delivered, but tries not to do this
  - In January, shipping lanes are frozen; so no deliveries are made. In anticipation of this, Russe orders and stockpiles two months worth of coal in December. Much coal can be stored at the Russe thermal plant
  - The level of deliveries for each month during the February-December period are approximately the same
  - The coal suppliers are both Bulgarian companies
  - Russe sends bill to HQ for coal, and to Committee of Energy (formerly a governmental ministry-is a national organization) for the cost of district heating
  - Fuel price is fixed (in leva) but changes with changes in the exchange rate
    - Fuel invoices are paid in USD
    - Fuel prices paid for Russian/Ukrainian coal by the Bulgarian fuel companies are based on ruble/USD exchange rate, and prices paid by NEK to fuel companies are based on leva/USD exchange rate. [Fuel companies appear to be in a good position. As ruble weakens relative to the dollar, fuel companies pay less dollars to Russians/Ukrainians. As leva weakens relative to the dollar, NEK pays more dollars to the fuel companies.]
- Russe provides district heating for the city also

- Russe uses a revolving credit account at Post Bank, a branch of the Sofia bank. Amount of leva that Russe may borrow is related to the amount of cash that HQ advances to Russe
- The rate of interest paid by Russe on borrowed funds is a relatively low rate. Russe has a good payment record and is a desirable customer for the bank. Russe has been with the same bank for three years. Their previous bank raised its interest rate charge; so Russe changed banks.
- Major overhauls are paid for by HQ directly.
- In September, Russe found itself without enough cash, so HQ took over payments to coal suppliers, for salaries, etc. This will continue into 1996
- Russe is never in a positive cash position; expenses always exceed their available cash
- HQ makes 1-2 payments to Russe each month
- Some ESB's have begun to pay Russe directly, instead of paying HQ which, in turn, then pays Russe. Large payments are received from ESB's in the middle of the month due to payments received from large industrial customers. Households tend to pay at end of month
- To obtain payment from HQ, Russe sends telex to HQ stating how much cash is needed. Russe expects to get the money within two days, or less, if there is money available. Russe can predict its cash needs in advance
- Payments for certain types of expenses must be paid on time or there will be severe penalties. Some of these types of payments include interest on loans with banks, taxes payable to the government, etc. HQ pays the VAT
- Russe provides 12 month forecast to the Budget Department every three months. Forecast is on an accrued basis. Forecast is not accurate due to changes in generation levels, outages, etc.

Dobrinka Ovtcharova-Plovdiv Supply Branch

- Meters for industrial customers are read manually each month and the readings are entered into meter books. Readings from meter books are entered onto computerized billing system and bills are produced on or near three dates (dates may differ among Branches): 15th, 23rd, 5th of next month. The first bill (on the 15th) represents about 50% of the total revenue from industrial customers, and the next two bills represent about 25% each.
- About 80% of customers make payment to the bank immediately upon receipt of the payment order
    - Customer is required to make payment by the end of the third day after the date of the payment order
- All unspent money is transferred daily to HQ
- Three regions bill industrial customers: Plovdiv (about 4,000 customers), Asenovgrad (about 1,400 customers), and Karlovo (about 500 customers)
- Interest rate on late payments is set by the government. While most (80%) industrial customers pay their bills on time, some of the largest pay late (10-30 days). In the last year, late payment charges have amounted to about 200,000,000 leva. There is no late payment charge on household bills
- Plovdiv has its own billing system that records the amount of interest paid by customers
- Meters for households are read for the first two weeks of each month. Household bills are issued once per month between the 20th of the month and the 5th of the next month
- There are about 300,000 household meters
- Bills are sent to customers about two weeks after meters are read
- Meter readers spend the last two weeks of the month collecting payments from customers. In Plovdiv, some of the meter readers have begun to read meters all month long, while others spend all month working on collecting payments from customers
- Most people pay their bills on payday or when pensions are paid.
- Accounts Payable:
    - Payday is on the 10th and 24th of each month
    - Money is held on the 9th and 23rd to be used pay employees
    - Can look at accounts payable liability account daily to see how much is owed-can see detail or just total for the account
    - Amounts owed are relatively small
        - Estimated % that expenses are of revenues (2.5 billion leva) = 15%
- All generation is purchased from HQ; no generation purchases are made from other sources
- Plovdiv could do a 30 day forecast of revenue and expenses. It would take about 2-3 days of effort. Four different programs must be accessed in order to obtain the data
- Plovdiv uses E-mail to send cash balance data daily to the Corporate Finance Department

Dimtcho Ivanov-Investment Department

- Government has asked for NEK's investment strategy through the year 2010
- NEK uses EBRD, EIB, local banks and the World Bank as resources for capital for the investment program
- In 1995, 70 % of the planned amount will be spent on investment projects. In 1995, NEK received about 2 billion leva from the government; would like to get 4 billion in 1996
- Four big projects are in process to increase reliability, as well as projects for nuclear waste and for an ash pond
- In 1996, government says that NEK should spend 21 billion leva, NEK has budgeted for 14 billion leva. In 1995, NEK spent about 11 billion leva
- Separate bank accounts are used to receive and to pay funds for investment
- Corporate Finance Department obtains the loans for investment projects and also makes the payments from these loans
- Investment Department keeps a small fund to finance local construction
    - ESB's can contract for capital projects of up to 3 million leva. If they want to replace a distribution line or install a small administration building, which exceeds this level, branch managers must submit budgeted cost amounts to the Investment Department for inclusion in the corporate investment budget

Radka Iaramova/Mihail Stoikov-Corporate Budget Department

- Budget Department thinks that their fuel forecasting process needs improvement. IRP Manager might be a helpful tool
- Actual cost information is received monthly from the Branches, on paper or in some cases, on pc diskettes. Data is sent to Budget Department, Corporate Finance Department and the Accounting Department
- Quarterly budget report includes both cost data and a written analysis of financial performance
- Quarterly, power plants submit cost reports to the Budget Department
- Several years ago management used to compare actual costs to budgeted costs, but decided to change to a comparison with prior year data
- If Budget Department sees a large variance between actual and budgeted amounts, it will contact the branch for an explanation (not written)
- Costs for new construction are not budgeted by the Budget Department. These costs are budgeted by the Investment Department
- Interest on debt used for construction is not included in the cost of the new plant for construction that is financed with Bulgarian funds. Interest on loans issued by foreign banks generally require that interest related to construction is capitalized and repaid with the loan principal over the life of the loan
- Budget Department gives its budget data to Corporate Finance Department for use in the financial model

NEK/CMPI

DEVELOPMENT OF CASH MANAGEMENT PROCESS

NOTES FROM INTERVIEWS WITH COMPANY PERSONNEL
1/31-2/8/96

CMPI Interviewers:	Charles Bonney	
	Waine Whittier	
NEK Personnel Interviewed:	Albena Valkatchovska	Corporate Finance Department
	Bozhan Bozhanoff	Bobov Dol Power Station
	Krassimir Kanev	Corporate Finance Department
	Nikolaj Koshutarski	Bobov Dol Power Station
	Dobrinka Ovtcharova	Plovdiv Electric Supply Branch
	Nikodim Stamov	Corporate Finance Department

Albena Valkatchovska-Corporate Finance Department

- Reviewed and discussed comments on the notes made during our December visit to Sofia. Will make several changes to clarify what was conveyed during the interviews.
- Household customers:
    - Individuals do not receive regular account balance statements from banks. Banks make some errors when paying bills on behalf of its customers for electricity, water, etc.
    - Most people have a savings account at a bank and earn interest at the rate of about 1.68% to 2.50% per month.
    - Individuals are permitted to have foreign currency bank accounts. They can buy up to 2,000 USD per year. Interest rate on USD is about 6% to 9% per year.
- With the 30 day cash flow model, it appears to be advisable to have each Branch report their largest 3-5 invoices, plus any invoice over some level, possibly 500,000 leva
- It probably makes sense to have all Branches report their cash data, regardless of the size of the branch
- Cash at Russe and Varna flows directly to their local power plants to expedite the flow of cash. But the accounting actually shows the purchase of generation from the power plants by Headquarters and the sale of generation from Headquarters to the electricity supply Branches

Cash Flow Forecasting Model

- Taxes:
  - Branches are responsible for 10% income tax
  - There is a 2% income tax on which is for land improvement ("amelioration" tax)
  - There is also an employment pre-qualification payroll tax of 7%
  - There is a new tax act which will be implemented this year in Bulgaria
  - Value added tax (VAT) is computed at the rate of 18% of total revenue from industrial customers (only), less VAT paid on *all* expenses, regardless of customer class .
  - Beginning in April, 1996, households will begin to pay VAT on their electric bills
- Power plants may pay a penalty to offset environmental pollution
- Some customers tell bank at beginning of year that NEK can deduct from their account the amount due for electricity used
- Some of the largest industrial customers bring their bill payment to NEK when they wish
- NEK is in the process of changing to the use of fewer banks (possibly 3-4) for most of its transactions in order to have same day cash transfer between Branches and Headquarters
- Most Branches transfer funds to Headquarters at the end of the day, with the funds available to Headquarters on the next morning
- Currently the Branches only report to the Finance Department the amount of cash income and expenses paid; they do not report the cash balance on hand
- The Finance Department can get cash balances from the banks but does not currently do so. No daily reconciliation of the amounts reported by the Branches to the bank balances is done
- Invoice payment process:

<u>If paying in leva</u>

  - Payment order is filled out by NEK-are 5-6 copies
  - Accountant takes all payment orders to bank
  - Bank stamps one copy, which the accountant takes back to NEK for its files
  - The next day the bank provides to NEK a register showing all payments made on the prior day
  - NEK may pay some invoices in cash-vendor comes to NEK for payment

<u>If paying in foreign currency</u>

  - Use a special payment order form for foreign currency payments
  - Take contract as well as payment order to bank, to prove that payment must be made in foreign currency
  - Bank provides NEK with record of payment in two days. On the third day, a copy of the "SWIFT" is provided to NEK to prove that payment was made

Cash Flow Forecasting Model

Krassimir Kanev-Corporate Finance Department

- A form of E-mail ("V-mail") has been developed by the Vitosha Company and is used internally by NEK to transfer information between Headquarters and the Branches
- Software is being programmed by NEK to transfer cash data from the Branches to Headquarters
- Albena has completed the instructions to the Branches regarding how to report accrued expenses and cash

Albena Valkatchovska/Nikodim Stamov-Corporate Finance Department

- For the Chaira pumped storage project, interest on the World Bank loan is in effect capitalized, since it is added to the loan amount for repayment
- Under the EBRD and EIB loans for projects at Maritsa East 2, Unit 8, NEK pays interest currently; interest is not recorded as part of the construction costs. Accounting practice in Bulgaria is to record interest as a current expense
- In the monthly cash flow model
    - Separate construction projects into two types: one where the project is financed by foreign loans, and where there is no current cash flow effect on NEK; and a second, where NEK funds are used
    - All types of fuel costs should be shown separately
    - The cash report which is sent to Corporate Finance should have a line on which withdrawals of materials and inventory can be reported. This will permit the model to calculate the m&s inventory
    - In the plant model, add a switch to allow interest during construction to be added to the cost of the project, if desired
    - Add logic to compute the VAT to the o&m model. VAT is paid monthly
- A form of bartering is done with Romania, where NEK exchanges electricity for the right to use the transmission line
- Interest on foreign debt is paid twice per year
- At year end, the amount of debt is recalculated at the current exchange rate. The change in debt due to the change in the exchange rate is charged to a deferred account on the balance sheet. This balance is divided by the remaining life of the loan and amortized to expense annually. When the construction project is put into service, the unexpensed exchange balance is transferred to that plant-in-service cost group
- Even for the larger projects financed by foreign banks, NEK must pay Bulgarian contractors in leva and then apply to the foreign banks for reimbursement in US dollars. This process may take up to one month to complete. The exchange rate for reimbursement to NEK is dated as of the date of payment to the contractors in leva.
- Foreign banks always provide financing in US dollars
- Export sales payments are all processed through Headquarters
- The Bulgarian government receives 50% of earnings as a dividend-they are the only holders of equity in NEK
- About 10% of the Branches currently use EXCEL

Cash Flow Forecasting Model

Dobrinka Ovtcharova-Plovdiv Branch

- There are four regions at Plovdiv
- Revenue:
    - Industrial customers must pay their electricity bills no later than the 15th and the 23rd of the month in which the electricity is used (based on estimated bills), and the 10th of the month after (based on actual bills)
        - Meters are read and billed by the 2nd day of the month
        - Some customers come in to pay their bills on that day or the next
        - Other industrial customers are sent their bills by mail-are received by the 5th or 6th of the month
        - Amount billed on the 15th is 50% of prior month actual
        - Amount billed on the 23rd is 25% of prior month actual
    - Connection deposits-are small in amount
    - Household customers are not sent bills for electricity used, except in Sofia. Customers come to NEK locations to pay bills
    - Committee of Energy is billed for district heating usage, except in Sofia where the district heating plant is owned by the municipality
    - Interest charged on late payments by industrial customers (only). This is a large component of revenue (220,000,000 leva)
    - Sale of assets (rare)
    - Interest income from bank accounts (small)
    - Services performed
    - VAT charged on industrial customers-is part of billed amount.
- Proceeds from loans are a source of cash as well as revenue. There are many local loans from time to time
- Materials represent about 20% of the total expenses of the Plovdiv branch (80,000,000 leva out of 400,000,000-most of the rest of the expense is labor)
- Payday at the Branches is normally within 1-2 days of the 10th and 24th of the month (payday at Headquarters is on the 2nd and 17th)
- Annual construction costs at Plovdiv are small (20,000,000). Construction costs are included in the budget prepared by the Investment Department-is negotiated with the branch. These costs are capitalized
- Taxes:
    - Branch is accountable for a 10% income tax
    - Is paid by Headquarters, then allocated to Branches on the basis of the number of employees, and is paid by each branch to its municipality
    - Amelioration tax of 2% of income is paid by Headquarters monthly
    - Re-employment tax of 7% of payroll is paid by Headquarters
    - Property tax is paid four times a year (March, June...). May be paid in advance by March 31 to obtain a small (5%) discount
    - Income taxes are withheld from employees' pay at the rate 20% and paid to the government on that day

Cash Flow Forecasting Model

    - Value added tax is paid twice per month. On the 28th, an advance estimated payment is made, and on the 14th of the following month a payment is made to reconcile to the actual
- The branch always pays the bills it has; some days there are no bills to pay. Unused funds are transferred to Headquarters
- Tools available to aid in forecasting expenses and revenue include the liability data within the Azour-L accounting records (contains date paid and other data but not the invoice date) and from the billing system the history of amounts billed. Amounts paid could be obtained if programming was done.
- Only the regions produce bills and collect cash-not the Branches (unless the branch has no regions)
- Household bills:
    - Meters are read from the 1st to the 15th (most industrial customers' meters are read from the 15th to the 31st)
    - Meter books are given to the regions for input of data onto the regions' computers
    - On the 22nd of the month the meter data entry is complete for households; it is complete on the 2nd of the following month for industrial customers
    - Meter readers now spend part of their time reading meters and part collecting cash payments from household customers
    - Customers may also go the NEK office and have bill produced by computer while they are there and make their payment
- Purchase orders:
    - Purchase orders are internal NEK documents that authorize the acquisition of materials and services. Purchase orders are not sent to vendors
    - At beginning of year, prepare a list of construction sites and compare with funds available
    - Prepare a purchase order and have it authorized by the branch manager
    - A contract is prepared and signed, and contains payment terms
- Cashbox controls are in place. Meter readers perform audits and unscheduled inspections

Bobov Dol Power Plant

Bozhan Bozhanoff-Manager

- Plant is 600+ MW and uses coal
- Plant has 1,050 employees
- Burns brown coal, lignite and imported coal. Local coal mine does not have enough to supply all of the plant's needs. Some coal comes from other Bulgarian mines
- Spent 450,000,000 last year doing overhaul of boiler tubes for one unit-will do same this year for another unit
- Gave us a tour of the plant

Nikolaj Koshutarski-Chief Accountant

- Plant sells a small amount of steam to one customer, which pays the plant directly in cash
- Plant prepares an invoice by the 3rd of each month and sends it to Headquarters.
    - Not sure when Headquarters will pay the plant. Headquarters usually pays part of the bill on one day, another part on another day, etc., as funds are available. Number of payments per month is approximately 10
    - Bill rate includes operation and maintenance expenses, and overhaul and coal costs paid by the plant
    - Plant pays most contractors directly; but Headquarters pays for some large equipment if it signed the contract with the vendor. Headquarters also has begun to pay for the cost of local coal
- VAT is not included in the transfer price paid by Headquarters; it is paid separately. Headquarters, not the plant, pays VAT to the government. Plant accounting department keeps track of how much VAT the plant has paid to vendors, and Headquarters reimburses the plant for that amount
- The transfer price used by the plant to bill Headquarters for generation is provided by the Budget Department.
    - This price excludes depreciation expense-otherwise, plant would have extra cash since this is a non-cash expense
    - Transfer price changes every month and is different for each plant
    - At end of each quarter, variances between actual expenses and the transfer price are cleared to expense
    - At year end, the Budget Department calculates an average transfer price for the year
    - Municipal income tax is not included in the transfer price. Plant pays the tax, then gets paid by Headquarters
- Money does not stay in a bank account. It "...goes out in 15 minutes"
- Plant uses Azour-L general ledger system
- Insurance is paid only on cars and is paid by Headquarters
- Two bank offices are located right in the plant administration building
- Plant recommends construction expenditures to the Investment Department, but they may get adjusted
- Plant can obtain loans of up to 100,000,000 leva
- Payroll is computed in Sofia by NEK, but plant expects to get the software to do it themselves this year
- Property tax is paid by the plant and is included in the transfer price
- Coal is 82-85% of the total expenses of the plant
- Labor is about 10% of the total expenses of the plant
- Other expenses, mostly maintenance, make up about 6% of the total
- During October-January period, plant uses the more expensive imported coal. Local coal use is steady all year

NEK/CMPI

DEVELOPMENT OF CASH MANAGEMENT PROCESS

NOTES FROM DISCUSSIONS
3/27-4/4/96

CMPI Interviewers:	Charles Bonney	
	Waine Whittier	
NEK Personnel Interviewed:	Albena Valkatchovska	Corporate Finance Department
	Krassimir Kanev	Corporate Finance Department
	Pancho Sipkov	Budget Department
	Nikodim Stamov	Corporate Finance Department
	Plamen Stoimenov	Corporate Finance Department

General

- Billing rate increases are expected to occur both in May and possibly in September, 1996
- Households will start to pay VAT beginning in April
- Foreign banks want the average price billed to be the equivalent of about 3.5 cents per kilowatt-hour, excluding VAT. After April, the average price is estimated to be less than 80% of the target level
- The 10% municipal income tax is paid monthly by the Branches and regions to their municipalities
- The amelioration tax of 2% and the 7% re-employment tax are paid monthly by Headquarters
- NEK does not currently accrue for the expense of processing spent nuclear fuel or the decommissioning of the nuclear generation units
- Interest rate charged to customers on billed amounts that are paid late is about 10% over the prime rate
- In 1997, the level of income tax depreciation will be increased to about the level of book depreciation. Currently, tax depreciation is about 70% of book depreciation
- Interest is paid monthly on domestic loans, around the 25-27th of each month
- No income taxes have been paid by NEK
- Intangible assets include such expenses as for software and trademarks
- Property tax is paid quarterly on the 15th of the month following the end of each quarter. (Possibly the model could calculate this amount based on an average factor derived from NEK accounting records)
- Electricity supply Branches do not borrow funds unless told to do so by Headquarters. Power plants do initiate some loans (up to a specified level) without authorization from Headquarters
- Imported coal is generally paid for at the time of delivery

Cash Flow Forecasting Model

- There is a 5% tax on imports, paid at the customs office when the goods are delivered. This tax is included in the price paid to the supplier
- Advance payments for the purchase of nuclear fuel are charged to Other Receivables account
- It can take 2-4 weeks to borrow money using short term domestic loans
- There is an NEK policy which indicates that the electricity supply Branches should send a certain percentage of their prior month net cash flow to Headquarters, by the 15th and 25th of each month. If the Branches do not pay enough to satisfy these percentage requirements, then subsequent payments to Headquarters must include interest for the number of days that payments are overdue. Interest must also be paid by Headquarters for late payments to the power plants. The purpose of the interest charge is to encourage the timely collection of payments from customers
- With the Committee of Energy, sales by NEK of district heating steam are exchanged for purchases of domestic coal. The liability of each party is discharged by signing of a "protocol", an agreement to exchange the value of products
- VAT example: customers receive bill for March kwh usage in early May and pay bill by May 15. NEK pays the VAT to the government in May, on the basis of accrued revenue
- In the summer, kwh sales are lower and expenses are higher, resulting in less net VAT paid to the government than in other seasons

Modifications to the Monthly Financial Model

- Numerous refinements were discussed and will be made to the model
    - Decided to drop lines 15-25 ("From Headquarters") on the proposed cash flow input form. These amounts would duplicate amounts already in the model
    - Cash inflow will be supplied either by the Budget Department or by the Electricity Supply Branches
    - Cumulative retained earnings will be added as an information line on the Management Summary
    - The temporary cash investment rate will be determined as 4% over the prime interest rate
    - Separate loan issues will be modeled in the Financings section for projects financed by foreign banks
    - Present worth factor used by NEK for planning currently is 10%, excluding inflation
    - Unbilled revenue will be calculated as a % of sales. Since NEK currently does not record unbilled revenues, this % will be set at zero
    - Investments, prepayments and subsidies will be input manually into the model
    - The portion of materials used for construction versus o&m expense needs to be determined and applied to the materials inventory withdrawals
    - Many other modifications will also be made

Short term forecast

- While the monthly finance model will be useful as a planning tool, its main purpose in this project is to compute certain input data for use in a short term cash forecast. Examples of such data include income taxes, dividends, and interest on foreign loans

Cash Flow Forecasting Model

- There was much discussion about the best source of short term cash flow data. It was decided that little or no data would be required to be submitted by the Branches to Headquarters
- Cash flow data will be used only by Headquarters
- Other Revenue line includes such items as payments for imported electricity and return of advance payments
- Reports should include a comparison of planned and actual cash flow in order to track the accuracy of planned data and provide a means for continuous improvement of plan data

Revisit Objectives of This Project

Objectives of this project were reviewed and determined to be about the same as originally established. Recommendations should address:

- development and use of cash flow forecasting model
    - deliverables were changed to include a five week cash flow forecasting model, instead of a 30 day model
    - reliance on data that can be obtained from records at Headquarters will serve as the source of data for the Five Week Model, instead of requesting data from the Branches
- acquisition of hardware and software
- reports which compare actual and planned data
- forecasting procedures to be used to develop certain data

Cash Flow Forecasting Model

Transfer Pricing-Pancho Sipkov-Budget Department

Transfer pricing is the establishment of prices at which generation is "sold" (i.e., transferred) by the power plants to Headquarters, and the establishment of prices at which energy is "sold" by Headquarters to the electricity supply Branches. It is an internal company pricing mechanism which is used to measure the financial performance of the power plants and the electricity supply Branches, on which wage incentive payments are based. This process is a "paper" transaction and does not involve the movement of cash.

Transfer prices are computed using budgeted expenses and generation for each quarter. At the beginning of each year, the Budget Department provides the Branches with estimated expenses by quarter for the new year. At the end of each quarter, the transfer price is re-calculated. It is based on actual billed revenue in the most recent quarter less budgeted expenses for the branch in the upcoming quarter plus budgeted miscellaneous revenue for the upcoming quarter. This amount is divided by the actual kilowatt-hour generation in the most recent quarter, adjusted to include the allowed level (18%) of losses. Expenses exclude such non-cash expenses as depreciation and exclude profit.

General Comments About Billing Rates

- Budget Department software only collects data; it does not forecast data
- Budget Department has no software to calculate transfer prices
- Budget Department is working on developing new customer billing rates
    - Using past 3 months of data
    - Prices are changed one or two times per year
    - Meter reading schedules are changed each time customer rates are changed. Customers are billed at new rates beginning on the day the new rates go into effect (bills are not prorated using a combination of new and old rates)
- Households have shown a steady increase in usage while high voltage customers' usage has declined

Transfer Pricing Example:

Money

Revenue from final customers for first quarter, 1996 = 200,000 leva
All costs of operating a branch = 10,000 leva
Expected net profit from miscellaneous services = 1,000 leva

Revenue	200,000 leva
Branch Expenses	10,000
Net Revenue	190,000
Miscellaneous Revenue	1,000
Total Net Revenue	191,000

Generation

Kwh generated and purchased during the first quarter* = 180,000
Kwh sold to consumers during the first quarter = 120,000
Kwh losses during the first quarter = 60,000
% loss during the first quarter = 60,000/180,000 = 33.3%
Kwh losses allowed in the transfer price calculation for the Branches is 18%

* Kwh generation is measured at the station fence. Transmission and distribution losses are absorbed by the Electricity Supply Branches.

Allowed losses:
(120,000 * .18)/(1-.18) = 26,341 kwh

Losses in excess of the allowed level, and for which the Branches are responsible:
180,000 - (120,000 + 26,341) =33,659 = 18.7%

Transfer price would be: 191,000 / (180,000 - 26,341) = 1.243 leva/kwh

NEK/CMPI

DEVELOPMENT OF CASH MANAGEMENT PROCESS

NOTES FROM DISCUSSIONS

MAY 5-10, 1996

CMPI Representatives:	Charles Bonney	
	Waine Whittier	
NEK Representatives :	Albena Valkatchovska	Corporate Finance Department
	Krassimir Kanev	Corporate Finance Department
	Nikodim Stamov	Corporate Finance Department
	Plamen Stoimenov	Corporate Finance Department

General Comments

- Rates increased on May 1
- Exchange rate increased from 74 leva to 94 leva for the USD from February to now; then it rose again to as much as 120 leva during our visit in May
- Prime interest rate increased from 49% to 67 % in April; and again to 108% during CMPI's visit
- CMPI brought revised Monthly Model and new 5 week forecast model diskettes
- Gas fuel for power plants is purchased by Headquarters; oil is purchased directly by power plants
- Forecast data about imported electricity is supplied by the Trade Department
- Payroll
    - Supply Branches hold cash prior to payday; so cash shortage shows up at Headquarters on that Supply Branch payday
    - Some employees are paid using debit cards
    - Payroll amounts reported on cash reports include the costs for social security; this is paid by NEK directly and is not deducted from employees' income
    - Employees may obtain up to 50% of their paycheck in advance
- Amounts of funds shown on the Supply Branch's daily cash report as transferred to Headquarters actually are not received at Headquarters until the next day. Amounts transferred from Supply Branch to cashbox are also shown on the cash report
- Cash is not transferred between Supply Branches
- NEK uses LIFO to value nuclear fuel and average weighted cost to value the materials and goods inventory

Five Week Model - General

- A transfer file has been developed which allows certain data that is calculated by the Monthly Model to be transferred to the 5 week model. Such data includes NEK income taxes, amelioration tax, interest payments, loan repayments, dividends, reemployment tax and the VAT to be paid to the government

If desired, a year-end forecast for 5 weeks that crosses into the following year can be developed. This would entail running two annual models, but still only one Five Week Model

Five Week Cash Flow Model - Input

- **From Electricity Supply Branches:** To obtain a quick estimate of sales revenue for the month just passed, generation data could be used and reduced by a loss factor; or the relationship of generation to revenue from the prior month could be used as the ratio to project current month revenue
    - Table will be changed to look first for actual revenue; if none, then look next at projected revenue based on current data; and lastly, look at the original planned revenue.
    - It was decided not to use a separate table for wages in the Branches since there was not a consistent pattern of cash outflow. The Five Week Cash Flow Model will be revised to show cash inflow from the Branches net of such expenses
- **From Loan Proceeds** are forecasted by Headquarters
- **From Other Revenues** includes such transactions as the return of money deposited with vendors, money from tenders that are sold, etc. All other revenue categories are derived either from the Monthly Model or from the Supply Branches
- **To Power Plant Branches:**
    - Maintenance expenses can be forecasted based on the information available from the Monday morning meeting of the NEK executives at which time work on large maintenance jobs is discussed
    - Forecasted monthly construction expenditures are supplied to Albena by the Investment Department. Need to verify if data is on a cash or an accrued basis
- **To Investment Branch**: includes construction charges are for all of NEK except Headquarters (which is shown on a separate line below)
- **Nuclear fuel**: data is supplied by the Trade Department
- **Imported coal**: most of the expenses is paid by Headquarters, but Russe Power Plant may also pay for some imported coal. Data is supplied by the Trade Department. Amount depends on outages, weather, etc.
- **Local coal**: is paid by Headquarters. Some forecast data may be available in the Dispatch Department. This expense tends to be fairly stable except at year end
- **Gas** used at the Varna Power Plant is paid by Headquarters. Varna Power Plant is large and has 1,260 MW. Gas is purchased from Russia and is very expensive. Forecast data can likely come from the plant itself. Because the Varna plant is used primarily to cover peak loads, it is difficult to forecast how much coal will be needed.
    - Estimated order-of-magnitude annual expenses for fuel are: local coal-10B leva; imported coal-5B leva; and gas-2B leva

- **Imported electricity**: All contracts are listed at the beginning of the year by the Trade Department. New contracts are approved by Krassimir Kanev and can be added to the list a that time. All projected payments and dates are listed on the Trade Department list. Some of the imported electricity is delivered in accordance with contracts while some is obtained only when there is an emergency, and therefore is not predictable in advance.
- **Private Power**: the Accounting Department can supply forecast data for this expense
- **Materials, Supplies and Services**: Headquarters buys for itself and for all of NEK. The Trade Department should be able to supply the necessary data. CMPI will expand the form developed by Albena to report forecast data provided by the Trade Department. Columns may be added to show the denomination of currency to be paid, the exchange rate to leva, the amount of leva, and blanks to be used by the Trade Department to update the forecast.
    - In the column for currency payment type, currencies can include USD, DM, Swedish Crowns, Swiss Francs, French Francs, Austrian Shillings, an Leva.
        - A single character will be assigned to each type of currency in order for the coding function to select the correct exchange rate. A column is also needed for multiple payments-the norm is 2-3 per contract
        - Will assume 500 contract lines, including space for multiple payments
        - Will provide a separate sheet for each buyer (10, plus one for totals)
        - Add an extra title row to allow input of Bulgarian titles
        - Add column to identify branch name and department ordering items
        - Add columns for revision of data
        - Some materials are purchased by other departments within Headquarters without using the Trade Department; so that forecast data must come from those departments directly (example: Foreign Relations, Supply Planning, etc.)
- **Wages and Social Security**: forecast data will be supplied by the Accounting and Budget Departments
- **Construction (Headquarters only)**: data is derived from the Investment Department report for all of NEK
- **Other Expenses**: penalties, bus trips (domestic), bank fees, etc.

- A variance report will be prepared by the system that compares actual cash amounts reported by week to forecasted amounts
    - The form will leave spaces at the bottom for a written narrative that discusses permanent versus temporary variances from plan
    - A separate schedule will be used to record payments that are planned but do not occur. When payment is made, the delayed payment schedule will be adjusted.

<u>Monthly Model</u>

- Need to reconcile the "direct" method (cash) income statement with the "indirect" method (accrued)
- In the Monthly Model, the VAT needs to be separated from other revenue in order to calculate the net VAT received with the VAT paid out on expenses. VAT is excluded from revenue and expenses on the income statement except if VAT from expenses is more than that from revenue. In this case, NEK records an expense on the income statement

- On the balance sheet, a separate line needs to be used to show Prepayments, with possible sub-categories of nuclear fuel, other fuel and other. Do same for materials and goods inventory
- On the balance sheet, add a separate liability account for coal suppliers versus other suppliers
- At year end, NEK recomputes its debt at the latest exchange rates and defers the difference in the debt balances recorded on NEK's books and the debt value at current exchange rates. This difference is written off to expense over the remaining life of the debt. During the year, exchange variances are charged directly to an account for losses or revenue from exchange variances
    - A line will be added to the Monthly Model income statement to record this expense
- The Monthly Model includes operating losses as a charge against retained earnings. On its books, NEK records losses as an asset; permission must be obtained from the Minister of Finance to eliminate this item from the balance sheet
- A line will be added for "extraordinary adjustments" on the income statement
- A quarterly variance report using the Monthly Model data will be provided to allow comparison of actual to plan, for the income statement and for the balance sheet
- For the materials inventory, the portion applicable to operating and maintenance expenses (as opposed to construction) needs to be identified, since inventory withdrawals could be for either o&m or construction.

NEK/CMPI

DEVELOPMENT OF CASH MANAGEMENT PROCESS

NOTES FROM DISCUSSIONS

AUGUST 5-8, 1996

CMPI Representatives:	Charles Bonney	
	Waine Whittier	
NEK Representatives :	Albena Valkatchovska	Corporate Finance Department
	Nikodim Stamov	Corporate Finance Department

- The notes from the last visit of CMPI to NEK were reviewed and revised to incorporate NEK comments
- Several questions were raised by NEK about specific formulas used in the monthly model. Formulas will be changed to resolve these questions, where appropriate
    - In the Planned Construction schedule, new plant book and tax depreciation will be computed using average life for each type of plant. Tax depreciation will be computed by multiplying a designated percentage times the book depreciation
    - Losses carried forward and amortized to expense should be deducted from taxable income and not taken as a direct tax credit
    - In the Rates and Revenue schedule, the ability to either input late payment interest directly or to apply a percentage to the accounts receivable balance should be added
- CMPI will develop a report which compares sources and uses of funds on a cash basis and on an accrual basis
- Many changes were made to the monthly model since the last visit. Each of these was reviewed
- No VAT is applicable to nuclear fuel-logic needs to be changed
- The variance report for the income statement should be produced monthly, while the variance report for the balance sheet will be produced quarterly
- The purpose of the Buyers Model is to calculate a materials and supplies value for the Five Week Model. This model can report the value of expenditures in seven different currencies or convert them to leva. Exchange rates must be input into this model
- Additional data that should be input into the Buyers' Model includes the planned and actual delivery dates and the cost not yet paid
- A question about the possible duplicate use of debt repayment in the Source and Use report on a cash basis needs to be addressed

- Income taxes are accrued as follows: one-third of the prior quarter actual taxes is recorded for each of the first two months of the next quarter and is adjusted to actual in the first month of the next quarter. The amount of taxes paid will be a manual input
- Interest is charged on unpaid taxes. NEK currently owes the state about 8 billion leva (includes income taxes, VAT, and interest)
- The Council of Ministers approves the capital budget; available cash is used for construction before state income taxes are paid. Local municipal income taxes are paid when due
- NEK will send fax a copy of the new tax law to CMPI

Sources and Uses Section

- Grants should be added as a source
- Grants of property should be recorded as the value of the plant asset and as "financings" on the liability side of the balance sheet. Property is depreciated over its economic life. There is no effect on the income statement, but there is an effect on the Sources and Uses and Balance Sheet schedules
- Grant of cash is recorded in the Cash Flow Section while a grant of property is not.

Rate and Revenue Section

- Change in accounts receivable is the source of Cash Flow line for accounts receivable. This line should include VAT

General

- Logic for computing interest on overdue taxes needs to be added
- Re-employment taxes should be included with operating expenses, not with taxes
- The melioration tax may be eliminated at some point in the future.
- Exchange losses are incurred at the time loan principal payments are made
- Unamortized exchange losses should be included on the balance sheet as a Deferred Charge
- Insurance is included with "Services" on Cash Report
- Depreciation rates were increased in 3/96 and 5/96. New depreciation level should be about 1.2 million leva per month
- Nuclear plant decommissioning fund has been approved but is not yet implemented. Collection % of revenue has not yet been determined
- Social security rate is 41.5 - 44%, not 35%, as now used in the model
- Sales to the railroad and telecommunications companies, as well as the army, all are made directly by Headquarters
- Interest on computer model-issued loans should be shown separately on the income statement
- Model results analysis should include different scenarios: borrow debt (usually at relatively high rate of interest; stretch payments to suppliers (usually implies a moderate rate of interest); or reduce costs
- Financing Section should show surplus cash from financings on a separate line, so that it is obvious what the model produced for financing
- Model is set for 12 iterations currently
- Interest rates to be used in the model for now include EBRD-7.1%; World Bank-8.5%; local (Bulgaria)-10.5%; and overall-7.5%

Cash Flow Forecasting Model

Remaining Tasks

A list of tasks remaining to be done on the project was compiled and prioritized and is shown below:

Tasks	Priority*	Status
For Monthly Model:		
Revise tax logic to conform to new tax laws	1	To be done
Develop report to compare scenario results	3	To be done
Add logic for re-valuing loans	1	To be done
Add logic for "grants"	1	To be done
Cash flow variance report	2	To be done
Cash flow in standard form-revise format	1	To be done
Add separate plant category for land	3	To be done
In the Finance section, designate short term and long term debt separately. Add balance sheet line for surplus/deficit and show interest separately on the Income Statement	1	To be done
Add logic for plant retirements	1	To be done
Add logic for computing interest on overdue taxes	1	To be done
For the Five Week Model:		
Develop delayed-payment schedule	2	To be done
Modify to span year end	2	To be done
For the Procurement Report:		
Monthly exchange rate losses for procurement and trading - add input line	1	To be done
Create database in ACCESS	2	To be done
General:		
Improve data and supply missing data	1	To be done
Perform more testing of whole model with real data	1	To be done
Prepare draft of final report, obtain NEK comments, complete it	1	To be done
Provide implementation assistance	1	To be done

*Priority codes: 1 = must do, 2 = should do, 3 = do if time permits

NEK/CMPI

DEVELOPMENT OF CASH MANAGEMENT PROCESS

NOTES FROM DISCUSSIONS

December 9-12, 1996

CMPI Representatives:	Charles Bonney	
	Waine Whittier	
NEK Representatives :	Albena Valkatchovska	Corporate Finance Department
	Nikodim Stamov	Corporate Finance Department

Meetings were held at NEK's facilities in Sofia during the week beginning December 9, 1996 to review progress on the cash management models.

General

The prime interest rate is 108% annually. NEK typically pays 10% above the prime rate for borrowed funds. NEK has not been borrowing money lately.

NEK assets were revalued in 1992. It is possible that they will again be revalued within the next year or so.

The social security rate used in the model should be 42%, the approximate average rate currently in effect at NEK.

For loans issued by the World Bank, interest is paid currently to the World Bank and is deducted from the loan proceeds. For EBRD and EIB loans, NEK pays the interest currently and records it as part of the cost of construction of the related project.

Income Taxes

For the period of January through June, 1996, the municipal income tax rate was 10% and the state income tax rate was 40%. The municipal tax was not deductible from the state tax. A 2% melioration tax was also applied to income. The total income tax was 52%.

Effective in July, 1996, the municipal income tax rate is 6.5 % and the state income tax rate is 36%, per the NEK Accounting Department. The municipal rate is deductible from the state tax rate for purposes of calculating the effective combined income tax rate, resulting in a combined net rate of 40.16%. The melioration tax of 2% of income was replaced with a 2% pension tax on

wages. Since this amount is deducted from employees' wages, the expense does not need to be separately recognized in the model.

Income taxes are calculated quarterly, but payments must be made monthly to the state. Payments are made on the 15th of each month for taxes related to the previous month and are based on the one third of the actual taxes paid in the previous quarter for which actual financial results are available. Tax payments and book taxes are reconciled to actual in the month following the end of each quarter. Income tax payments to the state are also reconciled to actual on the 15th of the month following the end of each quarter. If calculated taxable income is negative, it is carried forward cumulatively during the year until it becomes positive. Similarly, if estimated tax payments exceed actual tax payments required, the difference is carried forward until future tax liabilities have offset the previous overpayments.

In the month of December, two tax payments are made to the state, one on the 15th and one on the 25th.

NEK currently owes eight billion leva in income taxes. Interest expense is charged on unpaid tax balances (income taxes and VAT) at the rate of prime plus 10%.

Changes to the Models

Several changes have been made to the Monthly Model. Among others, these include:

- separate identification of short term debt and temporary cash investments that are created by the model, based on model input. This will give management the ability to be aware of actual and planned debt/investment balances versus those balances computed by the model. This will also better highlight the effects of different variables on model results.
- adding to the Basic Input schedule the option to override tax payments and enter them manually, if desired.
- changing the income tax calculation to monthly

Based on discussions, possible future changes to the models are shown below:

- NEK may want to consider having two liability accounts on the balance sheet for taxes payable: one for income taxes payable and one for value-added taxes. Also, provision for manual entry of tax payments should be made in the monthly model.
- In the Planned Construction schedule of the monthly model, a line should be added for grants. This amount should be deducted from total construction for purposes of calculating interest. This amount should be included in total construction costs for purposes of computing depreciation expense. Grant amounts are reflected in a liability account on the balance sheet.
- Provision should be made to enter fuel amounts manually into the monthly model. Local coal should be recorded separately from imported coal and nuclear fuel. The local coal liability may be satisfied with protocol (barter) rather than cash payments.

- VAT on imported fuel should be recorded separately from other taxes. Assume that VAT is paid when fuel is received. No VAT is recorded when an advance payment is made. Possibly, a switch could be added to indicate who is paying the VAT, the vendor or NEK.
- Add wheeling revenue category to the Rate and Revenue schedule of the monthly model.

OUTLINE
OF
GENERAL CASH FLOW

OUTLINE OF NEK CASH PROCESSING FLOW

I. Branch-Region

A. Revenues
1. Industrial customers
2. Households
3. Other
4. Interest on late payments
5. Miscellaneous

B. Expenses
1. Payroll
2. Other
1. Generation (at some Branches)
2. Domestically-financed construction
3. Vehicles
4. Materials
5. Taxes
6. Property
7. 10% Municipal income tax
8. Supplies (gas for vehicles, paper, misc. office items, etc.)
9. Interest expense
10. On customer deposits
11. Debt service on domestic loans

C. Cash Processing

II. Power Plants

A. Revenue
1. Transfers from Corporate Headquarters
2. District heating sales (Customer is the Committee of Energy)
3. Other

B. Expenses
1. Fuel (coal, nuclear, some gas)
2. Construction costs
3. Projects financed by foreign banks
4. Domestically-financed projects
5. Other: same as I.B. above

C. Cash Processing
1. Proceeds/repayment of bank loans (non-construction)
2. Cash from Headquarters
3. Other

Cash Flow Forecasting Model

III. Corporate Headquarters

A. Revenue

1. Transfer of excess cash from Branches
2. Payments from certain very large customers (e.g., railroad, Army)
3. Exported power
4. Interest Income
    5. Customer deposits
    6. Investments
7. Other

B. Expenses

1. Same as I.B. and II.B. above, plus
2. Nuclear fuel
3. Imported fuel
4. Imported and other non-NEK purchased power
5. Major plant overhauls
6. High cost spare parts
7. Debt service costs (i.e., interest) on domestic (for HQ only) and foreign loans
8. Taxes
    9. Property
    10. Income (40% on income before taxes)
    11. VAT (18% of value of expense)
    12. Land amelioration (2% of income)
    13. Payroll prequalification (5% of payroll)

C. Cash Processing

1. Loan proceeds
    2. World Bank
    3. EBRD/EIB
    4. Other (e.g., short term loans with domestic banks)
5. Sale of equity
6. Excess cash from Branches

I. Branch-Region/ A. Revenues/ 1. Industrial Customers

Branch/Region issues two estimated bills to large industrial customers, on the 15th (50%)and 23rd (25%) of each month, based on the amount billed in the prior month. A third bill for actual energy use is issued on the 5th of the following month (see below).

1. Branch/Region reads meters and bills customers
    2. enters meter data onto billing system
    3. billing system produces customer bill
    4. bills for actual power usage for all industrial customers are sent at about same time, on the 5th of the next month after the power was generated
5. Customer verifies bill accuracy
    6. when cash available, customer pays bill
        7. customer pays via bank transfer
            8. customer goes to bank and initiates payment order
            9. copy of order goes to bank, customer, and Branch/Region
            10. Bank sends notice that payment was made, to customer
        11. customer pays via cash
            12. customer brings cash to bank or withdraws cash from bank account
            13. customer initiates payment order
            14. copy of order goes to bank, customer, and Branch/Region

I. Branch-Region/ A. Revenues/ 2. Household Customers

1. Same as IA1-4,6-7,12-16
2. Meter reader may collect cash from customer in person
3. Payday and pension payments days are days with most payment activity

I. Branch-Region/ B. Expenses/ 1. Payroll

4. Employees report time worked
5. Time reports are approved by supervisors and forwarded to the Payroll Department
6. Payroll Department enters time worked into payroll system
7. Cash at all locations is held (i.e., cash excess is not forwarded to next level) on the day before payday
8. Payroll system matches time worked and pay rates and computes wages to be paid
9. Amount to be paid to each employee is counted and put in envelopes
10. Employees go to paymaster and get money on the 10th and 24th
11. Few other bills get paid on these days

I. Branch-Region/ B. Expenses/ 2. Other

1. Invoices received by (person making the purchases, or by the Accounts Payable Department?)
2. Invoices are approved for payment
3. Invoices are submitted to the Accounting Department
4. Accounting Department enters invoice data onto accounting system
5. Accounting Department prepares payment order and submits it to bank
6. Bank processes payment order and transfers specified amount to payee's bank account.
7. Bank notifies Branch/Region that invoice was paid

I. Branch-Region/ C. Cash Processing

1. Branch/Region receives cash in its bank account
    2. cash available within 1 day if Branch/Region and customer used same bank
    3. cash available within 3 days if Branch/Region and customer used different banks
4. Cash is used to pay outstanding local bills at Branch/Region . Average age of cash availability is 1 day
    5. All bills at Branch paid, then amount left is forwarded to HQ
    6. Only HQ would seem to have cash shortage
7. Cash balance at Region bank account is reduced to zero each day, and balance is moved to Branch bank account
    8. Does this mean that Region cash is in the system for an extra day?
        9. Are most Regions using the same banks as their Branches are? If so, is excess money at Regions consolidated with the excess at Branch to transfer to HQ on same day?
        10. Should Regions transfer some excess cash directly to HQ?
11. Cash is received at Branch bank account from Region bank accounts
    12. Cash balance at Branch bank account is reduced to zero each and balance is moved to HQ
        13. Is cash in the system for an extra day?

II. Power Plants/ A. Revenue/ 1. Transfers From Corporate Headquarters

1. Plant generates electricity, which it sells to Headquarters at transfer price
2. Amount of electricity sold is determined from meter readings
3. Plant submits bill to Headquarters once per month
4. Headquarters receives invoice, where it is approved for payment
5. Approver sends invoice to Accounting Department, where it is entered into the accounting system
6. Invoice is forwarded to Chief Accountant, who with other management personnel determines when to pay the invoice

7. Once approved by the Chief Accountant, the invoice is returned to the Accounting Department, where a payment order is made out.
8. The payment order is issued to the bank, which then transfers money to the Plant
9. The bank notifies NEK that payment was made
10. Plant receives funds in bank account.
11. Bank notifies Plant of deposit
12. Plant may determine that it will not have sufficient cash to operate in the future. It reviews its available cash balance and pending invoice payments. (Headquarters may assist with the funding of major plant overhauls, during plant downtime, etc.) Plant estimates how much additional funding it needs.
13. Plant decides when additional cash will be needed, recognizing the lead time necessary to accomplish the cash transfer as well as the availability of cash at Headquarters
14. Plant prepares and submits request for funds from Headquarters
15. Same process as steps 4-9 above

II. Power Plants/ A. Revenue/ 2. Other

Certain Branches may purchase power from the NEK power plants directly.

1. Power plant generates electricity, which is used by Branch
2. Power plant reads meters at Branch and issues bill for usage
3. Branch receives and approves bill for payment. Same process as I.B.2.1-7 above.
4. Plant receives funds in bank account.
5. Bank notifies Plant of deposit

II. Power Plants/ B. Expenses/ 1. Fuel

1. Fuel from domestic sources
    2. NEK Budget Department gives a report to coal companies at the end of each month that shows the existing coal balances, the estimated amount to be burned in the next month, and the estimated ending balance. Coal companies use this information to determine how much coal to mine/deliver in the next month
    3. Coal companies issue invoice for coal delivered (at what point during the month?)
    4. Same as II.A.1.3-11 above

5. Imported fuel
    6. Order for coal delivery is given to vendor
    7. Vendor sends advance invoice as ship begins trip to Bulgaria
    8. Customs documents are received, inspected and approved
    9. Coal is delivered to plant
    10. Invoice is entered into the accounting system
    11. Invoice is approved for payment
    12. Payment order is created and given to bank to make payment
    13. Bank transfers money to fuel company account
    14. Shipping companies receive cash

II. Power Plants/ B. Expenses/ 2. Construction Costs

15. Arrange for access to capital through loans
16. Develop construction schedule
17. Develop construction budget
18. Obtain budget approval
19. Issue purchase orders
20. Order materials
21. Possibly pay progress payments before delivery
22. Receive materials and invoice
23. Same process as I.B.2.1-7

II. Power Plants/ C. Cash Processing/ 2. Bank loans (construction)

1. Develop construction budget and submit to the Investment Department for approval
2. Investment Department (and Board of Directors) approves budget
3. Obtain approval to arrange for loan from bank
4. Provide all construction and financial plans and data required by the bank
5. Obtain approval from bank for the amount requested. Modify plans as required.
6. Agree to schedule for repayment
7. Receive invoices for materials delivered and labor services provided
8. Submit to bank supporting documentation for amounts requested as costs are incurred, and borrow the funds needed
9. Deposit funds into power plant bank account
10. Initiate payment orders for amounts owed to vendors
11. Monitor availability of loan and other funds
12. Repay loan amounts in accordance with loan agreement
13. Seek supplemental loans if needed

II. Power Plants/ C. Cash Processing/ 3. Cash From Headquarters

1. Plant prepares and issues invoice for generation- see II.A.1
2. Or Plant may issue supplemental request for funds
3. Headquarters approves/modifies Plant's request for funds
4. Headquarters initiates transfer of funds to Plant bank account
5. Plant reviews unpaid invoices and selects those for payment
6. Plant completes payment orders
7. Bank transfers funds to vendor accounts
8. Bank notifies Plant that payment was made

III. Corporate Headquarters/ A. Revenue/1. Transfer of Excess Cash From Branches

1. Branches review cash balance at end of each day
    2. Determine the amount of money required to pay bills the next day
    3. Hold money if next day is payday
    4. Transfer any cash excess to Headquarters
        (If Branch and Headquarters use the same bank, the transfer is instant; if not, the funds do not reach the Headquarters bank account until one day later)
5. Branch notifies Headquarters of the amount that it is transferring
6. Headquarters verifies bank balance and other deposits and withdrawals with amount reported by the Branches as having been transferred to Headquarters

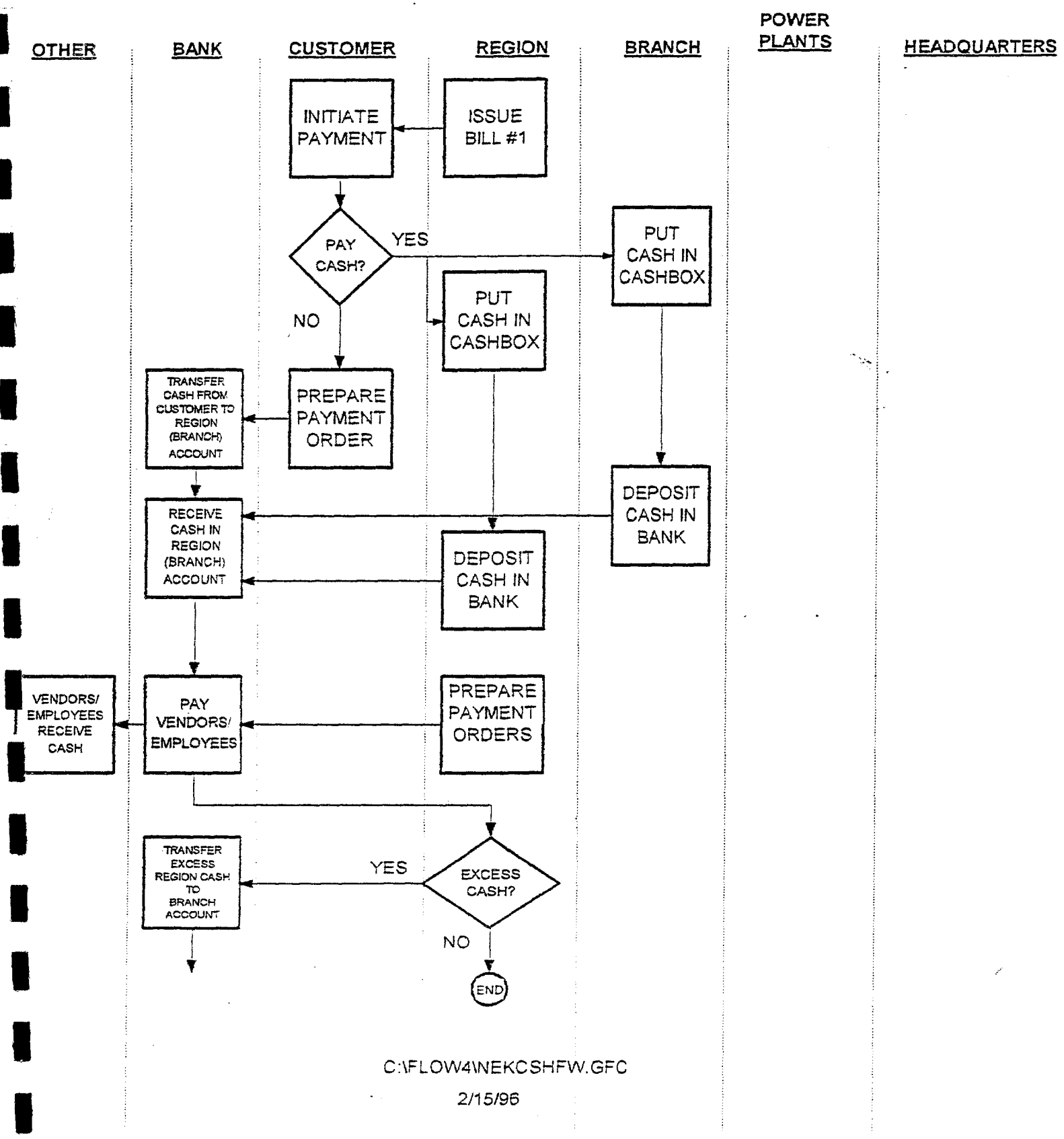
III. Corporate Headquarters/ A. Revenue/ 2. Payments From Large Customers

1. Invoices are issued on the 15th, 27th and 5th of the next month, as with other large industrial customers
2. Meters for large customers (railroad and Army) are read each month. Invoice on the 5th includes adjustment needed to reconcile estimated payments to the value of actual meter readings
3. Customer prepares and gives payment order to its bank
4. Bank transfers funds to Headquarters bank account

FLOW CHARTS
GENERAL CASH FLOW

NEK CASH FLOW PROCESS

REVENUE FROM INDUSTRIAL CUSTOMERS



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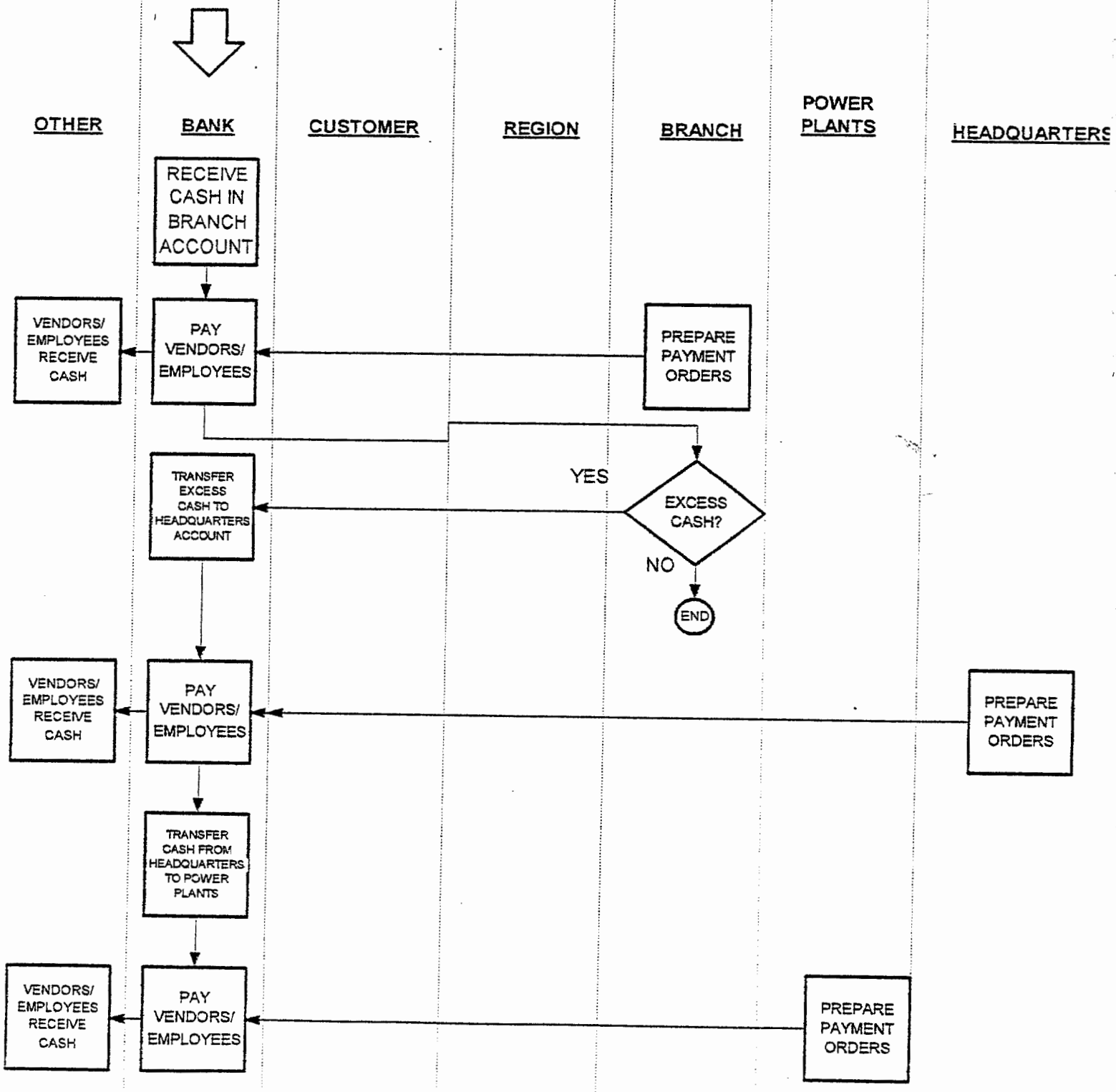
2/15/96

NEK CASH FLOW PROCESS

REVENUE FROM INDUSTRIAL CUSTOMERS



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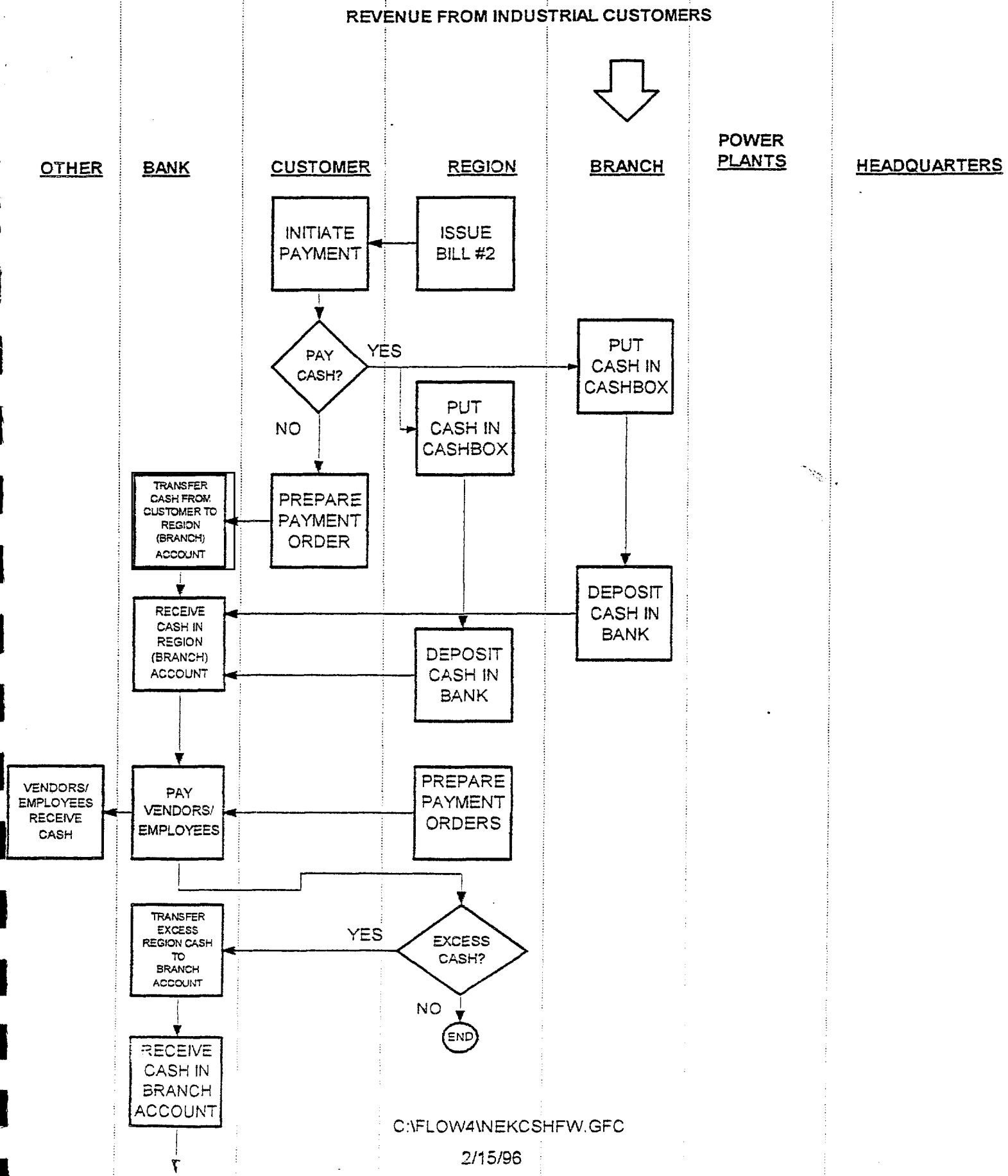
NEK CASH FLOW PROCESS



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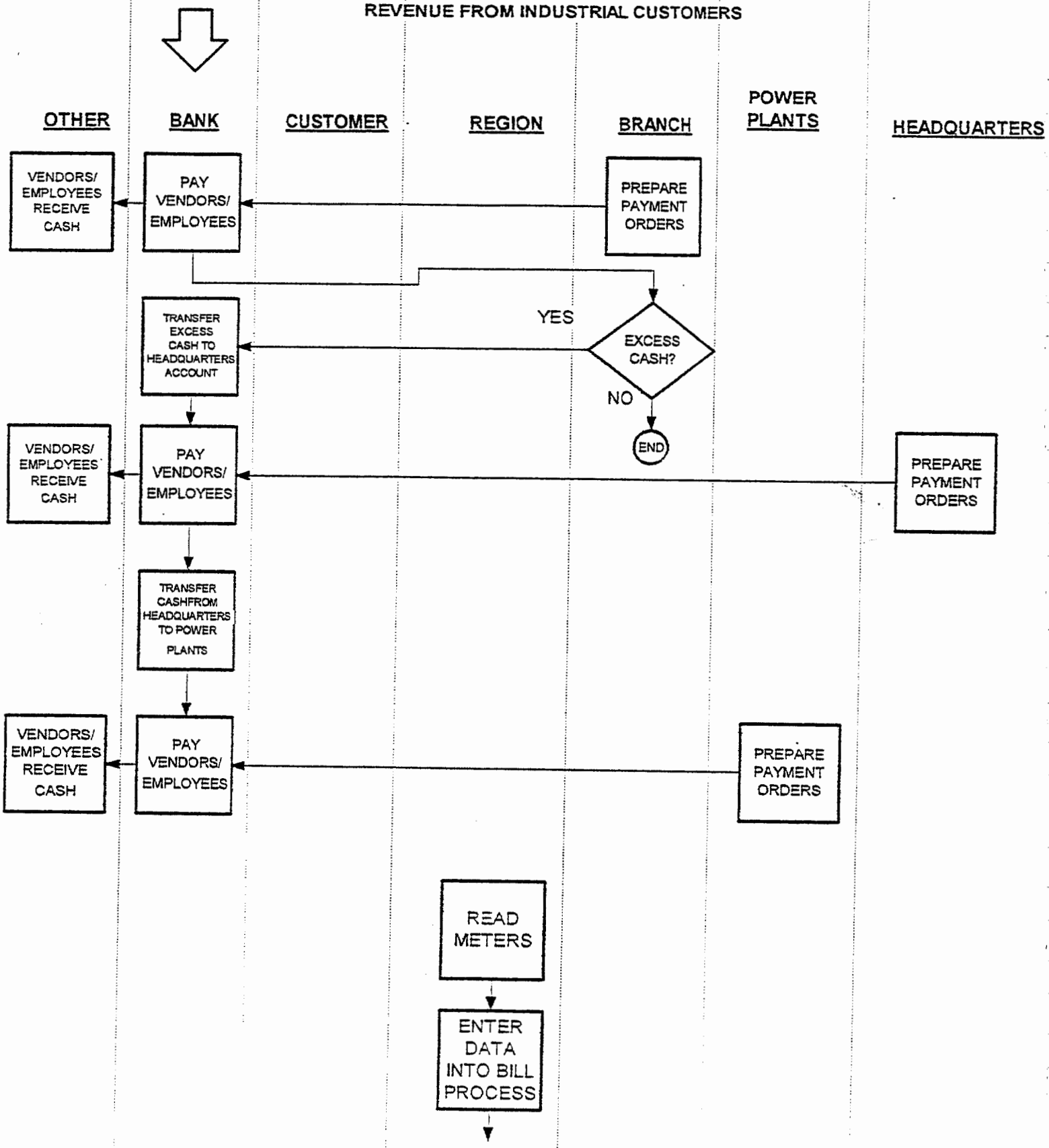
NEK CASH FLOW PROCESS

REVENUE FROM INDUSTRIAL CUSTOMERS



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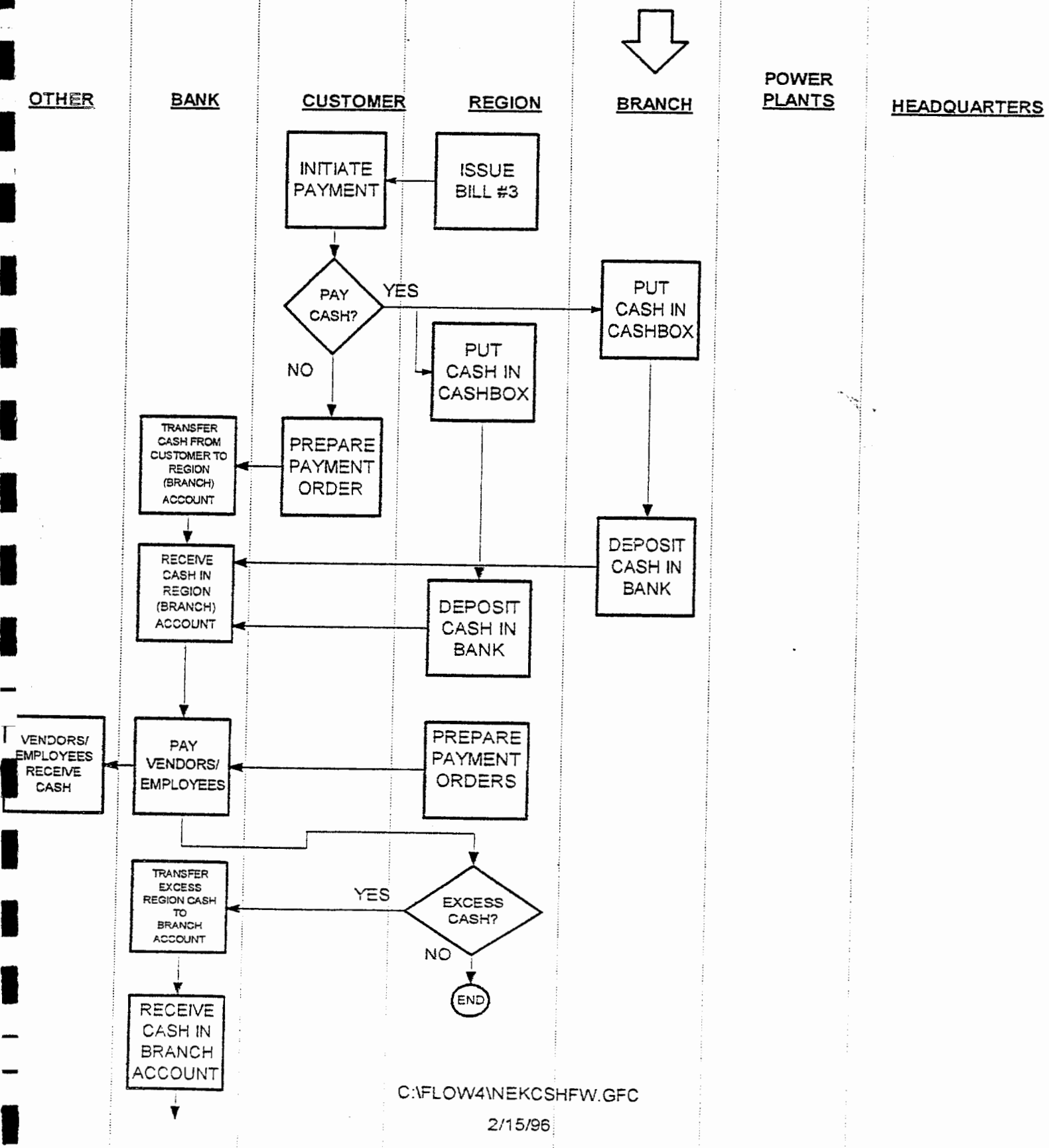
2/15/96

NEK CASH FLOW PROCESS

REVENUE FROM INDUSTRIAL CUSTOMERS



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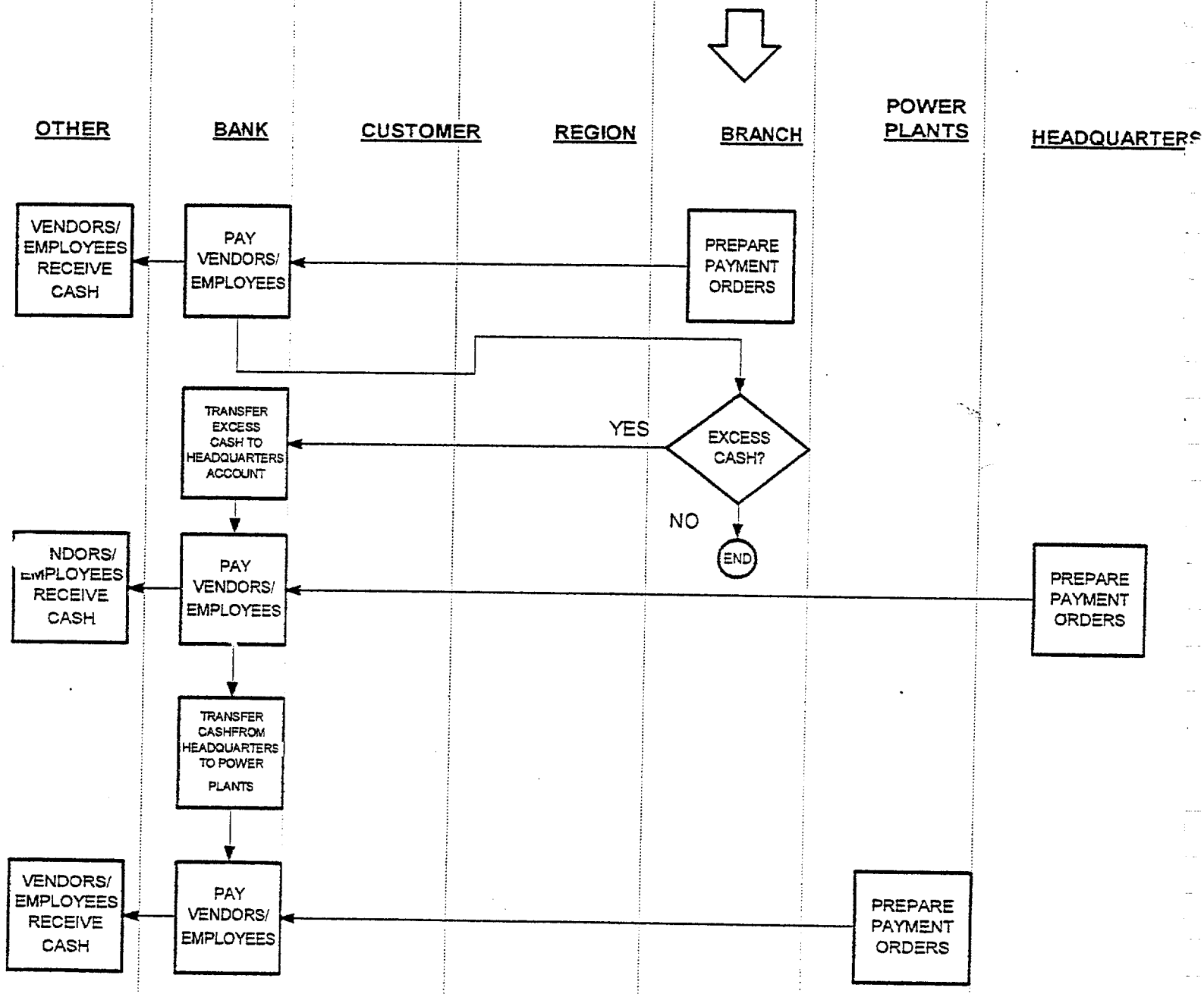
NEK CASH FLOW PROCESS

REVENUE FROM INDUSTRIAL CUSTOMERS



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2/15/96

SAMPLES OF REPORTS

FROM THE MONTHLY FINANCIAL MODEL

CONTROL MENU

Bulgarian Output GoTo	English Output Print	*********Print Indicated Reports*********		
Basic Input		XX		XX
Cash Flow				
Balance Sheet		XX		
Income Statement		XX	XX	
Sources and Uses of Funds		XX		
Rates and Revenues			XX	
Operation & Maintenance Costs			XX	
Purchased Power			XX	
Planned Construction		XX		
Financings		XX		
Taxes				
Management Summary		XX	XX	XX
Balance Sheet Variance				
Income Statement Variance				

MANAGEMENT SUMMARY

NEK Monthly Model | Test 1 | Study Year 1996 | 2/26/97 18:45:29

KEY ASSUMPTIONS	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Annual Inflation Rate (%)	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%
Exchange Rate (Leva/US$)	72.53	74.59	77.94	81.55	119.53	143.10	180.14	191.79	224.60	225.00	220.00	220.00
Exchange Rate (Leva/DM)	49.01	50.40	52.66	55.10	80.76	96.69	121.72	129.59	151.76	152.03	148.65	148.65
Short Term Interest Rate (%)	14.00%	22.00%	29.00%	29.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%

FINANCIAL PERFORMANCE												
Avg. Electricity Price (Lv/kWh)	1.80892	1.80817	1.81486	1.68157	2.04872	2.27086	4.08835	5.508438	6.313695	8.134381	1.869	1.81
Total Revenue (Millions of Lv)	6312	6546	7000	5037	4608	4796	8174	11730	15355	21153	6042	7088
Net Income (Millions of Leva)	1234	1239	-1257	-1039	-314	601	2073	4600	2553	8760	-3826	-695
Common Dividends (Mil. of Lv)	0	0	0	0	0	0	0	0	4613	0	0	2119
Retained Earnings (Mil. of Lv)	1234	1239	0	0	0	601	2073	4600	0	8760	0	0
Accumulated Ret. Earnings (Mil. of Lv)	1234	2473	2473	2473	2473	3074	5147	9747	9747	18507	18507	18507
Return on Common Equity (%)	1.22%	1.23%	-1.24%	-1.03%	-0.31%	0.60%	2.05%	4.55%	2.53%	8.67%	-3.79%	-0.69%
Pretax coverage ratio	8.86	8.92	7.76	6.35	1.20	-0.02	6.66	15.32	10.02	9.93	0.44	1.26

KEY FINANCIAL RATIOS (%)												
Debt-to-Equity	7.53%	7.30%	6.88%	6.63%	6.42%	6.40%	6.30%	6.31%	6.18%	14.28%	19.20%	22.97%
Internal Generation	543%	780%	746%	364%	293%	174%	272%	269%	435%	1261%	402%	98%
Net Revenue to Debt Service	707%	634%	-609%	-536%	-83%	164%	571%	1276%	700%	2242%	-862%	-139%
Current Assets to Liabilities	247.11%	253.76%	217.36%	212.39%	205.95%	207.18%	217.88%	231.50%	238.15%	302.79%	288.13%	299.58%
Net Income to Total Revenue	19.55%	18.92%	-17.96%	-20.64%	-6.81%	12.54%	25.36%	39.22%	16.63%	41.41%	-63.33%	-9.80%

FINANCINGS (Millions of Leva)												
Total Construction	378	378	577	281	497	725	925	1897	940	769	729	1179
New Long Term Debt	288	90	94	99	145	173	218	232	272	939	933	932
Long Term Debt Retirements	44	45	46	81	81	81	81	81	81	81	81	81
Short Term Debt Balance	0	0	0	0	0	0	0	0	8785	15058	18707	26475
Temporary Cash Balance	18313	16841	15722	13961	13289	10332	5326	454	0	70	0	100

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BALANCE SHEET

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ASSETS (Millions of Leva)

Property, Plant and Equipment	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Plant in Service	90788	91472	92156	92840	93524	94208	94892	95576	96260	96944	97628	98312	98996
Less Acc. Depreciation	15362	15782	16205	16630	17058	17489	17922	18357	18795	19236	19679	20125	20573
Plant in Service,net	75426	75690	75951	76210	76466	76719	76970	77219	77465	77708	77949	78188	78423
Constr. Work in Progress	6919	6614	6308	6201	5799	5612	5653	5893	7106	7362	7447	7492	7988
Total Property, Plant & Equip.	82346	82304	82260	82411	82265	82331	82623	83112	84571	85070	85396	85680	86411
Intangible Assets, net	89	103	118	136	156	180	207	238	274	315	362	416	479
Financial Assets	231	266	306	352	404	465	535	615	707	813	935	1075	1237
Deferred Assets	428	492	566	651	748	861	990	1138	1309	1505	1731	1991	2289
Cumulative Loss	6072	5672	4772	5830	5969	5983	5983	5973	5973	7633	7133	9859	12673
Current Assets													
Cash	3118	18313	16841	15722	13961	13289	10332	5326	454	0	70	0	100
Accts Receivable, Custs	7187	9051	11539	14014	14977	15270	15803	19946	29196	41860	59902	62543	65908
Accts Receivable, Other	1060	50	60	70	80	76	0	50	60	0	70	0	50
Unbilled Revenues	0	31	32	34	24	22	23	40	57	76	105	29	34
Nuclear Fuel Prepaymnts	913	2363	3288	4232	5196	6179	6792	8638	9685	10754	4394	5507	6642
Imported Coal Prepaymnts	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Coal Prepayments	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas & Oil Prepayments	0	0	0	0	0	0	0	0	0	0	0	0	0
Mat. & Goods Prepayment	1910	0	0	0	0	0	0	0	0	0	0	0	0
Other Prepaymnts & Assets	0	10	0	0	6	0	0	0	5	0	0	0	0
Nuclear Fuel Inventory	0	-546	-1041	-1556	-1944	-2297	-1436	-2104	-2943	-3966	2205	1693	1392
Imported Coal Inventory	0	304	651	999	1147	1319	1801	2107	2008	1808	1750	2166	2721
Local Coal Inventory	0	-282	-499	-913	-989	-1046	-1161	-1149	-2483	-4117	-6226	-6478	-6199
Oil & Gas Inventory	0	100	214	326	353	392	544	587	458	263	-20	147	400
Mat. & Goods Inventory	11032	11465	11869	12297	12644	12984	13267	13228	13226	13169	12984	13153	12977
Other Asset B	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	25221	40859	42954	45225	45454	46189	45965	46669	49723	59846	75234	78760	84024
Total Assets	114387	129696	130976	134604	134997	136008	136302	137745	142556	155182	170791	177781	187113

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BALANCE SHEET

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EQUITY AND LIABILITIES (Mil. of Leva)

Equity	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Preferred Stock	0	0	0	5	5	5	5	5	5	5	5	5	5
Common Stock	101034	101034	101034	101034	101044	101044	101044	101044	101044	101044	101044	101044	101044
Retained Earnings	0	1234	2473	2473	2473	2473	3074	5147	9747	9747	18507	18507	18507
Reserves	4	4	4	4	4	5	5	5	5	5	5	5	5
Other Fund	0	0	0	0	0	7	7	7	7	7	7	7	7
Total Equity	101038	102272	103511	103516	103526	103534	104135	106208	110808	110808	119568	119568	119568
Loans													
Model Short Term Debt	0	0	0	0	0	0	0	0	0	8785	15058	18707	26475
Planned Short Term Debt	2999	2619	2223	1918	1688	1601	1442	1442	1442	1442	1442	1442	1442
Long Term Debt	4608	4852	4897	4945	4963	5027	5120	5257	5409	5600	6459	7311	8163
Total Loans	7607	7471	7120	6863	6651	6628	6562	6699	6851	15826	22959	27460	36079
Commitments & Contingencies	0	0	0	0	0	0	0	0	0	0	0	0	0
Current Liabilities													
Nuclear Fuel	0	0	0	0	0	0	0	0	0	0	0	0	0
Imported Coal	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Coal	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil & Gas	0	0	0	0	0	0	0	0	0	0	0	0	0
Purchased Power	0	-140	260	399	380	623	759	1053	1634	2441	2999	4359	4917
Materials & Goods	11672	9774	9777	9832	9746	9736	9671	9390	9399	9414	9411	9415	9344
For Participations	1	2	2	6	6	4	4	4	4	4	4	4	4
To Employees	332	236	179	647	375	451	649	185	481	1887	2487	2487	2486
Other Taxes	0	-61	-112	-240	-330	-777	-1251	-2160	-3807	-5953	-9107	-9522	-10324
Deferred Income Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0
Income Taxes Payable	5650	5764	5878	9080	10223	11367	11273	12003	12734	15888	17427	18965	19994
For Social Security	202	174	157	295	215	237	296	158	246	662	839	839	839
Other Liabilities	786	786	786	786	786	786	786	786	786	786	786	786	786
Total Current Liabilities	18645	16535	16927	20806	21401	22427	22186	21420	21479	25130	24847	27335	28047
Grants	3344	3344	3344	3344	3344	3344	3344	3344	3344	3344	3344	3344	3344
Deferred Income	75	75	75	75	75	75	75	75	75	75	75	75	75
Total Equity and Liabilities	130708	129696	130976	134604	134997	136008	136302	137745	142556	155182	170791	177781	187113

INCOME STATEMENT

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REVENUES (Cash Basis)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Electricity & Heating Sales	4739	4341	4800	4343	5002	4917	4686	2433	2743	3193	3445	3683
Other Revenues	443	462	165	145	156	166	146	251	221	236	275	341
Total Revenues	5182	4804	4965	4488	5158	5083	4832	2684	2964	3429	3720	4024

OPERATING EXPENSES (Cash Basis)

Fuel	3360	2788	2678	2332	2295	3585	4394	2231	2389	2825	3118	3209
Purchased Power	700	370	461	334	132	114	208	2	2	2	2	2
Materials & Goods	874	895	899	992	848	831	723	254	270	294	289	297
Services	613	588	599	661	725	859	947	460	414	452	619	990
Wages & Social Sec.	687	676	673	676	680	1075	1076	528	623	540	548	658
Other Taxes	59	63	133	80	77	123	103	59	72	65	68	73
VAT	61	51	128	90	448	473	910	1646	2146	3153	415	802
Bank Fees	1	1	1	1	1	1	1	2	2	2	2	2
Other	73	71	97	77	90	80	77	39	39	37	38	38
Total Operating Expenses	6429	5502	5668	5243	5296	7142	8438	5221	5957	7370	5100	6071

INCOME BEFORE TAXES (Cash Basis)

Operating Income	-1247	-699	-703	-755	-138	-2058	-3606	-2537	-2993	-3941	-1380	-2047
Less												
Interest Expense Long Term Debt	73	15	503	3	327	5	105	57	1326	7	7	7
Principal Payments	44	45	46	81	81	81	81	81	81	81	81	81
Construction	378	378	577	281	497	725	925	1897	940	769	729	1179
Interest Expense Short Term Debt	0	0	0	0	0	0	0	0	322	874	1238	1657
Plus												
Loans(LTD & STD)	288	90	94	99	145	173	218	232	9056	7213	4582	8700
Subsidies & Other Financial Sources	1	1	2	1	1	2	1	7	7	9	8	7
Income from Temp Cash Investments	375	732	773	705	1317	1142	757	279	22	3	3	5
Income Before Income Taxes	-1079	-313	-960	-315	420	-1552	-3741	-4054	3423	1553	1159	3742

TAXES PAID (Cash Basis)

State Income Tax	0	88	88	2463	879	879	0	613	613	2643	1290	1290
Municipal Income Tax	0	22	22	616	220	220	0	118	118	510	249	249
Amelioration Tax	0	4	4	123	44	44	0	0	0	0	0	0
Net Income	-1079	-427	-1074	-3517	-723	-2695	-3741	-4784	2692	-1601	-379	2203
Dividends	0	0	0	0	0	0	0	0	0	4613	0	0

NET CASH FLOW

Total Cash Inflow	5846	5627	5834	5292	6621	6400	5808	3202	12049	10654	8314	12736
Total Cash Outflow	6925	6054	6908	8809	7344	9095	9548	7987	9357	16868	8693	10533
Net Cash Inflow	-1079	-427	-1074	-3517	-723	-2695	-3741	-4784	2692	-6214	-379	2203

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INCOME STATEMENT

REVENUES (Cash - Accrual)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Electricity & Heating Sales	-1431	-2062	-2035	-548	551	287	-3342	-9046	-12391	-17724	-2322	-3064
Other Revenues	301	319	0	0	0	0	0	0	0	0	0	0
Total Revenues	-1130	-1743	-2035	-548	551	287	-3342	-9046	-12391	-17724	-2322	-3064

OPERATING EXPENSES (Cash - Accrual)

Fuel	1027	673	474	675	785	1992	1540	-1354	-1983	-2639	932	1921
Purchased Power	140	-400	-139	20	-244	-135	-295	-581	-807	-558	-1360	-558
Depreciation	-420	-423	-425	-428	-430	-433	-436	-438	-441	-443	-446	-448
Amortization of Exchange Rate Adjust.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Materials & Goods	770	760	732	829	690	681	531	90	37	-64	279	14
Services	0	0	0	0	0	0	0	0	0	0	0	0
Wages & Social Sec.	97	57	-468	272	-76	-198	464	-296	-1406	-600	0	1
Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0
VAT Loss	61	51	128	90	448	473	910	1646	2146	3153	415	802
Bank Fees	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Total Operating Expenses	1674	717	300	1457	1171	2379	2713	-935	-2455	-1151	-180	1730

INCOME BEFORE TAXES (Cash - Accrual)

Operating Income	-2804	-2460	-2335	-2005	-621	-2092	-6055	-8111	-9936	-16573	-2141	-4795
Less												
Interest Expense Long Term Debt	-101	-181	297	-191	-50	-361	-258	-303	961	-384	-436	-493
Principal Payments	44	45	46	81	81	81	81	81	81	81	81	81
Construction	378	378	577	281	497	725	925	1897	940	769	729	1179
Interest Expense Short Term Debt	0	0	0	0	0	0	0	0	0	0	0	0
Plus												
Loans	288	90	94	99	145	173	218	232	9056	7213	4582	8700
Subsidies & Other Financial Sources	0	0	0	0	0	0	0	0	0	0	0	0
Income from Temp Cash Investments	0	0	0	0	0	0	0	0	0	0	0	0
Capitalized Interest	0	0	0	0	0	0	0	0	0	0	0	0
Income Before Income Taxes	-2837	-2612	-3160	-2077	-1003	-2363	-6584	-9553	-2862	-9826	2068	3138

TAXES & DIVIDENDS (Cash - Accrual)

State Income Tax	-114	-26	-3114	1320	-264	973	-731	-118	-2541	1105	-249	260
Municipal Income Tax	0	0	0	0	0	0	0	0	0	0	0	0
Amelioration Tax	0	0	0	0	0	0	0	0	0	0	0	0
Extraordinary Adjustment (Loss)	-400	-900	-200	-900	-300	0	-10	0	-400	-500	-1100	0
Net Income	-2313	-1666	184	-2477	-410	-3297	-5814	-9385	140	-10361	3447	2898
Dividends	0	0	0	0	0	0	0	0	-4613	4613	0	-2119
Net Cash Inflow - Ret. Earnings+Loss	-2313	-1666	184	-2477	-410	-3297	-5814	-9385	4752	-14974	3447	5017

INCOME STATEMENT

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REVENUES

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Electricity & Heating Sales	6170	6403	6835	4891	4452	4630	8028	11479	15134	20917	5767	6747
Other Revenues	142	144	165	145	156	166	146	251	221	236	275	341
Total Revenues	6312	6546	7000	5037	4608	4796	8174	11730	15355	21153	6042	7088

OPERATING EXPENSES

Fuel	2333	2115	2204	1657	1510	1593	2855	3585	4372	5464	2186	1288
Purchased Power	560	770	600	314	376	249	502	583	809	560	1362	560
Depreciation	420	423	425	428	430	433	436	438	441	443	446	448
Amortization of Exchange Rate Adjust.	1	1	1	1	1	1	1	1	1	1	1	1
Exc. Rate Losses (Procure. &Trading)	10	20	30	20	30	40	30	50	60	70	30	20
Materials & Goods	104	135	167	163	158	150	192	164	233	358	10	283
Services	613	588	599	661	725	859	947	460	414	452	619	990
Wages & Social Sec.	590	619	1141	403	756	1274	612	824	2029	1140	548	657
Other Taxes	59	63	133	80	77	123	103	59	72	65	68	73
VAT Loss	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	1	1	1	1	1	1	1	2	2	2	2	2
Other	73	71	97	77	90	80	77	39	39	37	38	38
Total Operating Expenses	4765	4805	5398	3806	4155	4802	5755	6206	8472	8592	5310	4360

TAXABLE INCOME

Operating Income	1547	1741	1602	1231	453	-6	2419	5524	6883	12561	732	2728
Less												
Interest Expense Planned Debt	175	195	206	194	377	366	363	360	365	391	444	500
Interest Expense Model STD	0	0	0	0	0	0	0	0	322	874	1238	1657
Plus												
Subsidies & Other Financial Sources	1	1	2	1	1	2	1	7	7	9	8	7
Income from Temp Cash Investments	375	732	773	705	1317	1142	757	279	22	3	3	5
Capitalized Interest	0	0	0	0	0	0	0	0	0	0	0	0
Income Before Income Taxes	1748	2279	2171	1743	1393	771	2814	5450	6225	11309	-939	583

NET INCOME & RETAINED EARNINGS

State Income Tax	114	114	3202	1143	1143	-94	731	731	3154	1539	1539	1029
Municipal Income Tax	0	22	22	616	220	220	0	118	118	510	249	249
Amelioration Tax	0	4	4	123	44	44	0	0	0	0	0	0
Extraordinary Adjustment (Loss)	400	900	200	900	300	0	10	0	400	500	1100	0
Net Income	1234	1239	-1257	-1039	-314	601	2073	4600	2553	8760	-3826	-695
Dividends	0	0	0	0	0	0	0	0	4613	0	0	2119
Retained Earnings	1234	1239	0	0	0	601	2073	4600	0	8760	0	0
Loss	0	0	1257	1039	314	0	0	0	2060	0	3826	2814

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GENERAL STUDY INFORMATION

Study Title	NEK Monthly Model												
Case Name	Test 1												
Study Year	1996												
Present Worth Year	1996												
Present Worth Rate (US $)	10.00%												
Month		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Annual General Inflation Rate		180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%
Prime Interest Rate		34.00%	42.00%	49.00%	49.00%	108.00%	108.00%	108.00%	108.00%	108.00%	108.00%	108.00%	108.00%
Exchange Rate (Leva/US$)	67.00	73	74.59	77.94	81.55	119.53	143.10	180.14	191.79	224.60	225.00	220.00	220.00
Exchange Rate (Leva/DM)	51.00	49.01	50.40	52.66	55.10	80.76	96.69	121.72	129.59	151.76	152.03	148.65	148.65
Late Payment Int.(=1 if Use)	0	6.00	7.00	8.00	9.00	4.00	6.00	7.00	8.00				
Services (=1 if Use)	0	8.00	6.00	7.00	9.00	3.00	76.00	5.00	4.00	7.00			
State Income Tax Rate		40%	40%	40%	40%	40%	40%	36%	36%	36%	36%	36%	36%
Override State Tax Payment?		no	no	no	no	no	no	no	no	no	no	no	no
State Tax Override Amount		0	77	0	0	0	0	0	0	0	0	0	0
Municipal Tax Rate		10%	10%	10%	10%	10%	10%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%
Amelioration Tax Rate		2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Re-employment Tax (% of Wages)		7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Social Security Tax Rate (% of Wages)		42%	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%
Personal Income Tax Withhold		25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Tax Loss Carry Forward	0												
VAT Rate - Purchases		18%	18%	18%	18%	22%	22%	22%	22%	22%	22%	22%	22%
VAT Rate - Industrial		18%	18%	18%	18%	22%	22%	22%	22%	22%	22%	22%	22%
VAT Rate - Households		0%	0%	0%	0%	22%	22%	22%	22%	22%	22%	22%	22%
VAT Rate - Heating		18%	18%	18%	18%	22%	22%	22%	22%	22%	22%	22%	22%
VAT Rate - Electricity Exports		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Historical Data (Millions of Leva)													
Book Depreciation		420	420	420	420	420	420	420	420	420	420	420	420
Tax Depreciation		240	240	240	240	240	240	240	240	240	240	240	240
Deferred Taxes		0	0	0	0	0	0	0	0	0	0	0	0
Plant Average Life (Years)	18.00												
Exchange Rate Charge	100												
Ex Rt Chg Avg Life (Years)	7.00												
Extraordinary Adjustment (Loss)		400	900	200	900	300	0	10	0	400	500	1100	0
Exc. Rate Losses (Procure. &Trading)		10	20	30	20	30	40	30	50	60	70	30	20
% of Mat & Supplies to O&M	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Quarterly Dividends (% of net income)				0.0%			0.0%			50.0%			50.0%
Dividend Payment Date		20			20			20			20		

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STARTING BALANCE SHEET (Millions of Leva)

ASSETS	End of 1995	Growth Rate Above Inflation (%) or Million of Leva											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Gross Plant in Service	90788.04												
Accumulated Depreciation	15361.72												
Intangible Assets	89.472	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Financial Assets	231.147	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Deferred Costs	427.887	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cumulative Loss	6072.379												
Cash	3118.117												
Minimum Cash Position		100	100	1200	100	100	0	50	60	0	70	0	100
Accts Receivable, Sales	7187.204												
Accounts Receivable, Other	1060.487	50	60	70	80	76	0	50	60	0	70	0	50
Unbilled Revenues(% of Sales)	0	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Nuclear Fuel Prepayments	912.5												
Imported Coal Prepayments	0												
Local Coal Prepayments	0												
Gas & Oil Prepayments	0												
Mat. & Sup. Prepayments	1910.441												
Other Prepayments & Assets	0	10	0	0	6	0	0	0	5	0	0	0	0
Nuclear Fuel Inventory	0												
Imported Coal Inventory	0												
Local Coal Inventory	0												
Oil & Gas Inventory	0												
Materials and Goods Inventory	11031.88												
Other Asset B	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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STARTING BALANCE SHEET (Millions of Leva)

LIABILITIES	End of 1995	Growth Rate Above Inflation (%) or Million of Leva I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Preferred Stock	0			5									
Common Stock	101033.9				10								
Retained Earnings	0												
Reserves	3.806					1							
Other Fund	0					7							
Short Term Debt	0												
Commitments & Contigencies	0	0	0	0	0	0	0	0	0	0	0	0	0
Nuclear Fuel	0												
Imported Coal													
Local Coal													
Oil & Gas													
Purchased Power													
Materials & Goods	11672.23												
For Participations	1.248	1	0	4	0	-2	0	0	0	0	0	0	0
To Employees	332.491												
Other Taxes	0												
Deferred Income Taxes	0												
Income Taxes Payable	5650.245												
For Social Security	202.097												
Other Liabilities	786.298												
Property Grants		0	0	0	0	0	0	0	0	0	0	0	0
Cash Grants	3343.603	0	0	0	0	0	0	0	0	0	0	0	0
Deferred Income	74.727	0	0	0	0	0	0	0	0	0	0	0	0

CASH FLOW

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	CASH INFLOW	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	From Industrials		3040	2988	3187	2934	3907	3633	3542	1781	1912	2135	2268	2413
2	Connection Deposits		29	26	26	28	26	23	22	4	4	5	5	6
3	From Households		1272	1211	1261	1077	1088	1222	1071	587	673	769	842	939
4	Heating Sales		141	142	117	93	27	62	73	65	66	82	87	83
5	Electricity Exports		286	0	234	239	0	0	0	0	92	207	248	248
6	Late Payment Interest		34	30	40	25	35	41	21	23	25	30	33	52
7	Sold Assets		44	47	49	54	54	56	57	3	2	3	4	6
8	Financial Sources													
a	Interest Earned		375	732	773	705	1317	1142	757	279	22	3	3	5
b	Other Investments		0	0	0	0	0	0	0					
c	Financial Investments		0	0	0	0	0	0	0					
d	Other Financial		1	1	2	1	1	2	1	7	7	9	8	7
9	Services													
a	Total		19	21	23	22	24	25	24	211	180	190	224	267
10	VAT(0 Because Included Above)		301	319	0	0	0	0	0	0	0	0	0	0
11	Other		16	20	26	17	17	22	23	10	10	8	9	10
12	Loans(Long Term Debt)		288	90	94	99	145	173	218	232	272	939	933	932
	Short Term Debt		0	0	0	0	0	0	0	0	8785	6273	3649	7768
	Other Financings		0	0	5	10	8	0	0	0	0	0	0	0
	Cash Grants		0	0	0	0	0	0	0	0	0	0	0	0
13	Subsidies		0	0	0	0	0	0	0					
14	Total Cash Inflow	0	5846	5627	5839	5302	6629	6400	5808	3202	12049	10654	8314	12736

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CASH FLOW

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		CASH OUTFLOW	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
30		Nuclear Fuel		1450	925	944	964	984	1847	1847	1047	1069	1090	1113	1135
31		Imported Coal		628	641	654	378	382	703	703	399	408	701	720	734
32		Local Coal		980	926	778	821	760	747	1557	606	731	847	930	976
33		Oil & Gas		301	295	302	169	169	289	288	179	181	187	355	364
34		Imported Electricity		474	162	166	106	0	0	0	0	0	0	0	0
35		Private Power		226	208	295	228	132	114	208	2	2	2	2	2
36		Materials & Goods		874	895	899	992	848	831	723	254	270	294	289	297
37		Services		613	588	599	661	725	859	947	460	414	452	619	990
38		Wages & Social Sec.		687	676	673	676	680	1075	1076	528	623	540	548	658
39		Construction		378	378	577	281	497	725	925	1897	940	769	729	1179
40		Financial Uses													
	a	Interest		73	15	503	3	327	5	105	57	1648	881	1245	1664
	b	Principal		44	45	46	81	81	81	81	81	81	81	81	81
	c	State Income Tax		0	88	88	2463	879	879	0	613	613	2643	1290	1290
	d	Municipal Income Tax		0	22	22	616	220	220	0	118	118	510	249	249
	e	Amelioration Tax		0	4	4	123	44	44	0	0	0	0	0	0
	f	Re-employment Tax		34	33	47	47	48	75	75	37	44	38	38	46
	g	Property Tax		1	3	40	1	0	12	0	3	9	4	9	4
	h	Other Taxes		25	27	45	32	29	36	27	19	19	23	21	23
	i	Bank Fees		1	1	1	1	1	1	1	2	2	2	2	2
41		VAT to Vendors(0, incl above)		0	0	0	0	0	0	0	0	0	0	0	0
42		VAT to State		61	51	128	90	448	473	910	1646	2146	3153	415	802
43		Other													
	a	Penalties and Charges		5	5	5	5	5	5	5					
	b	Business Trips		2	2	2	2	2	2	2					
	c	Other		66	64	90	70	83	73	71	39	39	37	38	38
		Dividends		0	0	0	0	0	0	0	0	0	4613	0	0
44		Total Cash Outflow	0	6925	6054	6908	8809	7344	9095	9548	7987	9357	16868	8693	10533
		Net Cash Outflow	0	1079	427	1069	3507	715	2695	3741	4784	-2692	6214	379	-2203

	Net Cash Position	3118.117	2039	1612	543	-2963	-3678	-6374	-10115	-14899	-12207	-18421	-18800	-16597

RATES & REVENUES

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ELECTRICITY & HEATING SALES

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Industrials (GWh)	1797	1791	1974	1642	1327	1377	1908	2031	2252	2410	2879	3476
Households (GWh)	1369	1505	1543	1181	812	639	0	0	0	0	0	0
Heating (1000 Gcal)	192	158	400	182	45	64	122	144	147	129	250	250
Electricity Exports (GWh)	128	120	115	0	0	0	11	6	63	134	214	284

ELECTRICITY & HEATING RATES (Excluding VAT)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Industrials (Leva/kWh)	1.809	1.808	1.815	1.682	2.049	2.271	4.088	5.508	6.314	8.134	1.869	1.810
Households (Leva/kWh)	1.809	1.808	1.815	1.682	2.049	2.271	4.088	5.508	6.314	8.134	1.869	1.810
Heating (Leva/Gcal)	799.7	1000.0	450.2	792.8	1518.2	628.7	1334.5	1739.8	1907.5	2212.4	686.6	686.6
Electricity Exports (Leva/kWh)	2.259	2.360	2.369	0.000	0.000	0.000	6.112	7.213	6.912	7.668	1.000	1.000

ELECTRICITY & HEATING REVENUES (Millions of Leva)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Industrials	3251	3239	3583	2761	2720	3127	7801	11188	14282	19604	5381	6292
Households	2476	2721	2800	1986	1663	1451	0	0	0	0	0	0
Heating	154	158	180	144	69	53	163	250	280	285	172	172
Electricity Exports	289	285	272	0	0	0	64	41	572	1028	214	284
Subtotal	6170	6403	6835	4891	4452	4630	8028	11479	15134	20917	5767	6747

OTHER REVENUES (Millions of Leva)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Connection Deposits	29	26	26	28	26	23	22	4	4	5	5	6
Late Payment Interest	34	30	40	25	35	41	21	23	25	30	33	52
Sold Assets	44	47	49	54	54	56	57	3	2	3	4	6
Services	19	21	23	22	24	25	24	211	180	190	224	267
Other	16	20	26	17	17	22	23	10	10	8	9	10
Total Other Revenues	142	144	165	145	156	166	146	251	221	236	275	341

TOTAL REVENUES (Millions of Leva)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Total	6312	6546	7000	5037	4608	4796	8174	11730	15355	21153	6042	7088

CHANGE TO ACCOUNTS RECEIVABLE (Millions of Leva)

Cash Inflow	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
From Industrials (Excl VAT)	2576	2532	2701	2486	3203	2978	2903	1460	1567	1750	1859	1978
From Households (Excl VAT)	1272	1211	1261	1077	876	1002	878	481	552	630	690	770
From Heating Sales (Excl VAT)	120	120	99	79	22	50	60	53	54	67	71	68
From Electricity Exports (Excl VAT)	286	0	234	239	0	0	0	0	92	207	248	248
From late Payment Interest	34	30	40	25	35	41	21	23	25	30	33	52
From Services	19	21	23	22	24	25	24	211	180	190	224	267
Subtotal Cash Inflow	4307	3915	4359	3928	4159	4096	3885	2228	2470	2875	3125	3383
Subtotal Revenue Minus Cash	1864	2488	2475	963	292	533	4143	9250	12664	18042	2641	3365

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OPERATION & MAINTENANCE EXPENSES (Millions of Leva)

	Prior Dec	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Nuclear Fuel		546	495	516	388	353	373	668	839	1023	1279	512	301
Imported Coal		324	294	306	230	210	221	397	498	608	759	304	179
Local Coal		1262	1144	1192	896	817	862	1544	1940	2365	2956	1183	697
Oil & Gas		201	182	190	143	130	137	246	308	376	470	188	111
Total Fuel	0	2333	2115	2204	1657	1510	1593	2855	3585	4372	5464	2186	1288
Imported Electricity		108	413	255	0	42	0	0	12	63	1	408	476
Private Power		452	357	345	314	334	249	502	572	746	559	954	84
Total Purchased Power	0	560	770	600	314	376	249	502	583	809	560	1362	560
Materials & Goods (w/o VAT)		104	135	167	163	158	150	192	164	233	358	10	283
Services	0	613	588	599	661	725	859	947	460	414	452	619	990
Wages & Social Sec.		590	619	1141	403	756	1274	612	824	2029	1140	548	657
Re-employment Tax	0	34	33	47	47	48	75	75	37	44	38	38	46
Property Tax	0	1	3	40	1	0	12	0	3	9	4	9	4
Other Taxes	0	25	27	45	32	29	36	27	19	19	23	21	23
Total Other Taxes	0	59	63	133	80	77	123	103	59	72	65	68	73
Bank Fees	0	1	1	1	1	1	1	1	2	2	2	2	2
Other	0	73	71	97	77	90	80	77	39	39	37	38	38

DELIVERIES (Millions of Leva)

	Prior Dec	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Nuclear Fuel	0	0	0	0	0	0	1234	0	0	0	7450	0	0
Imported Coal	0	628	641	654	378	382	703	703	399	408	701	720	734
Local Coal	0	980	926	778	821	760	747	1557	606	731	847	930	976
Oil & Gas	0	301	295	302	169	169	289	288	179	181	187	355	364
Total Fuel Deliveries	0	1910	1863	1734	1368	1312	2973	2548	1184	1320	9185	2005	2074
Materials and Supplies(O&M)	525	537	539	595	509	499	434	152	162	176	173	178	107

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OPERATION & MAINTENANCE CASH OUTFLOW (Millions of Leva)

	Prior Dec	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Nuclear Fuel	0	1450	925	944	964	984	1847	1847	1047	1069	1090	1113	1135
Imported Coal	0	628	641	654	378	382	703	703	399	408	701	720	734
Local Coal	0	980	926	778	821	760	747	1557	606	731	847	930	976
Oil & Gas	0	301	295	302	169	169	289	288	179	181	187	355	364
Total Fuel	0	3360	2788	2678	2332	2295	3585	4394	2231	2389	2825	3118	3209
Imported Electricity	0	474	162	166	106	0	0	0	0	0	0	0	0
Private Power	0	226	208	295	228	132	114	208	2	2	2	2	2
Total Purchased Power	0	700	370	461	334	132	114	208	2	2	2	2	2
Materials & Goods	0	525	537	539	595	509	499	434	152	162	176	173	178
Services	0	613	588	599	661	725	859	947	460	414	452	619	990
Wages & Social Sec.	0	687	676	673	676	680	1075	1076	528	623	540	548	658
Re-employment Tax	0	34	33	47	47	48	75	75	37	44	38	38	46
Property Tax	0	1	3	40	1	0	12	0	3	9	4	9	4
Other Taxes	0	25	27	45	32	29	36	27	19	19	23	21	23
VAT to Vendors(0, incl above)	0	0	0	0	0	0	0	0	0	0	0	0	0
VAT to State	0	61	51	128	90	448	473	910	1646	2146	3153	415	802
Total Other Taxes	0	121	114	260	170	524	596	1013	1705	2218	3218	484	875
Bank Fees	0	1	1	1	1	1	1	1	2	2	2	2	2
Other	0	73	71	97	77	90	80	77	39	39	37	38	38

SELECTED CHANGES TO CURRENT LIABILITIES (Millions of Leva)

	Prior Dec	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Services	0	0	0	0	0	0	0	0	0	0	0	0	0
Wages & Social Security	0	-97	-57	468	-272	76	198	-464	296	1406	600	0	-1
Total Other Taxes	0	-61	-51	-128	-90	-448	-473	-910	-1646	-2146	-3153	-415	-802
Bank Fees	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0

PLANNED CONSTRUCTION

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PLANNED CONSTRUCTION (US$ Sources) - Project Financing

	through 1995	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Construction Expenditures($)	21.468	0.71	0.69	1.08	0.81	0.39	2.24	2.63	0.44	0.23	0.05	1.21	1.21
US$ Annual Inflation Rate		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Escalated Const. Exp. (US$)		0.71	0.69	1.08	0.81	0.39	2.24	2.63	0.44	0.23	0.05	1.21	1.21
Exchange Rate (Leva/US$)	67.00	72.53	74.59	77.94	81.55	119.53	143.10	180.14	191.79	224.60	225.00	220.00	220.00
Esc. Const Exp (Mil of Leva)	1438.356	51.72	51.69	83.87	66.13	46.50	319.83	473.95	84.58	50.76	11.70	266.20	266.20
Interest Rate During Const.		7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%
Interest		0.30	0.62	1.04	1.51	1.86	3.01	5.49	7.23	7.66	7.85	8.72	10.38
Capitalize Interest? 1=Yes	0												
Total Construction Expenditure		52	52	84	66	46	320	474	85	51	12	266	266
Closes to Plant		0	0	0	0	0	0	0	0	0	0	0	0
Construction Work in Progress		73	125	209	275	321	641	1115	1200	1250	1262	1528	1795
Average Book Life (Years)	22.5												
New Book Depreciation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tax Depr/Book Depr (%)	92.0%												
New Tax Depreciation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difference		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tax Rate		40%	40%	40%	40%	40%	40%	36%	36%	36%	36%	36%	36%
New Plant Deferred Taxes		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PLANNED CONSTRUCTION (Millions of Leva) - General Financing

	through 1995	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Construction Expenditures	5481	327	327	493	215	450	405	451	1812	889	758	463	913
Annual Inflation Rate (%)		180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%	180.00%
Inflate Costs? 1=Yes	0												
Escalated Const. Exp.		327	327	493	215	450	405	451	1812	889	758	463	913
Interest Rate Above Prime		10.00%	5.00%	-5.00%	5.00%	-5.00%	-5.00%	-5.00%	-5.00%	-5.00%	-5.00%	-5.00%	5.00%
Interest Rate During Const.		44.00%	47.00%	44.00%	44.00%	103.00%	103.00%	103.00%	103.00%	103.00%	103.00%	103.00%	113.00%
Interest		194	194	171	159	342	320	299	337	394	406	400	439
Capitalize Interest? 1=Yes	0												
Total Construction Expenditure		327	327	493	215	450	405	451	1812	889	758	463	913
Closes to Plant		684	684	684	684	684	684	684	684	684	684	684	684
Construction Work in Progress		5124	4767	4576	4107	3873	3594	3361	4489	4695	4768	4547	4776
Average Book Life (Years)	22.5												
New Book Depreciation		0	2.5	5.1	7.6	10.1	12.7	15.2	17.7	20.3	22.8	25.3	27.9
Tax Depr/Book Depr (%)	92.0%												
New Tax Depreciation		0.0	2.3	4.7	7.0	9.3	11.7	14.0	16.3	18.6	21.0	23.3	25.6
Difference		0.0	-0.2	-0.4	-0.6	-0.8	-1.0	-1.2	-1.4	-1.6	-1.8	-2.0	-2.2
Tax Rate		40%	40%	40%	40%	40%	40%	36%	36%	36%	36%	36%	36%
New Plant Deferred Taxes		0.0	-0.1	-0.2	-0.2	-0.3	-0.4	-0.4	-0.5	-0.6	-0.7	-0.7	-0.8

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SHORT TERM DEBT & TEMP CASH INVESTMENT

		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Prime Interest Rate		34.00%	42.00%	49.00%	49.00%	108.00%	108.00%	108.00%	108.00%	108.00%	108.00%	108.00%	108.00%
TCI Rate Above Prime		8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
Annual Rate TCI		42.00%	50.00%	57.00%	57.00%	116.00%	116.00%	116.00%	116.00%	116.00%	116.00%	116.00%	116.00%
Change to Temporary Cash		15195	-1472	-1119	-1762	-671	-2958	-5005	-4873	-454	70	-70	100
Temporary Cash Balance	3118	18313	16841	15722	13961	13289	10332	5326	454	0	70	0	100
Temporary Cash Interest Earned		375	732	773	705	1317	1142	757	279	22	3	3	5
STD Rate Above Prime		-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%	-20.00%
Annual Rate Short Term Debt		14.00%	22.00%	29.00%	29.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%
Change in Model Short Term Debt		0	0	0	0	0	0	0	0	8,785	6,273	3,649	7,768
Model Short Term Debt Bal.	0	0	0	0	0	0	0	0	0	8785	15058	18707	26475
Model Short Term Debt Interest		0	0	0	0	0	0	0	0	322	874	1238	1657

TOTAL PLANNED DEBT (Millions of Leva)

	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Total LTD Issues	4608	288	90	94	99	145	173	218	232	272	939	933	932
Total LTD Retirements		44	45	46	81	81	81	81	81	81	81	81	81
Total LTD Interest Accrued		85	101	114	114	223	223	228	225	230	256	308	365
Total LTD Interest Paid		42	15	258	3	196	5	105	57	765	7	7	7
Total STD Issues	2999	0	0	0	0	0	0	0	0	0	0	0	0
Total STD Retirements		380	396	305	230	87	159	0	0	0	0	0	0
Total STD Interest Accrued		90	94	92	80	154	143	135	135	135	135	135	135
Total STD Interest Paid		31	0	245	0	131	0	0	0	561	0	0	0

CREDIT & LONG TERM DEBT - BULGARIAN SOURCES (Millions of Leva)

Reconstruction Fund-LTD	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	no	0	0	0	0	0	0	0	0	0	667	667	666
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		20	20	20	80.606	80.606	80.606	80.606	80.606	80.606	80.606	80.606	80.606
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance	2248	2228	2208	2188	2107.394	2026.788	1946.182	1865.576	1784.97	1704.364	2290.758	2877.152	3462.546
Interest Rate Above Prime		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Interest Rate		36.00%	44.00%	51.00%	51.00%	110.00%	110.00%	110.00%	110.00%	110.00%	110.00%	110.00%	110.00%
Interest Accrued		67	81	93	91	189	182	175	167	160	184	237	291
Interest Not Paid	15	45	127	0	91	127	309	484	651	105	289	526	818
Interest Payment Date		10	0	31	0	10	0	0	0	10	0	0	0
Interest Payment		37	0	220	0	154	0	0	0	705	0	0	0
Short Term Loans	**Prior**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		380	396	305	230	87	159	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance	2999	2619	2223	1918	1688	1601	1442	1442	1442	1442	1442	1442	1442
Interest Rate Above Prime		4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%
Interest Rate		38.50%	46.50%	53.50%	53.50%	112.50%	112.50%	112.50%	112.50%	112.50%	112.50%	112.50%	112.50%
Interest Accrued		90	94	92	80	154	143	135	135	135	135	135	135
Interest Not Paid	0	59	153	0	80	103	246	381	516	90	225	361	496
Interest Payment Date		10	0	31	0	10	0	0	0	10	0	0	0
Interest Payment		31	0	245	0	131	0	0	0	561	0	0	0

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CREDIT & LONG TERM DEBT - BULGARIAN SOURCES (Millions of Leva) (continued)

Issue E	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate Above Prime		36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%
Interest Rate		70.00%	78.00%	85.00%	85.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%
Interest Accrued		0	0	0	0	0	0	0	0	0	0	0	0
Interest Not Paid	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Payment Date		10	0	31	0	10	0	0	0	10	0	0	0
Interest Payment		0	0	0	0	0	0	0	0	0	0	0	0
Issue F	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate Above Prime		36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%
Interest Rate		70.00%	78.00%	85.00%	85.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%
Interest Accrued		0	0	0	0	0	0	0	0	0	0	0	0
Interest Not Paid	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Payment Date		10	0	31	0	10	0	0	0	10	0	0	0
Interest Payment		0	0	0	0	0	0	0	0	0	0	0	0
Issue G	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate Above Prime		36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%
Interest Rate		70.00%	78.00%	85.00%	85.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%	144.00%
Interest Accrued		0	0	0	0	0	0	0	0	0	0	0	0
Interest Not Paid	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Payment Date		10	0	31	0	10	0	0	0	10	0	0	0
Interest Payment		0	0	0	0	0	0	0	0	0	0	0	0
Total Bulgarian LTD Issues	2248	0	0	0	0	0	0	0	0	0	667	667	666
Total Bulgarian LTD Retirements		20	20	20	81	81	81	81	81	81	81	81	81
Total Bulgarian Sources LTD Int Accrued		67	81	93	91	189	182	175	167	160	184	237	291
Total Bulgarian Sources LTD Int Paid		37	0	220	0	154	0	0	0	705	0	0	0
Total Bulgarian STD Issues	2999	0	0	0	0	0	0	0	0	0	0	0	0
Total Bulgarian STD Retirements		380	396	305	230	87	159	0	0	0	0	0	0
Total Bulgarian Sources STD Int Accrued		90	94	92	80	154	143	135	135	135	135	135	135
Total Bulgarian Sources STD Int Paid		31	0	245	0	131	0	0	0	561	0	0	0

CREDIT & LONG TERM DEBT - US$ SOURCES (Millions of US$)

Issue H	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	no	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance	34.225	35.435	36.645	37.855	39.065	40.275	41.485	42.695	43.905	45.115	46.325	47.535	48.745
Interest Rate		7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%
Interest Accrued		0.22	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.30
Interest Not Paid	0.00	0.15	0.22	0.00	0.24	0.17	0.42	0.14	0.14	0.19	0.47	0.77	1.07
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.07	0.16	0.45	0.00	0.32	0.00	0.55	0.27	0.23	0.00	0.00	0.00
Issue I	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	no	2.757	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		2.757	2.757	2.757	2.757	2.757	2.757	2.757	2.757	2.757	2.757	2.757	2.757
Interest Rate		14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%
Interest Accrued		0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Interest Not Paid	0.00	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Interest Payment Date		15	15	15	15	15	15	15	15	15	15	15	15
Interest Payment		0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Issue J	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	no	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0.333	0.333	0.334	0	0	0	0	0	0	0	0	0
Retirement Date		27	27	27	15	15	15	15	15	15	15	15	15
Month End Balance	1	0.667	0.334	0	0	0	0	0	0	0	0	0	0
Interest Rate		10.50%	10.50%	10.50%	10.50%	10.50%	10.50%	10.50%	10.50%	10.50%	10.50%	10.50%	10.50%
Interest Accrued		0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		28	28	28	0	10	0	15	15	10	0	0	0
Interest Payment		0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Issue K	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate		25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%
Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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CREDIT & LONG TERM DEBT - US$ SOURCES (Millions of US$) (continued)

Issue L	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15

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Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate		40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%
Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total US$ LTD Issues	35.225	3.97	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
Total US$ LTD Retirements		0.33	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total US$ Sources LTD Interest Accrued		0.24	0.26	0.27	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.33
Total US$ Sources LTD Interest Paid		0.08	0.20	0.48	0.03	0.35	0.03	0.58	0.30	0.27	0.03	0.03	0.03
Total US$ STD Issues	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total US$ STD Retirements		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total US$ Sources STD Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total US$ Sources STD Interest Paid		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exchange Rate (Leva/US$)	67.00	72.53	74.59	77.94	81.55	119.53	143.10	180.14	191.79	224.60	225.00	220.00	220.00
Total US$ LTD Iss.(Mil of Lev)	2360.075	287.7	90.3	94.3	98.7	144.6	173.1	218.0	232.1	271.8	272.3	266.2	266.2
Total US$ LTD Ret.(Millions of Leva)		24.2	24.8	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total US$ LTD Int. Accrued (Mil of Leva)		17.6	19.6	20.9	22.2	33.5	41.2	53.2	58.1	69.7	71.6	71.6	73.3
Total US$ LTD Int. Paid (Mil of Leva)		5.6	14.7	37.7	2.7	41.9	4.7	104.8	57.3	59.7	7.1	7.2	7.0
Total US$ STD Iss.(Mil of Lev)	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total US$ STD Ret.(Millions of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total US$ STD Int. Accrued (Mil of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total US$ STD Int. Paid (Mil of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CREDIT & LONG TERM DEBT - DM SOURCES (Millions of DM)

Issue M	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate		41.00%	41.00%	41.00%	41.00%	41.00%	41.00%	41.00%	41.00%	41.00%	41.00%	41.00%	41.00%
Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Issue N	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate		37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%
Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CREDIT & LONG TERM DEBT - DM SOURCES (Millions of DM) (continued)

Issue O	Prior	I	II	III	IV	Page 4 V	VI	VII	VIII	IX	X	XI	XII

Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate		35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%
Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Issue P	Prior	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Amount Issued (STD?)	yes	0	0	0	0	0	0	0	0	0	0	0	0
Issue Date		15	15	15	15	15	15	15	15	15	15	15	15
Amount Retired		0	0	0	0	0	0	0	0	0	0	0	0
Retirement Date		15	15	15	15	15	15	15	15	15	15	15	15
Month End Balance		0	0	0	0	0	0	0	0	0	0	0	0
Interest Rate		41.50%	41.50%	41.50%	41.50%	41.50%	41.50%	41.50%	41.50%	41.50%	41.50%	41.50%	41.50%
Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Not Paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Payment Date		10	1	31	0	10	0	15	15	10	0	0	0
Interest Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM LTD Issues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM LTD Retirements		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM Sources LTD Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM Sources LTD Interest Paid		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM STD Issues	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM STD Retirements		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM Sources STD Interest Accrued		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total DM Sources STD Interest Paid		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exchange Rate (Leva/DM)	51.00	49.01	50.40	52.66	55.10	80.76	96.69	121.72	129.59	151.76	152.03	148.65	148.65
Total DM LTD Iss(Mil of Leva)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM LTD Ret.(Millions of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM LTD Int. Accrued (Mil of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM LTD Int. Paid (Mil of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM STD Iss(Mil of Leva)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM STD Ret.(Millions of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM STD Int. Accrued (Mil of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM STD Int. Paid (Mil of Leva)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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INCOME STATEMENT VARIANCE

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	January			February YTD			March YTD			April YTD		
REVENUES	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan
Electricity & Heating Sales	6170	6170	0	12573	3000	-9573	19407	3000	-16407	24299	3000	-21299
Other Revenues	142	196	54	286	20	-266	451	20	-431	596	20	-576
Total Revenues	6312	6366	54	12859	3020	-9839	19858	3020	-16838	24895	3020	-21875
OPERATING EXPENSES												
Fuel	2333	2333	0	4447	1400	-3047	6651	1400	-5251	8308	1400	-6908
Purchased Power	560	560	0	1330	100	-1230	1930	100	-1830	2244	100	-2144
Depreciation	420	443	23	843	400	-443	1269	400	-869	1696	400	-1296
Amortization of Exchange Rate Adjust.	1	0	-1	2	2	0	4	2	-2	5	2	-3
Materials & Goods	104	104	0	239	190	-49	406	190	-216	569	190	-379
Services	613	284	-329	1201	200	-1001	1800	200	-1600	2461	200	-2261
Wages & Social Sec.	590	590	0	1209	400	-809	2351	400	-1951	2754	400	-2354
Other Taxes	59	0	-59	122	30	-92	255	30	-225	335	30	-305
VAT Loss	0	125	125	0	2	2	0	2	2	0	2	2
Bank Fees	1	0	-1	2	2	0	3	2	-1	4	2	-2
Other	73	229	155	144	25	-119	241	25	-216	318	25	-293
Total Operating Expenses	4765	4668	-97	9570	2751	-6819	14968	2751	-12217	18773	2751	-16022
TAXABLE INCOME												
Operating Income	1547	1698	151	3288	269	-3019	4890	269	-4621	6121	269	-5852
Less												
Interest Expense Planned Debt	175	167	-8	370	200	-170	576	200	-376	770	200	-570
Interest Expense Model STD	0	0	0	0	10	10	0	10	10	0	10	10
Plus												
Subsidies & Other Financial Sources	1	0	-1	2	10	8	3	10	7	4	10	6
Income from Temp Cash Investments	271	0	-271	744	20	-724	1197	20	-1177	1515	20	-1495
Capitalized Interest	0	0	0	0	2	2	0	2	2	0	2	2
Income Before Income Taxes	1644	1531	-113	3664	91	-3573	5514	91	-5423	6871	91	-6780
NET INCOME & RETAINED EARNINGS												
State Income Tax	0	0	0	0	2	2	2422	2	-2420	2422	2	-2420
Municipal Income Tax	182	0	-182	402	2	-400	606	2	-604	759	2	-757
Amelioration Tax	36	0	-36	80	2	-78	121	2	-119	152	2	-150
Extraordinary Adjustment (Loss)	400	400	0	1300	400	-900	1500	400	-1100	2400	400	-2000
Net Income	1025	1131	106	1881	-315	-2196	866	-315	-1181	1137	-315	-1452
Dividends	0	0	0	0	1	1	0	2	2	0	3	3
Retained Earnings	1025	1131	106	1881	0	-1881	1881	0	-1881	2153	0	-2153
Loss	0	0	0	0	316	316	1015	317	-698	1015	318	-697

INCOME STATEMENT VARIANCE

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	May YTD			June YTD			July YTD			August YTD		
REVENUES	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan
Electricity & Heating Sales	28750	3000	-25750	33380	3000	-30380	41408	3000	-38408	52887	3000	-49887
Other Revenues	752	20	-732	918	20	-898	1065	20	-1045	1316	20	-1296
Total Revenues	29502	3020	-26482	34298	3020	-31278	42473	3020	-39453	54202	3020	-51182
OPERATING EXPENSES												
Fuel	9818	1400	-8418	11411	1400	-10011	14266	1400	-12866	17851	1400	-16451
Purchased Power	2620	100	-2520	2869	100	-2769	3372	100	-3272	3955	100	-3855
Depreciation	2127	400	-1727	2560	400	-2160	2995	400	-2595	3433	400	-3033
Amortization of Exchange Rate Adjust.	6	2	-4	7	2	-5	8	2	-6	10	2	-8
Materials & Goods	727	190	-537	877	190	-687	1069	190	-879	1233	190	-1043
Services	3186	200	-2986	4046	200	-3846	4993	200	-4793	5453	200	-5253
Wages & Social Sec.	3510	400	-3110	4783	400	-4383	5395	400	-4995	6219	400	-5819
Other Taxes	412	30	-382	534	30	-504	637	30	-607	696	30	-666
VAT Loss	0	2	2	0	2	2	0	2	2	0	2	2
Bank Fees	4	2	-2	5	2	-3	6	2	-4	8	2	-6
Other	408	25	-383	488	25	-463	565	25	-540	604	25	-579
Total Operating Expenses	22928	2751	-20177	27731	2751	-24980	33486	2751	-30735	39692	2751	-36941
TAXABLE INCOME												
Operating Income	6574	269	-6305	6568	269	-6299	8987	269	-8718	14510	269	-14241
Less												
Interest Expense Planned Debt	1147	200	-947	1513	200	-1313	1876	200	-1676	2236	200	-2036
Interest Expense Model STD	0	10	10	15	10	-5	305	10	-295	1079	10	-1069
Plus												
Subsidies & Other Financial Sources	5	10	5	6	10	4	7	10	3	14	10	-4
Income from Temp Cash Investments	1901	20	-1881	2060	20	-2040	2062	20	-2042	2067	20	-2047
Capitalized Interest	0	2	2	0	2	2	0	2	2	0	2	2
Income Before Income Taxes	7333	91	-7242	7106	91	-7015	8875	91	-8784	13277	91	-13186
NET INCOME & RETAINED EARNINGS												
State Income Tax	2422	2	-2420	3294	2	-3292	3294	2	-3292	3294	2	-3292
Municipal Income Tax	823	2	-821	823	2	-821	942	2	-940	1228	2	-1226
Amelioration Tax	165	2	-163	165	2	-163	165	2	-163	165	2	-163
Extraordinary Adjustment (Loss)	2700	400	-2300	2700	400	-2300	2710	400	-2310	2710	400	-2310
Net Income	1222	-315	-1537	124	-315	-439	1764	-315	-2079	5881	-315	-6196
Dividends	0	4	4	0	5	5	0	6	6	0	7	7
Retained Earnings	2238	0	-2238	2238	0	-2238	3878	0	-3878	7994	0	-7994
Loss	1015	319	-696	2114	320	-1794	2114	321	-1793	2114	322	-1792

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INCOME STATEMENT VARIANCE

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	September YTD			October YTD			November YTD			December YTD		
REVENUES	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan
Electricity & Heating Sales	68020	3000	-65020	88937	3000	-85937	94703	3000	-91703	101451	3000	-98451
Other Revenues	1537	20	-1517	1773	20	-1753	2048	20	-2028	2389	20	-2369
Total Revenues	69557	3020	-66537	90710	3020	-87690	96751	3020	-93731	103840	3020	-100820
OPERATING EXPENSES												
Fuel	22223	1400	-20823	27687	1400	-26287	29873	1400	-28473	31161	1400	-29761
Purchased Power	4764	100	-4664	5324	100	-5224	6685	100	-6585	7245	100	-7145
Depreciation	3874	400	-3474	4317	400	-3917	4763	400	-4363	5211	400	-4811
Amortization of Exchange Rate Adjust.	11	2	-9	12	2	-10	13	2	-11	14	2	-12
Materials & Goods	1467	190	-1277	1825	190	-1635	1835	190	-1645	2118	190	-1928
Services	5867	200	-5667	6319	200	-6119	6938	200	-6738	7928	200	-7728
Wages & Social Sec.	8248	400	-7848	9388	400	-8988	9936	400	-9536	10593	400	-10193
Other Taxes	768	30	-738	832	30	-802	901	30	-871	974	30	-944
VAT Loss	0	2	2	0	2	2	0	2	2	0	2	2
Bank Fees	10	2	-8	12	2	-10	14	2	-12	16	2	-14
Other	643	25	-618	680	25	-655	718	25	-693	756	25	-731
Total Operating Expenses	48164	2751	-45413	56755	2751	-54004	62065	2751	-59314	66426	2751	-63675
TAXABLE INCOME												
Operating Income	21393	269	-21124	33954	269	-33685	34686	269	-34417	37414	269	-37145
Less												
Interest Expense Planned Debt	2601	200	-2401	2960	200	-2760	3312	200	-3112	3659	200	-3459
Interest Expense Model STD	2402	10	-2392	4502	10	-4492	7256	10	-7246	10507	10	-10497
Plus												
Subsidies & Other Financial Sources	21	10	-11	30	10	-20	38	10	-28	45	10	-35
Income from Temp Cash Investments	2070	20	-2050	2074	20	-2054	2077	20	-2057	2082	20	-2062
Capitalized Interest	0	2	2	0	2	2	0	2	2	0	2	2
Income Before Income Taxes	18481	91	-18390	28596	91	-28505	26233	91	-26142	25376	91	-25285
NET INCOME & RETAINED EARNINGS												
State Income Tax	7351	2	-7349	7351	2	-7349	7351	2	-7349	10867	2	-10865
Municipal Income Tax	1556	2	-1554	2191	2	-2189	2191	2	-2189	2191	2	-2189
Amelioration Tax	165	2	-163	165	2	-163	165	2	-163	165	2	-163
Extraordinary Adjustment (Loss)	3110	400	-2710	3610	400	-3210	4710	400	-4310	4710	400	-4310
Net Income	6299	-315	-6614	15278	-315	-15593	11816	-315	-12131	7443	-315	-7758
Dividends	3088	8	-3080	3088	9	-3079	3088	10	-3078	3660	11	-3649
Retained Earnings	7994	0	-7994	16973	0	-16973	16973	0	-16973	16973	0	-16973
Loss	4783	323	-4460	4783	324	-4459	8245	325	-7920	13190	326	-12864

BALANCE SHEET VARIANCE

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ASSETS (Millions of Leva)	3 Months Ending March 31			6 Months Ending June 30			9 Months Ending September 30			Year Ending December 31		
Property, Plant and Equipment	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan
Plant in Service	92840	84637	-8203	94892		-94892	96944		-96944	98996		-98996
Less Acc. Depreciation	16630	11824	-4806	17922		-17922	19236		-19236	20573		-20573
Plant in Service,net	76210	72813	-3397	76970	0	-76970	77708	0	-77708	78423	0	-78423
Constr. Work in Progress	6201	24097	17896	5653		-5653	7362		-7362	7988		-7988
Total Property, Plant & Equip.	82411	96910	14499	82623	0	-82623	85070	0	-85070	86411	0	-86411
Intangible Assets, net	136	51	-85	207		-207	315		-315	479		-479
Financial Assets	352	91	-261	535		-535	813		-813	1237		-1237
Deferred Assets	651	161	-490	990		-990	1505		-1505	2289		-2289
Cumulative Loss	5830	162	-5668	5983		-5983	7633		-7633	12673		-12673
Current Assets												
Cash	15722	1199	-14523	10332		-10332	0		0	100		-100
Accts Receivable, Custs	14014	9275	-4739	15803		-15803	41860		-41860	65908		-65908
Accts Receivable, Other	70	1	-69	0		0	0		0	50		-50
Unbilled Revenues	34	1811	1777	23		-23	76		-76	34		-34
Nuclear Fuel Prepaymnts	4232	19	-4213	6792		-6792	10754		-10754	6642		-6642
Imported Coal Prepaymnts	0	1	1	0		0	0		0	0		0
Local Coal Prepayments	0	2	2	0		0	0		0	0		0
Gas & Oil Prepayments	0	3	3	0		0	0		0	0		0
Mat. & Goods Prepayment	0	3469	3469	0		0	0		0	0		0
Other Prepaymnts & Assets	0	1917	1917	0		0	0		0	0		0
Nuclear Fuel Inventory	-1556	2719	4275	-1436		1436	-3966		3966	1392		-1392
Imported Coal Inventory	999	684	-315	1801		-1801	1808		-1808	2721		-2721
Local Coal Inventory	-913	0	913	-1161		1161	-4117		4117	-6199		6199
Oil & Gas Inventory	326	1	-325	544		-544	263		-263	400		-400
Mat. & Goods Inventory	12297	2	-12295	13267		-13267	13169		-13169	12977		-12977
Other Asset B	0	3	3	0		0	0		0	0		0
Total Current Assets	45225	21106	-24119	45965	0	-45965	59846	0	-59846	84024	0	-84024
Total Assets	134604	118481	-16123	136302	0	-136302	155182	0	-155182	187113	0	-187113

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BALANCE SHEET VARIANCE

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EQUITY AND LIABILITIES (Mil. of Leva)	3 Months Ending March 31			6 Months Ending June 30			9 Months Ending September 30			Year Ending December 31		
Equity	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan	Plan	Actual	Act-Plan
Preferred Stock	5	0	-5	5		-5	5		-5	5		-5
Common Stock	101034	100966	-68	101044		-101044	101044		-101044	101044		-101044
Retained Earnings	2473	2227	-4700	3074		-3074	9747		-9747	18507		-18507
Reserves	4	5	1	5		-5	5		-5	5		-5
Other Fund	0	0	0	7		-7	7		-7	7		-7
Total Equity	103516	98744	-4772	104135	0	-104135	110808	0	-110808	119568	0	-119568
Loans												
Model Short Term Debt	0	5592	5592	0		0	8785		-8785	26475		-26475
Long Term Debt	4945	4946	1	5120		-5120	5600		-5600	8163		-8163
Total Loans	6863	10538	3675	6562	0	-6562	15826	0	-15826	36079	0	-36079
Commitments & Contingencies	0	3	3	0		0	0		0	0		0
Current Liabilities												
Nuclear Fuel	0	4497	4497	0		0	0		0	0		0
Imported Coal	0	4498	4498	9671		-9671	9414		-9414	9344		-9344
Local Coal	0	7	7	4		-4	4		-4	4		-4
Oil & Gas	0	294	294	649		-649	1887		-1887	2486		-2486
Purchased Power	399	1341	942	-1251		1251	-5953		5953	-10324		10324
Materials & Goods	9832	-1	-9833	0		0	0		0	0		0
For Participations	6	0	-6	11273		-11273	15888		-15888	19994		-19994
To Employees	647	178	-469	296		-296	662		-662	839		-839
Other Taxes	-240	179	419	786		-786	786		-786	786		-786
Deferred Income Taxes	0	180	180	22186		-22186	25130		-25130	28047		-28047
Income Taxes Payable	9080	181	-8899	3344		-3344	3344		-3344	3344		-3344
For Social Security	295	182	-113	75		-75	75		-75	75		-75
Other Liabilities	786	312	-474	786		-786	786		-786	786		-786
Total Current Liabilities	20806	11848	-8958	22186	0	-22186	25130	0	-25130	28047	0	-28047
Grants	3344	2265	-1079	3344		-3344	3344		-3344	3344		-3344
Deferred Income	75	136	61	75		-75	75		-75	75		-75
Total Equity and Liabilities	134604	123534	-11070	136302	0	-136302	155182	0	-155182	187113	0	-187113

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Income Tax Payments					
State		Muni cipal		Ameli aration	
Date	Amount	Date	Amount	Date	Amount
1/10/96	0	1/15/96	0	1/15/96	0
2/15/96	87.69231	2/15/96	21.92308	2/15/96	4.384615
3/15/96	87.69231	3/15/96	21.92308	3/15/96	4.384615
4/15/96	2462.894	4/15/96	615.7235	4/15/96	123.1447
5/15/96	879.4263	5/15/96	219.8566	5/15/96	43.97131
6/15/96	879.4263	6/15/96	219.8566	6/15/96	43.97131
7/15/96	0	7/15/96	0	7/15/96	0
8/15/96	612.5738	8/15/96	118.2926	8/15/96	0
9/15/96	612.5738	9/15/96	118.2926	9/15/96	0
10/15/96	2643.381	10/15/96	510.4568	10/15/96	0
11/15/96	1289.51	11/15/96	249.014	11/15/96	0
12/12/96	1289.51	12/15/96	249.014	12/15/96	0

Month	Re-emp. Tax Rate	Personal Tax Rate
1	7%	25.0%
2	7%	25.0%
3	7%	25.0%
4	7%	25.0%
5	7%	25.0%
6	7%	25.0%
7	7%	25.0%
8	7%	25.0%
9	7%	25.0%
10	7%	25.0%
11	7%	25.0%
12	7%	25.0%

VAT to State	
Date	Amount
1/10/96	29
2/10/96	61
3/10/96	51
4/10/96	128
5/10/96	90
6/10/96	448
7/10/96	473
8/10/96	910
9/10/96	1646
10/10/96	2146
11/10/96	3153
12/10/96	415

Electricity Sales				
	Indus trials		House Holds	
Month	GWh	Mil of Leva	GWh	Mil of Leva
1	1797.079	3251	1368.884	2476
2	1791.406	3239	1504.905	2721
3	1974.025	3583	1542.853	2800
4	1641.779	2761	1181.14	1986
5	1327.476	2720	811.706	1663
6	1376.804	3127	638.781	1451
7	1908	7801	0	0
8	2031	11188	0	0
9	2262	14282	0	0
10	2410	19604	0	0
11	2879	5381	0	0
12	3476	6292	0	0

Dividend Payments	
Date	Amount
1/20/96	0
1/0/00	0
1/0/00	0
4/20/96	0
1/0/00	0
1/0/00	0
7/20/96	0
1/0/00	0
1/0/00	0
10/20/96	4613
1/0/00	0
1/0/00	0

Credit & Long Term Debt - Bulgarian (Millions of Leva)					
Reconstruc		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0	1/15/96	20	1/10/96	37
2/15/96	0	2/15/96	20	1/0/00	0
3/15/96	0	3/15/96	20	3/31/96	220
4/15/96	0	4/15/96	80.606	1/0/00	0
5/15/96	0	5/15/96	80.606	5/10/96	154
6/15/96	0	6/15/96	80.606	1/0/00	0
7/15/96	0	7/15/96	80.606	1/0/00	0
8/15/96	0	8/15/96	80.606	1/0/00	0
9/15/96	0	9/15/96	80.606	9/10/96	705
10/15/96	667	10/15/96	80.606	1/0/00	0
11/15/96	667	11/15/96	80.606	1/0/00	0
12/15/96	666	12/15/96	80.606	1/0/00	0
Short Term		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0	1/15/96	380	1/10/96	31
2/15/96	0	2/15/96	396	1/0/00	0
3/15/96	0	3/15/96	305	3/31/96	245
4/15/96	0	4/15/96	230	1/0/00	0
5/15/96	0	5/15/96	87	5/10/96	131
6/15/96	0	6/15/96	159	1/0/00	0
7/15/96	0	7/15/96	0	1/0/00	0
8/15/96	0	8/15/96	0	1/0/00	0
9/15/96	0	9/15/96	0	9/10/96	561
10/15/96	0	10/15/96	0	1/0/00	0
11/15/96	0	11/15/96	0	1/0/00	0
12/15/96	0	12/15/96	0	1/0/00	0
Issue E		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0	1/15/96	0	1/10/96	0
2/15/96	0	2/15/96	0	1/0/00	0
3/15/96	0	3/15/96	0	3/31/96	0
4/15/96	0	4/15/96	0	1/0/00	0
5/15/96	0	5/15/96	0	5/10/96	0
6/15/96	0	6/15/96	0	1/0/00	0
7/15/96	0	7/15/96	0	1/0/00	0
8/15/96	0	8/15/96	0	1/0/00	0
9/15/96	0	9/15/96	0	9/10/96	0
10/15/96	0	10/15/96	0	1/0/00	0
11/15/96	0	11/15/96	0	1/0/00	0
12/15/96	0	12/15/96	0	1/0/00	0
Issue F		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0	1/15/96	0	1/10/96	0
2/15/96	0	2/15/96	0	1/0/00	0
3/15/96	0	3/15/96	0	3/31/96	0
4/15/96	0	4/15/96	0	1/0/00	0
5/15/96	0	5/15/96	0	5/10/96	0
6/15/96	0	6/15/96	0	1/0/00	0
7/15/96	0	7/15/96	0	1/0/00	0
8/15/96	0	8/15/96	0	1/0/00	0
9/15/96	0	9/15/96	0	9/10/96	0
10/15/96	0	10/15/96	0	1/0/00	0
11/15/96	0	11/15/96	0	1/0/00	0
12/15/96	0	12/15/96	0	1/0/00	0
Issue G		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0	1/15/96	0	1/10/96	0
2/15/96	0	2/15/96	0	1/0/00	0
3/15/96	0	3/15/96	0	3/31/96	0
4/15/96	0	4/15/96	0	1/0/00	0
5/15/96	0	5/15/96	0	5/10/96	0
6/15/96	0	6/15/96	0	1/0/00	0
7/15/96	0	7/15/96	0	1/0/00	0
8/15/96	0	8/15/96	0	1/0/00	0
9/15/96	0	9/15/96	0	9/10/96	0
10/15/96	0	10/15/96	0	1/0/00	0
11/15/96	0	11/15/96	0	1/0/00	0
12/15/96	0	12/15/96	0	1/0/00	0

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Credit & Long Term Debt- US$ Sources (Millions of Leva)					
Issue H		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	87.8	1/15/96	0.0	1/10/96	5.0
2/15/96	90.3	2/15/96	0.0	2/1/96	11.7
3/15/96	94.3	3/15/96	0.0	3/31/96	35.1
4/15/96	98.7	4/15/96	0.0	1/0/00	0.0
5/15/96	144.6	5/15/96	0.0	5/10/96	38.1
6/15/96	173.1	6/15/96	0.0	1/0/00	0.0
7/15/96	218.0	7/15/96	0.0	7/15/96	99.1
8/15/96	232.1	8/15/96	0.0	8/15/96	51.2
9/15/96	271.8	9/15/96	0.0	9/10/96	52.4
10/15/96	272.3	10/15/96	0.0	1/0/00	0.0
11/15/96	266.2	11/15/96	0.0	1/0/00	0.0
12/15/96	266.2	12/15/96	0.0	1/0/00	0.0
Issue I		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	200.0	1/15/96	0.0	1/15/96	0.0
2/15/96	0.0	2/15/96	0.0	2/15/96	2.5
3/15/96	0.0	3/15/96	0.0	3/15/96	2.4
4/15/96	0.0	4/15/96	0.0	4/15/96	2.7
5/15/96	0.0	5/15/96	0.0	5/15/96	3.8
6/15/96	0.0	6/15/96	0.0	6/15/96	4.7
7/15/96	0.0	7/15/96	0.0	7/15/96	5.7
8/15/96	0.0	8/15/96	0.0	8/15/96	6.2
9/15/96	0.0	9/15/96	0.0	9/15/96	7.3
10/15/96	0.0	10/15/96	0.0	10/15/96	7.1
11/15/96	0.0	11/15/96	0.0	11/15/96	7.2
12/15/96	0.0	12/15/96	0.0	12/15/96	7.0
Issue J		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/27/96	24.2	1/28/96	0.6
2/15/96	0.0	2/27/96	24.8	2/28/96	0.5
3/15/96	0.0	3/27/96	26.0	3/28/96	0.2
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0
Issue K		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/15/96	0.0	1/10/96	0.0
2/15/96	0.0	2/15/96	0.0	2/1/96	0.0
3/15/96	0.0	3/15/96	0.0	3/31/96	0.0
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0
Issue L		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/15/96	0.0	1/10/96	0.0
2/15/96	0.0	2/15/96	0.0	2/1/96	0.0
3/15/96	0.0	3/15/96	0.0	3/31/96	0.0
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0

Credit & Long Term Debt - DM Sources (Millions of Leva)					
Issue M		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/15/96	0.0	1/10/96	0.0
2/15/96	0.0	2/15/96	0.0	2/1/96	0.0
3/15/96	0.0	3/15/96	0.0	3/31/96	0.0
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0
Issue N		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/15/96	0.0	1/10/96	0.0
2/15/96	0.0	2/15/96	0.0	2/1/96	0.0
3/15/96	0.0	3/15/96	0.0	3/31/96	0.0
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0
Issue O		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/15/96	0.0	1/10/96	0.0
2/15/96	0.0	2/15/96	0.0	2/1/96	0.0
3/15/96	0.0	3/15/96	0.0	3/31/96	0.0
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0
Issue P		Retire ments		Interest Paid	
Date	Amount	Date	Amount	Date	Amount
1/15/96	0.0	1/15/96	0.0	1/10/96	0.0
2/15/96	0.0	2/15/96	0.0	2/1/96	0.0
3/15/96	0.0	3/15/96	0.0	3/31/96	0.0
4/15/96	0.0	4/15/96	0.0	1/0/00	0.0
5/15/96	0.0	5/15/96	0.0	5/10/96	0.0
6/15/96	0.0	6/15/96	0.0	1/0/00	0.0
7/15/96	0.0	7/15/96	0.0	7/15/96	0.0
8/15/96	0.0	8/15/96	0.0	8/15/96	0.0
9/15/96	0.0	9/15/96	0.0	9/10/96	0.0
10/15/96	0.0	10/15/96	0.0	1/0/00	0.0
11/15/96	0.0	11/15/96	0.0	1/0/00	0.0
12/15/96	0.0	12/15/96	0.0	1/0/00	0.0

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SAMPLES OF REPORTS

FROM THE FIVE WEEK CASH FLOW MODEL

5 WEEK FORECAST

5 Week Model Test 2/26/97 19:01:04

HEADQUARTERS TOTALS	Forecast for Week Beginning					Actual for Week Beginning					Variance (Actual-Forecast)				
CASH INFLOW	4/14/96	4/21/96	4/28/96	5/5/96	5/12/96	4/14/96	4/21/96	4/28/96	5/5/96	5/12/96	4/14/96	4/21/96	4/28/96	5/5/96	5/12/96
From Elec Supply Branches	919	919	886	862	862						-919	-919	-886	-862	-862
Electricity Exports	0	0	0	0	0						0	0	0	0	0
Loans (Bulgarian Sources)	0	0	0	0	0						0	0	0	0	0
Loans (US$ Sources)	0	0	0	0	0						0	0	0	0	0
Loans (DM Sources)	0	0	0	0	0						0	0	0	0	0
Other Revenues	0	10	0	0	0	13	2	2	15	3	13	-8	2	15	3
Total Cash Inflow	919	929	886	862	862	13	2	2	15	3	-906	-927	-884	-847	-859
CASH OUTFLOW															
To Power Plant Branches	0	25	0	16	0						0	-25	0	-16	0
To Investment Branches	0	25	0	16	0						0	-25	0	-16	0
Nuclear Fuel	0	15	0	16	0						0	-15	0	-16	0
Imported Coal	0	10	0	0	0						0	-10	0	0	0
Local Coal	0	15	0	16	0						0	-15	0	-16	0
Oil & Gas	0	10	0	0	0						0	-10	0	0	0
Imported Elec & Private Power	0	15	0	16	0						0	-15	0	-16	0
Materials, Supplies, Services	0	10	0	0	0						0	-10	0	0	0
Wages & Social Security	0	15	0	16	0						0	-15	0	-16	0
Personal Income Tax Withheld	0	4	0	4	0						0	-4	0	-4	0
Income Tax	0	0	0	0	0						0	0	0	0	0
Re-employment Tax	0	0	0	0	0						0	0	0	0	0
VAT to State	0	0	0	0	0						0	0	0	0	0
Construction	0	10	0	0	0						0	-10	0	0	0
Municipal Income Tax	0	0	0	0	0						0	0	0	0	0
Ameliaration Tax	0	0	0	0	0						0	0	0	0	0
Loans (Bulgarian Sources)	0	0	0	0	0						0	0	0	0	0
Loans (US$ Sources)	0	0	0	0	0						0	0	0	0	0
Loans (DM Sources)	0	0	0	0	0						0	0	0	0	0
Other Expenses	0	10	0	0	0						0	-10	0	0	0
Dividends	0	0	0	0	0						0	0	0	0	0
Total Cash Outflow	0	164	0	100	0	0	0	0	0	0	0	-164	0	-100	0

TOTALS	4/14/96	4/21/96	4/28/96	5/5/96	5/12/96	4/14/96	4/21/96	4/28/96	5/5/96	5/12/96	4/14/96	4/21/96	4/28/96	5/5/96	5/12/96
Net Cash Inflow	919	765	886	762	862	13	2	2	15	3	-906	-763	-884	-747	-859
Cash on Hand	1918	2683	3569	4331	5194	1012	1014	1016	1031	1034	-906	-1669	-2553	-3300	-4160

INPUT

5 Week Model Test Starting Cash = 999 Year = 1996 Month = 4 Day = 14 2/26/97 19:01:04

Electricity Exports		Other Revenue		Power Plant Wages		Power Plant Other		Invest. Branch Wages		Invest. Branch Other		Nuclear Fuel		Imported Coal	
Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount
2-Jan-96	8	2-Jan-96	8	10-Jan-96	8	2-Jan-96	8	10-Jan-96	8	2-Jan-96	8	10-Jan-96	8	2-Jan-96	8
17-Jul-96	9	3-Feb-96	9	24-Jan-96	9	3-Feb-96	9	24-Jan-96	9	3-Feb-96	9	24-Jan-96	9	3-Feb-96	9
30-May-96	10	25-Apr-96	10	10-Feb-96	10	25-Apr-96	10	10-Feb-96	10	25-Apr-96	10	10-Feb-96	10	25-Apr-96	10
14-Jul-96	11	14-Jul-96	11	24-Feb-96	11	14-Jul-96	11	24-Feb-96	11	14-Jul-96	11	24-Feb-96	11	14-Jul-96	11
17-Aug-96	12	7-Jun-96	12	10-Mar-96	12	7-Jun-96	12	10-Mar-96	12	7-Jun-96	12	10-Mar-96	12	7-Jun-96	12
9-Jul-96	13	9-Jul-96	13	24-Mar-96	13	9-Jul-96	13	24-Mar-96	13	9-Jul-96	13	24-Mar-96	13	9-Jul-96	13
15-Aug-96	14	4-Aug-96	14	10-Apr-96	14	4-Aug-96	14	10-Apr-96	14	4-Aug-96	14	10-Apr-96	14	4-Aug-96	14
15-Jul-96	20	15-Aug-96	15	24-Apr-96	15	15-Jul-96	15	24-Apr-96	15	15-Jul-96	15	24-Apr-96	15	15-Jul-96	15
20-Sep-96	16	20-Sep-96	16	10-May-96	16	20-Sep-96	16	10-May-96	16	20-Sep-96	16	10-May-96	16	20-Sep-96	16
11-Nov-96	17	11-Nov-96	17	24-May-96	17	11-Nov-96	17	24-May-96	17	11-Nov-96	17	24-May-96	17	11-Nov-96	17
16-Jul-96	5	16-Jul-96	18	10-Jun-96	18	16-Jul-96	18	10-Jun-96	18	16-Jul-96	18	10-Jun-96	18	16-Jul-96	18
10-Aug-96	19	3-Dec-96	19	24-Jun-96	19	3-Dec-96	19	24-Jun-96	19	3-Dec-96	19	24-Jun-96	19	3-Dec-96	19
8-Mar-96	20	8-Mar-96	20	10-Jul-96	20	8-Mar-96	20	10-Jul-96	20	8-Mar-96	20	10-Jul-96	20	8-Mar-96	20
				24-Jul-96	21			24-Jul-96	21			24-Jul-96	21		
3-Jan-96	46			10-Aug-96	22			10-Aug-96	22			15-Aug-96	100	10-Sep-96	200
6-Apr-96	43			24-Aug-96	23			24-Aug-96	23			24-Aug-96	23		
				10-Sep-96	24			10-Sep-96	24			10-Sep-96	24		
				24-Sep-96	25			24-Sep-96	25			24-Sep-96	25		
				10-Oct-96	26			10-Oct-96	26			10-Oct-96	26		
				24-Oct-96	27			24-Oct-96	27			24-Oct-96	27		
				10-Nov-96	28			10-Nov-96	28			10-Nov-96	28		
				24-Nov-96	29			24-Nov-96	29			24-Nov-96	29		
				10-Dec-96	30			10-Dec-96	30			10-Dec-96	30		
				24-Dec-96	31			24-Dec-96	31			24-Dec-96	31		
23-Aug-96	300														

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5 Week Model Test

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Local Coal		Oil & Gas		Imported Elec & PP		Mat, Supplies, Service		Wages & Soc.Security		Construction		Other Expenses	
Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount
10-Jan-96	8	2-Jan-96	8	10-Jan-96	8	2-Jan-96	8	10-Jan-96	8	2-Jan-96	8	2-Jan-96	8
24-Jan-96	9	3-Feb-96	9	24-Jan-96	9	3-Feb-96	9	24-Jan-96	9	3-Feb-96	9	3-Feb-96	9
10-Feb-96	10	25-Apr-96	10	10-Feb-96	10	25-Apr-96	10	10-Feb-96	10	25-Apr-96	10	25-Apr-96	10
24-Feb-96	11	14-Jul-96	11	24-Feb-96	11	14-Jul-96	11	24-Feb-96	11	14-Jul-96	11	14-Jul-96	11
10-Mar-96	12	7-Jun-96	12	10-Mar-96	12	7-Jun-96	12	10-Mar-96	12	7-Jun-96	12	7-Jun-96	12
24-Mar-96	13	9-Jul-96	13	24-Mar-96	13	9-Jul-96	13	24-Mar-96	13	9-Jul-96	13	9-Jul-96	13
10-Apr-96	14	4-Aug-96	14	10-Apr-96	14	4-Aug-96	14	10-Apr-96	14	4-Aug-96	14	4-Aug-96	14
24-Apr-96	15	15-Jul-96	15	24-Apr-96	15	15-Jul-96	15	24-Apr-96	15	15-Jul-96	15	15-Jul-96	15
10-May-96	16	20-Sep-96	16	10-May-96	16	20-Sep-96	16	10-May-96	16	20-Sep-96	16	20-Sep-96	16
24-May-96	17	11-Nov-96	17	24-May-96	17	11-Nov-96	17	24-May-96	17	11-Nov-96	17	11-Nov-96	17
10-Jun-96	18	16-Jul-96	18	10-Jun-96	18	16-Jul-96	18	10-Jun-96	18	16-Jul-96	18	16-Jul-96	18
24-Jun-96	19	3-Dec-96	19	24-Jun-96	19	3-Dec-96	19	24-Jun-96	19	3-Dec-96	19	3-Dec-96	19
10-Jul-96	20	8-Mar-96	20	10-Jul-96	20	8-Mar-96	20	10-Jul-96	20	8-Mar-96	20	8-Mar-96	20
24-Jul-96	21			24-Jul-96	21			24-Jul-96	21				
15-Aug-96	100	10-Sep-96	200	15-Aug-96	100	10-Sep-96	200	15-Aug-96	100	10-Sep-96	200	10-Sep-96	200
24-Aug-96	23			24-Aug-96	23			24-Aug-96	23				
10-Sep-96	24			10-Sep-96	24			10-Sep-96	24				
24-Sep-96	25			24-Sep-96	25			24-Sep-96	25				
10-Oct-96	26			10-Oct-96	26			10-Oct-96	26				
24-Oct-96	27			24-Oct-96	27			24-Oct-96	27				
10-Nov-96	28			10-Nov-96	28			10-Nov-96	28				
24-Nov-96	29			24-Nov-96	29			24-Nov-96	29				
10-Dec-96	30			10-Dec-96	30			10-Dec-96	30				
24-Dec-96	31			24-Dec-96	31			24-Dec-96	31				

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SUPPLY BRANCHES FORECAST

5 Week Model Test 2/26/97 19:01:04

Forecast Daily Transfer of Funds to Headquarters (Millions of Leva)											
Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount
1/1/96	116	2/1/96	129	3/1/96	118	4/1/96	131	5/1/96	123	6/1/96	100
1/2/96	116	2/2/96	129	3/2/96	118	4/2/96	131	5/2/96	123	6/2/96	100
1/3/96	116	2/3/96	129	3/3/96	118	4/3/96	131	5/3/96	123	6/3/96	100
1/4/96	116	2/4/96	129	3/4/96	118	4/4/96	131	5/4/96	123	6/4/96	100
1/5/96	116	2/5/96	129	3/5/96	118	4/5/96	131	5/5/96	123	6/5/96	100
1/6/96	116	2/6/96	129	3/6/96	118	4/6/96	131	5/6/96	123	6/6/96	100
1/7/96	116	2/7/96	129	3/7/96	118	4/7/96	131	5/7/96	123	6/7/96	100
1/8/96	116	2/8/96	129	3/8/96	118	4/8/96	131	5/8/96	123	6/8/96	100
1/9/96	116	2/9/96	129	3/9/96	118	4/9/96	131	5/9/96	123	6/9/96	100
1/10/96	116	2/10/96	129	3/10/96	118	4/10/96	131	5/10/96	123	6/10/96	100
1/11/96	116	2/11/96	129	3/11/96	118	4/11/96	131	5/11/96	123	6/11/96	100
1/12/96	116	2/12/96	129	3/12/96	118	4/12/96	131	5/12/96	123	6/12/96	100
1/13/96	116	2/13/96	129	3/13/96	118	4/13/96	131	5/13/96	123	6/13/96	100
1/14/96	116	2/14/96	129	3/14/96	118	4/14/96	131	5/14/96	123	6/14/96	100
1/15/96	116	2/15/96	129	3/15/96	118	4/15/96	131	5/15/96	123	6/15/96	100
1/16/96	116	2/16/96	129	3/16/96	118	4/16/96	131	5/16/96	123	6/16/96	100
1/17/96	116	2/17/96	129	3/17/96	118	4/17/96	131	5/17/96	123	6/17/96	100
1/18/96	116	2/18/96	129	3/18/96	118	4/18/96	131	5/18/96	123	6/18/96	100
1/19/96	116	2/19/96	129	3/19/96	118	4/19/96	131	5/19/96	123	6/19/96	100
1/20/96	116	2/20/96	129	3/20/96	118	4/20/96	131	5/20/96	123	6/20/96	100
1/21/96	116	2/21/96	129	3/21/96	118	4/21/96	131	5/21/96	123	6/21/96	100
1/22/96	116	2/22/96	129	3/22/96	118	4/22/96	131	5/22/96	123	6/22/96	100
1/23/96	116	2/23/96	129	3/23/96	118	4/23/96	131	5/23/96	123	6/23/96	100
1/24/96	116	2/24/96	129	3/24/96	118	4/24/96	131	5/24/96	123	6/24/96	100
1/25/96	116	2/25/96	129	3/25/96	118	4/25/96	131	5/25/96	123	6/25/96	100
1/26/96	116	2/26/96	129	3/26/96	118	4/26/96	131	5/26/96	123	6/26/96	100
1/27/96	116	2/27/96	129	3/27/96	118	4/27/96	131	5/27/96	123	6/27/96	100
1/28/96	116	2/28/96	129	3/28/96	118	4/28/96	131	5/28/96	123	6/28/96	100
1/29/96	116	2/29/96	129	3/29/96	118	4/29/96	131	5/29/96	123	6/29/96	100
1/30/96	116			3/30/96	118	4/30/96	131	5/30/96	123	6/30/96	100
1/31/96	116			3/31/96	118			5/31/96	123		

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SUPPLY BRANCHES FORECAST

5 Week Model Test

2/26/97 19:01:04

Forecast Daily Transfer of Funds to Headquarters with NEK Paydays Added (Millions of Leva)											
Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount
7/1/96	91	8/1/96	79	9/1/96	89	10/1/96	117	11/1/96	154	12/1/96	174
7/2/96	91	8/2/96	79	9/2/96	89	10/2/96	117	11/2/96	154	12/2/96	174
7/3/96	91	8/3/96	79	9/3/96	89	10/3/96	117	11/3/96	154	12/3/96	174
7/4/96	91	8/4/96	79	9/4/96	89	10/4/96	117	11/4/96	154	12/4/96	174
7/5/96	91	8/5/96	79	9/5/96	89	10/5/96	117	11/5/96	154	12/5/96	174
7/6/96	91	8/6/96	79	9/6/96	89	10/6/96	117	11/6/96	154	12/6/96	174
7/7/96	91	8/7/96	79	9/7/96	89	10/7/96	117	11/7/96	154	12/7/96	174
7/8/96	91	8/8/96	79	9/8/96	89	10/8/96	117	11/8/96	154	12/8/96	174
7/9/96	91	8/9/96	79	9/9/96	89	10/9/96	117	11/9/96	154	12/9/96	174
7/10/96	91	8/10/96	79	9/10/96	89	10/10/96	117	11/10/96	154	12/10/96	174
7/11/96	91	8/11/96	79	9/11/96	89	10/11/96	117	11/11/96	154	12/11/96	174
7/12/96	91	8/12/96	79	9/12/96	89	10/12/96	117	11/12/96	154	12/12/96	174
7/13/96	91	8/13/96	79	9/13/96	89	10/13/96	117	11/13/96	154	12/13/96	174
7/14/96	91	8/14/96	79	9/14/96	89	10/14/96	117	11/14/96	154	12/14/96	174
7/15/96	91	8/15/96	79	9/15/96	89	10/15/96	117	11/15/96	154	12/15/96	174
7/16/96	91	8/16/96	79	9/16/96	89	10/16/96	117	11/16/96	154	12/16/96	174
7/17/96	91	8/17/96	79	9/17/96	89	10/17/96	117	11/17/96	154	12/17/96	174
7/18/96	91	8/18/96	79	9/18/96	89	10/18/96	117	11/18/96	154	12/18/96	174
7/19/96	91	8/19/96	79	9/19/96	89	10/19/96	117	11/19/96	154	12/19/96	174
7/20/96	91	8/20/96	79	9/20/96	89	10/20/96	117	11/20/96	154	12/20/96	174
7/21/96	91	8/21/96	79	9/21/96	89	10/21/96	117	11/21/96	154	12/21/96	174
7/22/96	91	8/22/96	79	9/22/96	89	10/22/96	117	11/22/96	154	12/22/96	174
7/23/96	91	8/23/96	79	9/23/96	89	10/23/96	117	11/23/96	154	12/23/96	174
7/24/96	91	8/24/96	79	9/24/96	89	10/24/96	117	11/24/96	154	12/24/96	174
7/25/96	91	8/25/96	79	9/25/96	89	10/25/96	117	11/25/96	154	12/25/96	174
7/26/96	91	8/26/96	79	9/26/96	89	10/26/96	117	11/26/96	154	12/26/96	174
7/27/96	91	8/27/96	79	9/27/96	89	10/27/96	117	11/27/96	154	12/27/96	174
7/28/96	91	8/28/96	79	9/28/96	89	10/28/96	117	11/28/96	154	12/28/96	174
7/29/96	91	8/29/96	79	9/29/96	89	10/29/96	117	11/29/96	154	12/29/96	174
7/30/96	91	8/30/96	79	9/30/96	89	10/30/96	117	11/30/96	154	12/30/96	174
7/31/96	91	8/31/96	79			10/31/96	117			12/31/96	174

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SUPPLY BRANCHES FORECAST

5 Week Model Test

2/26/97 19:01:04

Daily Transfer of Funds to Headquarters as a % of Prior Month Sales												
Day	J	F	M	A	M	J	J	A	S	O	N	D
1	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
2	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
3	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
4	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
5	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
6	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
7	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
8	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
9	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
10	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
11	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
12	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
13	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
14	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
15	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
16	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
17	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
18	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
19	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
20	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
21	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
22	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
23	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
24	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
25	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
26	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
27	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
28	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
29	3.23%	3.57%	3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
30	3.23%		3.23%	3.33%	3.23%	3.33%	3.23%	3.23%	3.33%	3.23%	3.33%	3.23%
31	3.23%		3.23%		3.23%		3.23%	3.23%		3.23%		3.23%

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SUPPLY BRANCHES FORECAST

5 Week Model Test

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	Sales (GWh)		Sales (Millions of Leva)		
Month	Forecast	Actual	Forecast	Actual	Used
D	3500	3400	3600	3590	3590
J	3022	3300	3125	3610	3610
F	3064	3200	3208	3650	3650
M	2657	3100	3374		3937
A	2639	3000	3359		3819
M	2338		2988		2988
J	2178		2818		2818
J	1908		2454		2454
A	2031		2665		2665
S	2262		3615		3615
O	2410		4615		4615
N	2879		5381		5381
D	3476		6292		6292

Employee Pay	
Date	Amount
10-Jan	100
24-Jan	90
10-Feb	110
24-Feb	95
10-Mar	100
24-Mar	100.5
10-Apr	101
24-Apr	101.5
10-May	102
24-May	102.5
10-Jun	103
24-Jun	103.5
10-Jul	104
24-Jul	104.5
10-Aug	105
24-Aug	105.5
10-Sep	106
24-Sep	106.5
10-Oct	107
24-Oct	107.5
10-Nov	108
24-Nov	108.5
10-Dec	109
24-Dec	109.5

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SAMPLES OF REPORTS

FROM THE BUYERS REPORT MODEL

TOTAL PAYMENTS

WEEKLY TOTAL PAYMENTS DUE (ORIGINAL PLAN) 2/26/97

Week Beginning	Leva	$	DM	Crwn	SwFr	FrFr	AusS	Total in Leva
4/6/97	3560	0	0	2020	0	0	0	508560
4/13/97	0	0	0	400	0	0	0	100000
4/20/97	0	0	0	0	7950	0	0	1216350
4/27/97	0	0	0	500	0	0	0	150000
5/4/97	0	0	0	3300	0	0	0	990000

WEEKLY TOTAL PAYMENTS DUE (REVISED PLAN)

Week Beginning	Leva	$	DM	Crwn	SwFr	FrFr	AusS	Total in Leva
4/6/97	0	0	0	2200	0	0	0	550000
4/13/97	4000	0	0	900	0	0	0	229000
4/20/97	0	0	0	0	0	0	0	0
4/27/97	0	0	0	600	8000	0	0	1404000
5/4/97	0	0	0	3313	0	0	0	994000

DELAYED PAYMENTS (ORIGINAL MINUS REVISED PLAN)

Week Beginning	Leva	$	DM	Crwn	SwFr	FrFr	AusS	Total in Leva
4/6/97	3560	0	0	-180	0	0	0	-41440
4/13/97	-4000	0	0	-500	0	0	0	-129000
4/20/97	0	0	0	0	7950	0	0	1216350
4/27/97	0	0	0	-100	-8000	0	0	-1254000
5/4/97	0	0	0	-13	0	0	0	-4000

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CONTRACT PAYMENTS DUE 2/26/97

										Original Plan						Revised Plan						
No	KomNo	Coun-try	Purpose	Vendor	Item	Cn-trct Cur	Original Total Amount	Revised Total Amount	Pay Cur	Pay Date	% to Pay	Leva/ Con	Leva/ Pay	Pay Cur Amount	Amount In Leva	Pay Date	% to Pay	Leva/ Con	Leva/ Pay	Pay Cur Amount	Amount In Leva	Notes
1	9565249	Switz	Line	ABB	Switches	Lev	356	400	Lev	4/8/97	100.0%	1	1	356	356	4/17/97	100.0%	1	1	400	400	
2	9669003	Germ	Trans	KOVO	Tires	DM	795	800	Sw	4/23/97	100.0%	153	153	795	121635	5/1/97	100.0%	153	153	800	122400	
3	458				Paint	Cr	200	300	Cr	4/6/98	30.0%	134	134	60	8040	4/14/97	30.0%	250	250	90	22500	
4						Cr			Cr	4/15/97	20.0%	250	250	40	10000	5/1/97	20.0%	300	300	60	18000	
5						Cr			Cr	5/5/97	15.0%	300	300	30	9000	6/1/97	10.0%	350	350	30	10500	
6						Cr			Cr	5/1/97	25.0%	300	300	50	15000	7/1/97	30.0%	400	400	90	36000	
7						Cr			Cr	7/1/97	10.0%	400	400	20	8000	8/1/97	10.0%	400	400	30	12000	
8	454545				Transformers	Lev	500	400	Cr	4/7/97	100.0%	1	250	2	500	5/8/97	100.0%	1	300	1	400	
9						Lev			Lev			1	1	0	0			1	1	0	0	
10						Lev			Lev			1	1	0	0			1	1	0	0	
11						Lev			Lev			1	1	0	0			1	1	0	0	
12						Lev			Lev			1	1	0	0			1	1	0	0	
13						Cr	1000	1100	Cr	3/7/97	10.0%	150	150	100	15000	3/7/97	10.0%	150	150	110	16500	
14						Cr			Cr	4/7/97	20.0%	250	250	200	50000	4/7/97	20.0%	250	250	220	55000	
15						Cr			Cr	5/7/97	30.0%	300	300	300	90000	5/7/97	30.0%	300	300	330	99000	
16						Cr			Cr	6/7/97	10.0%	350	350	100	35000	6/7/97	10.0%	350	350	110	38500	
17						Cr			Cr	7/7/97	0.0%	400	400	0	0	7/7/97	0.0%	400	400	0	0	
18						Cr			Cr	8/7/97	5.0%	400	400	50	20000	8/7/97	5.0%	400	400	55	22000	
19						Cr			Cr	9/7/97	20.0%	500	500	200	100000	9/7/97	20.0%	500	500	220	110000	
20						Cr			Cr	10/7/97	10.0%	550	550	0	0	10/7/97	20.0%	550	550	0	0	
21						Lev			Lev			1	1	0	0			1	1	0	0	
22						Lev			Lev			1	1	0	0			1	1	0	0	
23						Lev			Lev			1	1	0	0			1	1	0	0	
24						Lev			Lev			1	1	0	0			1	1	0	0	
25						Lev			Lev			1	1	0	0			1	1	0	0	
26						Lev			Lev			1	1	0	0			1	1	0	0	
27						Lev			Lev			1	1	0	0			1	1	0	0	
28						Lev			Lev			1	1	0	0			1	1	0	0	
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36						Lev			Lev			1	1	0	0			1	1	0	0	
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41						Lev			Lev			1	1	0	0			1	1	0	0	
42						Lev			Lev			1	1	0	0			1	1	0	0	
43						Lev			Lev			1	1	0	0			1	1	0	0	
44						Lev			Lev			1	1	0	0			1	1	0	0	
45						Lev			Lev			1	1	0	0			1	1	0	0	
46						Lev			Lev			1	1	0	0			1	1	0	0	
47						Lev			Lev			1	1	0	0			1	1	0	0	
48						Lev			Lev			1	1	0	0			1	1	0	0	
49						Lev			Lev			1	1	0	0			1	1	0	0	
50						Lev			Lev			1	1	0	0			1	1	0	0	

Note: Contracts with more than 7 payment dates must be broken into multiple groupings of no more than 7 entries.

PAYMENTS DUE BY CURRENCY (ORIGINAL PLAN)

Leva	$	DM	Crwn	SwFr	FrFr	AusS
356	0	0	0	0	0	0
0	0	0	0	795	0	0
0	0	0	60	0	0	0
0	0	0	40	0	0	0
0	0	0	30	0	0	0
0	0	0	50	0	0	0
0	0	0	20	0	0	0
0	0	0	2	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	100	0	0	0
0	0	0	200	0	0	0
0	0	0	300	0	0	0
0	0	0	100	0	0	0
0	0	0	0	0	0	0
0	0	0	50	0	0	0
0	0	0	200	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
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0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

PAYMENTS DUE BY CURRENCY (REVISED PLAN)

Leva	$	DM	Crwn	SwFr	FrFr	AusS
400	0	0	0	0	0	0
0	0	0	0	800	0	0
0	0	0	90	0	0	0
0	0	0	60	0	0	0
0	0	0	30	0	0	0
0	0	0	90	0	0	0
0	0	0	30	0	0	0
0	0	0	1	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	110	0	0	0
0	0	0	220	0	0	0
0	0	0	330	0	0	0
0	0	0	110	0	0	0
0	0	0	0	0	0	0
0	0	0	55	0	0	0
0	0	0	220	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
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0	0	0	0	0	0	0
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0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

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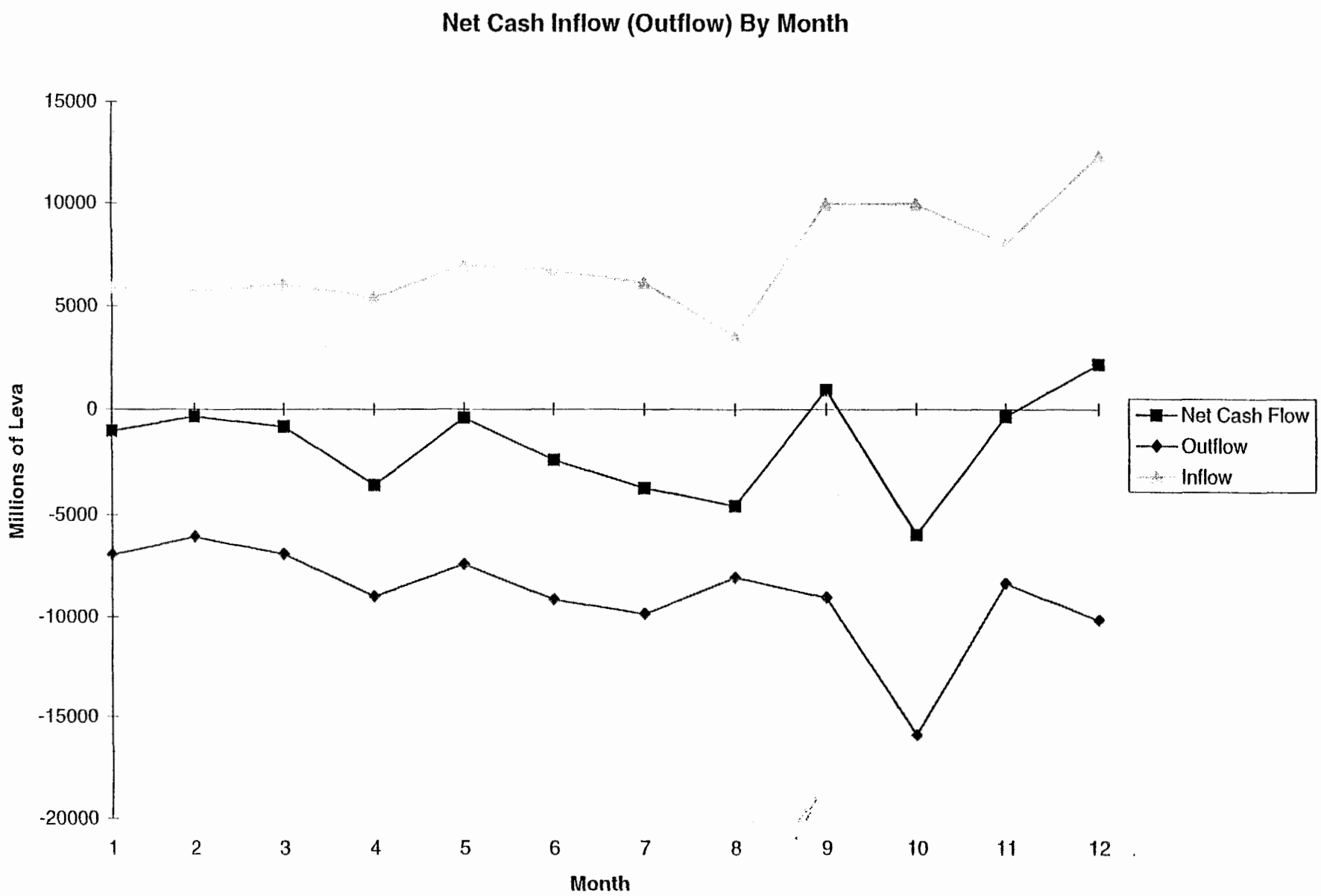
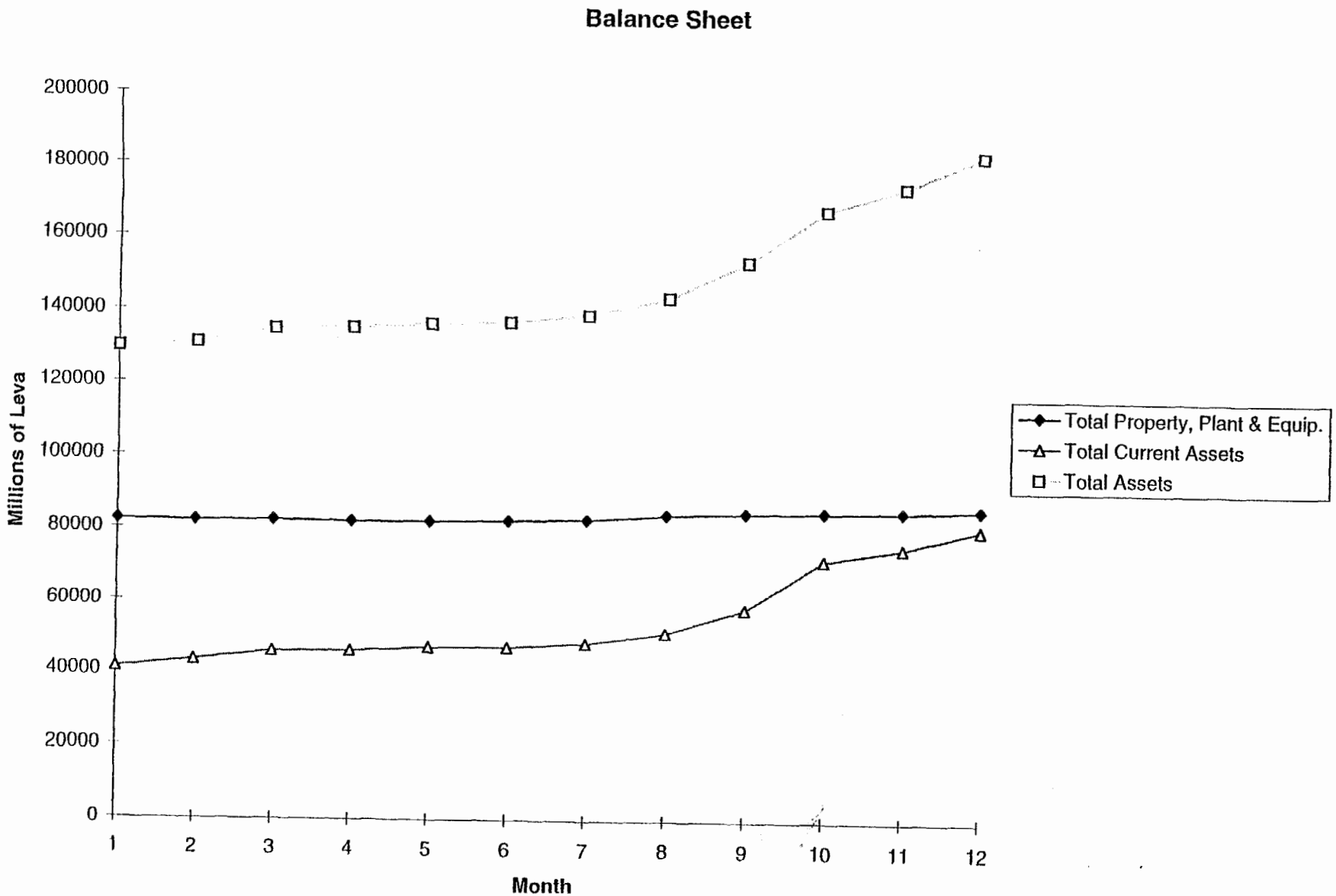
GRAPHS

OF DATA TRENDS

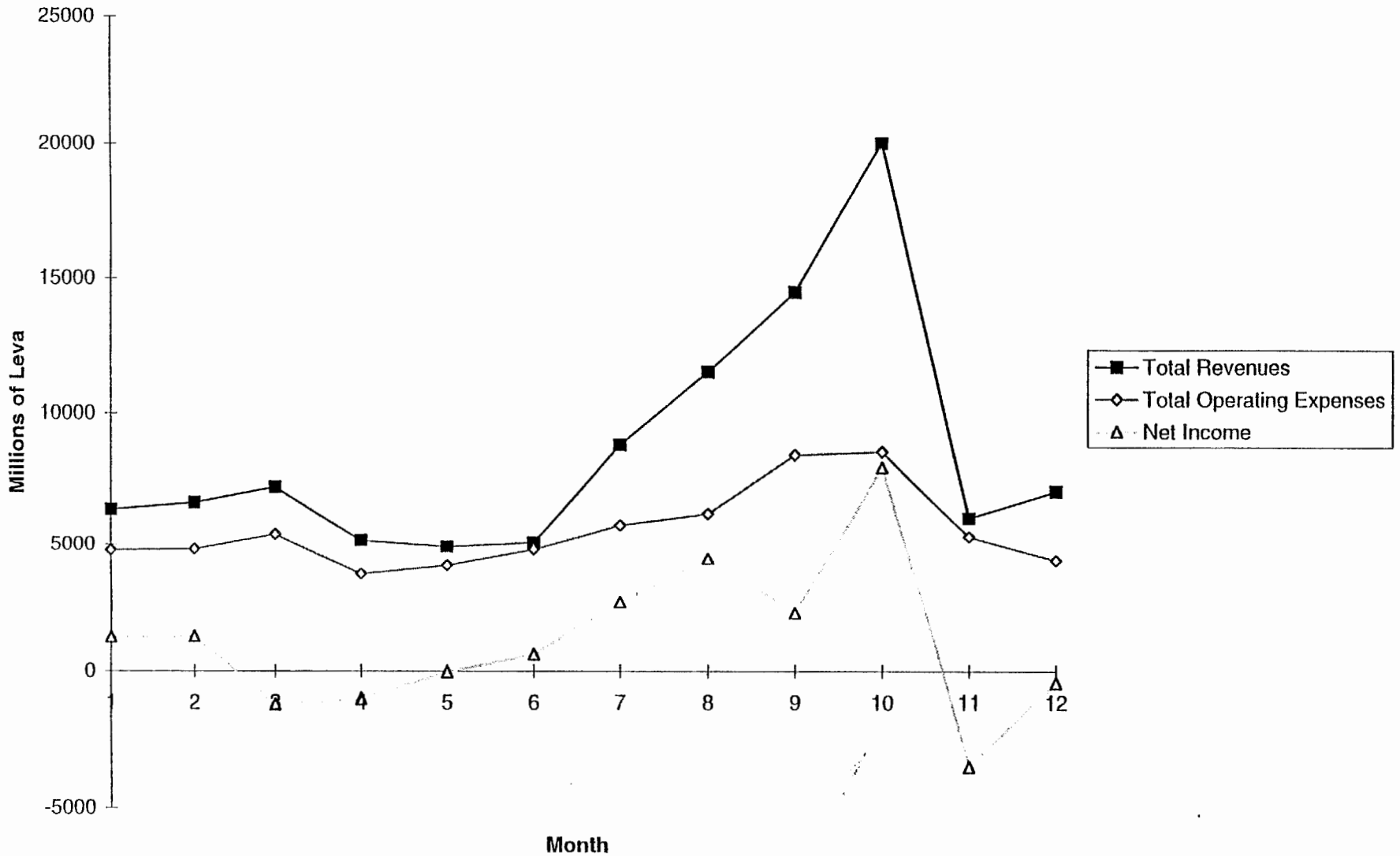
AND FINANCIAL PERFORMANCE

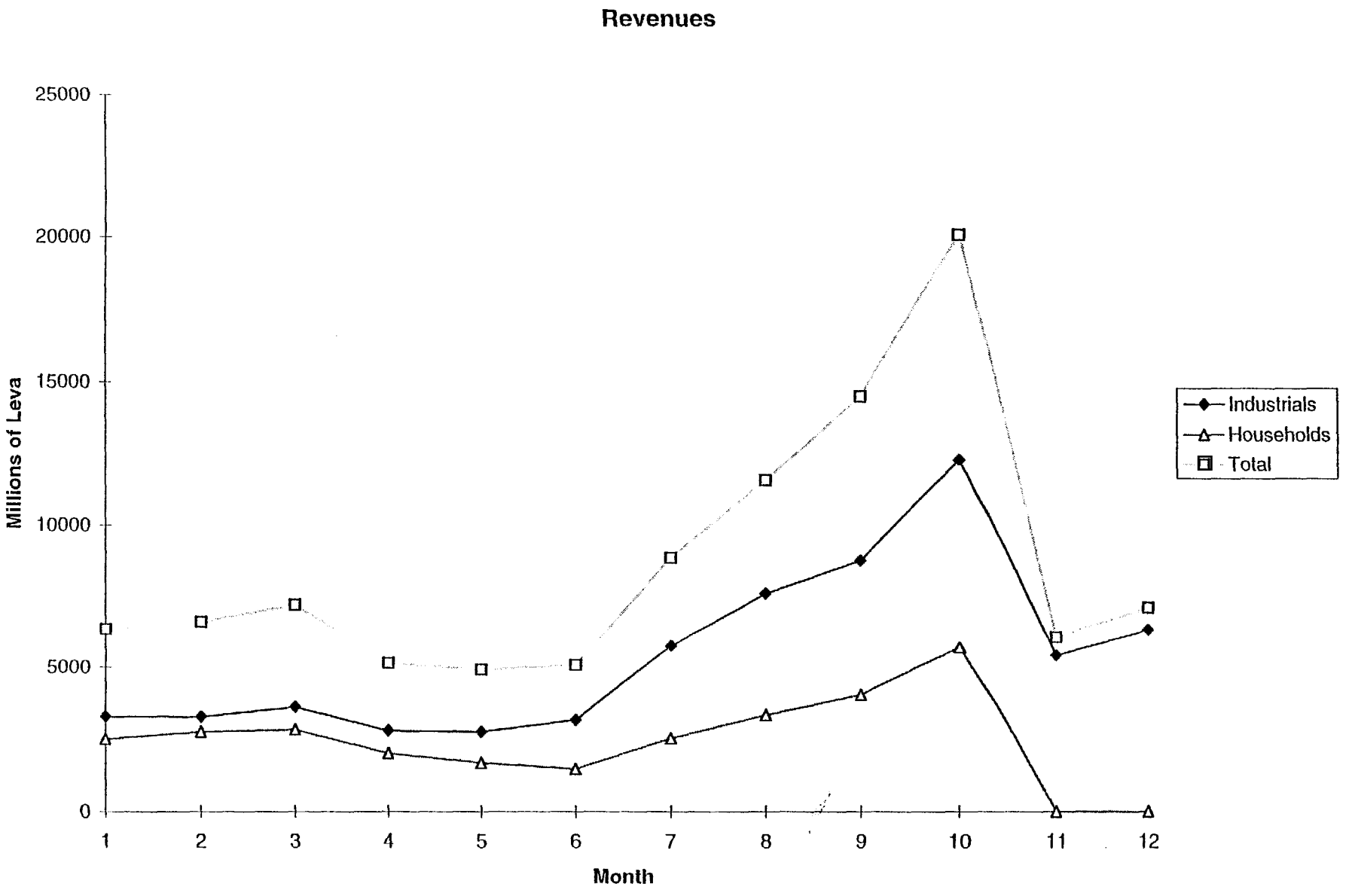

Net Cash Inflow (Outflow) By Month
15000
10000
5000
0
-5000
-10000
-15000
-20000
Millions of Leva
1
2
3
4
5
6
7
8
9
10
11
12
Month
Net Cash Flow
Outflow
Inflow


Balance Sheet
Millions of Leva
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
1
2
3
4
5
6
7
8
9
10
11
12
Month
Total Property, Plant & Equip.
Total Current Assets
Total Assets

282

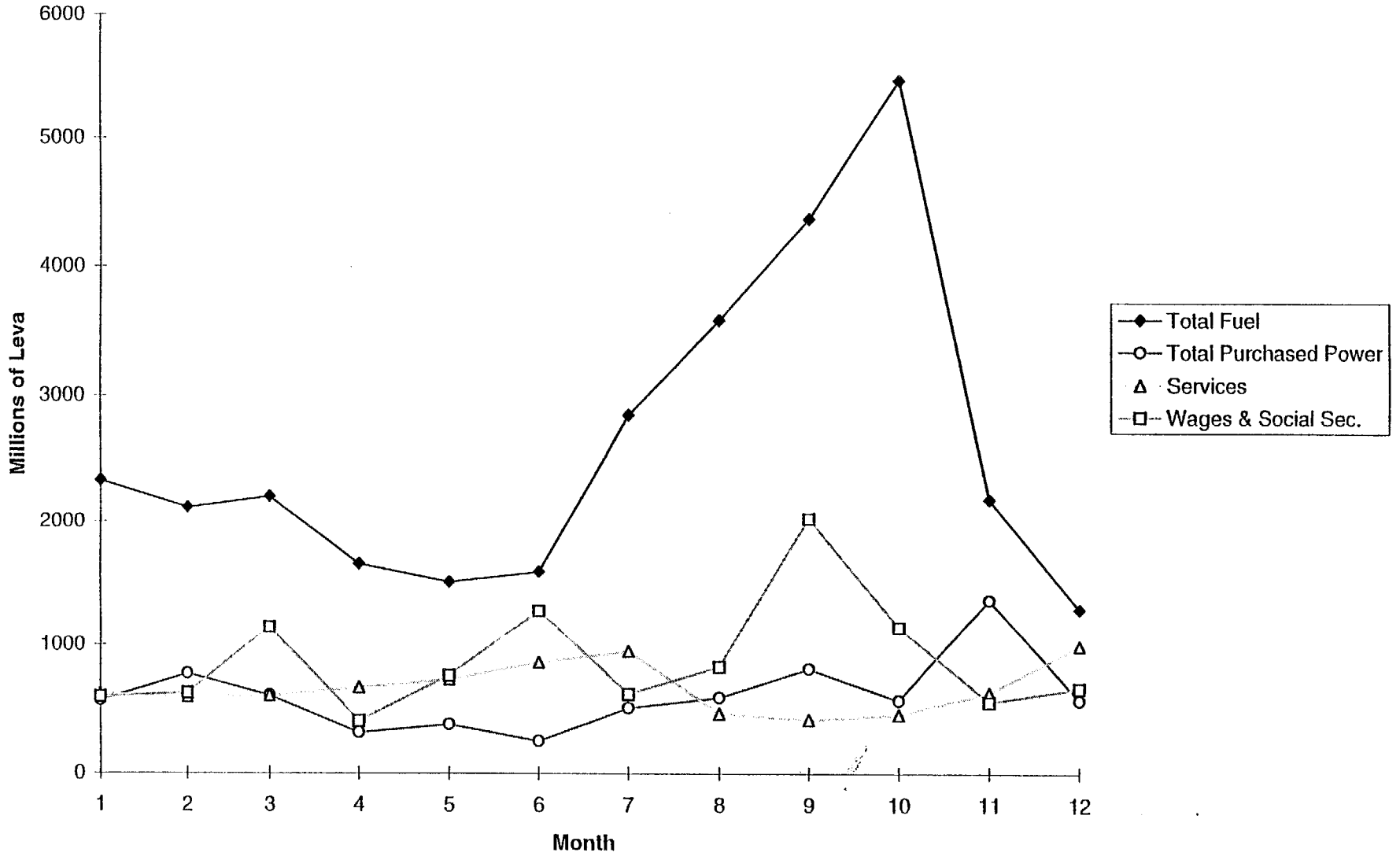
Income Statement




Revenues
Millions of Leva
25000
20000
15000
10000
5000
0
1
2
3
4
5
6
7
8
9
10
11
12
Month
Industrials
Households
Total

284

Operations and Maintenance Expenses



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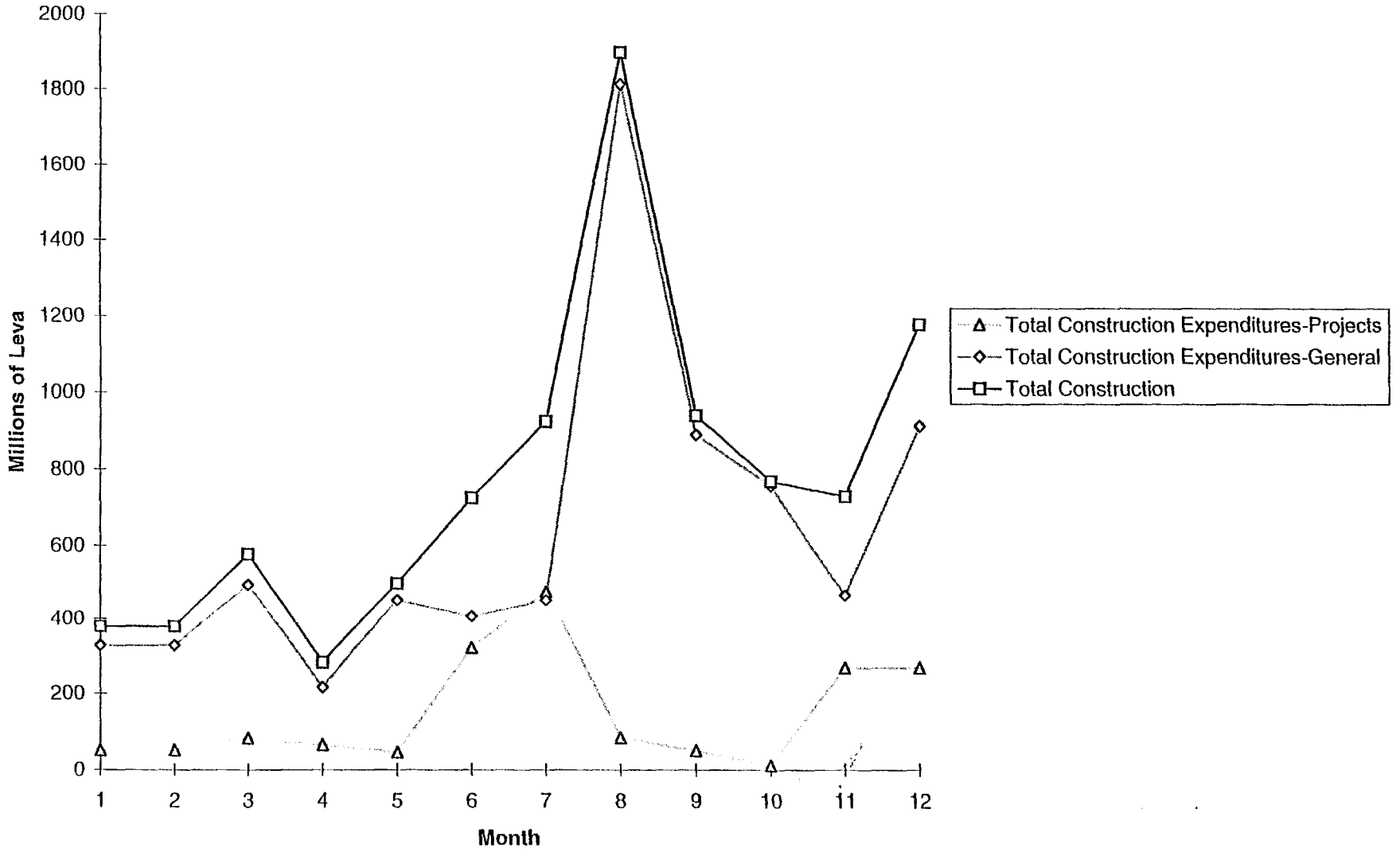
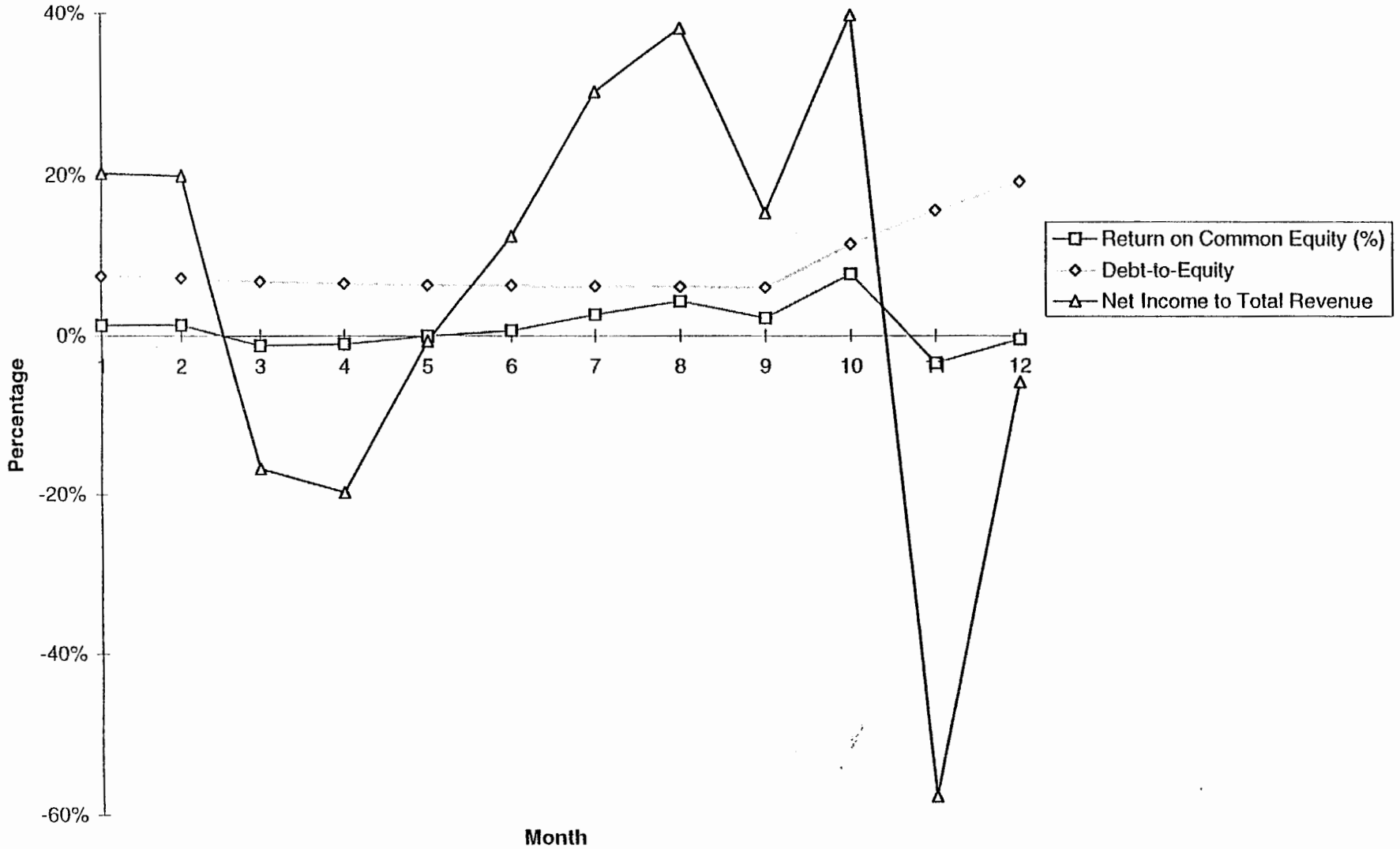
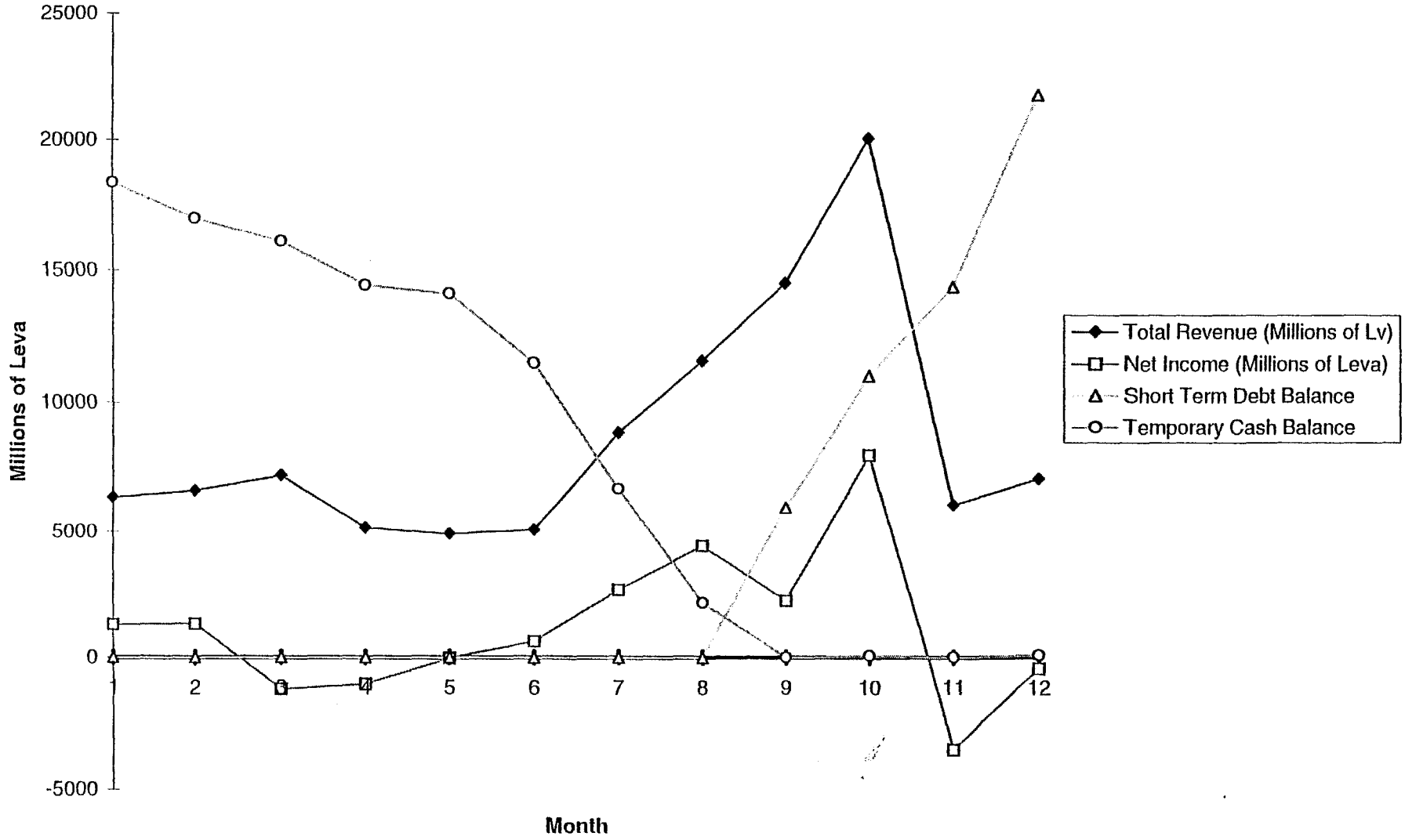
Planned Construction



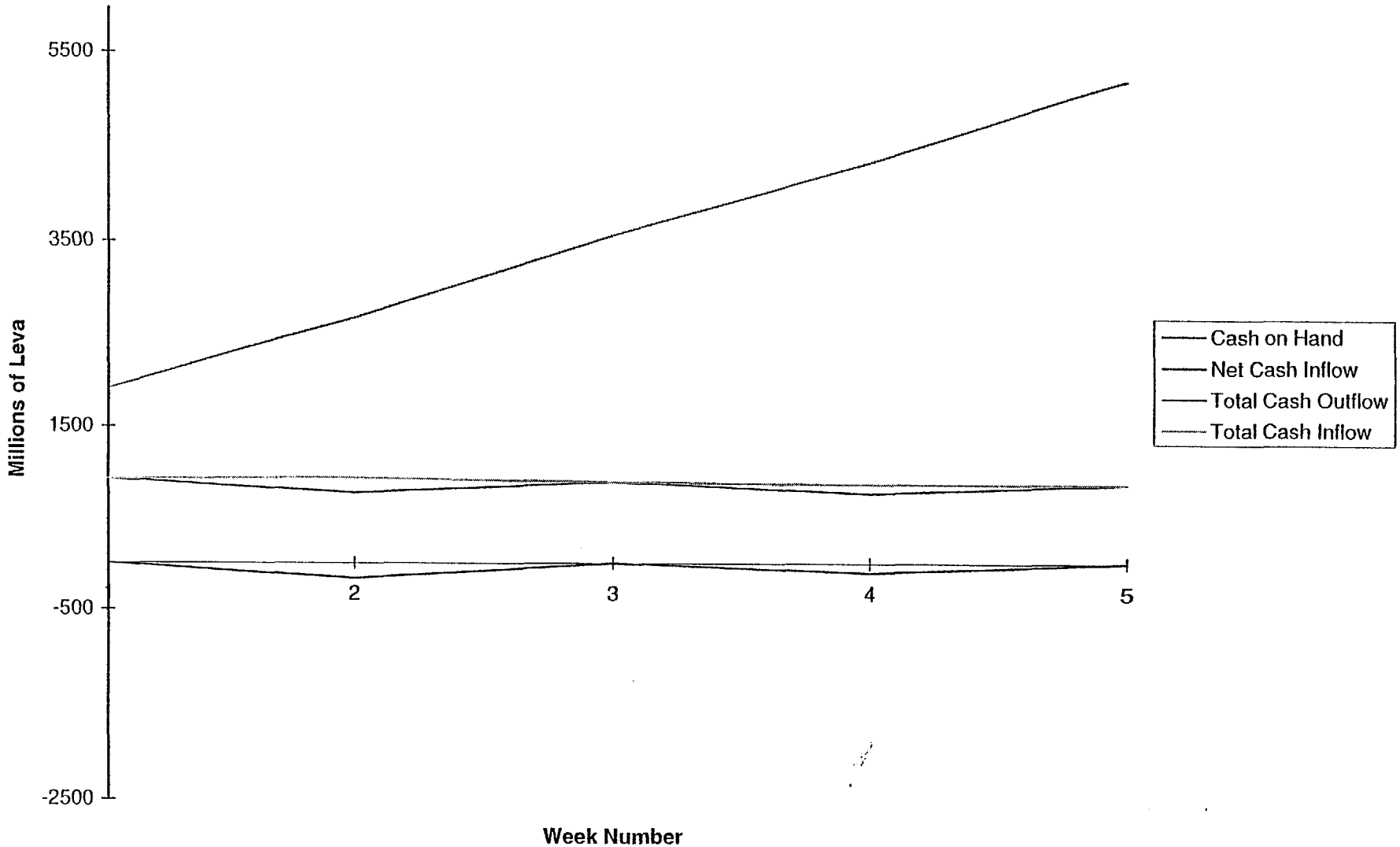
NEK Financial Performance Summary in %



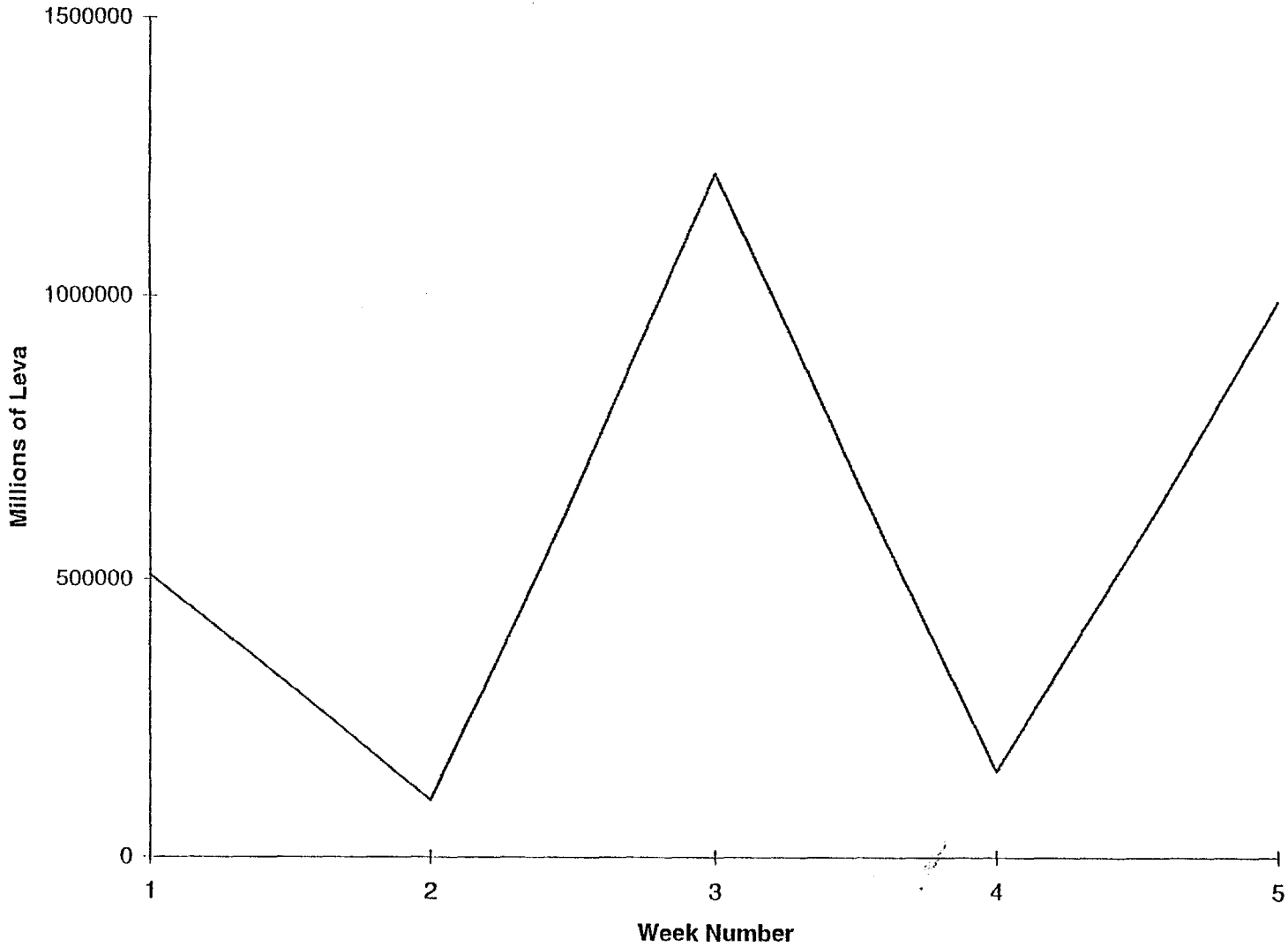
NEK Financial Performance in Leva



Five Week Cash Forecast



Total Weekly Payments Per Trade Department



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APPENDIX H

AGREEMENT

FOR THE PURCHASE OF POWER FROM AN INDEPENDENT POWER PRODUCER

Today, ... 19 ... a contract was signed in the city of Sofia between:

.....
..... ,
represented by .....,
hereinafter referred to as SELLER for short, on one part,

and

NATSIONALNA ELEKTRICHESKA KOMPANIA AD, Sofia, represented by its General Manager Kozma KOUZMANOV, hereinafter referred to as BUYER for short, on the other part,

TO THE FOLLOWING EFFECT:

I. DEFINITIONS

1. Billing Cycle -

The period of time between monthly meter readings.

2. Calendar Year -

A twelve-month period beginning January 1st.

3. Facilities -

All the SELLER's equipment, including the power plant on ..... fuel, boilers with output ..... Gcal/h, generator ..... , switchyard and power lines having a total capacity of ..... kW, owned by SELLER.

4. Facility Station Service -

The electric energy used in connection with the operation and maintenance of the entire SELLER facility and the other power plant auxiliaries used in conjunction with the operation of the facility /pollution control equipment, etc./.

5. Force Majeure -

Events unforeseeable and beyond the reasonable control of a party to the contract which include, without limitation to: sabotage, wars, insurrection, riots, explosions, fires, floods, lightning, storm, hurricane, torrential rain, hailstorm, landslides and collapsing earth, earthquake, drought, icing and other natural disasters; strikes, lockouts or other disturbances; regulations of bodies of state authority; failure to deliver or accept delivery of electric energy during such time as a party may be obliged to discontinue temporarily delivering or accepting delivery of the hereby contracted electric energy owing to system emergency or pre-emergency.

6. Initial Date of Delivery -

The date on which electric power is first delivered to BUYER by SELLER's Facility.

The electric power incident to the initial testing and operation of the Facility shall not constitute delivery under the agreement.

7. Limited Capacity -

The temporarily reduced capacity of the Facility resulting from Force majeure events.

SELLER shall determine Limited Capacity, subject to BUYER's permission, assuming that operation of the Facility in a manner so as to deliver minimum amounts of electric power.

8. Peak Hours -

All hours between 8 - 11AM and 18 - 21 PM -Winter Period, from October 1st through March 31st.
All hours between 8 - 12AM and 20 - 22PM - Summer Period, from April 1st through September 30th.

The definition of Peak Hours may change in the event that the peak hours on BUYER's system change.

This Agreement shall be deemed amended effective for electric power deliveries during the peak hours as of the coming into effect of the act which defines the BUYER's system peak hours.

9. Point of Delivery -

The point of connection of SELLER's equipment or tap (when owned by BUYER) to BUYER's system with specifically indicated pole number or structure, substation, street name, city.

10. Point of Metering -

The location of each and every meter used to determine the amount of active and reactive electric power to be billed to BUYER as per the clauses of this Agreement and according to a scheme which is part and parcel thereof.

11. Revised Initial Delivery Date -

The date to which SELLER changes its projected initial delivery date.

12. SELLER's Interconnection Equipment -

All equipment and facilities managed by SELLER, located on SELLER's side of the Point of Delivery and necessary for the interconnection to BUYER's system. This equipment includes, but is not limited to: connection, transformation and disconnection equipment, protective relays and automatics, safety equipment.

13. Normative Acts for Electric Power Pricing -

The acts of an empowered state authority for setting the price of electric power and its application.

14. Special Facilities -

Facilities owned by SELLER and used as intersystem connection between SELLER and BUYER, which are necessary, complementing or reinforcing BUYER's system.

15. System Emergency Mode-

A condition of BUYER's system which, in BUYER's sole judgment, is likely to result in significant disruption of service to customers, or is likely to endanger human life or health or cause damage on property.

16. System Pre-Emergency Mode -

A condition of BUYER's system, which in BUYER's sole judgment could lead to a System Emergency.

17. Tap -

All equipment and facilities owned either by SELLER or BUYER, which are necessary for the interconnection of SELLER's Facility to BUYER's system and include, bit are not limited to, connection, transformation and commutation equipment, protective relays and automatics, safety equipment.

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18. Unavoidable Interruption -

Any period of twenty-four (24) or more consecutive hours during which:

a) a Force Majeure event prevents SELLER from generating and delivering electric power;

b) SELLER reduces deliveries of electric power below the average hourly delivery rate in compliance with requests by BUYER's dispatchers;

c) a Force Majeure, System Pre-Emergency or System Emergency mode prevents BUYER from accepting deliveries of electric power from SELLER.

II. SUBJECT OF THE AGREEMENT

Article 1. SELLER shall deliver and sell to BUYER and BUYER shall accept and purchase from SELLER the electric power generated by the facility described in It.3 of Section I.

Article 2./1/ SELLER shall deliver the contracted amount of electric power at the point of delivery. Delivered electric power shall be with capacity ..... .

/2/ The Initial Delivery Date under this Agreement shall be .....

Article 3./1/ The quantity of electric power which SELLER undertakes to deliver and sell to BUYER shall be as follows:

- per calendar year		by zones	by quarters
..... mini kWh	peak	..... min kWh	Ist ..... min kWh
..... max kWh		..... max kWh	..... max kWh
	day-time	..... min kWh	IInd ..... min kWh
		..... max kWh	..... max kWh
	night-time	..... min kWh	IIIrd ..... min kWh
			..... max kWh
			IVth ..... min kWh
			..... max kWh

- per calendar year		by zones	by quarters
..... min kWh	peak	..... min kWh	Ist ..... min kWh
..... max kWh		..... max kWh	..... max kWh
	day-time	..... min kWh	IInd ..... min kWh
		..... max kWh	..... max kWh
	night-time	..... min kWh	IIIrd ..... min kWh
			..... max kWh
			IVth ..... min kWh
			..... max kWh

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- per calendar year	by zones	by quarters
..... min kWh	peak ..... min kWh	Ist ..... min kWh
..... max kWh	..... max kWh	..... max kWh
	day-time ..... min kWh	IInd ..... min kWh
	..... max kWh	..... max kWh
	night-time ..... min kWh	IIIrd ..... min kWh
		..... max kWh
		IVth ..... min kWh
		..... max kWh

Article 4. BUYER shall ensure conditions for synchronized operation of power-generation facilities of SELLER with BUYER's system.

Article 5. SELLER shall use its best efforts to generate and deliver electric power from the Facility, which is its property, by using gas, water or other fuel.

Article 6. SELLER shall install and maintain all the equipment located on SELLER's side of the Point of Delivery and necessary for the interconnection to BUYER's system.

Article 7./1/ SELLER is owner of the entire equipment as per the preceding article up to the disconnector which isolates SELLER's Facility from BUYER's system and shall maintain and repair said equipment.

/2/ SELLER shall conduct initial testing and inspection of power line tap /if owned by SELLER/, of relay protection and automatics, as well as their annual surveying and inspection.

/3/ Tests on relay protection and automatics shall be by BUYER or BUYER's authorized qualified assignee.

/4/ BUYER is entitled to perform functional tests on relay protection and automatics after testing is completed.

/5/ All expenses under paras.3 and 4 shall be borne by SELLER.

Article 8./1/ SELLER undertakes to maintain its Facility, including the power line tap /if owned by SELLER/, and to exercise control on these in conformity with the established technical rules and norms.

/2/ SELLER undertakes to notify BUYER in writing for any planned changes, additions or replacements in the Facility and/or the interconnection equipment. The indicated changes shall comply to the applicable technical rules and standards, as well as to BUYER's design and safety requirements.

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/3/ In the event that SELLER introduces changes without notification to BUYER, the latter shall have the right to disconnect the power line tap if BUYER has enough grounds to believe that said changes could endanger the normal operation of BUYER's system. Such disconnection does not represent a Force Majeure event or unavoidable interruption in the sense of this Agreement.

/4/ SELLER may, at SELLER's expense, make all changes, reasonably necessary in BUYER's opinion, on the equipment for interconnection of SELLER in view of BUYER's system needs.

Article 9. BUYER shall pay SELLER for electric power purchased in calendar year at the rate per kilowatt-hour in conformity with the normative document applicable at the time of sale.

Article 10./1/ SELLER shall grant to BUYER, for the duration of this Agreement, rights of way and easement to enable BUYER's access to and passage through SELLER's property for installation, start-up and maintenance of metering devices and special equipment.

/2/ SELLER shall grant to BUYER rights of access on property of SELLER which are directly linked with electric power delivery under this Agreement, provided that such access will not disrupt or interfere with SELLER's normal operations.

/3/ SELLER shall execute all necessary documents, including notarial deeds, required by BUYER to register the rights of way and easement.

/4/ SELLER shall procure to BUYER all necessary rights of way and easements for BUYER's installation, operation, maintenance and replacement of metering and/or special equipment located in third parties' property.

III. TERM OF THE AGREEMENT

Article 11./1/ This Agreement is concluded for a term of 3 years,

/2/ The term of the Agreement shall commence on the day of its signing by both parties and shall terminate on the respective day of the last year.

Article 12. SELLER shall observe the initial delivery date as defined in Article 2, para.2 of the Agreement.

Article 13./1/ Not later than 30 (thirty) prior to the agreed initial delivery date, SELLER may elect a revised date which shall be no later than 6 (six) months after the projected initial delivery date by notifying BUYER in writing of the election.

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/2/ The term of this Agreement shall be extended with the time as per the preceding article.

Article 14. In the event that SELLER fails to deliver the electric energy on the agreed initial delivery date or on the revised date, SELLER shall pay compensation to BUYER under the procedure of Articles 79 and 81 of this Agreement.

Article 15./1/ The term of this Agreement shall be automatically extended for each subsequent calendar year in the event that neither party has requested its termination at least one (1) month prior to its expiry date.

/2/ In the event of Force Majeure conditions the term of this Agreement shall be extended with the time of Force Majeure duration.

Article 16. The Agreement shall terminate:

a) upon expiry of the term for which it is concluded, except for the cases in Article 15, para.1;

b) with the termination of the concession contract /in the cases when SELLER carries out its activity as an independent producer under a concession granted in compliance with the Concessions Law/.

Article 17. The Agreement may be terminated prior to its expiry date in the events and as per the procedures of Section XI.

IV. TECHNICAL CONDITIONS

Article 18. The SELLER's Interconnection Equipment to BUYER's system shall meet BUYER's design and safety requirements, including all effective regulatory acts.

Article 19. When the interconnection between SELLER's Facility and BUYER's System requires a Tap to BUYER's transmission and distribution network, the Tap must meet BUYER's design and safety requirements and all applicable regulatory acts.

Article 20. SELLER shall, at its expense, maintain the interconnection equipment and the tap /in case SELLER owns it/, from the BUYER's system.

Article 21. BUYER shall notify SELLER in writing of any planned additions, modifications or replacements to the Facility, including SELLER's Interconnection Equipment.

Article 22. SELLER shall operate the Facility following BUYER's instructions with a view to BUYER's load and system reliability.

Article 23. SELLER shall at its expense obtain and maintain telecommunication facilities acceptable to BUYER for the transmission of operating information and instructions between BUYER and SELLER's operational staff.

Article 24. SELLER shall provide on a daily basis at BUYER's request the following:

1. the instantaneous kW output from the Facility;
2. the integrated kWh generation;
3. the integrated net output from the Facility for the preceding 24-hour period;
4. any other operational data related to the operation of the Facility.

Article 25. /1/ The metering of electric power supplied to BUYER shall be by meters for active and reactive power, furnished and installed by SELLER within the ownership title boundaries between the parties to a spot agreed with the BUYER.

/2/ Meters used to measure electricity sales shall be three-rate meters and meet the effective standards.

Article 26. Power sold shall be measured depending on the SELLER's unified hours of peak, day-time and night-time tariff zone for the whole country.

Article 27. Inspection, setting and replacement of meters used to measure power sales shall be carried out upon request of either party in the presence of SELLER and BUYER's representatives.

Article 28. /1/ All meters shall be sealed, and the seals shall be broken only by BUYER when the meters are to be inspected, tested or adjusted.

/2/ Should any meter is found to be damaged, defective or inaccurate during inspection it shall be adjusted, repaired, or replaced, at BUYER's expense, on the basis of a Protocol signed by SELLER and BUYER.

/3/ Upon signing of the Inspection Protocol within 5 days parties shall adjust the Billing statement for power sold.

Article 29. BUYER shall, at SELLER's expense, inspect and accept any required Tap and SELLER's Interconnection Equipment. Prior to connecting SELLER's facility to its system, BUYER shall check whether design and safety requirements as per the effective regulatory acts are met.

Article 30. In the event that the Facility is equipped with a synchronous generator SELLER shall furnish, install and maintain equipment necessary to establish and maintain synchronous operation with BUYER's system.

Article 31. In the event that the Facility is equipped with induction generators, then before SELLER installs capacitors or other means of generator excitation, SELLER must obtain BUYER's written permission and modify SELLER's Interconnection Equipment as required by BUYER.

Article 32. For the parallel operation and BUYER's system protection SELLER shall install and maintain the following equipment: line disconnector, automatic circuit breaker, current transformers, voltage transformers, relay protection and such other equipment as may be reasonably required by him.

Article 33. Settings of relay protection and automatics ensuring parallel operation of SELLER's facility with BUYER's system under normal and emergency conditions shall be within BUYER's competence and shall be made against payment in the case when they have been caused by modifications on the Facility.

Article 34. SELLER shall comply with all BUYER's instructions with respect to relay protection and automatics, including performance of post-emergency tests of this equipment.

Article 35. SELLER shall maintain in perfect condition, control and notify immediately BUYER's competent authorities of actuation of relay protection, automatics and alarm system of facilities related to the operation of BUYER's system as well as of telecommunication and telecontrol devices.

Article 36. SELLER shall maintain in perfect condition the generation islanding devices and other automatic control devices so that to provide for house load supply of its Facility from BUYER's system.

Article 37. SELLER shall, at its expense, repair and maintain its relay protection and any other equipment owned or operated by the SELLER.

Article 38. /1/ Before November 30 of each year, SELLER shall provide BUYER with a maintenance schedule of the Facility. Starting dates and duration of repairs planned under this schedule shall be agreed with BUYER.

/2/ Any forced changes in the maintenance schedule shall be agreed in writing between the parties 5 calendar days before starting current repairs and 30 calendar days before a major overhaul.

Article 39. Upon obtaining permission by BUYER's dispatch center concerning any current request SELLER shall be entitled to interrupt Facility operation and start repair works.

Article 40. SELLER shall be obliged to interrupt or reduce deliveries of electric power at BUYER's request because of system pre-emergency or system emergency.

Article 41. SELLER shall comply with the orders of BUYER's dispatchers and see to the normal operation of the Facility. SELLER shall notify BUYER of the occurrence of any emergency situations to its Facility and provide for their immediate remedy.

Article 42. Should the SELLER fail to eliminate the accident within reasonable period of time BUYER may claim compensation as defined under Articles 79 and 81 of the Agreement, in the case of decreased supply of electric power.

Article 43. BUYER shall control and dispatch SELLER's facility according to the load requirements based on the Instructions for operational Dispatching of the electric power system.

Article 44. SELLER shall comply with the instructions of BUYER's respective operating dispatching staff related to the operation of its Facility that is in BUYER's operational subordinate position.

Article 45. At any time BUYER may issue an order to SELLER to start, stop or regulate Facility load as per the requirements of the operation dispatching.

Article 46. SELLER shall provide BUYER permanent access to the Facility.

V. BILLING AND PAYMENT

Article 47. SELLER and BUYER's authorized representatives shall read the meters measuring electricity sales at midnight of the last day of each month and then they shall issue a Billing Statement for the respective month.

Article 48. In the event that the delivery point does not coincide with the metering point and „selling" reading is made at a voltage level different from the voltage of the delivery point, then transformer losses shall be deducted from the quantity of electric power sold during each billing cycle.

Article 49. /1/ BUYER shall pay for electric power at prices and under procedures as defined in regulatory acts.

/2/ BUYER shall make payments by direct transfer.

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Article 50. /1/ SELLER shall submit a Billing Statement for the quantity of electric power sold during the previous month to BUYER latest on the third day of the current month.

/2/ Payment for electric power shall be made at BUYER's request by presenting a pay order to the Bank on a day following the receipt of the billing statement.

Article 51. In case of necessity BUYER may purchase additional electric power above the contracted quantities. Such additional quantities of electric power shall be paid for by an increase of up to 20% above the current prices, on the basis of an additional agreement.

Article 52. /1/ Adjustments to a billing statement issued by SELLER shall be made on the basis of a bilateral inspection protocol signed by authorized representatives of SELLER and BUYER.

/2/ BUYER shall pay for recomputed billing statements when paying the electric power sold for the month following the signing of the bilateral protocol.

VI. OPERATION UNDER DEFICIENCY

Article 53. SELLER shall immediately notify BUYER of the occurrence of power deficiency during the operation of the facility.

Article 54. In case the power deficiency has occurred due to SELLER's fault and is accompanied with non-fulfillment of contracted quantity of electric power for the billing period, SELLER shall compensate BUYER under the procedure and conditions of Articles 79 and 81 of the Agreement.

VII. OPERATION OF THE FACILITY

Article 55. In order to prevent degradation of system to BUYER's customers as a result of interconnecting with SELLER's Facility, the SELLER's synchronous generators shall generate reactive power within their operating limits as may be reasonably necessary to maintain reactive power balance and voltage levels of the system.

Article 56. /1/ Upon request of the respective dispatch center of the BUYER, SELLER shall regulate the reactive power of the Facility generators within their operating limits.

/2/ Compliance with this Article shall be controlled on a monthly basis using the reactive power meters of generators and reactive power hourly records of the operating documentation of the Facility.

Article 57. SELLER shall not energize equipment de-energized by BUYER.

Article 58. Should BUYER determine that any of SELLER's Interconnection Equipment fail to perform in a manner consistent with BUYER's design and safety requirements, or a modification has been made so that performance is not as originally reviewed by BUYER, or SELLER has failed to perform proper testing or maintenance of that equipment following written notice, BUYER shall be entitled to de-energize the interconnection between SELLER and BUYER until appropriate corrective actions have been completed by SELLER as verified by BUYER. Any period of de-energization as permitted by this paragraph shall not constitute a Force Majeur.

Article 59. Operating information and local operation instructions shall include economic dispatching, synchronization and separation, scheduled and unscheduled outages and complete data on proper functioning of the Facility.

VIII. DISPATCHING OF THE FACILITY

Article 60. SELLER shall execute all BUYER's instructions related to the Facility operation and System safety according to the Instructions for operational dispatching of the electric power system.

Article 61. SELLER, at BUYER's request, shall during a System Emergency or during a System Pre-Emergency operate the Facility generators within their operating limits in a manner to mitigate the System Emergency or System Pre-Emergency.

Article 62. SELLER shall provide BUYER any operating data on dispatching of Facility operation.

Article 63. Upon request of BUYER and at SELLER's expense, SELLER shall provide a recording device, acceptable to BUYER, that will record data such as the integrated hourly output from the Facility. The information so recorded shall be made available on a schedule and in a manner determined by BUYER.

Article 64. In the case of an unscheduled outage or limitation SELLER shall immediately notify BUYER of the occurrence and the ending of the event.

IX. PURCHASE OBLIGATION ADJUSTMENT

Article 65. During the effective period of this Contract BUYER and SELLER may adjust the committed quantities of electric power, only subject to mutual written agreement.

Article 66. BUYER and/or SELLER shall have the right to demand an adjustment of the committed quantities of electric power not later than one month, in the following cases:

1. Prior to the occurrence of the event which had necessitated the adjustment.

2. Prior to the expiry of the accounted contracted period.

Article 67. In the event of any breach of the provisions of the preceding article no adjustment shall be made to the committed quantity of electric power.

X. CONTRACT AMENDMENT

Article 68. /1/ Either party hereto may claim amendments to the clauses of this Contract during the Contract term.

/2/ This Contract may be amended in the following cases: occurrence of a Force Majeure event or instruction given by State authorities.

Article 69. /1/ No amendments of and supplements to the Contract shall be valid unless they are formulated in written additional agreements signed by both parties hereto.

/2/ Such amendments and supplements shall become effective on the date of their signing and shall constitute an integral part of this Contract.

XI. EARLY TERMINATION

Article 70. Each party hereto shall fulfill its Contract obligations precisely and in good faith in compliance with the Law, the provisions of this Contract without preventing the other party from executing its obligations in the same manner.

Article 71. /1/ This Contract may be terminated before the end of the Contract term in the following cases:

1. By mutual written agreement between the two parties

2. Unilaterally by each party hereto, by not less that thirty (30) days' written notice to the other party.

3. Unilaterally by each party hereto, by not less that thirty (30) days' written notice to the other party in the case of force majeure event of duration more than 6 /six/ months.

/2/ In the preceding cases a bilateral protocol accounting for the work performed as of the date of Contract termination and settling the financial relations between the parties shall be signed.

/3/ The Contract may also be terminated by the non-defaulting party before the end of the contract term by serving a written notification to the defaulting party, under the procedure specified in the following articles.

Article 72. /1/ In the event that SELLER fails to supply the committed quantity of electric power, then BUYER shall explain in writing the failure and shall set a thirty (30) days' time-limit to remedy the failure.

/2/ If at the expiration of the term set forth under para. 1 the SELLER still fails to perform strictly its obligation to deliver the committed quantities of electric power during two consecutive months BUYER may terminate the Contract by not less that thirty (30) days' written notice.

Article 73. /1/ In the event that SELLER fails to deliver electric power of standard quality then BUYER may set a fifteen (15) days' time-limit to correct defects.

/2/ The duration of deliveries of low-quality electric power shall be determined with installed metering devices approved for such use and checked according to the established procedure.

/3/ If at the expiration of the term set forth under para.1 SELLER fails to supply electric power of standard quality for one month then the BUYER may terminate the Contract by a thirty (30) days' written notice.

/4/ Notwithstanding that during the term of the notice the Contract shall be in force BUYER may dishonour payment for electric power of low-quality.

Article 74. /1/ If BUYER fails to pay within the term set forth in Art. 50, para.1 hereof for the electric power consumed in two consecutive months SELLER shall notify in writing of such breach and shall set a thirty (30) days' time-limit during which BUYER must remedy it.

/2/ If at the expiration of this time-limit BUYER fails to pay for the electric power SELLER may, by not less than thirty (30) days' written notice, terminate the Contract.

Article 75. If a party hereto fails to perform any of the other contract conditions for reasons under its reasonable control the correct party may terminate the Contract by giving the non-performing party an adequate period, but not more than 120 (One hundred and twenty) days,

to perform and warning that at the expiration of the term the Contract shall be deemed as terminated.

Article 76. All notices under this Agreement shall be in writing. The term of each notice starts from the date of its receipt by the party hereto in observance of the regulations of the Civil Procedure Code.

Article 77. Notices shall be sent to the domicile address of each party hereto, as follows:

SELLER:	BUYER:
.....	.....
.....	.....
.....	.....

Each party may change the above address following a 15 (fifteen days) notification in writing to the other party.

XII. LIABILITY

Article 78. /1/ Whenever SELLER supplies electric power which does not comply with the standards SELLER shall pay to BUYER damages amounting to 20% of the electric power cost, for the period of non-performance.

Article 79. Whenever SELLER supplies electric power of less quantity than the committed for the respective billing period, SELLER shall pay to BUYER damages amounting to 20% of the cost of the non-delivered electric power.

Article 80. Whenever SELLER supplies electric power in surplus quantities than the committed quantity for the respective billing period, SELLER shall pay to BUYER damages amounting to 10% of the cost of the surplus quantity supplied.

Article 81. In the cases of articles 78, 79, 80 BUYER may claim indemnity for actual damages and/or loss of revenues, if their amount is higher than the amount of the penalty or indemnification.

Article 82. In the event of adjustment to the prices of electricity during the contract term the amount of liquidated damages shall be calculated on basis of prices effective at the beginning of the non-performance period.

Article 83. /1/ In case of an overdue payment pursuant to Art. 50 /1/ BUYER shall indemnify the SELLER to the amount of the statutory interest on the amount due commencing with the overdue date to the date on which the amount is transferred to SELLER's account. If the

payment made by BUYER is not enough to cover the amount of interests and the principal priority shall be given to interests.

/2/ With partial payments in the cases set forth in the preceding paragraph BUYER shall indemnify SELLER to the amount of the statutory interest on the remainder of the amount due.

/3/ SELLER shall be behind schedule, if SELLER does not pay in due time as set forth in Art.50 hereof.

Article 84. SELLER shall not be financially accountable to BUYER for non-delivery of electric power, interruption or aggravation of power supply in the presence of:

1. Technical defects in BUYER's electrical equipment and facility;

2. Wrong or untimely actions taken by the staff that operates and maintains BUYER's electric equipment and facility;

3. Lack of qualified staff to operate and maintain electric equipment and facility that is a responsibility of the BUYER to provide;

Article 85. /1/ In the event of unilateral termination of the Contract by either party of its own free will the same party shall pay the other party a one-time liquidated damage to the amount of ..... Leva.

/2/ If the non-performing party terminates unilaterally this Contract this same party shall pay damages as per the preceding para. in addition to the damages of which provision is made for non-performance of contracted quantity and/or quality.

Article 86. If BUYER or SELLER are not able to perform their obligations because of a Force Majeure the non-performing party shall not pay damages and neither party shall be financially accountable for such non-performance.

XIII. FORCE MAJEURE

Article 87. /1/ If either party has been rendered unable to perform its obligations under this Contract because of a Force Majeure the non-performing party within fifteen (15) days thereafter shall give the other party written notice describing the particulars of the occurrence.

/2/ The non-performing party shall give notice of its intent to cure the consequences of the non-performance and in no event more than thirty (30) days after the occurrence of the Force Majeure event.

/3/ The notification shall be in writing and shall contain a proposal with detailed schedule for the repairs and other efforts to cure the force majeure consequences.

/4/ The party to which the notification is addressed shall in writing advise the other party whether it accepts or not the proposed schedule.

/5/ In the event that the party does not approve the proposal it notifies of a 30 (thirty) days period to revise the plan. If the proposal is not revised upon expiry of this period, the performing party may terminate the contract by a 30 (thirty) days written notification.

/6/ In the event that the proposal is accepted and repair work has started, and the force majeure event continues for more than 6 /six/ months, the contract may be terminated under the procedure of Art.71 /1/ para.3.

XIV. INSURANCE

Article 88. /1/ Beginning thirty (30) days after execution of this Contract, each party shall take out and maintain for the duration of this Contract the following insurance:

1. Property damage liability (including comprehensive general liability).

2. Motor vehicle liability - third party motor vehicle liability insurance in respect of motor vehicles operated by SELLER or BUYER, their respective branches and personnel.

/2/ Within thirty 30 (thirty) days after taking out the insurance, each party shall furnish the other party with a copy of each insurance policy.

Article 89. Within 30 (thirty) days after execution of this Contract SELLER shall take out and maintain for the duration of this Contract Workers' Bodily injury and occupational disease and life insurance including provisions and recommendations in favour of BUYER.

XV. CONTROL ON CONTRACT IMPLEMENTATION

Article 90. With the expiry of each quarter the parties to the contract shall report contract implementation status by drawing up a protocol.

Article 91. /1/ Each party to this Contract shall authorize a specialist who shall be responsible for and shall supervise the following:

a/ contract technical conditions, including accurate metering of the electric power supplied to BUYER;

b/ financial matters under this Contract.

/2/ Within seven (7) days after assignment of the individuals pursuant to para.1 the parties shall notify each other of their respective names and the provisions of the Contract for which they shall be responsible.

/3/ In the event of a replacement of any of the individuals assigned pursuant to the preceding paragraphs then the party making such a replacement shall give written notice to the other party of the new circumstances within 7 (seven) days.

XVI. SETTLEMENT OF DISPUTES

Article 92. /1/ The parties shall use their best efforts to settle all disputes arising out of or in connection with this Contract or the interpretation thereof at the negotiation table.

/2/ Any dispute between the parties which cannot be settled through negotiation may be submitted by either party to a competent court /it is possible to submit the dispute to the Arbitration court at the Bulgarian Chamber of Commerce and Industry, under its procedural rules/.

/3/ Disputes shall be settled in compliance with the requirements of the Bulgarian Civil Law.

XVII. SPECIAL CONDITIONS

Article 93. /1/ Neither party has the right to assign and transfer its authorizations under this Contract to third parties without the written consent of the other party.

/2/ the Statement of transfer of authorizations under this Contract shall be furnished to the other party thirty (30) days prior to its execution.

/3/ This Statement of transfer shall contain an analysis and justification of the legal and financial status of the third party backed up with a bank guarantee issued by the party requesting this modification to ensure the right of the other party under the Contract.

Article 94. The provisions of the applicable law shall apply to all unsettled issues under this contract.

Part and parcel of the present contract shall be:

1. The scheme as per Section I, item 10.

2. A Maintenance Schedule of the Facility Generation capacity, as per Article 38 /1/.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in two original copies, one for each party, in their respective names and shall become effective as of the day and year of its execution.

SELLER:	BUYER:
.....	.....
.....	K.Kouzmanov
.....	General Director
Registration:	Registration:
Tax Office No.	Tax Office No.
Bank Account:	Bank Account:

APPENDIX I

ENVIRONMENTAL MANAGEMENT PROGRAM

MARITSA EAST 3
THERMAL POWER PLANT

PREPARED BY
THE NATSIONALNA ELEKTRICHESKA KOMPANIA
AND
CENTRAL MAINE POWER COMPANY

United States Agency for International Development
Utility Consultancy Contract

March 1997

FOREWORD

This Environmental Management Program has been prepared by the Natsionalna Elektricheska Kompania (NEK) and Central Maine Power Company (CMP) under a USAID contract. The purpose of this Program is to establish a formal environmental management system for use at the Maritsa East 3 Thermal Power Plant. Very importantly, the Program can also be modified for use at the other thermal power plants and hydroelectric power plants in the NEK system.

This is an initial Program and, as such, each of the sections should be updated and improved as experience is gained by plant managers and key staff. In particular, environmental goals and targets should be reviewed on an annual basis to assure that they are pertinent. The progress made toward achieving these goals and targets should be reviewed on a quarterly basis so that corrections can be made and resources refocused as needed.

The key to a successful environmental management program is commitment to the concept of improving environmental performance. This commitment requires consistent attention to environmental matters.

MARITSA EAST 3
ENVIRONMENTAL MANAGEMENT PROGRAM

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STATEMENT OF ENVIRONMENTAL POLICY

Maritsa East 3 is committed to the protection of the environment. It is every employee's responsibility to adhere to the following policy:

At Maritsa East 3, protection of the environment is the responsibility of every employee.

Maritsa East 3 will comply with all environmental laws.

Managers are expected to maintain their knowledge of the environmental regulations that apply to their operational areas and ensure, to the extent possible, that compliance is achieved.

All employees are expected to advise management of the status of environmental matters under their control.

All employees are expected to report environmental problems, spills, leaks, and discharges immediately to the management of the plant.

Maritsa East 3 will make continuing efforts to prevent or minimize waste discharges from its facilities to the environment.

Maritsa East 3 will regularly train its employees concerning environmental impacts and compliance.

Yanko Angelov _____

Plant Manager, Maritsa East 3

FACILITY DESCRIPTION

General Facility Description

Maritsa East 3 power plant is one of three power plants of the Maritsa East Complex. It is located some two kilometers to the north of Mednikarovo village, in the Haskovo district. It is located near the Troyanovo 3 coal pit.

The total power produced from the thermal power plant (TPP) is 840 MW, from four mono-blocks (boiler-turbine), each with a nominal rating of 210 MW. The first unit was commissioned in 1978, and the final unit was commissioned in 1981. Average annual generation is 4,310 x 10^3 kWh/yr. Each boiler is designed for the direct combustion of low grade, low calorie lignite mined from the Maritsa East coal fields.

Coal

The coal for the boilers is supplied from the Troyano 3 pit. Coal consumption is approximately 8,000 x 10^3 tons per year. Coal quality of the Troyanovo 3 coal pit is high sulfur , high ash , high clay, low carbon , and has a low heat content. Coal to the Maritsa East 3 TPP is transported via rubber conveyor belts to a storage facility holding 400,000 m^3. The conveyor belt system can transport up to 4000 t/h, and has one standby belt system.

Coal is fed from the crushers into the storage bunkers. Any combining of coal that is necessary due to coal composition is done at the pit or the coal storage bunker. The coal is then conveyed to eight mill fans where it is dried and pulverized, and sent to the coal concentrators.

Guaranteed Composition of Coal Quality	
Ash	14.96%
Moisture	56.00%
Carbon	18.62%
Hydrogen	1.54%
Oxygen	5.56%
Nitrogen	0.33%
Sulfur	1.63%
Lower Heating Value	1300-1600 kcal/kg

Blocks

The boilers are natural circulation type boilers, designed for a steam output of 670 t/h, manufactured by the Podolsk Boiler Plant in Russia. The turbines are rated at 210 MW each.

Boilers (each)		
Type		EP-62
Steam Output		670 t/h
Steam Conditions	818 K	
		13.7 MPa
Feedwater Temperature		515 K
Fuel Consumption		367 t/h
Exit Gas Temperature		443 K
Design Heat Input		
Turbines (each)		
Rated Capacity		**210 MW**
Speed		**3000 RPM**
Steam Conditions		**813 K**
		12.7 MPa
Condenser Pressure		**0.0061 MPa**
Generator (each)		
Capacity		210 MW
Voltage		15.75 kV
Stator Cooling		water
Rotor Cooling		hydrogen

Distribution

Maritsa East 3 is connected to the Bulgarian electric power distribution network via 220 kV and 400 kV switchgear located in the plant's substation yard. In addition to the external switchgear, the switchyard also contains a 500 kW diesel generator and transformers for supplying power to the coal handling equipment.

Water Usage

Water is used for industrial requirements such as makeup water, cooling water, wash water, and for sanitary facility requirements. The industrial makeup requirement is approximately 100,000 m^3/day. The sanitary requirement is approximately 100 m^3/day.

Water Treatment System

Boiler feedwater makeup is supplied from the Rozov Kladenets Lake. The water is demineralized and desalinated in the water treatment plant. The water treatment plant consists of lime decarbonization, mechanical filtration, and an ion exchange (cation, twin anion, and a mixed bed) system. The treatment plant capacity is rated at 180 t/h, and is fully automated.

Cooling water for the two cooling towers is supplied from the Rozov Kladenets Lake. The rated capacity of the twin cooling towers is 11,354 m^3 (5677 M^3 in each cooling tower), under normal operating conditions, which cools 57,500 t/h (water temperature reduction of 282 K). Cooling water is discharged to the Sokolista River as necessary.

Ash and Process Wastes Handling

Fly ash and slag are transported hydraulically from the power plant to Isritska ash dump site (waste treatment ponds) which consists of three independent waste pits (total 52.3 ha). In addition, a series of interconnecting drains transports plant process waste waters (e.g. yard drainage, blow down, wash up waters, cooling waters) to the ash dump site.

Only one of the three waste treatment ponds is operative, with the other two remaining in standby (while dewatering). The waste water is settled in the treatment pond. "Clarified" waste water is returned to the plant for reuse in the ash removal process. Any waste water that is not reused is discharged to the Sokolista River.

The discharges from the waste treatment ponds to the Sokolista River are subject to regulations as developed by the Bulgarian Ministry for the Environment. As such, this discharge is monitored by NEK, and the results reported to the ministry.

The current sampling point is located prior to the discharge into the Sokolista River.

Air Emissions

All boiler emissions are emitted through one of four electrostatic precipitator designed for a 99.5% efficiency. All fly ash is then returned to the waste treatment ponds as noted in the ash handling procedures. After passing through the electrostatic precipitator, the exhaust gases are discharged to the ambient air via a 325m steel stack, with a diameter of 12.45 meteres.

Stack sampling points are located just prior to the ID fan inlets.

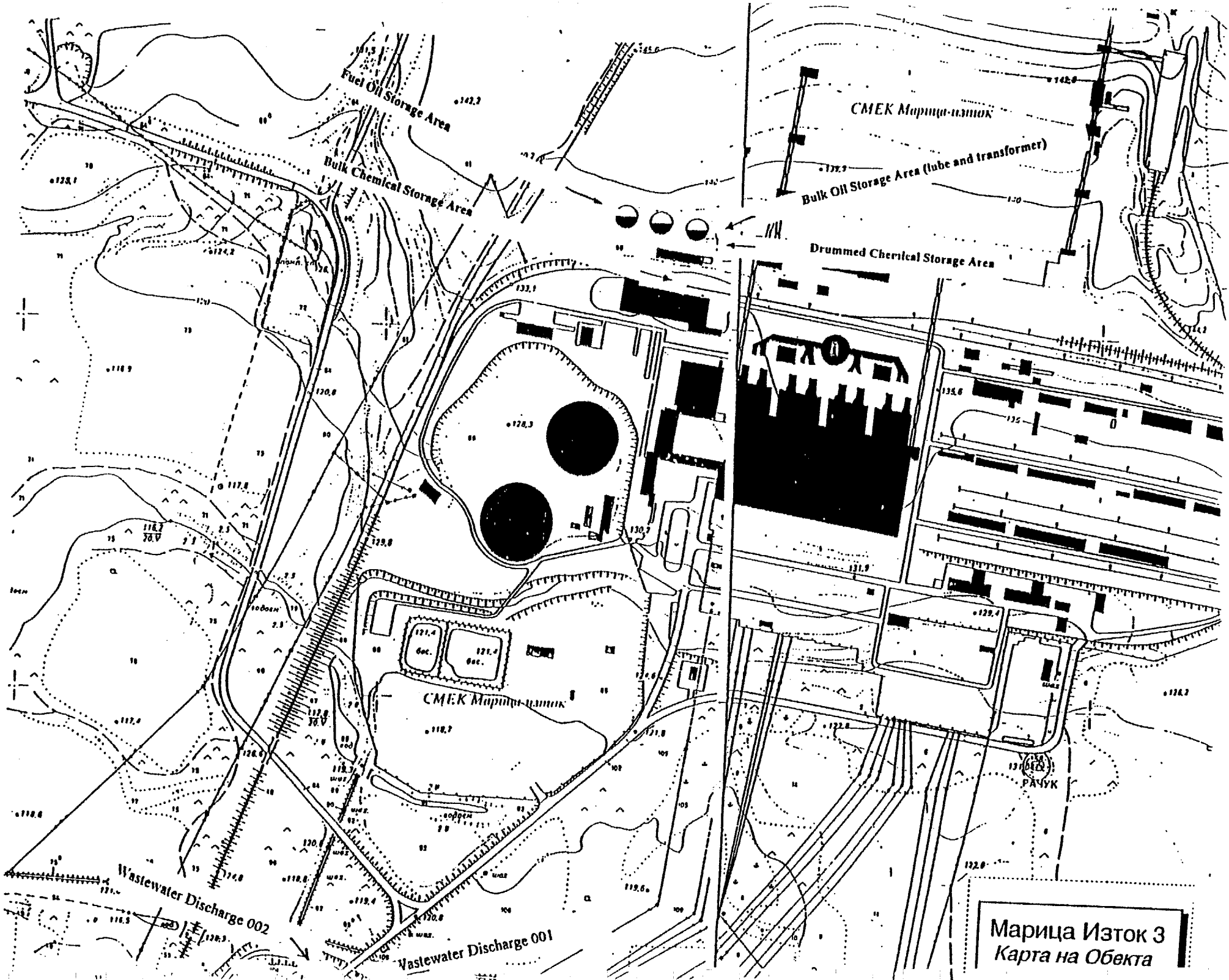
Chemical Storage

The following chemicals are stored on site.

Chemical	Location(s)	Type	Amount
Sulfuric Acid	Bulk Chemical Storage Area	Tank	120 m^3
Sodium Hydroxide	Bulk Chemical Storage Area	Tank	140 m^3
Hydrochloric Acid	Bulk Chemical Storage Area	Tank	125 m^3
Lubricating Oil	Bulk Oil Storage Area Tanks (3)		50 m^3 each
Transformer Oil	Bulk Oil Storage Area Tanks (3)		50 m^3 each
Fuel Oil	Bulk Oil Storage Area Tanks (3)		8000 tons each
Misc. Drum	Drum Storage Area		200 - 1 each (several)

These are the main chemical storage areas.

PLANT LAYOUT DRAWINGS AND MISCELLANEOUS SCHEMATICS


Fuel Oil Storage Area
Bulk Chemical Storage Area
СМЕК Марица-изток
Bulk Oil Storage Area (lube and transformer)
Drummed Chemical Storage Area
СМЕК Марица-изток
РАЧУК
Wastewater Discharge 002
Wastewater Discharge 001
Марица Изток 3
Карта на Обекта

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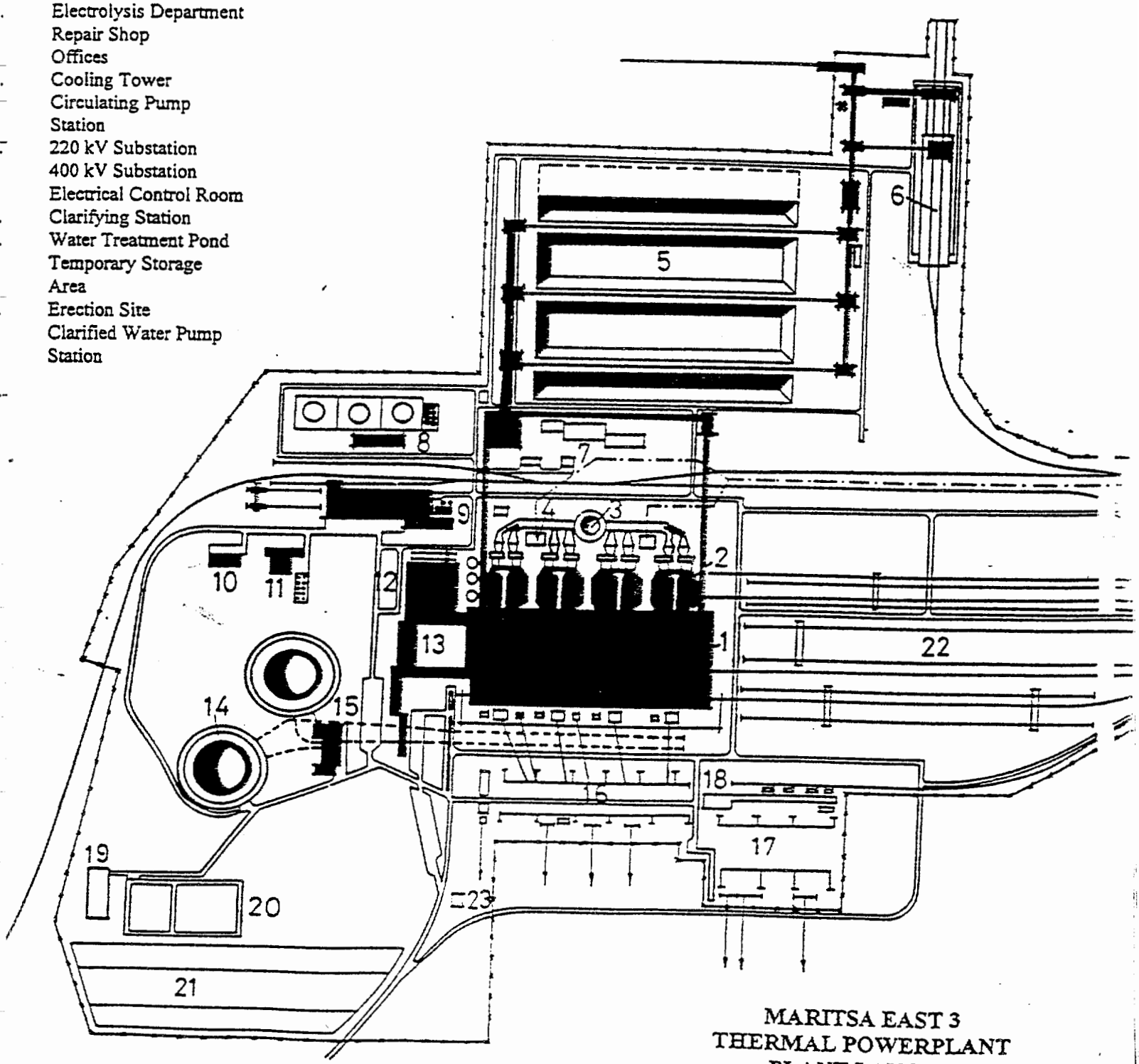
1. Main Building
2. Two Duct ESP
3. 325 M Concrete Stack
4. Dredge Pump Station
5. Coal handling and Coal Storage
6. Rail unloading (coal)
7. Startup Boiler
8. Oil Storage Facility (#6 fuel oil)
9. Water Treatment area
10. Fire Department
11. Electrolysis Department
12. Repair Shop
13. Offices
14. Cooling Tower
15. Circulating Pump Station
16. 220 kV Substation
17. 400 kV Substation
18. Electrical Control Room
19. Clarifying Station
20. Water Treatment Pond
21. Temporary Storage Area
22. Erection Site
23. Clarified Water Pump Station



MARITSA EAST 3
THERMAL POWERPLANT
PLANT LAYOUT

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NEK ENVIRONMENTAL GOAL AND OBJECTIVES
AND
MARITSA EAST 3 ENVIRONMENTAL OBJECTIVES

The environmental performance of the Maritsa East 3 Power Plant is evaluated based on a comparison of how well the Plant meets expected goals and objectives. These goals and objectives are set by the Company to enable the Plant to focus its efforts on agreed upon performance standards such as operating in compliance with regulations, improving processes, and other measurable factors.

These performance standards are the basis for all other environmental activities at the Plant. For example, the Plant should organize and operate in such a manner as to meet the goals. In some cases, intermediate goals will enable the Plant to continue to make progress toward meeting ultimate goals which may be years away.

Therefore, all of the following sections which deal with Plant organization and staffing, monitoring, reporting, and feedback to operations are based on the goals and objectives stated in this section.

CORPORATE ENVIRONMENTAL GOAL
(Proposed)

Corporate Environmental Goal - ***Protect the Environment***

Objective: Develop an Environmental Management System.

Objective: Identify, prioritize, and reduce negative impacts on the environment.

Collect environmental data for each plant using measurements taken in the field by qualified NEK staff using NEK equipment.

Establish a monitoring system to assure that all emissions from each generating station are monitored at least quarterly.

Objective: Focus on the importance of environmental value in the assessment of energy resources.

Perform a baseline environmental audit at each plant.

Objective: Maximize workplace safety and minimize exposure to hazards.

Develop and deliver a training program for all staff to instruct them in environmental issues and procedures to minimize adverse impacts.

Objective: Develop innovative ideas and technologies that improve the quality of the environment.

Establish a company-wide Environmental Team with representatives from each power plant to identify opportunities for improvements and new approaches.

MARITSA EAST 3 ENVIRONMENTAL GOAL 1996

Maritsa East 3 will institute a power plant wide environmental management system and an environmental organization. An Environmental Team consisting of Deputy Plant Manager, the EHS Manager, and the Environmental Engineer will work with all employees to mitigate the environmental impacts of the plant.

Maritsa East 3 Objectives

1. Establish a comprehensive environmental monitoring program at Maritsa East 3.

2. Characterize all of the Plant's waste streams in terms of quality and quantity.

3. Identify and implement at least one significant reduction in each of the waste streams identified in key action 2, (air, water, and solid waste).

4. Develop and deliver a training program for all staff at the plant to instruct them in environmental issues and procedures to minimize adverse environmental impacts.

5. Conduct a plant wide environmental audit.

6. Participate on the NEK corporate environmental team.

MARITSA EAST 3

ENVIRONMENTAL ORGANIZATION

THE MARITSA EAST 3 ENVIRONMENTAL TEAM

Maritsa East 3 has formed a team of experts within the plant whose task will be to monitor and correct environmental problems. This team is known as The Environmental Council. The Council consists of the Chief Engineer, the Environmental, Safety and Health Manager, the Plant Environmental Engineer, the Heads of the Boiler, Turbine, Electrical, PEO, Ash Transport, Chemical, RCC, BC-1, and BC-2 Departments.

The objective of this team is to ensure that all environmental matters are properly addressed in a timely and cost effective manner. This team will meet on a monthly basis to review compliance programs at Maritsa East 3, and to set pollution prevention goals.

Kev Personnel

While all plant personnel are vital to the success of the program here at Maritsa East 3, the responsibility for the day-to-day management of environmental operations is the responsibility of several key individuals. These persons are the Plant Manager, the Deputy Plant Manager, the Environmental Health and Safety Manager, the Plant Environmental Engineer, and each Department Manager. An overview of each person's responsibility is as follows:

Plant Manager

The Plant Manager communicates the company and plant environmental policies. He ensures that environmental goals are established. He also allocates the resources necessary to ensure compliance with the Best Management Practices (BMP) and existing regulations. If deficiencies are found, he ensures that a compliance plan is established to correct the deficiencies.

Chief Engineer

The Chief Engineer ensures that the plant is in compliance with all regulations, or that a compliance plan is established to correct any deficiencies. The Chief Engineer ensures that all Department Managers are held accountable for environmental compliance at Maritsa East 3.

The Chief Engineer chairs the Environmental Council.

Environmental Health and Safety Manager

The Environmental Health and Safety Manager serves as the Plant's primary environmental compliance officer and reports directly to the Deputy Plant Manager. He supervises all aspects of plant environmental compliance, including licensing, reporting, enforcement and training. He also meets with the Ministry of the Environment and the NEK Corporate Environmental Department. The Environmental Health and Safety Manager reports environmental status on a periodic basis to the Deputy Plant Manager and the Plant Manager.

The incumbent in this position is the key environmental position at the plant. He is the Environmental Team Leader and, as such, he works with plant management to establish environmental goals for the plant. He is responsible for reporting periodically on the environmental status of the plant, including non-compliance issues and progress towards achieving environmental goals of the plant.

The Environmental Health and Safety Manager is the Deputy Chairman of the Environmental Council.

Plant Environmental Engineer

The Plant Environmental Engineer is responsible for all day-to-day compliance with existing standards and the Best Management Practices that Maritsa East 3 has implemented. He assists all Departments in resolving compliance issues. He submits compliance reports to the Environmental Health and Safety Manager, and monitors the implementation of any corrective actions necessary.

The Plant Environmental Engineer is responsible for providing or assisting in the provision of environmental training of plant personnel to assure that they are trained to adequately to perform their environmental duties. The Plant Environmental Engineer will work with each Department Manager to ensure that personnel are properly trained.

Department Manager

Each Department Manager provides the technical and labor resources to ensure compliance with the BMP and existing environmental standards. The Department Manager, with the assistance of the Plant Environmental Engineer and the Environmental Health and Safety Manager, ensures that all personnel are trained and can respond appropriately in environmental matters.

MARITSA EAST 3

COMMUNICATIONS

COMMUNICATIONS

Effective communications among all levels of NEK and the MOE are critical to the success of the Maritsa East 3 environmental program. Good communication is necessary to inform plant management of environmental performance so that actions can be taken to improve performance. This applies to immediate non-compliance conditions as well as longer term issues such as reporting on progress toward achieving goals.

In order to create baseline information, routine monitoring results should be recorded and communicated regularly. The flowcharts in Appendix B illustrate communications for specific processes and personnel. Of particular importance are the actions required to prevent or improve non-compliance conditions.

Routine Environmental Communications

Periodic reporting is necessary to keep Plant management informed of environmental issues. Written periodic reports should be generated by the Environmental Engineer and routed to the Environmental Health and Safety Manager and Deputy Plant Manager. Routine environmental communications among staff occur on a daily basis. An example of this would be the status of a sampling report. Documented reporting would be on a less frequent basis. Documented routine environmental reports include the following:

Weekly Status Reports

A weekly exception report will be completed by the Environmental Engineer. This report will summarize exceptions to any license conditions, as well as exceptions to established Best Management Practices. This report will be based on information received from the Laboratory, Operations, and other departments as required. An example of this 1-2 page summary report is in Appendix A.

Monthly Reports

Monthly reports summarize all environmental activity at the plant for the previous month, as well as highlight any upcoming or ongoing projects of significance. This report will provide a detailed summary of activity. This report should be distributed to plant management as well as NEK Headquarters. An example of the monthly summary report is in Appendix A.

External Reports

Frequently, agencies such as the MOE (both regional and State), and the World Bank may require environmental communications, both written and oral. All external reports should be reviewed by the Environmental Health and Safety Manager prior to being issued. Copies of correspondence should also be sent to NEK Headquarters. In addition, the Environmental Health and Safety Manager shall be kept informed as to interactions between the MOE and Maritsa East 3 and/or NEK personnel.

Emergency Environmental Communications

When license conditions or Best Management Practices are violated in such a manner as to cause "serious" environmental harm, immediate notification and action is necessary.

The Environmental Staff Engineer shall first notify the Environmental Health and Safety Manager of any incident that has caused or is likely to cause "serious" environmental harm. While the Staff Engineer is working on the resolution of the problem, the Environmental Health and Safety Manager, or his designee, shall make the necessary notifications to the Chief Engineer, the Plant Manager, the NEK Environmental Department, and the Ministry of the Environment (Stara Zagora Region).

The Environmental Health and Safety Manager shall meet with the MOE and NEK Management as necessary to review the situation. This review will include the cause of the incident, the corrective action taken, and any potential long term corrective measures necessary to prevent recurrence. The Environmental Health and Safety Manager will submit a written report to Chief Engineer, the Plant Manager, the NEK Environmental Department, and the Ministry of the Environment (Stara Zagora Region) following each such incident.

See the flow charts in Appendix B for a detail of the reporting procedures.

Emergency Phone Numbers

Plant	Person	Home	Office
Plant Manager	Mr. Yanko Anguelov		
Deputy Plant Manager	Mr. Ivan Stoykov		
Environmental Health and Safety Manager	Mr. Geno Tarrurov		
Environmental Staff Engineer	Mr. Zeliazko Sourchev		
Operations Department Manager	As required		

NEK Corporate

Corporate Environmental Manager	Mr. Hristo Schvabsky

Ministry of the Environment (MOE)

Stara Zagora Office	Dr. Barrakova or designee

MARITSA EAST 3

ENVIRONMENTAL AUDIT

Refer to the
"Wastewater Discharge System Initial Field Audit"
under separate cover

MARITSA EAST 3

ENVIRONMENTAL TRAINING

TRAINING

Environmental training at Maritsa East 3 is to be continuous throughout each employee's career. Training consists of formal classroom, routine meetings, group discussions, and on the job training. These training sessions are intended to provide employees with the environmental awareness necessary to perform their jobs. The employee training program also educates employees about the general importance of preventing a release of pollutants to water, air, or land. The employee training program schedule and an example for chemical handling is included.

The current training program includes:

Weekly Supervisory Meeting (Managers, Supervisors)

This will be conducted with the production meeting, and current environmental performance will be reviewed, as well as potential solutions to any current problems. In addition, any regulatory updates, source testing, operational issues affecting environmental performance, and permitting issues will be reviewed.

Quarterly Supervisory Environmental Updates (Managers, Supervisors)

Each quarter, applicable standards, permits, reporting, record keeping, previous quarter's performance, operations and maintenance, and hazardous material handling will be reviewed with the Department Managers.

Monthly Environmental Updates (All Employees)

Each month, all employees will receive updates on current regulations, spill response, housekeeping, how we are doing, and participate in ways to reduce environmental impact. These meetings will emphasize safety and environmental training.

These sessions are intended to provide the operating personnel with an understanding of regulatory requirements and how their actions impact compliance with the standards.

Annual Environmental Training (Individual Departments)

Annually, appropriate employees will be trained in areas such as proper chemical handling, proper storage and disposal, boiler emissions and control, solid waste handling, and other environmental topics. This training will range from two to eight hours, depending upon the individuals area of responsibility. This training should include environmental awareness, policy, goals, requirements and tools available. The Environmental Manager, or the designee, and the appropriate Department Manager will prepare the specific training courses. A typical training schedule is on page 23, as well as an example Chemical Handling course outline. Similar ones

should be prepared for other specific areas, such as General Environmental Training (including Pollution Prevention), Oil Storage and Disposal, and Boiler Emissions.

In addition to this training, each employee will have at least 54 hours (total) of Chemical Handling and Fire Protection Training, Accident Prevention and Management, Emergency Simulation Training, and Pertinent Maintenance Training per year.

Periodic Supervisory Training

The Department Supervisors of Maritsa East 3 undergo specific technical training every two years, which includes environmental aspects as well as other technical issues.

The Management of Maritsa East 3 (Deputy Plant Manager, Plant Manager,) undergo advanced Management Leadership, which should include environmental policy making, as well as strategic environmental planning.

On The Job Training (Individual Departments)

All employees will be trained on chemicals in their area including hazards and good housekeeping techniques. In addition, some departments will have specific training needs such as Coal Handling--(an example would be training to minimize coal pile contaminated runoff). Each Department Manager, with the assistance of the Environmental Health and Safety Manager, will develop training needs based on the current regulations and Best Management Practices.

Annually, at least one training course each in Air Quality, Chemical Handling, Wastewater Management, and Solid Waste Management will be developed and delivered to appropriate Maritsa East 3 employees. By doing this, all employees will receive the initial training within the next 1 to 3 years. After the initial course development delivery, the courses will then need only annual updates to improve their timeliness and quality. This will be a good investment for the improvement of environmental performance at Maritsa East 3.

TRAINING SCHEDULE

Maritsa East 3

Training Course	Departments	Frequency
Chemical Handling (4 hrs. per employee)	Water Treatment, Chemical Laboratory Maintenance Department	Annual
Oil Storage and Disposal (2 hrs. per employee)	Wastewater Treatment, Chemical Laboratory Maintenance Department	Annual
Boiler Emissions (8 hrs. per employee)	Operators	Annual
Solid Waste Handling (8 hrs. per employee)	Ash, Wastewater Treatment	Annual
Wastewater Management (4 hrs. per employee	Wastewater Treatment, Chemical Laboratory	Annual
General Environmental Training (2 hrs. per employee)	All Employees	Annual
Supervisory Updates (1 hr. per supervisor/manager))	All Supervisors/Managers	Monthly

CHEMICAL HANDLING

EXAMPLE OF COURSE OUTLINE

1. Review the list of all chemicals stored on site. This would include a brief description of use, quantity, location, and storage container.

2. Review the list of all chemicals this specific group of employees would normally come in contact with (varies by group).

   Chemicals

   Quantity of Material Stored and Location

   Physical Characteristics (ph, flash point, density of vapors etc...)

   Environmental and Health Hazards of each chemical

   Safe Handling Procedures, including Personal Protective Equipment required

   Emergency Response

   Proper Disposal Techniques

   Recordkeeping and Reporting Requirements

DEFINITIONS

DEFINITIONS

Best Management Practices - Those practices used by NEK to help conduct operations in an environmentally acceptable manner.

Effluents - Liquid discharges which are released from plant operations to the environment.

Receiving Waters - Bodies of water such as rivers to which effluents are discharged.

Emissions - Gaseous or particulate discharges into the atmosphere from plant processes.

Ambient Air - The existing local and regional air.

Hazardous Materials - Those materials which present a hazard to health or the environment.

WASTEWATER MANAGEMENT

CONTENTS:

Introduction
Summary of Process, Discharge Points, and Discharge Schematic
License Requirements
Sampling and Analysis
Reports
Recordkeeping Protocols #37, 38, 39
Testing Schedule

WASTEWATER MANAGEMENT

INTRODUCTION

Water resources are extremely important to the safe and efficient operations of Maritsa East 3. Water is utilized in all aspects of power generation, such as condenser cooling, boiler water makeup, sealing and cooling water, housekeeping, and sanitary needs. Maritsa East 3 management recognizes that in order to continue plant operations, water is a vital resource. Therefore, Maritsa East 3 personnel must strive to protect this resource through conservation efforts and minimizing pollutant discharges.

This section, Wastewater Management, outlines proper monitoring procedures and responses to Maritsa East 3 discharges to the Sokolista River. This ection should be reviewed annually and updated as new regulations and techniques (sampling, monitoring, or reporting) are implemented.

WASTEWATER DISCHARGE

LICENSE REQUIREMENTS

Based on documentation from the Ministry of the Environment, the following minimum analysis shall be performed by Maritsa East 3 staff:

Every Other Day	Sample and analyze for the following:	
	pH Petroleum products (oil and grease) Total dissolved solids	Sulfates Conductivity Suspended solids
Monthly	Sample and analyze for the following:	
	pH Biological Oxygen Demand (BOD) Total dissolved solids	Dissolved Oxygen Chlorides
Quarterly	Sample and analyze for the following:	
	Phosphates Ferrous (iron)	Manganese Heavy Metals

Note that these are the minimum analysis required. It is important that additional samples and parameters be tested so that the waste streams can be fully characterized. Additional samples will better define out of compliance times.

WASTEWATER MANAGEMENT

SUMMARY OF PROCESS DISCHARGE POINTS - WASTEWATER

Discharge 001

Discharge 001 is the main discharge from Maritsa East 3 into the Sokolitsa River, and contains the excess effluent from the ash ponds that cannot be recycled back into the process water stream (due to low process water demand). It also contains coal pile runoff, and miscellaneous yard drainage. This discharge is through a 1.5 meter concrete pipe, as detailed on the attached print. This discharge is regulated under Protocol 11, SG Issue 96, 12.12.1986, Third Class Standards (in Appendix C).

Wastewater sampling should occur prior to the discharge due to the high velocities at the entrance to the Sokolista River. The high velocities prevent a representative sample from being taken. Sampling is to be done at the last point prior to the discharge, just after the recycled wastewater and the excess wastewater are separated. Representative samples should reflect current operating conditions.

Discharge 002

Discharge 002 is the cooling tower discharge, as well as septic wastes, oil, and chemical storage area drainage, and general yard drainage from this area of the facility. This discharge is regulated under Protocol 11, SG Issue 96, 12.12.1986, Third Class Standards (in Appendix C).

Wastewater sampling should occur prior to the discharge due to the high velocities at the entrance to the Sokolista River. Representative samples should reflect current operating conditions of this intermittent discharge.

NEK - THERMAL POWER PLANT - "MARITSA EAST 3"

PROTOCOL #37

Chemical control of waste waters, discharged into river Sokolitsa

Sample taking cite: **Clarified waters "Izbistrenl Vodi"**

Person taking the sample: Jelka Delcheva

Date: **March 23, 1996**

ANALYSIS

Air Temperature 16C Water Temperature 15C

INDICATORS	UNIT	RESULT	NORM
pH		8.05	6.0-9.0
Dissolved Oxygen	mg/l	6.0	>=2.0
Saturation with Oxygen	percent	61.89	>=20
Total dry remains (105 C)	mg/l	3005	
Dissolved Substances	mg/l	2391	1500
Undissolved Substances	mg/l	614	100
Petroleum Products	mg/l	4.4	0.5
Oxidation (permanganate)	mg/l	126.4	40
Nitrogen (ammonium)	mg/l	2.81	5.0
Iron	mg/l	1.87	5.0
Smell	Bala	1	3.0

Conclusion: The samples DO NOT CORRESPOND to the Class III norms (State Newspaper, issue 96 from 12.12.1986) for the analyzed indicators numbered 7, 8, 9, 10

Subunit: NEK Co. TPP "Maritsa Iztok 3"
conducting the analysis: J. Detcheva

Signed by Head of the Laboratory

NEK - THERMAL POWER PLANT - "MARITSA EAST 3"

PROTOCOL #38

Chemical control of waste waters, discharged into river Sokolitsa

Sample taking cite: **Industrial Waters**

Person taking the sample: Jelka Delcheva

Date: **March 25, 1996**

ANALYSIS

Air Temperature 13C Water Temperature 14C

INDICATORS	UNIT	RESULT	NORM
pH		7.86	6.0-9.0
Dissolved Oxygen	mg/l	4.0	>=2.0
Saturation with Oxygen	percent	38.98	>=20
Total dry remains (105 C)	mg/l	1446	
Dissolved Substances	mg/l	1228	1500
Undissolved Substances	mg/l	218	100
Petroleum Products	mg/l	6.8	0.5
Oxidation (permanganate)	mg/l	1390	40
Nitrogen (ammonium)	mg/l	2.99	5.0
Iron	mg/l	2.46	5.0
Smell	Bala	1	3.0

Conclusion: The samples DO NOT CORRESPOND to the Class III norms (State Newspaper, issue 96 from 12.12.1986) for the analyzed indicators numbered 7, 8, 9, 10

Subunit: NEK Co. TPP "Maritsa Iztok 3"
conducting the analysis: J. Detcheva

Signed by Head of the Laboratory

NEK - THERMAL POWER PLANT - "MARITSA EAST 3"

PROTOCOL #39

Chemical control of waste waters, discharged into river Sokolitsa

Sample taking cite: **The river after the drains**

Person taking the sample: Jelka Delcheva

Date: **March 25, 1996**

ANALYSIS

Air Temperature 14C Water Temperature 8C

INDICATORS	UNIT	RESULT	NORM
pH		7.89	6.0-9.0
Dissolved Oxygen	mg/l	6.64	>=2.0
Saturation with Oxygen	percent	56.68	>=20
Total dry remains (105 C)	mg/l	1057	
Dissolved Substances	mg/l	9831	1500
Undissolved Substances	mg/l	74	100
Petroleum Products	mg/l	3.6	0.5
Oxidation (permanganate)	mg/l	44.24	40
Nitrogen (ammonium)	mg/l	2.73	5.0
Iron	mg/l	1.87	5.0
Smell	Bala	1	3.0

Conclusion: The samples DO NOT CORRESPOND to the Class III norms (State Newspaper, issue 96 from 12.12.1986) for the analyzed indicators numbered 7, 8, 9, 10

Subunit: NEK Co. TPP "Maritsa Iztok 3"
conducting the analysis: J. Detcheva

Signed by Head of the Laboratory

WASTEWATER MANAGEMENT

SAMPLING AND ANALYSIS

Sampling

The objective of sampling is to collect a small, accurate, representative amount of the wastewater. This relies on accurate and repeatable procedures by the persons performing the procedures. It is impractical to give directions covering all situations, and the best sampling procedure must be left to judgment of the individual.

There are two types of samples: grab and composite. Grab samples are single sampling events that represent only what is being discharged at the time. However, when a source is fairly constant, then the sample represents more than that instant. For some sources, such as water supplies, lakes, etc., a grab sample will accurately represent this source. However, a single grab sample does not represent most wastewater flows and is not recommended in most cases.

Multiple, time based grab samples can accurately represent wastewater flows. For example, 24 grab samples (one per hour) could accurately represent wastewater flows. Mixing these 24 samples together and then performing the analysis is called a composite sample. This type of sampling can be either manual (by hand) or automatic (with a sampler).

Sampling Procedures

In general, obtain a sample that is safe and representative, and handle it in such a way that it does not become contaminated before it reaches the laboratory. It is also important to choose the right container (e.g. glass or plastic, TFE), as containers can influence the analysis.

Use only clean sampling bottles, preferably with a 2 liter capacity. Rinse the container 2-3 times with the water to be sampled. Note that if the sample must be preserved (see the Laboratory Manager), do not perform the rinse. Preservatives are added to clean bottles to preserve samples for future analysis. Common sample preservation techniques include pH control, chemical addition, the use of amber and opaque bottles, and refrigeration.

Samples should be taken beneath the surface of the water, and for grab samples, if possible, a top, middle, and bottom (move container through the effluent stream) sample should be taken. Sample containers should be filled to within 1-2 cm from the top and sealed to prevent contamination. Samples should be returned to the laboratory for analysis as soon as possible.

Analysis

The laboratory analysis is completed for all criteria pollutants as outlined under "License Conditions" in the Appendix. Additional testing (frequency, parameters, etc...) is recommended to fully characterize each waste stream. The details of the actual laboratory procedures can be obtained from the Laboratory Manager.

SCHEDULE

for the volume and the frequency of the chemical control of samples
taken in connection with the protection of the environment

Department "Chemical" of the Thermal Power Plant "Maritsa East 3", 1996

#	INDICATORS	SAMPLE LOCATION				
		Sololitsa River before Iskritsa village	Collector "Clarified Waters"	Collector "Industrial Rain"	Outfall 001	Outfall 002
1	Air Temperature	xx	xx	xx	xx	xx
2	Water Temperature	xx	xx	xx	xx	xx
3	Color	xx	xx	xx	xx	xx
4	Smell	xx	xx	xx	xx	xx
5	pH	xx	xx	xx	xx	xx
6	Dissolved Oxygen; mg/l	xx	xx	xx	xx	xx
7	Saturation with Oxygen; %	xx	xx	xx	xx	xx
8	Total Dry Remains	xx	xx	xx	xx	xx
9	Dissolved Substances	xx	xx	xx	xx	xx
10	Undissolved Substances	xx	xx	xx	xx	xx
11	Petroleum Products	xx	xx	xx	xx	xx
12	Oxidation (peranganate)	xx	xx	xx	xx	xx
13	Nitrogen (ammonium)	xx	xx	xx	xx	xx
14	Iron	xx	xx	xx	xx	xx
15	BOD_5; mg 02/1	xx	xx	xx	xx	xx
16	Flow - L/min.	xx	xx	xx	xx	xx

Legend:
xx = 4x/week

Note: ME III schedule is not in compliance.

AIR QUALITY MANAGEMENT

CONTENTS:

Introduction
Regulatory Requirements
Emission Points
Sampling Procedures
Estimating Emissions Using AP-42
Reporting
Recordkeeping

AIR QUALITY MANAGEMENT

Introduction

Air emissions from Maritsa East 3 impact both the local and regional environments. As such, Maritsa East 3 strives to minimize these impacts when it is possible, given the current operational constraints. It is important for all Maritsa East 111 employees to conduct operations in a manner which results in the lowest possible emissions.

Maritsa East 3 emissions are primarily from the 325 M stack, which all boiler emissions are discharged. There are many minor emissions points which effect local areas, for example cooling tower venting, storage tank emissions, and solvent usage and storage.

It is important for Maritsa East 3 employees to accurately monitor and report (internally and externally) air emissions. Accurate emissions measurements also aid in the development of any control equipment which may be required, as well as serve as a baseline for measuring improvement.

This section outlines regulatory requirements, emission points, sampling procedures, estimating techniques, and recordkeeping and reporting.

Regulatory Requirements

Current regulations limit emissions from sources through ambient and source level limits. The current emissions parameters are in Appendix C. The main parameters applicable to Maritsa East 3 are summarized in the table below:

Ambient Standards (mg/m3)

	30 min Ave	24 Hour Ave	Annual
S02	0 50	0.15	05
NOx	0.60	0.10	0.10
Particulate	0.60	0.06	----
H2S	0.008	0.008	0.008

Source Emissions (mg/m3)
(Plants commissioned prior to 1992)

Domestic Coal	200	Particulate
	3500	S02
	1000	NOx
	250	CO

While it is the goal of Maritsa East 3 to meet these requirements, it is recognized that under current conditions it is not practical. However, the plant should still monitor, record, and report emissions values for these parameters (Source Emissions) to quantify performance and to seek some improvements.

Emission Points

Stack 001

Stack 001 is a 325 M steel lined concrete chimney, -m in diameter. This reinforced stack conveys all the boiler emissions from the facility, and is in accordance with GEP standards. Stack velocities range from -m/sec to -m/sec.

The testpoints for this stack prior to the stack base, in the ductwork on the horizontal run after the ID fans. The sample point is a **12** cm threaded pipe located approximately in the lower center portion of the ductwork, approximately 1-2 diameters downstream and 1-2 diameters upstream of the nearest flow disturbances.

Other Sources

Other "fugitive" emissions sources include the cooling tower vent emissions, building area vents, #6 fuel oil tank vents, lubricating tank vents, chemical storage tank vents, and shop vents (welding, machine, etc...). While these sources do not contribute to the measured ambient emissions, they do contribute to the local (plant) environment. Currently, there are no monitoring standards. However, Best Management Practices should be employed to minimize these fugitive emissions. These practices include maintaining proper tank temperatures, covering containers, and utilizing cleaning solvents efficiently.

Sampling Procedures

The objective of sampling is to obtain a representative sample of the gas stream so that estimates can be made about the gas stream in total. When stack gas measurements are conducted, certain sampling methods should be used to ensure that an accurate and representative sample is obtained from the gas stream. Gas stream concentrations are not always uniform, and influences such as boiler controls, fans, elbows, expansion/contraction, and monitoring equipment can create problems. If a sample is taken too close to a flow disturbance, care must be taken so that an accurate sample is obtained. This will usually require the establishment of a sample grid (multipoint sampling). For most applications, maintaining at least eight equivalent diameters downstream, and two equivalent diameter upstream will eliminate problems with flow stratification. Note that a sufficient distance (0.5 meters) from the stack wall must be maintained to ensure accurate sampling.

For a rectangular cross section, the equivalent diameter is determined from:

Equivalent Diameter (Eq)=2 (length) (width) / (length+width)

Once the sampling location is chosen, the flue cross section is laid out in a number of equal areas, the center of each being the point the measurement is to be taken. For circular stacks, the cross section is divided into equal annular areas, and sample points are located at the centroids of each area. These locations may be determined from:

$$r = [(2n-1) / N]^{1/2} a$$

where a = radius of duct
N=number of traverse points
n=point number (1,2,3,4....)
r=radial location from the centroid of the duct

Estimating Techniques

When accurate sampling or continuous monitoring is not available, other techniques must be used in order to quantify air emissions. One such technique is the use of emissions factors based on fuel and operating characteristics. Utilizing emissions factors is helpful in that emissions are estimated consistently, and when actual stack testing is done the emissions factors can be correlated (corrected) based on stack test results.

Emissions estimations should be done at least weekly, based on multiple analysis of the coal. Due to fuel variability, estimations may vary from 10-40%. To develop an overall average, many samples must be taken to develop confidence in the estimations.

The most common estimating technique is EPA's Standards Document AP-42, as applicable to lignite combustion. This can be found in Appendix D. In general, the two most important parameters to record are sulfur and ash. Once these are known, emissions of particulate, NOx, and S02 can be estimated. Recording combustion oxygen is very useful, as well as other operating conditions.

As more stack tests are completed, Maritsa East 3 can develop site specific emissions factors based on local coal conditions.

Recordkeeping and Reporting

Once actual sampling is done and/or estimation of emissions using AP-42 is completed, these records must be compiled. Appendix A contains a sample form used for recording air emissions based on using estimating techniques or actual stack testing. This form should be completed monthly based on multiple analysis of the coal quality and other operating conditions. It should be filed with NEK as well as kept on site. Backup information used to calculate these emissions should also be filed with this data. These records should be kept for at least 3 years to develop a history.

NON-COMBUSTION WASTE MANAGEMENT

CONTENTS:

Best Management Practices
Inventory
Storage Areas
Reports
Recordkeeping Requirements

Non-Combustion Wastes

A wide range of wastes are generated at Maritsa East 3. Liquid and solid wastes (e.g. lube oil change-outs) are routinely generated and can also be generated as a result of spills or accidents. Currently there are no regulations that deal with spills to the ground, but there are requirements should these discharges make it to surface waters such as the Sokolista River. Environmental concerns, as well as concerns for personnel safety and financial issues (lost product and cleanup costs) emphasize the need for limiting non-combustion waste generation. It is the responsibility of each employee to minimize the amount of waste being generated at Maritsa East 3. Non-combustion wastes are typically low-tech wastes which require low-tech solutions. Wastes can be minimized using a variety of techniques, depending upon the waste. For example, oil soaked dirt can be disposed of by mixing the dirt in small quantities with the coal. The oil can then be burned and the ash/dirt can be buried with the bottom ash.

The key to a successful waste minimization program is providing a method of proper segregation of wastes. This will allow employees to keep all waste streams in distinct areas. In addition, cost reductions, improved housekeeping, and improved safety are incentives for continued waste minimization reductions.

To organize a waste minimization program, Maritsa East 3 must start with an audit of all waste generating activities:

- What types of wastes are regulated by the European and/or Bulgarian Regulatory Community?
- If there are no regulated streams, what wastes are currently disposed of that are potentially harmful to plant personnel or the environment?
- Where in the plant and what is the process generating these wastes?
- Are these wastes liquid, solid, or sludges?
- How much waste is generated? Analyze this data by month and by year to see if there is a pattern.
- Does this waste get cross-contaminated with any other wastes, increasing the volume?
- How is each waste handled (stored, disposed of)?

Once these questions are answered for the major waste streams, then a reduction plan can be put into place. If limited resources are available (people, money, time), prioritizing your reductions must be done. This can only be effectively accomplished after an audit is performed. It is important to focus on the top priority first, and then on the remaining opportunities. The top priority is the item that is the most likely to be done (given budgets, manpower, etc.), and will yield a significant reduction.

A rating system should be devised to prioritize a potential reduction projects. This rating system can look like the following:

Item	Effectiveness of Solution (1-5)	X X	Ease of Implementation (1-5)	=Total =
Build Storage Pad for Wastes	5		4	20
Training Personnel on Disposal	3		3	9
Spraying Waste Oil on coal	4		3	12
Chemical Substitution	5		1	5
Recondition Processes that generate (to make less wastes)	4		2	8
Reduce inventory amounts/control distribution of solvents	5		3	15
Standardize stock (don't have 10 solvents, carry 2 if possible)	4		3	12
Implement spill prevention programs (Keep it off the ground, inspection of storage containers, proper labeling (no mixing), adequate spill response materials available, housekeeping)	5		4	20
Incineration of wastes	3		3	9

In this example, the top priority is to build a storage pad for the wastes and to implement a spill prevention program based on this example. The plant would focus resources on this solution.

Maritsa East 3 must perform an audit to determine what problems exist. Based on this audit, potential solutions, their effectiveness, and their impact can be assessed.

Some examples of waste minimization programs for specific waste streams:

Waste Oil:

Source: Transformer oils (non-pcb), crankcase oils, lube oils, oil from waste water separators

Frequency: Continuous

Minimization Strategies: Training
Segregation (separation)
Recycling
Burning onsite in boiler

Auditing will verify the effectiveness of the solution. It is important to demonstrate that waste reductions are being made.

Proper management of powerplant waste streams reduces pollution (contamination), is cost effective, and improves employee safety and morale.

APPENDIX A

Forms Used To Collect Information

Date_____

Monthly Environment Summary Report

Maritsa East 3

AIR EMISSIONS

	Coal Tons	Coal S%	NOx Tons	SO_2 Tons	CO Tons	Dust Tons	KWH
Boiler 1							
# Violations of Standard							
Boiler 2							
# Violations of Standard							
Boiler 3							
# Violations of Standard							
Boiler 4							
# Violations of Standard							

U:\JH\USAID\EX\MARCH*.ME0118.DOC

Date_____

Monthly Environment Summary Report

Maritsa East 3

WATER DISCHARGES

Cal. Day	M^3/Day Max.	M^3/Day Ave.	Solids Kg	Oil Kg	BOD Kg	Ph Ave.	Ph Max/Min	DO	BOD
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
Monthly Summary									
Avg									
Max									

Date_____

WEEKLY EXCEPTION REPORT

Maritsa East 3

Discharge Point	Date and Time in violation	Date and Time Corrected	Parameter Exceeded	License or BMP	Corrective Action

Submitted by: _____

Routing: EHS Manager
Deputy Plant Manager
Department Heads

Date_____

Monthly Environment Summary Report

Maritsa East 3

WASTES

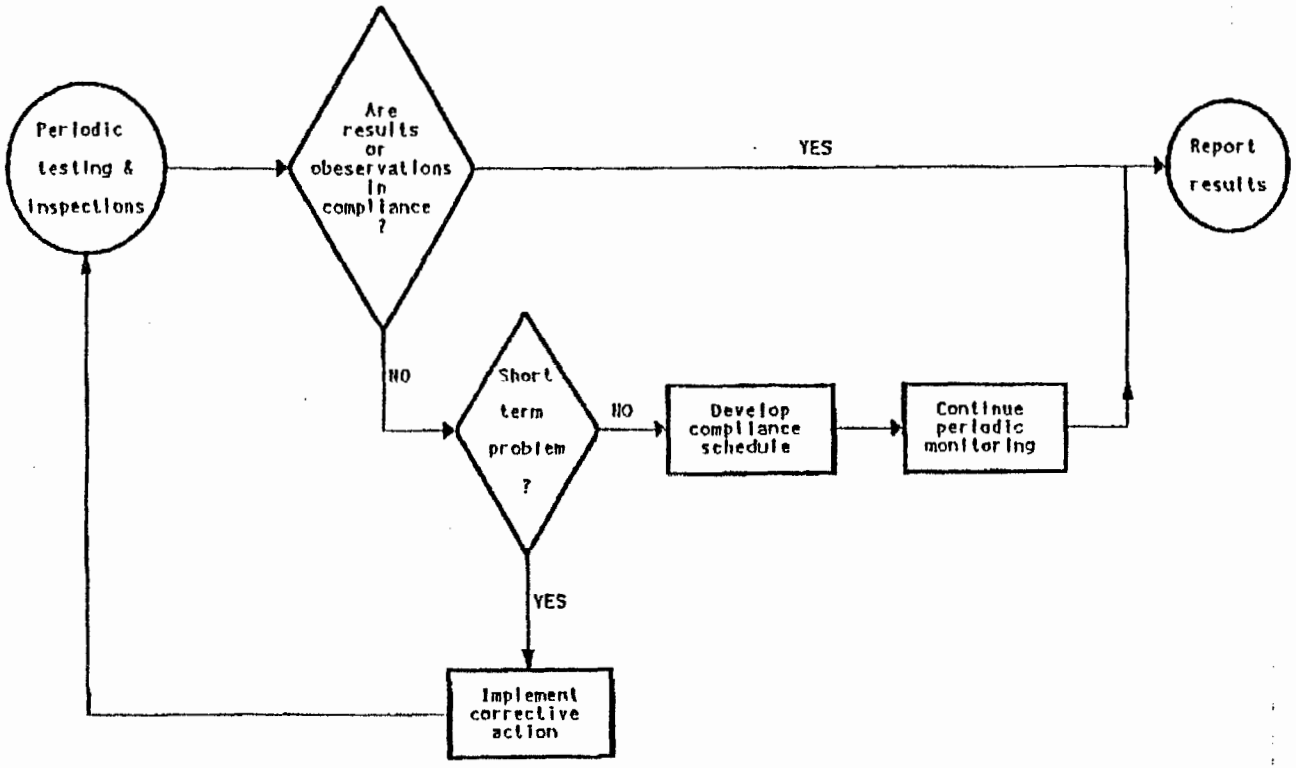
Type of Waste	Amount	Where Disposal	Comments

APPENDIX B

Flowcharts

NEK Maritsa East III Compliance Cycle

Overview



FH U:\BULGARIA\OVERVIEW
JML 3/12/96

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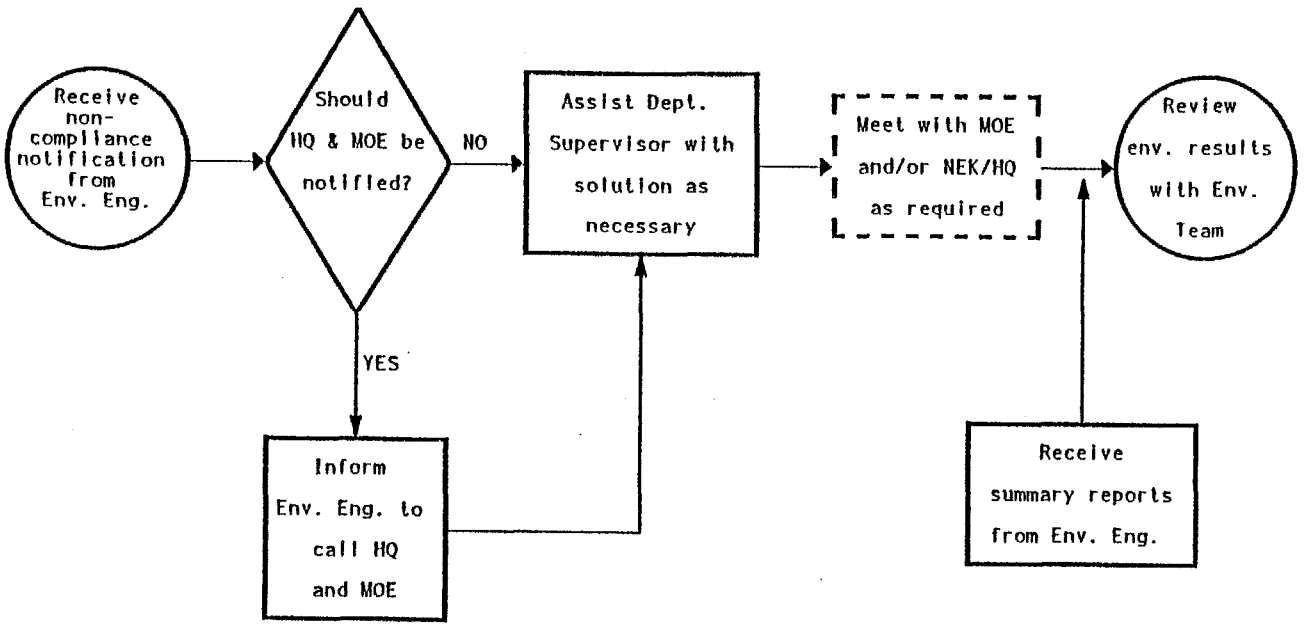
NEK Maritsa East I,, Compliance Cycle

Deputy Plant Manager



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JML 3/12/96

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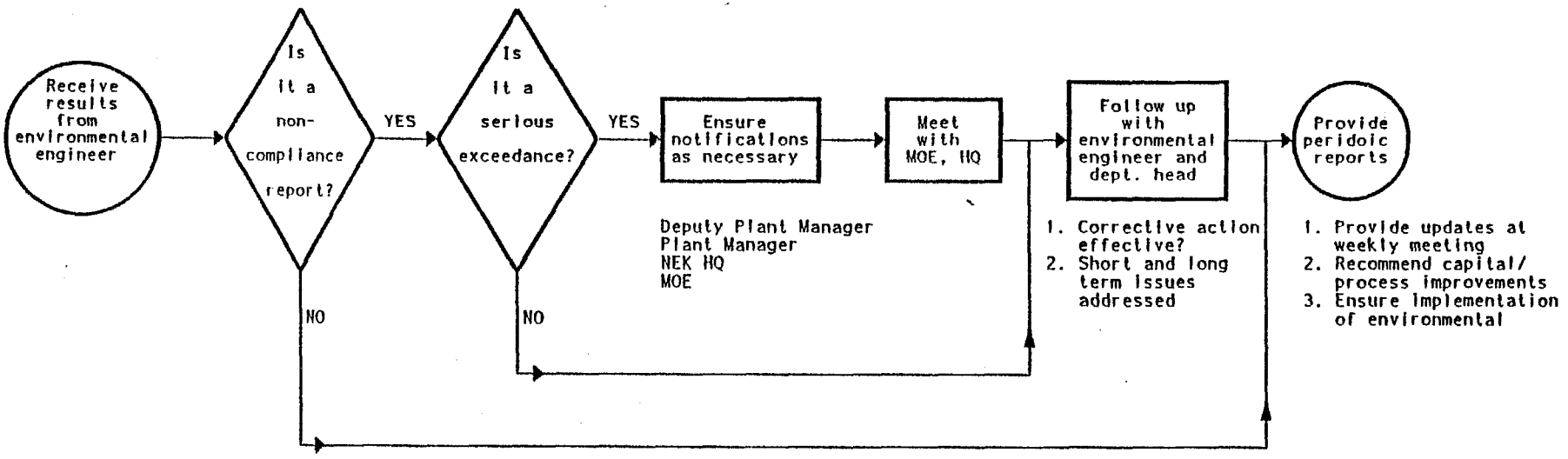
NEK Maritsa East I Compliance Cycle

Manager of Environmental, Health and Safety



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JML 3/12/96

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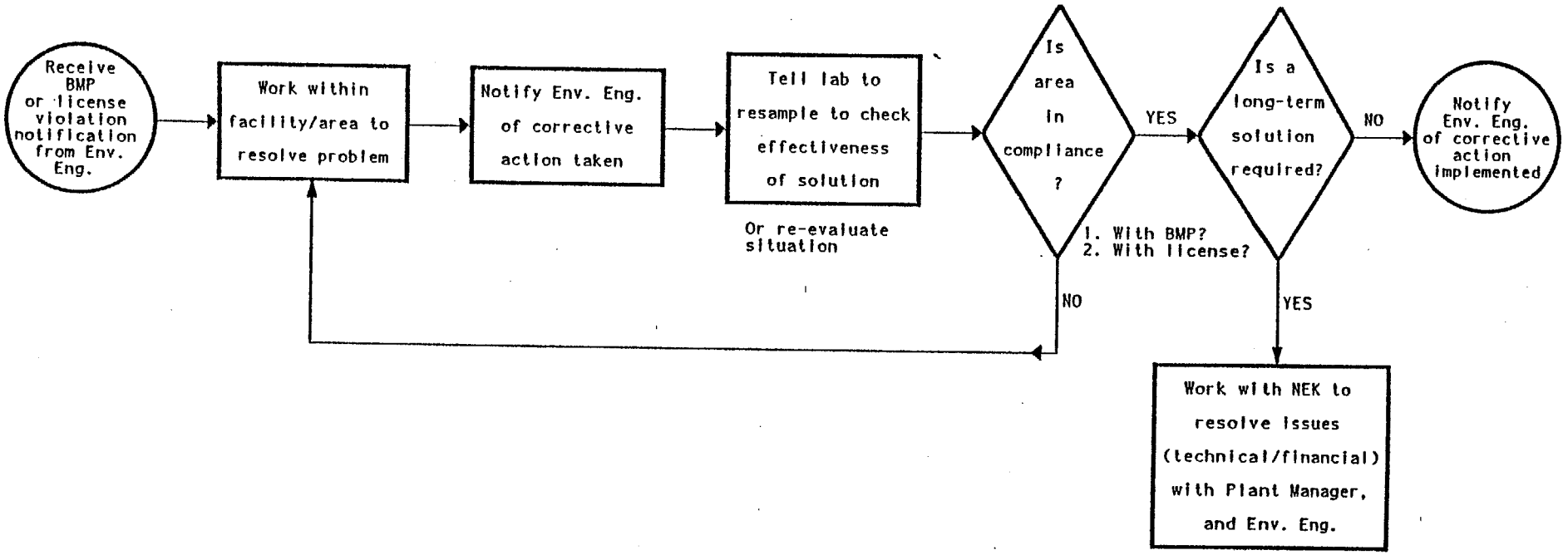
NEK Maritsa East I Compliance Cycle

Department Supervisor



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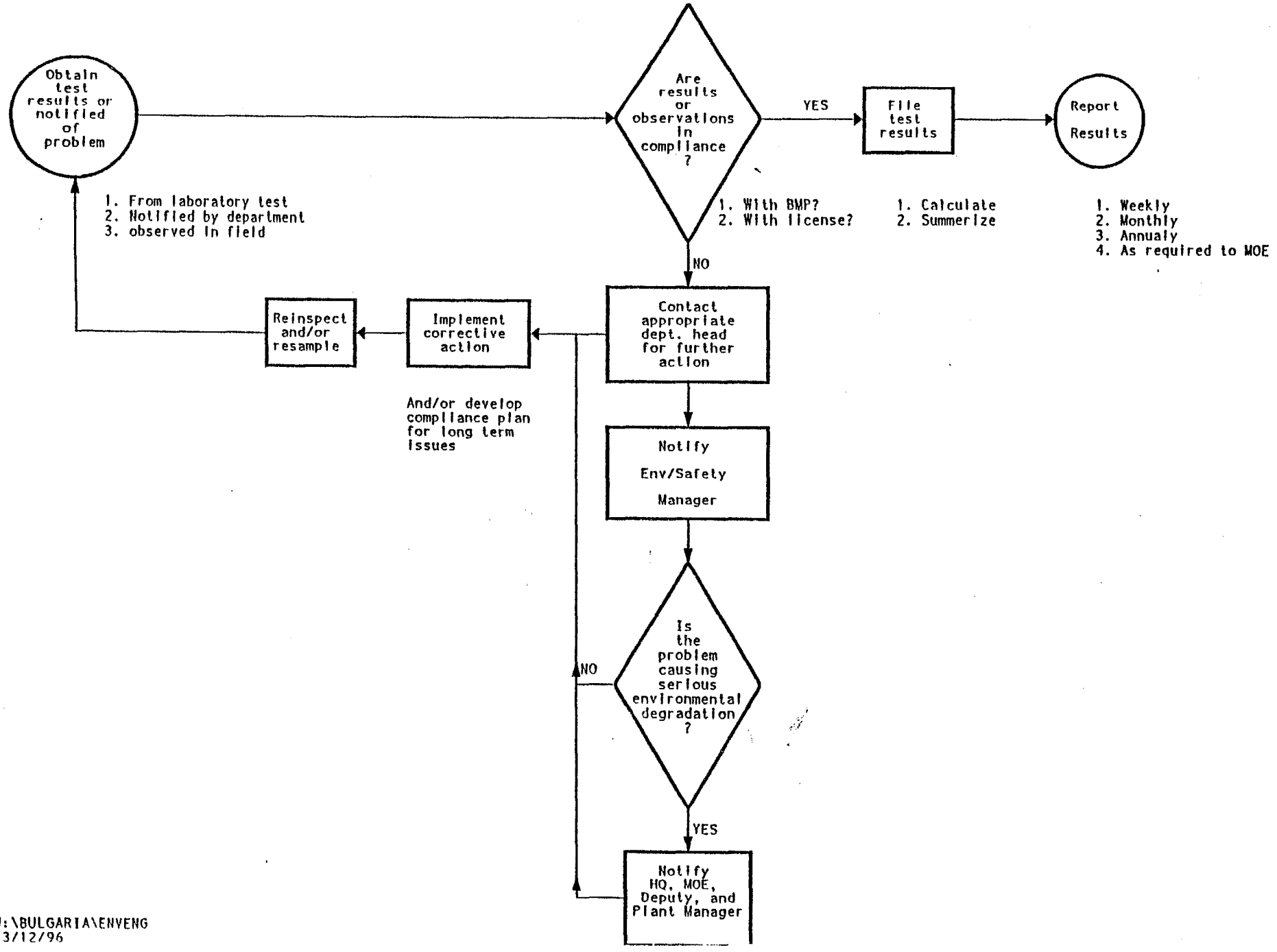
JML 3/12/96

NEK Maritsa East 1 Compliance Cycle

Environmental Engineer



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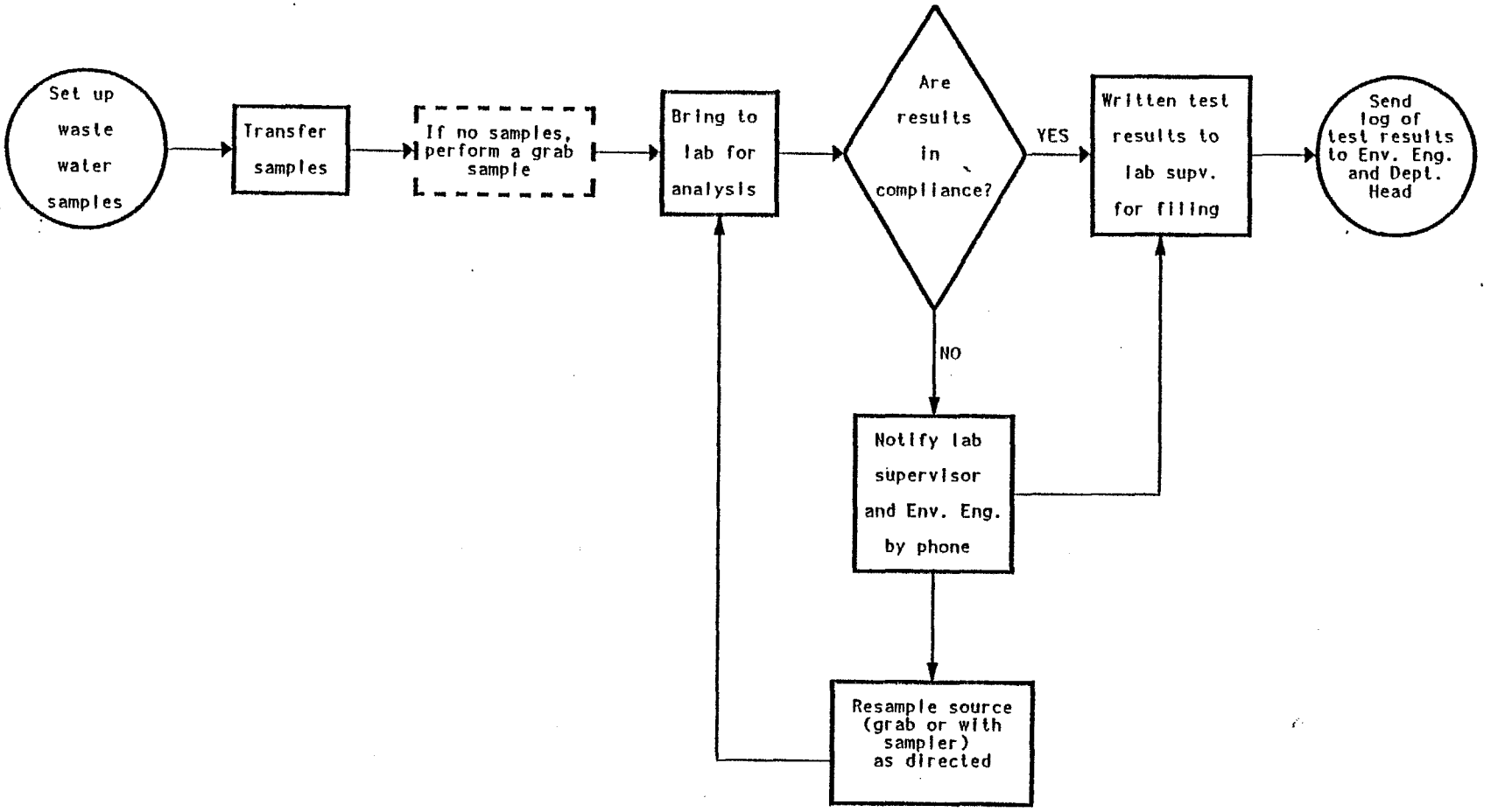
JML 3/12/96

NEK Maritsa East I, Compliance Cycle

Chemistry Lab



FN U:\BULGARIA\CHEMLAB
VML 3/12/96

APPENDIX C

Environmental Compliance Requirements

Environmental Compliance Requirements

Headquarters

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Compliance Dates Done	Comments
Air										
Geneva Protocol	Transboundary air pollution	All Fossil Fuel	Volatile Compnds	Reduce emissions	None by NEK	HQ	Dichev	1/1/96		Tracking acton by NEK HQ
Helsinki Protocol	Transboundary air pollution	All Fossil Fuel	Sulfur Dioxide	Reduce emissions by 30%	None by NEK	HQ	Dichev	1/1/96		Tracking action by NEK HQ
Oslo Protocol	Transboundary air pollution	All Fossil Fuel	Further SO2 steps	Further reduce emissions	None by NEK	HQ	Dichev	1/1/96		Tracking action by NEK HQ
Sofia Protocol	Transboundary air pollution	All Fossil Fuel	Nitrogen Oxides	Reduce to '87 levels	None by NEK	HQ	Dichev	1/1/96		Tracking action by NEK HQ
All										
Bulgarian Constitution	Right to clean environment	All Fuels	All pollutants	Comply with emission standards	Adherance to laws	HQ	Dichev	1/1/96		See Art. 55
Environ. Impact Assment	Review required by Reg 1	All Fuels	All pollutants	Environ. review of existing power plants	Complince based on negotiation	Hq	Dichev	1/1/96		Detailed review of the impact of existing plants
Environ. Protection Act	Establishment of penalties	All Fuels	All pollutants	Standards and penalties established	Track compliance at NEK	HQ	Dichev	1/1/96		HQ tracks for all NEK
Water										
National Waters Law	Must obtain use permit	All Fuels	None	Dams and sludge ponds regulated	Annual	HQ	Dichev	1/1/96		HQ obtains/updates water use permit for plant

Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Air										
Best Management Practice			SO2, Nox, Dust	Characterize waste stream	Report to management	Environmental	Susshov	9/30/96		
Best Management Practice			SO2, Nox, Dust	Begin monitoring waste stream		Environmental	Susshov	10/1/96		
Best Management Practice			SO2, Nox, Dust	Prepare monthly monitoring report for October	Report to management	Environmental	Susshov	11/1/96		
Best Management Practice			SO2, Nox, Dust	Set reduction target	Report to management	Environmental	Tanurov	12/1/96		
Best Management Practice			SO2, Nox, Dust	Prepare monthly monitoring report for November	Report to management	Environmental	Susshov	12/1/96		
Best Management Practice			SO2, Nox, Dust	Prepare monthly monitoring report for December	Report to management	Environmental	Susshov	1/1/97		
Best Management Practice			All	Prepare annual monitoring report	Report to management	Environmental	Susshov	1/31/97		Prepare annual report showing progress towards targets for air
Clean Air Law	May not emit above limit	Domes. Coal	Sulfur oxides	650 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissions monthly
Clean Air Law	May not emit above limit	Domes. Coal	Dust	200 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissions monthly
Clean Air Law	May not emit above limits	Domes. Coal	Criteria pollutants	Emission Standards established	Monthly summary to mngmt.	Power Plant	Staff Nam	1/1/96		Staff prepares summary report based on testing
Clean Air Law	May not emit above limit	Domes. Coal	Nitrogen oxides	600 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissins monthly
Clean Air Law	May not emit above limit	Domes. Coal	Carbon monoxide	250 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissions monthly
Clean Air Law	May not emit avove limit	Domes. Coal	Criteria pollutants	Emission standards in the law	Occasionally, unannounced	MOE	Inspectora	1/1/96		MOE staff samples emissions
Solid										
Best Management Practice			Solid Waste	Characterize waste stream	Report to management	Environmental	Susshov	5/30/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Begin monitoring waste stream	Monthly report to management	Environmental	Susshov	6/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Best Management Practice			Solid Waste	Prepare monthly monitoring report for June	Report to management	Environmental	Susshov	7/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for July	Report to management	Environmental	Susshov	8/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for August	Report to management	Environmental	Susshov	9/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for September	Report to management	Environmental	Susshov	10/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for October	Report to management	Environmental	Susshov	11/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for November	Report to management	Environmental	Susshov	12/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Set reduction target	Report to management	Environmental	Tarrurov	12/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for December	Report to management	Environmental	Susshov	1/1/97		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			All	Prepare annual monitoring report	Report to management	Environmental	Susshov	1/31/97		Prepare annual report showing progress towards targets for solid waste
Water										
Best Management Practice			Wastewater	Begin monitoring wastestream		Environmental	Susshov	6/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for June	Report to management	Environmental	Susshov	7/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report July	Report to management	Environmental	Susshov	8/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report August	Report to management	Environmental	Susshov	9/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for September	Report to management	Environmental	Susshov	10/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for October	Report to management	Environmental	Susshov	11/1/96		
Best Management Practice			Wastewater	Set exceedance targets	Report to management	Environmental	Tarrurov	12/1/96		

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Best Management Practice			Wastewater	Prepare monthly monitoring report for November	Report to management	Environmental	Susshov	12/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for December	Report to management	Environmental	Susshov	1/1/97		
Best Management Practice			All	Prepare annual monitoring report	Report to management	Environmental	Susshov	1/31/97		Prepare annual report showing progress towards targets for water
Clean Water Law	May not discharge above limit	Domes. Coal	Zinc	10.0 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limits	Domes. Coal	All pollutants	Effluent standards in the law	Monthly summary to mngmt	Power Plant	Staff Nam	1/1/96		Staff prepares summary report based on testing
Clean Water Law	May not discharge above limit	Domes. Coal	Temperature	Less than 3°C above seasonal	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Suspended solids	100 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Chlorides	400 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Sulfate	400 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Cadmium	0.02 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Murcury	0.01 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Chromium (III)	1.0 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Chromium (VI)	0.1 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Nickel	0.5 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Lead	0.2 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limits	Domes. Coal	All pollutants	Effient standards in the law	Occasionally, unannounced	MOE	Inspectors	1/1/96		MOE staff samples discharge
Clean Water Law	May not discharge above limit	Domes. Coal	Copper	0.5 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Compliance Dates: Dept.	Staff	Due	Done	Comments
Natnl Wter Brd, Dcree. 199	No water use without permit	All Fuels	None	Use permit reuired to use surface waters	Monthly	Power Plant	Staff Nam	1/1/96		HQ obtains/updates water use permit for plant

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APPENDIX D

EPA Standards Document AP-42

Table 1.7-1 (Metric Units). EMISSION FACTORS FOR SULFUR OXIDES (SO_x), NITROGEN OXIDES (NO_x), AND CARBON MONOXIDE (CO) FROM UNCONTROLLED LIGNITE COMBUSTION[a]

Firing Configuration (SCC)[b]	SO_x[c]		NO_x[d]		CO[e]	
	Emission Factor	Rating	Emission Factor	Rating	Emission Factor	Rating
Pulverized coal, dry bottom, tangential (SCC 10100302)	15S[e]	C	3.7	C		
Pulverized coal, dry bottom, wall fired (SCC 10100301)	15S	C	5.6	C	0.13	C
Cyclone (SCC 10100303)	15S	C	6.3	C		
Spreader stoker (SCC 10100306)	15S	C	2.9	C		
Other stoker (SCC 10100304)[e]	15S	C	2.9	C		
Atmospheric fluidized bed (no SCC)	3S	D	1.8	C	0.08	C

[a]Units are kg of pollutant/Mg of fuel burned.
[b]SCC= Source Classification Code.
[c]Reference 2.
[d]References 2-3, 7-8, 15-16.
[e]References 7, 16.
[e]S= Weight % sulfur content of lignite, wet basis.
For high sodium ash (Na_2O > 8%), use 11S.
For low sodium ash (Na_2O < 2%), use 17S.
If ash sodium content is unknown, use 15S.

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Table 1.7-3. EMISSION FACTORS FOR PARTICULATE MATTER (PM) AND NITROUS OXIDE (N_2O) FROM LIGNITE COMBUSTION[a]

Firing Configuration (SCC)	PM[b]		N_2O[c]	
	Emission Factor	Rating	Emission Factor	Rating
Pulverized coal, dry bottom, tangential (SCC 10100302)	3.3A (6.5A)	E		
Pulverized coal, dry bottom, wall fired (SCC 10100301)	2.6A (5.1A)	E		
Cyclone (SCC 10100303)	3.4A (6.7A)	C		
Spreader stoker (SCC 10100306)	4.0A (8.0A)	E		
Other stoker (SCC 10100304)	1.7A (3.4A)	E		
Atmospheric fluidized bed			1.2 (2.5)	E

[a]Units are kg of pollutant/Mg of fuel burned and lb. of pollutant/ton of fuel burned.
SCC= Source Classification Code.
[b]References 5-6, 12, 14. A = weight % ash content of lignite, wet basis.
[c]Reference 18.

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APPENDIX E

MSDS Sheets

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name	Emergency Telephone Number
Address *(Number, Street, City, State, and ZIP Code)*	Telephone Number for Information
	Date Prepared
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*

Section III — Physical/Chemical Characteristics

Boiling Point		Specific Gravity (H_2O = 1)	
Vapor Pressure (mm Hg.)		Melting Point	
Vapor Density (AIR = 1)		Evaporation Rate (Butyl Acetate = 1)	

Solubility in Water

Appearance and Odor

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL

Extinguishing Media

Special Fire Fighting Procedures

Unusual Fire and Explosion Hazards

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable		

Incompatibility (*Materials to Avoid*)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion?

Health Hazards (*Acute and Chronic*)

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure

Medical Conditions
Generally Aggravated by Exposure

Emergency and First Aid Procedures

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Waste Disposal Method

Precautions to Be Taken in Handling and Storing

Other Precautions

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)

Ventilation	Local Exhaust	Special
	Mechanical (*General*)	Other

Protective Gloves	Eye Protection

Other Protective Clothing or Equipment

Work/Hygienic Practices

☆U.S. Government Printing Office: 1987—191-004/6436

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HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: [redacted] DATE: 02/14/94 PAGE 01
PRODUCT CODE: 16-10362-00

CAS # 001310-73-2

FORMULA: NaOH

CHEMICAL FAMILY: Alkali

CHEMICAL NAME AND SYNONYMS: [redacted], Lye Solution

SUPPLIERS NAME: Harcros Chemicals Inc
5200 Speaker Rd
Kansas City Ks 66106
SUPPLIERS PHONE NUMBER: 913-321-3131
TRANSPROTATION EMERGENCY PHONE NUMBER: 1-800-424-9300

S.A.R.A. INFORMATION

HAZARDS: Fire:No Pressure:No Reactivity:No Acute: Yes Chronic:Ye
PHYSICAL DATA: Mixture:Yes Pure:No Solid:No Liquid:Yes Gas:No

SECTION I Hazardous Ingredients

INGREDIENTS	PERCENT	AIR CONTAMINANT LEVELS
SODIUM HYDROXIDE (CAS # 1310-73-2)	25%	TWA/TLV 2 mg/m3 Ceil ACGIH/OSHA
Water (CAS # 7732-18-5)	75%	N/D

SECTION II Health Hazards

Threshold Limit Value: See Section I

Potential Effects of Exposure:

Eyes:
Caustic soda is destructive to eye tissues on contact. Will cause severe burns that result in damage to the eyes and even blindness. Mist or dust can cause irritation with high concentrations causing burns.

Skin:
Major potential hazard - solid or liquid contact with skin can cause severe burns deep ulcerations. Contact with dust or mist can cause multiple burns with temporary loss of hair at burn site. Solutions of up to 4% in water may not cause irritation and burning for several hours, while 25 to 50% solutions can cause these effects in less than 3 minutes.

Inhalation:
Airborne concentrations of dust, mist, or spray of caustic soda may cause mild irritation at 2mg/m(3), and, at higher concentrations, damage to the upper respiratory tract and even to the lung tissue proper which could produce chemical pneumonia, depending upon severity of exposure. Chronic overexposure to spray or mist may result in irritation or tissue damage and an increased susceptibility to respiratory illness, and permanent lung damage.

Ingestion:
Caustic soda can cause severe burns and complete tissue

CONTINUED ON PAGE 02

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KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: CAUSTIC SODA LIQ 25% DRY BASIS DATE: 02/14/94 PAGE 02
PRODUCT CODE: 16-10362-00

SECTION II Health Hazards CONTINUED

perforation of mucous membranes of the mouth, throat, esophag and stomach if swallowed. Severe scarring of the throat can occur after swallowing. Death can result from ingestion.

First aid:

Eyes:
Immediately flush eyes with large quantities of water, for at least a 15 minute period, periodically lifting upper and lower lids to ensure washing of entire surface. Washing eyes within one minute is essential to achieve maximum effectiveness. See medical attention immediately. Contact lenses should not be worn when working with this chemical.

Skin:
Immediately wash contaminated skin with plenty of water. If wearing goggles flush head and face thoroughly before removing goggles. Remove contaminated clothing under the shower. This washing may be followed with a rinse with vinegar or dilute acetic acid (3% solution) if available. If skin feels slippery caustic may be present in sufficient quantities to cause rash or burn, continue washing until slippery, feeling is gone. Remove contaminated clothing and footwear and wash clothing before re-use. Discard footwear which cannot be decontaminated. Seek medical attention immediately.

Inhalation:
Get person out of contaminated area to fresh air. If breathing has stopped, artificial respiration should be started. Oxygen may be administered, if readily availble. Seek medical attention immediately.

Ingestion:
If swallowed, DO NOT induce vomiting. Give large quantities of water. If available, give several glasses of milk or acidic beverages (tomato or orange juice, carbonated soft drinks). Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Seek medical attention immediately.

Other Information:

HEALTH HAZARD DATA:

Acute LC(50)	>40 mg/m(3)/1 Hr.
Oral Acute LD(50) (rat):	140 - 340 mg/kg
Dermal Acute LD(50) (Rabbit):	> 2 g/kg.

Sodium Hydroxide is not listed on the IARC, NTP, OSHA or EPA carcinogen lists.

Medical Conditions aggravated by Exposure:
May aggravate existing skin and/or eye conditions on contact, also asthma, respiratory and cardiovascular disease.

Reproductive Toxicity:
No studies are identified relative to sodium hydroxide and reproductive toxicity.

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: The IDLH level for sodium hydroxide is 200 mg/cubic-meter.

PRIMARY ROUTES OF EXPOSURE: Inhalation and skin.

NOTES TO PHYSICIAN:

CONTINUED ON PAGE 03

HARCROS CHEMICALS INC
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PRODUCT NAME: CAUSTIC SODA LIQ 25% DRY BASIS DATE: 02/14/94 PAGE 03
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SECTION II Health Hazards CONTINUED

CORROSIVE! May cause stricture. If lavage is performed, suggest endotracheal and/or esophagoscopic control.

SECTION III Special Protection Information

Respiratory Protection:
For exposures above PEL/TLV and up to 50 mg/m(3) use any powered air-purifying respirator with a dust and mist filter or supplied-air respirator operating in a continuous flow mode. In each case full eye protection essential. For this recommendation and advice on higher concentrations see Ref.(1) Section IX.

Ventilation Required:
Provide ventilation adequate to maintain airborne concentrations below OSHA limits of 2 mg/m(3). Local exhaust ventilation preferred where dilutions or reactions cause misting, or solid caustic soda ground up and dust generated. Air concentration of carbon monoxide formed by reaction of caustic soda and reducing sugars should not exceed 50 ppm for an 8 hr TWA. Ventilation equipment should be corrosion-resistant, and, if hydrogen may be generated, explosion-proof.

Protective Clothing:

Eyes:
Chemical splash goggles and face shield should be worn whenever exposure possible. Have eye baths immediately available where eye contact can occur.

Skin:
Gloves coated with rubber, PVC, or other plastic required, also hard hats, safety shoes, and rubber boots, along with rubber apron when handling caustic soda. Provide a safety shower at any location where skin contact can occur. Sleeves should be worn over gloves and pants over rubber boots to avoid skin contact. Caustic soda attacks wool.

Additional Protective Measures:

Neutralization supplies, (3% acetic acid preferably) and abundant running water should be close at hand in working and storage areas.

SECTION IV Fire & Explosion Hazard Data

Flash Point (Method): None

Flammable Limits (% Volume in Air):

Upper: Non-Flammable

Lower: Non-Flammable

Extinguishing Media:
Dry chemicals or "alcohol" foam for adjacent fire. Avoid use of carbon dioxide if possible as it reacts exothermically with

CONTINUED ON PAGE 04

HARCROS CHEMICALS INC
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MATERIAL SAFETY DATA SHEET

PRODUCT NAME: CAUSTIC SODA LIQ 25% DRY BASIS DATE: 02/14/94 PAGE 04
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SECTION IV Fire & Explosion Hazard Data CONTINUED

caustic soda.

Special Fire Fighting Procedures:
Pressure-demand self-contained respiratory protection and protective clothing should be worn by firefighters. Thoroughl decontaminate equipment after use. Flood with water to cool containers, using care not to splatter or splash the material Ref (3) Sec IX.

Unusual Fire and Explosion Hazards:
Highly flammable hydrogen is formed by reaction of concentrate caustic soda with aluminum, tin, zinc, and alloys which contai these metals. See Section IX in regard to violent reaction when water added to concentrated caustic soda. Contact with water or moisture may generate enough heat to ignite combustible materials.

SECTION V Physical Data

Boiling Point: 25% approx. 231 deg. F

Specific Gravity (H(2)O=1): 20 deg. C/4
25% approx. 1.219
See Ref. (4) Section IX

Vapor Pressure (MM HG.): 68 deg. F
25% approx. 11.

Vapor Density (AIR=1): N/A

Evaporation Rate (Butyl Acetate=1): N/A

Solubility in Water: Complete

Percent Volatile by Volume: Not Volatile

pH: (1% aqueous solution) approx. 13

Freezing Point: 25% +4 deg. F

Appearance and Odor: Clear liquid, no odor

SECTION VI Reactivity Data

Stability:
Stable in normal use, in a sealed container. Is hygroscopic and will pick up moisture on exposure to humid air. Will slowly absorb carbon dioxide from the air to form sodium carbonate.

Incompatibility:
With strong acids, without dilution or agitation, will produce a violent or explosive reaction. Will react with leather and wool, also aluminum, zinc, tin, and alloys containing these metals, nitrocarbons and halocarbons (Trichlorethylene will react to form spontaneously flammable dichloroacetylene). Also reacts with acetaldehyde, acrolein, chlorine trifluoride, maleic anhydride, phosphorus, pentoxide, tetrahydrofuran and hydroquinone. Will react with metals to form hydrogen gas only

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SECTION VI Reactivity Data CONTINUED

in presence of moisture. Protect against contact with moisture At elevated temperatures may cause caustic embrittlement of steel.

Hazardous Decomposition Products:
Caustic soda reacts with reducing sugars (e.g. in food soils when used in cleaning compounds) to form hazardous carbon monoxide. Before entering closed or semi-closed areas, after cleaning, test and monitor space for carbon monoxide.

Hazardous Polymerization: Will not occur.

SECTION VII Spill and Leak Procedures

Steps to be taken if material is released or spilled:

Clean-up workers must use protective clothing and equipment to prevent body contact. Running water should be available for emergency use.

Liquid Product: Preferred clean-up procedure dam up spill, cover with sand or inert porous material, transfer into caustic-resistant containers (labelled "Corrosive"). Solid Product: When solid sodium hydroxide is spilled in a dry condition, it can be promptly shoveled up for recovery or disposal. (CAUTION! Avoid Dusting, Avoid Contact with skin or eyes). Control the disposal of the waste solid. (Delay in clean-up may allow absorption of moisture from the atmosphere and may increase the difficulties of clean-up). Avoid flushing chemical into public sewer or water systems. Flush clean-up area with water. Dilute acid, preferably acetic acid may be used to neutralize final traces of caustic (observe appropriate safety precautions for handling acid solutions). Small spills may be neutralized with dilute acidic solution (dilute-acetic or 6 molar hydrochloric acid) before flushing away. For large spills pick up spill with vacuum equipment (alkali resistant) for disposal, or flush to holding area with water, prior to neutralization. Notify local health and pollution control officials if flushed spillage unavoidably enters public sewers orother water systems. If spill occurs into navigable water, notify U.S. Coast Guard. Caution! Spill area will be slippery. Spills of 1000 lbs or more must be reported to the National Response Center - Phone: (800) 424-8802.

Waste Disposal Method:

If not diluted and neutralized, this product, as a liquid, can become a hazardous waste as designated by the Environmental Protection Agency under authority of the Resource Conservation and Recovery Act (RCRA). The waste would have RCRA Hazardous Waste number D002 (Corrosive) as designated in 40 CFR 261.22. Federal, state and local regulations should be followed in disposing of this substance; also empty containers and materials used in cleaning up spills or leaks.

If solid product becomes a waste, it DOES NOT meet the criteria of a hazardous waste as defined under 40 CFR 261, in that it does not exhibit the characteristics of hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D.

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SECTION VII Spill and Leak Procedures CONTINUED

As a nonhazardous solid waste it should be disposed of in accordance with local, state, and federal regulations by treatment in a wastewater treatment system.

AQUATIC TOXICITY:
Aquatic Toxicity Rating 2 (TLM96:100-10 ppm)
TLM96 - Gambusia Affinis (Mosquito-Fish) 125 ppm)
TLM48 - Brown Shrimp 33-100 ppm, Cockle 330-1000 ppm, armed bullhead.
33-100 ppm, unspecified platfish 33-100 ppm
TLM24 - Small Bass 31.7 ppm, Bluegill 76.6 ppm

SECTION VIII D.O.T. Shipping Information

Proper Shipping Name:	SODIUM HYDROXIDE SOLUTION
Hazard Class:	8, UN1824 PGII
Label Requirements:	CORROSIVE
Reportable Quantity:	SHIPMENTS OF 04000 LBS OR MORE ARE REPOR TABLE
Other Information:	

SECTION IX Additional Information

This information may be of importance to you:

FURTHER PRECAUTIONARY MEASURES:
Keep container closed. Avoid contact with strong acids to prevent violent or explosive reactions. Do not allow water to get into container because of violent reaction with concentrated caustic soda. Avoid storing next to strong acids.

When diluting, add Caustic Soda slowly with agitation to surface of solution to avoid violent splattering, boiling and eruption. Water should always be lukewarm (80-100 deg. F), never start with hot or cold water.

Product can react EXPLOSIVELY with acids, aldehydes, and many other organic chemicals - when mixing product with solutions containing such chemicals, follow all of above mixing instructions, and add product very gradually, while stirring constantly.

Emptied containers retain vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned, or destroyed.

Minimize skin contact. Wash with soap and water before eating, drinking, smoking or using toilet facilities. Wash thoroughly after handling or contact. Exposure can cause burns which are not immediately painful or visible. (Never touch eyes or face with hands or gloves that may be contaminated with caustic soda)

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PRODUCT NAME: CAUSTIC SODA LIQ 25% DRY BASIS DATE: 02/14/94 PAGE 07
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SECTION IX Additional Information CONTINUED

REFERENCES:

(1) NIOSH/OSHA Pocket Guide to Chemical Hazards DHHS(NIOSH) Publication No. 85-114.

HAZARD RATING	NPCAHMIS
Health	3
Flammability	0
Reactivity	2
Special Protection	X

********* E N D O F R E P O R T *********

NAME: GENE TURNER DATE ISSUED: 01/10/1994
DATE REVISED:

< = LESS THAN N/A = NOT APPLICABLE UNK = UNKNOWN
> = MORE THAN N/D = NOT DETERMINED
N/E = NOT ESTABLISHED

The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completenes of the data contained herein. This information is offered for your info mation, consideration and investigation. You should satisfy yourself th you have all current data relevant to your particular use. Harcros Chemicals Inc knows of no medical condition, other than those noted on this material safety data sheet, which aregenerally recognized as being aggravated by exposure to this product.

NEK CO. BRANCH THERMAL POWER PLANT "MARITSA IZTOK 3"

ORDER
0139

THERMAL POWER PLANT "MARITSA IZTOK 2", MARCH 26, 1996

In connection with the coordinated environmental plan from NEK Co. and CMP Co. USA and the introduction of environmental management system for environmental protection from the hazardous emission discharged from the thermal power plant Maritsa Iztok 3.

I ORDER

1. For the timely and professional solution of the arising environmental problems at the power plant, the **ENVIRONMENTAL COUNCIL** to be created consisted of:

CHAIRMAN:	Chief Engineer
DEPUTY CHAIRMAN:	Head of Boiler Department
AND MEMBERS:	Inspector Environmental Protection
	Head of Boiler Department
	Head of Turbine Department
	Head of Electrical Department
	Head of PEO Department
	Head of Slag Transporting Department
	Head of Chemical Department
	Head of RCC
	Head of BC-1 Department
	Head of BC-2 Department

2. The evaluation of all discharge streams of the power plant concerning their quantitative and qualitative content to be conducted according to a schedule coordinated in advance with the Head of OKD and approved by the Chief Engineer of the Thermal Power Plant for the volume and the frequency of the chemical control.

   Responsible Person: Head of Chemical Department

3. When taking samples for the chemical analysis the conditions for picking, conservation, transportation, and storage of the samples to be monitored and complied with.

   Responsible Person: Head of Chemical Department

4. I designate the following permanent cites for taking water samples for the chemical analysis:
   - Sokolitsa river - before Iskritsa river

- Collector "Clarified waters/Izbistreni Vodi"
- Collector "Industrial rain"
- Sokolitsa river - after the mouthing of the canal waters into the river.

5. The chemical control of the discharged waters to cover the following analysis:
   - Water temperature
   - Color
   - Smell
   - pH
   - Dissolved oxygen
   - Saturation O2 in percent
   - Oxidation (permanganate)
   - Undissolved substances
   - Nitrogen (ammonium)
   - Iron (total)
   - Petroleum products
   - BPK_5 - only for the everyday necessities/faces waters

6. In case of finding of deviations of the norm requirements, the following people have to be informed immediately: engineer on duty and inspector for environmental protection.

   Responsible Person: Head of Chemical Department

7. The results of the analyzed samples are to be timely presented to the inspector for environmental protection in the form of a protocol.

   Responsible Person: Head of Chemical Department

8. In case of emergency pollution of the environment of doubts of such, as well as in case of coming signals of pollution, the management of the Chemical Department directs the urgent sample taking and analysis.

   The volume, frequency, and duration of the control are determined by the Head of the Chemical Department according to the possible pollution and impacts.

9. When implementing the control of the discharged waters and gases from the regional environmental inspection or other controlling bodies, the management of the Chemical Department to organize the joint taking of the samples and their timely development.

10. At the same time with the taking of the samples of waste waters from collectors: "Clarified Waters" and "Industrial rain", the personnel of the Chemical Department to determine also the capacity of the discharged in river Sokolitsa waters. The metodics of the determination is to be coordinated with sector PTO in TO.

    Responsible Person: Head of Chemical Department
    Head of sector PTC

11. The control of the air emissions for dust and sulfur dioxide content performed from the Chemical Department is also to be implemented according to an established schedule.

Responsible Person: Head of Chemical Department

12. Environmental violations will be considered and proposed for sanctioning in cases of:
    - insufficient quantities of washing water necessary for the normal operations of the electro filters.
    - the feeding of water from the slag storage to the washing shaft with exceeding content of undissolved substances.
    - the discharge in the power plant drainage of oils and other petroleum products.
    - the discharge of unburned fuel oil when firing the boilers.
    - the turning on and the loading of the electro filters in inappropriate times.
    - the discharge of everyday necessities/feces waters outside the designated for this purpose places.

13. The facilities will be considered as technically unfit in cases of:
    - operation of the electro filters with worn out nozzles of the ash-washing apparatuses or not functional mechanisms.
    - untimely removal of holes of the slag-ash-transporting pipes and plugging up of the drains.
    - untimely cleaning of the precipitators, the drains, the shafts, as well as the other hydro facilities.
    - the pollution of the power plant area with refuse including pollution occurring in the process of its transportation.

14. I make the inspector for environmental protection responsible to the monitoring of the good working order of the facilities and require his reaction to immediately react in cases of deviations.

15. Environmental protection subjects to be included in the personal training programs.

Responsible Person: Heads of Departments

16. I make the inspector of environmental protection responsible for to stay in contact with the environmental department of NEK Co. Sofia and the Regional Environmental Inspection - Stara Zagora for the purpose of exchanging information and methodical guidelines.

17. I make the Department Heads and the Work Managers to present information that is timely and has the necessary accuracy for the allowed environmental violations as well as preparing of such information for the needs of the Regional Environmental Inspection, and the Ministry of the Environment. The same information to be presented to the Inspector for Environmental Protection in the OKD Department.

18. The Head of OKD should report monthly to the Chief Engineer the environmental situation at the power plant as well as the unsolved environmental problems.

19. In cases of detecting of environmental violations I make the Department Supervisors responsible for demanding written explanations from the staff which allowed the violations. These explanations should be presented in the OKD Department.

The control for the execution of this order I give to the Chief Engineer of the power plant - Eng. Ivan Stoikov.

Plant Manager _____

(Eng. Ianko Angelov)

APPENDIX G

Sample Training Modules

Chemical Handling

Awareness Program

Jamie Cough
NEK April 1996

Chemical Handling Procedures

Agenda:

Goals of Training

Definitions

Review Chemical Inventories
including Storage Locations and Storage Amounts

Physical Characteristics

Safe Handling Procedures

Emergency Response

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Chemical Handling Procedures

Agenda (cont.):

Proper Disposal Techniques

Recordkeeping and Reporting Requirements

Employee Information and Training Goals

1. Recognize the Hazards to the Environment and the Employee

2. Understand Chemicals and their Properties

3. Know how to Safely Handle Emergencies and Proper Disposal Techniques

Definitions

Hazardous Chemical

Health Hazard

Physical Hazard

Hazard Determination

Chemical Inventory

Chemical	Storage Location	Storage Amount

Physical and Chemical Characteristics of Chemicals

Chemical Sodium Hydroxide 50%

Use Boiler Water Treatment Regeneration Chemical

Storage Location(s)

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Physical and Chemical Characteristics

Boiling Point

Specific Gravity

Density

Ph

Vapor Density

Fire And Explosion Hazards

Reactivity

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Safe Handling Practices

Personal Protective Equipment

Safe Handling Procedures

First Aid

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Emergency Response

Spill Response

Fire Response

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Disposal Procedures

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Recordkeeping and Reporting Requirements

Disposal Tracking

Who

What

Where

When

How

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APPENDIX H

MOE Monitoring Letter (20 July 1995)/Bulgarian Standards

67, W. Gladstone Street, 1000 Sofia, Bulgaria tel.: (359-2) 81 00 85 ; fax: (359-2) 52 16 34 or 81 05 09

To:	Mr. John Bastey	From:	Vesselin Kandev Head of Environment Protection Department
Att:		Date :	Thursday, 20 July, 1995
Fax N	1 207 622 4437	Page N	5

Dear Mr. Bastey,

Thank you for your fax of 14 July 1995. I have the pleasure to present to you the answers to you questions as far as they are regulated with the water regulations in force.

I would like to call your attention once again to the fact that the present regulations on preserving the water resources in Bulgaria are not very complete and some of them are quite old and because of that now large-scale preparatory work is carried out for the total improving and updating of the water preservation legislation.

Answers to the questions:

1. The sampling points for the monitoring the quality of the river waters actually are situated below the zone of complete mixing with the discharge in order to assess whether the quality of the river waters answer the provided purposes for their quality (in conformity with the ambient standards for the quality of the waters - the three classes as in the Regulation No7).

The zone of the complete mixing is determined individually for each individual case by experimental studies in which the characteristic features of the water receiving body and the source of discharge are taken into consideration.

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There is not any concrete method introduced through a regulation for calculating and determining the mixing zone. The effluent limits for each specific source of discharge are determined on the basis of the quality of the waters in the water receiving body which is to be reached. In some cases for the existing point sources the determination of the effluent limits in the permit for discharge is practically done according to the possibility of meeting them at the present stage, based on negotiations between the MoE's Regional Inspectorates and the discharger. These effluent limits are included in the permit for discharge which necessitates monitoring of the discharge itself (at the point of discharge) in order to identify whether its quality adheres to the requirements written in the permit for discharge.

2. NEK is obliged to control the quality of its own waste waters which are discharged (selfmonitoring) and has no obligation to test the water receiving body above and below the outfall of the waste waters.

The Regional inspectorate - Stara Zagora recommends as an advisable regime for water monitoring the following :

taking samples every other day and analyzing the following characteristics: dissolved and not dissolved substances, electric conductivity, sulfates, petroleum products and pH.

In cases of accidents it is possible to take more often the samples and to exercise the control on the specific characteristics.

3. The national network for monitoring the quality of the surface waters comprises of 460 sampling points.,

Regularly - monthly the following characteristics are to be determined : active reaction (pH), dissolved oxygen, dissolved and not dissolved substances, , content of nitrogen compounds, BOD, total solidity and chlorides. Once in three months the following parameters are measured phosphates, manganese, ferrous, heavy metals and some other parameters - and when necessary for some specific points.

4. The available apparatus of the Regional inspectorate - Stara Zagora, the ways of taking samples, devices for sample taking, preserving the samples etc. as follows:

a) for waters:
sample taking with plastic buckets and automatic sample taking device - "Calypso EA 2000". For the parameters which are changing in time (as oxygen, temperature etc.) the analysis is done at the place of sample taking, for specified parameters the samples are preserved in a refrigerator.

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The main laboratory apparatus for the analysis of samples in the Regional inspectorate are: pH-meter, conductometer, Oxy-meter, KV/VIS - Lambda 2, AAC, segment analyzer, device for measuring of TOC.

b) for the air:
For control of the emissions of harmful substances in the smoke gases - mobile emission station for measuring the content of oxygen, carbon oxide (CO), carbon dioxide (CO2), sulfur dioxide (SO2), nitrogen oxide, total amount of hydrocarbons in the waste gases, as well as determining the parameters of the gas flows - pressure, speed, temperature and humidity.

- Additional apparatus in the station are "Bravo M" and "Bravo HT".
- The sample taking apparatus is of the type "STROHLEIN" for dust and gas emissions.

The apparatus for the emission control is as follows:
- sample taking devices for dust and gases АПД - 30 -"Higitest", "Bravo H" and "Bravo MhT"
- mobile station with automatic gas analyzers and stationary in the town of Stara Zagora equipped with automatic gas analyzers, spectrophotometer "Specol 10" u "Specol 11" ; analytical balance Sartorius, dryer and UV/VIS "Lambda" 2S.

The parameters monitored are:
- for the stationary stations - dust, SO2, NO2, H2S, lead airborne, pressure and temperature;
- for the mobile stations - CO, ozone, SO2, NO, NO2, dust, H2S, NH3, speed of the wind, direction, temperature of the air, barometric pressure, humidity and radiation.

5. There are no regulations for the requirements of QA/QC in the MoE system. In 1993 in the framework of the collaboration between MoE and EPA - region II in Bulgaria a training seminar was organized on QA/QC while doing the monitoring. Experts from EPA carried out the training and supplied materials from EPA - USA for this activity. These materials are currently used and they are going to be adapted to the Bulgarian conditions and issued as guidelines by MoE for applying in practice.

As I have promised, I am sending you by mail the National Report for 1995 on the strategy and policy in the air protection , submitted to UN ECE in Geneva and some other materials that we discussed in CMPI.

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I would like also to thank you for the pleasant and useful days in Mainwand if you have materials and pictures from our work in the company, please send them when it is possible.

Please, find enclosed the organograma of the new administrative structure of our ministry which Mr. Delyanov has promised to send you.

Best regards

V. Kandev
Head of Environment Protection
Department

Environmental Standards

Law/Reg: Air Law
Media: Air

Existing TPPs (until 12/31/92):

Domestic Coal	
CO	250.000
NOx	1000.000
PM	200.000
SOx	3500.000
Gaseous Fuel	
CO	100.000
NOx	500.000
PM	10.000
SOx	0.000
Imported Coal	
CO	250.000
NOx	1300.000
PM	150.000
SOx	2000.000
Liquid Fuel	
CO	170.000
NOx	700.000
PM	50.000
SOx	1700.000

New TPPs (and all TPPs after 1/1/93):

Domestic Coal	
CO	250.000
NOx	600.000
PM	100.000
SOx	650.000
Imported Coal	
CO	250.000
NOx	600.000
PM	80.000
SOx	650.000
Liquid Fuel	
CO	170.000
NOx	450.000
PM	50.000
SOx	650.000

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Environmental Standards

Law/Reg: Water Law
Media: Water Pollution

Water Quality Standards, Group I.

Cadmium	0.005 mg/l
Chloride	200.000 mg/l
Chromium (III)	0.100 mg/l
Chromium (IV)	0.020 mg/l
Copper	0.050 mg/l
Lead	0.020 mg/l
Mercury	0.000 mg/l
Nickel	0.050 mg/l
Sulfate	200.000 mg/l
Suspended Soli	30.000 mg/l
Zinc	1.000 mg/l

Water Quality Standards, Group II.

Cadmium	0.010 mg/l
Chloride	300.000 mg/l
Chromium (III)	0.500 mg/l
Chromium (IV)	0.050 mg/l
Copper	0.100 mg/l
Lead	0.050 mg/l
Mercury	0.001 mg/l
Nickel	0.200 mg/l
Sulfate	300.000 mg/l
Suspended Soli	50.000 mg/l
Zinc	5.000 mg/l

Water Quality Standards, Group III. Temperature: Not more than 3 degrees C increase in water temperature over seasonally adusted ambient temperatures.

Cadmium	0.010 mg/l
Chloride	300.000 mg/l
Chromium (III)	0.500 mg/l
Chromium (IV)	0.050 mg/l
Copper	0.100 mg/l
Lead	0.050 mg/l
Mercury	0.001 mg/l
Nickel	2.000 mg/l
Sulfate	300.000 mg/l
Suspended Soli	50.000 mg/l
Zinc	5.000 mg/l

APPENDIX J

ENVIRONMENTAL COMPLIANCE DATABASE

INSTRUCTIONS

PREPARED BY
THE NATSIONALNA ELEKTRICHESKA KOMPANIA
AND
CENTRAL MAINE POWER COMPANY

United States Agency for International Development
Utility Consultancy Contract

03/28/96

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NEK Environmental Compliance Data Base

The NEK Environmental Compliance *data base* is made up of three (3) *tables*, four (4) *reports* and three (3) *queries*. All of these are located on one (1) *form*. This allows you to edit information, add data, print reports, etc. from one easy location.

Glossary[1]

data base - A data base is a collection of information. It allows you to record, organize, change, and retrieve information easily. One data base may consist of several tables, reports, and queries.

table - A structure that stores information in columns (fields) and rows (records).

query - A question about data stored in tables or instructions to perform an action.

form - An input format used to enter, display, edit and print data from tables.

report - An output format used to display and print data from tables.

Tables

1. Compliance Requirements

This table contains all of the Environmental Law and Regulation Requirements, along with the Best Management Practices. Each record shows the **required completion date**, the **department that is responsible for the work and the staff member that is responsible for the work**. Other information is included as well. This table should be updated regularly and new requirements may be added as necessary.

2. Standards

This table lists all of the Environmental Laws and Regulations in detail. Also included are the limits for air emissions and water discharges. The only time this table will change is when there is a new law or there is a change to a current law.

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[1] Global Training Network, Inc., Access 2.0 for Windows Introduction, copyright 1994 (All glossary definitions)

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3. Team Members

This table provides an Environmental Contact List at each facility. The data is currently incomplete and needs to be updated for Bobov Dol, Maritsa East I, Maritsa East II, Russe and Varna. Also, phone numbers need to be added for all Environmental Team Members.

Using the Data Base

1. Double click on **Microsoft Access Icon** to open Access application.

2. Click on **File, Open Database, (Enter file name - NEKCOMPL), OK.**

3. Single click on **Form** button. There are four (4) forms to choose from. *Changes to all tables should be made using the Environmental Compliance form.* Click on **Environmental Compliance, Open.**

You are now in the master form. You have the option of updating tables, printing reports or running queries.

To update a table, single click on one of the **Table** buttons. This will bring you into another form specifically for inputting data into that table. Make any changes or additions here. When complete, single click on **Exit to Main Menu** button.

To print a report, single click on one of the **Report** buttons.
1. The **Compliance** report prints all of the records in the Compliance Requirements table.
2. The Standards table prints out in two separate reports. The **Standards 1** report prints the Laws and Regulations. The **Standards 2** report prints the limits for air exceedances and water discharges.
3. The **Team Members** report prints all of the records in the Team Members table.

After clicking on the desired report, this will bring you to a **Print Preview** screen. This allows you to view the report on the screen. At this point you can single click on the **Print Icon**, then **OK** to print the report or single click on the **Close Window Icon** to exit to the main menu.

To run a query, single click on one of the **Query** buttons.
1. The **Compliance by Staff** query allows you to print a report that shows all of the Law and Regulation Requirements or Best Management Practices assigned to a particular staff member (for example, Susshov).
2. The **Compliance by Plant** query allows you to print a report that shows all of the Law and Regulation Requirements or Best Management Practices assigned to a particular plant (for example, Maritsa East III).

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3. The **Compliance by Due Date** query allows you to print a report that shows all of the Law and Regulation Requirements or Best Management Practices that have a due date within a certain time frame (for example, all items due in April).

After clicking on the desired query, it will ask you a question. If you chose the **Compliance by Staff** query, it will ask you to **enter the staff name.** If you enter **Susshov**, a report will appear on the screen that shows all of the items that Susshov is responsible for. At this time, you may print the report by clicking on the **Print Icon**, then **OK** or exit the report by clicking on the **Close Window Icon.** Follow the same format to run the **Compliance by Plant** query.

If you click on the **Compliance by Due Date** query, it will ask you to **enter the Begin Date Due.** If you want everything due in October, enter **10/01/96, OK.** It will then ask you to **enter the End Date Due.** Type in **10/31/96, OK.** Again, you have the option of printing the report or exiting back to the main menu.

Exiting the Data Base

When you are done using the NEK Environmental Compliance data base, you have two options. You may click on the **Exit Form** button. This brings you back to the screen with the four forms to choose from. To exit Access at this point, click on **File**, then **Exit.** Your other option is to click on the **Exit Access** button. This will automatically close out the Access application.

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Environmental Compliance Requirements

Headquarters

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Air										
Geneva Protocol	Transboundary air pollution	All Fossil Fuel	Volatile Compnds	Reduce emissions	None by NEK	HQ	Shvabeld	1/1/96		Tracking acton by NEK HQ
Helsinki Protocol	Transboundary air pollution	All Fossil Fuel	Sulfur Dioxide	Reduce emissions by 30%	None by NEK	HQ	Shvabeld	1/1/96		Tracking action by NEK HQ
Oslo Protocol	Transboundary air pollution	All Fossil Fuel	Further SO2 steps	Further reduce emissions	None by NEK	HQ	Shvabeld	1/1/96		Tracking action by NEK HQ
Sofia Protocol	Transboundary air pollution	All Fossil Fuel	Nitrogen Oxides	Reduce to '87 levels	None by NEK	HQ	Shvabeld	1/1/96		Tracking action by NEK HQ
All										
Bulgarian Constitution	Right to clean environment	All Fuels	All pollutants	Comply with emission standards	Adherance to laws	HQ	Shvabeld	1/1/96		See Art. 55
Environ. Impact Assment	Review required by Reg 1	All Fuels	All pollutants	Environ. review of existing power plants	Compliance based on negotiation	HQ	Shvabeld	1/1/96		Detailed review of the impact of existing plants
Environ. Protection Act	Establishment of penalties	All Fuels	All pollutants	Standards and penalties established	Track compliance at NEK	HQ	Shvabeld	1/1/96		HQ tracks for all NEK
Water										
National Waters Law	Must obtain use permit	All Fuels	None	Dams and sludge ponds regulated	Annual	HQ	Shvabeld	1/1/96		HQ obtains/updates water use permit for plant

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Air										
Best Management Practice			SO2, Nox, Dust	Characterize waste stream	Report to management	Environmental	Susshov	9/30/96		
Best Management Practice			SO2, Nox, Dust	Begin monitoring waste stream		Environmental	Susshov	10/1/96		
Best Management Practice			SO2, Nox, Dust	Prepare monthly monitoring report for October	Report to management	Environmental	Susshov	11/1/96		
Best Management Practice			SO2, Nox, Dust	Set reduction target	Report to management	Environmental	Tamurov	12/1/96		
Best Management Practice			SO2, Nox, Dust	Prepare monthly monitoring report for November	Report to management	Environmental	Susshov	12/1/96		
Best Management Practice			SO2, Nox, Dust	Prepare monthly monitoring report for December	Report to management	Environmental	Susshov	1/1/97		
Best Management Practice			All	Prepare annual monitoring report	Report to management	Environmental	Susshov	1/31/97		Prepare annual report showing progress towards targets for air
Clean Air Law	May not emit above limit	Domes. Coal	Sulfur oxides	650 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissions monthly
Clean Air Law	May not emit above limit	Domes. Coal	Dust	200 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissions monthly
Clean Air Law	May not emit above limits	Domes. Coal	Criteria pollutants	Emission Standards established	Monthly summary to mngmt.	Power Plant	Staff Nam	1/1/96		Staff prepares summary report based on testing
Clean Air Law	May not emit above limit	Domes. Coal	Nitrogen oxides	600 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissins monthly
Clean Air Law	May not emit above limit	Domes. Coal	Carbon monoxide	250 mg/cubic meter	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples emissions monthly
Clean Air Law	May not emit above limit	Domes. Coal	Criteria pollutants	Emission standards in the law	Occasionally, unannounced	MOE	Inspectors	1/1/96		MOE staff samples emissions
Solid										
Best Management Practice			Solid Waste	Characterize waste stream	Report to management	Environmental	Susshov	5/30/96		Oily Waste, Solvents, Other Hazardous Waste and Ash

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Best Management Practice			Solid Waste	Begin monitoring waste stream	Monthly report to management	Environmental	Susshov	6/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for June	Report to management	Environmental	Susshov	7/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for July	Report to management	Environmental	Susshov	8/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for August	Report to management	Environmental	Susshov	9/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for September	Report to management	Environmental	Susshov	10/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for October	Report to management	Environmental	Susshov	11/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for November	Report to management	Environmental	Susshov	12/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Set reduction target	Report to management	Environmental	Tarturov	12/1/96		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			Solid Waste	Prepare monthly monitoring report for December	Report to management	Environmental	Susshov	1/1/97		Oily Waste, Solvents, Other Hazardous Waste and Ash
Best Management Practice			All	Prepare annual monitoring report	Report to management	Environmental	Susshov	1/31/97		Prepare annual report showing progress towards targets for solid waste
Water										
Best Management Practice			Wastewater	Begin monitoring wastestream		Environmental	Susshov	6/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for June	Report to management	Environmental	Susshov	7/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report July	Report to management	Environmental	Susshov	8/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report August	Report to management	Environmental	Susshov	9/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for September	Report to management	Environmental	Susshov	10/1/96		

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Dept.	Staff	Compliance Dates Due	Done	Comments
Best Management Practice			Wastewater	Prepare monthly monitoring report for October	Report to management	Environmental	Susshov	11/1/96		
Best Management Practice			Wastewater	Set exceedance targets	Report to management	Environmental	Tamurov	12/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for November	Report to management	Environmental	Susshov	12/1/96		
Best Management Practice			Wastewater	Prepare monthly monitoring report for December	Report to management	Environmental	Susshov	1/1/97		
Best Management Practice			All	Prepare annual monitoring report	Report to management	Environmental	Susshov	1/31/97		Prepare annual report showing progress towards targets for water
Clean Water Law	May not discharge above limit	Domes. Coal	Zinc	10.0 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limits	Domes. Coal	All pollutants	Effluent standards in the law	Monthly summary to mngmt	Power Plant	Staff Nam	1/1/96		Staff prepares summary report based on testing
Clean Water Law	May not discharge above limit	Domes. Coal	Temperature	Less than 3°C above seasonal	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Suspended solids	100 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Chlorides	400 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Sulfate	400 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Cadmium	0.02 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Murcury	0.01 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Chromium (III)	1.0 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Chromium (VI)	0.1 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limit	Domes. Coal	Nickel	0.5 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly

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Environmental Compliance Requirements

Maritsa East III

Law/Regulation	Prohibition	Fuel	Pollutant	Standard	Compliance Determination	Compliance Dates: Dept.	Staff	Due	Done	Comments
Clean Water Law	May not discharge above limit	Domes. Coal	Lead	0.2 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Clean Water Law	May not discharge above limits	Domes. Coal	All pollutants	Effluent standards in the law	Occasionally, unannounced	MOE	Inspectors	1/1/96		MOE staff samples discharge
Clean Water Law	May not discharge above limit	Domes. Coal	Copper	0.5 mg/l	Monthly	Power Plant	Staff Nam	1/1/96		Staff samples effluent monthly
Natrl Wtar Brd, Dcree. 199	No water use without permit	All Fuels	None	Use permit reuired to use surface waters	Monthly	Power Plant	Staff Nam	1/1/96		HQ obtains/updates water use permit for plant

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Environmental Team Members

27-Mar-96

Facility	Contact	Title	Phone Number
Bobov Dol			
Headquarters	Hristo Shvabski	Environmental Specialist	
Headquarters	Krassimir I. Kanev	Head, Generation	
Headquarters	Trifton Tsvetkov	Executive Director	
Maritsa East I	Penjo Penev	Plant Manager	
Maritsa East II	Todor Mikailov	Plant Manager	
Maritsa East III	Ivan Stoikov	Deputy Plant Manager	
Maritsa East III	Susshov	Plant Environmental Engineer	
Maritsa East III	Tarrurov	Env, Safety, & Health Manage	
Maritsa East III	Yanko Anguelov	Plant Manager	
Russe		Plant Manager	
Varna		Plant Manager	

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Facility	Contact	Title	Phone Number
Vama		Environmental Manager	

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Environmental Standards

Law/Reg: Constitution, Art 55

Media: All

A. Right to a healthy environment.

Law/Reg: Environmental Protection Act

Media: All

A. Specific according to each law but this act is enabling legislation that establishes the broad outlines of Bulgarian Environmental Laws.

Law/Reg: Geneva Protocol

Media: Air VOCs

A. Parties to the treaty agree to control and reduce VOC emissions nationally.

B. Transboundary fluxes to be decreased by:

1. Reducing VOC emissions by 30% by 1999.

2. If it has a Tropospheric Ozone Mngt. Area (TOMA) focus efforts on the TOMA first.

C. Within 2 years:

1. Implement BACT on new sources.

2. Encourage low volatility solvents.

3. Apply BACT for VOCs from mobile sources.

4. Foster public transport.

Law/Reg: Helsinki Protocol

Media: Air SO2

A. Reduce sulfur emissions nationally by 30% as soon as possible and no later than 1993, based on 1980 levels.

Comments: Tracking function. NEK staff provides information to Ministry of Environment to assist in national policy formation.

Environmental Standards

B. Institute a national study of potential for further reductions.

C. Develop national programs and work to attain goal of 30% reduction in sulfur fluxes.

Law/Reg:	National Waters Act

Media: Water Use

A. The use of natural waters is permitted. Dams and sludge ponds are regulated.

Law/Reg:	Oslo Protocol

Media: Air SO2 Progress

A. Control and reduce sulfur depositions to levels at or below those Annex I.

B. Adhere to Annex II timing to reduce sulfur emissions by 33% in 2000, 40% in 2005 and 45% by 2010.

C. Comply with Sulfur Oxide Management area language if necessary.

D. Use most effective sulfur emission steps available to the industry.

E. Apply Annex V controls to all sources.

F. Use economic methods to obtain reductions.

G. Allows two parties to agree on steps to accomplish reductions.

Comments: Tracking function. NEK staff provides information to Ministry of Environment to assist in national policy formation.

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Environmental Standards

H. Begin negotiations according to Article 8.

Law/Reg:	Sofia Protocol

Media: Air NOx

A. Reduce nitrogen oxide emissions to the national levels of 1987 by Dec. 31, 1994.

B. Within 2 year after date of force:

3. Begin controlling pollution from existing stationary sources.

B. Within 2 years after date of force:

1. Apply national BACT standards to major new sources.

2. National emission standards to mobile sources.

C. Within 6 months begin negotiations on further steps to reduce NOx.

Comments: Tracking function. NEK staff provides information to Ministry of Environment to assist in national policy formation.

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Environmental Standards

Law/Reg: Air Law
Media: Air

Existing TPPs (until 12/31/92):

Domestic Coal	
CO	250.000
NOx	1000.000
PM	200.000
SOx	3500.000
Gaseous Fuel	
CO	100.000
NOx	500.000
PM	10.000
SOx	0.000
Imported Coal	
CO	250.000
NOx	1300.000
PM	150.000
SOx	2000.000
Liquid Fuel	
CO	170.000
NOx	700.000
PM	50.000
SOx	1700.000

New TPPs (and all TPPs after 1/1/93):

Domestic Coal	
CO	250.000
NOx	600.000
PM	100.000
SOx	650.000
Imported Coal	
CO	250.000
NOx	600.000
PM	80.000
SOx	650.000
Liquid Fuel	
CO	170.000
NOx	450.000
PM	50.000
SOx	650.000

Comments: Tracking function. NEK staff provides information to Ministry of Environment to assist in national policy formation.

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Environmental Standards

Law/Reg: Water Law
Media: Water Pollution

Water Quality Standards, Group I.

Cadmium	0.005 mg/l
Chloride	200.000 mg/l
Chromium (III)	0.100 mg/l
Chromium (IV)	0.020 mg/l
Copper	0.050 mg/l
Lead	0.020 mg/l
Mercury	0.000 mg/l
Nickel	0.050 mg/l
Sulfate	200.000 mg/l
Suspended Soli	30.000 mg/l
Zinc	1.000 mg/l

Water Quality Standards, Group II.

Cadmium	0.010 mg/l
Chloride	300.000 mg/l
Chromium (III)	0.500 mg/l
Chromium (IV)	0.050 mg/l
Copper	0.100 mg/l
Lead	0.050 mg/l
Mercury	0.001 mg/l
Nickel	0.200 mg/l
Sulfate	300.000 mg/l
Suspended Soli	50.000 mg/l
Zinc	5.000 mg/l

Water Quality Standards, Group III. Temperature: Not more than 3 degrees C increase i water temperature over seasonally adusted ambient temperatures.

Cadmium	0.010 mg/l
Chloride	300.000 mg/l
Chromium (III)	0.500 mg/l
Chromium (IV)	0.050 mg/l
Copper	0.100 mg/l
Lead	0.050 mg/l
Mercury	0.001 mg/l
Nickel	2.000 mg/l
Sulfate	300.000 mg/l
Suspended Soli	50.000 mg/l
Zinc	5.000 mg/l

Comments: Tracking function. NEK staff provides information to Ministry of Environment to assist in national policy formation.

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Microsoft Access - [Form: Environmental Compliance]

File Edit View Records Window Help

NEK Environmental Compliance Data Base

Single click to open "table".	Single click to run "report".	Single click to run "query".
Compliance Requirements	Compliance	Compliance by Staff
Standards	Standards 1	Compliance by Plant
Team Members	Standards 2	Compliance by Due Date
	Team Members	

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Record: 1 of 1

Form View NUM

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Microsoft Access

File Edit View Security Window Help

Database: COMPLI1

New | Open | Design

Table
Query
Form
Report
Macro
Module

Forms

- Compliance Input Form
- Environmental Compliance
- Environmental Team Members
- Standards

Ready

CAPS NUM

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Microsoft Access - [NEK Environmental Compliance Table]

File Edit View Records Window Help

Environmental Compliance Requirements

Record #: 1

Facility: Headquarters

Date Due: 1/1/96

Law/Reg: Helsinki Protocol

Date Done:

Media: Air

Prohibition: Transboundary air pollution

Fuel: All Fossil Fuel

Pollutant: Sulfur Dioxide

Standard: Reduce emissions by 30%

Compliance Determination: None by NEK

Dept: HQ

Staff: Shvabski

Comments: Tracking action by NEK HQ

Exit to Main Menu

Record: 1 of 57

Form View

NUM

433

Microsoft Access - [Standards]

File Edit View Records Window Help

Environmental Standards

Law/Reg: Helsinki Protocol

Media: Air SO2

Standards: A. Reduce sulfur emissions nationally by 30% as soon as possible and no later than 1993, based on 1980 levels.

Comments: Tracking function. NEK staff provides information to Ministry of Environ. to assist in national policy formation.

Emissions/Pollutants

Fuel:

Pollutant/Emission	Limit	Unit
	0	

Exit to Main Menu

Record: 1 of 87

Form View

NUM

Microsoft Access - [Environmental Team Members]

File Edit View Records Window Help

Exit to Main Menu

Environmental Team Members

Facility	Contact	Title	Phone Number
Bobov Do			
Maritsa East I	Penjo Penev	Plant Manager	
Maritsa East II	Todor Mikailov	Plant Manager	
Maritsa East III	Yanko Anguelov	Plant Manager	
Maritsa East III	Ivan Stoikov	Deputy Plant Manager	
Maritsa East III	Tamurov	Env. Safety, & Health Mana	

Record: 1 of 13

Form View

NUM

APPENDIX K

RECOMMENDATIONS
FOR
MARITSA EAST 3

In the areas of air emissions, waste water discharges, and solid waste, the management and staff of Maritsa East 3 understand the importance of reducing these waste streams yet, face severe constraints on financial resources at the Plant. However, during our work with the Maritsa East 3 Plant and the management and staff of NEK, we identified some areas of improvement that can be accomplished with available resources particularly if these improvements continue to be a priority at the Plant. Other areas such as equipment purchases will require additional financial resources.

Solid Waste - The overall goal is to reduce the quantity of waste produced and to manage the waste that is produced so that it will have the least adverse environmental impact.

Specific measures include:

1. Establish a waste holding area for solid wastes prior to their disposal.
2. Dispose of liquid wastes by spraying on coal piles (just before burning so that liquids will not runoff)
3. Construct a new chemical storage area which is covered and bermed. The area should be designed with a concrete floor and runoff should be controlled. The preferable location is near the rail line to provide for future transportation to more appropriate disposal facilities. These disposal facilities, perhaps, could be operated for the use of all three of the Maritsa East Powerplants.

Wastewater - The overall goal is to reduce the quantity of wastewaters discharged into the Sokolitsa River and to improve the quality of those wastewater streams that are discharged into the Sokolitsa River.

1. In the oil water separator, the oil should be left cool rather than heated so that it will separate or, at least, the temperature should be lowered. This is likely a major source of oil and grease in discharge to the Sokolitsa River.

2. Relocate the wastewater sampling point in the Sokolitsa River. The velocity is too high and representative samples are difficult to obtain here. Quantify discharges

daily from both discharge points and follow and/or improve the waste water discharge system section of the Environmental Compliance Plan.

3. Complete a water audit and continue to review miscellaneous cooling and sealing water use, hoses running. These miscellaneous flows unnecessarily increase the wastewater discharge stream.

4. Purchase automatic continuous sampling equipment for monitoring discharges. One unit should be dedicated to the wastewater discharge points at the Sokolitsa River. A second unit can be used at different points throughout the Plant. As specific reductions are made, the water quality improvement can then be documented.

5. The Ash Transport System is one of the largest systems of the Plant and, at this time, must continue to remove ash from the Plant. However, there are opportunities to reduce the input of waters to this system so that continuous discharge of clarified transport water does not go in to the Sokolitsa River. The Plant management should continue to make this a high priority.

Air Quality - The overall goal is to reduce the quantity of air emissions and to improve the quality.

1. Begin using standard emission estimating techniques such as AP 42 to estimate emissions. This will standardize the calculations and help establish a meaningful emissions baseline against which improvements can be measured.

2. Purchase portable air emissions monitoring equipment for periodic testing and begin monitoring emissions regularly. This will encourage emissions reductions by providing feedback from different set points during Plant operation.

Training

1. Provide regular training for selected employees and managers with increased emphasis on environmental impacts of each employees area of work. The Compliance Plan program should be followed as an example or improved.

Environmental Performance/Compliance

1. Implement reporting, monitoring , communication systems in Compliance Manual. Establish baseline conditions through monitoring program.

APPENDIX L

MARITSA EAST 3
WASTEWATER DISCHARGE SYSTEM
INITIAL FIELD AUDIT

July 1996
Natsionalna Elektricheska Kompania
and
Central Maine Power Company

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MARITSA EAST 3
WASTEWATER DISCHARGE SYSTEM
INITIAL AUDIT

Introduction

Wastewaters at the Maritsa East 3 Powerplant are similar to those from most coal fired powerplants and are generated from three major sources: the ash transport system, the industrial water systems and yard run-off. The ash transport system consists of water from boiler discharges, well water and water pumped to the plant from the river. The industrial waters are those that, after treatment, are used at the plant to transport or dilute various generation and industrial processes. The yard run-off waters are the result of precipitation, leaks and intentional discharges that are collected in yard drains and trenches located throughout the power plant.

On April 3,1996 we performed an initial site audit of the wastewater discharge system. There are two purposes for conducting this audit. First, CMP wanted to demonstrate to the Maritsa East 3 staff the basic method of performing a field audit and second, to display how such an audit fits in to an environmental management system.

Method

The Chief of the Technical Workshop and an Operations Workshop representative participated in the field audit. They provided a plant site drawing and indicated, on the drawing, the location of discharge points and the major inputs to the wastewater discharge system. The auditors then "walked " the system and took photographs and notes for reference.

Beginning with the two discharges into the Sokolitsa River, the auditors traced the wastewater system in reverse. The reason for this is to document the input to each wastewater stream. In this manner, they could systematically see most of the inputs. Whenever possible the type of waste stream input was noted. Tracing the discharges in this manner allowed us to determine what they might contain so we could evaluate the Best Management Practices for preventing such streams from entering the discharge in the first place.

Observations

The two discharges to the Sokolitsa River are shown (Photos 2 and 3). It is in this portion of the river where the waters are sampled for chemical criteria specified in the regulations of the MOE. Please note that the current sampling area has a velocity too high to accurately sample. An alternate area should be selected.

We next moved upstream to the point in the wastewater system where excess ash transportation water enters the system and then discharges directly to the river (Photo 4). Note the appearance of the water and its apparent quality. Water is used to collect ash from the electrostatic precipitators (ESPs) and bottom ash from the boilers. It is piped from the base of several ash hoppers that accumulate ash particles from the ESPs. These particles are discharged from the hoppers and transported by a constant flow of water and form a slurry (estimated at 5-10% solids) that is carried to the pump house and pumped to the disposal area. There may be other waste streams that enter this system. At the disposal area, ash from the transport water is allowed to settle into diked ash ponds. Most of the particles settle and the clarified water is then pumped back to the power plant to be used in the process again. As might be expected, since there is no chemical treatment of these ash transportation waters, they are saturated with metals and other soluble fractions of all the wastes that are dumped into the system.

Further upstream we noted a manhole cover within the fenced area of the electrical switchyard and transformer area (Photo 5). This provides rainfall runoff directly to the wastewater system. In the event of any oil leakage from the equipment transformer oil and additives can be discharged to the river. Potentially, PCBs are in the oil and can enter the wastewater stream.

Throughout the plant site there are other waste streams that enter the wastewater system. These include cooling waters, sealing waters. There are yard drainage ditches and coal pile runoff ditches that eventually drain through the system right to the river (Photos 6 and 7).

Several processes necessary to support plant operation represent major sources of wastewater which enter the system. The fuel oil storage and oil/water separating areas are examples of such processes. The oil tank storage area has a dike around the tanks, but the condition of the dike is such that oil can escape to the discharge system. In addition, the open oil oil/water separators(Photo 8) is an area where oily water is discharged to drainage ditches and then the wastewater system and ultimately to the Sokolitsa River. Bulk quantities of chemicals are stored in the chemical storage area and the water treatment area (Photos 9 and 10). Many of the oil and chemical containers in the storage area are in poor condition and could be leaking onto the soil. Rain water ultimately washes this to the yard drainage and into the waste water system, then to the river. In the same manner, chemicals spilled in the water treatment area enter the drainage ditch and then go to the river.

In addition to these process areas, other locations such as the loading area along the railroad tracks (Photo 11) is an area of oil and chemical spillage which washes off to the wastewater collection system and to the river. There are also some locations inside the powerplant where oily water discharge to

floor drains and eventually to the river. The sanitary system and kitchen waste system also enter the waste stream and discharge directly to the river.

Results

This initial audit clearly shows that there are many untreated waste streams that enter the wastewater discharge system and ultimately discharge into the Sokolitsa River through Discharges 001 and 002. This untreated wastewater degrades the water quality in the Sokolitsa River and, in fact, may be costly due to wasted chemicals and oil. The waste stream inputs are:

1. Excess Ash Transportation Water
2. Switchyard Runoff
3. Miscellaneous Yard Runoff and Coal Pile Runoff
4. Oil Tank Storage Area and Oil-Water Separator
5. Spilled Chemicals from Storage and Water Treatment Chemical Storage Area
6. Internal Powerplant Discharges
7. Sanitary System

These untreated discharges are a prime cause for oil and grease standards to be exceeded and, therefore, the Plant not meeting the regulatory criteria during some monitoring periods. Based on this audit there are some very obvious improvements that can be made. However, the Plant staff must continue to obtain data. Each of these waste streams should be tested and characterized for both quality and quantity. Comparing these input characteristics with the characteristics of discharges 001 and 002 will provide information on the degree that each waste stream affects the total discharge. Also, by removing the waste stream or by reducing it, the effect on the total discharge can be observed.

Water Quality monitoring should take place more frequently as a check on plant activities. Also, if some process are improved or waste streams discontinued, then the increased monitoring will show how effective these changes are. Therefore, the Plant staff should sample the discharge according to the Environmental Compliance Plan. The data should be consistently recorded so that water quality data trends can be noted. If improvement is noted then, the new methods should continue or increase. If the quality does not improve then new methods should be tried or current ones increased.

While the Plant staff begins the characterization of these individual waste streams, they should prioritize or target certain ones for reduction or elimination. The criteria might include:

Cost to Reduce or Eliminate the Waste Stream
Environmental Impact of Waste Stream
Time Required to Reduce or Eliminate the Waste Stream

When considering the list of waste streams, then, the ash transport has a potentially high impact, but it may be relatively expensive to make the physical or process changes. On the other hand, the Chemical Storage area may not be expensive to improve but could provide quantifiable reductions in pollutants.. Based on these types of criteria, the priority list might be as follows:

1. Chemical Storage Area
2. Switchyard Oily Water
3. Oil Storage and Conditioning Area
4. Inside Powerplant Discharges
5. Miscellaneous Yard Runoff
6. Ash Transport System
7. Sanitary System

A schedule should be developed to implement these changes and progress toward reducing the waste streams should be tracked. A specific plan should be made and followed for each waste stream. For example, the first waste stream is the Chemical Storage Area. Our inspection revealed the following:

1. The containers that store the chemicals are rusted and leaking.
2. The soil under and around the storage area is contaminated with the chemicals.
3. Many of the containers are only partially filled (further inspection needed).
4. Many of the chemicals are no longer used (further inspection needed).
5. Access to the chemicals is open to anyone.

Based on these additional observations a plan might include

1. Removal and disposal of leaking containers.
2. Consolidating the chemicals into fewer containers.
3. Disposal of those chemicals no longer used.
4. Removal of contaminated soils.
5. Restricting access to storage area.
6. Covering the area with a roof for protection.
7. Berming the area to prevent runoff.

This is only an example but can serve to show how pollution prevention begins. In this case, it begins with an audit to systematically establish the existing condition. Then an evaluation of the environmental damage or risk presented. This is followed by a prioritization of waste streams to reduce and then by specific steps to take for the reduction or elimination of the waste stream. All along this process, however, staff need to acquire data on the discharge to evaluate conditions and progress which may lead to changes in the solution.

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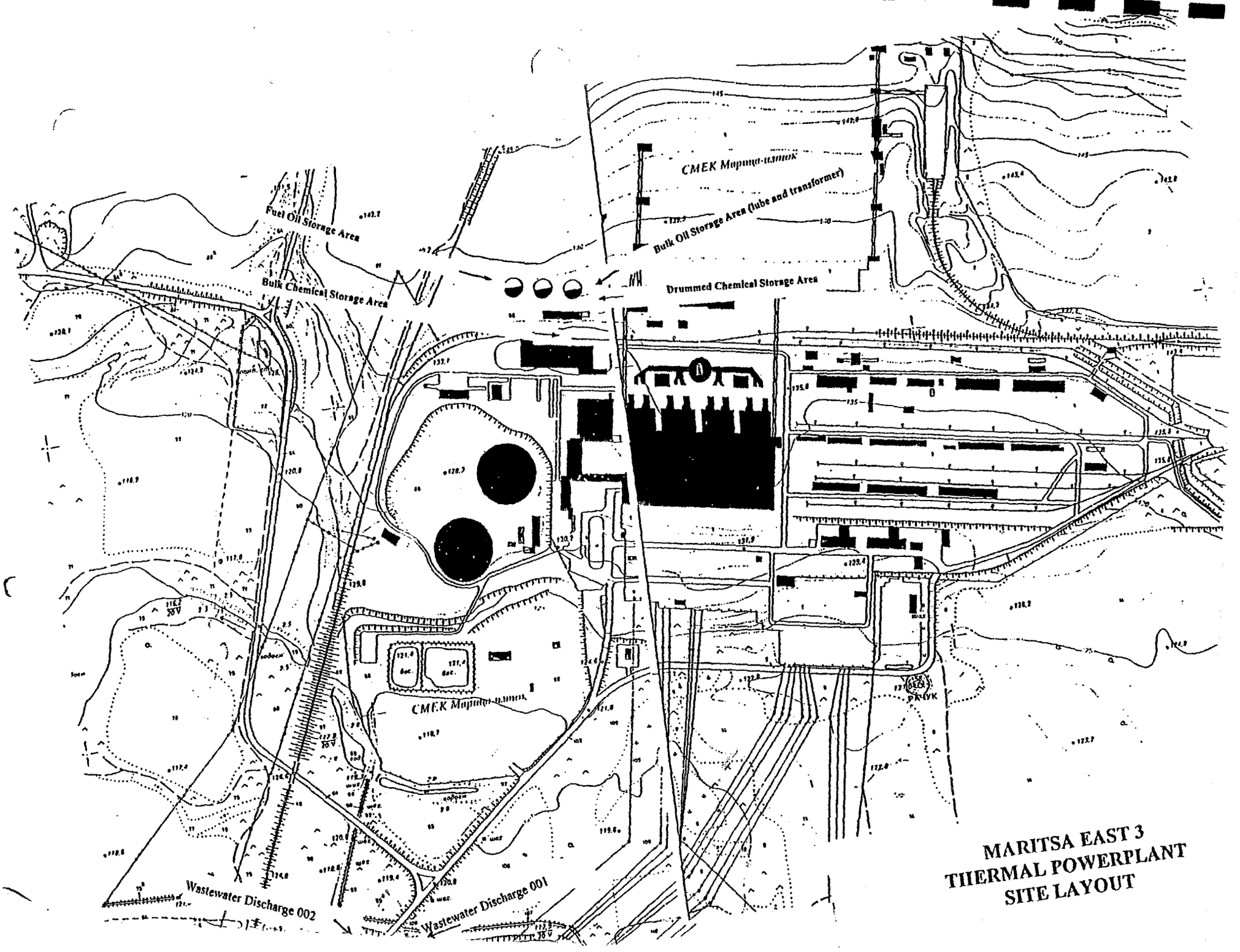

MARITSA EAST 3
THERMAL POWERPLANT
SITE LAYOUT

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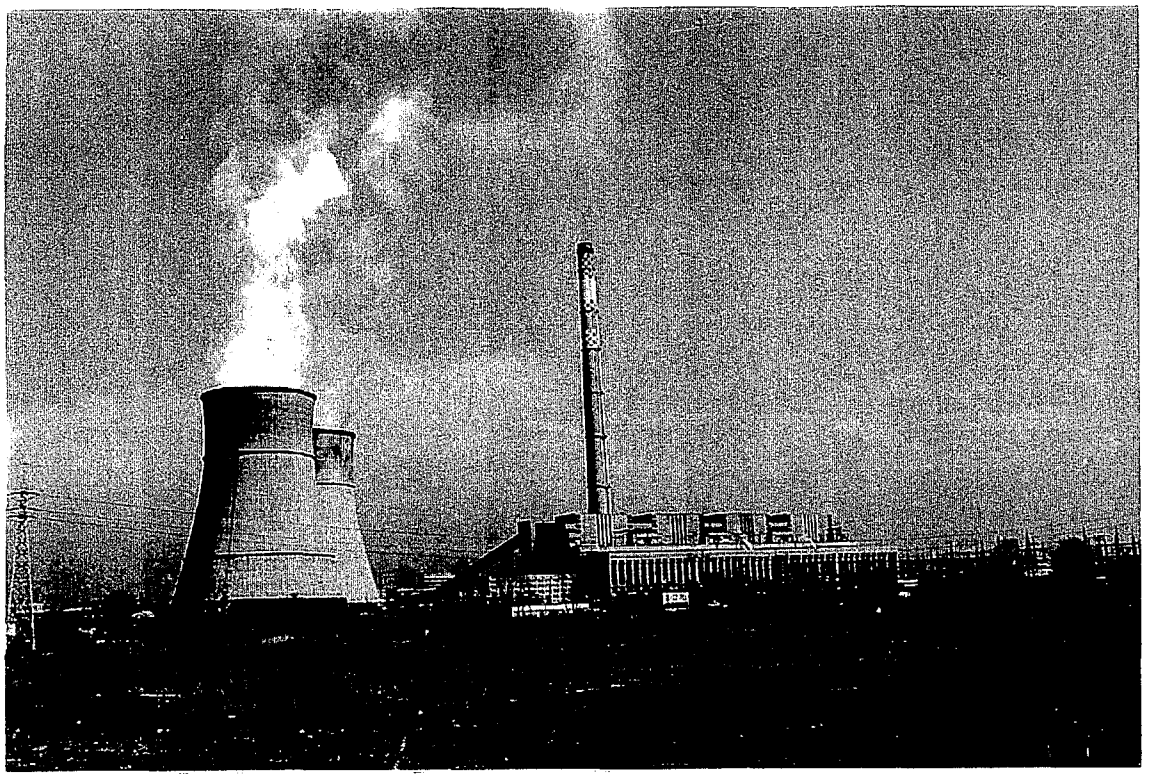
PANORAMIC VIEWS OF THE PROPERTY



Maritsa East III Thermal Power Plant.

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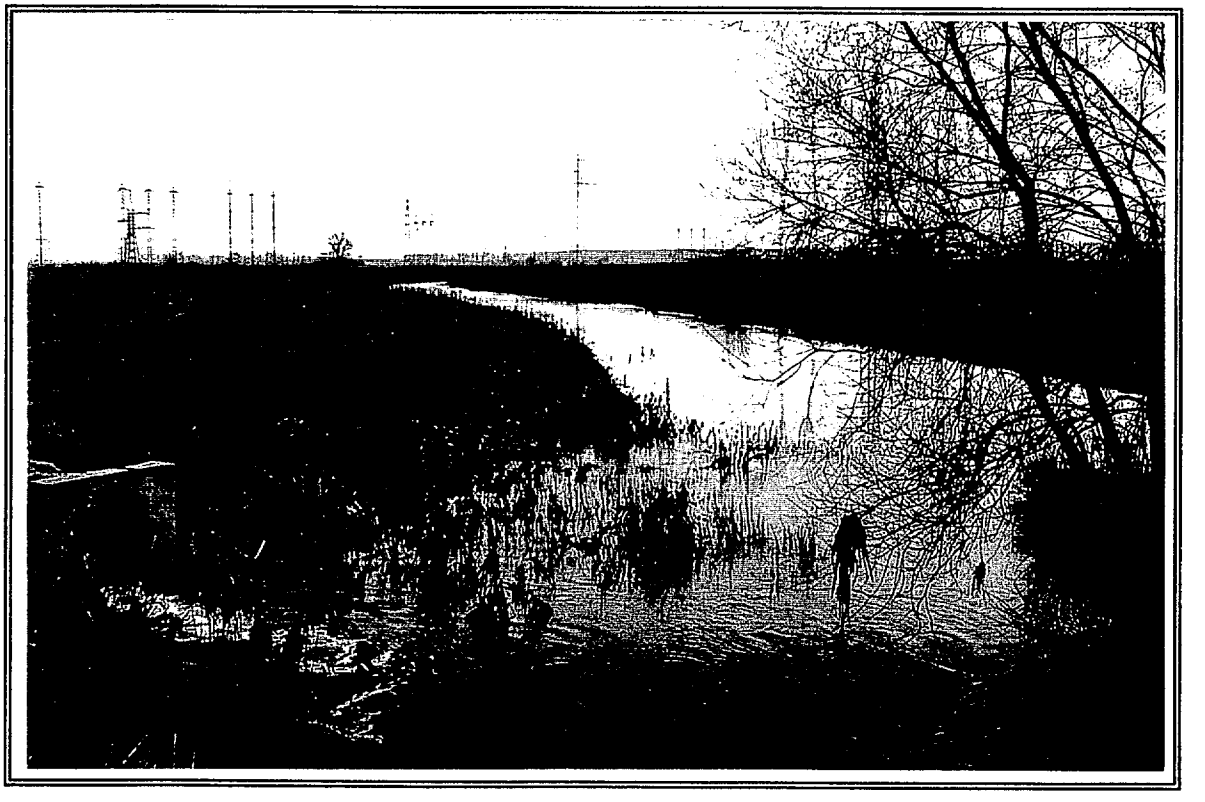
PHOTOGRAPHS

Wastewater discharge outfall 001.



Detail view of outfall.

PHOTOGRAPHS

Wastewater discharge outfall 002.

Detail of outfall 002.

Chemical Handling

Awareness Program

Jamie Cough
NEK April 1996

Chemical Handling Procedures

Agenda:

Goals of Training

Definitions

Review Chemical Inventories
including Storage Locations and Storage Amounts

Physical Characteristics

Safe Handling Procedures

Emergency Response

Chemical Handling Procedures

Agenda (cont.):

Proper Disposal Techniques

Recordkeeping and Reporting Requirements

Employee Information and Training Goals

1. Recognize the Hazards to the Environment and the Employee

2. Understand Chemicals and their Properties

3. Know how to Safely Handle Emergencies and Proper Disposal Techniques

Definitions

Hazardous Chemical

Health Hazard

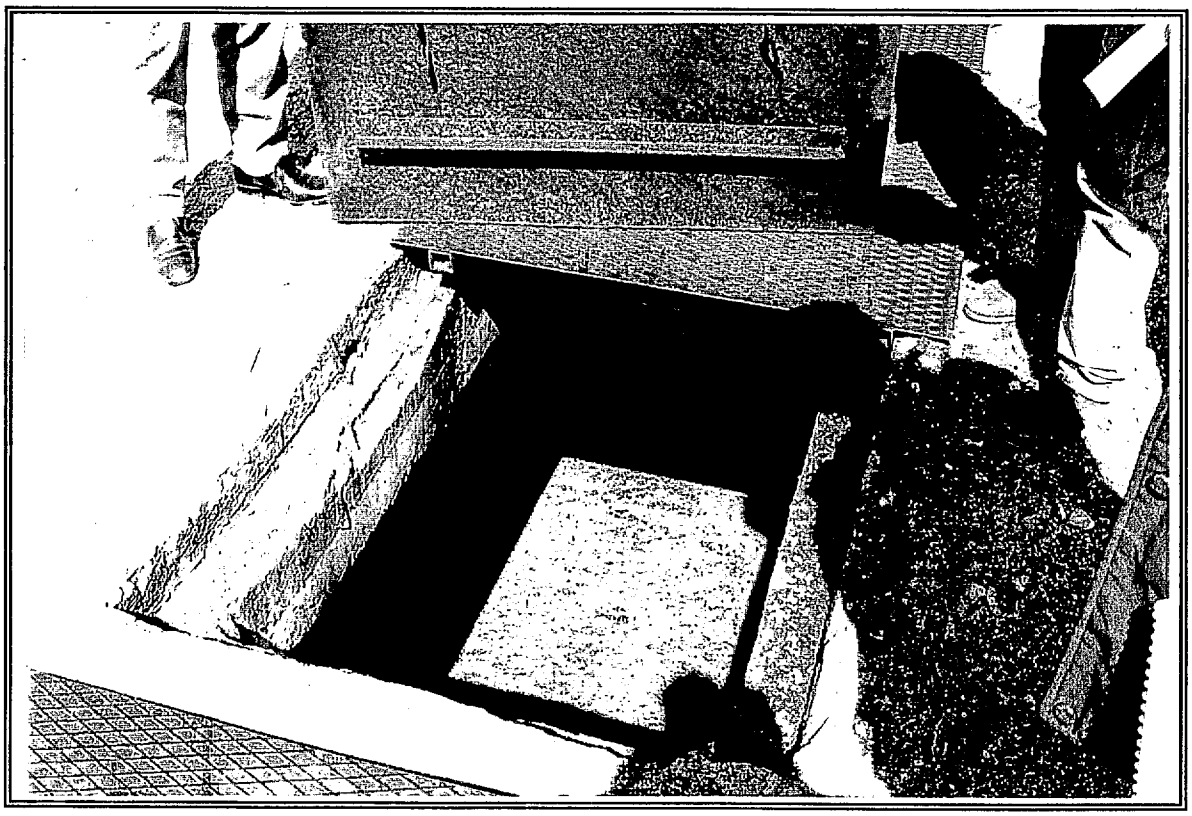
Physical Hazard

Hazard Determination

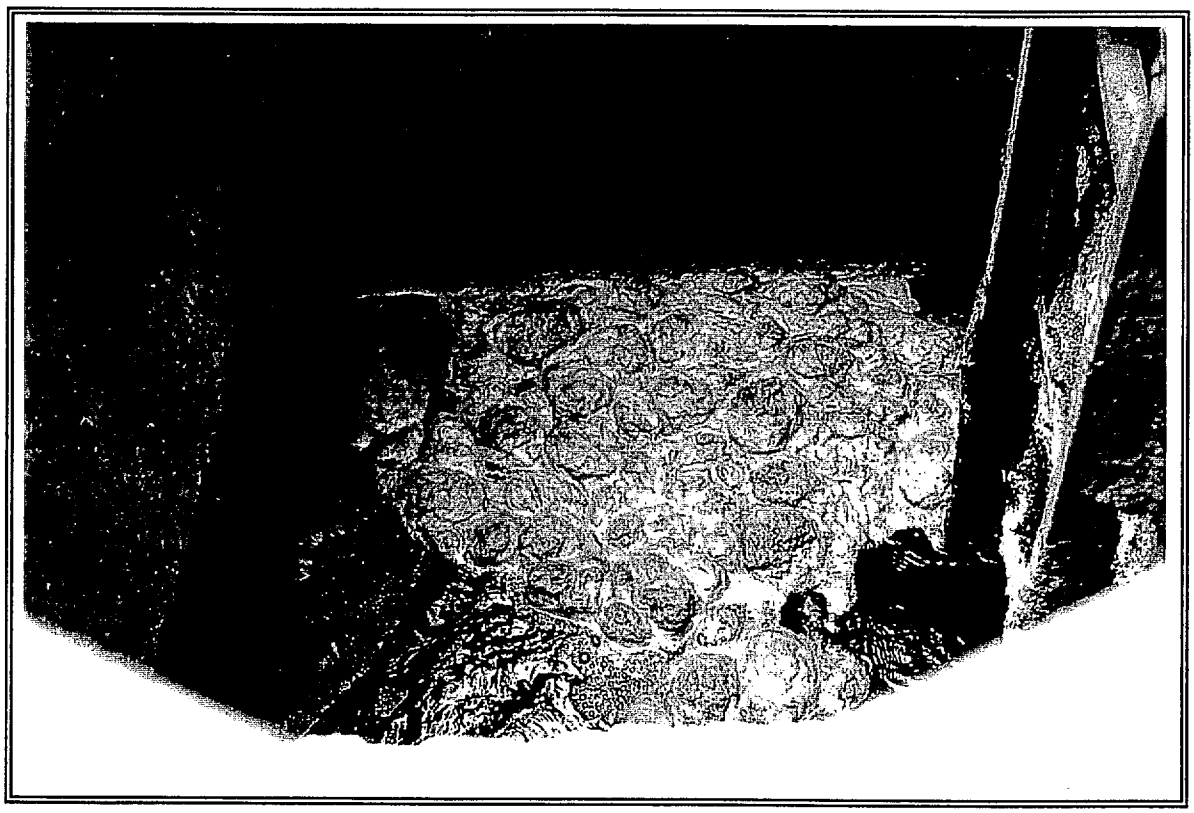
Chemical Inventory

Chemical	Storage Location	Storage Amount

PHOTOGRAPHS



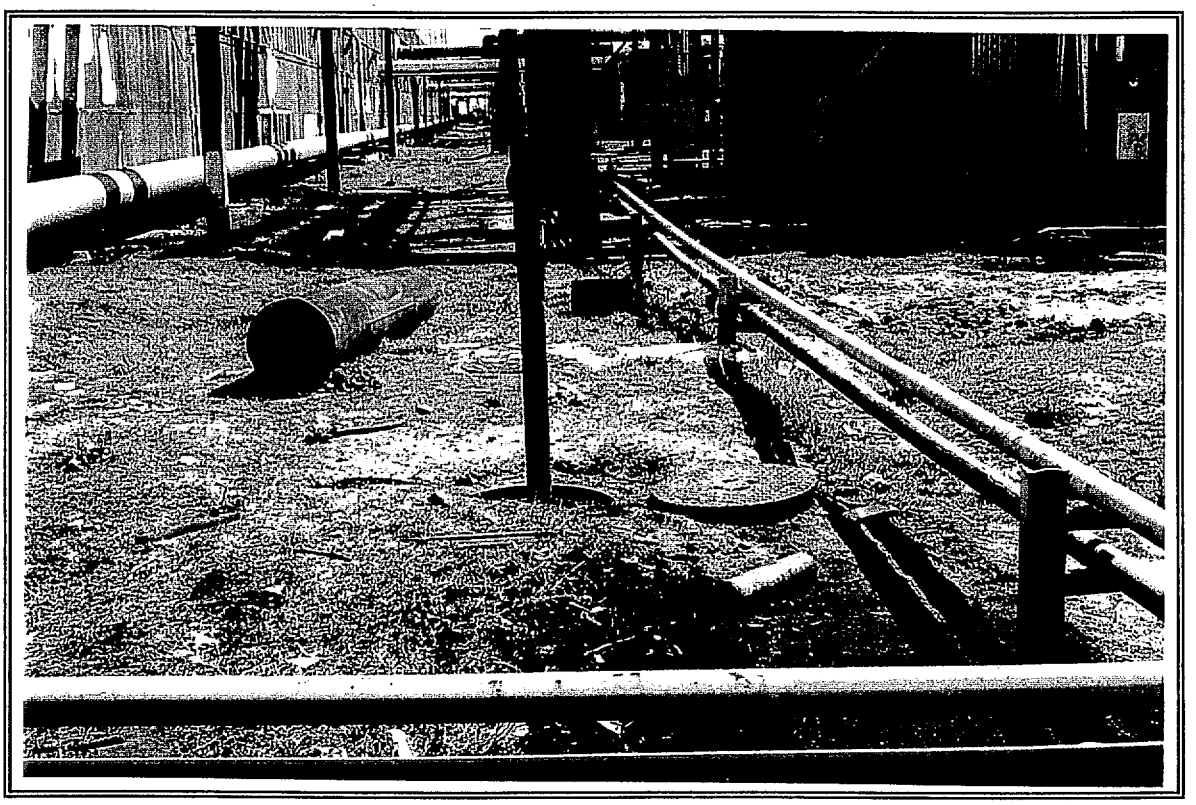
Ash transport water.



Closeup view.

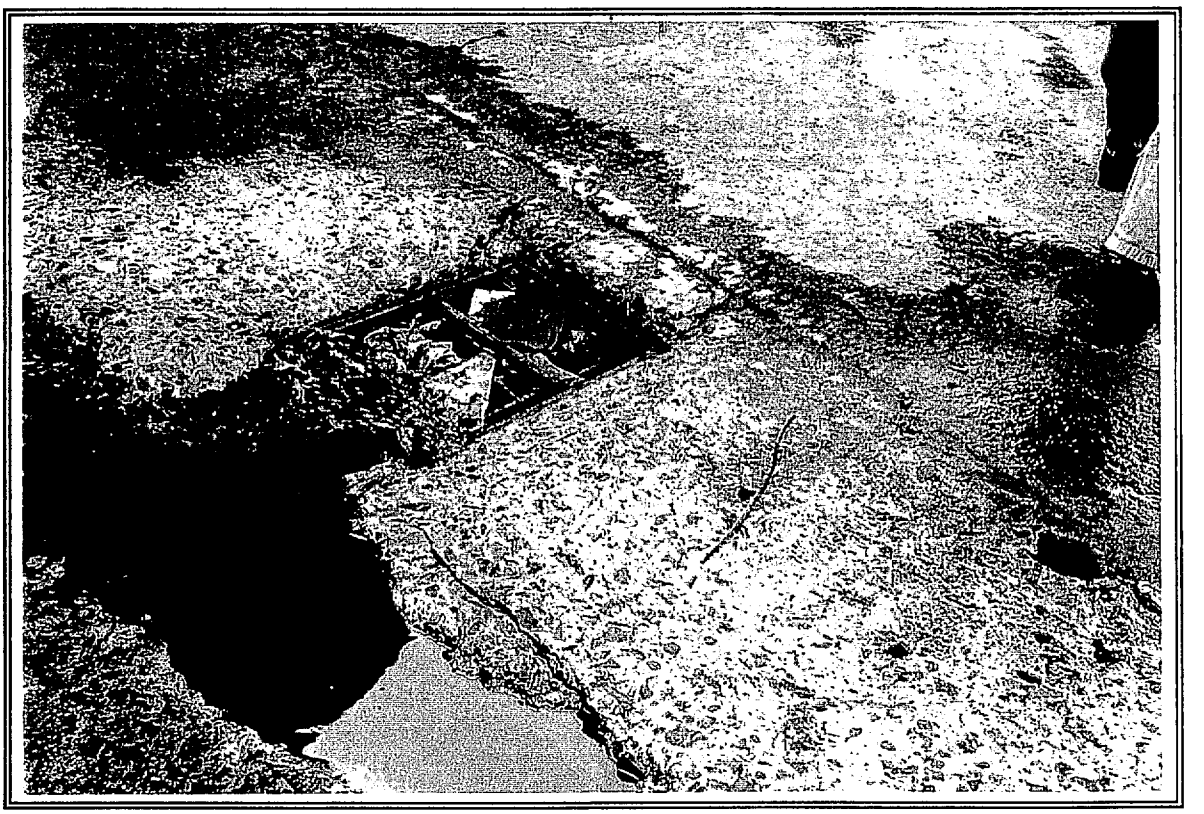
PHOTOGRAPHS

Power plant switchyard.



Power plant switchyard showing drainage.

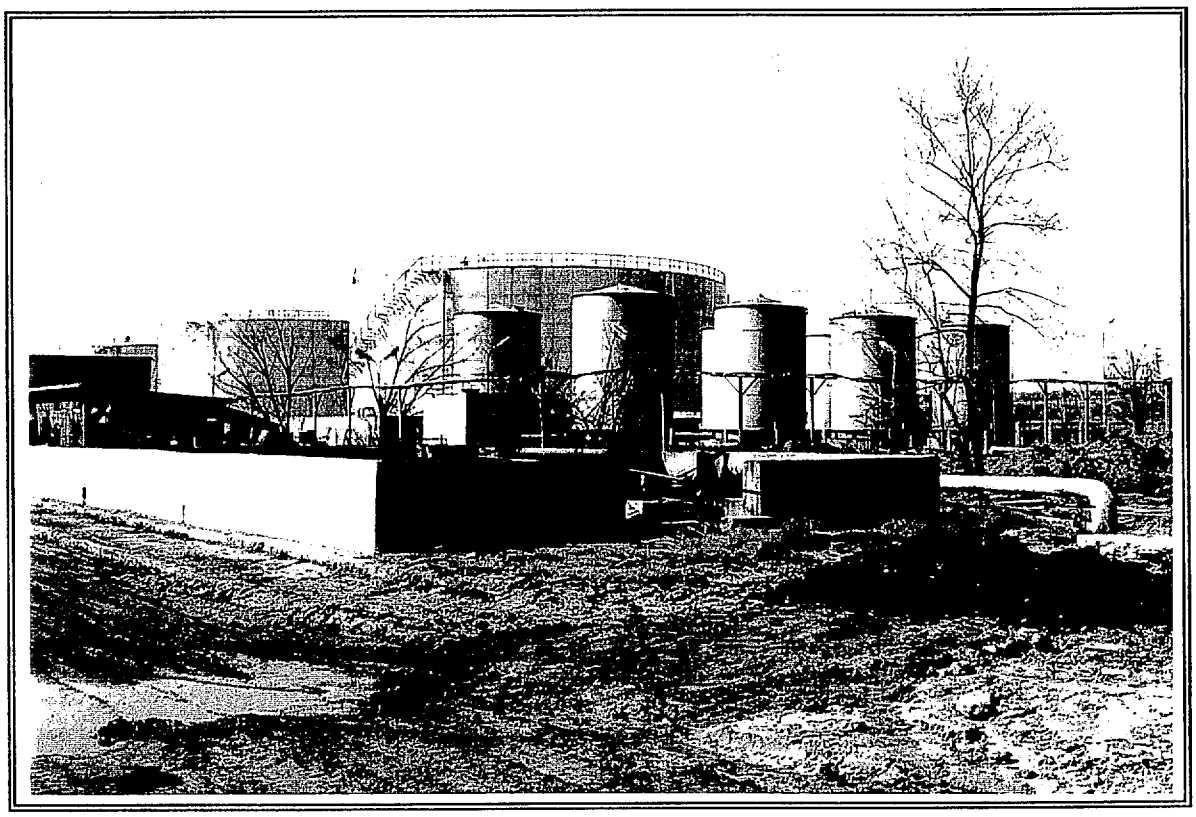
PHOTOGRAPHS



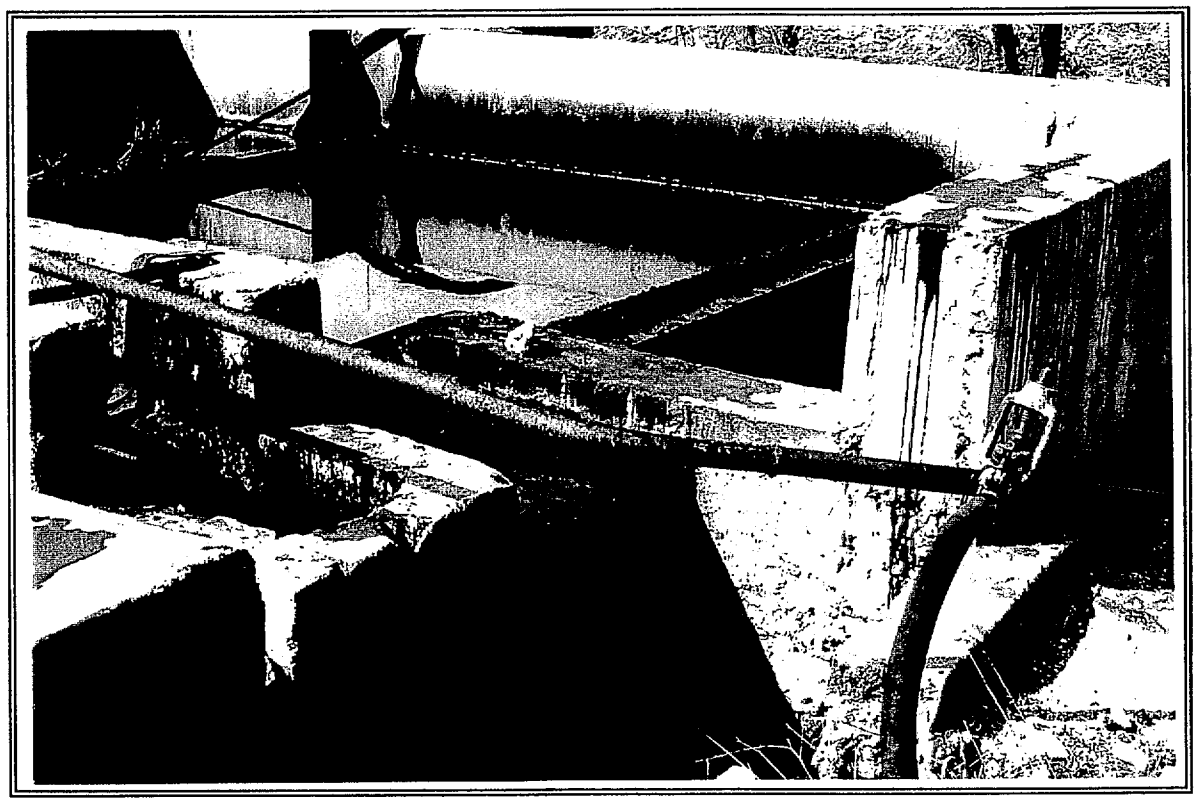
Power plant yard drainage.

Coal pile drainage ditch.

PHOTOGRAPHS

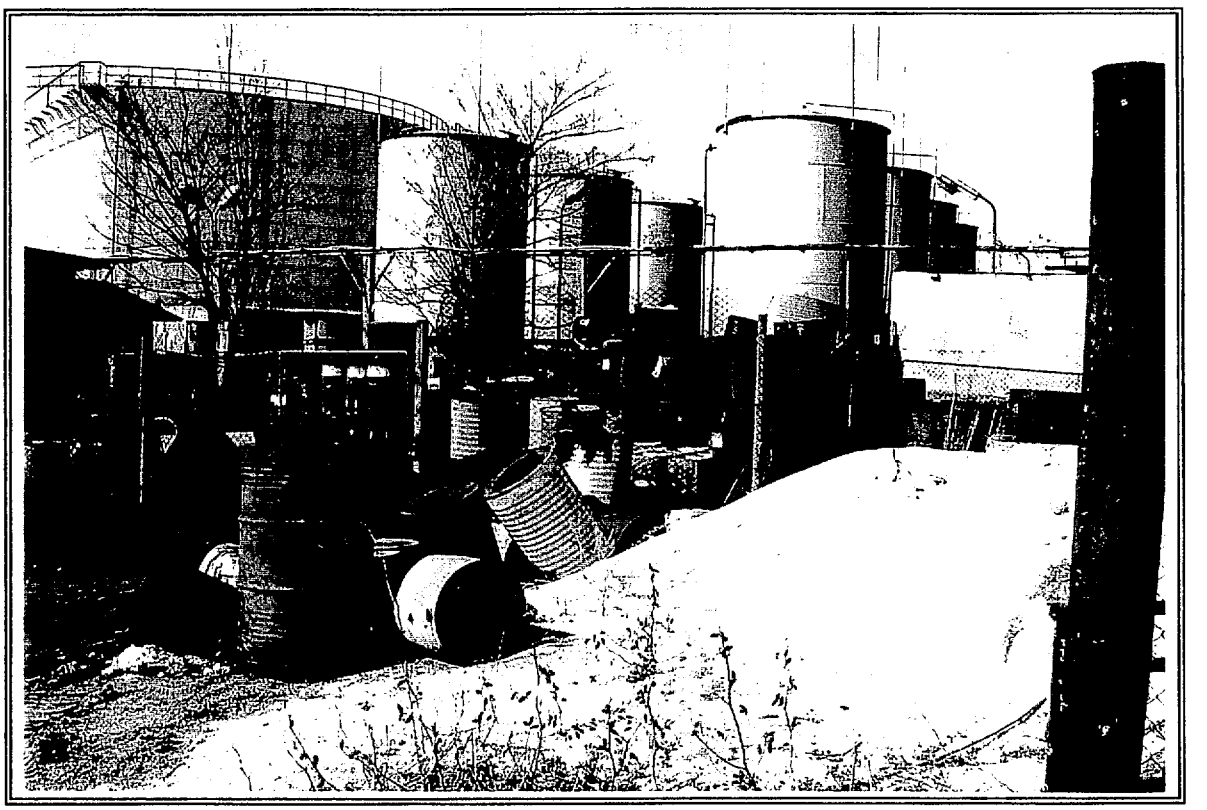


Oil storage area.

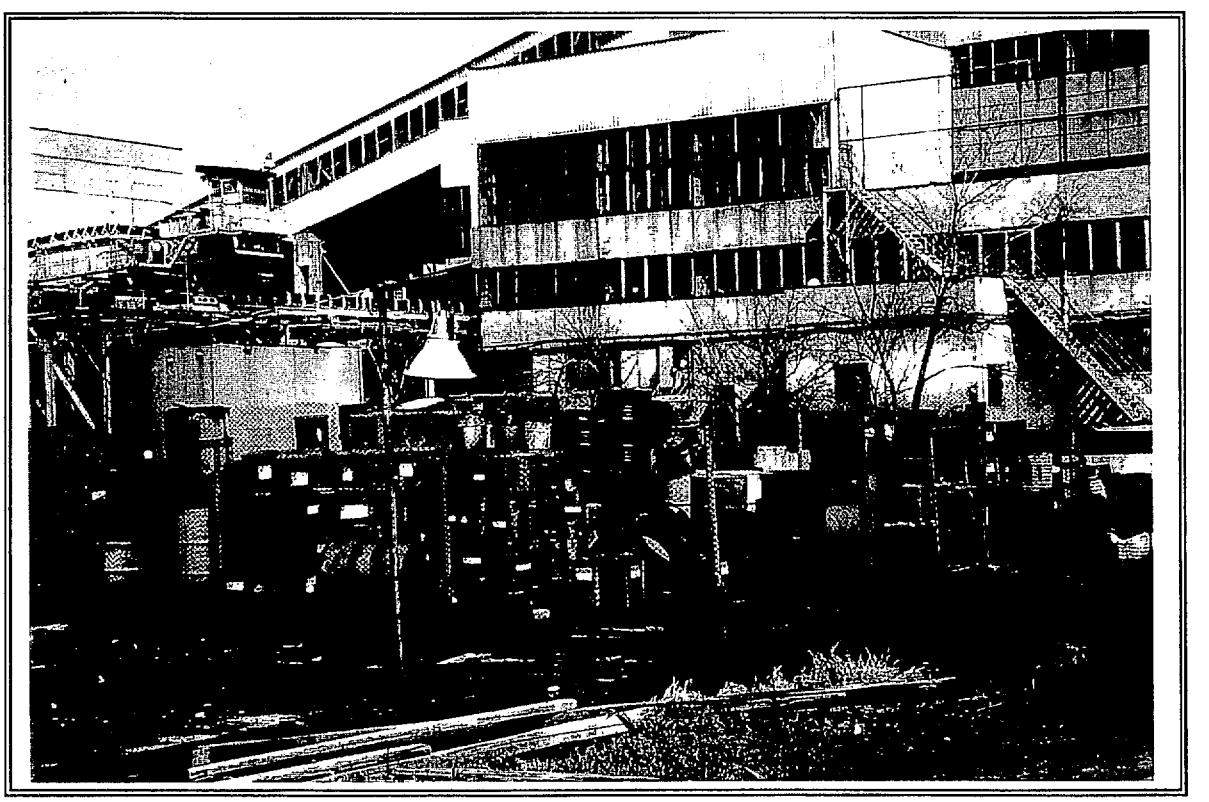


Oil conditioning area, close-up view.

PHOTOGRAPHS

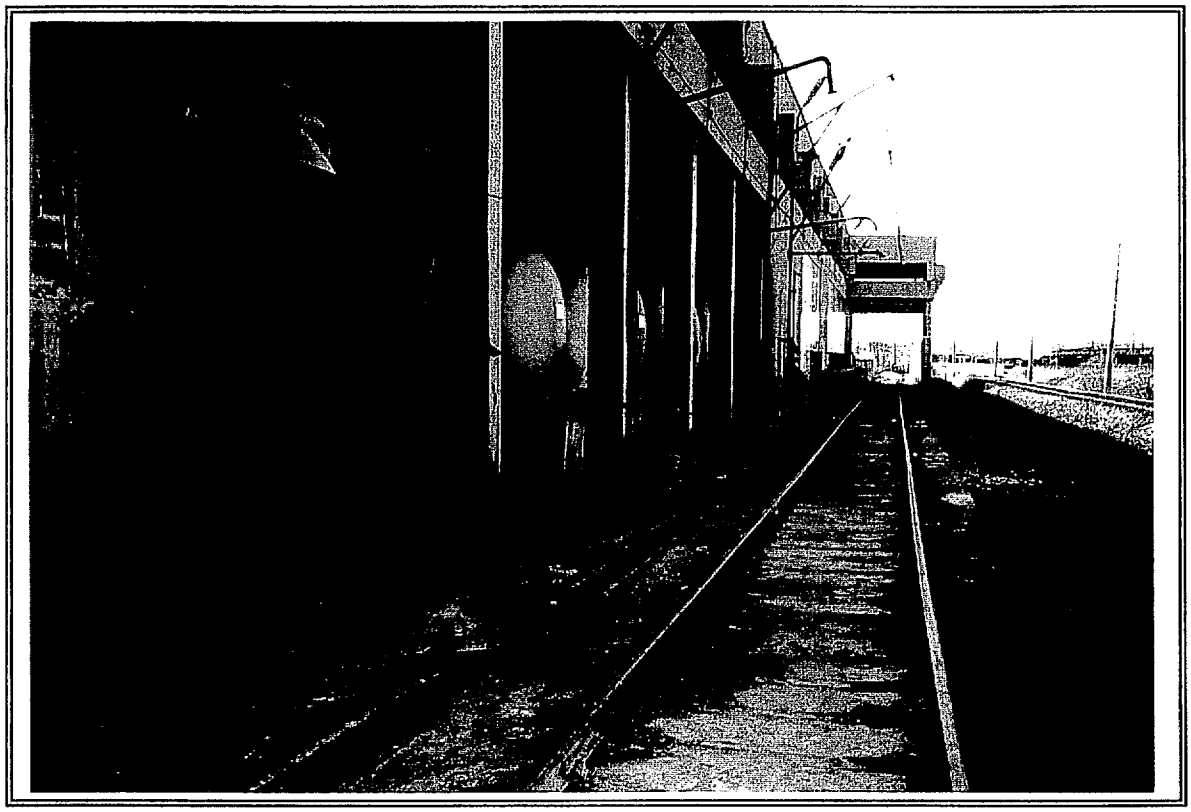


Chemical storage area, view I.

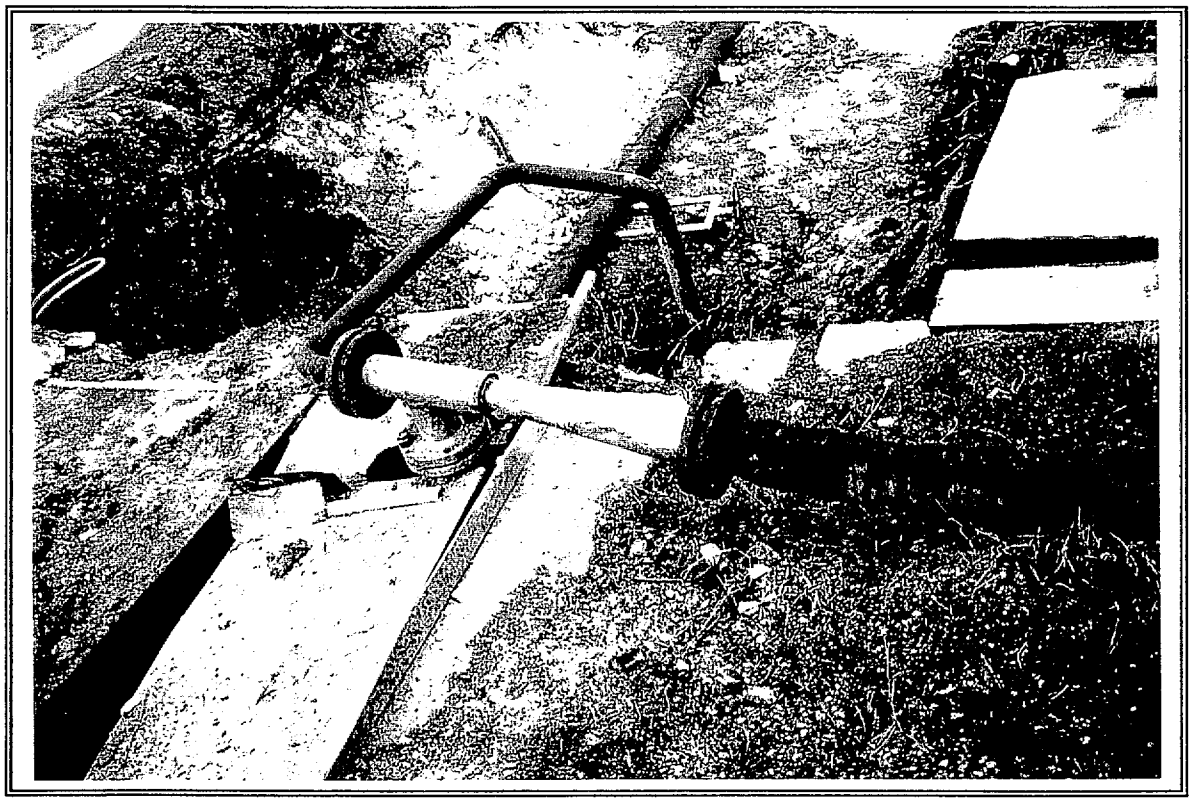


Chemical storage area, view II.

PHOTOGRAPHS



Storage area for water treatment chemicals.



Run-off water from the chemical storage area.

PHOTOGRAPH

Material loading area.

PHOTOGRAPH

Pipe trench.