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Environmental Policy and Technology Project

For the New Independent States of the former Soviet Union

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RUSSIA

FINAL REPORT

Delivery Order No. 10

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Prepared by:

Environmental Policy and Technology Project

A USAID Project Consortium Led by CH2M HILL

Section 1
Introduction

Delivery Order 10 was designed to provide support for a variety of environmental activities in the Russian Federation. In order to achieve this purpose, the DO contained three components: (1) centralized Field Support, (2) Novokuznetsk (NVK) subproject, and (3) Nizhnii Tagil subproject. The main objective of the DO were to:

1. Improve public health;

2. Reduce pollutant emissions from industries and cities;

3. Assist industries in restructuring in an environmental sound and sustainable manner; and

4. Strengthen institutions and train individuals to continue improvements initiated during the course of the DO and the EPT Project.

These objectives served as the basis for the staffing, organization, and scope of work described in the Novokuznetsk and Field Support workplans dated April 1995, December 1995, and January 1997.

Modifications to Delivery Order 10 were introduced in the workplans as a result of decisions made by USAID and the EPT Project during the course of implementation. These changes are (1) the cancellation of the Novokuznetsk 2010 Program, (2) the consolidation of Nizhnii Tagil subproject implementation under the EPA, the agency originally assigned the lead role in that subproject, with CH2M Hill 's role redefined as providing support on an as needed basis, and (3) the reassignment of NVK 2010 funding to a series of Special Initiatives, including the Lake Baikal Initiative, the Environmental Impact Assessment Expert System Initiative, and the Russian Far East Small Enterprise Support Program.

Contents of this Report

Based on the changes outlined above, this final report provides an overview of the DO 10 field support component, the Novokuznetsk subproject, and the Lake Baikal and Environmental Impact Assessment Special Initiatives. A separate final report for DO 1 reviews initial work performed under the EPT Project and a final report for DO 11 discusses the activities and accomplishments of the Russian Far East subproject. Coverage of achievements realized under the Small Enterprise Support Program are also in the final report for the Russian Far East subproject. Task deliverables are listed in an Appendix to this report.

Section 2
Moscow Field Support

The Moscow Field Support Office (FSO) was organized and staffed to support the following objectives:

1. Support flexible and cost-effective project implementation with minimal duplication of project support functions among the subprojects;

2. Provide logistical and technical support not available at subproject and activity sites;

3. Facilitate program impact assessment and identify new and follow-on activities;

4. Encourage maximum use of host-country organizations, services, and individuals.

The Moscow Field Support Office staffing plan was designed to ensure EPT Project home office support in Moscow and in Washington, D.C., for the subprojects in Novokuznetsk and the Russian Far East and for the Lake Baikal and Environmental Impact Assessment Special Initiatives, and also to provide needed support to the Moscow-based USAID Contracting Officer and Contracting Officer's Technical Representative.

The Moscow office also provided overall direction, technical oversight, training, policy and administrative support, and institutional development training for the subprojects and Special Initiatives. In addition, the Moscow office was responsible for Russia-based procurement and logistics, property management, financial management and reporting, subcontracting management, human resources management, project reporting, and inbound and outbound travel.

The EPT Project Core Contract provided for a Regional Director and ten Russian support positions; DO No. 10 supplemented this core staff with additional positions to meet Field Support Office responsibilities. With USAID approval, staffing was adjusted in response to imperatives occasioned by changes in the scope of project work and the desire to streamline Project administration and management, particularly by substituting local Russian staff for long and short-term expatriates. By project end, the majority of senior expatriate project positions had been shifted to local Russian staff.

Section 3
Novokuznetsk Subproject

The major focus of DO No. 10 activities was the Multiple Pollution Source Management subproject in the city of Novokuznetsk. According to statistics of the Ministry of Environment (now State Committee on Environment), Novokuznetsk is one of Russia's fourteen most polluted cities.

Novokuznetsk ("New Kuznetsk") is a purpose-built industrial city that rose in the late 1920's in the Kuzbass (the "Smithy Basin") of Western Siberia. It is located in Kemerovo Oblast on the Tom River in a basin rich in coal next to the site of Kuznetsk ("City of Smithies"), a tsarist stronghold established in 1647 as part of the eastward expansion of Russia into Siberia. The city's first massive iron and steel complex, the Kuznetsk Metallurgical Combine (KMK) began operations in 1931 as the eastern half of a railroad-oriented "pendulum" that sent Kuzbass coal west to Magnitogorsk and Magnitogorsk iron ore east to the Kuzbass. The industrial base of the city expanded rapidly during WWII with the absorption of industrial plants evacuated from areas of western Russia under Nazi occupation, and again after the war, when yet a larger steel mill, the West Siberian Metallurgical Combine (ZapSib) and a large aluminum smelter were built.

The massive industrial build-up was not accompanied by equivalent investment in the environment. The city's smelters spew rust-red dust high into the atmosphere, while air in the Novokuznetsk basin itself is thick with smoke from numerous lower stacks, the horizon often invisible through a dark-grey haze. Dark black dirt - particulates from coal dust and fly-ash - coats every surface in the city, including the inhabitants' lungs. To add to the problems, the city still relies in large measure on an outdated water supply system and web of underground pipes that is increasingly subject to contamination and leakage.

In the early 1990's Novokuznetsk city leaders and industrial managers began to look for ways to clean the environment, reduce health problems such as respiratory ailments and water-borne diseases, and diversify the economy by introducing small and medium scale environmentally benign enterprises. In 1994 the city embarked on a project of joint cooperation with the U.S. Agency for International Development through the EPT Project.

The basic task for the EPT Project team was to determine which activities could be undertaken for maximum impact with the limited resources available to USAID. With this in mind, the team undertook a limited assessment of health risks with the help of the local Sanitary-Epidemiological Service (San-Epi) and Hydro-Meteorological Service. On the basis of this study it was determined that the two areas of greatest risk were 1) contaminated drinking water (responsible for 15-20% of children's clinic visits) and 2) poor air quality (responsible for a wide range of chronic lung and bronchial conditions). In consultation with USAID and local environmental and health officers, the EPT Project team made the decision to concentrate resources on economically affordable measures to address these primary concerns through activities directed toward 1) improving the quality of drinking water management and treatment; 2) reducing the primary levels of air pollution; 3) promoting sustainable development through environmentally benign small and medium-sized enterprises that would offer alternative employment to the few massive smelting enterprises that currently dominate the economic life of

the city.

Water Quality Improvement: Drinking Water Management (Novokuznetsk Task 3)

Background

An initial analysis of Novokuznetsk drinking water found that fewer than 90% of pathogens were being removed by the existing treatment system. In order to demonstrate alternative methods of water treatment, the EPT Project invited Novokuznetsk Vodokanal management and municipal environmental officers to participate in a study tour of several water treatment facilities in the U.S. in areas with natural conditions comparable to those of Novokuznetsk. This tour successfully convinced local officials and water company engineers that there were a number of feasible low-cost measures that would significantly improve the quality of water in Novokuznetsk. In part on the basis of the experience gained on this study tour, and in part on the basis of on-site studies, water treatment specialists from Novokuznetsk Vodokanal, from Novokuznetsk San-Epi, and from CH2M HILL formed a project team that developed a program to address water treatment issues in Novokuznetsk.

Major Accomplishments

Water Filtration and Leakage Control

The existing filtration system used media focused on achieving high rates of flow with little loss of pressure (head) and consequent poor removal of pathogens, while the filtration plant itself was overloaded because of excess demand caused by high rates of leakage. EPT Project engineers developed a pilot program to demonstrate the effectiveness of low-cost multimedia filters that preserved desired pressures while effecting high pathogen removal. To cope with problems of leakage the EPT Project provided computer monitors and the team developed a hydraulic model that identifies severe pressure variations, mistakenly closed valves, blockages, leaks, and other bottlenecks in the system. For minimal expenditures, valves were opened, blockages, removed, leaks repaired, and minor additions were made to the underground piping system. The result was an immediate reduction in pumping requirements (resulting in a lower load on the filtration/disinfection system) and decreased leakage (in part because the system can now operate at lower pressure). Perhaps the greatest effect of these changes on the population of Novokuznetsk is that in many areas of the city water is now being delivered to all floors of high-rise buildings that had previously seldom had tap water higher than the fourth floor. The new technology introduced by the hydraulic control system allowed Novokuznetsk Vodokanal to avoid building a new pumping station and reconstruct large sections of the existing pipe network at a savings of over one million dollars, while reduced pumping costs are effecting an annual savings of $70,000 in electricity demand.

Novokuznetsk Vodokanal now has a program in place to replace all existing filter media with multimedia filters. Novokuznetsk Vodokanal, in turn, demonstrated the effectiveness of the new system to other Kuzbass area water treatment plants. In addition, with EPT Project assistance, Novokuznetsk Vodokanal developed a consulting practice to train other treatment plants in the development and use of hydraulic models.

Water Quality Analysis, Data Collection, and Disinfection

At the start of project activities, the existing disinfection program lacked real-time water quality analysis and control systems to manage chlorine treatment of the filtered water. To demonstrate treatment capabilities with modern equipment, the EPT Project team developed a pilot computerized monitoring and control system at the city's major source of drinking water, the Dragunskii water treatment plant. This system automates the real-time monitoring of treatment parameters such as flow, pathogen levels, and turbidity and also automates the treatment process itself to allow optimal application of chlorine to given levels of pathogens.

Successive components of this activity provided assistance in laboratory analysis, procurement of laboratory equipment, and improved techniques of water data collection and analysis.

Laboratory analysis

Under EPT Project sponsorship, a team of US laboratory specialists analyzed the existing laboratory set-up and recommended significant improvements, including establishment of a contract laboratory that would serve as a single point to locate new equipment and to perform analyses for multiple Kuzbass-area entities requiring such analysis.

Laboratory Equipment

The project team assisted the city of Novokuznetsk in a successful application to the Commodity Import Program that resulted in a grant of $700,000 to secure equipment for a modern water quality laboratory that would operate on a contract basis to provide analytical services to area water treatment plants and federal, regional, and municipal agencies.

In addition, the EPT Project directly provided laboratory equipment and training to Novokuznetsk Vodokanal to monitor and control water quality throughout the treatment process and to conduct coliform bacteria analysis on a continuing 20-hour rather than 48-hour basis.

Data Collection and Analysis

In order to assist the Novokuznetsk Sanitary-Epidemiological Service in its public health tasks of monitoring and controlling the work of Novokuznetsk Vodokanal and other public health-related water treatment facilities, the EPT Project assisted the Service in developing a database to store and analyze water quality data. As a result, the Service is now able to prepare more accurate and more timely analyses and reports and has, at the same time, been able to reduce labor costs.

Air Quality Improvement

Background

In approaching the air pollution tasks, the EPT Project team began work with the Novokuznetsk environmental committee and the Novokuznetsk Hydro-Meteorological Service. They determined that the primary sources of pollution within the city of Novokuznetsk were not, as

seemed immediately intuitive, the city's heavy industries, for their high stacks diffuse air into the upper atmosphere at a height sufficient to bypass the inversion layers that often cover the Novokuznetsk Basin. Instead, most air pollution in the city derives from the low stacks of the city's district heating plants. These furnaces burn low-quality coal with a high content of fines (that is, particles of coal smaller than 6mm. in size), they operate at low efficiency without effective air pollution control equipment, and their low stacks release both gases and breathable particulates from unburned fines into nearby residential areas.

EPT Project efforts were directed to finding methods to reduce emissions that were not only low in cost, but that would have an economic payback to ensure replication of the results achieved at the demonstration projects. In addition, it was important to help provide the Municipal Environmental Committee with tools and training that would allow better enforcement of its air quality management program

Air Pollution Reduction : Air Pollution Monitoring (Novokuznetsk Task 4)

Major Accomplishments

To improve the ability of city regulatory agencies to identify, track, and control air emissions, the EPT Project financed and supervised the installation of three air monitoring stations, provided the city with an air pollution emissions inventory system and dispersion modeling software, and conducted a series of seminars on air quality monitoring, dispersion modeling, source testing, and Visible Emissions (VE) Monitoring (US Environmental Protection Agency Method Nine). The Air Pollution Task thus provided the city of Novokuznetsk with tools and training to help manage and develop its air quality regulatory program.

Air Quality and Meteorological Monitoring Stations

Three new monitoring stations provided by the EPT Project record levels and trends of fine particulate matter (PM10) concentrations in and around Novokuznetsk. These stations also record meteorological data on a continuous basis for use in refined dispersion modeling and provide the city with high-quality air pollution and meteorological data for use in dispersion modeling and regulatory programs.

Dispersion Modeling

The EPT Project installed for the city a dispersions modeling package that plays a key role in the city's air pollution management and control program. This package allows the city at little expense to assess air quality, plan control measures for severe air pollution episodes, and assess what strategies will be most cost effective in reducing overall levels of pollution.

Visual Emissions (VE) Monitoring

The EPT Project sponsored training in a program for monitoring visual emissions to provide the city with a low-cost methodology to monitor and inspect sources of particulate air pollution and set priorities for corrective action. The VE program is especially important as a low-cost

alternative to conventional source testing, which is expensive both in time and money. The city now has the ability to identify gross emitters, require corrective action, and assess emission fees based on actual as opposed to previously under reported emissions.

Electronic Air Emissions Inventory

The existing Novokuznetsk manual emissions inventories omitted large amounts of data. In order to develop a more thorough and accurate emissions inventory, the EPT Project provided the city with an electronic emissions inventory that contains more sources, develops more accurate emission estimates, and can be updated more efficiently. The new air emissions inventory has particular application in helping to justify city proposals for "extreme risk" designation and to support dispersion modeling.

Lessons Learned, Sustainability, and Replication

The new tools introduced by the EPT Project provide the city with a more effective ability to monitor real-time fluctuations in emissions, to direct regulatory efforts to areas and sources of greatest emissions, and also to enforce close-down orders at times when emissions become an immediate threat to human health.

The testing and monitoring methods introduced by the EPT Project to Novokuznetsk, such as Visible Emissions Monitoring and source testing procedures, are being disseminated by the EPT Project-sponsored Technical Training Center at the Siberian Mining and Metallurgical Academy to regulators and combustion engineers throughout the Kuzbass.

Air Pollution Reduction: Improved Boiler Efficiency (Industrial Environmental Audits - Novokuznetsk Task 5)

CH2M Hill's experience around the world has shown that boiler houses can reduce emissions significantly by employing simple low-cost technologies that allow them to burn fuel more efficiently. To demonstrate the potential of this approach, U.S. experts provided training to Russian engineers and combustion specialists in the conduct of environmental energy audits at six types of major facilities that provided a cross-section of types of industrial plants across the Soviet Union. The selection of facilities was based both on local needs and the desire to allow a high potential for replication.

As a first step, energy audits that included boiler tune-ups were conducted at boiler houses and resulted in an average reduction in energy consumption of three percent and a concomitant reduction of particulate emissions of over ten percent. The cost of an annual boiler house tune-up is approximately $1,600; the cost savings achieved from a three percent improvement in combustion efficiency at an average boiler (many of which are smaller than the test boilers) is approximately $6,000 per year. With approximately 320 boiler units in the city of Novokuznetsk, the total cost of performing tune-ups would be about $500,000 per year with an annual payback of approximately $1.5 million, a dramatic payback on the $100,000 USAID spent on auditing equipment.

The second step was to install control equipment recommended in the energy audits to allow superior monitoring of combustion operations. Tests conducted before and after installation of the control equipment showed an improved average combustion efficiency of eight percent and particulate reduction of over thirty percent and average energy savings sufficient to provide a payback period for the cost of the control equipment of about one year. The economic calculations for payback on control equipment are more complex than for tune-ups, as automated control technology is not appropriate for smaller boiler units. EPT technicians estimate, however, a potential cost savings of $52,000 per boiler at the 80 appropriately sized boiler that represent approximately 80-85 percent of the boiler capacity in the city. In addition, if the three large combined heat and power plants in the city were to install automated controls at a total installation cost of less than $800,000, annual savings in coal costs are estimated at $2.4 million per year.

Sites for environmental audits included the ZapSib Metallurgical Combine, a poultry processing center, and the Kedrovskii Mine near Kemerovo, the capital city of the Oblast in which Novokuznetsk is located. Using techniques taught by the EPT Project team, the ZapSib audit was expanded to a major environmental audit document that the company has used in a successful bid to attract investment for upgrading production processes. At the poultry factory, the audit team supervised the installation of temperature controls that allow de-coupling the water supply required for space heating from the higher temperature water required for processing, resulting in decreased costs by a reduction in coal consumption and a simultaneous reduction of particulate emissions. The Kedrovskii Mine site allowed the EPT Project to extend the audit training program beyond the confines of Novokuznetsk proper and to include demonstration of control techniques at a different kind of production process that widely spread throughout the larger Kuzbass region.

As an intermediate step in the audit process, the EPT Project organized a training and study tour to the U.S. for selected Novokuznetsk area specialists to demonstrate the application of on-site energy and environmental audit techniques using still more advanced technologies than those initially applied in Novokuznetsk.

Air Pollution Reduction: Improved Combustion Efficiency - Clean Coal Demonstration Project (Industrial Environmental Audits - Novokuznetsk Task 5)

The final and most costly step in increasing boiler efficiency is to address the problem at the front end by employing a higher-quality, and therefore more costly, fuel. An EPT Project Novokuznetsk engineer, Dr. Ekaterina Volynkina, identified an economically viable solution to this problem. By burning coal that has been sorted, or "cleaned," to remove fines, boiler houses can increase combustion efficiency by 20-25 percent and at the same time reduce air emissions by 60-80 percent. The result of this idea was the Clean Coal Demonstration Project, which was intended to show that the use of the more expensive, pre-sorted coal will result not only in reduced particulate emissions, but also that the increased efficiency of combustion can compensate for the additional cost of higher quality fuel by allowing less fuel to be used, resulting in break-even or reduced overall costs.

The EPT Project financed demonstrations of Dr. Volynkina's methods at three representative

boiler houses. The results of tests conducted before and after the demonstration showed that cost savings are sufficient to justify building a local coal sorting facility and that reductions in particulate emissions ranged from 30 to 90 percent. Using pre-sorted coal adds approximately $4 per ton of coal delivered to the boiler, but this amount is more than compensated for by a savings of approximately $5 per ton due to improved efficiency and an additional $1 per ton due to reduced maintenance and ash disposal costs. The net benefit of $2 per ton, attributable to a 10 percent increase in efficiency, adds an economic benefit to the health benefit of reduced emissions and justifies the cost of constructing a coal sorting facility. These results are being used by local coal companies to try to attract investment in such a facility.

Lessons Learned, Sustainability, and Replication

The EPT Project trained more than fifty Russian technicians to perform environmental/energy process efficiency audits, including hands-on training in the performance of multi-media environmental audits at large industrial complexes and specific air emissions and energy efficiency audits at boiler houses and a large power plant.

As the primary mechanism for replicating the achievements of the boiler house efficiency program, the EPT Project, in addition to helping sponsor the creation of a Technical Training Center at the Siberian Mining and Metallurgical Academy, also sponsored the creation of two local private consulting groups, NECCO and EcoUgol, that are able to provide a full range of energy consulting services to the Kuzbass region.

NECCO worked directly with the supplier of control equipment to the EPT Project, Control Techtronics International (CTI), which was chosen not only on the basis of the lowest bid, but also because it had successfully set up a long-term delivery system in Eastern Europe and countries of the former Soviet Union. CTI bid the project at or below cost in order to establish a similar beachhead in Russia.

NECCO handled the planning and installation together with CTI, then entered a representation agreement with CTI to provide further, fully commercial installations at additional boiler houses in the Novokuznetsk area. Since the capital cost of the automated control equipment is not high, approximately $50,000 per boiler, and the payback is rapid, capital costs are not an obstacle to further installations of similar control equipment.

Both NECCO and EcoUgol have access to the portable equipment brought to Novokuznetsk for the environmental/energy audit program and, after performing audits, boiler house tune-ups, and equipment design and installation services under EPT Project direction, have gone on to market these services on the basis of their economic pay backs.

Sustainable Development (Novokuznetsk Task 6)

Major Accomplishments

To support the development of new market-oriented environmentally benign small and medium-sized enterprises, the EPT Project sponsored a Business Center to train new entrepreneurs and

businesses.

Since its registration in 1996, the Business Center has developed curricula and conducted workshops to train over 1,800 individuals. In addition, it has prepared and delivered over 930 printed training brochures and provided 585 in-house and subcontracted consultations to the Novokuznetsk and Baikalsk area business community. Topics covered include *How to Start a Business*, *Business Planning, Accounting*, *Legal Aspects of Business Formation*, *Market Research*, and others.

Through a matchmaking program the Business Center has introduced clients to appropriate financial and trade contacts and assisted clients with administrative and logistical support. It has also developed a database of businesses to which all clients of the Business Center have access.

Lessons Learned, Sustainability, and Replication

The Business Center has become an integral part of the business community in the city of Novokuznetsk. It has established a long-term contractual relationship to provide business training for the Federal Employment service and has received strong material and logistical support from the Administration of the city of Novokuznetsk. The main mission of the Business Center, to promote sustainable economic development in the greater Novokuznetsk region, has the ongoing support of the City Administration, the Federal Employment Service, and the Novokuznetsk business community.

Section 4
Lake Baikal Special Initiative

Background

The Baikal Special Initiative grew out of a request made by Minister of the Environment Danilov-Danilian at the January 1996 Gore-Chernomyrdin Commission working sessions in Washington, D.C., for U.S. technical assistance to the Russian effort to convert the Baikalsk Pulp and Paper Mill to environmentally benign technology. The Baikalsk Mill is a kraft-process dissolving pulp mill located on the south-east shore of Lake Baikal that has long been seen in Russia as the most egregious symbol of Soviet-era environmental negligence. The specific U.S. aid requested by Minister (now State Committee Chairman) Danilov-Danilian was for 1) technical assistance in evaluating draft proposals for conversion; 2) technical assistance to the Government Baikal Commission Expert Group on Conversion chaired by Academician V.A. Koptiug, President of the Siberian Branch of the Russian Academy of Sciences (unfortunately, since deceased); 3) technical assistance in securing a financing/investment package to support conversion.

Major Accomplishments

Technical assistance to the Expert Group of the Government Baikal Commission

- On the basis of technical information provided by the USAID/EPT Project team at the request of the Expert Group of the Government Baikal Commission, the Commission adopted a recommendation to convert the Baikalsk mill to a zero-discharge closed cycle integrated papermaking plant based on US technology.

- After analyzing this information, the Expert Group made a recommendation that the Baikalsk plant be converted to papermaking based on a combination of zero-discharge chemi-thermomechanical mass produced according to U.S. technology (70-80 percent) and on kraft pulp brought in from outside mills (20-30 percent). This recommendation was adopted by the Government Baikal Commission on 9 January 1997.

Technical assistance to specify a program for conversion of the Pulp Mill

- At the request of the Irkutsk Oblast Administration, the EPT Project team provided technical assistance to a special working group convened to draft a Federal Targeted Program for conversion. American assistance was particularly desired in order to ensure that the proposed conversion technology incorporated the specific U.S.-origin zero-discharge closed-cycle processes and technologies required by the Baikal Commission. The proposed conversion will result in reduction of waste water discharges to Baikal to zero and the reduction of air emissions by 670 percent from present levels.

- A draft federal targeted program on conversion to zero-discharge technology was finished with EPT Project team assistance in March of 1997 and has been submitted to all appropriate jurisdictions for comment and approvals, including oblast and federal

Environmental Expertise, the Learned Council of the Russian Academy of Sciences, the Ministry of Economics, and UNESCO (which made elimination of pollution discharges into Baikal a condition of designating Baikal a World Heritage Site).

- The EPT Project Team, through a subcontract with a workgroup based on the Siberian Branch of the Russian Academy of Sciences, developed a plan for reclamation of fourteen large storage ponds for lignin sludge. Reclamation of these ponds will eliminate the single greatest threat to the biological health of Lake Baikal, the biological death of a large part of the lake that would result from a natural disaster such as an earthquake or torrential rains that would dump the contents of the ponds into the lake.

Technical assistance to develop financing for the conversion to zero-discharge technology

- In order to facilitate the large-scale investment necessary for the conversion to zero-discharge technology, the Special Initiative helped to develop an investment prospectus for the federal program of conversion, sponsored a training seminar on International Accounting Procedures for Baikal-area businesses, and facilitated contacts among potential investors, the Government Baikal Commission Expert Group, and Baikalsk Mill management. Partly as a result of this effort, the Mill's Vice-President for Finance, A.V. Shteinberg, expresses confidence that financing for the program will be found upon final approval of the proposed federal targeted program for conversion.

Lessons Learned, Sustainability, and Replication

- A small, sharply focused project (to help find technical means to eliminate waste water discharges from a notorious polluter on Baikal) with a strongly motivated partner (the Russian Academy of Sciences) was able to achieve significant success with extremely limited resources.

- The sustainability of the Baikal effort will depend in large measure on two factors: strong support from the Russian government to help provide sovereign guarantees for needed investment; and pressure from the environmental community to require implementation of a no-discharge regimen on the operation of the Baikalsk Pulp and Paper Mill and other Baikal-area plants.

- The technology on which the zero-discharge closed-cycle process is based, turbine evaporator-concentrators based on Boeing engine technology, can to a significant extent be built under license on-site in Irkutsk at an idle aircraft plant. The Russian Academy of Sciences has expressed interest in extending this tested technology to other applications than the Baikalsk Pulp and Paper Mill, including other pulp mills, oil refineries (the world's largest is located in Angarsk, Irkutsk Oblast), and cleansing of polluted mine waters. All of these applications are in use already in other parts of the world where minimal or zero discharge is required by environmental conditions.

- The Limnological Institute of the Russian Academy of Sciences is preparing grant proposals to submit to the USAID ROLL program and the World Bank to develop and

foster environmentally benign, small-scale technologies that will extend the benefits of this large-scale plan for conversion to small, diversified industries.

Section 5
Environmental Impact Assessment Special Initiative

Background

The Environmental Impact Assessment Special Initiative developed out of a request from the then Ministry of Environment (now the State Committee on Environment) to help develop a program to coordinate vastly differing kinds of information produced by vastly different information systems provided under the Commodity Import Program. The EPT Project responded to this request by proposing the russification of an environmental impact assessment program developed for the Asian Development Bank that would allow the integration of information from the Novokuznetsk CIP program and other data sources and would use a proposed Kuznetsk Metallurgical Combine co-generation plant as a test case. The program would be modified for applicability to the thermal-related power sector generally and would incorporate Russian and multi-lateral lender environmental impact assessment standards, practices, and regulations in a standardized format that to promote transparency in the application of standards in the exercise of State Environmental Expertise.

The EPT Project worked closely on this activity with Ecoline, a Russian NGO with extensive expertise in conducting environmental impact assessments of controversial projects, including thermal and atomic power plants, dams, railways, and other major construction projects. Ecoline provided major assistance in all aspects of the project and played a critical role in making it a success.

Major Accomplishments

Russification of Environmental Impact Assessment Expert System

In a cooperative effort between and among the software developers, the EPT Project team, Ecoline, and Russian technical specialists, the existing program was reprogrammed to incorporate Russian environmental standards and to provide the most correct Russian equivalents for English terms and concepts in the knowledge base. The terminology was then standardized to ensure easy comprehension of both general and program-specific terms used in the interface. Finally, after consultations with Environmental Impact Assessment practitioners and instructors, an *Ecoline* programmer traveled to the corporate headquarters of the software developers to assist in assembling and testing the software and to arrange for program development and distribution in Russia.

Performance of an applicability study of the software by Russian Environmental Impact Assessment practitioners

Under Ecoline supervision, a compiled version of the program was brought to Russia and distributed to four independent groups of Environmental Impact Assessment specialists and practitioners and also to the Department of Environmental Expertise of the State Committee on Environment. The Russian specialists were asked to evaluate the following aspects of the software: technical imperfections; areas of potential application; necessary or recommended

modifications in the program design, the interface, and the knowledge base. The program was then further modified and perfected on the basis of these evaluations.

Conduct of two workshops to present the software and distribute software licenses to a broad spectrum of potential users

Upon completion of all program modifications, Ecoline and the EPT Project team jointly sponsored two day-long training seminars at which the software was demonstrated and working copies of the program were distributed to 24 selected users. The first seminar was directed to NGO's (including one originally sponsored by USAID/EPT from Novokuznetsk), to Environmental Impact Assessment instructors at institutions of higher learning (including one from the Technical Training Center originally sponsored by USAID/EPT at the Siberian Metallurgy and Mining Academy in Novokuznetsk), and to commercial users; the second seminar to representatives from government ministries, including the State Committee on Environment and the Ministry of Construction, and from a range of regional (oblast and municipal) committees for environmental protection (including two from Novokuznetsk: one from the Novokuznetsk Environmental Protection Committee and one from the Novokuznetsk Institute of Construction). In addition, the EPT Project team provided licenses and training to two representatives of the Baikal Foundation.

In addition, a special personal presentation of the software was conducted for G. Chegasov, the head of the Department of Environmental Expertise at the State Committee on Environment and for one of his departmental experts, and the Department was also presented with copies and licenses to the software. Mr. Chegasov noted that if the program meets the requirements of his Department, then he proposes to make its use obligatory at the project design stage by incorporating its use into official construction guidelines (SNiP's). Mr. Chegasov also noted that, although the program was probably not necessary for the professional practitioners on his highly skilled staff, it could be of great benefit for the practice of environmental impact assessments in regional environmental review committees where experts of the highest caliber are often not available.

Provision of computer equipment to run Environmental Impact Assessment Expert System software to NGO users

Because the Environmental Impact Assessment Expert System produced under the auspices of this Special Initiative requires a high-level computer (minimum Pentium class with 32Mb RAM), and many of the NGO's involved in Environmental Impact Assessment work who have received program licenses do not have the necessary computing power to run the program, the EPT Project received COTR and CO approval to purchase up to six computers and distribute these to NGO practitioners who are otherwise unable to use the program.

Lessons Learned, Sustainability, and Replication

The experience of developing this complex program demonstrates the importance of involving Russian cooperating partners at the earliest possible opportunity. Because of a series of accidental happen stances, including the reorganization of the Ministry of Environment as the

State Committee on Environment, this did not happen until late in the project. Thus, the efforts of Ecoline were particularly important in enabling the EPT Project team to bring this effort to a successful conclusion.

Under the leadership of Ecoline, seminar participants have formed an Environmental Impact Assessment Expert System user's group. The purpose of the user's group is to provide a source of technical assistance in program use, to work on further expansion and development of the program's knowledge base, and to work on further development of the program, and in particular extension of program capabilities to additional industry sectors. In addition, as mentioned earlier, the head of the Department of State Expertise of the State Committee on Environment has indicated the desirability of incorporating use of the program in the design stage of projects and for use by regional environmental protection committees.

Appendix
Deliverables by Task

Section 3: Novokuznetsk Subproject

Drinking Water Management (NVK Task 3)

- Management of the NVK Vodokanal and the Sanitary Epidemiological Service (San-Epi) were brought to the US to visit water treatment plants to demonstrate that it is possible to treat water to much higher quality than was being achieved in NVK. A report on this trip was prepared and submitted on August 1, 1994.
- A report evaluating drinking water laboratory needs was prepared and submitted on September 6, 1994.
- A pilot public education program was prepared on June 30, 1995.
- Software and training were provided in developing a hydraulic model of the water distribution system. A report was prepared and submitted on October 31, 1996.
- Criteria for receipt of drinking water equipment was prepared and submitted on April 30, 1996.
- A drinking water quality evaluation report that detailed the progress in preparation and use of a database for keeping track of water quality data was prepared and delivered on July 17, 1997.
- An evaluation of the Dragunskii water treatment plant was prepared and submitted on July 17, 1997.
- A conference on disinfection planned for Spring 1996, was unneeded and was canceled by agreement with USAID in 1996.
- A report which documents the support provided by EPT Project to Vodokanal in setting up a consulting company to assist other Vodokanals in transferring the lessons learned from the EPT project was prepared and submitted on July 17, 1997.

Air Pollution Reduction (NVK Task 4)

- An air pollution database was completed and submitted on November 30, 1994.
- A plan to reduce air pollution from heating boilers was submitted on November 30, 1994.
- A report on federal and regional air pollution regulations and policies and a program to monitor, model, and enforce regulations were submitted on December 7, 1994.
- An emissions inventory system for district heating boilers was completed on December 31, 1995.
- An emissions inventory for industrial sources was completed in April 1997.
- The ambient air quality monitoring system was upgraded by the addition of 3 new stations, and six Russians were trained in its use by October 31, 1995.
- A US dispersion model was adapted for use in NVK, and six Russians were trained in its use in May 1997.
- US training in visible emissions monitoring techniques was provided for two Russians (seven trained) in October 31, 1995.
- Training in source testing procedures for over 20 Russians was provided as part of the Audit task, during audits, clean coal testing, and equipment testing in May 1995, October

1995, October 1996 and May 1997.

- A summary report of the air task was completed and submitted on June 25, 1997.

Industrial Environmental Audit (NVK Task 5)

- Two rounds of industrial environmental training audits were conducted. The first, involving five boiler houses and the cement plant in Novokuznetsk, was completed in May 1995. The second was at the Kedrovskii boiler house in Kemerovo, and was completed in October 1995.
- A training program in energy and environmental management for ten Russians was conducted in the Pittsburgh area in July 1995. A report on this program was submitted on October 30, 1995.
- Reports which document the audit findings were prepared following the audits. These were prepared in Russian by the training participants.
- A report which documents follow-up actions required for long-term changes to take advantage of the lessons learned in the audits task was prepared. This was included in a summary report on the audits task, submitted in September 1997.
- Equipment recommended in the audits was procured and, after installation, testing was performed on its effectiveness. A report on this was submitted in September 1997.
- A report on the result of the clean coal demonstration program was submitted in September 1997.

Sustainable Development (NVK Task 6)

- Training and support to the Novokuznetsk 2010 plaining team was provided and reported in April 1996.
- A short course on business principles was presented and reported in October 1995.
- A report on commercial opportunities analysis (business-screening techniques) was provided in October 1995.
- A report on the ability of Business Center to be self-supporting and on the "incubator" and "matchmaker" programs was prepared and delivered in September, 1997.

Section 4: Lake Baikal Special Initiative

Though the Baikal Special Initiative was not a workplan task with specific deliverables, the following work products were among those produced in connection with Initiative activities.

- Report on environmental engineering and safety of Biriukov Conversion Proposal by team of EPT Project Russian safety engineers
- Final summary report with annex of guidelines for further development of Biriukov proposal to bring it to a level for feasibility evaluation
- Analyses by Russian experts of Baikalsk Pulp and Paper Mill proposal for conversion to modernized kraft pulping and guidelines for further development of Mill proposal
- Report to Expert Group on time frame for conversion to paper in the absence of financial constraints
- Summary paper and description of contemporary BCTMM processes and their use in

papermaking

- Summary paper and analysis of zero-discharge closed-cycle technologies
- Interim report of activities performed and results achieved delivered to Chairman of State Committee on the Environment Danilov-Danilian
- Investment prospectus to support Baikalsk Pulp and Paper Mill conversion and Baikalsk area diversification
- Remediation plan for existing sludge ponds and other waste
- Seminar on principles of business organization and development for Baikalsk area entrepreneurs
- Seminar on the application of Generally Accepted International Accounting Principles to enterprise bookkeeping

Section 5: Environmental Impact Assessment Special Initiative

Though the Environmental Impact Assessment Special Initiative was not a workplan task with specific deliverables, the following work products were among those produced in connection with Initiative activities.

- Calyx EIS Expert System Software Program and 26 site licenses (ESSA, Inc.) (in English and Russian)
- Calyx EIS Expert System Software Program Manuals and User Guide (in English and Russian)
- Calyx EIS Expert System Technical Comments and Recommendations (Ecoline)
- Calyx EIS Expert System Software Evaluation Report (Ecoline)
- Evaluation of Calyx EIS Expert System by Drs. G. Belousova and M. Denisov, Ecocenter MTEA Ltd. (in Russian)
- Evaluation of Calyx EIS Expert System by Dr. E. Lazuta, KostromaGrazhdanProiekt (in Russian)
- Calyx EIS Expert System program output: summary of Report on Assessment of Environmental Impacts (OVOS) (in Russian)
- Seminar proceedings and concluding documents (in Russian)

The Environmental Policy and Technology (EPT) Project: Environmental degradation and natural resource mismanagement threaten public health, biodiversity and economic vitality in the New Independent States (NIS). To assist the NIS in alleviating these problems, the U.S. Agency for International Development (USAID) began the EPT Project in 1993. EPT provides technical assistance and policy advice in the environmental sector and promotes environmentally sound economic development through public and private, U.S. and NIS partnerships. The EPT Project is managed by USAID with support from the U.S. Environmental Protection Agency (USEPA). For assistance in project design, management and implementation, USAID has agreements with CH2M HILL International, Harvard Institute for International Development and ISAR. As the primary EPT contractor, CH2M HILL International has the lead role in delivering technical assistance, logistical support and policy support for selected projects. EPT Regional Offices are located in: Washington, D.C.; Moscow, Russia; Kyiv, Ukraine; and Almaty, Kazakstan.

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CH2M HILL International Services, Inc.
P.O. Box 24548, Denver, Colorado 80224 U.S.A.