DEFENSE ENVIRONMENTAL CONFERENCE '95

GARMISCH, GERMANY
7 - 13 MAY 1995

1 November 1995

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ABSTRACT

The Defense Environmental Conference '95 integrated four defense sector environmental conferences that were conducted simultaneously, May 7-13, 1995 in Garmisch, Germany. While each conference conducted specific business of its own, individual attendees had numerous opportunities to exchange views informally in addition to attending the formal programs. Participants from Eastern Europe and the Former Soviet Union, and the United States addressed common issues concerning the management of existing and emerging environmental management issues. This report is largely devoted to providing national situation papers presented to the Military Engineering Workshop on the Environment. A series of short commentaries has been added to these proceedings to describe the other three conferences' activities.

ACKNOWLEDGMENTS

Representatives from many organizations contributed to and helped ensure the success of the Defense Environmental Conference '95. All of these participants deserve thanks from their respective nations for a very productive exchange of information that will lead to improved environmental management throughout the international defense community.

As sponsor of the Military-to-Military contact team Program with Eastern European and Former Soviet Union nations, the U.S. European Command sponsored the centerpiece Third Annual Central and Eastern European Military Engineering Workshop on the Environment ("Mil-to-Mil" conference). The theme of the workshop was environmental management lessons learned that might be profitably shared and that theme shaped discussions throughout the week-long set of conferences. Capt. John Faunce (U.S. Navy, EUCOM J4/LIE) ably chaired many joint sessions, and also served as subject matter proponent and chairperson for the Mil-to-Mil program conference.

The Pilot Study working group for Environmental Aspects of Reusing Former Military Lands, a project of the NATO Committee on Challenges of Modern Society, conducted a programmed working meeting which involved both regular members and Partners for Peace members. As a result, additional idea exchange synergy occurred when the Pilot Study participants joined the other conferences' members in formal and informal meetings. Pilot Study co-chairs Dr. Fritz Holzwarth (Germany) and Mr. Gary Vest (United States of America) and all of the participants deserve credit for magnifying the benefits of the joint conference to participating nations.

Concurrently, the Office of the U.S. Joint Chiefs of Staff convened a World Wide U.S. Military Joint Environmental Conference to work on environmental management issues facing U.S. forces around the world. Col. Kurt Kratz (U.S. Army, Joint Staff Logistics Directorate), coordinated and chaired working sessions and helped to lead the joint sessions as well. One of the most important components of this conference was the presentation of environmental situation summaries regarding selected nations and regions. These added greatly to the Defense Environmental Conference '95 attendees' understanding of world environmental challenges.

A Private Industry Conference, under the aegis of the American Defense Preparedness Association, the National Security Industrial Association, and the Society of American Military Engineers, offered participants of the other three conferences a unique opportunity to understand several cutting edge environmental technologies (managerial, as well as scientific and engineering technologies). (The aforementioned conferences were: Military Engineering Workshop on the Environment; World Wide U.S. Military Joint Environmental Conference, and the NATO/CCMS Pilot Study on Environmental Aspects of Reusing Former Military Lands.) Mr. Nelson Jackson, Director of Technical Services for the American Defense Preparedness Association, organized the exhibits for the conference and Mr. Theodore Harris of the National Security Industrial Association organized the industry speakers' presentations. Mr. Peter Carellas, Director of the National Security Industrial Association, managed the conference budget, and Mr. James Donahue, Director of Support Services for the Society of American Military Engineers, coordinated the industrial conference and contributions to joint sessions.

It is important to note that this conference was not a single event but rather, a combination of four independent initiatives; thus, their successful orchestration as a single entity was a particularly significant achievement. Mr. Gary Vest, Principal Assistant Deputy Undersecretary of Defense for Environmental Security, conceived the multi-conference concept to take advantage of natural relationships and potential synergism. Dr. Judith Reid, Executive Director of the Defense Environmental Conference, on assignment to the Army Environmental Policy Institute from the U.S. Army Corps of Engineers, worked tirelessly both in the United States and Europe to coordinate all aspects of planning, conducting and concluding the conference. The following individuals were also indispensable in planning and managing the quadripartite Conference: Ms. Rachel Fleishman, Ms. Lindabeth Doby, Mr. Ron Eller, Maj. Mike Imphong and CM Sgt. Bill Rew. Additional AEPI staff who conducted VIP contact and session recorder functions were: Dr. Edward Novak, Director; Mr. John Fittipaldi, Senior Fellow; and Mr. Robert E. Jarrett, Senior Fellow. Special thanks go to the Armed Forces Recreation Center for the care and support provided at Garmisch. The Monterey Institute of International Studies provided thorough, carefully researched English translations of Russian and Moldovan papers submitted by participants for inclusion in these proceedings. Permission to use country

maps that appear at the beginning of each appendix was granted by SoftKey International, Inc. of Cambridge, Massachusetts.

The U.S. Army Space Command provided a contract vehicle and associated logistical/contract support in connection with the preparation and publication of these proceedings. Under that contract, Ms. Barbara Bryant of Science Applications International Corporation edited and managed the production of this document. As Proceedings coordinator, Mr. Jarrett, AEPI Senior Fellow, accepts responsibility for any errors in adjusting text and grammar.

INTRODUCTION

Background of the Conference

The defense sectors of many nations recognize the commonality of environmental management issues they face, despite obvious differences in the geographic and socio-political contexts in which those issues arise. They have also realized the wisdom of sharing solutions. The U.S. Armed Forces participate in a number of forums as a means of identifying and addressing environmental issues. The U.S. Department of Defense noticed early in 1995, that three sets of separate activities were beginning to converge in key respects. This led to a proposal to schedule three important meetings which would coincide in time and place.

The U.S. European Command, located at Stuttgart, Germany initiated a program of Military-to-Military cooperation with Eastern European and Former Soviet Union nations and republics in 1993; the objective: to foster cooperation and communication on defense environmental issues. The NATO Committee on the Challenges of Modern Society (CCMS), with offices in Brussels, Belgium, has a long history of sponsoring both civilian and military sector "pilot studies" on environmental issues of mutual concern to any particular group of member states willing to engage in a defined attack on such problems. In recent years, non-member states have participated in such studies. One such CCMS effort is the Pilot Study on Reuse of Former Defense Lands, which covers the pollution management challenges such lands often pose. Both the Mil-to-Mil and CCMS programs of action provide opportunities for cross-fertilization. In addition, the various United States regional or Theater commands face issues and possess knowledge concerning operations in all geographical settings in many nations. Each of the U.S. Theater Commands contains elements of the Air Force, Army and Navy and operate under the authority of the U.S. Joint Chiefs of Staff. They are beginning to operate under nation-specific environmental guidelines and standards. In the process of formulating these guidelines, those involved have obtained a substantial amount of information about international environmental issues.

These developments led the Department of Defense to co-schedule three key meetings that would allow all participants to present and exchange their information and ideas. An important dimension was added when the environmental technology community expressed its willingness to hold, simultaneously, a small exhibition of and to lecture on pertinent leading edge technologies.

The four-part Conference took place at Garmisch, Germany, 7-13 May, 1995. Approximately 150 representatives from 23 nations took part. The Hotel General Patton served as conference headquarters. Most sessions were at the Abrahms Complex, but Hotel Eibsee hosted the majority of the NATO Pilot Study activities.

Purpose and Scope of this "Proceedings"

These proceedings are intended to provide a permanent record of a series of national environmental situation papers which discuss conditions in participating nations generally and on the respective defense sector in particular. Each nation represented at the Military-to-Military conference was asked, to provide, "as a ticket of admission" a presentation in both written and oral form. Each presentation was intended to:

A. Emphasize successful technologies and approaches; and include a general description of the state of environmental matters in the country as a whole (civil sector), with emphasis on process, pollution, methodologies and technologies.

B. Provide a comprehensive report on environmental programs within the military sector with an emphasis on organization, and the programmatic components of cleanup, compliance, conservation, pollution prevention and environmental technology.

This report contains only short commentaries on the other conferences. The NATO pilot study process has its own schedule of milestones, including criteria for review, consensus formation and appropriate reporting. Participating nations will receive officially released reports and working papers, when available. (AEPI is not an authorized releaser of this material.) Although some parts of the U.S. Theater Commands' presentations were open to all conference attendees, most of their discussions addressed day-to-day regulatory and procedural details of little interest outside the group. Their international environmental remarks, while interesting,

were not presented as unitary papers suitable for publication. Finally, the industrial technology lecture topics, which contain content not suited for comprehensive coverage here, are best researched in professional literature or discussed with patent owners to ensure that essential data are not overlooked. To cover all of the above material in its proper depth would require publication of a document several hundred pages longer than its current length - a task too large to accomplish in reasonable time or the budget of this report.

CHAPTER 1

Keynote Remarks

The following are main points expressed by six keynote speakers, all of whom successfully delivered presentations intended to stimulate discussion. The themes they expressed recurred throughout the Conference.

Mr. Gary Vest, Principal Assistant Deputy Under Secretary of Defense for Environmental Security, opened the conference by stressing the importance of encouraging the world's militaries to address environmental issues. He noted the unprecedented opportunities the military forces now have to integrate environmental concerns into their daily activities which contribute significantly to the peacetime welfare of their nations. Mr. Vest pointed out that environmental security is becoming an increasingly important part of interaction and cooperation in NATO. "The first NATO CCMS meeting on defense environment was held in Munich in 1980," he said. "We have accomplished much since then. Today, defense environmental cooperation is an important part of the North Atlantic Cooperation Council (NACC) work plan and figures prominently in our activities under the Partnership for Peace."

Mr. Vest stressed that cooperation between international military establishments is of the utmost importance, adding that, given the resources they command, the militaries of the world constitute the single largest force to improve or damage the environment. In several ways he challenged those present to dedicate themselves to carrying out the necessary cultural changes that must be effected to ensure that this force is applied in a positive manner. "It's a sign of the times that certain groups of countries once faced each other across an iron curtain," Mr. Vest noted. "Now, that curtain is gone and we're working to create a new world together. I like the world much better this way."

Dr. Fritz Holzwarth, Deputy Director-General, Directorate of Soil Protection and Clean-up of Contaminated sites, of the German Federal Ministry for the Environment, Nature, Conservation and Nuclear Safety, and Co-Chair of the NATO Pilot Study, viewed the meeting as a milestone in the history of the NATO Committee on Challenges of Modern Society, which has been working on environmental issues for almost 50 years. In his remarks, he pointed to

two new sets of participants in the Pilot Study on Reuse of Military Lands: The Partners for Peace members and private sector contributors. He saw these changes as signaling new vitality in preventing and solving environmental problems. However he cautioned that environmental problems could sow the seeds of future conflict, triggered by transboundary pollution migration or inadequate water supply. Through this cautionary note, Dr. Holzwarth emphasized the overwhelming geopolitical importance of positive, cooperative management of environmental issues.

This Conference is a requirement! With this strong statement, Dr. Jean-Marie Cadiou, NATO CCMS Assistant Secretary General for Scientific and Environmental Affairs, emphasized the importance of addressing environmental issues together. He stressed the issues' enormous size and complexity which underscore the absolute necessity to share solutions. Dr. Cadiou called up numerous images of the Cold War environmental legacy in the forms of both known and lost material: sunken ships, downed aircraft, chemical and nuclear waste dumping, groundwater laced with spilled chemicals, and chemical weapons awaiting destruction, to name but a few examples. He raised many difficult issues with which decision-makers are currently grappling, such as the proper way to deal with excess weapons-grade plutonium.

Dr. Cadiou then listed a number of new study initiatives for addressing these daunting problems. He pointed out that such activities are growing so quickly that CCMS has commissioned the U.S. Institute for Defense Analysis to design and establish a worldwide Internet Bulletin Board to provide members with a means to participate in these initiatives and draw on available studies. This resource is scheduled for introduction in 1996.

Mr. Robert Clerman, Mitre Corporation, spoke on the "Perspective of a Public Interest Partner for Environmental Solutions." Through his remarks he sought to represent the public in general. Mr. Clerman stated that the "right balance" is *the* control problem in managing environmental issues. Observing that the United States has accomplished a great deal, he questioned whether or not successes were accomplished in the best way or, he asked, might some other combination of issue management approaches have been more productive? Has the command-and-control approach been applied in proper balance with other methods (tax policy, free-market approach, education, energy policy, etc.)? Are there better ways than those

currently being employed of integrating competing interests in environmental solutions? Mr. Clerman appeared to raise such questions as a means of stimulating those present to review critically their own values and ways of doing business. He ended by observing that the goals of environmental improvement and economic growth are not necessarily mutually exclusive..

Mr. William Parker who represented the National Security Industrial Association, focused on continuing environmental security issues of great magnitude, citing as an example, the current operation of first generation nuclear power plants. In the shadow of these huge problems, he stressed the importance of fundamentals: the achievement of environmental excellence, remediation of contamination and the need to take into account the rights and opinions of people in the neighborhood of military activities.

"We co-exist in one world environment - and it is our life support system, Its condition dictates our quality and quantity of life and the very freedoms for which we have so long strived. And, our ability to sustain it will dictate the sustainability of life for every generation to come." With these words, Dr. Edward Novak, Director of the U.S. Army Environmental Policy Institute, firmly drew a line in the sand: the need for humans to operate in compatibility with nature. In his address, Dr. Novak advocated a forward-oriented approach to environmental issue management, as a guarantor of a long and fruitful future. He described a concept of "futures"-based environmental research and analysis, organized to provide early warnings and prevention options. He stressed that the value of this approach lies in exposing the information and insights needed to shape wise decisions and actions. Dr. Novak added that the time is ripe for environmental futures studies, because environmental issues are issues of international strategic interest. He offered the following recommendations:

A. Devote serious, sustained attention to preventing and avoiding future environmental problems.

B. Establish an early warning system to identify and act on potential future environmental risks.

C. Evaluate five over-arching environmental problem areas related to potential future environmental issues.

    1. sustainability of terrestrial ecosystems

2. non-carcinogenic human health effects
3. non-traditional environmental stressors
4. health of the oceans
5. greenhouse gas reduction

D. Begin a coordinated international effort to anticipate and respond to environmental change, beginning with four steps:
   1. improve and integrate environment-related futures research.
   2. focus international attention on independent variables (socio-political, economic, natural) that drive environmental change.
   3. improve environmental awareness and education.
   4. develop an integrated environmental data system.

Dr. Novak ended his remarks by challenging the unique forum to work toward an "environmentally conscious defense strategy; moving away from the destructive weapons of conventional warfare, possibly culminating in the very black cloud of threat of nuclear warfare, to a new paradigm of non-destructive conflict management." The "weapons" necessary to turn this corner and insure sustainable environments, cultures, and peoples for all future generations, include advancing the knowledge and methods for:

A. Effective international communication;
B. Understanding cultural differences and similarities between countries and educating national leaders about them; and
C. International negotiations to effectively and permanently achieve conflict resolution *before* violent conflict occurs.

CHAPTER 2

Military Engineering Workshop on the Environment

As discussed in the INTRODUCTION, the national environmental situation papers covered by this chapter were presented in the Third Annual Central and Eastern European Military Engineering Workshop on the Environment, sometimes called the Mil-to-Mil Conference, to describe actual environmental conditions and institutional tools for environmental management in eleven nations. This Proceedings report chapter provides the complete papers in Central and Eastern European countries. (See Appendices A - K for full texts.) This Proceedings report chapter provides those papers, as references, for all Defense Environmental Conference '95 participants. All papers were reformatted and lightly edited to provide a uniform appearance. The editors contacted authors to confirm that editorial adjustments did not change the authors' meanings. Unfortunately, a few graphics did not copy well for this publication.

Seven special presentations addressed "technologies" for managing environmental situations. A synopsis of each follows:

Conversion of Military Bases to Civilian Use: Mr. Anthony Mei, U.S. Army Corps of Engineers, discussed critical planning, public participation and decision-making issues based on current experiences in the United States. Though details of the approach would vary for different cultures, he presented fundamental principles that must be addressed.

European Management Action Plan: Mr. James Morgan, MITRE Corporation, described a total planning process for comprehensive environmental management and decision-making for current and former military sites. He stressed the need for rigorous plans, especially when seeking funding from private or multilateral governmental sources. Participants received complete copies of the manual.

International Program for Emergency Planning: Mr. Roger Qualls, U.S. Army Space and Strategic Defense Command, shared a commercially available computer software system for planning and managing response to emergencies, including environmental emergencies. He made a strong point that military organizations should closely coordinate their planning with

civilian authorities to encompass calls to assist in responding to civilian environmental emergencies.

Long-term Scientific Study (LSS)/44: Environmental Technologies for Application to Military Assets and Bases: Dr. Joel Tumarkin, U.S. Institute for Defense Analysis, briefed the concept and planned outputs of a special scientific study for NATO. The study's emphasis is on applying pollution prevention methods to 10 key areas of contamination emanating from NATO bases and ships. The areas selected for proof of concept are: refrigerants, fire extinguishments, POLs (petroleum/oils/lubricants), munitions, energetics and propellants, organic coatings, inorganic coatings, pesticides, volatile organic compounds, shipboard solid wastes, and shipboard liquid wastes.

Risk-Based Tools for Site Evaluation: Dr. Fred Price, MITRE Corporation, summarized reasons for use, content, advantages, disadvantages and examples of risk-based tools. He spoke of tools for disciplined screening, action goal setting and site characterization; explaining them within the context of the European Management Plan discussed by Mr. Morgan. Dr. Price emphasized using the tools in rational balance, according to cost/time constraints and relative comprehensiveness needed for managing each given contaminated site.

Naval National Armaments Group, Special Working Group 12: Mr. Andrew Kissell, U.S. Navy, outlined a NATO project to define naval origin wastes and to seek methods for their reduction and control. He listed resulting publications and multi-national implementation activities being conducted by Alliance members and Partnership for Peace members.

Spill Prevention, Control and Remediation Planning: Mr. Vitas Vasaitis, U.S. Navy - Europe environmental staff described in detail how his organization develops such plans and why. He explained the technical and cost-effectiveness advantages of involving operating staffs in their formation and the dangers of not having such plans in place and resources ready for their activation. (The voluminous nature of the presentation graphics and lack of accompanying explanatory texts precludes their inclusion in these Proceedings.)

CHAPTER 3

World Wide U.S. Military Joint Environmental Conference

The U.S. Joint Chiefs of Staff sponsored World Wide U.S. Military Joint Environmental Conference provided information about environmental conditions and approaches to management of U.S. military facilities overseas. Owing to the group's heavy focus on problem-solving and the diversity of geographical areas they cover, they did not provide a set of papers for publication. Some presentations, such as U.S. Navy - Europe's discussion of petroleum spill prevention and response planning, were highly informative and sparked discussion (See Chapter 2 for this particular item), thereby enhancing information-exchange during the Conference. The group's lecture vugraph outline style slides lacked sufficient detail to be self-explanatory to non-attendees and are, therefore, not included in these proceedings.

"Executive agents" are those officials within the U.S. Army, Air Force or Navy with international missions who exercise special keystone roles in the environmental programs. In addition to their normal duties, they are responsible for constantly reviewing changing environmental management policies and standards of nations with which their commands have relationships. They also help convert the information into operating policies and serve as spokespersons for U.S. Armed Forces in their respective host nations. Headquarters, U.S. Army - Europe, for example, carries out this lead role in Belgium, Germany and the Netherlands. This is an extremely important responsibility which contributes significantly to consistent protection of the environment and to recognition of host nations' concerns.

The Executive Agents' participation in the joint conference helped them learn a great deal from other attendees about international environmental concerns and management philosophies; knowledge that might not reach them through normal channels. In joint, open sessions and informal contacts they actively shared their own special knowledge with colleagues.

The following three sub-paragraphs comprise a topical summary of the JCS conference track:

A. Discussion/working group on the Overseas Environmental Baseline Guidance Document. The OEBGD sets the minimum environmental standards for overseas installations. Initial efforts were made to streamline the standards and make them easier to apply and understand. Afterwards, discussion centered on various approaches to rank required actions and to support the funding for complying with the standards.

B. Working Group on the Disposal of Hazardous Waste during Contingency Operations. Over the last several years the U.S. military has been involved in several contingency operations, e.g., Somalia, Rwanda, and Haiti. Each Commander has been forced to deal with hazardous waste disposal problems; however, no standard disposal methodology exists to guide them. The Working Group explored optional methods to identify effective approaches that can be considered for inclusion in future operational policy.

C. Update of the Geographical Unified Commanders' Environmental Program. These sessions characterized the environmental programs and assessed trends in environmental issues and technological innovations within each of the five geographical regions.

CHAPTER 4

NATO/CCMS Pilot Study on Environmental Aspects of Reusing Former Mlitary Lands

The NATO Pilot Study on Environmental Aspects of Reusing Former Military Lands began in 1994. Such studies are conducted by an interested group of NATO member nations who share a need and the various study tasks and propose a pilot study of interest. The Committee on Challenges of Modern Society (CCMS) determines whether the agreed-upon study topic has sufficient merit to be named as a formal NATO study. Since its formation approximately 25 years ago, the CCMS has issued several dozen pilot study reports on a wide variety of environmental topics in the civilian and military arenas; from broad policy to narrow scientific and engineering perspectives.

The intent of this pilot study transcends efforts to simply report on past progress or to recommend programs to member states. Its formal purpose is, "to facilitate the transition of contaminated military properties" (Source: Pilot Study Terms of Reference). Five subgroups are at work on the following topics, with the intent to produce jointly operated tools for all of the participating nations:

A. Identification of Former Military Lands for Reuse and Restoration - identify methods and formats for assessing the environmental characteristics of military lands for reuse.

B. Remediation Strategies - identify and select remedial strategies that are appropriate and effective enough to address the assessed environmental problems on military lands for reuse in the participating nations.

C. Analytical and Information Support - provide analytical and informational support to all activities in this Pilot Study.

D. Program Implementation - assess and evaluate a nation's ability to restore and reuse military lands and assess the economic, social, political and military factors that will assist or hinder the implementation of in-country restoration activities.

E. Financial Resources - provide information necessary to access public, private and industrial sources of financial support for the restoration of former military lands.

Attending nations for the Pilot Study were:

Australia	Austria	Canada
Belarus	Belgium	Germany
Czech Republic	Estonia	Lithuania
Hungary	Latvia	Poland
Netherlands	Norway	Spain
Romania	Slovakia	United States
Ukraine	United Kingdom	

(From minutes dated 19 June 1995)

Pilot Study participants joined with those of the other conferences to offer and learn ideas of mutual interest. However, it is premature to publish any of the reports and meeting minutes in this volume. This information will become available through official NATO channels in due course, as various stages of work end and study member nations generate consensus on outcomes and plans. The first phase is scheduled to end in mid-1996.

CHAPTER 5

Industrial Environmental Conference

Industry presenters served a very special function for the defense, international environmental attendees by lecturing on a group of technologies for managing differing aspects of the environmental issue spectrum. Mr. William Parker, Vice President of EG&G, Inc., served as moderator for the Industry Panel and helped to organize this portion of the conference.

Arrow-Pak, Macro-encapsulation Technology: Mr. Paul Sage, Ogden Environmental and Energy Services, discussed a technology for sealing hazardous or mixed radioactive wastes in monolithic, high density polyethylene containers. The thick-walled containers were described as each having the ability to safely contain the equivalent of up to seven drums of waste for a design life of 500 years.

Catalytic Extraction Process: Mr. Claire Chanenchuk, Molten Metal Technology, and Mr. Randy Davis, M4 Environmental Management, Inc., described a technology for using a bath of molten metal as a medium for heat transfer and chemical reaction with various feed materials to produce desired products or detoxified wastes. The process has the flexibility to account for many variables to reliably achieve desired end results.

National Defense Center for Environmental Excellence: Mr. Michael Katz, Concurrent Technologies Corporation (CTC), gave a briefing on the mission, organization, methods and facilities of the National Defense Center for Environmental Excellence (NDCEE) at Johnstown, Pennsylvania. Principal areas of activity are: a) applied research to aid technology transition (20%) and b) technology applicability demonstration (80%), one fourth of which is rapid response assistance to clients. NDCEE is a major industrial laboratory facility for testing and developing pollution prevention technologies in support of all United States military activities. The facility has a wide range of testing, pilot scale and full-sized equipment on a 207,000 square foot manufacturing floor. CTC operates NDCEE for the Department of Defense under a multi-year, $150 million contract.

Plasma Arc Treatment of Radioactive, Hazardous and Ordnance Waste Streams: Mr. Jeffrey Ruffner, MSE, Inc., and Mr. Robert O'Such, Applied Ordnance Technology, explained the technology of treating wastes in a powerful electrical plasma to destroy a wide range of harmful or reactive chemicals and to immobilize heavy metal and radioactive elements in glass-like final products. The system can take items up to four inches (10 cm) in size and can process military wastes such as explosives. Development is well along, though some work is required to enhance reliability.

SS19 Missile Destruction in the Ukraine: Mr. Robert Stevens, Morrison Knudsen Corporation, chaired a team explaining the complex institutional and technical challenges facing the consortium of bi-lateral government agencies, universities, and firms working to convert a missile manufacturing plant to one for missile destruction. This project is being conducted by Former Soviet Union nations and others to fulfill current missile reduction obligations under international arms reduction agreements. The presentation stressed the absolute necessity of international partnering, to bring adequate expertise to bear on many emerging environmental problems.

Washington Perspective: Mr. Tom Adams, The Delta Group, interpreted political attitudes and trends in the United States as they affect environmental issue management. He said that current behavior shows that the U.S. executive and legislative branches have entered a period of reflection, focusing on the need to reconcile and deal with a large number of confusing and/or contradictory regulations currently in force. He observed that environmental interest groups are forming coalitions centered on specific issues, such as impacts of paper manufacturing, representing a major shift in tactics, away from achieving broad philosophical goals in favor of achieving individual, precedent-setting victories.. Mr. Adams listed several current realities (in his opinion) of environmental management in the United States:

A. The "green" movement has slowed somewhat.
B. Criminal penalties for environmental crimes are realities of life, not just hypothetical threats embodied in regulations.
C. Of the three main waste disposal methods (bury, burn or recycle), recycling is being emphasized more while incineration is decreasing.

D. There is no simple answer for ranking environmental problems for resolution, in a time of resource shortage. Disciplined risk analysis of health, safety and environmental factors is required.

Waste Reduction Pays Program (WRAP): Mr. William Parker, EG&G, Inc., explained the financial and environmental benefits of instituting aggressive "design for recycling" pollution prevention programs. He listed a set of practical steps and warnings that he stressed should be applied to any program carefully orchestrated for success.

At the general Conference closing, Mr. James Donahue, Society of American Military Engineers, expressed pleasure at the successful "industrial segment" presentations and results.

CONCLUSION

Mr. Vest, in bringing the conference to a formal close, described the Central and Eastern European participants as "very special as individuals with whom we have formed friendships and commended them for their desire to alleviate and prevent environmental problems." Mr. Vest observed that there is still much to be done to address remaining environmental security issues in all of our countries, including the United States. He expressed a personal hope that relationships forged during the conference will help those involved to accomplish the challenging tasks ahead. "I recognize the great progress in the world over the last decade," he said and concluded with a plea that participants build on these new friendships, and on recent progress, to chart a positive course for the future.

Defense Environmental Conference '95
General Schedule

Monday, 8 May 1995

Time	CCMS	MI-to-MI	JCS	Industry
8:00		Late Registration		
			JCS Opening Session	
9:00			Gary Vest	Private Industry
				Setup
10:00			Joint Staff Policy	
			Issues	
11:00		Group Picture		
			DENIX Demo	
12:00			Lunch	
13:00	**Combined Opening**	**Combined Opening**	**Combined Opening**	**Combined Opening**
	Session	**Session**	**Session**	**Session**
14:00	**USEUCOM Remarks**	**USEUCOM Remarks**	**USEUCOM Remarks**	**USEUCOM Remarks**
	NATO S&T Chair	**NATO S&T Chair**	**NATO S&T Chair**	**NATO S&T Chair**
15:00	**Break**	**Break**	**Break**	**Break**
	AEPI	**AEPI**	**AEPI**	**AEPI**
16:00	**Mtre, Corp.**	**Mtre, Corp.**	**Mtre, Corp.**	**Mtre, Corp.**
	Industry Perspective	**Industry Perspective**	**Industry Perspective**	**Industry Perspective**
17:00	**Conclude**	**Conclude**	**Conclude**	**Conclude**
18:00	...	...	...	...
19:00	**Icebreaker/**	**Icebreaker**	**Icebreaker/**	**Icebreaker/**
	Standup	**Standup**	**Standup**	**Standup**
20:00	**Dinner**	**Dinner**	**Dinner**	**Dinner**

Tuesday, 9 May 1995

Time	CCMS	Mil-to-Mil	JCS	Industry
8:00			OEBGD	
			Working	
9:00	Executive Board	MilMil Opening	Groups	
	subgroup Briefs	IMET		
10:00		Env. Cleanup Process		Exhibits
		Break		
11:00	Discussion	Navy Environmental		
	...	...	...	
12:00	Lunch	Lunch	Lunch	
13:00	subgroups meet			
	Separately			
14:00		EASTERN	EASTERN	
	Break	European	European	
15:00		State of the	State of the	
		(break)	(break)	
16:00		Environment	Environment	...
	...	Reports	Reports	
17:00				
		...	...	
18:00				
19:15	**Castle**	**Castle**	**Castle**	**Castle**
	Dinner	**Dinner**	**Dinner**	**Dinner**
20:00				

Wednesday, 10 May 1995

Time	CCMS	MI-to-MI	JCS	Industry
8:00			Hazardous Waste	
			Disposal Programs	
9:00	German Presentation	Mgmt Action Plan Process	Working Groups (HWDPWG)	
		...		
10:00	...	Break		Exhibits
	Break	Mgmt Action con't		
11:00	Presentation &	Civil Defense Plan	HWDPWG	
	Discussion con't	Conversion of Installations	Report Out	
12:00	Lunch	Lunch	Lunch	
13:00	(13:15)Subgroup II Mtg.			
14:00		**Industry Panel**	**Industry Panel**	**Industry Panel**
		on Innovative	**on Innovative**	**on Innovative**
15:00		**Cleanup/Compliance**	**Cleanup/Compliance**	**Cleanup/Compliance**
		Technology	**Technology**	**Technology**
16:00				
	...			
17:00	NATO Long-Term			
	Strategic Study 44	...	...	...
18:00				
19:00	**BarBQue**	**BarBQue**	**BarBQue**	**BarBQue**
	Dinner	**Dinner**	**Dinner**	**Dinner**
20:00				

Thursday, 11 May 1995

Time	CCMS	M-to-M	JCS	Industry
8:00				
			Industry Overseas	
9:00	Environ. Standards	"Clean Ship/Bases"	Environmental	
	Military Activities		Programs	
10:00	...	...	OEBGD	Exhibits
	Break	Break	Proposed	
11:00	Discussion	Risk Assessment, etc.	Report out	
	...	...	...	
12:00	Lunch	Lunch	Lunch	
13:00	Field Trip	Field Trip		
	(optional)	(optional)	PACOM	
14:00			SOUTHCOM	
			Programs	
15:00				
				...
16:00				
17:00			...	
18:00				
19:30	**Farewell**	**Farewell**	**Farewell**	**Farewell**
	Dinner	**Dinner**	**Dinner**	**Dinner**
20:00				

Friday, 12 May 1995

Time	CCMS	MI-to-MI	JCS	Industry
8:00				
	Concluding Session			
9:00				
9:30	**Marshall Center**	**Marshall Center**	**Marshall Center**	**Marshall Center**
10:15	**Break**	**Break**	**Break**	**Break**
10:45	**Report on CCMS**	**Report on CCMS**	**Report on CCMS**	**Report on CCMS**
11:00	**Report on MIMI**	**Report on MIMI**	**Report on MIMI**	**Report on MIMI**
11:15	**Report on JCS**	**Report on JCS**	**Report on JCS**	**Report on JCS**
11:30	**Report on Industry**	**Report on Industry**	**Report on Industry**	**Report on Industry**
11:45	**Closing Remarks**	**Closing Remarks**	**Closing Remarks**	**Closing Remarks**
12:00			Lunch	
13:00			ACOM Program	
			Report and	
14:00			Discussion	
			...	
15:00			CENTCOM	
			Program	
16:00				
			...	
17:00				
18:00				

Saturday, 13 May 1995

Time	CCMS	MI-to-MI	JCS	Industry
8:00			EUCOM Program	
			Report and	
9:00			Discussion	
			...	
10:00			Wrap Up Session	
11:00				
			...	
12:00				
13:00				
14:00				
15:00				
16:00				
17:00				
18:00				
19:00				
20:00				

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APPENDIX A

THE STATE OF THE ECOLOGICAL SITUATION IN THE REPUBLIC OF BULGARIA AND THE MINISTRY OF DEFENCE'S PROGRAMME FOR IDENTIFYING PROBLEMS RESULTING FROM MILITARY ENGINEERING ACTIVITIES

By Lt. Col, Eng. Mitdo Dimitrov
Capt, Eng. Todor Dotchev
Lt, Eng. Georgi Popov

May 1995


Bulgaria
50 km
50 miles
Romania
Bucharest
Vidin
Tutrakan
Silistra
Dulovo
Ruse
Kardam
Belogradchik
Lom
Oryakhovo
Belene
Svishtov
Razgrad
Tolbukhin
Mikhaylovgrad
Knezha
Byala Slatina
Pleven
Byala
Popovo
Kaspichan
Novi Pazar
Serbia and Mont.
Vratsa
Levski
Pavlikeni
Turgovishte
Shumen
Varna
Berkovitsa
Mezdra
Lovech
Gorna Oryakhovitsa
Iskur
Teteven
Dryanovo
Veliko Turnovo
Kostinbrod
Bankya
Sofia
Gabrovo
Pernik
Karlovo
Kazanluk
Sliven
Aytos
Pomorie
Black Sea
Ikhtiman
Panagyurishte
Stara Zagora
Nova Zagora
Yambol
Burgas
Samokov
Kyustendil
Bobovdol
Chirpan
Stanke Dimitrov
Pazardzhik
Elkhovo
Malko Turnovo
Michurin
Plovdiv
Maritsa
Dimitrovgrad
Asenovgrad
Kharmanli
Lyubimets
Struma
Macedonia
Blagoevgrad
Khaskovo
Svilengrad
Gotse Delchev
Kurdzhali
Smolyan
Momchilgrad
Sandanski
Madan
Turkey
Greece
Istanbul
Aegean Sea
Turkish Straits
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THE STATE OF THE ECOLOGICAL SITUATION IN THE REPUBLIC OF BULGARIA AND THE MINISTRY OF DEFENCE'S PROGRAMME FOR IDENTIFYING PROBLEMS RESULTING FROM MILITARY ENGINEERING ACTIVITIES

by Lt Col, Eng. Mitko Dimitrov
Capt, Eng. Todor Dotchev
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Ladies and Gentlemen: My name is Mitko Dimitrov, Lieutenant-Colonel, engineer, chief of a department within the Ministry of Defence.

During the last few years, the Republic of Bulgaria's state policy regarding issues pertaining to ecology and preservation of the environment has been performed on the basis of a new strategy that is conducted using up-to-date conceptual, institutional, structural and technological approaches. In keeping with this strategy, the Ministry of Environment has established a dialogue with other governmental departments to discuss their activities that have a major impact on the environment and to share responsibilities, thereby eliminating duplication of environmental management functions. Agreements to allow collaboration on particular problems have been prepared between a number of ministries, including the Ministry of Defence.

In accordance with this collaborative philosophy, the Ministry of Defence has assumed the responsibility of cleaning the environment while engaged in military property conversion and reduction of Army personnel to ensure that military units conform to requirements set out in current ecological legislation.

Over the past several years, political, economic and social factors--the cultural restructuring of our country--have had a strong impact on this nation's defence activities. In view of the military's response to these changes, military-engineering activities have not contributed significantly to environmental contamination. However, new ways of planning and conducting state policy, and the need to comply with the complex existing system of environmental monitoring and control, make it necessary for the Ministry of Defence to develop and implement its environmental procedures through its "Ecology" department. The Ministry of

Defence has developed a program of environmental protection to cover 1995-2000. The plan covers the chief sources of contamination, activities connected with them, and tracking of funding. The plan calls for contaminants to be classified in groups based on the degree of harm they are likely to pose to the environment.

A. The categories, and the types of pollution they are likely to produce, are as follows:

1. military repair factories -- chemically polluted water caused by electrodeposition and other industries that emit heavy metals and cyanides; waste water containing oil products; emission of protective coatings and non-ionizible radiation from microwave electromagnetic fields; heating plants, solid wastes, etc.;
2. oil products storage -- waste waters containing oil-based products;
3. navy bases -- water polluted by stored oil products; bilge waters; waters containing heavy metals from electrodeposition;
4. airfields -- noise, vibration, non-ionizible radiation, waste gas air pollution;
5. ranges -- noise, vibration, non-ionizible radiation, erosion of soils, munitions and waste pollution;
6. auxiliary farms and social sites.

B. Proposed Environmental Programmes and Solutions

1. ecological research into and assessment of military training ranges and their infrastructure development to include their effects on animals, plants, and human beings
2. elimination of damage caused by the Army's training and military exercises such as vehicle traffic from roadways, refueling operations, noise caused by track vehicles and machine-cleaning procedures;
3. remediation of areas polluted by navy and air operations;
4. reduction of noise caused by mock firing at military ranges;
5. steps to ensure that measures and procedures used to clean barracks and military units are in compliance with current ecological legislation;

6. performance of an ecologically-based analysis of methods and procedures used to develop arms and munitions. This method should take into account new products' potential adverse effects on the environment, from their design to their disposal;
7. creation of a comprehensive analysis of working conditions that covers all combinations of potentially harmful factors with their known and potential consequences;
8. development of an ecological education program. Since 1994, the Ministry of Defence has adopted an interdisciplinary approach toward ecological education, covering research into different fields of science and technology. An ecological education program should be offered to four levels of military personnel:
   a. basic: Soldiers and sergeants
   b. general - Military higher educational institutions and the Military Academy
   c. special subjects - "Ecology Engineering" (a specialized course)
   d. army leaders - A general staff course

The proposed programme topics focus on specific types of pollution caused by military operations. The service forces' and armed forces' military-engineering study areas are as follows:

9. research into electromagnetic background in connection with radio-locator transfer centres. The development and use of ionizing electromagnetic waves causes "pollution" by electromagnetic energy. In response, the Ministry of Defence has conducted research in the following areas:
   a. development of a mathematical model of the field;
   b. development of a dosimetrical control system;
   c. identification of locations that register electromagnetic emissions above established standards;
   d. determination of biological norms for electromagnetic energy flux;

e. development of technologies for measurement registration;

f. development of criteria and an index to measure:

   1) how crucial this technology is to society; and

   2) effects on the environment of man's use of electromagnetic radiation.

g. setting of limits for flux to achieve health and environmental safety;

h. alteration of the work schedule for equipment use to manage exposure doses.

10. development of control and advanced measures to manage potential contaminants that contain radioisotopes with high- and low-activity: organic and inorganic compounds, degassing and deactivating materials, and solutions. This will require the integration of processes developed by the Republic of Bulgaria, European, and other nations' processes that have been disseminated to develop and promote ecological policy in all areas, including defense activities.

The state policy covering environmental preservation is implemented through special laws, new economic regulations, management procedures and mechanisms, and a complex system for monitoring and control. All of these measures are designed to provide solutions to existing ecological problems, take into account ecologically-based criteria in the restructuring of the Bulgarian economy, preserve natural resources and biological variety diversity, and minimize health hazards to the population.

Bulgaria's most serious ecological problems are concentrated in so-called "hot spots" wherein distinct sources, or groups of sources pollute the environment. Heavy industry (ferrous and non-ferrous metallurgical processes, chemical and cement plants, central heating power stations, etc.) cause most of the pollution in these "hot spots" as in most other polluted areas of Central Europe.

Approximately 12% of Bulgaria's population lives in hot-spot regions and, as a result, tend to suffer related health-care problems. Several regions have reported a number of lead overdoses and, according to investigations conducted between 1986-1990, the average lead level in blood tests among citizens in these areas is higher than those measured in other

European cities. Respiratory ailments have also been recorded and suspected cases of damaged immune function have been documented as well. Specific types of pollution and their effects discussed in the following sections.

I. Air Pollution

The registered mean annual concentrations of dust in the atmosphere above most major Bulgarian towns exceed accepted levels. Many Bulgarian towns record a dangerously high atmospheric concentration of sulphur dioxide, caused by heavy industry-based emissions and the use of coal to heat homes. Bulgaria has the highest emissions of sulphur oxides in the world. To date, the small number of motor vehicles in the region has helped to prevent the concentration of nitrogen oxides from reaching critical levels; however, their increasing popularity, coupled with the lack of equipment to clean automobile emissions is sure to lead to increased emissions in the near future. The natural environmental plan calls for strategies of air pollution prevention and management to be carried out on a regional basis. Optimum strategies and procedures for the implementation of the national standard have yet to be identified. A well-conceived approach to carry out current laws and regulations will affect the way these and environmental risks posed by these and other industrial pollutants are addressed.

II. Water pollution and various water sites

Although the potable water supply is generally considered to be safe, heavy metal contamination has been recorded in some areas and the rising level of nitrate content in drinking water in three areas of the country poses significant risks. Among Bulgaria's 13 rivers, only the Mesta river can be called relatively clean. The Beli Lom and Danube rivers do not meet the standards for recreational use. Pollution of up to 50% of all 10 of the remaining rivers is considered to be polluted.

With the exception of the areas around the ports of Burgas and Varna, the Bulgarian seacoast meets recreational pollution-safety standards; however, in recent years, observers have recorded an increase in the amount of organic matter and incidents of eutrophication in the areas' sea water.

III. State of soil and forest sites

Approximately 20% of arable areas and forest lands are degraded or polluted due to erosion and soil acidification. Erosion has caused major damage; approximately 29% of arable land degradation is attributable to water and wind erosion. Acidification affects approximately 1.5 million hectares; about 500,000 have been degraded by excessive use of fertilizers. Mining and industrial emissions pollute the soil at a rate of approximately 100,000 hectares of arable land per year; however, the amount of contamination measured thus far has not reached critical levels.

The Ministry of the Environment has worked with the Ministry of Agriculture to establish standards governing the maximum allowable concentrations of four heavy metals and for nine other metals and oils. The creation of these standards is a step in the right direction; however, many other steps must be taken to control soil pollution. Examples include the need to: develop a draft law to protect soils which covers land usage and remediation; develop a system to classify and monitor polluted soils; identify means of funding the burning or neutralization of old pesticides; raise funds for projects to restore or develop alternative use of lands that are polluted with heavy metals and radionucliides; develop plans to close old mines, including uranium mines, and re-cultivate waste areas.

Bulgaria is quite successful in protecting its forest reserves. Data collected over the past 30 years show a stable and slightly increasing volume in forest lands. Bulgarian forests are subject to less pollution-related damage than those of Central Europe.

IV. Protected Areas

Bulgaria has 10 national parks and 98 natural reserves, 18 of which are biospheric reserves. Protected historic sites comprise approximately 3% of the country's total area. During the past two years, these areas doubled in size.

Since 1991, the Republic of Bulgaria has conducted a modest reform effort to develop market-level legislative approaches to improve the environment. The National Assembly passed a fundamental environmental preservation legislation. New types of ecological standards were

also created that permit legislators to revise current standards to include sanitary requirements. In 1992 the Parliament passed the Law for Preservation of the Environment calling for procedures to estimate the impacts of projects on the environment.

The Ministry of Environment recently introduced several pieces of draft legislation that will govern environmental investigations and must be applied to existing enterprises, including those scheduled for privatization. These laws can be categorized into two groups:

A. Legislation; to prevent future contamination and encourage environmental management, experts from the Ministry of the Environment and other institutions have drafted text for three laws: Law for Fresh Air; Law for Waters; Law for Waste Management; and Law for Noise.

B. Laws governing the preservation of nature and management of natural resources; specifically: Law for Preservation of Marine Fauna and Sea Water; Law for Protected Areas; Frame Law for Biological Variety; Law for Forest Sites; Law for Forest Restitution; Law for Herbs; Law for Game; and Law for Underground Natural Resources. These laws are in the process of being approved and conform to a large extent to other international documents.

Despite limited funding for ecological initiatives, the Ecological Strategy to the Year 2000 was formulated. This strategy is open-ended and gives the designers flexibility to identify and rank policy priorities and their implementation, based on the current pace of economic and social development.

The national priorities for ecological policy are divided into the following stages:

Stage 1: "take stock" of: polluted areas (to include water sources), extent of pollution; sources of pollution.

Stage 2: Evaluate the suitability of polluted agricultural lands and waters for use.

Stage 3: Perform complex evaluation of polluted lands and waters; devise a methodology to decrease (or eliminate) the effects of pollution and identify remediation technologies.

Stage 4: Monitor progress on projects for environmental preservation.

The ecological policy will be directed toward:

A. Strengthening economic responsibility for environmental damage by implementing a system of economic regulations and mechanisms while re-instituting and increasing penalties for pollution. Pollution sources will be controlled through the issuance of licenses and certificates for pollutant generating activities and by the collection of charges for waste treatment;

B. Gradual, step-by-step decentralization of environmental management procedures, leading to an increase in local governing bodies' autonomy in solving their own ecological problems;

C. Implementation of ecological criteria in privatisation and restructuring of the economy;

D. Implementing national strategies and national programmes for specific aspects of environmental protection through the establishment of:

   1. a national programme for preservation of wetlands;
   2. a national programme for waste management;
   3. a regional programme to preserve the river Danube's basin water, part of the international agreement for the river Danube basin;
   4. a regional programme for the Black Sea; part of the international programme for the preservation of the Black Sea.

E. Creating a national system to monitor the environment and control implementation of environmental protection legislation;

F. Ensuring coordination between state institutions in setting and implementing state policy regarding the management of air, water, resources, forestry, land and mineral resources, land, homeowners' property and human health;

G. Integrating the Republic of Bulgaria's environmental protection and management efforts with those of other European countries to ensure sustainable environmental development. This plan should be carried out by working toward:

   1. harmonisation of legislative systems with those worldwide in general and specifically the European processes of the European Union;
   2. participation in world and European institutions specifically created to solve global and regional environmental problems;

3. "fulfillment of the obligations arising from joining a number of world, regional, and bilateral conventions and agreements."

The establishment and affirmation of national environmental protection policy and its structure has led specialists to direct their attention toward improving existing technologies in this field and creating new ones. For the past three or four years, our country's financial resources have been limited. As a result, we are reduced to devoting our current efforts toward supporting the ecological balance and the definition and introduction into industry of environmentally friendly technologies which must produce maximum high quality production and minimize waste.

We are directing our application of ecological technologies to achieve the following goals:

A. Economical use of raw materials;

B. Careful use of natural resources;

C. Creation of new technological approaches to minimize or eliminate waste production;

D. Complete, closed-cycle processing of raw materials;

E. Full utilisation of wastes via waste recycling;

F. Develop solutions for ecological problems caused by agricultural activities.

Over the past several years, the Republic of Bulgaria has actively sought to adopt many countries' efforts to preserve natural resources, address human health problems caused by pollution and restore and improve the quality of our natural surroundings. We hope to cooperate with other countries to achieve a united ecological policy and high-quality environmental conditions throughout one, peaceful world.

APPENDIX B

ENVIRONMENTAL PROGRAMME IN THE CZECH ARMED FORCES

By 1st LT Victor Šaroch
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May 1995


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Germany
Austria
Slovakia
Hungary
Leipzig
Dresden
Wroclaw
Usti nad Labem
Decin
Liberec
Jablonec
Turnov
Trutnov
Teplice
Litomerice
Dvur Kralove
Nachod
Chomutov
Most
Zatec
Melnik
Mlada Boleslav
Karlovy Vary
Sokolov
Kladno
Hradec Kralove
Oder
Cheb
Rakovnik
Beroun
Elbe
Pardubice
Sumperk
Krnov
Marianske Lazne
Prague
Kutna Hora
Chrudim
Ceska Trebova
Ostrava
Havirov
Plzen
Rokycany
Benesov
Stribro
Pribram
Havlickuv Brod
Olomouc
Frydek-Mistek
Cesky Tesin
Domazlice
Klatovy
Vltava
Tabor
Zdar nad Sazavou
Prostejov
Hranice
Jihlava
Prerov
Kromeriz
Strakonice
Pisek
Jindrichuv Hradec
Trebic
Brno
Gottwaldov
Moravske Budejovice
Moravа
Uherske Hradiste
Znojmo
Cesky Krumlov
Ceske Budejovice
Breclav
Hodonin
Danube
Vienna
Bratislava
51
48
100 km
100 miles
T2
15
8

M-2

ENVIRONMENTAL PROGRAMME IN THE CZECH ARMED FORCES

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Next year, the army environmental service in our country will celebrate the fifth anniversary of its existence. This would be a good time to briefly recapitulate the conditions and methods of environmental care in the Czech Army.

I. Environmental problems in the Army of the Czech Republic

Current problems and challenges are:

A. Waste management — handling, registration and neutralization of waste in accordance with existing legislation;

B. Protection of soil and groundwater from harmful substances, environmental safety of technical facilities (gas stations, maintenance, storage, etc.) and vehicles; investigation of old environmental loads, clean-up measures;

C. Air protection — adhering to emission limits for fixed sources and vehicles;

D. Indoor environmental protection — radon risk assessment;

E. Nature conservation and landscape protection in military training areas;

F. Aircraft noise abatement.

The environmental service's fundamental tasks include registration of all these problems and the setting up of priorities and preventive measures. Private companies, hired by the regional construction agency, are responsible for remediation and technical solutions. Some of these agencies have provided hot-line telephone numbers to call if environmental disasters occur. The special military enterprise "Military Forests and Farms" deals with ecological vegetation damage at military training areas.

The Military Topographical Institute and the Military Geographical Institute are involved in the "Military Environmental Information System", which serves as both a general and specialized information tool to conduct environmental management at garrisons, training areas and bases. The Department of Environment is responsible for ensuring the development of this information system which will include topographical data and some digitized maps of traning areas provided by the Institute. A private firm will be hired to develop the system.

II. Aims of Military Environmental Service

Within the armed forces the term "environmental service" can be interpreted as the commitment to ensure that all defence activities are carried out in accordance with current national environmental legislation. This policy will lead to increased public approval for the national defence sector and an improvement in the Army's understanding of how environmentally sound operations can improve its operations. Such awareness teaches personnel that, in the long-term, environmentally-friendly measures reduce costs (by reducing or eliminating penalties and remediation costs), and increase tactical capabilities (by permitting more discrete troop movements). Other positive results include an improvement in social perceptions of and, therefore, the standing of the Army (which is a part of society), and provision of education about environmental issues (among conscripts).

The Environmental Service has as its chief responsibility the issuance of, or consultation on, military regulations that cover general and specific environmental activities and the means commanding officers and other personnel use to carry them out. These regulations embody and build upon the national environmental policy and form the basis of the nation's defence environmental policy.

III. Means of Achieving the Objectives

The chief criterion to consider in any attempt to achieve harmony between defence activities requirements and those of environmental protection, is the goal of achieving "sustainable living." Necessary measures to achieve this harmony include: the creation of a legal framework within which to make such decisions (the establishment of regulations and

methodical rules that identify responsibilities and plans for operations within the environmental arena); the development of environmental and training programs to improve widespread awareness of these issues; and support for advances in environmental technologies and methods.

IV. Environmental Policy of the Defence Sector

A. Provide a general summary of impacts military facilities and their operations cause to the surrounding environment;

B. Remediate environmental damage with an emphasis on that caused by air bases;

C. Create a network of key Army headquarters-based environmental advisors (with the goal of developing an environmental service);

D. Promote pollution prevention principles (that emphasize waste and hazardous materials management);

E. Link military and individual responsibility for environmental damage to military regulations and stress that civilian and military awareness of environmental protection is one of the main pillars of the defence environmental policy.

Environmental policy must emanate from within the defence establishment. The Department of Environment of the Ministry of Defence is responsible for ensuring that national environmental policy is applied to meet defence conditions and requirements. Close cooperation and co-production with civilian authorities and control bodies, mutual good will, trust, and development of international cooperation with foreign ministries of defence and within the framework of NATO CCMS activities are all essential prerequisites to the successful realization of this policy.

The Czech Army's environmental programmes function within specific sectors as well. Methodologies are developed for middle-to-long-term projects, whereas short-term (year and trimestral plans) are defined step-by-step. Currently, the most important plans are the Radon Program inventory of military buildings that contain concentrations of radon above the legal limits, an environmental education and training programme (which includes seminars, training

courses, and studies) and the above-mentioned "Military Environmental Information System" project which has already been described as a general and special information tool for environmental management at garrisons, training areas and bases. A technical methodology currently being employed, the "Unified System of Toxic Waste Disposal" is designed to increase the number of safety procedures to be followed in connection with the handling of hazardous materials.

Lack of funding prevents the defence sector from investing in larger environmental projects such as water treatment plants, gas heating plants, and recycling stations.

V. Conclusion

In conclusion, I would like to express the opinion that the armed forces' efforts to carry out effective environmental management would not be possible without the existence of a military environmental service. It is the only body (authority) that is capable of remaining well-informed about both military and environmental matters and of synthesizing this knowledge throughout the decision-making process.

APPENDIX C

REPORT OF THE ESTONIAN ENVIRONMENTAL PROGRAM WITHIN THE MILITARY

By Andres Rekker
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(Translated by H. Kirsti Valge)

May 1995


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60
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Estonia
Tallinn
Loksa
Kunda
Kohtla-Jarve
Sillamae
Narva
Paldiski
Maardu
Iphvi
Keila
Nomme
Kehra
Tapa
Rakvere
Kivioli
Ahtme
Narvskoye Reservoir
Baltic Sea
Nissi
Kardla
Vormsi
Rapla
Vasknarva
Hiiumaa
Haapsalu
Paide
Mustvee
Lelle
Sarevere
Russia
Emmaste
Parnu-Jaagupi
Poltsamaa
Jogeva
Muhu
Virtsu
Vohma
Kallaste
Lake Peipus
Orissaare
Vorts-Jarv
Saaremaa
Parnu
Tartu
Sindi
Viljandi
Mustla
Elva
Kuressaare
Kihnu
Rapina
Lake Pskov
Moisakula
Polva
Prilpalu
Gulf of Riga
Ikla
Torva
Voru
Antsla
Valga
Rouge
Pskov
Latvia
50 km
50 miles
57
Riga
24
27

M-3

REPORT OF THE ESTONIAN ENVIRONMENTAL PROGRAM WITHIN THE MILITARY

by Andres Rekker
Department of Defense Environmental Advisor
Ministry of Defence, Republic of Estonia
(Translated by H. Kirsti Valge)

Estonia is one of the three Baltic countries and its environmental problems are quite similar to those described by our colleagues from Latvia and Lithuania. These problems include harbors full of sunken ships and airfields polluted with aircraft fuel to such an extent that the River of Pärnu, which flows past an airfield, once caught fire. Underneath the airfield at Tapa there is a pool of oil in the uppermost aquifer that has captured tons of oil per summer for at least the past ten summers.

There are polygons [the Soviet military's term for artillery and bombing ranges], used for bombing and artillery practice, that still contain unexploded ordnance, and ordnance depots with hazardous materials and abandoned chemicals such as open containers of nitric acid. Tanks containing oil are surrounded by oil-saturated soil. Although the environmental damage in many areas has already been assessed, an enormous amount of work and data collection has not yet been conducted.

The position of Environmental Expert was created in November of 1994, to act as a counsel in environmental affairs and to formulate a response to environmental problems that concern the Ministry of Defence. Ultimately, this Ministry plans to establish an internal Office of Environment whose members will work closely with the Ministry of Environment.

Soviet troops left approximately 750 facilities and/or property after their withdrawal from Estonia. The Estonian defence forces plan to use selected parts of about one hundred of these. To offer one example, the Estonian military plans to use 3,000 of the Puurman Polygon's 10,000 hectares. The remaining area will become a nature preserve. After unexploded shell and mines in the other polygons are removed, they will eventually be turned over to civilian use.

If any particular military facility or property is believed to have potential economic value, the Ministry, which lacks the funds to conduct environmental remediation projects, will try to find an investor who is willing to assume this responsibility. It is often difficult to locate an investor and, as a result, the facility, equipment or property is likely to remain unused. One example is a rocket base [military installation] that is isolated in deep woods, miles from any inhabited area. The base contains two five-story apartment buildings which housed the base workers and their families. No one has expressed an interest in using the base. Currently, there are 300 facilities or properties that, due to their perceived unprofitability no one has offered to take over.

However, some remediation efforts are underway. The Ministry of Defence, working with the state owned scrap metal firm, a/sEMEX, is collecting and selling abandoned metal for scrap. The modest profits from this project are being used to remediate the military installations' most urgent environmental problems (defusing unexploded shells, for example).

One of the Defence Ministry's chief goals is to raise the troops' awareness of environmental issues, thereby preventing them from inadvertently causing future damage. Eventually, a set of environmental regulations governing defence activities and procedures will be created to ensure that the armed services are in compliance with the environmental regulations observed by NATO countries. Currently, however, the Ministry of Defence has no designated representative or office to deal with environmental issues.

The second most pressing problem is the need to clean up fuel storage areas and motor pools. The Soviet military left these facilities in environmentally deplorable condition. Of the six former storage areas, the Ministry of Defence retained title to three; the other three were turned over to the Ministry of Economic Affairs. Of the three belonging to the Ministry of Defence, management of two were contracted out to private companies which agreed to bring them up to a technical and environmental level acceptable to the Ministry of Defence, which lacks the funds to conduct such programmes. The third storage area, which has deteriorated beyond rehabilitation, will be eliminated. The soil around all the fuel tanks is soaked with oil that escaped from leaking or poorly maintained tanks which were installed in 1948.

Yet another problem is the presence of scuttled ships in the Tallinn Harbors. [Tallinn is the capital city of Estonia; it is located on the southern shore of the Gulf of Finland.] From 1945 to 1994 about fifty (50) ships were sunk in these harbors. The last ship was scuttled on August 19, 1994 in Tallinn "Mine Harbor." In cooperation with the Norwegian firm, NEWT, seven ships have been raised, all of which were leaking oil. In view of the already fragile ecological condition of the harbor, this will inevitably cause additional problems. The Soviets also left more than ten sea mines in the harbor. The Swedish Navy is now helping us to remove them.

One of the long term projects involves the Soviet uranium enrichment plant in Sillamae. [Sillamae is located in northeastern Estonia, on the southern shore of the Gulf of Finland. Only a narrow strip of land and seawall separates lagoons of radioactive waste from the Gulf of Finland.] At present, the plant is producing rare earth metals; about 10% of the world market supply. The plant still uses radioactive ores which, over 40 years of operation have caused a growing radioactive waste problem. The town and port of Paldiski in the Pakri Peninsula offers a particularly stark example. We have a video of it that we would like to show you.

ENVIRONMENTAL ACTION PLAN FOR PALDISKI
SPONSORED BY NORDIC ENVIRONMENT FINANCE CORPORATION

Tallinn

January 20, 1995

SUMMARY

I. Preface

The current study has been carried out under the initiative of the Government of Estonia and the Estonian Ministry of Environment (MOE). The Council of Nordic Ministers delegated the Nordic Environment Finance Corporation (NEFCO) to facilitate and finance the development of an Environmental Action Plan for Paldiski.

A team of MOE representatives: Mr. Harry Liiv; Mr. Allan Gromov; Mr. Jaan Saar; Mr. Voldemar Tassa; and Mr. Madis Metsur of MAVES Ltd. conducted this study.

Mr. Madis Metsur and Dr. Arvo Käärd, both of MAVES Ltd., conducted complementary investigations and compiled the report. Dr. Husamuddin Ahmadzai of the Swedish Environmental Protection Agency coordinated the work on behalf of NEFCO.

II. Background

The former Soviet Naval Base located in the town and port of Paldiski and the surrounding Pakri Peninsula houses several facilities, including a functional town infrastructure, a non-freezing port, a railway network, a favorable geographical position and lovely surroundings. The area is potentially suitable for development. However, solutions for its environmental problems must be found to provide better living conditions for its inhabitants and to facilitate further development.

Paldiski/Pakri peninsula is located about 50 km from the capital Tallinn. The peninsula is situated on the limestone plateau between the Pakri and Lahepere Bays along the Estonian northern coast and has an area of 40 km^2. A military harbor on the coast of Paldiski Bay was established by Peter I sometime during the period spanning 1689 - 1725. The harbor, located at Roberwiek village, was renamed Baltiiski Port in 1762, from which the present name Paldiski has been derived. The town of Paldiski was formally granted its official status in 1783.

Compared to the other ports of the Baltic Sea, Paldiski Harbor is virtually ice free during winters and, since 1870, the harbor has been connected to the network of Baltic Railway. Historically, the port of Paldiski has been of the great importance to Tallinn and St. Petersburg, functioning as their preliminary port, especially during the winter season. The former Soviet Union/Russia took over the harbor in 1917. The Paldiski Peninsula together with the islands of Big-Pakri (Suur-Pakri, 11.6 square km) and Small-Pakri (Väike-Pakri, 12.9 square km) served as a large military base (gross total 65 km^2) for the former Soviet Union since 1939. The Paldiski peninsula, including the town (32.5 square km), and its two main harbors, housed a submarine base with a nuclear training center for mariners of the former Soviet Union.

The Pakri Peninsula (former Leetse Peninsula) is located on the limestone plateau of the Estonian northern coast, between Pakri (Paldiski) and Lahepere Bays, and ends in the north at Cape Pakri. The Pakri Peninsula is 12 km in length; the average width is 5 km , area, 40 km^2. Absolute elevation of the grade on Pakri Peninsula is 31 m at its highest; the average height of the Pakri cliff coast is 24-25 m. In the southern part, at Leetse, the average height is 25-26 m. Absolute elevation of the limestone cliff bank at Leetse is 14-18 m.

An average geological profile of the limestone cliff is as follows:

1 m of moraine;

20 m of limestone;

3 m of dictyonema shale;

30 m of sandstone with intermediate clay layers;

65 m of blue clays;

90 m of sandstone;

granite rocks at 180-190 m depth and deeper.

The Pakri Peninsula is dominated by 3 spreading aquifers: one is situated in the ordovician limestones (O); the other in Ordovician-Cambrian (O-Cm); and the third in Cambrian-Vendian (Cm-V) sandstones. The uppermost (O) aquifer has no natural protection against penetration of pollution, the second (O-Cm) is relatively protected but military objects at depths greater than 20 m and unsealed/uncapped drill wells/holes are endangering the water quality in this aquifer. The first aquifer - O - is practically unused. O-Cm aquifer in some places serves as the local water supply. Groundwater in the third - Cm-V aquifer, spreading under the blue clay layer, is well protected. The Cm-V sandstone aquifer supplies Paldiski with water. The filter parts of the drill wells open the sandstone at a depth of 90-200 m below the ground. Thus, blue clays protect the utilized groundwater from pollution.

The two Pakri islands are currently uninhabited. Before 1939, Small Pakri housed 2 villages and two fishing ports; Big Pakri housed 3 villages and 3 fishing ports. The use of the islands as a target practicing range for aerial bombing etc., have left the farms and villages situated on these islands are in ruins. All roads of local value have been destroyed and there is no functioning connection between the islands.

Currently, most of the military facilities are unsuitable for civilian use. The buildings should be demolished and the debris landfilled appropriately. Most of the communal housing was damaged by vandalism committed during the withdrawal of Russian Federation troops from Paldiski Peninsula and is unfit for occupation. Former military activities have left a legacy of hazardous waste in large quantities and of varying severity. Vast areas of the Paldiski Peninsula are visibly polluted e.g. with fuel and oils, metal scrap, batteries, explosive materials, and asbestos.

Although local authorities and enterprises are willing to contribute to remediation efforts, they are unable to devote significant financial resources to the task. To complicate matters further, the new managers of the contaminated facilities are neither conscious of existing environmental conditions nor of their responsibility to address them.

A. The Pakri Peninsula's most serious current and potential pollution problems include:
    1. danger of radioactive pollution;
    2. pollution of sea, surface and groundwater with liquid fuels;
    3. soil pollution with oil, solvents, their breakdown products (including PCB contaminated oils, PAH etc.);
    4. heavy metals;
    5. structures unsuitable for civil use; large contaminated areas and systems;
    6. lack of waste management;
    7. dud aircraft bombs on the polygons of the Pakri Peninsula and the islands as well as in the aquatory of the Pakri islands;

B. The largest environmentally hazardous objects known on the Pakri Peninsula are the following:
    1. reactors of the Submarines Training Center of the former Soviet Union;
    2. the boilerhouse of Paldiski, operating on liquid fuel;
    3. sewage water treatment facilities of Paldiski;
    4. the only official landfill of Paldiski and the Pakri Peninsula;
    5. harbors.

III. Facility Background - Nuclear Reactors

The region of Estonia in which the Pakri Peninsula is located contains trace amounts of radioactively contaminated soil, the result of the Chernobyl catastrophe. The Pakri Peninsula belongs to the regions of Estonia where increase in the amount of radioactive substances in the soil, caused by the Chernobyl catastrophe, was minimal. According to aerial monitoring-based reports, the content of Cs-137 in the soil is less than 0.1 Ci/square km. The natural gamma

background level in this region is among the lowest in Estonia, 0.08 µS/h. No radioactively polluted spots have been found on the Pakri Peninsula or on the closed territories under the jurisdiction of the Russian Federation (0.235 square km) housing the nuclear reactors and their auxiliary equipment, including 2 radioactive waste storage areas.

Specialists in the Russian Federation Army are in the process of decommissioning the nuclear reactors in coordination with the Government of the Republic of Estonia. A special Estonian governmental commission is supervising this project. According to the Government of the Republic of Estonia, the caps of both reactors were opened in August and in September 1994 to remove the nuclear fuel within. One of the reactors, which has a capacity of 90 MW, had operated from 1983 to 1990. The other reactor, with a capacity of 70 MW, had operated from 1968 to 1990. The fuel was removed during October, 1994 and transported back to Russia in special containers. The military specialists of the Russian Federation are addressing only the problems associated with the removal and transportation of the nuclear fuel. All components, except the rods containing nuclear fuel, remain on the territory of the former Soviet Union Submarines Training Center which is located some kilometers to the east of Paldiski. The total decommissioning of the nuclear object is expected to be completed by 1999 at a cost of approximately 60-100 million US $.

The latest data on the content of radioactive substances in the natural environment, measured in 1992, provided by the Russian Federation to Estonia is as follows:

aerosols in the air close to the ground	0.2 10^{-4} Ci/m^3,
precipitation	0.4 10^{-11} Ci/m^3 in day,
drinking water	2.3 10^{-11} Ci/l,
sea water	1.6 10^{-11} Ci/l,
algae	1.6 10^{-8} Ci/kg,
soil in the bottom of the sea	0.6 10^{-8} Ci/kg,
soil	1.1 10^{-8} Ci/kg,
vegetation	0.6 10^{-8} Ci/kg,
sea fish	0.2 10^{-8} Ci/kg,
gamma background	0.16 µS/h,

beta pollution	not detected.

Openings at the limestone shore along the Pakri Peninsula are registering levels somewhat higher than background levels of radioactivity. The radioactivity here has been registered at levels higher than 0.5 Ci/square km.

Indirect investigative methods (the territory of the above-mentioned facility is still under the jurisdiction of the Russian Federation) seem to reveal that minor quantities of oil products from the boilerhouse near the reactors also reach the sea. According to measurements collected in 1992 by MAVES Ltd., the boilerhouse's oil strainer is discharging 0.3 to 5 kg of oil products per day.

In addition, the nuclear reactor is located on a limestone bank over unprotected groundwater. Topsoil is missing in some places; in others it is comprised of gravel and sand up to 1 m thick. If constructions of the nuclear facility is deeper than 20 m below the grade, it will endanger the second (C-O) aquifer from the ground surface.

IV. Central Boilerhouse of Paldiski

The design and construction of the central boilerhouse which is fueled using black oil (furnace oil) is out-dated. In 1994, the boilerhouse used 12,000 tons of black oil per year; and is projected to burn 7,000 tons in 1995. For years, thousands of tons of black oil have leaked and flowed unchecked from the boilerhouse and railway tanks into the soil. When the tanks were full, and supplementary railway tanks had to be returned to the fuel base, operators released oil directly into the soil to avoid paying fines. Extensive black oil leakage from tanks and pipelines also occurred. The soil around the Central Boilerhouse of Paldiski is soaked with oil over an area of approximately 6 hectares. Experts estimate that thousands of tons of black oil may have penetrated the filling material of the facility. Pools of oil have formed in the low lying areas and precipitation carries the black oil permeating out of the upper layers of the soil and pools into the storm drainage. Black oil has been flowing from the territory of the Paldiski Boilerhouse into the Paldiski Bay - the Baltic Sea for a number of years. According to

investigations carried out by MAVES Ltd. (1992), an average of 160 kg of black oil flowed into the sea daily. During rainy periods this amount reached up to 400 kg a day.

Since July, 1994, the Central Boilerhouse of Paldiski has maintained and emptied the boilerhouse's oil separator. However, the separator is inefficient and, despite efforts to maintain it, when heavy precipitation occurs, black oil from the Central Boilerhouse continues to run into the sea.

The Ministry of the Environment of Estonia has instructed MAVES Ltd. and the Central Boilerhouse of Paldiski to begin primary treatment of black oil contamination to clear black oil from the surface. Boilerhouse employees pumped About 350 tons of black oil, containing about 50% water out of the territory during the summer 1994. MAVES Ltd operations during Sept-Nov 1994 secured about 8 tons of separated black oil from the oil separator near the sea, and 244 tons from the territory and close vicinity of the boilerhouse. Conditions near the boilerhouse still cause concern. The filling ground still contains large amounts of black oil and more efficient pumps and separators are required for pumping large amounts of oil from pools and ditches etc.

The boilerhouse's stationary treatment facilities should be rebuilt if it is to continue to operate. The oil separator near the sea also should be reconstructed as soon as possible. Although pumping may serve as a short term remedy to contain the situation, this procedure alone is inadequate to remediate and control the contaminated area. Once the free phase of single-chain hydrocarbons is reduced/removed, the extent of oil contamination and future risks must be assessed.

V. Sewage Treatment Facilities

The existing sewage treatment facilities at Paldiski are more than 20 years old and consist of a compound settling basin, chlorinate, sedimentation basin and deep-sea spillway. Currently no activated sludge-based biological treatment is being conducted. The troops of the former Soviet Union began construction of a new large scale treatment plant (designed to have a sewage pumping station, de-gritters, activated sludge tanks, final settling basins, sludge dewatering fields). About 30-40% of the treatment complex has been completed but the

usability of these unfinished treatment facilities has not been fully determined. Project documentation is missing and was probably been taken to Russia when the former Battalion of Sanitary Engineering withdrew. None of the required materials or equipment (pumps, blowers, etc.) to complete the project have been allocated. In principle, assessment of the sewage treatment complex of Paldiski which will lead necessary changes in the construction design and equipment are possible; however, this entails drawing up plans for a new project. The present condition and status of the facility should probably be reassessed and constructed according to modern technology from the ground up.

It is difficult to predict at present how much sewage water treatment Paldiski will require in the future. Nevertheless, such an estimate must be made in planning the new treatment facilities. One alternative is to assume that the facilities should be equipped to serve the needs of 10,000 inhabitants. Another alternative would be to employ small efficient biological treatment containers which could be expanded easily to process increased amounts of sewage water.

Thirty eight (38) of the 105 homes in Paldiski are connected via a sewage pipe network to the central sewer system. All of the aforementioned enterprises are also connected; however, no detailed map of the Paldiski sewer system exists. The current assessment of this system is based entirely on the knowledge and practical experience of the people who maintained it during the Soviet period. Although the sewer system is functional, it requires study. The pipelines are built of random materials and construction practices were driven by convenience of the foremen and reflect Soviet period limitations. The lack of specific data on the sewer system extends to those of the former military units located in the general Pakri Peninsula and the islands. Even the people who worked on them know nothing because no inventory of the sewage systems of the former military units located on the Pakri Peninsula and the islands has ever been carried out.

In addition to the main discharge from the wastewater treatment plant, about ten wastewater outlets have been found, none of which are connected to the general sewer network. The largest of these are: the outlet of the nuclear reactor discharging into Lahepere Bay (the water is contaminated with organic substances and heating oils); the outlet of the

Border Guard Unit; the wastewater outlet of the Training Center of the Border Guards; and the wastewater outlets of the Southern Harbor Facilities, which are directed into the bottom of Pakri Bay.

VI. Landfill

The officially authorized landfill facility is located in the center of the Pakri Peninsula. In the past, all waste was hauled to the official landfill via a road passing through the landfill site. Both sides of the road are covered with waste for a length of about 1 km. The width of waste layers along the road varies, ranging from up to 100 m, at one side, to 20 m at the other side of the road. In places, the waste has been piled together with bulldozers. The thickness of waste layer is 1-2 m and in some spots less than one m. The deposited waste dates from different periods (beginning from 1939) and is very heterogeneous in type, ranging from household waste to various kinds of military wastes generated by typical Soviet activities. ECO-PRO conducted an inventory of the landfill at the end of 1994. The landfill area spans ca 3.6 ha. The total amount of waste is estimated 28, 500 tons (23, 000 m^3). There are chemical waste as well, including:

PBS accumulators	5.1 t,
Chemicals	10.7 t,
Paints waste	5.0 t,
Asbestos	437 t,
Hg (lamps)	0.6 t.

This landfill, which may contain dangerous military wastes, must be considered hazardous. The area is neither guarded nor fenced and so-called “geologists” can scavenge and distribute the waste which poses significant risks to the environment and to people.

The landfill’s current location does not meet environmental requirements. A more appropriate site should be identified on the Peninsula for future use and a systematic waste management system organized for Paldiski and local townships. This should include a transportation system to cover the many spontaneous waste deposits all over the Pakri

Peninsula (one of which is located in the ruins of a church in Paldiski). Clean-up of the hundreds of waste hills should be conducted once a study of their content heterogeneity has been completed. Thirteen locations have been detected on the Pakri Peninsula where household waste and scrap has been dumped. In addition, large amounts of iron, steel scrap, concrete, timber, rubber waste, asbestos sheets, construction waste, ashes and slag from boilerhouses have been discarded in open-cast quarries and land-fills. For economic reasons, the existing inert waste should be concentrated and deposited in a smaller landfill area than the one currently in use. Efforts to separate waste metal and timber would reduce the current waste volume; however, this may prove to be a prohibitively labor-intensive exercise.

Another waste management related issue which should be addressed concurrently is the problems caused by spontaneously built garages and shelters for cattle all over the town of Paldiski.

VII. Northern and Southern Harbor

A limited inventory of the Northern Harbor at Pakri/Paldiski Bay aquatory (1400 m^2 area) has also been carried out. The bottom of the aquatory is contaminated with timber waste (1 ton), iron and steel scrap (12 tons), nonferrous metal scrap (1.2 tons) and solid rubber waste (0.8 tons). Their advanced state of corrosion has rendered all of this scrap on the sea bottom worthless as a source of secondary raw material. The effects of emission of pollutants into the aquatory can be expected to last 15-20 years. The Northern Harbor is sheltered from two sides by breakwaters. The sea bottom in the aquatory is sandy and muddy. The depth of the harbor basin is about three to five m.

A solid fuel fired boilerhouse was located earlier in the harbor territory. The unloading place for the solid fuel, and two fish-processing buildings of the former cooperative fishing enterprise "Majak," are situated north of the Northern Harbor. The area between the railway leading to Peetri Fortress, and the fish-processing buildings require investigation to detect possible contamination. The former No. 1. Signal Division of Missile Launches' fuel storehouse, located in the immediate vicinity of the Northern Harbor, has not yet been inventoried (ca 10 000 m^2 area). According to visual observation, the area around the fuel

storehouse is badly polluted with oil products. It will probably be necessary to carry out an investigation of this fuel storehouse territory, make a risk assessment and design a remediation program. An evaluation of the heavy metal content of the soil of the solid fuel (coal; oil shale) unloading areas and in the bottom sediments of the Northern Harbor's aquatory basin is also indicated. Finally, a military launch which was scuttled and wrecked on the shore close to the Northern Harbor should also be dealt with.

The aquatory of the Southern Harbor (SH) and the territory of the harbor belongs to Tallinn Harbors, a company owned by the Estonian Government. Tallinn Harbors is reconstructing the Southern Harbor. There is a wharf at the Southern Harbor, and the aquatory is bordered with mole from three sides. The bottom of the aquatory, which is sandy and muddy, was dredged in June 1994. The sea depth inside the aquatory is 4-10 m. According to an inventory, carried out by AS Ecoman (1994), the ecological condition of the bottom of the aquatory is satisfactory; however no samples have been taken there.

It is estimated that the Southern Harbor aquatory may have suffered 10-20 years worth of pollution. The main contaminants are believed to be iron and steel scrap, elgl by a pontoon crane (4.0 tons), 3 scuttled launches (120.0 tons), and diverse spread iron and steel scrap (ca 0.5 tons) all over the aquatory. An area of about 620 m^2 is assumed to be contaminated. Due to the wrecked and corroded condition of the sunken launches, lifting them to the surface and thereafter fragmenting them may not be economically feasible. In addition, all of the sunken ships contain oils; one has been leaking oil into the aquatory. Although the sunken ships do not currently pose any acute danger to navigation in the harbor, they are limiting its use.

No explosives or radioactive substances have been detected either in the wrecked ships or on the bottom of the aquatory. The conditions in the sea bottom in the aquatory and the submerged part of the wharf have also been filmed.

The following objects are located at the Southern Harbor (all "former"):

No 5.5	transformer station,
No 5.10	fuel storehouse for torpedo boats and submarines, including pipeline leading up to the wharf,

No 5.18	accumulator warehouse of submarines,
No 5.6	torpedo factory,
No 5.7	warehouse containing air-cleaning chemicals (surface-active agent) for the submarines,
No 5.9	landfill for the accumulator plates (0,5 ha),
No 5.17	workshops (different),
No 5.4	warehouse of torpedoes, equipped with nuclear charge,
No 5.12	abandoned bathyscaphe,
No 5.13	underground collection tank for heavy fractions of oil products (filled),
No 5.14	tanks of chlorosulphonic acid,
No 5.15	metal scrap,
No 14.1	united warehouses of military unit No. 1052 etc.

Based on the above observations we conclude that the territory of Southern Harbor requires a detailed inventory, a proper risk assessment and a remediation action plan.

APPENDIX D

THE ENVIRONMENTAL CONDITIONS OF THE HUNGARIAN DEFENCE FORCES

By Dr. Ferenc Szabo
Deputy Director General
Ministry of Defense, Hungary

May 1995


Czech Republic
Poland
Hungary
100 km
100 miles
Slovakia
Ukraine
Austria
Aggtelek
Satoraljaujhely
Zahony
Kazincbarcika
Kisvarda
Vienna
Salgotarjan
Ozd
Miskolc
48
Balassagyarmat
Nyiregyhaza
Neusiedler See
Mosonmagyarovar
Ipel
Tisza
Hajdunanas
Esztergom
Vac
Lorinci
Eger
Mateszalka
Gyor
Komarom
Gyongyos
Hajduboszormeny
Sopron
Kapuvar
Dunakeszi
Jaszbereny
Balmazujvaros
Debrecen
Tatabanya
Budapest
Szombathely
Papa
Erd
Mor
Puspokladany
Sarvar
Varpalota
Szekesfehervar
Szolnok
Berettyoujfalu
Cegled
Nagykoros
Raba
Veszprem
Dunaujvaros
Balaton
Gyoma
Zalaegerszeg
Kecskemet
Dunafoldvar
Keszthely
Sio
Szentes
Bekescsaba
Kiskunfelegyhaza
Marcali
Oroshaza
Gyula
Slovenia
Nagykanizsa
Kiskunhalas
Kiskunmajsa
Hodmezovasarhely
Dombovar
Kaposvar
Szeged
Battonya
Szekszard
Drava
Bacsalmas
Mako
Komlo
Pecs
Baja
Romania
Mures
Barcs
Szigetvar
Serbia
and
Montenegro
Croatia
45
Bosnia & Her.
18
21

M-4

THE ENVIRONMENTAL CONDITIONS OF THE HUNGARIAN DEFENCE FORCES

by Dr. Ferenc Szabo
Deputy Director General
Ministry of Defence
Hungary

The Hungarian Acts and Regulations are mandatory for all employees and organizations in the Hungarian Armed Forces; therefore it can be assumed that the Hungarian Armed Forces have a constitutional obligation to adhere to the environmental pollution regulations legislated to date.

A new era of thinking about environmental issues throughout the Defence Forces commandership was introduced 1990. The Environmental Council of the Commandership of the Hungarian Defence Forces has been established, and the Short- and Medium-Term Action Program for Hungarian Defence Forces in the field of environmental protection has been compiled.

These measures will guarantee that environmental concerns will be considered in activities conducted by the Ministry of Defence, both in its governmental policies and in the formation of its defence strategy. Within the framework of the Short- and Medium-Term Action Program the Environmental Master Plan has been implemented to cover issues such as soil-pollution, water treatment, wastewater treatment, air-pollution, solid waste handling, noise and vibration damages and risks to nature. The primary objective of this program was to assess the baseline conditions of the environment and to create a database of information about it.

This baseline inventory of more than 110 military bases was completed in 1994.

A. Within the framework of this project the following tasks were outlined:
    1. surveying methods;
    2. testing of survey execution;
    3. data input; compilation of suitable software;
    4. experimental runs of the software to be used for risk analyses.

Task ranking was completed, division by division. The major tasks are as follows:

B. In soil pollution the listed objects should be ranked first:

1. Air Force bases, airfields;
2. fuel bases
3. bases with ample technical facilities and equipment.

This priority ranking is based on the need to address pollution caused by some carbon-hydrogen by-products threatening the drinking water bases of the country.

The most urgent task is to:

Rank conditions in time and space beginning with establishment of hazard elimination programs at the most critical places.

C. In regard to water pollution the following tasks should be ranked first:

1. survey of the technical status and the degree of usability of the facilities in wastewater treatment;
2. examination of vehicle usability and of a number of technical tools;
3. supervision of the technicality of fuel storage.

This ranking is based on the need to protect of the natural water resources.

The most urgent task is:

To let the prevention and elimination work be carried out continuously.

D. The most urgent tasks in the field of solid waste handling are:

1. domestic waste disposal;
2. hazardous waste management.

This ranking is based on the need to deal with the increasing amount of solid waste, and the exhaustion of the raw material bases.

Tasks:

Deal with issues of transitional storage, of exemption, of final disposal, and of reuse.

I. Air Pollution

Increased attention must be paid to dealing with stationary and mobile sources of pollution. Priority should be based on the extent of sanitary mass problems.

Most important tasks:

To dampen pollution caused by energy and hot water-producing facilities if it is above the maximum permissible threshold.

Regulation of the air pollution caused by transport vehicles.

Removal of out-of-date technology.

II. Noise and Vibration Hazards

Treated areas: airports and the areas where maneuvers are conducted.

Priority should be: protection against damaging health-impacts.

Task:

Establishment of technical protective measures and the systematic application thereof.

III. Hazards to Nature

Natural resources and landscape protection reservations are endangered in and around military shooting grounds and surrounding areas.

Priority should be placed on preservation of national treasures.

Task:

Initiation of a survey of the natural resources.

Increased PR activity in the army - education and training to foster environmental consciousness.

Another paramount objective of the Short- and Medium-Term Environmental Action Program was the initiation and institutionalization of environmental education in the Armed Forces.

To foster changes in the attitudes toward environmental protection, the Action Program launched a comprehensive educational plan. The first elements of this plan were recently introduced.

The Military Academy is offering a separate course this year on environmental protection. Another educational program may be offered for students in military high schools and colleges. In 1994, the new Environmental Education Center opened; this center and its offerings do not replace existing institution's and educational center's environmental courses which are intended to supplement their work through short courses, and will offer solutions to practical problems the defence forces face in the environmental arena. The Government's long-term goal is to regionalize this Center within the framework of the "Partnership for Peace," and to open its doors to members of other Central and Eastern European Organizations in addition to the members of the Hungarian Armed Forces. The Ministry of Defence is preparing to achieve these goals.

In 1994, the Ministry took its first steps in selecting and training "environmental activists" in its most important military organizations. The commanders of these organizations chose for this role those personnel who work directly on environmental problems in an official capacity. In 1994, three courses were offered for these personnel, focusing on general, environmental problems, soil pollution, and waste handling. This year more subjects and courses will be offered to help them achieve our next goal: to train activists in every area of general environmental protection. Once trained, they will be available to consult with and help Department of Environment and Safety Techniques to respond to dangerous environmental threats.

The Environmental Manual for the Hungarian Armed Forces, an indispensable guide to help change the attitudes of Defense Forces toward environmental issues, is currently being prepared and is due to be published this year.

Of course, many problems still need to be addressed; for example, the establishment of a coordinative group whose activities will reach all the way down through the ranks should be established in the near future.

Because current environmental regulations are obsolete, both in terms of content and applicability, new, more realistic regulations should be drawn up in the near future. Clear separation of the authorities and rights is necessary to efficiently implement these regulations.

No funding source currently exists to fund an institutional approach to environmental issues. Few material tools are available. These limitations limit any attempts to launch educational programs within the scope of the Master Plan Studies. We are working with the Ministry for Environmental Protection and Regional Policy to raise an interministerial fund to ensure support for such endeavors and to pursue financial aid being provided by NATO and NATO member countries.

We have not yet implemented all phases of our educational program and, therefore, have not yet trained the desired number of environmental protection specialists we will need to lead and execute our program. We need to develop a thorough action plan to deal with unexpected, large environmental disasters and individual environmental problems.

Finally, we would like to conclude with the observation that the Hungarian Armed Forces are exerting efforts beyond their present capabilities to introduce conscious, efficient environmental measures in their in their areas of competence. We have yet to achieve our final goal, however: to create a universally positive environmental attitude throughout the military establishment.

APPENDIX E

STATE OF THE ENVIRONMENT AND DEFENCE ENVIRONMENTAL ISSUES FOR LATVIA

By Mr. Andris Plaudis
Advisor on Environmental Affairs
Cabinet of Ministers of the Republic of Latvia

May 1995


Latvia
100 km
100 miles
Baltic Sea
Gulf of Riga
Irbe Straight
Kolka
Ventspils
Stende
Kuldiga
Kandava
Tukums
Jurmala
Riga
Ainazi
Rujiena
Burtnieku Ezers
Valka
Valmiera
Limbazi
Cesis
Smiltene
Aluksne
Vilaka
Gulbene
Sigulda
Lubana
Laudona
Karsava
Ogre
Aizpute
Saldus
Dobele
Jelgava
Daugava
Plavinas
Lubanas Ezers
Ludza
Liepaja
Priekula
Auce
Bauska
Jekabpils
Rezekne
Zilupe
Reznas Ezers
Dagda
Siauliai
Daugavpils
Kraslava
Tartu
Russia
Estonia
Pskov
Lithuania
Belarus
Russia
58
56
24
26
28

M-5

STATE OF THE ENVIRONMENT AND DEFENCE ENVIRONMENTAL ISSUES FOR LATVIA

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I. Introduction

Residents of the Republic of Latvia shall have the right to live in a quality human environment and require competent state institutions, legal persons and their officials, as well as natural persons to cease such activity, or failure to act, that degrade the environment, harm human health or endanger their lives, interests and property.

The Law of the Republic of Latvia 'On Nature Protection', Article 11

It is impossible to envision an improvement in Latvian residents' living standards unless the environmental conditions improve as well. When environmental quality falls, both society and the national economy suffers. Environmental problems have adverse effects on human health, the stability of natural ecosystems and on the availability and quality of natural resources. Degraded environmental conditions also have a negative impact on the public consciousness in general.

Taking into consideration the fact that Latvia's administrative system, national economy and society are in a transition period, clear environmental requirements should be included in the implementation of larger scale state administration reforms and the drafting of new legislation. A clear-cut development strategy should be devised for implementation of relevant economic projects and environmental protection as for any branch of the national economy. The National Environmental Policy Plan offers such a strategy.

Defence environmental issues in Latvia are covered in the management of general environmental matters. Environmental problems emanating from the existence and operations of defence-related installations and activities can be divided into two parts:

A. The first part may focus on the newly-formed Latvian National Defence Forces installations' and activities' potential impacts on the environment;
B. The second major part could focus on the environmental damage caused by former Soviet troops in Latvia over the past 50 years.

II. Some Facts About Latvia

The Republic of Latvia is located in northeastern Europe, on the east coast of the Baltic Sea. Estonia is on the north, Lithuania on the south, the Russian Federation on the east, and Belarus on the southeast (see map). Latvia has a coastline of nearly 500 kilometers and a total land area of nearly 65,000 square kilometers, comprising an area larger than such countries as Estonia, Denmark, Holland, Belgium or Switzerland.

Latvia's climate is typical of a northerly maritime region with moderate winters and moderately warm summers. Temperatures in Rīga range from 17.5 C in July to -4.3C in January. The average annual precipitation in Riga is about 617 mm.

Latvia has a population of approximately 2,566,000. Latvian nationals constitute only 54% of the total population; approximately 1 million or 43% are Slavonic or other nationalities. Most of the non-Latvian population lives in the largest cities. The population density is approximately 40 people per square kilometer; similar to that in other Baltic states but significantly less than that found in European countries.

Rīga, the capital of Latvia, is the nation's largest city with a population of 856,000. Daugavpils in the southeast has a population of 122,000. Liepaja in the west has a population of 105,000.

The official language is Latvian which is written in the Latin script. Similar only to Lithuanian, this non-Slavic, non Germanic language represents the Baltic branch of the Indo-European family of languages. Today, Russian and increasingly English and German are also widely spoken.

On May 4, 1990, the name of the Republic of Latvia was renewed and the Declaration on the Renewal of Independence of the Republic of Latvia was adopted. On August 21, 1991, a new constitutional law was adopted, ending Latvia's transition to independence from the USSR. On September 6 of that year, the Soviet State Council officially recognized Latvia's independence. On September 17, 1991, Latvia took its rightful place within the international community by gaining full membership in the United Nations. The national flag has a maroon background with a narrow white horizontal stripe (proportions are 2 to 1, respectively) superimposed across the center.

Latvia is an independent, democratic and parliamentary republic. Legislative powers are vested in the Saeima (Parliament), a 100-member elected body. The President is the Head of State and is elected by the Saeima. The President appoints the Prime Minister while the Saeima confirms the Cabinet of Ministers whose members hold executive powers.

The Ministry of Environmental Protection and Regional Development (MoE) is responsible for formulating and enforcing united state policy covering environmental protection, regional development, nature conservation and sustainable use of natural resources. This Ministry also has responsibility for inter alia building, tourism, nuclear safety, etc. The Ministry and its subordinated organizations are also responsible for state organizational control of the environment, building and spatial planning, environmental impact assessment, environmental data collection, the devising and implementation of legislation, and development of related international cooperation, as they affect environmental protection, regional development and building, including investment activities. Subordinate institutions and local and regional authorities implement the resulting environmental policy.

GENERAL STATE OF ENVIRONMENTAL AFFAIRS IN LATVIA

Currently Latvia faces two types of environmental problems. The first group is viewed in connection with the grim heritage left by the totalitarian period: characterized by inefficient, environmentally hostile, resource-squandering state sector industry; the re-structuring of agriculture, energy and transportation; underdevelopment of the environmental and utilities sectors; former Soviet military territories that became polluted during the occupation period and still have not been cleaned up; increased emergency risk and insufficient environmental quality in several regions.

The second category of problems can be viewed in connection with the restructuring of the national economy into a market economy. The amount of investment currently under way (0.8% of GDP) is insufficient to bring about a rapid improvement in Latvia. The absence of clarity in developing national branches of the economy hinders implementation of a preventive environmental policy. An adverse legal system exists due to the contradictory nature and lack of some important legal acts.

I. Brief Overview of Latvia's Environmental Conditions

Most of Latvia's environmental problems are concentrated in the so-called "hot spots"--the largest industrial centers, transportation crossroads, or in territories abandoned by the Russian Army. Only a few of these environmental problems are manifested throughout the country as a whole; among them: eutrophication and degradation of water ecosystems, excess usage of several natural resources, transboundary pollution, and accumulation of household and industrial waste. Excessive and, in many cases chaotic urbanization has caused grave problems in local areas as well.

**The description of Latvia's environmental conditions is based on the National Environmental Policy Plan for Latvia prepared by the Ministry of Environmental Protection and Regional Development)*

On the other hand, over the past decades, the existing state administration structure and system of management has permitted the preservation of natural forests, meadows and swamps, thus leading to the growth of rich animal and plant populations. Many of these species are on the edge of extinction in western and northwestern regions of Europe. Latvia can take pride in its comparatively untouched natural areas, vast forests and beaches which are free of construction and have low background pollution levels.

The point should also be made that, largely due to economic decline, total pollution has significantly decreased over the past three to four years. However, Latvia continues to struggle with many environmental problems. An overview of the most significant challenges follows:

II. Water Quality

This is typically cited as Latvia's chief environmental problem. According to available hydrobiological and hydrochemical data, 85% of all surface water is either slightly polluted or polluted. Eutrophication is the biggest concern; caused by biogenus substances, it is spreading rapidly. Untreated municipal waste water and leakage from agricultural lands comprise the main sources of these biogens. In several places, dangerous substances in polluted water have been identified (e.g., heavy metals, chloroorganic compounds, oil products), all of which have accumulated.

However, it is important to note that, since 1990, both the amount of waste water and agricultural leakage have decreased significantly, leading to a subsequent reduction in the total amount of pollution discharged into watercourses. This improvement can be attributed in large part to the start-up of Riga's municipal and other waste water treatment facilities and the country's overall decrease in production..

Conditions in the Gulf of Riga and the Baltic Sea deserve specific attention. The relative isolation and amount of discharge from rivers makes the antropogenous factor in the Gulf particularly significant. Reports of phosphorous and chlorophyll concentrations over the years serve as evidence of continuing eutrophication in the Gulf of Riga. Current findings from hydrochemical and biological studies do not indicate any increase in eutrophication in the Latvian zone of the central Baltic Sea. The sea waters in the Latvian economic zone are

moderately polluted; some areas suffer from local pollution. Zones of ecological risk include coastal regions in the vicinity of river estuaries, municipal and industrial waste water discharge locations, mineral extraction and gravel disposal sites, and regions surrounding ports.

III. Air Quality

Transportation activities account for most (65-68%) of all air pollution. Transportation has led to a 10 percent increase in air pollution since 1992, due in large part to the dramatic rise in the number of registered vehicles functioning nation-wide. The pollution caused by District heating is significant, in part due to changes in the type of fuel being burned. More heavy fuel containing high amounts of SO_2 is being burned than previously. Most of the non-mobile source pollution can be traced to the six largest industrial cities; Riga in particular which accounts for almost one-third of total emissions.

IV. Waste

The question of how to control and dispose of wastes is an emerging problem throughout Latvia. Hazardous wastes, which represent a small portion of the total amount, do, however, pose a threat to health and environment and will be discussed separately. The state, rather than local governments, controls most hazardous waste management activities. Although production of hazardous waste is declining (due to the general decline in industrial production), household waste dumps are becoming a growing problem. Existing dump sites are not sufficiently equipped to handle contents and are considerable sources of diffuse pollution. The present level of household waste generation is likely to increase due to the growing supply of western imports which signals a growing amount of throw-away packaging. Adding to the problem is the decrease in recycling and package reuse behavior, caused by changes in the state administrative and production structures over the past several years. Latvia also lacks a developed household waste management system.

V. Depletion of Biological Diversity

This is yet another area of increasing concern. The inefficient economy--and in particular, of the agricultural sector--during the Soviet period has allowed Latvia to preserve large natural and semi-natural areas. Latvia's forest areas have increased to more than 40% of Latvia's entire land mass and the country's wildlife is among the richest and most diverse in Europe. However, land use reform and changes in farming practices are threatening natural habitats and may irreversibly destroy presently rich resources.

VI. Urbanization

The last major area of environmental concern is the level of urbanization throughout Latvia. Although rural areas still manifest high environmental quality, conditions in large cities (Riga, Liepaja, Daugavpils) are rather poor. The trend toward urbanization (defined as the concentration of industry and population) has led 70% of the population to live in towns, including 34% in Riga and its suburbs. Industrial towns produce large amounts of air pollution, waste water and solid waste. This in turn has caused deteriorating health and environmental conditions, both within and beyond these areas. Urban environmental conditions are categorized as "degraded" if they were established through a one-sided (solely quantitative) means of solving the housing problem during the time of hyperindustrialization and mass-construction. This led to an inadequate environment for human beings: an impersonal environment with low quality construction and infrastructure. There are too many areas of this type in Riga and its surrounding areas. Attempts should be made to humanize housing conditions in 15 housing districts or two thirds of the human settlements built over the past 50 years. These conditions are significantly damaging the population's attitudes and outlooks, creating additional social and environmental problems.

VII. Environmental Policy Development

The chief national documents governing environmental protection are the National Environmental Policy Plan for Latvia (NEPP), which is a long-term strategy, and the National Environmental Action Programme (NEAP), which is intended to guide short-term actions.

NEPP was completed at the end of 1994 and approved by the Cabinet of Ministers on April 25, 1995; NEAP is due to be completed in Autumn 1995.

NEPP sets the major development directions for the nation's environmental protection system. This legislation represents the formulation of environmental policy goals for the next 20-30 years, listing principles on which the policy is based and instruments for its implementation. NEPP also is the basis for discussion and analysis of priority problems. Priorities have been set at different levels according to the effects of time and place. NEPP also demonstrates Latvia's commitment to formulating serious environmental policy and proves that the nation respects its obligations under the environmental treaties its government has signed, a commitment that should reassure investors.

The formulation of clear policy goals is a necessary prerequisite to the drafting of environmental protection policies. NEPP is intended to set long-term policy goals and coordinate planned activities with corresponding basic policy principles to guarantee subsequent policy implementation.

VIII. Policy Goals

The main policy goals are:

A. To achieve significant improvement in environmental quality in areas that display increased risk for human health and the stability of ecosystems while preventing deterioration in environmental quality throughout the rest of the area;

B. To retain the existing level of biodiversity and landscape quality that are characteristic of Latvia;

C. To achieve sustainable use of natural resources;

D. To integrate environmental protection policy into all branches and areas of life (into the national economy as a whole and in branch strategic plans; in legislation and, finally, in the public consciousness), thus creating a basis of sustainable development of the society and the state.

IX. Basic Principles of Policy

General principles for environmental protection policy include:

A. Retention of balance between the environment and the national economy - National economic development should take into account the capacities of ecosystems. Resources should be used in closed cycles; energy and material savings should be maximized; the quality of goods and services should be considered more important than quantity.

B. Pollution abatement at its source - Prevention of pollution is usually less expensive and more efficient in the long run than end-of-pipe abatement and clean-up.

C. The principle of individual responsibility - Everyone, individuals as well as officials, will take individual responsibility for the environment in which they live and change their behavior accordingly.

D. Environmental protection activities are to be based on historic experience, are nationally acceptable and suitable for local implementation - During the last 50 years in Latvia, decisions that were unacceptable to society as a whole were taken and subsequent activities carried out. This is inadmissible in the future.

E. The principle of publicity - Everyone has the right to be informed about the environmental situation and take part in the formulation of decisions that may have an impact on the environment.

F. An integrated approach to solving problems - It is necessary to choose strategies that solve several problems at once and don't merely shift problems from one place to another.

G. The principle of decentralization - The national government should intervene only in cases when a lower level administration cannot solve a specific problem, or when the desired efficiency can only be achieved with the help of higher-level administration.

H. "The polluter pays" principle - The prices of goods and services should reflect their overall costs of production, including the cost of any related environmental degradation. It is also a polluter's duty to abate or decrease pollution and to cover all costs associated with it.

I. The "precautionary principle" - If possible, the solution of environmental problems should already have started before complete scientific evidence of its causes has been received (the main principle in preventive environmental protection).

J. "From cradle-to-grave" principle - The trail of hazardous substances should be recorded from their production to the moment of their final disposal (final disposal - the method of neutralization applied to each type of waste: incineration, biodegradation, dumping, etc.)

K. The use of the best available technology and application of the best, most practicable methods - Dangers to the environment should be prevented by modification of alternating technologies - development and introduction of environmentally-friendly technologies.

L. The substitution principle - Wherever possible, substances and processes that are not environmentally-friendly should be substituted with those that are.

Individually, these principles apply specifically to Latvia; however, most of them (precautionary principle, principle of best available technology, substitution principle or polluter pays*)* are widely accepted all over the world and determine environmental protection policy for other European countries to a large extent as well.

The NEPP will serve as a general policy document; however, to solve problems, short term, specific actions are needed. For this reason, a National Environmental Action Program (NEAP) is being developed . The program will contain two parts: 1) a short-term action program (1-2 years); 2) a long-term action program. Discussions and planning for NEAP commenced in Autumn 1994.

X. Environmental Policy

The Ministry of Environmental Protection and Regional Development's Projects Coordination Department has a Projects Coordination Division that manages the environmental protection projects which include identification of problems (hot spots), the setting of priorities, financing, selection of executors, and supervision of implementation, follow-up, and analysis of project results. The Projects Department is committed to setting priorities and identifying problems in accordance with NEPP guidelines.

The Latvian government has set the national investment priorities for different sectors of the economy. These investment priorities are discussed in the Public Investment Program which places environmental investments third in priority, after energy and transportation. Other sectors take environmental issues into account as well. The most important environmental priorities in the energy sector are on energy saving and local fuel use. In the communal services sector, top priority is given to water treatment facilities, increasing the processing capacities of overloaded wastewater treatment plants and waste management; the latter through improvements in waste dump conditions to prevent ground water contamination. It is clear, however, that many activities, such as tourism, energy, transportation, construction and conservation of biodiversity and protected areas should be supported, not solely by public investments, but through private investments as well. We hope that legal and economic systems will develop in such a way as to encourage this process.

XI. Investment Principles and Criteria

The major principles behind the financing of environmental projects are closely lined to the government's policy goals. The principles on which project fundraising and execution are based are:

A. Resource mobilization and efforts to obtain foreign assistance;

B. Obtaining the loans from western donors with a lower interest rate;

C. Application of cost-benefit and cost-efficiency analysis;

D. Adopt a complex approach to problems, considering all of the options and potential consequences for overall area development;

E. Prioritize problems, objects, and territories according to their existing or potential impact on human health;

The following criteria are considered to be of primary importance:

F. Every project should have the funding and enough information to conduct an Environmental Impact Assessment;

G. Financial assistance my be offered in the form of loans or credits; more specific support, such as grants, are also acceptable;

H. Financial assistance should never aggravate state budget deficits;

I. The freedom from the Latvian side to respond to *ad hoc* circumstances implies that the allocation of loans and grants can be earmarked to solve problems of a very serious nature without prior admission or agreement on the part of the donors.

XII. Examples of Successful Projects

The "Liepāja Environmental Project", developed with assistance from the World Bank, will cost approximately $21 million. The project has been co-financed by the Nordic Environment Finance Corporation (NEFCO), the governments of Sweden, Finland and Denmark, EU PHARE, the Latvian government and the Municipality of Liepaja.

The project, is being administered by the Ministry of Environmental Protection and Regional Development's Project Department and has two main components:

A. a water and wastewater improvement component (WWIC) which consists of:

1. the rehabilitation and expansion of the Liepaja water and wastewater system, including equipment, works and engineering services;
2. training and other institutional strengthening (by "twinning" with a water utility in Sweden, for example) to help establish an autonomous and financially independent water and wastewater system in Liepaja;

B. An environmental management component (EMC) consisting of:

1. the development and implementation of comprehensive management plans for two selected coastal areas (Lake Jurkalne and Lake Pape);
2. the development of an integrated coastal zone management plan (ICZM) for the entire west coast of Latvia;
3. the development of eco-tourism along the west coast of Latvia.

By the end of April 1995, conditions were as follows:

C. The WWIC Project Implementation Units had been working for more than six months to establish mechanisms and prepare appropriate tender and contract document to conduct the project. Several tenders have already been offered to international countries and contract negotiations are underway. Design work was expected to start in May; several civil works were scheduled to begin in July.

D. The World Wildlife Fund is studying the comprehensive management plans for Jurkalne and Lake Pape. The Latvian team was scheduled to present its first report to the Danish head office by 1 May.

E. Work has not yet begun on the ICZM and eco-tourism components; the Ministry is still exploring various options.

The Ministry of Environmental Protection and Regional Development has assigned highest priority to the Daugavpils Water Management Project, in compliance with the policy principles declared in the National Environmental Policy Plan.

The Ministry and local authorities are giving high priority to improving water supply services and waste water treatment facilities. In 1992 the HELCOM Joint Comprehensive Baltic Sea Action Programme identified Daugavpils as an internationally important hot spot. Daugavpils is located on the Daugava River which starts in Belarus and flows through Latvia. The fact that the city of Riga, which is located on the estuary of the Daugava River and draws most of its water supply from the Daugava River, illustrates the importance of actions to improve existing conditions in Daugavpils.

The Daugavpils Water and Waste Water Project began in 1994. A feasibility study financed by EU PHARE is currently being carried out for the project which is being closely supervised by the World Bank. This project is part of the Municipal Services Development Project which will be initiated in 1996; therefore, the investment portion of the Daugavpils project will begin then as well.

THE ENVIRONMENT AND THE MILITARY

I. Environmental issues and Latvia's newly - formed National Defence Forces

The basic tasks of the newly - formed National Armed Forces (NAF) are to maintain the peace, security, and stability of the Latvian state and its population and to eliminate any (not only a military) threat.

The Concept of the Defence System of Latvia lists the following major responsibilities of the National Defence Forces:

A. To safeguard and defend the state's frontiers;

B. To provide territorial defence;

C. To function as an immediate reaction force in emergency situations.

The NAF consists of Ground Forces, Border Guards, the Air Force and Naval Forces. The Ground Force, which consists of regular, territorial and support troops, is the dominant force. The NAF also has large units of volunteers: the Territorial Forces, which are manned and guided by a small number of professional officers. Various units are assigned specific roles; however, they can perform many joint assignments in collaboration with local authorities in emergency situations such as ecological disasters.

The Air Force's primary mission covers control and security of air borders, ground force support and aerial reconnaissance. In peacetime, the Naval Forces guard territorial waters and coastlines. During crisis situations they work with other NAF forces to prevent sea attacks and may participate in ground operations during emergencies.

The Territorial Forces defend specific regions, facilities or residential areas, maintain public order and, during emergencies, assist Interior Ministry forces to guard state legislative and executive institutions, mass media facilities, communication, energy and other important economic and military state facilities. The Territorial Forces help border guards to maintain the legislative regime along the country's borders and to avert and respond to accidents and disasters and in liquidation of their consequences.

Latvia places great importance on military cooperation with Estonia and Lithuania, not only as a means of improving defence capabilities, but as an opportunity to demonstrate our common interests and willingness to cooperate to solve serious problems. For this reason, we greatly appreciate the formation of the UN Baltic Peacekeeping Battalion (BaltBat).

The Nordic and Baltic states' defence ministers have signed a memorandum of understanding that pledges cooperation in the development of the Baltic Battalion. The Battalion receives language training, technical equipment and basic infantry instruction from NATO countries. In September 1994, British instructors began offering language classes to Latvian BaltBat troops who are also receiving military training and specialized instruction at Adazi .

The NAF's weak spot is in its lack of armaments and military training; shortfalls caused by the financial restrictions the state has imposed on its armed forces during this time of economic change. The Ground Forces lack sufficient weapons and are currently equipped only with light arms such as AK assault rifles, carbines and pistols. No significant numbers of heavy weapons have been issued.

The Naval Forces have a relatively large number of ships (many provided by Germany and Sweden) but they are unarmed. The Navy's patrol ships need at least one small caliber automatic machine gun per vessel to combat smuggling activities. The Air Force has no armed aircraft and require a number of cargo planes and approximately 12 helicopters to conduct search and rescue operations.

In view of its limited resources, Latvia must be economical in its efforts to instruct, equip, and supply its troops. When the country's financial condition improves, the NAF will be better armed and its number of personnel increased.

The basic principles for formation of the NAF are as follows:

A. Its defence structures, armament and equipment should be compatible with those of NATO forces;

B. Its forces' accepted standards and adherence to environmental protection matters should be compatible with those for armed forces in democratic states;

C. There should be public control over the Defence Ministry and the NAF;

D. The Defence Ministry should cooperate with the Ministry of Environmental Protection and Regional Development in addressing environmental issues..

The NAF occupies training bases established by the former Soviet Army. The NAF's troop deployments and training bases do not pose any environmental burdens or threats. The necessary review of conditions and sanitation procedures was carried out during the Latvian take-over of the former Soviet facilities. Specific examples will be reviewed in the context of descriptions of environmental problems the current forces inherited from the Soviet Army.

For example, the NAF's basic training center occupies the former Soviet Army ground forces' training grounds in Adazi. The NAF's infantry and the Baltic Battalion forces train at this base. The Adazi training grounds and the training activities conducted here, conform to NATO standards, both militarily and environmentally. In the future, ground forces training for all three of the Baltic states may be conducted at this facility. If and when this occurs, strict environmental protection standards will be enforced.

The Latvian Air Force, which is currently being established, is based primarily in the former Soviet military airfield of Lielvarde. A detailed report on "The Contaminated Military Airfield Lielvarde Environmental Impact Assessment" was presented in the CCMS pilot study meeting in Garmisch, Germany.

The Latvian Navy is located in Liepāja and Bolderāja, in former Soviet naval military bases. These bases contain high levels of environmental pollution which will complicate efforts to convert unused portions for peaceful purposes. These problems will be reviewed in detail in a later discussion of the problems Latvia has inherited from the former USSR's Army.

II. Withdrawal of the Armed Forces of the Russian Federation from the Territory of Latvia

On August 31, 1994, all Russian forces withdrew from Latvia in accordance with the "Agreement between the Republic of Latvia and the Russian Federation on the Conditions, Terms, and Order of a Complete Withdrawal of the Armed Forces of the Russian Federation from the Territory of the Republic of Latvia and Their Legal Status During the Period of Withdrawal" signed on April 30, 1994.

One of Latvia's specific problems is the ballistic missile early warning radar station in Skrunda in the Kuldīga district. In accordance with the "Agreement between the Republic of Latvia and the Russian Federation on the Legal Status of the Skrunda Radar Station During Its Temporary Functioning and Dismantling", which is an integral part of the above-mentioned agreement, this radar will continue to function for up to four years (until August 31, 1998). Dismantlement of the radar system must start on September 1, 1998 and be completed no later than February 28, 2000. Latvia views the continued existence of this system as, not only an environmental problem, but a social and psychological one as well.

Latvia now controls the Large-Phased Array Radar (LPAR) site in the Skrunda radar base. On August 12, 19994, the United States government and the Government of Latvia concluded agreements concerning the provision of U.S. assistance in dismantling this unfinished facility. On September 30, 1994, the U.S. Army Corps of Engineers awarded a contract in the amount of $6.2 million (which it will administer on behalf of the U.S. Department of Defense) to the firm, Controlled Demolition Inc. (CD) of Phoetic, Maryland. The contract performance period is 486 calendar days.

The site has two main structures: a 19-story receiver building and an eight-story transmitter building. Examination revealed that, although the structures contain a large amount of steel and other components, it would not be cost-effective to disassemble them; therefore, dismantlement will be performed by implosion and mechanical demolition, a process that has already begun. On May 4, 1995, the fifth anniversary of the Latvian Redeclaration of Independence, the radar receiver building was destroyed in a few seconds. Latvia thanked the United States and other western countries for their support; within that context, Latvia's Foreign Minister, V. Birkavs, said, "Latvia is bidding another farewell to 50 years of unwilling existence under Soviet rule and to one of the symbols of the consequences of World War II."

III. Environmental Damage and Problems Caused by the Former Soviet Army in Latvia

The former Soviet Army's activities, installations and military bases, and its confiscation of land from Latvian citizens for military use, caused serious damage to Latvia's environment and natural resources. The conversion of these abandoned sites and installations to civilian use, have high economic, environmental, health and political priority.

The territories occupied by the Soviet Army, and the location of its bases in Latvia, were chosen not only for the country's advantageous geographical location but because it is the strategic center of the Baltic region. The USSR's Baltic Military District, later, the Russian Northwest Military Group's army headquarters, Air Force headquarters and border guard headquarters were located in Riga. The reserve command centers and training areas or grounds for these headquarters were also located in this region. Large fuel depots, chemical and chemical warfare depots, munitions, and military-technical support supply centers were located in Latvia to ensure the availability of centralized supplies for the entire Baltic Military District. The region also contained large military technical repair depots. The military naval bases were located in Riga and Liepaja. According to our data, Latvia contained former Soviet Army military units and bases of differing scales and purposes, which occupied approximately 100,000 hectares or 1.5% of Latvia's territory.

Latvia's major task is to make the proper decisions concerning the future disposition of former Soviet Army areas and installations. from the standpoint of environmental protection, this task calls for:

A. An inventory of military sites;

B. An evaluation of these sites' environmental status and assessments of the risks to the environment and to public health these sites contain and of existing environmental damage;

C. A listing of priorities and identification of remediation measures.

Studies on environmental pollution caused by the Russian Army were initiated in 1992; two military territories (Suzi and the Spilve fuel depot) were investigated in detail. Primary

observations (without sampling) and an initial assessment of former Russian army territories have been completed. Three hundred military sites, occupying approximately 96,000 hectares were studied. Fifty-three of these sites, an area of about 57,500 hectares, have not been investigated in enough detail and warrant further study. The Ministry of Environmental Protection and Regional Development of the Republic of Latvia conducted these investigations. It should be noted that Latvia lacks experience in conducting such studies, lacks many of the financial and technological resources to do so, and relies heavily on other countries' assistance.

The most serious environmental and economic damage was caused by the former Soviet Army's military firing grounds, airfield, rocket bases, filling stations, fuel depots and naval ports. The Russian Army had firing grounds for every kind of weapon in Latvian territory. Many of the buildings in these areas are not suitable for conversion to civilian use. More information about environmental problems stemming from defense-related installations and activities of the former Soviet Army, and later, the Russian Army in Latvia will be presented at various NATO/CCMS Pilot Study meetings.

Overall, the former Soviet Army-caused environmental problems Latvia is dealing with are similar to those found in many post-socialist Eastern European countries. Only the order of priorities it is establishing to deal with them differs. The problems posed by restoration of the military harbour in Liepaja for civilian use offers one characteristic example of the environmental challenges Latvia faces.

IV. Former Military Harbour in Liepāja

Due to its geographical location near Western Europe, Liepaja and the Liepaja region was one of the most militarized areas in Latvia, housing one of the largest USSR, and later Russian, Baltic Fleet naval bases in the Baltic Sea.

The presence of the military harbour in Liepāja has caused serious and virtually inseparable socio-economic and environmental problems in connection with the port and the city. The Port of Liepaja was a commercial venture port until the end of World War II. From 1945 - 1957 it operated as a closed Soviet Union Naval base. From 1957 - 1966 a portion of the facility was put to commercial use again. In 1966 the port was liquidated and its territory

passed to the Soviet Union's Navy. The city became a semi-closed border area and a major portion of the port was dedicated exclusively to military purposes. The Russian Naval ships remained in Liepaja until June 1, 1994, posing a significant hindrance to the operation and development of the commercial port of Liepaja.

Together, the military harbour in Liepaja and the Karaosta (military port - northern part of the city; see map) comprise one-third of the city's total territory (approx. ~1,828 hectares). The military naval base filled both facilities and contained a large number of military units containing military support units, living quarters and necessary service facilities, to support a variety of activities.

The city contained 128 different military structures including barracks, workshops, warehouses, canteens, saunas, boiler houses, garages, hydrographic service equipment and civil personnel, etc. to support a total (including officers) of 5,600 military personnel. After the withdrawal of Soviet troops approximately 20,000 inhabitants of Karaosta (one-fifth of the population in the city of Liepaja) lost their military-related jobs. The critically poor housing conditions (including partially destroyed and vandalized homes) and large number of unusable buildings left by the Russian Army have created a feeling of isolation and despair among the local population. This perception has been intensified by many citizens' separation from the central part of the city due to an underdeveloped transportation network (to which no enhancements had been needed previously) and the critical condition of the roads.

The process of reviewing and correcting comprehensive plans for the city of Liepaja's development will be based on the need to deal with the conditions described above and to re-develop the Port of Liepaja and Karaosta areas to function as economically activate entities. This plan is only in its initial stages but speedy implementation is vital.

V. Liepāja Harbour Environmental Problems

Both the port and city of Liepaja suffer from a "heritage" of environmental problems; chief among them, the mechanically and chemically polluted harbour water basin. Large quantities of metal fragments, ropes of wire, cables, domestic waste and other contaminants are being removed from the quays which are being restored and reconstructed. Some port areas are contaminated with heavy metals, oil and biological products in amounts that are several times higher than permissible norms. Submerged weapons and ammunition have also been found in several areas.

The Liepāja Harbour, which is well protected by jetties and breakwaters, contained many of the Russian Baltic Fleet's surface vessels and submarines until the end of the 1960s. Among the vessels docked there were submarines, anti-submarine ships, rocket ships, torpedo cutters, mine trawlers and many other specialized ships and support vessels; more than 200-300 in all. The ships were equipped with modern military equipment including nuclear tipped rockets; however, none contained nuclear-powered engines. These ships were mainly diesel-driven and, therefore, did not cause much pollution.

After the military naval base at Liepāja was enlarged and reconstructed, the stationed group of ships contained approximately 15 black oil- fueled ships which became the main harbour pollutant.

No attention was paid to environmental protection measures while the naval base was in operation. Virtually all of the wastes were poured or dumped into the harbour water basin. Since none of the military ships had bilgewater collection systems this waste and oil lubricants from the ships' power plants were discharged into the harbour waters along with other oil products, unfiltered, polluted coolant waters, kitchen waste waters and toilet waters.

VI. Preliminary Investigations

The only preliminary investigations of harbour water and bottom sediment pollution were conducted two years ago by a Latvian company, "Balt-Ost-Geo." The investigations which were quite general (not detailed) showed that the harbour bottom, especially the eastern part, is heavily polluted with oil products and heavy metals. Natural water movement is causing these

substances to leach from the settled sediment and pollute the water. (See map showing the degree of pollution recorded).

These investigations revealed large concentrations of arsenic and quicksilver and the presence of oil products. In accordance with standards set by the London Dumping Convention and National and Interim Regulations for marine and environmental control in Latvian ports, wrack removal and dumping areas, one third of these pollutants cannot be dumped and must be utilized. The rest may be deposited in the Baltic Sea without any damage to the environment (see map).

The following legend shows the level of bottom deposit pollution listed:

A - within limit

B - low pollution; dumping permitted

sum total for oil products 200-1,500 mkg/g

Pb+Cu+ZE 100-200 mkg/g

C - polluted, dumping permitted with future restrictions

sum total for oil products, 1,900-8,300 mkg/g

Pb+Cu+Zn >200 mkg/g; Zn>60mkg/g

Pb+Cu+Zn >1,000 mkg/g for Military Port Canal

D - very high pollution level, dumping prohibited

sum total for oil products > 8,300 mkg/g

Pb+Cu+Zn >200 mkg/g for Winter Harbour

Pb+CU+Zn >400 mkg/g for Commercial Canal

Pb+Cu+Zn >700 mkg/g for Military Port Canal

"Balt-Ost-Geo" investigation results show the thickness of the bottom deposit in the harbor basin ranging from 0.2 - 0.3 m. The highest concentration of pollution was in oil products (up to 69.6 mg/g). Of this, 60-90% contained diesel oil remnants with very low (0.5-7.7%) asphaltene concentration which is typical of fresh, unevenly spread pollution bottom deposits. These deposits contain a nitrogen and phosphorus combination, ammonium remnants, lead, copper and zinc. This concentration reached the following levels in the Commercial Canal

and Winter Harbour, respectively: lead: 73 mkg/g and 92 mkg/g; copper: 85 mkg/g and 50 mkg/g; zinc to 260mkg/g and to 380 mkg/g. In addition, a large pile of old, destroyed ships and submarine batteries (covering an area of 3000m^2) sits on the back of the Military Port Canal. Operating the port as a military harbour has caused serious water and bottom sediment pollution which has affected the entire port's water basin; even the Baltic Sea may be affected.

VII. Sunken ships

The Military Port Canal has the highest number of sunken ships and the highest level of chemical pollution. The last ships in the Russian naval fleet departed the Port of Liepaja on July 1, 1994, leaving behind a number of sunken or partly sunken ships and submarines in several parts of the harbour.

According to data provided by the Russian Naval authorities, 37 vessels remain weighing 38,099 tons. Nine ships are still afloat (total tonnage 11,459); eight are partially sunk (12,168 tons); and 20 are fully sunk (14,472 tons). Portions of these ships are impeding quay operations and traffic in the harbour. Some are causing substantial pollution due to constant leakage of remaining oil products and other contaminants.

Most of the ships that were functional but deemed to have outlived their useful lives were sunk in 1992-93, probably because anticipation of the fleet's departure led to reduced ship maintenance and subsequent stripping of non-ferrous metals. The locations of most these ships are well known; most (23) are in the Military Port Canal (see map).

Before efforts to remove these vessels can be initiated, ownership must be established based on international maritime and national laws. Shipwreck ownership rights and Latvia Maritime administration procedures are codified in the Latvian Maritime Code.

VIII. Liepāja Harbour Environmental Problems in Connection with the Environmental Protection of the Baltic Sea

Almost all water pollution issues, especially those concerning coastal zones, must be dealt with in connection with those of the Baltic Sea. Latvia's interests in this field are related to the interests of neighboring countries and international organizations. With this in mind, the Latvian

government has adopted a national program called "Environmental Protection of the Baltic Sea." Finding solutions to the pollution problems caused by the former naval base in Liepaja must be one of the first issues dealt with under this program.

A consensus has been reached that a complete understanding of earlier investigations must be reached and a thorough business plan conceived, before clean-up work on the Liepaja harbour can begin. Experts have called for an environmental impact assessment to determine whether or not cleaning operations will lead to a rapid increase in the area's coastal waters; concern over possible transboundary pollution spread have been raised as well.

Liepāja is on the eastern coastline of the Baltic Sea which is partly closed body of water with a surface area of approximately 400,000 km^2 and a catchment of approximately four times this size. Water exchange between the Baltic system and oceanic waters is poor, causing introduced contaminants to accumulate within the Baltic Sea basin. Concerns about the quality of the Baltic Sea waters have been raised for many years with an emphasis on oxygen depletion, algae growth, heavy metal concentrations and the levels of trace organic contaminants.

Latvia has signed and ratified the "Convention of the Marine Environment of the Baltic Sea Area" (Helsinki Convention), which obligates the government to undertake concrete actions to reduce marine pollution caused by land-based sources and to implement a broad range of recommendations on various environmental matters identified by the Helsinki Commission (HELCOM). Latvia has actively participated in many HELCOM programs such as the Program Implementation Task Force which coordinates implementation of the Baltic Sea Joint Comprehensive Environmental Action Program (JCP). Liepaja was identified under the JCP as one of nine pollution hot-spots in Latvia and was ranked by Latvian authorities as their first priority for national and foreign investment in environmental protection for the years 1994-2000.

As a result, Liepāja has attracted the interest of international agencies; in particular the World Bank, (NEFCO), the Swedish, Finnish and Danish governments, and EU PHARE to fund "Liepaja Environment Project" programs aimed at water supply, waste water treatment and the surrounding territories near Liepaja. HELCOM JCP, the World Bank, and the Environmental Protection Section of the State Investment Program have granted this project (which is also a part of the Baltic Sea Protection Program) high-priority status. Proposed

financing for these projects consists of a mix of loan funding (from World Bank and NEFCO), bilateral grants and contributions from state and municipal budgets, and grants from the Swedish, Finnish and Danish governments and EU PHARE. The World Bank has described them as one of the "best" it has developed in conjunction with Eastern Europe.

IX. Scoping Study and Environmental Impact Assessment

The European Union has allocated some funds provided under the PHARE Regional Environmental Program for projects designed to protect the Baltic Sea. One element of the agreed-upon financing is designated for the completion of a "Scoping Study/Environmental Impact Assessment" (SS/EIA) with respect to the possible development of a commercial port facility at Liepaja Harbour. The Terms of Reference for the tender require completion of the SS/EIA to fully define the problems involved in the possible redevelopment of the harbour. The results would be contained in an "Initial Scoping Report" which would describe all essential details related to the redevelopment effort and include conclusions on the amounts of initial and continued dredging required. It should also contain a detailed design for sampling and analysis of sediments covering both contamination and biological investigations. The results from these data analyses should be made available on a computerized database. All of this information will be relevant to the development of disposal options for contaminated soil caused by initial dredging of the harbour and surrounding area.

One major aspect of any redevelopment of the Liepājā Harbour and its port facilities is the potential need for initial, and later, maintenance-driven dredging of the harbour approaches and of the harbour itself. Such dredging, which is needed to accommodate vessels of significant draft, could remobilize contaminants in the sediments of the dredged area. Any sediments removed from the canal approaches and from the harbour itself would also require disposal.

As is mentioned in the "Terms of Reference", the End Phase Report for the study should identify and discuss the various disposal options both for contaminated soils from the initial dredging and any less contaminated materials from later maintenance dredging. It should also present costs of all options and a cost-benefit matrix. The EIA for the dredging and disposal activities should be included.

This study, which was initiated in February 1995, is expected to take 12 months to complete and entails the submission of four reports. The first report, "Initial Scoping and Design of Investigations" was submitted to Ministry of Environmental Protection and Regional Development (MoE) in mid-April for comment.

X. The Assistance in Environmental Programs Within the Military Offered by Other Countries

Thanks to the Government of Germany and its Federal Ministry for Environment, Nature Conservation and Nuclear Safety, since 1992, we have had excellent cooperation from the Industrieanlagen-Betriebsesellschaft mbH (IABG) company. Latvian specialists had the opportunity to familiarize themselves with environmental problems in former Soviet military territories in Germany, participated in the applications seminar: "Data Processing Programs - ALADIN, MEMURA, MAGMA" and received copies of software.

The joint Latvian - German project "Contaminated Military Airfield Lielvārde Environmental Impact Assessment" to investigate the Lielvārde airfield using German methodology has been completed. This project — the first joint project focusing on Latvian territory formerly occupied by the Soviet Army — was conducted to identify measures needed to prevent the spread of ground water pollution. We are grateful for the experience and technical assistance (training for mine-lifters, for example), we received during this project.

Norway will help Latvia to conduct geological investigations aimed at identifying the amount of Russian Army-caused soil pollution. A joint Latvian - Norwegian project, "Investigation of Former Soviet Army Bases In Latvia and Identification of Environmental Damage and Problems" has been proposed. A key component of the project, which will be coordinated by the Norwegian Defence Research Establishment, is the transfer of appropriate philosophy, methodology and technology to Latvian researchers.

In 1994 Latvia began a three-year joint project with Canada to conduct a demonstration project to remediate rocket fuel-polluted soil in the rocket bases Taši and Barta in the Liepāja region. Preliminary analyses have been completed and appropriate soil cleaning technologies

from those used in Canada will be selected (current estimates favor the use of physico-chemical methods with biological remediation methods to be applied during the final stages).

This project also calls for training of Latvian specialists in Canada; the total amount of funding provided for the project is approximately $1 million.

Proponents of the project are:

A. Environment Canada - Emergencies Engineering Division

B. Gartner - Lee International Inc.;

C. Canadian - Latvian Community

D. Rīga Technical University.

The Latvian Ministry of Environmental Protection and Regional Development strongly supports this project.

The Latvian government has also prepared a project proposal with specialists from the United Kingdom called "Assistance to Private Farmers in the Saldus Region." The principle goal of this program is to provide development, planning and management advice to private farmers who are authorized to resume farming operations on the periphery of the former Soviet bombing range at Zvarde, thus demonstrating a positive impact on the environment and social sector in that area.

In the past, the Soviet military firing range and aviation targets covered 24,500 hectares of farm land and forests at Zvarde in the Saldus District. Mechanical and chemical pollutants such as aviation bomb splinters and undetonated bombs have defaced the terrain. Diffuse contaminants such as aircraft fuels, burning wastes and explosives have rendered the soil unusable. Undetonated bombs must be disposed of and soil samples analyzed so that remediation measures can be identified if the land is to be reclaimed for cultivation. Only through cooperation with specialists from several countries can our work be successful.

XI. Conclusions

It should be noted that environmental pollution in rural areas of Latvia is relatively low. At the same time there is a high biodiversity level. According to Indulis Emsis, State Minister of

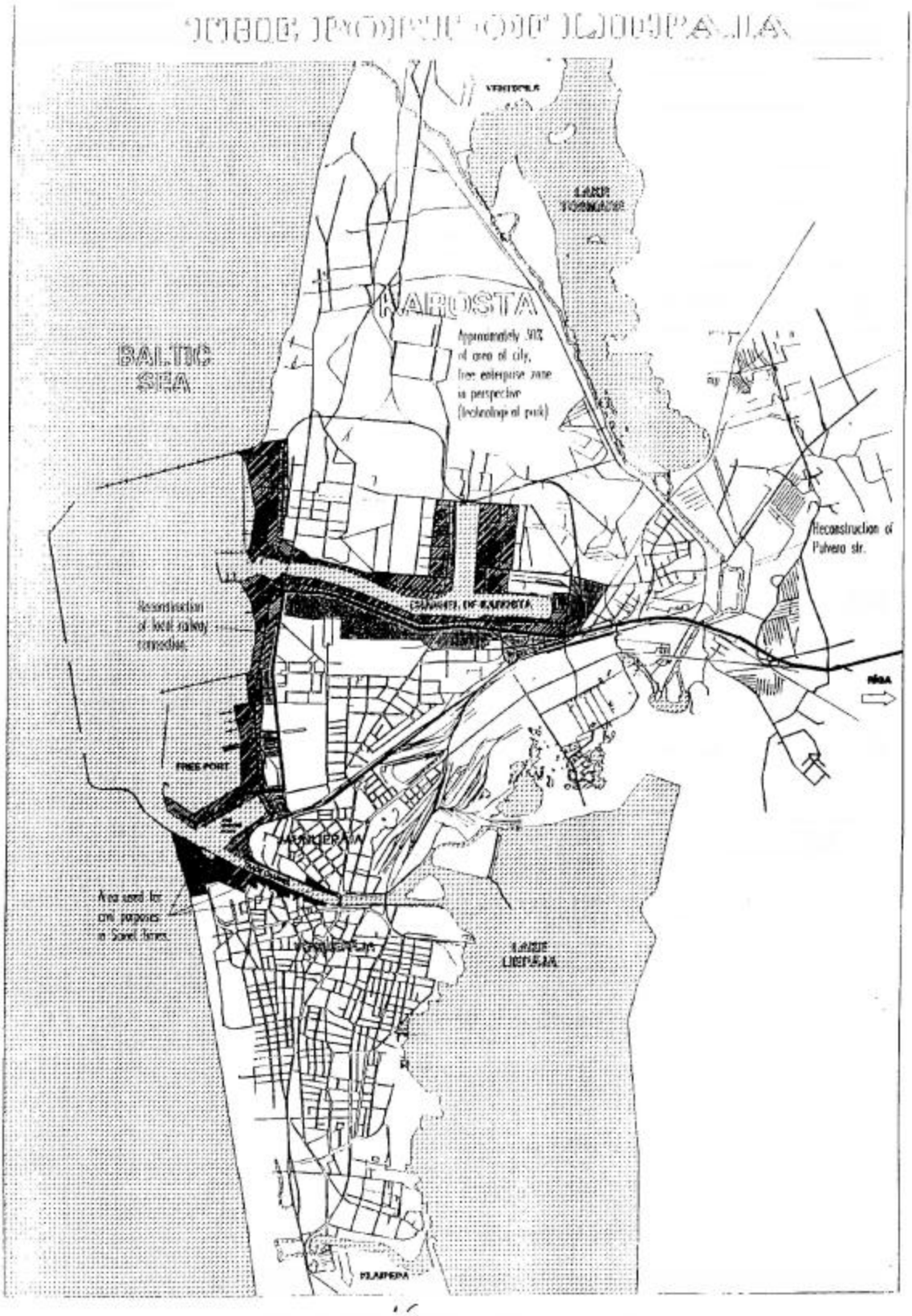
Environmental Protection of Latvia: "In the future, as Latvia develops socially and economically, the overall environmental situation will also change. Priorities will change; possible or alternative solutions to problems will change; society, businesses and ministries that deal with economic questions will need to become more involved in the solution of actual problems."

Developed countries' support and readiness to assist is already evident in Latvia. It is possible to analyze global experience and implement the most effective scenario of national environmental policy. At present, there is a unique opportunity to revitalize the national economy by applying the strategy of sustained and balanced development.

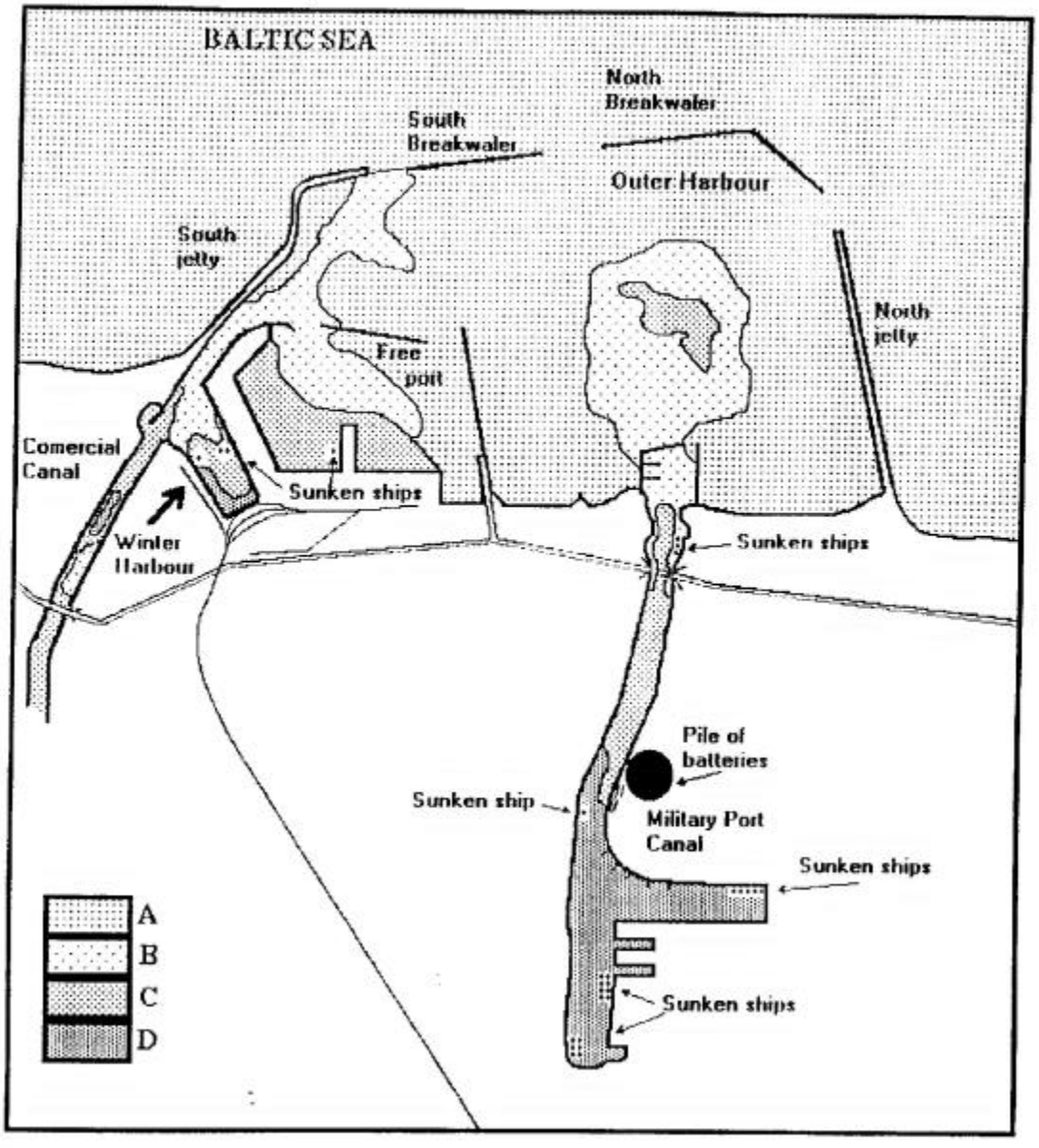
XII. Acknowledgments

This report was prepared and written in collaboration with the following colleagues from the Ministry of Environmental Protection and Regional Development: Dzidra Hadonina, Head of the Division of State Cadastres and Natural Resources; Ugis Rusmanis, Deputy State Secretary, and with the kind assistance of Ilona Tesnova, Senior Referent of the Environmental Protection Department.

LATVIA: IN BALTIC REGION


BALTIC
SEA
Approximately 30%
of area of city,
free enterprise zone
in perspective
(including oil park)
Reconstruction of
Pulvera str.
Reconstruction
of local railway
connection
FREE PORT
Area used for
civil purposes
in Soviet times
LAKE
LIELUPE
RĪGA

Liepāja Harbour pollution



APPENDIX F

LITHUANIA

By Cpt. Alvydas Kazakevicius and
1st Lt. Algimantas Kutanovas

May 1995


Lithuania
Latvia
Riga
50 km
50 miles
Baltic Sea
Mazeikiai
Zagare
Joniskis
Birzai
Salantai
Telsiai
Siauliai
Joniskelis
Daugavpils
Plunge
Kursenai
Pandelys
Palanga
Kretinga
Rietavas
Radviliskis
Panevezys
Zarasai
Klaipeda
Gargzdai
Kelme
Anyksciai
Utena
Dukstas
Silale
Kintai
Skaudvile
Raseiniai
Silute
Kedainiai
Svencioneliai
Taurage
Ukmerge
Pabrade
Pagegiai
Neman
Jurbarkas
Jonava
Neris
Kurskly Zaliv
Sovetsk
Sakiai
Kaisiadorys
Kaunas
Russia
Kazlu Ruda
Naujoji Vilnia
Kybartai
Trakai
Chernyakhovsk
Kapsukas
Vilnius
Alytus
Salcininkai
Varena
Belarus
Lazdijai
Druskininkai
Poland
56
54
22
24
26

M-9

LITHUANIA

by Cpt. Alvydas Kazakevicius and
1st Lt. Algimantas Kutanovas

Lithuania is a small state by the Baltic Sea with an area of 65 thousand square kilometers. It is larger that Switzerland by a third and is 25% larger than Denmark. It is also larger than Holland and Belgium. Lithuania is Europe's geographic center. On March 11, 1990 Lithuania left the Soviet Union, reestablished its independence and freed itself from the Soviets who had illegally annexed Lithuania in 1940 and after World War II.

On August 31, 1993 the last Russian soldier left Lithuanian territory. Up to that time 11 percent of Lithuania's territory had belonged to the Russian military which had established more than 400 military installations.

Most of the abandoned military bases were not in compliance with existing environmental protection laws. The main pollutants consisted of oil products, components of rocket fuel, radioactive materials.

U.S. environmental protection experts have visited and conducted preliminary tests at the abandoned military bases as have military personnel under the auspices of the "Mil-to-Mil" program. U.S. - European civil engineering corps representatives, members of the Canada's and Norway's National Defence Ministry and geological services, MITRE Corp. (American Center for Environment, Resources and Space), and NOTRA Environmental Services, Inc. (Ottawa, Canada) and the Environmental Protection Division of the German industrial firm IABG (Industrieanlagen-Betriebsyesellschaft, Ottobonn, Germany) offered assistance in testing.

At the request of the Environmental Protection Ministry of the Republic of Lithuania, "Krüger Consult", a Danish company, and Baltic Consultation Group", a Lithuanian company, used funds provided by the European Community program PHARE to conduct an inventory of all military objects (installations). This study make clear the immediate need for detailed testing and remediation of polluted sites.

In 1991 Lithuania's Government adopted a law on environmental protection and in 1994 the Ministry of Defence and the Ministry of Environmental Protection confirmed the need for protection of the environment in Lithuanian Military Forces. In 1994 a system of military environment protection was established and is now being developed. Ecologists are working in all military units and sub-units under the coordination of the Chief Ecologist of the General Staff. The Ministry of Environmental Protection also has a Civil Safety Department with regional sections and assistance teams.

The military ecologists' task is to establish and equip a laboratory with mobile units to perform ecological testing and for controlling environmental conditions throughout military areas. This work is currently being conducted by regional inspectors attached to the Ministry of Environmental Protection.

This unprecedented Lithuanian military environmental protection program is being established and financed by the Government. During the years 1995-2000 the most important military facilities' current ecological state and their most dangerous pollution sources will be identified. The emphasis will be on stopping current pollution, instituting future prevention, and on the preparation of in-depth study projects and remediation planning.

Although environmental protection (including military areas) is a top priority, the current, very difficult state of the economy leads us to predict that the Government's allocations for this program will be small and will not cover the cost of the most needed projects.

According to the resolution adopted by Government of the Republic of Lithuania there is provision for the use of budgetary funds and of foreign loans taken by the government or guaranteed by it for environmental protection and remediation measures, including these works at the military installations. Currently, small-scale ecological protective work is being performed in lands belonging to the Lithuanian military. Lack of funding has prevented these tasks from being performed in some areas.

The most important problems facing Lithuania's military environment protection are:

A. Pollution prevention with an emphasis on containing such contaminants as oil products and other dangerous chemical liquids. These pollutants must not contaminate drinking water sources;

B. The disposal of the most dangerous pollutants through, for example, proper rocket fuel storage, testing of the former Soviet rocket bases and disposal of rocket fuel by-products; another important example is the need to dismantle mines at former Soviet military installations;

C. Immediate, detailed testing of the Lithuanian military's facilities (installations);

D. Providing for the methodological and technical assistance in the design, outfitting, and exploitation of equipment needed to clean up sewer waters and facilities in military bases (such as vehicle wash-houses and gas stations) which do not damage the environment.

Lithuania's military ecologists have expressed concern over the current dangerous state of the military installations. They hope that assistance from foreign governments and the private sector will be forthcoming to supplement the insufficient funding the Lithuanian government is able to provide at this time.

Lithuania's pollution affects the safety of the Baltic waters, thus making our problem Europe's problem as well. With this in mind, we will be grateful for any outside assistance in arriving at effective solutions.

I. The Radioactive - Based Pollution in the Baltic Sea

The following list offers examples of radioactive-based pollution in the Baltic Sea (sources are noted parenthetically).

A. In 1960, a ship belonging to the Soviet Union dumped $100m^3$ liquid radioactive waste by-products into the Gulf of Finland near Gogland Island (Suursaar Island, Gogland Island; 45 kilometers south of the Finnish town of Kotka) on the Baltic Sea. These waste products' radioactivity reached 0.2 Ci ($0.74\text{-}10^{10}$ Bg).(1)

B. In the summer of 1971, a Soviet submarine sank in the Baltic Sea, several kilometers west of Palanga. After leaving one of the USSR navy bases the ship sailed 250 kilometers south. It is not known whether or not the submarine had a nuclear power reactor or contained nuclear military warheads. The government of the Soviet Union

ordered a search for this ship; according to unconfirmed reports, it was subsequently found and retrieved and the reason for the accident was determined: the seaman on duty had incorrectly secured the lid inside the hatch of the submarine.(2)

C. In September 1980, a Soviet nuclear submarine (the class of the ship is not known), carrying out a mission in the Baltic Sea, suffered a number of unexpected strong blows. Shortly thereafter, the submarine went out of control. An alarm was sounded on board, and several members of the crew were isolated in separate quarters where they had been on duty. Later this submarine was towed to Kaliningrad over a 36-hour period, because the journey was conducted only during hours of darkness. The isolated crew members were transported from Kaliningrad to Riga and hospitalized. According to medical experts the patients exhibited signs of exposure to low levels of radiation. It is possible that a leaking pipe from the first system's reactor caused the accident.(3)

II. Sources of information:

A. Facts and problems related to Radioactive Waste Disposal in Sea adjacent to the Territory of the Russian Federation: Materials for a Report by the Government Commission on Matters Related to Radioactive Waste Disposal at Sea created October 24, 1992/A.V. Jablokov and others. Moscow: Office of the President of the Russian Federation, 1993. pp. 71-60.

B. Detailed account by the former Soviet Lieutenant-Colonel Vasilenko, who was stationed in Kaunas.

C. Nuclear Ship Accidents: Description and Analysis by P.L. Olgard. Report of Technical University of Denmark. Denmark, 1993. p. 16-17.

It is worthy of note that, to this day, officials of the Russian Federation have failed to disclose information about the Soviet Union's submarine ship accidents and radioactive emissions from their ships into the sea waters. One example comes from Vladimir Dumik, a first rank Captain and an officer of Russia's Military Navy Office governing section who expressed

the following to Russian correspondents on April 13, 1994: "In total, in seas and waters, four submarines of the former Soviet Union sank; three were nuclear powered ships. The fourth was a diesel ship containing nuclear rockets." A report issued by Denmark's Technical University in May 1993 (3) disputes this account. The report (which is not final) describes 23 accidents in the period 1961-1990 involving Soviet nuclear submarines or ships containing nuclear weapons, including 6 sunken ships. Unfortunately, the facts presented in this technical report do not cover all the nuclear pollutants these accidents released into the Baltic; therefore, efforts to gather and analyze information should continue.

INFORMATION ON THE ECOLOGICAL STATE OF SIAULIAI (ZOKNIA) AIRFIELD AND ITS IMPACT ON THE ENVIRONMENT

To put any discussion of projects on Siauliai military airfield use into the proper context, it is advisable to consider both the state of the airfield and of the surrounding terrain, each of which may significantly limit economic development of the area.

Primary data shows that previously heavy airfield use, coupled with the peculiarities of its geographical situation and natural conditions, will cause it to negatively affect the environment and people. The consequences of these conditions are evident even now, despite the airfield's altered nature and operations. Environmental pollution and natural resource damage continue to increase. Construction and exploitation of the airfield have disturbed environmental components and affected other portions of the ecosystem.

Soil throughout the airfield (1213 ha.) has either been destroyed, mechanically damaged, or polluted. Installation of communications and building works destroyed the natural relief. There are 68 ha. of open deeply damaged areas and total area requiring recultivation is 17 millions m^3.

Oil product-based soil and water pollution is the most serious ecological problem affecting the airfield and its environs. The top level of soil and ground water are most heavily polluted at refueling and former fuel storage sites. About 362 hectares (ha.) are polluted with oil products; this includes 25 ha. in fuel storage areas. Maximum concentrations in the soil (at the depth of 1.5 m) reach 47 g/kg. In some areas, oil-based soil pollution has been observed down to a the depth of 15 m. As many as 85% of surface soil samples taken in different spots of the airfield show oil pollution with values up to 70-100 times higher than the background readings (Supplements 1-4). The volume of polluted soil is 2.5 millions m^3.

Oil products have penetrated the top level of soil and polluted the groundwater. Nineteen to 30 cm kerosene layer covers the groundwater in this area. Oil concentrations in these areas reach up to 100 grams per liter. According to preliminary estimates, up to 20,000 tons of oil products have accumulated on the water's surface. The concentration of oil products in the airfield's surface water is up to 25.5 mg/l (Supplement 5). The extent of the polluted

waters spread and intensity of its flow beyond the airfield is not known; however, it should be noted that a water and oil mixture spouts in pits near the eastern boundary of the airfield.

The area surrounding the former galvanizing process workshops is polluted with heavy metals. The soil contains unusually high amounts of Cr, Cu and Co, surface water is polluted with Ni, and ground water with Zn and Al (by 17 and 222 times exceeding maximum allowable concentrations correspondingly). (Supplement 6).

Three sources of radioactive pollution were found in the repair plant in close proximity to the airfield. Radiation in their epicenters was 2200 µR/h, 1800 µR/h and 500 µR/h correspondingly (background value - 15 µR/h). The polluted area covers 190 m^2. Laboratory analysis revealed that Ra-226 concentrations are 60180 k Bq/kg. Polluted soil was removed by Russian soldiers. In other soil samples the concentration of Pu^{239} 5 differ by 4, Pb^{214} - 10, Bi^{214} 7. $T1^{208}$ - 5, Cs^{137} - 10 times but the background values have not been exceeded.

As with other military objectives the airfield is heavily polluted with domestic and building wastes and scrap metal. Such areas cover as much as 30 ha.; 0.3 ha. of the area is covered with chemical wastes.

Also of concern is the fact that in handing over the airfield to the Lithuanian government, Russia did not provide a list of used and stored chemical substances.

The airfield is in a crucial area: within a watershed. Therefore, its pollutants endanger Siauliai city which has 150,000 inhabitants and its environs which include drinking water sources, recreational lakes and ponds, as well as shallow rivers. The airfield is located in a water-deficient zone which limits the amount and type of methods used to remove oil pollution from the soil. In addition, the Šiauliai city drinking water source (name of this source - Lopšiai) is in the adjoining territory.

The Russian army has not left any documentation of the existing — but uncompleted — water-cleaning equipment. Earlier investigations revealed that the airfield has a negative acoustic, vibrational and electromagnetic impact on the environment; this also affects the living quarters in which the noise level in rooms was 12 times higher than the maximum permissible levels. The intensity of electromagnetic field spread by former Soviet radar equipment was 2-4 times posted safety values.

The airfield environs were also polluted with burning products. Concentrations of benzapyrene in the air exceeded maximum allowable concentrations by 5 times and more.

All of these conditions could have a negative impact on the health of the population. Earlier investigations indicated a dangerously poor living environment near the airfield, leading to a proven high morbidity rate. In some cases, conditions were so severe that local residents were forced to move away from close proximity to the airfield. All of these factors must be considered while planning the purpose and intensity of the area's use.

The available scanty data allowed researchers to assess that the ecological situation in the airfield and its environs has not been investigated sufficiently. Therefore, its development and consequences cannot be predicted with any reliability. This indicates the importance of carrying more detailed investigations of the ecological status of the area. Nevertheless, preliminary results of investigations stress the importance of taking urgent measures to stop the spread of pollutants (especially oil) and to remediate soil and groundwater.

The information has been prepared by Doctor of Science R. Bauoinas from Vilnius University and a group of Lithuanian ministry of Environmental Protection experts on the ecological state of Lithuanian military sites. The materials were produced by the Lithuanian ministry of Environmental Protection, State Geological Service, Institute of Geography, Ecological Centre "Altematyva" (Vilnius) and other institutions.

Water place Zokniai airfield Supplement 1

Geological-hydrogeological section

Supplement 4 Arrangement of surface water sampling sites

Scheme of Siauliai (Zokniai) airfield

Supplement 3 Arrangement of soil sampling sites

Scheme of Siauliai (Zokniai) airfield

Supplement 2 Zokniai (Zapad) airfield

Gudeliai lake, polluted areas, heavily polluted areas, areas of potential pollution

Supplement 5 Results of surface water investigation mg/l, Sample N

Supplement 6 Results of soil investigation mg/kg, Sample N, Oil, and spectrographic method.

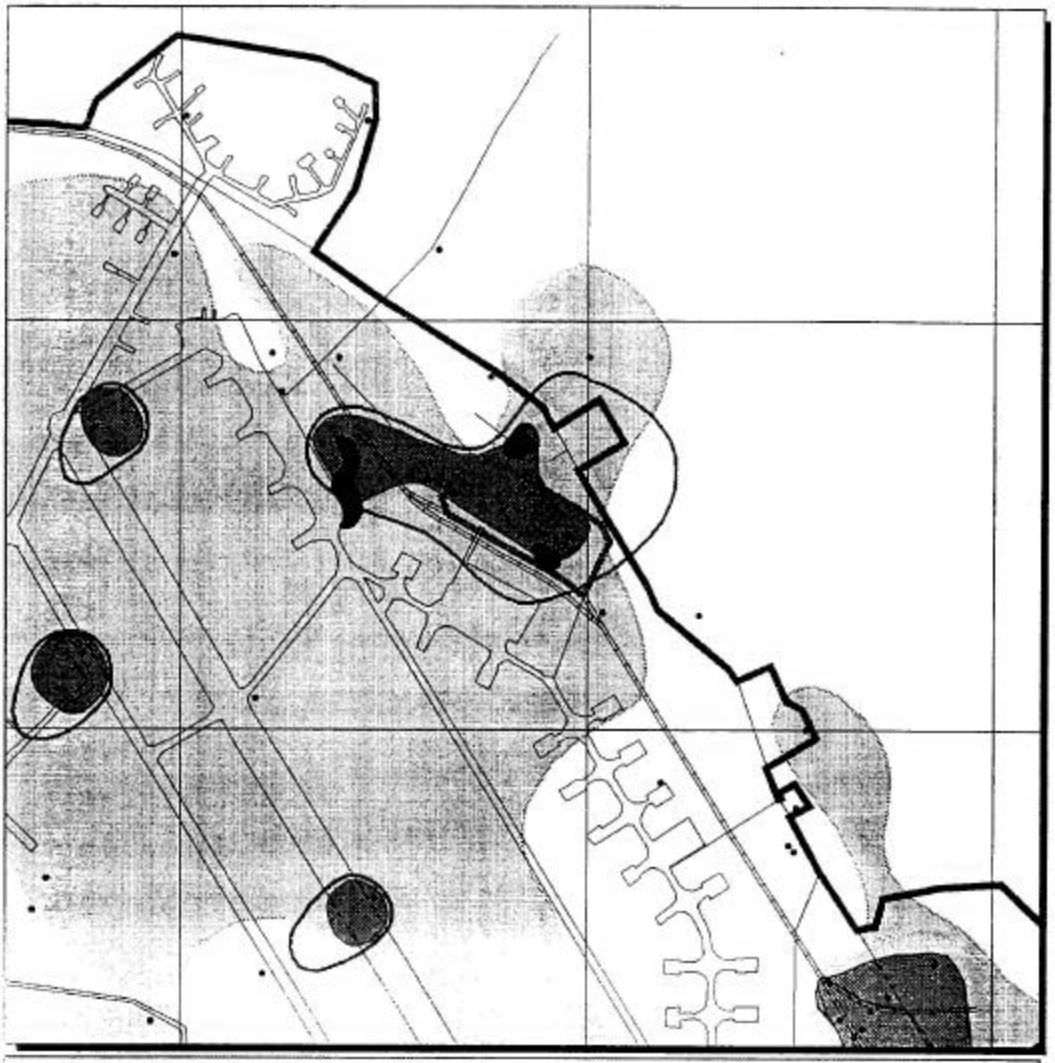
Supplement 5

Results of surface water investigation mg/l

Sample No.	Cu	Cr	Ni	Zn	Oil
1	0,03	0,05	0,22	0,02	20,4
2	0,04	0,07	0,26	0,06	6,2
3	0,04	0,03	0,30	0,08	0,39
4	0,03	0,08	0,20	0,03	7,5
5	0,04	0,10	0,25	0,03	25,5
6	0,02	0,15	0,10	0,21	0,22
7	0,02	0,05	0,20	0,02	19,8
8	0,03	0,03	0,14	0,04	0,39
9	0,01	0,08	0,20	0,03	0,31
10	0,02	0,06	0,15	0,02	0,28
11	0,03	0,03	0,39	0,04	0,28
12	0,03	0,15	0,20	0,20	0,14
13	0,02	0,08	0,20	0,46	0,54
13a	0,05	0,04	0,10	0,03	0,11
14	0,05	0,03	0,22	0,10	0,56
15	0,03	0,04	0,15	0,04	0,31
16	0,04	0,07	0,10	0,08	0,28
17	0,02	0,06	0,20	0,02	0,19
18	0,02	0,09	0,10	0,01	0,19
19	0,03	0,17	0,10	0,03	0,26
20	0,04	0,05	0,15	0,08	0,48
21	0,03	0,03	0,10	0,04	0,28
22	0,15	0,08	0,20	0,02	1,5

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

SOIL AND GROUNDWATER CONTAMINATED BY OIL AT PRESENT FUEL BASE OF ŠIAULIAI AIRBASE

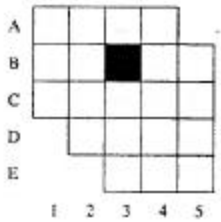


LEGEND

This map presents the layout of the present fuel base of former air force base in Zokniai near Siauliai city.
Also shown are areas of soil and groundwater contaminated by oil products and location of wells.
One grid cell covers one square kilometer area.
All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Airbase Roads and Runways
- Railways
- Limits of Present Fuel Base
- Soil Contaminated by Oil
- Soil Heavily Contaminated by Oil
- Free Phase Oil
- Groundwater Contaminated by Oil
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

SCALE 1 : 15 000

0 150 300 600 m

Flat Coordinate System, Matched with Transverse Mercator Projection
CM 24th Degree East Longitude, WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

SOIL AND GROUNDWATER CONTAMINATED BY OIL AT FORMER FUEL BASE OF ŠIAULIAI AIRBASE

LEGEND

This map presents the layout of the former fuel base of former soviet air force base in Zokniai near Siauliai city.

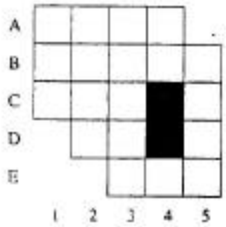
Also shown are areas of soil and Groundwater contaminated oil products and location of wells.

One grid cell covers one square kilometer area.

All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Airbase Roads and Runways
- Railways
- Former Fuel Base
- Soil Contaminated by Oil
- Soil Heavily Contaminated by Oil
- Free Phase Oil
- Groundwater Contaminated by Oil
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

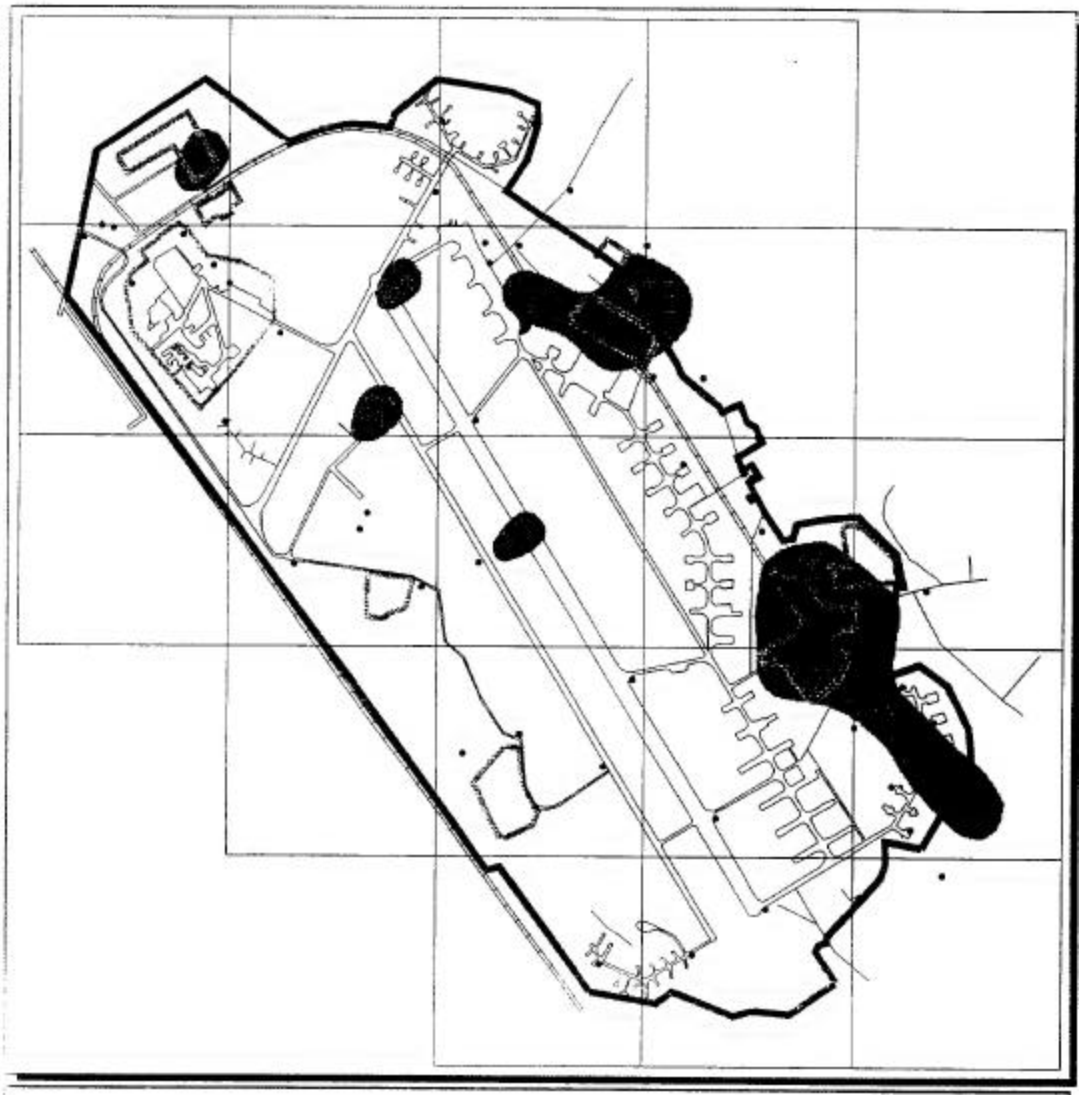
SCALE 1 : 15 000

0 150 300 600

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude, WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

GROUNDWATER CONTAMINATED BY OIL IN ŠIAULIAI AIRBASE

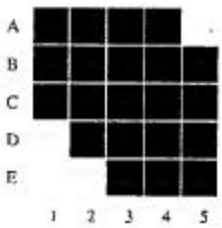


LEGEND

This map presents the layout of the territory of former soviet air force base in Zokniai near Šiauliai city.
Also are shown areas of groundwater contaminated by oil products and location of wells.
One grid cell covers one square kilometer area.
All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Facility Boundary
- Airbase Roads and
- Railways
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- Ground Water Contaminated by Oil
- Free Phase Oil

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

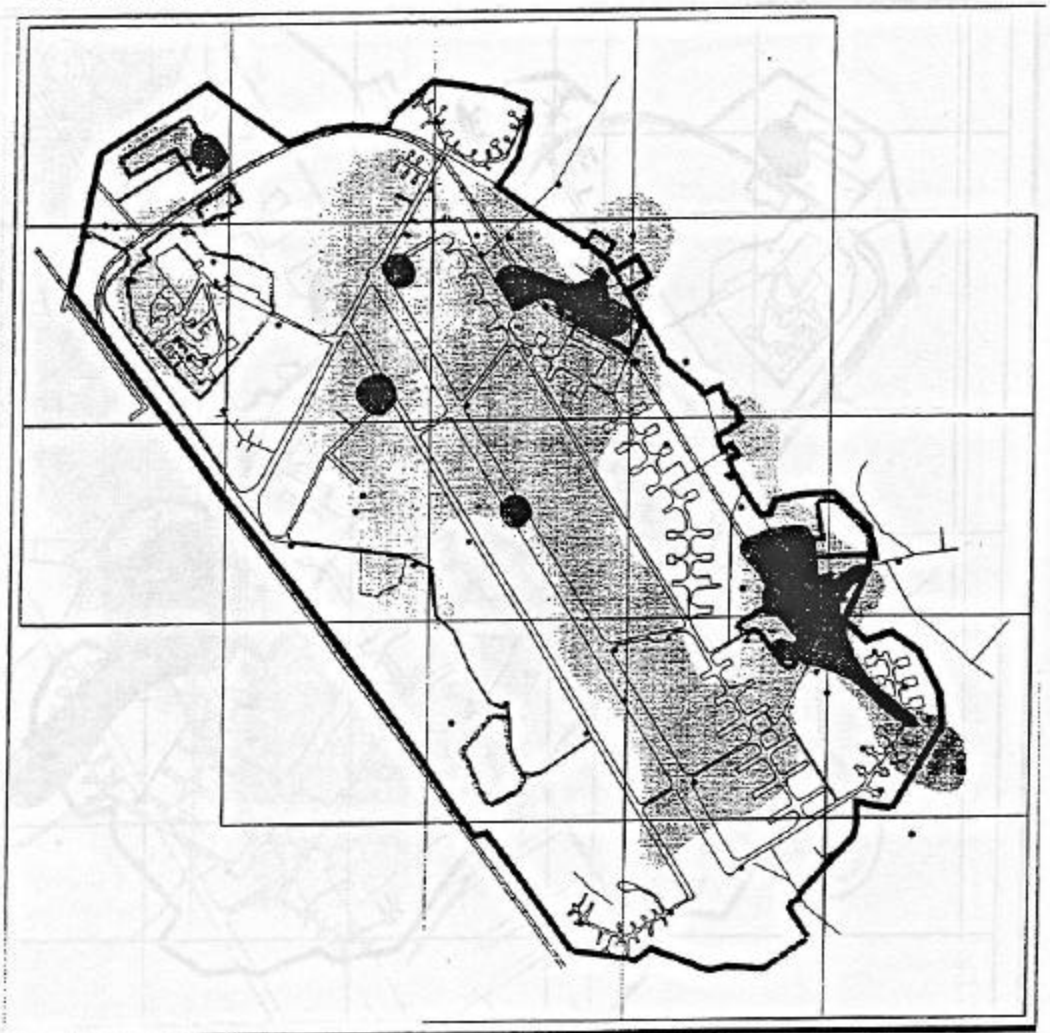
SCALE 1 : 30 000

0 300 600 1200 m

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude. WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

SOIL CONTAMINATED BY OIL AT ŠIAULIAI AIRBASE

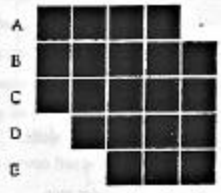


LEGEND

This map presents the layout of the territory of former soviet air force base in Zoliniai near Siauliai city.
Also shown are areas of soil contaminated by oil products location of wells.
One grid cell covers one square kilometer area.
All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Facility Boundary
- Airbase Roads and Runways
- Railways
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- Soil Contaminated by oil
- Soil Heavily Contaminated by oil (more than 50 mg/kg)

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

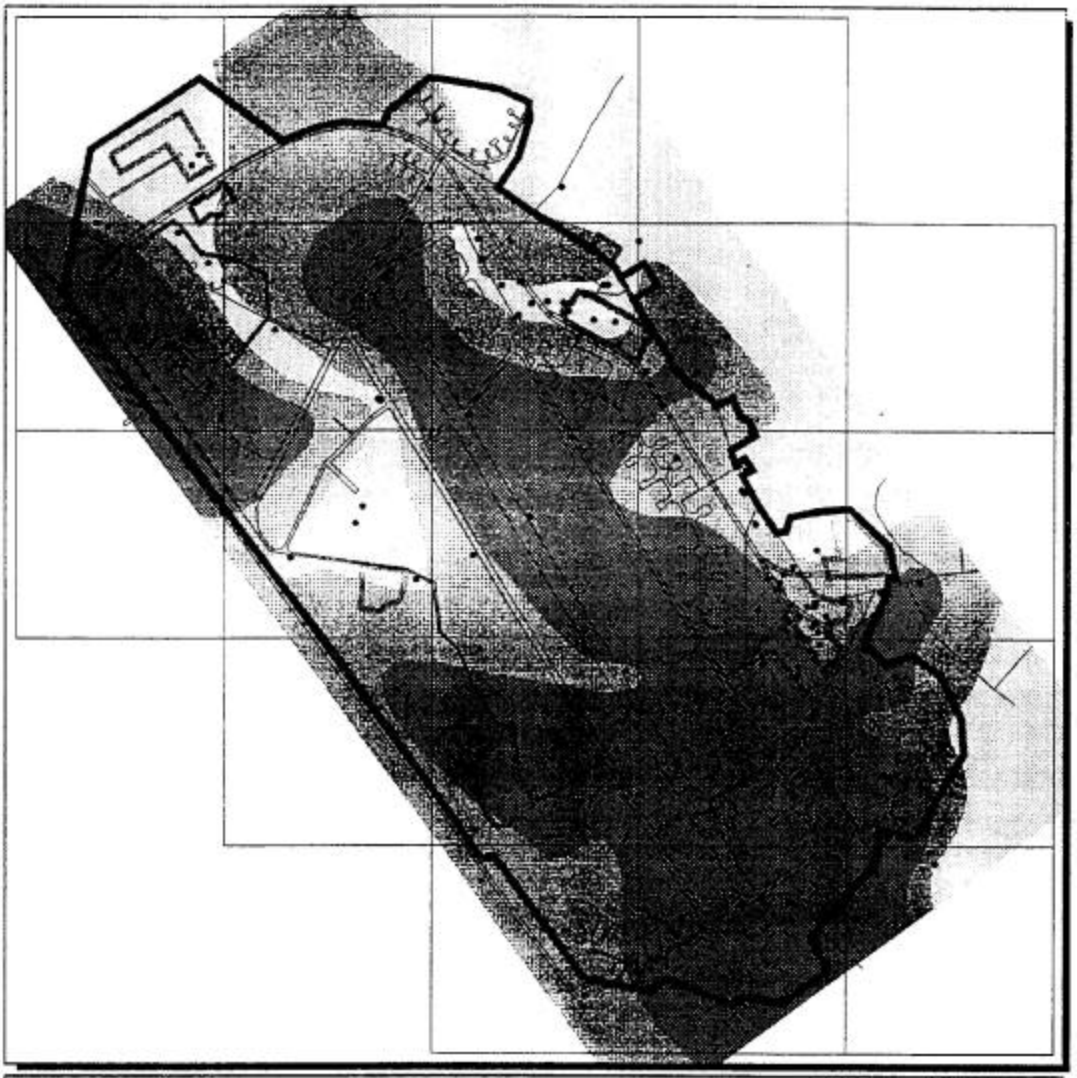
SCALE 1 : 30 000

0 300 600 1200 m

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude. WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

PERMEABILITY OF UPPER GROUNDWATER AQUIFER AT ŠIAULIAI AIRBASE

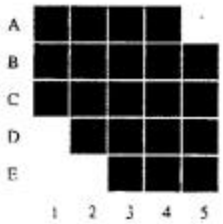


LEGEND

This map presents the layout of the territory of former soviet air force base in Zokniai near Siauliai city. Also shown are classified areas of permeability of upper aquifer. One grid cell covers one square kilometer area. All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Facility Boundary
- Airbase Roads and Runways
- Railways
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- Area With Low Permeability
- Area With Medium Permeability
- Area With High Permeability

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

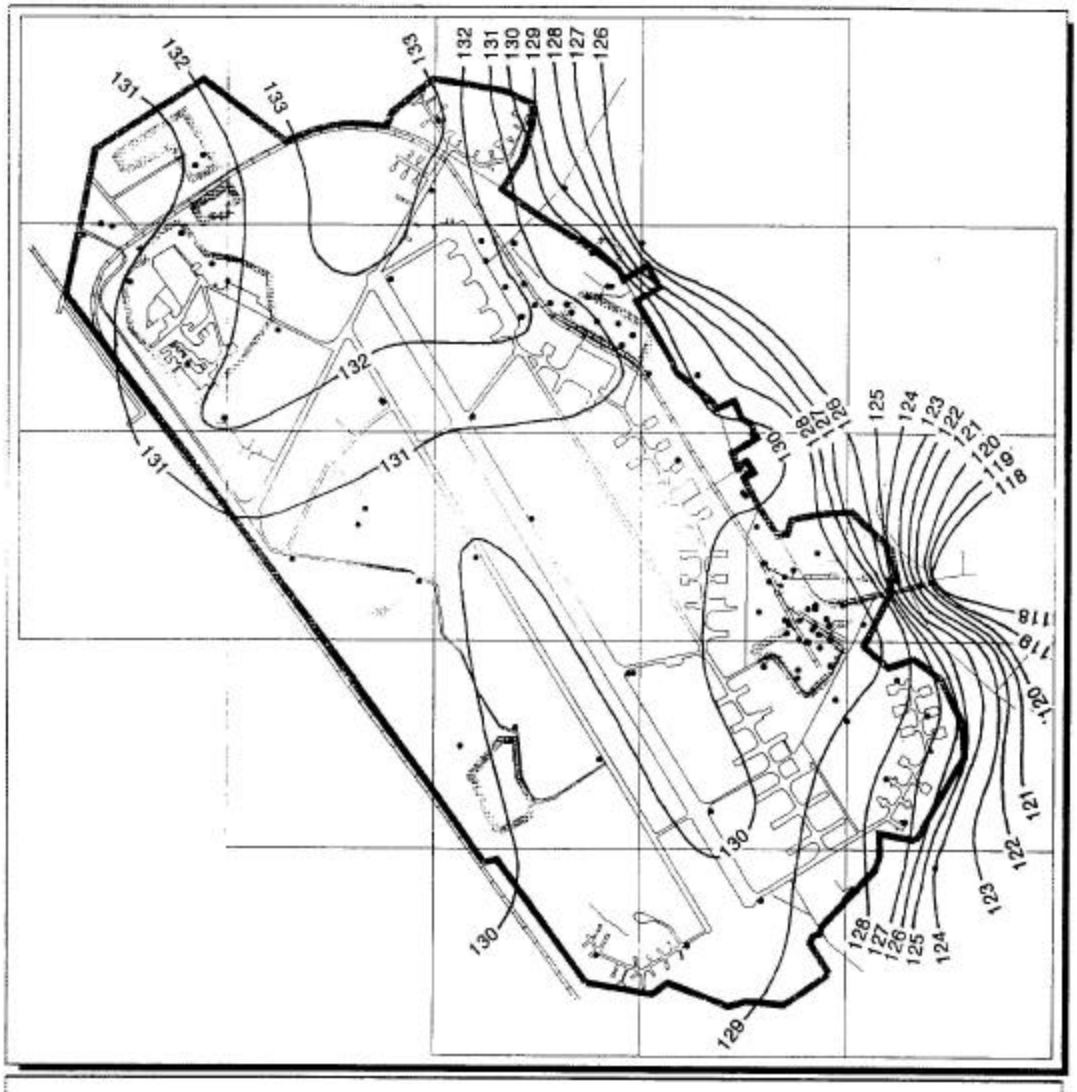
SCALE 1 : 30 000

0 300 600 1200 m

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude. WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

GROUNDWATER LEVELS AT ŠIAULIAI AIRBASE



LEGEND

This map presents the layout of the territory of former soviet air force base in Zokniai near Šiauliai city.

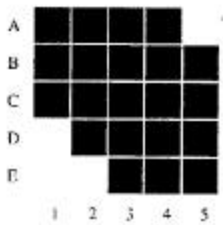
Also shown are iso-lines of groundwater levels.

One grid cell covers one square kilometer area.

All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Airbase Facility Boundary
- Airbase Roads and Runways
- Railways
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- —129— Groundwater Level Iso-line

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

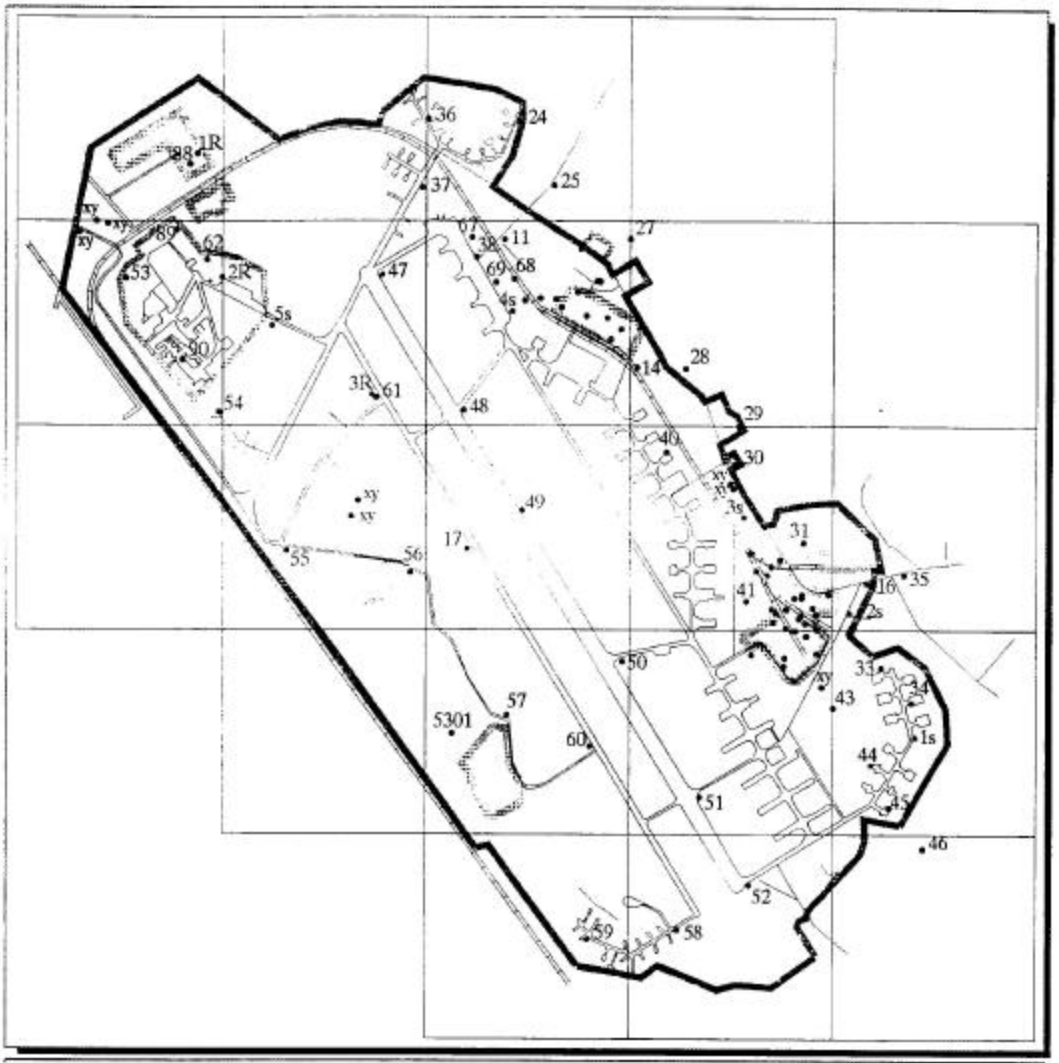
SCALE 1 : 30 000

0 300 600 1200 m

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude, WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

LAYOUT OF ŠIAULIAI AIRBASE LOCATIONS OF WELLS



LEGEND

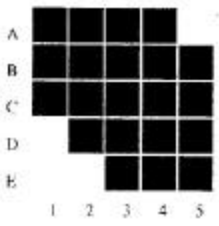
This map presents the layout of the territory of former soviet air force base in Zokniai near Šiauliai city. Also shown are locations of different kinds of wells.

One grid cell covers one square kilometer area.

All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Airbase Facility Boundary
- Airbase Roads and Runways
- Railways
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- 46 Number of Well
- xy Water Supply Well without Number

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

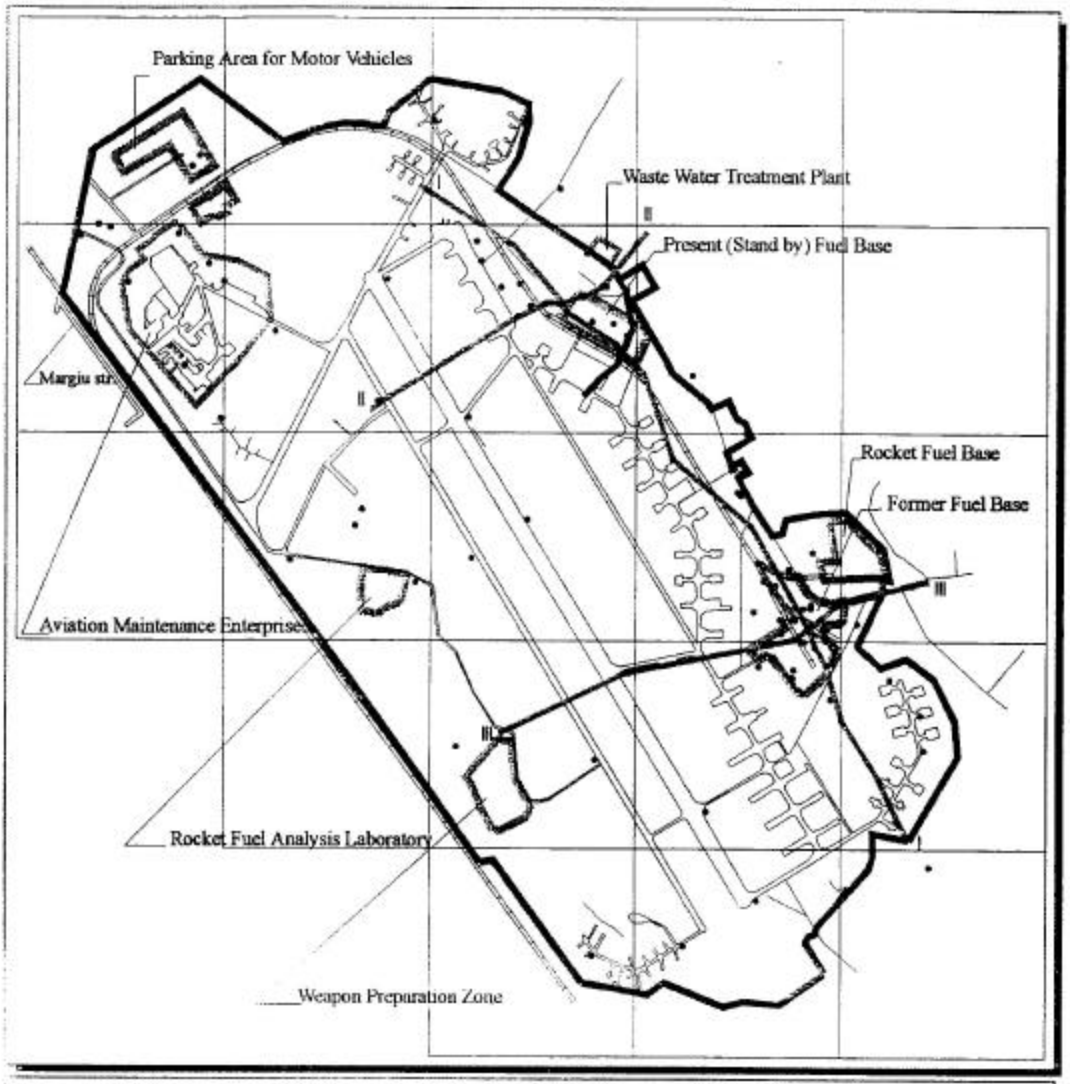
SCALE 1 : 30 000

0 300 600 1200 m

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude, WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

LAYOUT OF ŠIAULIAI AIRBASE WITH CONTAMINATING FACILITIES



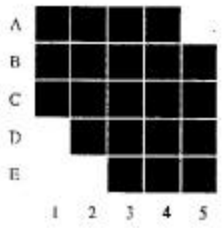
LEGEND

This map presents the layout of the territory of former soviet air force base in Zokniai near Siauliai city. Also shown are locations of geological-hydrogeological profiles. One grid cell covers one square kilometer area.

All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Airbase Facility Boundary
- Airbase Roads and Runways
- Railways
- Water Supply Wells
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- Geo-hydrological Profiles
- Drainage System

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

SCALE 1 : 30 000

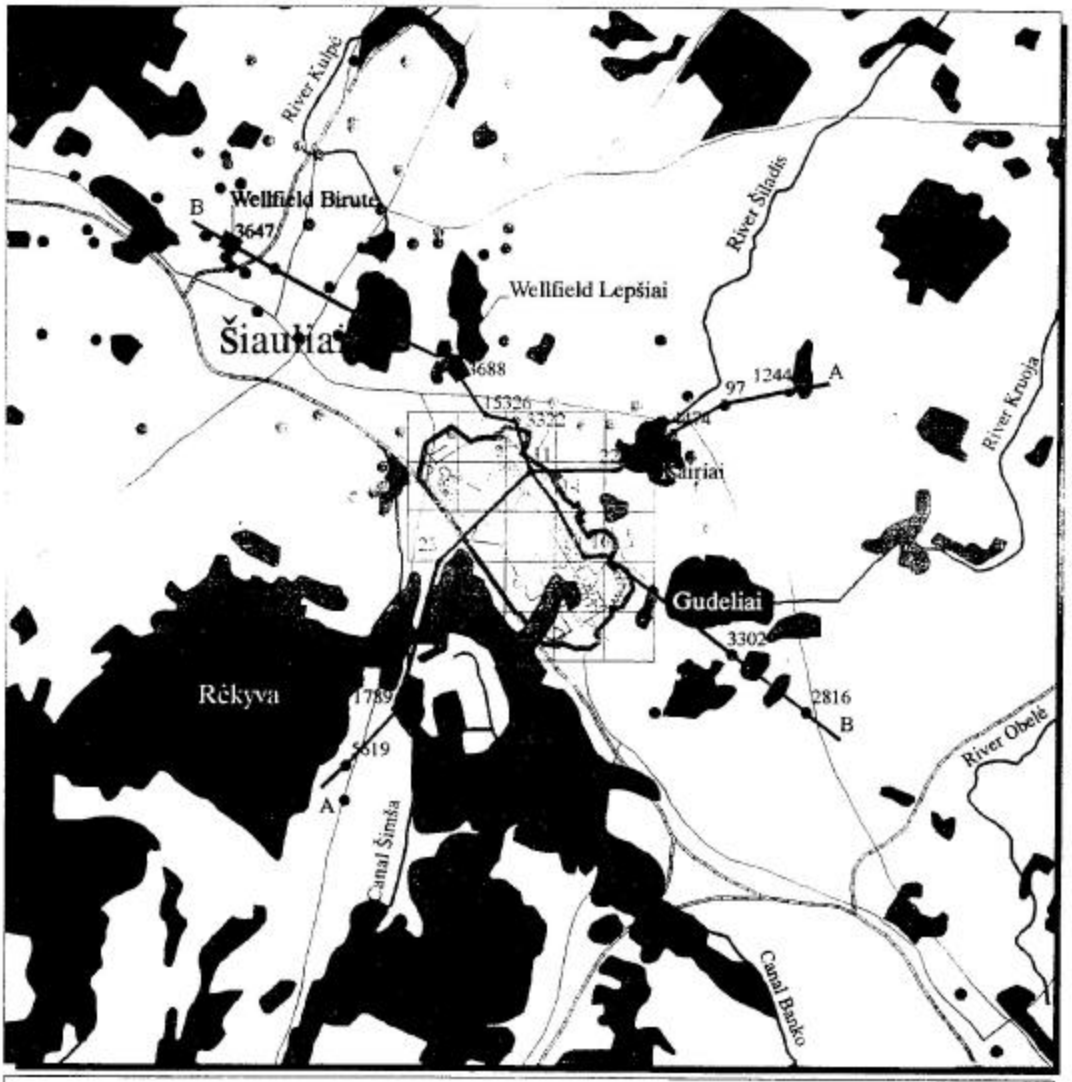
0 300 600 1200 m

Produced in association with GEOBITAS

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude, WGS72.

INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

NATURE AND INFRASTRUCTURE FEATURES IN THE VICINITY OF ŠIAULIAI AIRBASE



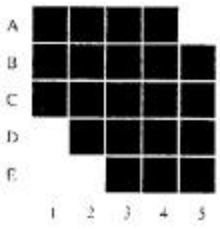
LEGEND

This map presents main geographical features of former soviet air force base in Zokniai near Siauliai city. Also shown are the main infrastructure features such as roads,railways, take off paths, etc.

Source map scale is 1 : 200 000.

- Airbase Boundary
- City Area
- Roads
- Airbase Roads and Runways
- Railways
- Rivers and Canals
- Lakes
- Forests
- Water Supply Wells
- Test /Monitoring Wells
- Geo-hydrological Profiles

SHEET LAYOUT



SCALE 1 : 125 000

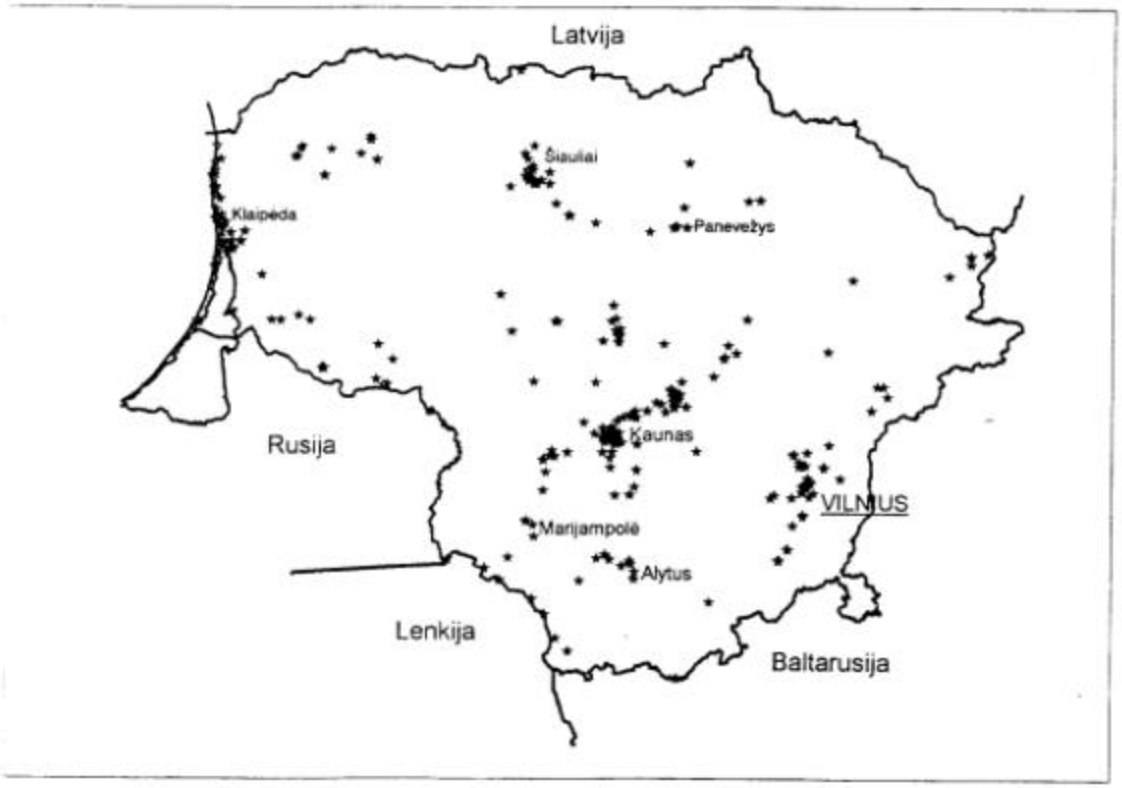
0 1250 2500 5000 m

Produced in cooperation with GEOBITAS

Transverse Mercator Projection
CM at 24th Degree of East Longitude
WGS72 Ellipsoid. Scale Factor 0.9998

4.1 lentelė: Karinių teritorijų pasiskirstymas pagal dydį

Dydis (ha)	Teritorijų kiekis	Bendras plotas (ha)
mažiau nei 1	59	17
1 - 10	77	309
10 - 100	80	2,718
100 - 1,000	45	13,594
1,000 - 10,000	13	37,261
daugiau nei 10,000	1	13,862
Viso:	275	67,762



INVESTIGATION AND CLEAN UP OF OIL POLLUTION ON THE FORMER MILITARY AIRBASE IN SIAULIAI, LITHUANIA

FORMER(MAIN)FUEL BASE OF ŠIAULIAI AIRBASE

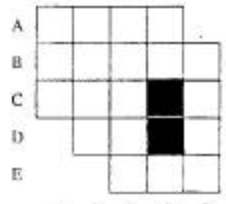
LEGEND

This map presents the layout of the former (main) fuel base of former airforce base in Zokniai near Šiauliai city. Also shown are location of wells at the fuel base.

All features are from source maps of scale 1 : 5 000.

- Airbase Boundary
- Airbase Roads and Runways
- Railways
- Limits ofFormer Fuel Base
- Buildings
- Monitoring Wells
- Old Monitoring Wells
- Test Wells
- Water Supply Wells
- 71 Well No.

SHEET LAYOUT



GIS CRISP 3.1 (C) ALNA, 1994

SCALE 1 : 7 500

0 75 150 300 m

Flat Coordinate System, Matched with Transverse Mercator Projection CM 24th Degree East Longitude, WGS72.

APPENDIX G

ENVIRONMENTAL MANAGEMENT LEGISLATIVE AND NORMATIVE BASES FOR ENVIRONMENTAL PROTECTION IN THE REPUBLIC OF MOLDOVA

By Colonel Severin Eudgen
The Republic of Moldova

May 1995


Moldova
Ukraine
Romania
Black Sea
Dnestr
Prut
Nistru
Mohyliv-Podil's'kyy
Oknitsa
Briceni
Yedyntsy
Bratushany
Soroca
Karnenka
Riscani
Floresti
Krasnen'koye
Danul
Ribnita
Bolotino
Balti
Dragoneshty
Lazo
Teleneshty
Falesti
Orhei
Dubasari
Ungheni
Calarasi
Grigoriopol
Iasi
Chisinau
Speya
Lapusna
Hincesti
Tiraspol
Karpineny
Bender
Slobodzeya
Causeni
Krasnoye
Chimishliya
Opachi
Leovo
Odesa
Comrat
Basarabeasea
Baymakiya
Ciadir-Lunga
Cahul
Vulcanesti
Yetuliya
Galati
50 km
50 miles
48
46
26
28
30

M-21

TO THE U.S. DEPARTMENT OF DEFENSE CONFERENCE ON ENVIRONMENTAL PROTECTION

by Colonel Eugeniu Severin
Republic of Moldova

Dear Mr. Chairman:

At this forum we represent the Ministry of Defense of the Republic of Moldova. Our republic was created as a result of the disintegration of the former Soviet Union. We proclaimed our independence on August 27, 1991. Moldova is situated in the south-eastern part of Europe. Its territory stretches 350 kilometers from north to south and 150 kilometers from east to west. The total area of the Republic of Moldova spans 33,700 square kilometers, and Chisinau is the capital. The population is comprised of 4.35 million people, and the population density is 129 people per square kilometer. The territory of Moldova is located in the Carpathian seismological zone. Hence, earthquakes in Moldova sometimes range between six and eight points on the Richter scale. The most dangerous earthquakes in our century were recorded in November 1940, March 1977, August 1986, and May 1990.

The average rainfall is 380 millimeters in the southern part of the Republic, and 560 millimeters in the northern regions. Moldova suffers from droughts every third year. The drought in 1994 severely hurt the national economy. The damage caused by the drought equaled the annual budget of the Republic. Strongly broken terrain, storms, over-ploughing of sloped areas, and a failure to properly apply anti-erosion techniques have all activated the process of erosion. Landslides are extremely detrimental to the economy of the country. The total area of potential landslides is 400,000 hectares, including 43,300 hectares of active landslides.

Every year, approximately 500,000 tons of emissions are released into the air from stationary sources of pollution. The biggest amount of pollution comes from energy and construction enterprises and from transportation. Emissions are especially high in the cities due

to larger amounts of traffic. In 1993, for instance, 311,491 automobiles were responsible for 235.35 kilotons of harmful emissions. The technical condition of purification systems is far from satisfactory.

The situation can be changed with the introduction of technologies that produce little or no waste, with technological modernization, with an increase in the amount of more efficient purification systems, and with the use of environmentally clean fuel for energy production.

It is worth mentioning, that our state, along with the other former Soviet republics, inherited a variety of problems from the methods of development employed during Soviet rule. These problems become more aggravated as we shift to a new economic model.

I will give you only a few examples which reflect the situation in the country at the present time. Every year, 4.7 million tons of waste accumulate in Moldova, 126,000 tons of which are toxic. More than half of the sources of drinking water in Moldova contain an overconcentration of nitrates. One third of the locations in Moldova lack water purification systems. Thousands of tons of pesticides, unused and prohibited on the territory of Moldova, are stored here. Annual wastes from the animal husbandry industry registers at nearly 8 million cubic meters.

These problems cannot be solved immediately. The budget deficit will not allow us to increase spending on environmental protection or the liquidation of the environmental situation. We do not receive any foreign aid in this area at all.

By the same token, environmental conditions are the most important factors that influence the vital activities of the population. Living conditions, however, are worsening. For example, in the first quarter of 1995, for the first time in many years, the population shrank, i.e. more people died than were born during this time. The average lifespan decreased as well and amounts to only 37.7 years.

Bearing in mind that the National Army of Moldova is in the process of formation and creation, we must admit that the Ministry of Defense of Moldova does not have any program on environmental protection or the rational use of natural resources. We are counting on methodological help and other kinds of assistance from international organizations and missions, which will allow us to accelerate our way out of the crisis considerably.

Allow me to express our gratitude to the conference organizers. We appreciate your invitation and the opportunity to participate in the conference. We wish you prosperity and well-being.

ENVIRONMENTAL MANAGEMENT LEGISLATIVE AND NORMATIVE BASES FOR ENVIRONMENTAL PROTECTION IN THE REPUBLIC OF MOLDOVA

by Colonel Eugeniu Severin
The Republic of Moldova

Currently, the Republic of Moldova uses a very complex system of legislative acts and norms in the field of environmental protection. It includes a number of acts approved recently during the republic's economic transformation, as well as those adopted in the past when the centralized economic system still existed.

The Constitution gives general principles for environmental protection. Article 37 guarantees the right of all citizens to favorable environmental conditions. In this regard, the state guarantees every citizen free access to information on environmental and labor conditions. According to Article 126, the state ensures:

A. Rational utilization of natural resources according to national interests;
B. Restoration and protection of the environment and maintenance of environmental equilibrium.

At the same time, the constitution proclaims that protection of the environment is the duty of all citizens of the country.

The legislative system of environmental protection includes:

A. The Law on Environmental Protection (1993);
B. The Code of Lands of the Republic of Moldova (1991);
C. The Civil Code of the Republic of Moldova (1979);
D. The Water Code of the Republic of Moldova (1993);
E. The Subsoil Code of the Republic of Moldova (1993);
F. The law "Regarding the Use and Protection of the Animal World" (1981).

It is worth mentioning a number of laws addressing environmental protection that have been adopted in the last two years:

A. The law "Regarding Consumer Rights Protection" (1993);
B. The law "Regarding the Provision of Sanitary-Ecological Conditions for the Population" (1993);
C. The law "Regarding Monument Protection" (1993);
D. The law "Regarding Civil Protection" (1994);
E. The law "Regarding Land Ownership Regulations and Monitoring State Lands" (1992).

At the national level, standardized regulations are imposed by the State Department for Standards, Meteorology, and Technical Inspection. To make the system of standards at a national level more efficient, the Department continues to use the standards of the former Soviet Union (GOST) until new standards are issued on the territory of the Republic.

In the field of environmental protection other technical documents were used along with GOST standards: construction norms and regulations, medical and medical-biological norms, instructions, regulations, technical normative documents, and other documents approved by governmental organizations of the former Soviet Union.

The Department extended the validity of the current relevant documents on standard regulations until the new national normative acts are adopted.

I. Environmental Policy and the Tools of Promotion

The main environmental protection trends in the future, described in a government program for 1994-1997, include the following:

A. Promotion of the policy of rational use of natural resources;
B. Evaluation of environmental conditions and their possible changes, based on monitoring. The problems will be evaluated and solved according to the degree of their complexity and priority;

C. Design and implementation of a new program on the protection of the environment, especially in the field of improving soils and protecting water resources;
D. Establishment of environmental and economic mechanisms which will ensure the rational use of natural resources and an efficient way to protect the environment;
E. Creation of national state parks and practical solutions in the restoration of the most important ecological systems.

It is also planned that the republic will extend its international cooperation in the field of environmental protection and take an active part in implementing international agreements signed by the country. Relations between Ukraine and Romania will be fully restored, and new joint projects in regional ecology will be launched.

The effective application of this environmental policy will be dependent on the administrative and economic steps in protection of the environment.

II. Administrative Steps

Consolidation of state environmental control. During the last few years, the rights of official bodies in the field of environmental protection, sanitation and epidemiology, and technical inspection have grown significantly. Regional environmental agencies have been formed to coordinate activities at the local level.

Evaluation of environmental impact and expert examination of project documents. The Department for Protection of the Environment has at its disposal different powerful tools which can influence the environmental situation, including environmental impact studies. The ecological expert examination then will include project documentation along with environmental impact studies.

Average pollution of the environment. To date, the Republic of Moldova has issued 127 documents, defining the average amount of permissible emissions, to industrial enterprises. There are a total of 700 enterprises which must be inspected.

Ecological Pasportization. ["pasportization" refers to official documentation indicating that the level of pollution in question has been deemed to be at acceptable levels.] In accordance with a 1990 governmental decree in the Republic of Moldova, in order to determine the impact of pollution on the environment, ecological pasportization of industrial and agricultural enterprises has been introduced in the country. To date, 448 enterprises have been inspected and issued an ecological passport.

III. Economic Steps

The economic scheme for rational utilization and improvement of nature consists of two phases. Aimed at ecological stabilization, stage I will run through the year 2000. Stage II, from 2001-2010, includes ecological restructuring.

In the first stage, economic, technological, scientific, legislative, and organizational measures will play the most important role. They will include:

A. An increase of investment in environmental protection activities from the federal budget, as well as from non-governmental sources;
B. Technological modernization in the industrial and agricultural sectors and a reduction of water consumption;
C. Decentralization of environmental protection, along with strengthening of the rights of self-governing, local organizations in natural resource utilization and the assumption of responsibility for environmental protection;
D. Implementation of economic steps in the protection of the environment;
E. The introduction of legislative and normative mechanisms for the implementation of stages I and II.

Stage II includes restructuring measures, such as:

A. The introduction of modern technologies for reducing natural resource consumption;
B. The construction of modern purification systems for residue and drain water.

Due to radical changes in the socio-economic system and to the process of transformation to a new economy, the program presented here no longer corresponds to the present situation. It is necessary to introduce new mechanisms for implementing original plans for environmental protection. The new program will include ecological incentives from international agreements such as "Agenda 21" (Rio de Janeiro, 1992) and "Plans of Action for Central and Eastern Europe" (Lucerne, 1993).

In connection with these plans of action, the government adopted a state strategy for 1994-97, which is called "The National Program of Action in the Field of Environmental Protection."

THE STATE SYSTEM OF ENVIRONMENTAL REGULATION IN MOLDOVA

I. Monitoring the Environment

The current system of environmental regulation includes the following state bodies of the Republic of Moldova:

A. The Committee for Environmental Protection

B. The Ministry of Healthcare

C. The Ministry of Agriculture and Food Provision

D. The Association of Geologists of Moldova (AGeoM).

The Department of Environmental Regulation consists of the following sections: the Hydrometeorological Service Department of Moldova, the National Environmental Institute, and various State Inspection Committees for the Environment (including regional committees).

The Department of Environmental Regulation in Chisinau oversees environmental regulation as a whole and controls five analytical laboratories in Tiraspol, Belts, Kahul, Kausheni, and Ungeni. These laboratories are responsible for controlling air, water, and soil conditions over the entire territory of the Republic under normal circumstances and during natural disasters. The Hydrometeorological Service Department governs a number of laboratories (in Chisinau, Belts, Tiraspol, Kahul, Dubasari, etc.), 13 meteorological stations, 51 meteorological posts, 48 water testing stations, 37 agrometeorological centers, and 40 hydrological posts (fig. 7.1.1).

The Center of Epidemiology and Hygiene under the Ministry of Healthcare directs an analytical center with a specialized laboratory in Chisinau, four cross-regional laboratories in Belts, Bender, Orhgei, and Kahul, and 45 local laboratories. Their main responsibility is to analyze the environmental quality of water, soil, air, and food products, as well as the level of radioactive contamination on the territory of the republic.

The Ministry of Agriculture and Food Provision supervises the Scientific Production Association “Fertility,” the Chisinau Agrochemical Institute, chemical stations in Chisinau, Belts, and Kahul, six regional product quality analysis stations, and various vegetation protection

centers. The Ministry also oversees the Head Committee of Land Reforms and Privatization which governs the Research Design Institute and the Committee of State Control of Land Privatization. The Research Design Institute deals with land distribution and the Committee of State Control of Land Privatization takes a regional approach to privatization issues.

The Association of Geologists of Moldova (AGeoM) is in charge of a central analytical laboratory which estimates ground water quality. AGeoM is responsible for monitoring geological processes and ground water regulation on the territory of the republic.

At present, the National Institute of Environment is in the process of designing an integral environmental monitoring system comparable with the most advanced international systems in this field.

II. State Inspectorate for the Environment

According to the Law on Environmental Protection, state environmental regulation is enforced by the Department for Environmental Protection through its special body, the State Inspectorate for the Environment.

The main goal of the inspectorate is to execute state control in the protection and rational use of soil, air, shallow and ground waters, plants (including forests) and animals (including fish), and mineral resources. It also strives for the empowerment of environmental laws and methods of improving the environmental situation on the territory of the Republic of Moldova.

Representatives of the Inspectorate work with state committees to collect data on industrial pollution, approve new technological tests, and determine locations for new enterprises.

The Inspectorate includes various inspection and control divisions in different sectors (water, soil and mineral resources, meteorology, forests and national parks, chemical industry, ecological disasters, information and standardization). It is divided into territorial subdivisions (11 zones) and has a flora and fauna section as well. More than 200 environmental inspectors perform their duty in Moldova today.

In 1994, the whole structure of state environmental regulation was modified significantly. According to the law "Regarding the State Control of Protection of the Environment and

Rational Use of Natural Resources" (approved by the government and forwarded to the Parliament) and to the government decree "Regarding Regulations in Water Resource Management," the government will exercise control in the rational use of domestic resources, while the Department for Environmental Protection will administer the protection of the environment.

Along with the Inspectorate for the Environment other relevant state bodies in the field of environmental protection include the Sanitary-ecological Service (for hygiene and environment), the Traffic Police (for car emissions), and the production association "AGeoM" (for ground water).

III. Ecological Expert Examination

The State Ecological Committee of Experts was formed in 1988 in accordance with a decree of the government of the Republic of Moldova. The construction and reconstruction of enterprises should agree with the Law on Environmental Protection and undergo ecological expert examination.

Expert examination of environmental conditions is conducted by special divisions of the Department for Environmental Protection. The most prominent specialists and scientists in relevant fields direct expert examinations of the most important enterprises.

The ecological expert examinations are implemented by regional, republican, and central bodies of the Department for Environmental Protection.

All economic activities, regardless of character, location, type of ownership, costs, and financial sources, require ecological expert examination.

Ecological expert examination results in the final general approval of an establishment or program, in the form of a special document that allows financing of different economic activities and construction work. The monitoring and regulation of the implementation of this document is performed by local ecological agencies.

IV. Ecological Public Prosecutor's Office

The Ecological Public Prosecutor's Office, part of the Public Prosecutor's Office, exercises executive control over norm compliance in environmental protection.

The Ecological Public Prosecutor's Office began its work in 1991, in accordance with the law "Regarding the Public Prosecutor's Office in the Republic of Moldova." Its powers encompass the implementation of the Law on Environmental Protection by all production associations, organizations, and institutions, regardless of their juridical status. The Ecological Public Prosecutor's Office also regulates compliance with the norms of the Civil Code, water, subsoil and land protection, arbitration, the Law on Environmental Protection, and other normative (standards setting) acts issued by the government.

V. The Impact of Radiation

The basic components of radioactive contamination on the territory of the Republic of Moldova consist of radioactive elements such as Uranium-238, Thorium-232, their radioactive decay product, Potassium-40, along with fallout deposits such as Strontium-90 and Cesium-137. This contamination resulted from nuclear arms tests during the last 50-60 years and radioactive fallout from the Chernobyl accident in 1986.

The concentration of radioactive elements currently registers at an average level of 20-30 Bq/kg for Uranium-238, 40 Bq/kg for Thorium-232, and 500 Bq/kg for Potassium-40. In 1986, the concentration of radionuclides in Strontium-90 and Cesium-137 varied within the limit of 3-6 Bq/kg. In 1985, the level of radioactive contamination in the republic did not exceed 12 mR/per hour.

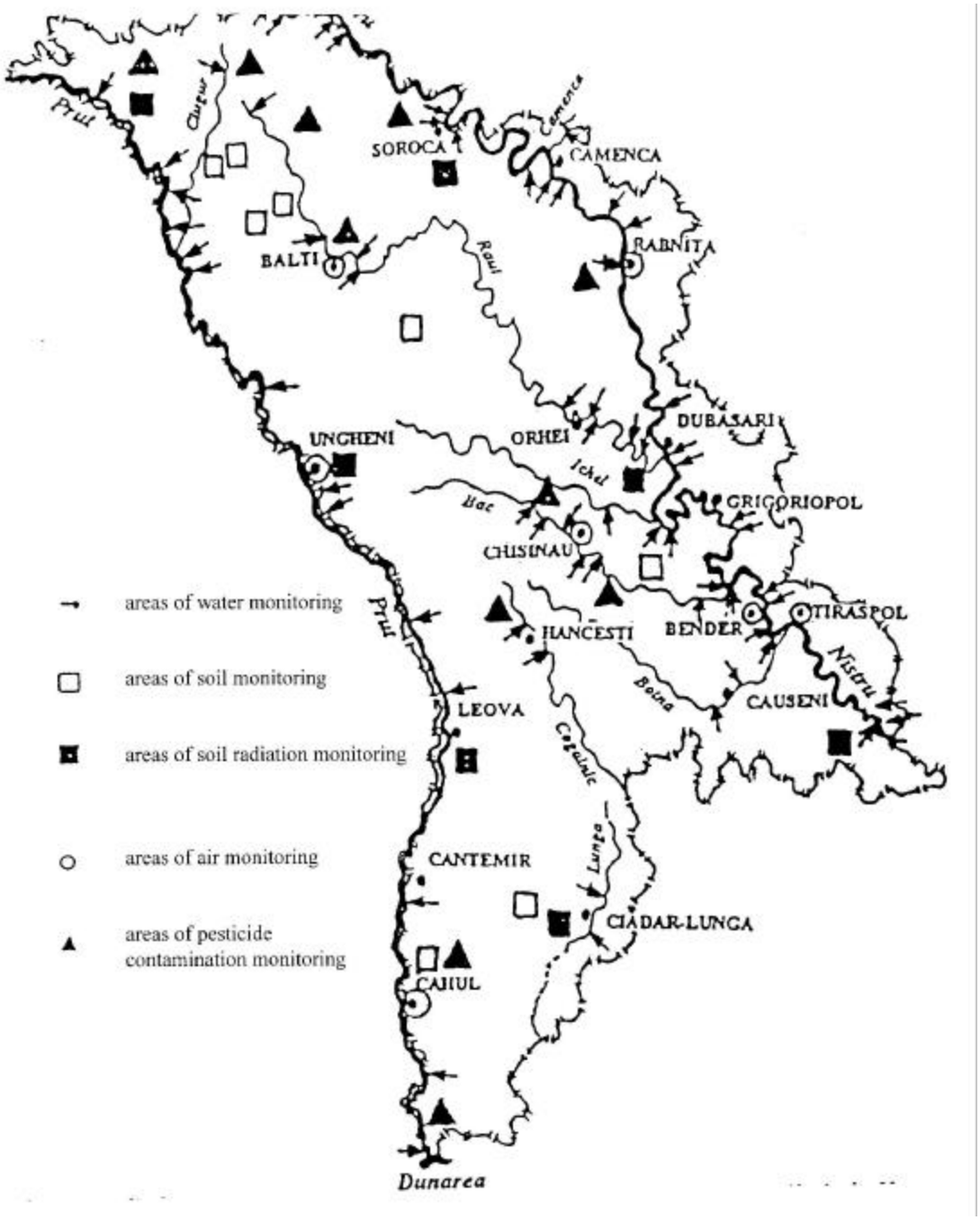
As a result of the Chernobyl accident, the territory of Moldova was subjected to radioactive contamination. The level of radioactive contamination in the first days after the accident in 1986 ranged from 200 to 400 mR/per hour.

While conducting spectrometric analyses of soil and plants in the republic, scientists found a number of radionuclides with a half-life of more than two days. These radionuclides reflected the isotopic composition of the elements from the Chernobyl accident, which was proven in the literature published shortly thereafter.

At present, the natural level of radioactive contamination is being affected only by Cesium-137. The average level of radiation on the territory of the Republic is 15-17 mR/per hour.

The concentration of radionuclides in Strontium-90 and Cesium-137 found in animal and plant products does not exceed 1Bq/kg, which leads to product consumption restriction. The maximum accumulation of radionuclides has been observed in the vegetation systems of certain agricultural plants (tobacco, fodder, vegetables).

Currently, Moldova is subjected to ionizing radiation from 342 enterprises and research centers. There are 858 units of radiological equipment in open and closed laboratories and 560 in radiological and microradiographical medical centers.


areas of water monitoring
areas of soil monitoring
areas of soil radiation monitoring
areas of air monitoring
areas of pesticide contamination monitoring
SOROCA
CAMENCA
BALTI
RABNITA
UNGHENI
ORHEI
DUBASARI
GRIGORIOPOL
CHISINAU
HANCESTI
BENDER
TIRASPOL
CAUSENI
LEOVA
CANTEMIR
CIADAR-LUNGA
CAHUL
Dunarea
Prut
Raut
Bac
Ichel
Botna
Nistru
Lunga

APPENDIX H

THE ENVIRONMENT IN POLAND

By LTC Krystauf Marszalik
Director of the Environmental Office
Ministry of National Defense, Poland

May 1995


Poland
Baltic Sea
Gulf of Gdansk
Russia
Lithuania
Belarus
Ukraine
Germany
Czech Republic
Slovakia
Austria
Berlin
Prague
Pomeranian Bay
Swinoujscie
Slupsk
Koszalin
Gdynia
Gdansk
Tczew
Elblag
Suwalki
Olsztyn
Szczecin
Bydgoszcz
Grudziadz
Torun
Narew
Bialystok
Ostroleka
Lomza
Cienchanow
Gorzow Wielkopolski
Pila
Inowroclaw
Vistula
Wloclawek
Bug
Plock
Poznan
Warsaw
Warta
Konin
Zielona Gora
Leszno
Skierniewice
Siedlce
Biala Podlaska
Lodz
Kalisz
Sieradz
Radom
Piotrkow Trybunalski
Lublin
Chelm
Legnica
Wroclaw
Jelenia Gora
Oder
Kielce
Zamosc
Walbrzych
Opole
Czestochowa
Vistula
San
Tarnobrzeg
Bytom
Gliwice
Katowice
Sosnowiec
Rybnik
Krakow
Rzeszow
Jastrzebie- Zdoj
Wodzislaw Slaski
Tarnow
Krosno
Przemysl
L'viv
Bielsko-Biala
Nowy Sacz
100 km
100 miles
15
20
25
55
50

M-23

THE ENVIRONMENT IN POLAND

by LTC Krystauf Marszalik
Director of the Environmental Office
Ministry of National Defense, Poland

I. Environmental Pollution in Poland

Part of the inglorious legacy of the previous (communist) political system is the disproportionately high level of environmental pollution in relation to the industrial potential of Poland or other Central and Eastern European countries. This pollution is an inescapable side-effect of such features of the communist economy as:

A. The years-long dominance of the most energy-consuming and harmful industries, particularly minerals extraction and metallurgy;

B. The construction of huge industrial plants, usually located in already heavily industrialized areas;

C. The wasteful use of low-priced minerals, energy and water in production processes, and the resulting release of excessive quantities of waste into the environment;

D. The pricing of goods without regard for their real production costs.

Moreover, as the exclusive owner of industrial facilities, the state was not interested in introducing strict laws to enforce the construction of pollution-control installations. Such investment expenses in Poland in the 1970s and 1980s consumed 0.2-0.3% of the national income, several times lower than the amount expended in free market countries. As a result, Poland's natural environment deteriorated progressively, and at the end of the 1980s, it was one of the most polluted countries in Europe.

Below are outlined a number of the main indicators of the level of environmental pollution in Poland in 1988-1990, the period of its political and economic transformation. This is a kind of closing balance, a comprehensive description of the legacy of the previous system; it also shows how much there is to be done in order to make up for years of inaction and negligence.

II. Atmospheric Pollution

Atmospheric pollution in Poland is among the heaviest in Europe. In 1988-1989 about 4 million tons of sulphur dioxide ($S0_2$) and 1.5 million tons of nitrogen oxides ($N0_x$) were emitted from the country's territory per year, making Poland the third biggest polluter in Europe (after the former Soviet Union and Germany). In terms of particulate emissions, at about 3:4 million tons per year, Poland ranked directly behind the former Soviet Union. Carbon monoxide emissions of 3.2 million tons and approximately 470 million tons of carbon dioxide per year were recorded. Whether calculated per unit of national income, per unit of energy generated, or per capita, these values are many times higher than those reported in OECD countries.

In all the big cities the concentrations of particulates, $S0_2$ and $N0_x$ substantially exceed permissible standards. The situation is most dramatic in the Upper Silesia Region, in Cracow and in the Legnica-Glogow copper region, and also in the Sudety Mountains, where acid rain is leading to the largest-scale extinction of mountain forest in Europe.

In the Sudety Mountains, where the Polish, German and Czech borders meet, there are 12 big power plants (including one Polish power plant in Turów) which burn poor-quality brown coal. None of these plants have facilities for exhaust gas desulphurization, and $S0_2$ emissions from this small area, called 'the Black Triangle,' account for 20% of the European emissions of $S0_2$. It should come as no surprise to learn that this area has the largest sulphur compound deposition, and that the acidification of precipitation causes it to have a pH below 3.0. This is a striking example of the environmental effects after many years of failure to install pollution control devices.

III. Water Pollution

The water pollution problem is equally dramatic. In 1989, as much as one-third of Poland's municipal and industrial sewage was dumped untreated into surface waters and another 35% was discharged after receiving only preliminary mechanical treatment. Only the remaining 32% of the waste was treated to a satisfactory level. Of all Polish cities, 366, or 44%, including cities with more than 200,000 inhabitants (Bialystok, Lódz, Radom), did not have waste treatment plants. The waste treatment plant capacities in many other large urban-

industrial areas such as Warsaw, Cracow, Poznan, Gdansk, Bydgoszcz and Szczecin were far from sufficient (GUS - Main Statistical Office, 1991 c).

Due to this negligence the quality of Polish rivers is very poor. In 1989 only 5% of the total river length had potable (Class I) water. Along 35% of it the water was below all rankings and could not be used even for industrial purposes.

A specifically Polish problem is the high salinity of many rivers, produced by Upper Silesian bituminous coal mine effluents. Some of these mines have deep saline waters which must be pumped up to the surface during mining operations. This refers mainly to the most recently opened mines, constructed in the past 20 years in the Rybnik area. The total amount of salt dumped into the Vistula and Odra rivers every day is 9,000 tons, enough to fill 450 20-tonne railway wagons! This causes huge material losses caused by chloride damage to heating systems in towns and cities located along the two biggest Polish rivers and in many industrial plants that use river water. No one as yet has estimated the real cost of extracting coal from the mines with the most saline effluents.

IV. Organization of River Monitoring in Poland

Water quality analyses have been conducted since 1989 and are an integral part of the Programme of Monitoring the Environment. The State's monitoring programme is strictly regulated by an ordinance of the Chief Inspector of Environmental Protection, which specifies the required parameters of quality and frequency of analyses.

V. Methods of Evaluating State of Pollution

Voivodeship (province) inspectorates of environmental protection and specialized scientific-research units conduct monitoring analyses. The work is coordinated, in consultation with the State Inspection of Environmental Protection, by the Institute of Meteorology and Water Economy. The yearly yield of data includes approximately 7,700 water tests which total more than 19,600 quality parameter analyses.

The basis for evaluation is provided by determinant concentrations recorded during medium-low flows over a number of years. The changes in determinant concentrations along

the course of the river constituted the basis for charting a hydro-chemical profile which classified water according to the standards specified in the ordinance of the Council of Ministers of November 5th, 1991. Classifications were made for each parameter and for a whole group of parameters characteristic of specific types of pollution:

A. Organic substances, marked BZT5, dissolved oxygen, ChZT and ChZTCr;
B. Salinity such as: chlorides, sulphates and dissolved substances;
C. Quantity of suspended matter;
D. Biogenic compounds, including: ammonium nitrogen, nitrite nitrogen, nitrate nitrogen, nitrogen, phosphates, phosphorus;
E. Specific pollution (phenol compounds and heavy metals);
F. Sanitary condition was characterized by presence of excremental cola germs.

In addition, a classification was made according to obligatory parameters which had been recorded since 1964. This group includes BZT, ChZTM", chlorides, sulphates, dissolved substances, suspended matter and phenol compounds. The outcome of the evaluation is determined by the highest parameter that is in excess of the standard. Statistical interpretation was also employed according to concentrations of 90% probability of impassability [sic]. The results of the analyses are published in annual documents that list characteristics of river contamination. Currently, monthly communiqués are prepared on the state of rivers in the 20 most important profiles presenting the transportation of pollutants to the Baltic.

To compare the river water quality from the years 1978 - 1983 and 1990 - 1992 we chose those rivers (or their stretches) in which the same scope of obligatory parameter markings was collected. Comparative analyses cover 50 rivers of a total length of 8,930.7 km. The results of these comparisons indicate that 1990 - 1992 saw a considerable improvement of the quality of water: The quantity of waters of the 1st and 2nd class increased by 26% while the length of parts of rivers of the 3rd class of heavily polluted rivers of the 3rd class and of heavily polluted rivers decreased.

Over the length of 5,176.6 km of rivers in the Vistula river-basin, the volume of water of the 1st and 2nd class increased by 27.8% while the amount of water of the 3rd class and of

heavily polluted water decreased markedly. The improvement in the quality of the Vistula river is due to a drop in industrial production and reduction of industrial sewage and agricultural contamination discharged into the river. As for the Odra drainage-area, the analyses of the length of 3,282 km of the river course indicates that the quality of water there also improved. The quantity of water of the 1st and 2nd class has increased while the amount of water of the 3rd class and of heavily contaminated water has decreased. The improvement is credited to a drop of organic and mineral pollution flowing in from Czechoslovakia. Improvement on the littoral rivers has been by far greater. The amount of waters considered 1st class grew by 39% while the waters of the 2nd and 3rd classes diminished.

These favorable changes are attributable to smaller volumes of sewage and waste discharged from cities and plants. The construction of 927 new sewage treatment plants of a total capacity of 2,091,000 cubic metres per day also affected these conditions as did a decrease in agricultural contamination which, over the past few years of drought, accumulated and was transported to the rivers during periods of intense precipitation.

VI. Conclusions

A. The monitoring studies indicate that the excessive pollution is caused by concentrations of biogenic substances and bad sanitation. Rivers carrying excessive volumes of biogenic substances grow moldy [eutrophic] posing a danger to lakes and water reservoirs.

B. Specific contamination, such as phenols and heavy metals occur in vestigial quantities and do not actually affect the quality of water.

C. Economic recession and reduction of contamination following the construction of 927 new sewage treatment plants, and minimal contamination from scattered sources due to on-going drought led to a marked improvement in river water quality from 1990 - 1992.

Most of the lakes in Poland have also been severely polluted. Of 161 large lakes tested for water quality (25% of the lake volume in Poland), only 4 qualified for the highest purity

class, and 63 lakes had water unsuitable for drinking or recreational purposes (Class III and below all rankings). This is a particularly acute problem because the self-cleaning process in non-flowing waters is much slower than in rivers (GUS, 1991c).

Pollution of underground waters by community sewage, substances used in farming (fertilizer and pesticide residues) and petroleum products has also become common. The latter form of contamination is most severe in areas where the barracks and firing grounds of the former Soviet Army units stationed in Poland were located in 1989. In all, 65.9% of the residential wells in villages and 54.2% of the wells on the outskirts of urban areas had poor quality (undrinkable) water, and in 5 provinces over 80% of such wells were so affected (Konin, Sieradz, Kalisz, Lódz and Leszno) (GUS, 1991). The main source of their pollution is community sewage.

Since 99.5% of the territory of Poland is within the Baltic Sea catchment area, the sea receives most of the sewage dumped into the rivers. This is one of the main reasons for its rapidly increasing pollution. In 1989, of the total load of sewage dumped into the Baltic Sea by the countries of the Baltic Sea catchment area, Poland contributed 40% of the phosphorus 34.7% of the nitrogen, and 21.3% of the organic matter.

VII. Waste Management

Poland still does not have any efficient system for collecting and using municipal waste. That is why every year 40-46 million cubic metres of municipal waste are dumped at disposal sites, only a few of which are organized in accordance with the principles of environmental protection and proper maintenance. The first composting plants were constructed in Warsaw and Katowice.

In 1989, industrial plants generated about 170 million tons of waste, of which 43% (including 2-3 million tons of hazardous waste) were dumped at waste disposal sites or refuse dumps because Poland does not yet have modern installations for safe neutralization or utilization of waste. Currently, existing waste disposal sites contain 1,500-2,500 million tons of industrial waste and this amount is growing year by year. Almost half of this waste has accumulated in the small area of Katowice province.

VIII. Environmental Pollution in Upper Silesia

The consequences of the long-term neglect of environmental control investment are most apparent in Upper Silesia. Since the twelfth century, non-ferrous metal ores have been extracted in this region which has the richest deposits of natural resources in Poland and bituminous coal has been mined there since the eighteenth century. It was only after World War II, however, that extraction reached levels which accelerated the process of environmental deterioration throughout the region.

IX. The Scale of Mineral Extraction

In the 1980s, 62 coal mines in the Upper Silesia industrial region extracted 190-200 million tons of coal per year (several times more than before World War II), generating several tens of millions of tons of coal waste and discharging 2.0-2.5 tons of salt into the rivers every year. So-called break-down coal extraction led to cave-ins of abandoned galleries, and caused uneven settling of the land which subsided several metres in some extreme cases. This has caused huge environmental and economic losses.

A substantial amount of the coal extracted is burned on the spot in several large power plants and in the heating system of the Silesian conurbation, which has over three million residents. It is also made into coke which is used in steelworks and chemical plants. In 1989 Katowice province extracted 98% of the national output of coal and 100% of zinc ores generated and produced 50% of the national steel output, 34% of the coke, 41% of the window glass, 50% of the passenger cars and 7% of the sulphuric acid.

This production causes the emission of about 560,000 tons of particulates, 950,000 tons of $S0_2$, 250,000 tons of $N0_x$ and about 900,000 million cubic metres of sewage, of which only 25% are properly treated.

X. The Impact On Health and Ecology

No wonder, then, that such large-scale extraction of minerals and such a high concentration of environmentally hazardous industry (in an area of only 6,650 square kilometres,

21% of Poland's total area) have caused an unprecedented ecological disaster in Poland. The region has been identified as one of the most polluted places in Europe. In addition to constantly excessive concentrations of particulates, sulphur and nitrogen oxides, there are also concentrations of heavy metals (lead, cadmium, zinc) and of volatile hydrocarbons including a number of carcinogenic substances which exceed permissible standards by a factor of several times.

It is estimated that about one million residents of Silesia now live in areas strongly affected by toxic substances that pose a threat to human health and life. This is apparent from human health indicators. The average life-span there is one year less than in Poland as a whole and the death rate of men in the 30-59 age group exceeds the national average by about 40%. The Infant mortality rate there is the highest in Poland: in 1989 it was 18.5 per 1,000 live births, while the national average was 15.9. The children there usually have lower birth weights, and their rate of birth defects is 60% higher than in other parts of Poland. Doctors have recently reported the discovery of defects in the genetic code in residents of Silesia who live in the most polluted areas. This is attributable to one-sided, long-term forced industrialization in a region where investment in these industries was most effective from the microeconomics point of view.

XI. Other Environmentally Threatened Regions

Upper Silesia is not the only region in Poland which has suffered considerable environmental devastation over the past 45 years. Planning analyses carried out in the 1980s identified 27 regions that demonstrated serious ecological threats. They cover 10% of Poland's territory and are inhabited by about 30% of the population.

Apart from Upper Silesia, the other threatened areas are all large industrial regions. They include:

A. Walbrzych (bituminous coal extraction, code plants, glassworks);

B. Legnica, Lublin and Glogów (copper mining and processing),

C. Tarnobrzeg (sulphur extraction, sulphuric acid production, glassworks);

D. Plock, Pulawy, Tarnów, Wloclawek, Tomaszów Mazowiecki, Blachownia Šlaska and Szczecin (large chemical plants);

E. Czestochowa, Zawiercie and Kielce (metallurgical and cement plants);

F. Opole, Chelm and Inowraclaw (cement plants);

G. Belchatów, Turów and Konin (large brown coal mines and power plants).

Large metropolitan areas (Cracow, Lódz, Poznan, Wroclaw, Bydgoszcz) which contain a number of polluting industrial plants are also regarded as areas of environmental hazard. In addition, the areas around the bays of Gdansk, Puck and Szczecin have been classified as Baltic Sea areas of ecological disaster, due to the large quantities of sewage carried by the Vistula and the Odra rivers, and dumped by coastal cities (Gdansk, Gdynia and Szczecin) and large seaports.

XII. The Consequences of Environmental Devastation

Identification of environmentally threatened regions and of the main causes of environmental degradation provides a good basis for setting environmental investment priorities in these areas, which are crucial to the Polish economy. It is estimated (Environment Ministry, 1991a) that degradation of the natural environment in those areas causes material losses amounting to 5-10% of the national income (several thousand million dollars per year). These losses are related to accelerated corrosion, decreased harvests, lost work days due to illness, and considerable damage to the forests.

Even greater are the immeasurable losses to the health of Poland's inhabitants. Unlike the trend toward increased life-expectancy reported in West European countries for the last 15 years, Poland's average life-span has leveled or even dropped, at least partially because of deteriorating environmental conditions. Also immeasurable are the losses caused by the destruction of priceless monuments of national culture. This problem is particularly acute in the old royal city of Cracow. This is the price Polish society is paying for years of submission to a foreign political system and an ideology-led, unnatural economic system.

XIII. Nature Conservation

It should be stated, however, that although many regions have been severely degraded by environmental damage there are still important areas in Poland in which nature has been preserved in almost primeval form, only slightly affected by human activity. These are the national parks, nature reserves and other protected areas such as landscape parks and protected landscape areas. Thanks to prolonged efforts by Polish naturalists, led by Professors Goetl and Szafer, the important regions' most precious natural assets have been protected.

Although in 1989 the 15 Polish national parks and 985 nature reserves accounted for only 0.82% (about 258,000 hectares of the countries' territory, about 17% of Poland's territory was under protection, including 51 landscape parks and 178 areas of protected landscape, (GUS, 1991b). This is not inconsiderable compared to other countries; for example, in 1989, only 6% (254,000 sq km) of the area of the European OECD countries was under various forms of nature protection (OECD, 1991). This means that in Poland a 20% greater share of territory is legally protected for its natural and landscape values, compared to Western Europe.

Unfortunately, a number of these most valuable areas are heavily exposed to pollution from industrial plants and metropolitan areas. This is especially true of the Karkonosze and Ojców national parks, whose forests are threatened with extinction.

It is obvious that in the face of increasing human pressure, nature conservation cannot be effective if the causes of environmental pollution are not eliminated. Therefore, environmental protection in Poland must incorporate two main objectives: the quickest possible improvement in the state of the most polluted areas, and effective protection of the most precious wildlife and landform reserves against all forms of human pressure.

SOLUTIONS

I. 'Black Triangle' PHARE regional programme

The Middle European Brown Coal Basin is recognized as one of the most infamous hot spots in Europe and is responsible for much of its pollution. It is worth while to note that the region is responsible for about 30% of the European $S0_2$ emission. The main sources of pollution emission are electric power stations with a total output of over 15,000 MW. Since the transboundary transfer of pollution is a major problem, its reduction in the region is a matter of concern, not only to the three countries concerned (Czech Republic, Germany and Poland) but also to many other European countries. Poland has only one power plant of 2,000 MW in the region. Due to the unfavorable meteorological conditions and especially since most winds are from the west and southwest, the pollution travels into Poland primarily. Studies conducted by the Voivodeship Environmental Inspectorate in Jelenia Góra show that in some parts of Sudety Mountains as much as 75% - 85% of the total air pollution comes from the Czech and German Republics. Following the initiative of environmental ministers of Czechoslovakia, Germany and Poland the Commission of the European Communities formally initiated the "Black Triangle" PHARE Regional Programme on December 6, 1991.

During the G-24 environmental meeting held in Warsaw in September 1991, and in several Working Group meetings, an agreement was reached on the Programme of activities as follows:

A. Development of a Framework Plan to form the basis of an integrated and comprehensive improvement programme;
B. Support for the establishment of a "Black Triangle" Secretariat;
C. Support for the establishment of a joint ambient air monitoring network;

According to the Commission's decision the programme should concentrate primarily on air pollution abatement (industrial emission), waste management and nature protection. A longer-term aim was to bring environmental conditions in the Region to EU standards. The programme addresses the integration of a long-term environmental development plan into

regional and national economic strategies. These regional plans would then be integrated into an overall Master Plan for the Region, which in turn, would be integrated by the PHARE governments into their own regional environment recovery programmes. This was the second attempt to improve environmental conditions despite difficult economic conditions in the countries involved. Following discussions the "Black Triangle" Region was defined as covering the Czech Republic (administrative districts in northern Bohemia), Germany (Dresden and Chemitz Districts) and Poland (Jelenia Góra I Walbrzych Voivodeships).

In the first phase of programme implementation, the Framework Plan was developed and the seven most severe sources of pollution emission were identified in the Czech Republic, Germany and Poland and an Urgent Action Plan was formulated. A Joint Regional Monitoring System, composed of 42 monitoring stations, will be implemented in the three countries and serve as an essential component of a future smog warning system as well.

The Joint Programme Coordination Unit was established in Usti and Labem in the Czech Republic. Experts of the three countries are working in this unit. From the beginning Poland chose to concentrate on the reduction of pollution emissions from primary sources to limit its transboundary impact. We believed that, although such action is extremely expensive on a large scale, we could attract joint action from other countries and financial institutions and that, with programme money, we could achieve some visible regional ecological improvement and reduce the negative environmental impact in Europe.

Two years after its initial implementation the programme's main objective has not been met; however a democratic management body for the programme has been created. It functions as a discussion and consultative forum for the region and for the countries participating in the programme. Its role reaches far beyond the programme management and this management system will no doubt continue to exist, even after the programme itself has been completed. The main main focus of the organization has been to shape the programme's operations over the next three years. All participants have agreed that the reduction of pollution emission from power stations and other large industrial plants is the main problem in the region and that the programme should support remediation activities in all possible ways. Although PHARE Regional financial resources are limited, one future goal is to create a system of

financial support for environmental investment in the region. Work on this proposal is well underway and may be presented to the European Commission for approval at the end of 1995. It is also worth noting that Polish efforts to improve regional environmental conditions continue; one important example is the recently completed modernization of the block No. 9 (200 MW) in the Turów Power Plant which included installation of desulphurization equipment and low emission burners. This is the first unit of this size in the region to contain such installations and, thus, can serve as an example for others. We completed this installation without external assistance; however such support would undoubtedly expedite such work in other facilities.

The following information describes the environmental activities in one of Poland's major industrial organizations in this arena: the Turów Power Station. The plans for reconstruction of the station, which are conceived with an emphasis on environmental protection concentrate on the complex treatment of exhaust fumes; especially on replacing the traditional burners with fluidal burners and circulatory grid and electrofilter modernization. The use of fluidal burners will allow desulphurization of the exhaust fumes by 90% and a decrease in the concentration of nitrogen oxides. The modernization of the electrofilters will improve dust collection to 99.8%. The modernized power station will reach the emission of SO_2 -200 g/GJ, NO_x-150 g/GJ and dusts 90 g/GJ.

"Fluidyfying" is the process of creating a suspension of small coal particles in the flowing stream of air. When the appropriate size of coal particles is matched with the speed of the air flow, the coal particles are induced into turbulent motion and they create so-called "fluidal phase" which exhibits properties very similar to those of liquids. The coal particles are then properly mixed with air and the large area of contact causes higher burning intensity which permits a decrease in furnace size and burning temperature to 900ºC. The lowered temperature reduces the amount nitrogen oxides created during the burning process. Additional benefits come from the potential to burn low calorie coal, which contain large amounts of dust. Positive results were also obtained during burning of brown coal, slime and natural overgrowth of pit coal, municipal residues, etc.

We believe that post-modernization emission parameters will meet the pollution levels required by the national and even post-1997 European Community levels. Planned, as a part of

the complex program, the introduction of new technology for transportation and storage will eliminate secondary dusting. The construction of the heat source for the communal and industrial needs will limit low emissions from the local sources. After the modernization project has been completed the pollutant concentrations will be below required levels and for sulphur dioxide it will be equal to nearly 60% of the D 30 norm of 440 µ/m3.

II. Desulphurization of exhaust fumes and modernization

Power blocks Eight, Nine and 10 have been in operation for over 20 years and prolongation of their operating life up to the year 2000 requires:

A. Major overhaul of burners, construction of installation for dry desulphurization, replacement of electrofilters and reduction of nitrogen oxides concentration by the primary methods;
B. Major overhaul of turbine generators and the automatic controls;
C. Replacement or overhaul of electrical equipment of the blocks.

Block No. Nine has undergone these procedures; Block No. 10 was put out for modernization in July of 1994 and Block No. Eight will be modernized in 1995. Fulfillment of the environmental protection requirements, including those in force after 1987, that apply to currently operating facilities, will be guaranteed by the completion of the project to install dry desulphurization of exhaust fumes of up to 50% efficiency, conversion of burning technology allowing for reduction of nitrogen oxides to circa 30% using primary methods and the replacement of electrofilters with the new ones that are up to 99.8% efficient.

The dry desulphurization method relies on injection of lime into the burner at accurately determined locations and times. The lime then reacts with sulphur dioxide present in the exhaust fumes. The electrofilters trap the desulphurization products and the excess lime with the ashes.

Construction on this installation began in July 1993. The project included the management of storage and unloading for three blocks, complete lime transport and included an injecting system for number Nine burner and transport routes for the installations at Blocks Eight and 10. These tasks were completed in February 1994.

The decision to modernize the electrofilters was preceded by a detailed technological and economical analysis conducted with an emphasis on environmental protection. At that time, dust collection was 96.6% effective. The electrofilters are being modernized to achieve 99.8% efficiency so the 1997 dust emissions standards can be met. In February 1994, block Nine was put in service with the new electrofilter and in July 1994 the work began on modernizing the electrofilter on Block 10.

These steps decrease the dust emission from 85,845 tons/year (in 1985) to 10,500 tons/year and fulfill the dust emissions standards to be enforced after 1997; that is:

95 g/GJ for burners 8 - 10

90 g/GJ for fluidal burners.

The reduction of $N0_x$ emission from Turów Power Station is being accomplished through primary methods; that is, modifying the burning process of brown coal in the burners. When energetic fettles (material, such as sand or ore, used to line a furnace) are burned three types of nitrogen oxides ($N0_x$) are generated:

A. fuel $N0_x$, created from the nitrogen contained in the fuel itself;
B. thermal $N0_x$, created from the nitrogen contained in the air supplied for the burning process, formed at high temperatures;
C. fixed $N0_x$ created from the nitrogen supplied with air which are formed regardless of the temperature.

Nitrogen oxide (NO) constitutes circa approximately 95% of the series of nitrogen oxides ($N0_x$) formed. The means used to reduce $N0_x$ emission in Turów Power Station are as follows:

A. Reduction of the overall excess of air;
B. Air fractionating and partition of reaction zones into substochiometric afterburning zones;
C. Injection of compressed coal dust;
D. Identification of the optimum for the amount of air inside the burners;
E. Improvement of side mixing;
F. Exhaust fumes recycling.

The work aimed at reduction of $N0_x$ levels was started in 1989. The installation of equipment to reduce $N0_x$ levels for block Nine took its final and complete shape in 1995. Currently the block is operating in the start-up and training phase during which work is also carried out to optimize the operation.

The experience gained thus shows that improvement in the burning process connected with better air control, in air tightness of the burner and in coal grinding is possible and firmly underway.

III. The Effects of Ecological Policy

The emphasis on ecodevelopment of the state adopted in 1990, made it possible to select the priorities for implementation in the following three categories:

A. Short-range priorities, i.e. the most urgent issues, which should be completed by the end of 1994 due to direct impact on public health and the need to maintain the most valuable natural resources of the state;

B. Medium-range priorities; enabling Poland to halt the emission of pollutants into natural environment and adaptation to European standards by the year 2000, and thus enabling Poland to join the European Union;

C. Long-term priorities, focusing on the implementation of ecodevelopment principles in national economy, ensuring safe existence of society and stable natural conditions.

We believe that we can reach these objectives by the year 2020. The implementation of short-range priorities over the past two - three years shows that this process is being properly managed and does not require any fundamental changes in the ecological policy of the state. These results will be achieved through implementation of the following measures:

A. Enforcement of stricter environment protection policies, applied in the field of industry, municipal economy, and transportation;

B. Growth of financial outlays for environmental protection; and

C. (Unfortunately), a decrease in industrial output due to the state's economic and political transformations.

Eighty industrial plants specified on the national list and 800 plants from Voivodeship lists have been placed under special supervision. All of these enterprises were forced to change their technologies, construct or upgrade the protection facilities and develop rectification programmes. Plants that failed to produce programmes for eradication of environmental threats or that did not embark upon investment activities were subject to decisions that led to a halt in their operations. Up to seven plants were put out of operation, and in 25 cases only the most ecologically harmful technological lines have been shut down. The plants' ecological effects in the so called "List of 80" fully confirmed the integrity of such decisions, resulting in the reduction of dust emissions by 60% and gas emissions by 40% (mainly $S0_2$, $N0_x$, CS_2, and hydrocarbons). The amount of accumulated waste decreased by 40%, and the content of pollutants in COD [sic] sewage fell by 70%. In the programme focusing on raw material and energy conservation and energy efficiency improvements, special emphasis has been placed on the hard coal cleaning programme. As much as 953 billion PZL (approx. 41.5 million US$) were invested into 5 Upper Silesian collieries (Siersza, Jaworzno, Sonica, Knurów, Janina), which enabled the enterprises to reduce their annual $S0_2$ emission by 71 thousand tons.

A. The reduction of emission pollutants into the atmosphere in Upper Silesia and other ecologically threatened regions has been achieved through implementation of following measures:
    1. implementation of a coal desulphurization and cleaning programme;
    2. abandonment of ecologically oppressive technologies;
    3. elimination of small, local boiler units;
    4. provision of municipal and community gas networks;
    5. installation of appliances that reduce emissions into the atmosphere.

Adoption of all these measures resulted in the reduction of emissions of $S0_2$ by 1.2%; $N0_2$ by 8.2%; dust by 19%. The $S0_2$ and $N0_2$ emissions are lower than the decrease in levels anticipated over such a short period of time.

B. The potential to increase the supply of clean water for towns has been achieved due to construction of sewage treatment plants and water treatment stations and upgrading the water supply and sewage networks.

   1. currently eight water reservoirs are under construction;
   2. active construction, modernization and development of water supply systems is under way. As many as 300 sewage treatment plants are commissioned annually. In the years 1991-1993, 1950 sewage treatment plants have been commissioned of which 80% are based on biological treatment technology.
   3. activities aimed at identifying solutions to the problem of river water salinity with coal extraction sewage are underway. The daily salt input amounts to 6,000 tons of C1 and $S0_4$ ions, of which 30% is delivered into the Odra River basin, and 70% - into the Vistula River basin.

A sophisticated desalinization installation was recently put into operation at the Debiensko colliery in the Odra River basin. Another desalinization unit is ready for commissioning in Oswiecim which will treat sewage from the Piast, Ziemowit and Czeczott collieries. The above collieries contribute 58% of all the C1 and $S0_4$ ions supplied into the Vistula River.

C. Decreasing the noxiousness of wastes is the most difficult problem in Poland which inherited 1243 dangerous waste lagoons from the previous political administration. Most of these disposal sites do not incorporate base protection. In 1991, the State Environmental Protection inspection initiated an inventory of dangerous waste. The following projects were also completed in 1991:

   1. dangerous disposal incinerating plants in Gliwice and Dabrowa Górnicza;
   2. an installation built to reduce R11 [sic] thousand tons p.a. of post-chromium sludge at the Alwernia Chemical plant, which, however, constitutes less than 5% of such waste that is generated in Poland;

3. tunnel etching plant for hydrochloric acid with a regeneration station in 1992. In subsequent years more thermal waste disposal plants have been built and sophisticated dangerous; waste lagoons have been commissioned. However, during this same period of time the amount of industrial waste generated and disposed of in special plants or stored in lagoons has grown by over 250 million tons. The largest quantities of such industrial wastes are currently stored in the Katowice, Legnica, Walbrzych, Kraków and Szczecin Voivodeships.

Municipal waste constitutes another, universally difficult problem. For this reason, when creating new legal requirements concerning waste disposal, we rely on relevant European Union guidelines and experience achieved by other states.

D. Improvement of ecological security of state borders is based on the establishment of an effective control and warning system capable of sensing an influx of pollutants. The control and monitoring system should be implemented by the following measures:
   1. monitoring of water quality in frontier rivers;
   2. counteracting illegal imports of waste based upon: The Basle Convention on the Control of Trans-Border Dislocation of Dangerous Waste and its disposal (achieved through cooperation with Interpol).

E. Increasing the afforestation rates proceeds according to assumptions proposed by a programme submitted by the Forestry Research Institute, the General Management of State Forests in cooperation with MOSZNiL. According to the programme, as much as 30% of the country area is slated to undergo afforestation. Currently this figure is at 28% Protection of forest genetic resources is being implemented based upon GEF subsidies to the amount of $4.5 million USD. Polish Forestry priorities are based on international obligations, i.e. the Convention on the Protection of Biodiversity, II Ministerial Conference on the Protection of Forests In Europe. It should be noted that the Ministry of Environmental Protection and, Natural Resources and Forestry achievements in the realm of environmental protection over just three years have been

significant. However, other Polish decision-making organizations have failed to keep pace.

ENVIRONMENTAL PROTECTION IN THE POLISH ARMED FORCES

Like other governmental or private large-scale organizations, Poland's Armed Forces cause environmental damage. Only some of this damage can be attributed specifically to military operations. It is always necessary to work out a reasonable compromise between maintaining natural resources and enabling the Polish Armed Forces to accomplish their defence mission. Military operations must go hand in hand with ecological responsibility.

The declining military threat and the increasing degradation of the environment have led to a situation in which the Armed Forces are judged, not only by their ability to preserve peace, but also by their efforts to control environmental pollution and to actively contribute to environmental protection.

The Polish Armed Forces' activities in the field of environmental protection have been conducted for more than twenty years but not in a systematic and planned way. These activities have been conducted based on rules described in the Polish ecological law which treats the military as it does any other users of the environment.

Environmental actions influence both personnel accommodations (military housing estates and barracks complexes) and training areas and airfields. These activities cover, not only investment and repair of infrastructure, but a systematic, specialized evaluation of state of the environment with an emphasis on close cooperation with competent civil institutions. Military research centers have made great scientific strides in this area which non-military personnel can access.

The Environmental Office in the Ministry of Defence was established early in 1994. Its main emphasis is on the formulation of basic policy decisions, and coordination and control of the technical tasks of environmental protection to be performed by a specific organizational area, which includes general counseling provided to the appropriate activity/military leader.

The Polish Armed Forces environmental protection programme includes:

A. Cleanup - identification of the problem;

B. Compliance - all activities that ensure that current operations at Army installations must meet national environmental requirements and Army regulations;

C. Conservation - protection and enhancement of our natural resources;

D. Pollution Prevention - prevention of future pollution by reducing use of hazardous materials and release of pollutants into the environment;

E. Environmental Security Technology;

F. Safety and Health.

The Polish Armed Forces are facing the challenge in all areas of environmental concern. These areas mainly include the following:

THE PROTECTION OF ATMOSPHERE

The Armed Forces use thousands of boiler-houses. In recent years, pollution emissions have stabilized with some decrease due mainly to a decrease in fuel consumption. Actions to protect the atmosphere are a high priority in the government's programmes.

The direction of activities in the Ministry of Defence in the field of protection of atmosphere comprise:

A. The modernization of heating and local boiler-houses by:
    1. elimination of furnace heating and use of local boiler-houses, connection of military facilities to the city sources of heating;
    2. modernization of existing boiler-houses by replacing old boilers with modern high-duty and ecologically safe ones;
    3. conversion to hydro-carbon and high-calorie fuel and non-sulphured solid fuel.
B. Reduction in consumption of fuel and energy by:
    1. economical use of energy;
    2. improvement in insulation of walls and heating networks;
    3. regulation of quality of burning processes;
    4. installation of magnetizers to prevent boiler-scale.
C. Usage of non-conventional, ecologically safe sources of energy;
D. Installation of fumes-clearing devices and increase in the height of chimneys;
E. Permanent maintenance and proper exploitation of heating and air-protection devices;
F. Measurement of fumes emission, especially in boiler-houses where such measures are obligatory.

These measures should help us to achieve a 3% decrease in atmospheric emissions.

It is important to note that despite the high costs of planning and implementation of relevant projects, the rate of the successful regulation of formal and legal issues is high. Within the last 4 years the number of boiler-houses with permissible emission has increased by 70%.

We are also implementing measures to limit the emission of engine fumes. We have ensured our ability to conduct diagnostic examinations of engines (including the measure of fumes composition) in 80% of vehicles with spark ignition and in 60% of track vehicles and cars with self-acting ignition.

THE PROTECTION OF SOIL AND INLAND AND SEA WATERS

Of the total amount of sewage generated by military facilities, 65% is drained off to municipal sewage systems, 29% is drained off through their own purification plants to the soil and surface waters and the remaining 6% is transported to dumping grounds. The Armed Forces use hundreds of sewage purification plants (50% of which are biological and mechanic-biological ones).

Examinations of the level of degradation of soil and water environment in the airfield show that the ground is often polluted with fuel and lubricants. This is a threat to the sub-surface water table.

Only 50% POL (petrol, oil, lubricants) depots in military districts, 60% of airfield depots and 35% of stations and depots in Armed Forces units and formations possess the basic equipment needed to ensure environmental protection. Approximately 40% of our POL service's facilities have been in service for more than 30 years.

There is a trend toward a reduction in the total, absolute amount of domestic sewage transported by military bases. However, due to our lack of ability to purify this sewage to the degree required by newer Polish Water Law, the proportion and absolute amount of sewage carried away to dumping-grounds has increased.

The activities of the Armed Forces in the field of protection of soil and water are based on and driven by:

A. Modernization of sewage systems in military bases by:
    1. connection of military facilities to municipal sewage systems (purification plants and pumping stations);
    2. building and modernization of sewage treatment plants.
B. Protection of ground and water against possible liquid pollutants by:
    1. hardening of the roadbeds at railway refueling facilities;
    2. replacement of exploited fuel and chemicals tanks;
    3. protection against gas-leaks from the above-mentioned tanks (through use of concrete covers, impenetrable foil, etc.);

4. installation of leakage-monitoring systems in fuel and other tanks;

C. Recultivation of grounds polluted with oil-derived pollution;

D. Water treatment in harbor basins;

E. Installation of anti-oil dams in naval bases to prevent the spread of potential leakages during refueling or removal of bilgewater or used oil;

F. Construction of bilgewater and sewage collection systems in naval bases (including de-oiling plants for bilgewater);

G. Adaptation of ships to meet the ecological requirements of the Helsinki Convention;

H. Modernization of chemical cleaners through the introduction of closed cycle technology in washing machines and reuse of washing liquids;

I. Quality supervision of drinking, industrial and sewage and sea water in harbors and training areas;

J. Proper exploitation and maintenance of soil and water protection facilities.

NOISE REDUCTION

Aircraft operations cause more noise than any other source generated by the Armed Forces. The introduction of modified rules in the organization of air traffic (time, zones and flight level) has only slightly diminished the effects of airfield operations their immediate vicinities.

Local inhabitants and authorities are bringing increased pressure to bear on this issue. Heavy punishments are inflicted when operations exceed the permissible noise level.

Lack of knowledge and technology to lessen noise during take-offs and landings has forced the military to rely largely on passive measures which include:

A. Application of acoustic protection measures in buildings located within areas where the noise exceeds acceptable levels;
B. Establishment of noise protection zones within which the building of living and social facilities is forbidden;
C. Revision of existing regulations concerning the use of airfields as well as air traffic rules and procedures.

Current interpretation of the "Ecological Policy of the State" and the provisions of the draft of the Act on the protection of environment it appears that future designation of such protection zones will be rejected in the future. The voivode's (the head of provincial authorities) legal ability to close facilities that violate environmental protection regulations will force the military to view aircraft noise as a high priority issue and the focus of environmental research in the near future.

We foresee the following directions in the activities of the Armed Forces in the field of aircraft-generated noise pollution:

A. Production of acoustic maps for all military airfields - to help ensure rational town and country planning and the identification of preventive zones.
B. Installation of noise suppressing devices in aircraft engine testing places.

THE PROTECTION AGAINST ELECTRO-MAGNETIC RADIATION

The basic sources of electro-magnetic radiation in the Armed Forces are: radiolocation posts, radionavigation equipment in rocket artillery units, and high-power radio transmitters.

To minimize the influence of microwave sources on the environment we are implementing the following actions: the replacement of high power radar with other, less powerful equipment of this type; reduced hours of operation; the designation of radiation sectors, and the rise of radiation beam over inhabited areas. However, thus far these actions have not proved to be very effective.

Given the current state of technology in the field of microwave radiation protection, we have tested electro-conducting clothes and fabrics the effectiveness of modern protective glasses which are now being distributed among our radiotechnical units. Our combat vehicles are equipped with high-frequency radiation screens made of electro-conductive cloth.

The Armed Forces efforts to protect people and the environment against microwave radiation include:

A. Periodic examination of microwave radiation intensity in accordance with relevant regulations;
B. Development of expertise to determine the kind and degree of microwave radiation risk to people and the environment;
C. Establishment of protective zones in the vicinity of microwave radiation sources;
D. Reimbursement of eviction costs for persons displaced from such protective zones.

THE PROTECTION OF ENVIRONMENT AGAINST WASTE MATERIALS

The amount of domestic waste materials in the military bases and the cost of their removal has been successively increasing. The waste materials are carried out to the dumping grounds and are not re-used.

However, some types of waste materials of industrial value (such as old uniforms, glass containers, bones, tires, batteries, ammunition shells, tantalum condensers) are re-used. The scrap from the armament and technical equipment withdrawn from the Armed Forces is delivered to the steelworks.

The detailed planning and introduction of municipal and industrial waste material utilization programs and the neutralization of toxic waste materials is the government's highest priority. All the actions undertaken in this domain should be preceded by the examination of the composition of the military facility waste to categorize their type and content

Within the framework of such activity a priority should be applied to the following:

A. Safe neutralization of hazardous toxic residues;
B. Recycling of materials;
C. Safe combustion of chronically hazardous wastes (residues) that pose chronic health risks;
D. Creation of a pre-identification system for municipal wastes to determine proper methods of disposal or re-use (composting, combustion or bio-gas production).

PREVENTION OF CHEMICAL AND RADIOACTIVE CONTAMINATION

Within the framework of the modernization of the radioactive contamination detection system the following organizational actions have been undertaken:

A. The organization of a monitoring network based on automatic contamination measurement and wire data transmission;

B. The establishment of cooperation between the State Atomic Agency and with the Ministry of Environment Protection, Natural Resources and Forestry the inclusion of a subsystem for radioactive contamination detection in the state contamination monitoring system;

C. The organization of contamination detection system training, to include participation from operational groups and data collecting groups from the Central Analysis Contamination Center.

It is generally safe to say that our Armed Forces observe existing environmental protection regulations concerning chemical and radioactive contamination. Inspections of stored and employed combat training toxic agents, decontaminators, radioactive preparations, and incendiary components have revealed neither clear violations nor threats to people or the environment.

With regard to anti-chemical training, we have relinquished the use of combat toxic agents and open ionizing radiation sources and replaced them with simulation contamination agents of which only training combat toxic agents and training tear gas grenades may create a threat.

THE PROTECTION OF THE EARTH'S SURFACE

For many years a tendency to reduce agricultural areas used by the Armed Forces has been observed. From the point of view of agri-technical and ecological requirements the policy on land usage is being carried out properly. High prices have caused the usage of mineral fertilizers to decrease. Nevertheless, this year it was higher by 9% than the average usage in the country.

In addition, our engineering troops are often engaged in:

A. Explosive and mine clearing activities in the land and air training fields;

B. Pyrotechnical inspections on real estate and other facilities handed over to the Polish side by the former Soviet Army.

In 1993 as a result of the above-mentioned actions about 175,000 unexploded shells were neutralized. One hundred and thirty three (133) [facilities or sites] were under anti-flood and anti-ice protection of the Armed Forces (including 32 [facilities or sites] under permanent protection and 121 [facilities or sites] under emergency protection.

For the last 4 years the military have planted about 200,000 trees and 1,500,000 shrubs in the accommodation facilities. The tendency to decrease the proportion of the green areas in such facilities has been stopped, and a small increase has been observed.

For many years the Armed Forces and the Nature Preservation League have achieved positive results from a country-wide tree and shrub-planting programme. They have afforested about 8,000 hectares of wasteland, planted about 4,000,000 trees and shrubs, cultivated more than 300 hectares of established and growing forestland, and cleared about 800 kms of fire-extinguishing wood strips.

OTHER ECOLOGICAL ACTIVITIES

The military also participates in the ecological activities of such organizations as the Polish Academy of Sciences, the Scientific-Technical Council of the Ministry of Environmental Protection, Natural Resources and Forestry, and the Parliamentary Commission on Environmental Protection. We also cooperate with the Nature Preservation League, especially their forest planting activities.

The military also has close contacts with the State Inspectorate for Environmental Protection. An option is under consideration to include military research institutes and sanitary-epidemiological centers in the state monitoring system of environmental pollution in the future.

The implementation of planned ecological programs takes place under the complex social-economic conditions and the new national legal system which is currently being amended. This transition will require the Ministry of Defence to adapt to new conditions and to take into account the increased number of ecological problems it must face despite decreasing resources devoted to investment and repair. Despite these limitations the military had undertaken a broad range of ecological activities but cannot guarantee fulfillment of all defense sector environmental problem solutions.

It is important to stress the contributions military research centers have made; their excellent professional preparation have caused many civilian institutions to become deeply interested in working closely with them.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olsztyńskie
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APPENDIX I

ENVIRONMENTAL PROTECTION IN ROMANIA

By LTC Jordache Olaru
Ministry of National Defence Romania

May 1995


Romania
100 km
100 miles
Slovakia
Ukraine
Hungary
Moldova
Serbia
and
Montenegro
Bulgaria
Black
Sea
48
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21
24
27
30
Satu
Mare
Baia
Mare
Suceava
Botosani
Prut
Iasi
Zalau
Dej
Bistrita
Piatra
Neamt
Roman
Oradea
Cluj- Napoca
Husi
Vaslui
Turda
Tirgu Mures
Bacau
Miercurea- Ciuc
Arad
Mures
Alba Iulia
Medias
Siret
Birlad
Deva
Sfintu Gheorghe
Timisoara
Sibiu
Focsani
Lugoj
Hunedoara
Brasov
Galati
Petrosani
Resita
Rimnicu
Vilcea
Buzau
Tulcea
Tirgu Jiu
Tirgoviste
Ploiesti
Braila
Danube
Drobeta- Turnu
Severin-
Jiu
Pitesti
Ialomita
Slobozia
Slatina
Bucharest
Craiova
Constanta
Olt
Alexandria
Giurgiu
Calarasi
Calafat

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ENVIRONMENTAL PROTECTION IN ROMANIA
- Achievements and Prospects -

by LTC Jordache Olaru
Ministry of National Defence
Romania

I. Environmental Protection Aspects in the Military

For a long time the conservation of nature has been limited to protecting some species against abusive mistreatment and to the establishment of protected areas such as national parks and reserves.

The aberrant development, throughout the country, of many industrial giants, has led to continuous air and water pollution, the uncontrolled destruction of soil, forests and vegetation, and the alarming growth of unusable waste products. These are just a few of the problems those in charge of environmental protection have cited in their decision to take a number of measures to preserve and protect nature.

The Romanian Armed Forces are fully engaged in an extensive process of implementing democratic changes in accordance with the Individual Partnership Program and the Romanian and American military cooperation program (Mil-to-Mil). Within these combined frameworks, the defense establishment is developing a concrete series of activities in the environmental protection area to improve both the image of our military and its fields of responsibility.

From 1990-1995, the Romanian Armed Forces carried out a series of representative actions in this area, out of which the most relevant are the following:

A. The inclusion of Article 13 of the Law of National Defence which stipulates that "it is compulsory that the training activities carried out within the boundaries of our national terrestrial, air, maritime and riverine space are conducted in observance of the environmental protection standards." This is the legal foundation for environmental protection organization, action and coordination in our military;

B. A specialized framework within which to pursue environmental protection initiatives has been set up at the level of the Romanian Ministry of Defense whose main tasks are to organize, conduct, control and coordinate all the activities in this field;

C. Since 1993, Romanian officers from different branches of the various services have been attending symposia and courses on environmental protection organized by the NATO School (SHAPE) in Oberammergan-Germany;

D. The Romanian Ministry of National Defense is enforcing the "Technical Provisions on the Protection of the Atmosphere" and "The Methodological Regulations On Polluting Atmospheric Emissions From Stationary Sources" published by the Ministry of Waters, Forests, and Environmental Protection;

E. New military regulations, specialized instructions for all service branches incorporate provisions of the national legislation on environmental protection and of the International Conventions which Romania has signed;

F. Military units and formations take part in river and forest clean-up projects in mountain areas that the military owns and administers;

G. Participation in forestation and reforestation campaigns in military owned and administered areas that exhibit soil erosion, abusive timber cuts, contamination, and destruction caused by natural disasters, etc.

Careful analysis of the military's activities proves its commitment to conducting traditional professional training without endangering the environment. We are going to point out some of the measures that can confirm this statement:

A. Soldiers' training is conducted in specific training ranges; there are few real fires or exercises (one for each service branch and joint arms commands);

B. Military specialists within the Procurement and Logistics Department focus on research aimed at conventional arms reduction and identification of new materials and approaches to foster environmental protection;

C. Non-production, non-storage and non-use of chemical weapons in military training exercises by, for example, using fake chemical substances that do not contaminate the environment;

D. Air Force and Navy units carry out as few training exercises as possible inside the national air space or in the Black Sea basin in order to comply with the established limits of air and water contamination in these areas;

E. The number of real tactical and operational troop exercises has been reduced; instead they conduct map exercises, and computer simulations;

F. The Romanian Ministry of Defense (MOD) has expressed a permanent and constant commitment to, in accordance with current environmental legislation, obtain an "environmental permit" for all new military construction from the national authority responsible for environmental protection: The Ministry of Waters, Forests, and Environmental Protection;

G. The Logistics Command (which is in charge of the food supply for the conscripts) is showing increased interest in improving farming practices, by preventing surface water contamination, reducing the use of pesticides, and by conducting water and waste water remediation.

The transition problems that affect our country's economic, social and administrative system--most of them caused by financial difficulties--are having a serious impact on the military system as well. The Romanian Ministry of Defense leadership is fully aware of the environmental protection field's highest priorities and of the importance of educating the military about ecology and would like to enhance the activities that are already being carried out.

In the future the MOD plans to:

A. Prepare a program to provide environmental protection education for the military to raise their awareness of the importance of implementing preservation projects and of minimizing environmental destruction.

B. Include in educational curricula and syllabi at all levels a section on environmental protection;

C. Develop military regulations and instructions in compliance with environmental protection legislation at the national level;

D. Create new specialized frameworks to deal with environmental protection issues at all services and departments within the Ministry of Defense;

E. Coordinate, conduct and finalize special events in cooperation with the Ministry of Waters, Forests and Environmental Protection during the European Year of Nature Conservation - 1995;

F. Organize and develop a special program for recycling and remediation of waste materials that can lead to important financial and energy savings;

G. Increase information and experience-exchanges with specialized organizations that are dealing with environmental protection issues in connection with other countries' armed forces.

GENERAL CONSIDERATIONS ON ENVIRONMENTAL PROTECTION IN ROMANIA

I. Background

Over the past few years, the post-Communist countries of Eastern Europe, due to a significant decreased in the availability of centralized funds, have found it difficult to solve environmental protection problems. They have been forced, in the free-market economy, to manage their scarce financial resources very carefully. This has rendered many enterprises incapable of implementing environmental protection measures and of operating existing installations properly.

A decrease in industrial production in Romania from 1990-1994 has led to an annual decrease in the amount of pollution in local areas. In some industrial regions, however, - mainly those with metallurgy and heavy non-ferrous metal smelters (Copsa-Mica, Baia-Mare and Zlatna), with energy industries, with electric power stations, coal supplied electric power stations (Rovinari, Turceni)), with siderurgy [sic] (Hunedoara, Calan, Resita, Galati, Calarasi) -- pollution is still a major problem.

Twenty percent of the total length of economically and socially vital rivers are polluted and approximately 200,000 hectares of soil are heavily contaminated. Extensive soil erosion has been recorded as well.

If we were to offer a general evaluation of Romania's environmental conditions, it would be appropriate to say that the country's status is similar to that of other Central and Eastern European countries which have several "hot areas" of severe pollution, along with large regions where the natural beauties are well preserved. After December 1989, a new strategy and a program of common actions have been promoted, including measures for both water and forest management and for environmental protection. This is part of the Government Program approved by our Parliament.

Our country's environmental protection strategy is based on the detailed analysis of the status of the environment; for example, the water management policy expresses the need to

achieve an appropriate balance between efficient use of water sources and their protection against depletion. The main objectives are a complex organization of water resources and their protection against depletion. Through the management of an entire water basin, it is possible to achieve optimum water distribution among various consumers, protective measures against pollution, and the revitalization of water resources.

II. Romania's Actions for Environmental Protection

In accordance with key strategy objectives of the country's environmental protection strategy, Romania's major pollutant sources have been assessed and classified, and a priority actions list containing the 14 "hot spots" has been developed. Programs and measures have been initiated to reduce and prevent pollution and to restore affected areas (Copsa-Mica Baia-Mare, and Zlatna).

From a legislative point of view we may say that since the Ministry of the Environment was created the most important environmental protection laws have been passed. One of these laws, the Law on the Danube Delta Biosphere Reserve is the first important piece of legislation to focus on the protection of the approximately 600,000 hectares covered by the Danube Delta which is considered a biosphere reserve. This is the first important law on environmental protection regarding the status of the approximately 600,000 hectares that represent Danube Delta biosphere.

Laws on environmental protection are constantly being improved, and technical guidelines that set limits on harmful substances that can damage the biosphere have been published. However, it is still difficult to control the activity of economic dealers and ensure their compliance with standards set by local authorities. The act of controlling the economic dealers' activity and their compliance with the local authorities set standards in this field.

We will continue to produce modern equipment for use in laboratories and in the network that monitors environmental quality.

We have purchased mobile laboratories performing air quality tests, spectrophotometers with atomic absorption, gamma spectrometric devices for the first nuclear power station at Cernavoda, and quick-testing instruments to determine water quality; all of this equipment

represented a financial expenditure of up to 2 billion lei and 450,000 lei from non-reimbursable funds. [According to the author, the lei, the Romanian currency had an exchange rate of 2100 lei to $1 U.S. in October 1995.]

The Environmental Protection agencies (local branches of the Ministry of Waters, Forests and Environmental Protection) are in charge of monitoring investments in the environmental protection field. In 1993, economic units throughout the country conducted pollution reduction projects at an estimated cost of 50 billion lei and in 1994, 50 billion lei was given to only one smelter (the Romplumb from Baia-Mare)..

In the last 2 years many other environmental protection activities have been conducted:

A. Increased legislative support was provided through specific regulations on: the mandatory impact assessment and environmental permits and the import of hazardous wastes a.s.o. [sic]

B. Special measures have been taken to protect inhabited areas and, water resources, and to provide water supplies for industry, population, etc..

C. Joint controls have been implemented both by the representatives of the environmental agencies and by the sanitary police, focusing on tap water supply sources and in inhabited areas, sanitarily protected areas, and on waste water treatment.

D. Coordinated exploitation of artificial lakes has been carried out with attention to their double use as sources of water supply and as a means of generating electric power.

E. Restrictions have been set on wood-cutting, not to exceed 15 million cubic meters; a figure that represents our forest capacity according to silvicultural assessments.

F. Improved monitoring equipment has been introduced for the transmission of meteorological and hydrological databases which are used to process and store information on qualitative and quantitative water management.

G. In 1993, the first measures to invest in water management, forest management and environmental protection were taken; these goals will be achieved through increased funding and focusing on small and achievable goals. With this in mind, a series of 31 separate projects will be conducted.

III. Prospects on environmental protection in Romania

The major prospective action-items aimed at achieving environmental protection in Romania are the following:

A. Development of legislation related to environmental protection in Romania;

B. Establishment of the legislative framework needed to sustain and support investments in the environmental field, especially through the adoption of an advantageous fiscal policy;

C. Encouragement of major investment in environmental protection;

D. Provision of foreign investors to accept the entire costs for environmental restoration of the areas that their activities will disturb;

E. Closing down of polluting industries and extension of protected regions;

F. Increase in government financial support, for as long as necessary to help the major industrial polluters to become proficient in cleaning up pollution, preventing it, and in learning how to comply with environmental legislation, primarily during the first stage of the transition period;

G. Organization of special events to celebrate the European Year of Nature Conservation;

H. Extension of international cooperation in the environmental field.

IV. Conclusions

Since the current environmental legislation is already in accordance with international standards, there is no risk that Romanian companies will enjoy an undue competitive advantage by facing less stringent environmental requirements than international companies. We believe,

therefore that all investors will encounter identical business conditions at both the European and the Eastern European levels.

Foreign investors who are willing to invest in Romania should be aware that we have a series of laws to support them, such as: the Law of Foreign Investors, the Law of Joint Venture, the Law of Privatization, and the Law of Agriculture.

Everyone who wishes to carry out activities that may have an environmental impact must obtain an Environmental Permit from The Ministry of Waters, Forests and Environmental Protection. All existing facilities must obtain an environmental authorization to continue their operations.

It is important to keep in mind that all Eastern European countries are facing significant economic difficulties in their quick transition to a free market economy. Due to these difficulties, there is a risk that environmental protection problems will be solved only after the necessary steps have been taken to spur economic growth that can create new financial sources. However, this economic growth should be sustainable.

APPENDIX J

ENVIRONMENTAL CONDITIONS ON THE TERRITORIES OF RUSSIAN ARMED FORCES DISPOSITION

By A. I. Kuzin and V. G. Safronov
Ministry of Defense of the Russian Federation

May 1995


Russia
Arctic
50
90
130
170
80
50
10
Barents Sea
Laptev Sea
Norwegian Sea
Kara Sea
East Siberian Sea
Chukchi Sea
Bering Strait
Baltic Sea
Sea of Okhotsk
Sea of Japan
Black S.
Caspian S.
Pacific Ocean
Arabian Sea
Bay of Bengal
Indian Ocean
Norway
Finland
Ukr.
Bel.
Europe
Kazakhstan
Mongolia
China
Japan
Central Asia
S.W. Asia
South Asia
East Asia
S.E. Asia
Northern Africa
Makarova
Dudinka
Noril'sk
Murmansk
Gornyatskiy
Kandalaksha
Nar'yan Mar
Arkhangel'sk
Syktyvkar
St. Petersburg
Vologda
Yekaterinburg
Perm'
Tobol'sk
Tara
Tomsk
Moscow
Kazan
Nizhny-Novgorod
Omsk
Ob
Novosibirsk
Chelyabinsk
Kargat
Barnaul
Saratov
Volgograd
Volga
Samara
Irkutsk
Ulan-Ude
Baley
Bratsk
L. Baikal
Chita
Amur
Skovorodino
Magdagachi
Blagoveshchensk
Yuzhno Sakhalinsk
Petropavlovsk-Kamchatskiy
Rostov
Groznyi
Khabarovsk
Vladivostok
Nakhodka
Taksimo
Aldan
Yakutsk
Magadan
Paren
Anadyr'
Bilibino
Ugal'nyye Kopi
Yenisey
Lena
2000 km
2000 miles

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ENVIRONMENTAL CONDITIONS ON THE TERRITORIES OF RUSSIAN ARMED FORCES DISPOSITION

by A. I. Kuzin and V.G. Safronov
Ministry of Defense of the Russian Federation

The particular role of the Armed Forces in the system of state environmental security depends on the following circumstances:

First, it is impossible to create environmentally safe weapon and military technologies.

Second, the Armed Forces, in particular because of their main function and because of the presence of technology that requires large power and material capacities, are very environmentally hazardous. Sources like nuclear and chemical weapons, a nuclear fleet, and missile forces pose great danger to the environment.

Third, the Armed Forces negatively impact the environment with daily activities, such as dumping non-purified effluent, contaminating soils and surface and ground waters with oil products, and using toxic components of nuclear fuel and other hazardous materials. As a result of these activities solid and liquid radioactive wastes accumulate.

Fourth, the Armed Forces program on destruction of and the reduction of the number of nuclear, chemical, and conventional weapons potentially endangers the environment.

Finally, the Armed Forces possess the scientific technical capabilities for resolving not only military, but also state ecological problems.

Daily activities such as training, weapons testing, and others have caused environmental problems that need to be resolved immediately.

The formation of radioactive waste is a result of military activities such as the temporary shut-down of and liquidation of defense establishments that contained nuclear weapons, and the utilization and decommissioning of nuclear vessels and their maintenance depots.

The volume of liquid radioactive waste (LRW) created in the Navy has not changed in the past few years, and registers at the level of 18-20,000 cubic meters every year. Approximately 40% of it is formed in the Far Eastern regions. The activity of liquid radioactive waste ranges from 10^{-7} to 10^{-3} curies per liter. All in all the Navy stores 10,000 cubic meters of liquid

radioactive waste with a total activity of 200 curies. LRW is collected, processed and stored in special tankers and floating bases. The Pacific Fleet possesses three special tankers and two floating depots, while the Northern Fleet has only one special tanker. LRW is reprocessed no less than 100 times on these ships. One more technological transporter is under construction because the existing ones are completely full. At the same time special tankers are used as temporary storage and reprocessing facilities.

In 1994, the amount of solid radioactive waste (SRW) did not exceed 3,500 cubic meters. SRW storehouses, built in 1960-1962, are currently used, although they are almost filled to capacity as well. A project for creating specialized coastal technical complexes for liquid and solid radioactive waste processing has been developed, but the decision to build these complexes in the Far East and in the North has yet to be made. Financial questions on how to build and how to further develop this project have not been solved either. Waste accumulation deteriorates the radioecological environment of the territories of fleet disposition and of utilization and maintenance areas. There are technical solutions for the burial of low-, medium-, and high-level radioactive waste and spent fuel not designated for reprocessing.

Russian specialists developed a system of technical measures for thorough (from 10^4 to 10^5 times) LRW purification. These measures are unique. The resolution of financial issues faced by the federal program "On the Handling of Radioactive Waste for 1995-2005" will help solve the radioactive waste problem quickly.

There are technical procedures which can solve not only radioactive waste problems in Russia, but also the issue of accepting foreign radioactive waste for reprocessing and burial in Russia, if financial and intergovernmental decisions are also made.

Environmental pollution from missile and space activities is characterized by various influential factors. Among them, the main factors are:

A. penetration into fall-out areas of shattered carrier-rockets, metal rocket booster fragments, and fuel remnants;
B. atmospheric pollution from rocket fuel combustion products including ozone-active elements (nitrous oxides, chlorine compounds, etc.);
C. the formation of orbital groupings of space debris surrounding the earth;

D. the release of various toxins during ground operations.

Among all of these factors, the pollution of fall-out areas is very important because of toxic rocket propellants such as unsymmetrical dimethylhydrazine, nitric acid, and nitrous oxides. The presence of toxic unsymmetrical dimethylhydrazine in these areas has resulted in its accumulation in the soil and groundwater. Its concentration is much higher than the permissible level. The difficulty of solving this detoxification problem in the areas of propellant spills is determined by the physical and chemical properties of these compounds and by the landscape, hydrological characteristics, and other peculiarities of the area.

From an environmental perspective, the most important factor to be added to the list is the influence of rocket fuel combustion products on the atmosphere and its main elements. The following table lists the composition of propellant combustion products used in Russian and foreign rocket technology.

Composition of combustion products

	Quantity of given fuel combustion products									
Object	H_2	H_2O	CO	CO_2	N_2	HCL	CL	NO	Al_2O_3	Пр.
"Cosmos"	0.96	25.3	8.29	20.9	24.5			0.64		0,11
Rocket	0.35	4.16	0.78	6.1	5.2			0.23		0,02
"Soyuz"	1.40	40.9	52.4	59.6						0,02
Rocket	1.00	23.3	32.7	34.0						0,01
	0.48	4.20	8.0	9.7						0,01
Space Shuttle	38.8	826.2	131.3	66.2		193.1	4.50	1.72	279.6	1,14
"Proton"	1.32	192.9	27.4	207.3				5.95		0,32

An analysis of the data in the table shows that rocket fuel combustion products consist of a number of compounds that are dangerous for the ozone layer, especially with the catalytic reaction caused by their interaction with atmospheric ozone. Solid propellant/rocket fuel combustion products, containing chlorine, have an even stronger, negative effect. Their catalytic activity causes more atmospheric destruction than the catalytic activity of, for example, nitrous oxides. This factor must be taken into consideration in connection with the direct escape of combustion products from heights of 10 to 40 km, despite existing atmospheric pollution from ozone-active compounds and the relatively low contribution of rocket technology.

Among the negative influences of rocket technology on the environment, pollution from artificial objects in space has become very real in the last five to 10 years. Currently, the number of large fragments in the atmosphere registers at nearly 8,000. These fragments, 10 centimeters in diameter, are observed and tracked from the earth. However, a large group of smaller, but still very dangerous particles exists. The number of particles sized one to 10 centimeters is already 35,000, although more pessimistic estimates give a figure of 70,000. The number of even smaller particles (less than 1 centimeter) is 3.5 million. This cloud of space debris poses a direct threat to space activities, especially during the implementation of space exploration and training programs.

In addition, chemical pollution of the biosphere represents a negative factor in missile and space activities. This pollution results primarily from vapors and from liquid phases of rocket propellants during the technological preparation process for the utilization and during

maintenance. Most existing complexes have special devices to utilize the released chemical compounds. But in many cases, they are not completely successful at preventing emissions of toxic compounds into the atmosphere and onto the surface of the earth. Hence, during the preparation of the carrier rocket "Cosmos," a certain amount of unsymmetrical dimethylhydrazine can permeate the environment and that act pre-determines the necessity of special safety devices.

Taking into consideration the significance of the negative effect of rocket technology on the environment, the Russian Ministry of Defense has undertaken serious steps in the implementation of environmental protection measures.

It is important to emphasize two main directions in solving this problem:

A. Technological perfection of all rockets and carrier-rockets;
B. Clean-up of technogenically polluted territories, Ministry of Defense regions, and fall-out areas.

Concerning the first direction, above all, a wide spectrum of activities is intended for ecological improvement of technologies in all future developments. These activities include, above all, a renunciation of ecologically dangerous fuel components and an attempt to use primarily non-toxic elements (such as liquid oxygen and hydrogen, condensed natural gases, low toxic hydrocarbons).

Regarding the use of space vehicles, it is necessary to shift completely to reusable systems, which will solve the problem of fall-out areas. In addition, during the development of new rocket technology projects, certain requirements, such as the elimination or minimization of rocket boosters and space fragments remaining in Earth's orbit, will be implemented.

It is also important to improve the environmental characteristics of operating missile and space complexes. In the context of this statement, the "Rocket Ecology" project plays a very important role. The project is undergoing expert examination within the research programs financed by the International Science and Technology Center.

The essence of the project is the development of a detoxification method for unsymmetrical dimethylhydrazine in the tanks of the rocket during the passive part of the flight.

After the separation of the rocket stage, a certain amount of spontaneously combustible oxidizer, mixed with an oxidizing inhibitor, is forwarded into the fuel tank. This process halts the explosive flow. The amount of the oxidizer is computed to provide for the conversion of practically all of the unsymmetrical dimethylhydrazine into non-toxic combustion products, which are discarded through the drainage valves into the atmosphere during the passive phase of the flight.

Theoretical and experimental research proved the effectiveness of this method of detoxification. The possibility of its practical realization is currently being considered for application to the carrier-rocket "Cosmos." These projects can also be of significant interest to Western Europe, the USA, and China, because they use unsymmetrical dimethylhydrazine-based, highly toxic fuel.

The implementation of purification measures in regions and fall-out areas polluted by the Ministry of Defense is also significant. It is necessary to note certain positive results achieved during the last few years concerning the collection, distribution, and re-utilization of metal rocket and carrier-rocket fragments. From 1991 to 1994, 6,000 tons of metal were collected and taken out of the space-vehicle launching site "Plesetsk" and from the Arkhangelsk region. Most of it had significant commercial value. It is more difficult to deal with the detoxification and restoration of soil subjected to the toxic components of rocket fuel. However, work efforts to determine the level of pollution in the soils and to create a complex for recultivation activities is currently underway. The design of new experimental examples is expected by 1997-1998.

Pollution from oil products as a result of spills and leaks is one of the most critical, unsolved environmental problems in the Armed Forces. The intensive year-around use of oil products (more than 13 million tons) at military bases and depots has resulted in leaks for several decades.

Unsatisfactory technical conditions, untimely repairs, and the reconstruction of fuel depots continue to cause significant oil spills affecting surface soil and water, as well as subsurface soil and groundwater. Sometimes it leads to the formation of subsurface oil lenses. In the "Engels," "Eisk," and other garrisons the environmental situation is a very serious problem.

The total area of oil-polluted lands is approximately 3,100 hectares, which makes up nearly 0.02% of all Ministry of Defense territories. The level of pollution from oil products at sea remained high even in 1994. In the main fleet disposition areas a concentration exceeding the utmost-permissible level by 2.5 to 20 times was observed. The Navy possesses only 74 oil collectors for the purification of polluted areas. These capabilities do not even exceed 50% of the Navy's needs.

A real pollution problem in the Armed Forces occurs due to emissions of harmful substances, such as household garbage and solid waste, from garrison boiler-houses, building enterprises, repair shops, sewers, and military state farms.

In 1994, discharges into the atmosphere were made by stationary sources during training and routine military activities. During this time nitrous oxides, carbon monoxide, sulfur anhydride, vanadium oxide, solid particles, and others were released into the atmosphere. Armed Forces operations in 1994 released a total of 700,000 tons of non-purified solid waste. However, nearly 100,000 tons of waste underwent purification processes and can be added to the group of normatively cleaned waste. The volume of discharges has increased because old boilers are still being used.

The existing environmental pollution is the result of garrison sewage, the volume of which exceeded 500 million cubic meters in 1994. Of this amount, nearly 400 million cubic meters of it underwent purification and can be accepted as cleaned according to norms. However, in the Far Eastern and Baikal garrisons up to 40% of the outflow does not go through the purification process, and the Baltic and Northern garrisons are equipped with sewage systems for only 6-15% of their waste. At the present time more than 300,000 cubic meters are dumped from coastal facilities every day. Only 48% of this amount undergoes the purification process.

The pollution of garrisons and surrounding forest areas with household refuse, construction debris, and metal waste is a serious problem in the Armed Forces. Nearly 10 million tons of household garbage and more than 850,000 tons of solid industrial wastes are accumulated daily at Ministry of Defense establishments. Nearly 90% of solid household wastes are taken to dumps, and only an insignificant portion is forwarded to special plants for burning.

The results of the analysis of the environmental situation show that the emissions of pollutants from military activities is significantly lower than emissions from industrial plants. Most military garrisons have the same effect on the environment as small and medium-sized industrial plants.

In general, in 1994, the ecological situation in the Armed Forces is still evaluated as unfavorable and worsening. The main reasons for this complex situation are:

A. The absence of a purposeful program for financing nature protection; the small number of environmental agencies and subdivisions in the Army and in the Navy;
B. Flaws in normative methods and scientific technology for environmental security; the absence of a system of environmental education, training, and up-bringing; violations during the construction and operation of environmental establishments; breaches of operating requirements.

The Armed Forces are conducting scientific research on the issues of military ecology. The most important scientific programs organized by the Ministry of Defense in 1994 include:

A. The development of general technical requirements for the provision of environmental security regarding weapons testing and military technology;
B. Research on environmental problems in the Russian Armed Forces;
C. The development of science and technology programs for environmental security in the Russian Armed Forces;
D. The development of a methodology for estimating environmental degradation caused by military activities;
E. Research on the negative influence of the Armed Forces on the environment;
F. The development of a method of certification of military establishments in the Armed Forces;
G. The development of simple methods of estimating the environmental situation at military establishments.

A number of activities in 1994 have been devoted to the monitoring and restoration of the environment. In particular, military establishments are being examined. These examinations lead to the creation of databases which can be used to establish priorities for choosing the establishments that require purification and can evaluate the nature and the scale of the pollution.

The thorough examination of military establishments is aimed at creating maps of polluted areas, measuring the level of danger for the environment, and choosing rational technology for purification processes.

The results of these activities permit us to conclude that, at the present time, the problems of thorough analytical evaluation of Ministry of Defence establishments are being solved satisfactorily. More than that, the practical application of these activities allows us not only to take environmental rehabilitation measures, but also to formulate more precise requirements that will guarantee environmental security at existing and future military establishments. It will also help create a proposal on the modernization of existing and creation of new instrumental devices and methods for environmental monitoring.

The most costly and important activities are directly connected with the immediate restoration of the environment. Most of all, these activities include the development of technology for soil purification and oil pollution cleanup, using modern methods such as biodestruction.

To recapitulate, it is important to emphasize the fact that the Russian Federation Ministry of Defense is constantly trying to lighten the burden on the environment resulting from day-to-day military activities. Intensive work is being conducted on the implementation of measures, aimed at creating a healthier environmental situation in the dislocated areas [areas occupied or affected by) of the Russian Federation Army and Navy. This work and a sufficient level of financing will allow the resolution of environmental problems currently facing Russia and other countries of the world.

APPENDIX K

ENVIRONMENTAL PROGRAM IN THE SLOVAK ARMED FORCES AND IN THE SLOVAK REPUBLIC

By Lubomir Kusnir
Ministry of Defence of the Slovak Republic

May 1995


Slovakia
Katowice
Krakow
100 km
100 miles
50
Poland
Czech Republic
Brno
Zilina
Vah
Povazska Bistrica
Ruzomberok
Martin
Poprad
Bardejov
Presov
Humenne
Trencin
Spisska Nova Ves
Hornad
Brezno
Prievidza
Kosice
Michalovce
Nove Mesto nad Vahom
Piest'any
Ziar nad Hronom
Topol'cany
Banska Bistrica
Roznava
Hlohovec
Zvolen
Banska Stiavnica
Cierna nad Tisou
Trnava
Nitra
Hron
Lucenec
Austria
Bratislava
Levice
Nove Zamky
Ukraine
48
Dunajska Streda
Komarno
Danube
Budapest
Hungary
Romania
18
20
22

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ENVIRONMENTAL PROGRAM IN THE SLOVAK ARMED FORCES AND IN THE SLOVAK REPUBLIC

by Lubomir Kusnir
Ministry of Defence of the Slovak Republic

Environmental conservation in the Slovak Republic is based on the government's environmental policy. The Slovak Republic's objectives and plans for implementation in this area are being formulated within the context of policies and programs implemented by the United Nations, the Organization for Economic Cooperation and Development (OECD), the European Union, NATO and other joint bodies. Adherence to relevant statutes in international law and an awareness of integration trends in Europe are taken into account as well. Current objectives include efforts to achieve global environmental safety (ozone layer protection, moderation of the "greenhouse effect," nuclear and radiation safety of nuclear installations...), and to comply with statutes stated in international law and acknowledging current integration trends in Europe.

The state environmental policy has identified three sets of objectives:

long-term objectives	(from 2010 to 2030)
mid-term objectives	(from 2000 to 2010)
short-term objectives	(to be acheived by 1996)

The Slovak Republic's ability to achieve these objectives, which focus primarily on eliminating sources of air, water and soil pollution, should greatly improve environmental conditions throughout the nation. A waste economy program, based on an existing waste regulation law, has also been introduced. Its main objectives are:

A. Prevention;

B. Waste utilization and recycling;

C. Optimization of refuse disposal;

D. Controlled waste transportation;

E. Redevelopment of old uncontrolled waste disposal sites and other environmental burdens.

Specific conditions in targeted locations, which includes the type, level and amount of pollution they contain, will determine the type of technology used to remediate polluted soil and water. The amount of legally permissible pollutants an area may contain will be based on the location and intended use of each site. The current concentration limits are derived from valid standards set by the Slovak government.

The Slovak Armed Forces' environmental conservation practices are based on the government's environmental policy. The military's priorities, principles and objectives (long-, mid-, and short-time) reflect the mission and needs of the Slovak Armed Forces. A waste economy program has been developed for each service and component of the Armed Forces and each is being implemented step by step. The military establishment is finding it difficult, however, to eliminate inappropriate waste disposal sites that contain hazardous waste and other inappropriate or dangerous materials.

The Slovak Republic's environmental regulations apply to both the military and civilian sectors. The Armed Forces receive no exemptions; in their efforts to remediate polluted waters and soil, they are subject to the same "strict" criteria and standards that apply to Slovakia as a whole. The Slovak Environmental Inspectorate oversees the implementation of these criteria and standards.

The former Soviet Army's activities have caused the largest amount of soil and groundwater pollution (oil-product-based pollution in particular) in SLIAČ-VLKANOVÁ, LEŠŤ, and NEMŠOVÁ. These locations are currently being redeveloped with funding from the state budget. This project is expected to be conducted from 1999 - 2000. The "On Site" method, which has proved to be the most effective, has been applied in all of these areas. [This method refers to the fact that all clean-up and decontamination procedures are performed onsite, where the pollution occurred, rather than elsewhere.]

The Slovak Armed Forces' environmental program specific objectives include pollution prevention measures, cooperation with the Ministry of Environment and civil state authorities

involved in environmental conservation, development of an Army Information System to disseminate information about these issues, and an environmental education program. The implementation of this environmental program within the context of the state's environmental policy is a prerequisite to any efforts to achieve significant improvement in environmental conditions throughout Slovakia.