

PD-ABS-871

c 10N 91681

Contract No. DHR-5555-Q-00-1084-00

**Russian Federation  
Environmental Project:  
Hazardous Waste Management  
Component**

Aide Memoire of  
Joint World Bank / AID / Environment  
Canada Mission

22 February 1993

Reprinted by;

Environmental and Natural Resources Policy and Training (EPAT) Project  
Applied Research, Technical Assistance, and Training  
Winrock International Environmental Alliance

Joint World Bank / AID / Environment Canada Mission:

World Bank

Hans-Roland Lindgren, Environmental Specialist (Team Leader)

U.S Agency for International Development

Janelle D. Daane, AAAS Engineering Fellow

David Read Barker, EPAT Technical Assistance Coordinator

Environment Canada

G. Victor Buxton, Executive Director of Operations

- 1 -

**RUSSIAN FEDERATION ENVIRONMENT PROJECT  
Hazardous Waste Management Component**

**Aide Memoire**

1. At the request of the Government of the Russian Federation, a joint World Bank, U.S. Agency for International Development (A.I.D.), U.S. Environmental Protection Agency (EPA), and Environment Canada mission visited Russia from February 8 to 23, 1993 to initiate preparation of the hazardous waste component of the Russia Environment project as agreed with the world bank. The mission member from the World Bank was Hans-Roland Lindgren, Environmental Specialist. Other participants included: G. Victor Buxton, Executive Director of Operations, Environment Canada; Janelle D. Daane, A.I.D. Engineering Fellow, and David Read Barker, consultant to A.I.D.
2. The mission met with officials of the following government agencies and enterprises: Ministry of Environment and Natural Resources; Institute of Applied Ecology; Research Institute of Human Ecology and Environmental Health; Moscow Power Engineering Institute; Moscow Scientific and Industrial Complex; Russian Academy of Medical Sciences; and, ECOTECHPROM. A listing of the persons the mission met with is attached at Appendix 1.
3. The mission wishes to gratefully acknowledge the kind hospitality and generous assistance of all the officials that it met during its stay in Russia. The preliminary findings and recommendations of the mission, which are subject to the review and approval of the Bank's management, are summarized in this Aide Memoire.
4. The purpose of the Russia Environment Project in the waste sector is to provide assistance and support to develop a program for improved management of hazardous waste and restoration of environmental conditions at disposal sites. In addition the project will establish a National Pollution Abatement Fund for funding priority, credit-worthy pollution abatement projects, and provide technical assistance for training and technology transfer, collaboration with foreign experts, essential equipment and minor related infrastructure, studies and pilot and demonstration projects.
5. These technical assistance activities will be directed at solving problems, removing constraints and barriers, and strengthening institutions in the area of legislative and regulatory policy reform. Technology and methodology improvements will include improvements in efficiency and operation of existing infrastructure, testing the application of new economic tools to improve enforcement and compliance, education and training, and strengthening and streamlining administrative procedures and institutional arrangements.
6. During the mission the Ministry of Environmental Protection and Natural Resources and the World Bank agreed on the following priorities related to this waste management components:
  - Upgrading and developing environmental management infrastructure and institutions in Ministry of EP&NR and its associated agencies and committees of Republics, *oblasts*, *kray*, and local levels for management of hazardous waste.
  - Carry out pilot projects and action in selected cities to enable the transfer and adapt modern approaches and technologies and to develop, test and demonstrate new methodologies and approaches especially designed to reduce public exposure to hazardous waste, minimize creation of new waste and reduce the volume of existing stored waste and clean up existing dump sites.

## I. DESCRIPTION OF THE EXISTING SITUATION

### Waste Management Institutions

7. Focus on the environment and environmental issues in Russia has received new emphasis recently. Prior to the last few years, commitments to military investments consumed a large portion of the available budget, and very little money was left for ecology. However, as a result of the nuclear disaster at Chernobyl, the growing awareness of additional health problems caused by other hazardous waste constituents, and the restructuring of the Russian Federation, the Russian government has created new groups dedicated to addressing environmental concerns at the Ministerial, State Committee, and Committee, Federal levels. In Russia, there are 80 to 90 regional areas called *oblasts* that have subunits called *krays* and *rayons*. New structures are being developed at the *oblast*, *kray*, *rayon*, autonomous structure and city levels. However, the relationship between these structures and the Federal levels is not yet clearly defined.
8. The Ministry of EP&NR, until recently known as the Ministry of Ecology, was begun in 1987. The Ministry occupies three buildings located in different areas in Moscow. Many departments under the Ministry of EP&NR and several State Committees and other Committees focus on concerns related to Hazardous Waste. A list of the institutions of the Russian Federation related to hazardous waste is provided in Appendix 2.
9. Ministry departmental divisions such as the Division of Waste and Hazardous Materials, Department of Ecological Control and Analysis, and the Division of Industrial Ecology and Resource Use, Department of Ecological Programs and Industrial Ecology, appear to be central governmental bodies focused on environmental concerns related to hazardous waste. The Moscow Scientific and Industrial Complex, the Institute of Applied Ecology, the Moscow Power Institute, and the Ministry's International Cooperation Department, appear to play important support roles. Still others such as the Department of Environmental Safety and Standards and Committee on Sanitation and Epidemiological Control have sub-units focused on waste.
10. There is no single entity that deals with waste. In addition, the current organizational structure is subject to change, and the process of addressing waste disposal, reuse, and recycling, monitoring, licensing, is still evolving.
11. Currently, a new waste program administered under First Deputy Minister Alexander A. Averchenkov is in the process of being established. Dr. Averchenkov is responsible for the Department of Ecological Programs and Industrial Ecology, and the Department of Economy of Environmental Protection and Natural Resource Use. The new waste program will specify the functions of State bodies in waste management, the methods of their interaction, and the coordination of their activities. Dr. Djumshid A. Djangirov, Director, Division of Industrial Ecology and Resource Use, Department of Ecological Programs and Industrial Ecology, will serve as the Coordinator for the waste program.
12. The proposed waste program recommends the establishment of a special division (Department, Commission, Committee) in or under the Russian Ministry for Environmental Protection and Natural Resources which could implement the State policy related to wastes. In addition, the program indicates that an important role should belong to the legislative and executive bodies of the republics of the Russian Federation, the *krays*, *oblasts*, autonomous structures and cities.

13. Currently, each region has a Committee for Environmental Protection, and each Committee has a division or group of specialists dealing with wastes. Ministries, Departments, and Divisions, have direct two-way contact with regional committees as shown in the diagram in Appendix 2. However, communication and visitation to sites is probably limited since there are over 80 oblasts and the number of staff at the Ministerial, departmental and division levels are small. For example, there are only 11 staff members in the Division of Industrial Ecology and Resource Use for the entire Russian Federation and all 11 positions are located in Moscow.

14. Even though the system is faced with several constraints, some regional committees such as those in Riyazania and Volgograd have good reputations for regional involvement. For example, the Riyazania Committee has over 200 members.

15. Decision making at the institutional level is confused because of the new emphasis on environmental issues, the restructuring of the Russian government, and the change in ownership of individual enterprises. Not long ago, all ownership belonged to the Federal State. Now there is a distinction between Federal ownership, municipal or territorial ownership, and private industries.

16. Under State ownership, decisions regarding enterprises and their wastes belonged to the enterprises since they were part of the State. After *perestroika*, decisions affecting ecological concerns were given to local organizations or committees. The evolution of the restructuring of the regulations, monitoring, and licensing etc., and the local bodies associated with these changes, is taking place now. The new emphasis on hazardous waste is being folded into the inception of the new local bodies.

17. The local situation in Moscow provides an example of the decision making changes taking place at the local level. Moscow has over 3,500 enterprises, which annually produce 6.5 million tonnes of waste, of which 1.7 million tons are toxic. Because the Moscow region has many types of enterprises, there are toxic wastes from all sectors of the economy. ECOTECHPROM is a parastatal dealing with environmental responsibilities in the ten counties that make up the city of Moscow.

18. ECOTECHPROM deals with both waste processing and storage. It is working to establish district centers for waste within the city and centers outside of the city for wastes that cannot be disposed of within the city. In addition it deals with wastes from specific industries.

19. Until recently, there was no explicit strategy for waste disposal and processing. Most waste disposal and processing practices were expected to be solved at the enterprise. In 1989 ECOTECHPROMRESURS (or "ECOTECHPROM Waste") was established with responsibility for waste disposal. As noted in Figure 1, ECOTECHPROMRESURS is one component of ECOTECHPROM, and Moscowcanal (wastewater), Moscowstok (water), and ECOTECHPROM are three components of the technical section of the executive branch of the local government. Other sections under the executive branch include education, public health, power, transportation, etc. The executive branch has a local Minister that is the head of the technical section under the mayor who reports directly to Russian Federal government.

20. In addition to the organization structure shown in Figure 1, the executive branch has recently formed a committee of environmental protection. This group comprised of air and water experts, chemists, and others, has 80 members and possesses the authority to close down industries. Regional committees in *oblasts* and *krays* possess the same authority.



21. Although ECOTECHPROM, and the committee, share responsibilities for licensing enterprises, the relationship is not yet clear, and no licenses have been issued to date.

22. As noted in Figure 1, a separate local legislative branch exists. The legislative branch has a city council and an ecological commission. Arrangements are being considered now to combine the executive branch committee for environmental protection and legislative branch ecological commission into one "expert council."

23. On 15 Dec 1992, a large comprehensive integrated program was adopted for "Management, Structure of the Utilization, Detoxification and Disposal" of industrial waste in Moscow by ECOTECHPROMRESURS. The program has three components:

1. Control: Economic and legislative tools of the production and location of wastes.
2. Issues of centralized utilization and detoxification of wastes.
3. Minimization of wastes at the enterprise level.

24. A separate institute, the Institute for Applied Ecology works directly for the Ministry of Environmental Protection and Natural Resources. It provides information and data analysis concerning hazardous wastes to the government. The Institute staff communicate with 90 regional centers in the Russian Federation. The system for gathering data on high-level radioactive materials is more developed than that on hazardous wastes. They have no exact scientific methodological basis for collecting data on chemicals.

25. The 300 institute staff members work in one of the following eight divisions:

1. environmental standards
2. environmental economy including developing models, analyzing their economic consequences, and evaluating disposal charges
3. ecological safety, especially safety related to radioactivity
4. industrial technology and waste analysis
5. remote sensing and analysis
6. model development for air and water pollution
7. GIS technologies
8. environmental databases

#### Existing Laws on Industrial Waste

26. The legal framework for management of industrial wastes is established through a set of laws passed by the Parliament and approved by the President of the Russian Federation in the past two years. These laws are supplemented by decrees recently promulgated by the Russian Federation Council of Ministers and by those decrees of the USSR Supreme Soviet that remain in force in the new political arrangements.

27. The most important laws for management of industrial wastes are:

The law of the Russian Federation, RSFSR Law No. 2060-1, adopted 19 December 1991, "On the Protection of the Environment."

The law of the Russian Federation, "On Natural Resources."

The law of the Russian Federation, "On the Sanitary and Epidemiological Welfare of the Population."

28. The law "On Protection of the Environment" is the fundamental document for waste management. Section I describes the basic principles of environmental protection and the authority of bodies at all levels of the administrative hierarchy. Section II establishes the right of citizens to a healthy and livable environment and guarantees certain rights to individuals and public environmental associations. Economic mechanisms for environmental protection are outlined in Section III. Section IV establishes environmental quality standards. Section V outlines a system of environmental assessments. Environmental requirements for siting and construction of facilities and for the operation of facilities are specified in Sections VI and VII. Section VIII establishes "Environmental Emergency Zones" and "Environmental Disaster Areas." Specially protected nature areas and sites are described in Section IX, and the environmental monitoring is established in Section X. Section XI provides for environmental training, education and scientific research. Section XII provides for resolution of disputes in the area of environmental protection. Liability for violations of environmental legislation and compensatory damages are specified in Sections XIII and XIV. Finally, Section XV outlines international cooperation in environmental protection.

#### Existing Decrees on Industrial Wastes

29. Relevant decrees of the Russian Federation and the former USSR include:

The Decree of the USSR Council of Ministers No. 394 of 3 May 1984, "On the utilization, detoxification and burial of toxic industrial wastes."

The Decree of the CPSU Central Committee and the USSR Council of Ministers No 608 of 23 May 1986, "On the fundamental improvement of the utilization of raw materials, fuel, power and other material resources in 1986- 1990 and in the period up to the year 2000." Annex: The list of ministers and departments, research, design and technological institutions responsible for the programs on the utilization of specific types of secondary resources.

The Decree of the Russian Federation Council of Ministers No. 250 of 12 June 1984, "On the utilization detoxification and burial of toxic industrial wastes."

The Decree of the Russian Federation Council of Ministers No. 46 of 30 January 1985, "On serious drawbacks in the utilization of secondary material resources in the national economy of the Russian Federation."

The Decree of the Russian Federation Council of Ministers No. 276 of 2 July 1987, "On enhancing the role of the expertise for the projects on the construction of large national economy facilities to prevent adverse ecological consequences."

The Decree of the Russian Federation Council of Ministers No. 93 of 18 March 1988, "On the fundamental reconstruction of nature protection in the Russian Federation."

The Decree of the Russian Federation Council of Ministers of 16 March 1990, "On urgent measures for the improvement of the ecological situation in the Russian Federation in 1990- 1995 and guidelines for nature protection within the 13th Five Year period and up to the year 2000."

The Decree of the USSR Supreme Soviet of 27 November 1989, "On urgent measures for improvement of the ecological situation in the country."

### Existing Environmental Regulations

30. The general framework for environmental regulations appears to be quite substantial, but several officials of the Federal government identified gaps that they considered to be significant. Regulations dealing with hazardous wastes are established in several different types of documents, including the Construction Code; sanitary norms for toxic waste management; and "supplementary documents," which, for example, specify the amount of toxic wastes that landfills can contain. Such documents are listed in Appendix 3.

### Classification and standards of toxic wastes

31. Official classification of toxic wastes is contained in a document referred to as the "classifier" and formally entitled:

Interim classification of toxic industrial wastes and methodological recommendations on evaluating the class of toxicity of industrial wastes. Moscow, 1987.

32. The classification, developed in 1985 by the former Soviet Union, continues in force in the Russian Federation. Wastes are broadly grouped in four categories, with Class I the most toxic and Class IV nontoxic. Waste level parameters are based on mean lethal dosage and do not consider carcinogenic, allergic, or exposure levels. There is a need for improved regulatory procedures that would take into account sub-lethal direct exposure to toxic industrial wastes and indirect exposure through water, air, and food. A document entitled, "Maximum Contaminant Levels of Compounds in Toxic Wastes" was the precursor to the current classification system.

33. Official standards for toxic wastes are specified in a number of documents. Those identified as relevant are included in Appendix 4. Russian Federation State Standards relating to the environment begin with the code number 17. The Institute for Applied Ecology, under the supervision of the Ministry of Environmental Protection & Natural Resources, is responsible for establishing code number 17 standards and plays an important advisory and certifying role for other institutes and ministries on the environmental components of all standards such as CO emissions from automobiles.

### Pollution Permits

34. A system of pollution permits has been in operation for several years at the largest industrial enterprises. In 1990, licensing procedures were amended to include an "Ecological Passport" for an enterprise was established by GOST [State Standard] 17.0.0.04-90. Data on dangerous discharges are entered into the "Ecological Passport."

35. Although a permit system has been in place, a concerted efforts to reduce discharge of toxic industrial wastes is very recent. These efforts have been stimulated by belated recognition of the enormous magnitude of wastes accumulating throughout the country, but they have been seriously impeded by rapid political changes and economic decline, by an obsolete installed manufacturing base, and by a lack of the hard currency required to import modern pollution control technologies.

### Economic Incentives to Reduce Pollution

36. Faced with very limited options, in 1991 the Russian Federation introduced economic sanctions to limit toxic waste discharges. The position of the government is that toxic waste generators should pay at a very high rate for waste disposal and destruction. Article 20 of RSFSR Law No. 2060-1,

"On Protection of the Environment," establishes payment for the use of natural resources. Section 3 states:

Payment for environmental pollution and other types of effects are charged:

- for emission and discharge of pollutants, waste storage and other types of pollution within the bounds of established limits;
- for emission and discharge of pollutants, waste storage and other types of pollution beyond the bounds of established limits.

37. A strengthened regulatory document, "Basic charges for pollutant emissions and discharges into the environment and waste disposal: Coefficients based on ecological factors" was approved by the Russian Ministry of Environmental Protection and Natural Resources on 27 December 1992. The regulation requires fees for all four classes of wastes and for Class I waste discharges to be administered as a percentage of profits. The fee system covers air and water pollution as well as toxic wastes. The hope is that high fees will provide an incentive to reduce both the toxicity and the volume of discharges.

38. Regional (local) Environmental Committees set disposal fees for each enterprise and establish norms for the volume of wastes to be disposed of. Fixed fees are applied to volumes within the specified norms, above which the disposal fee increases four-fold to ten-fold, depending on the region. The overall system is approved at the federal level of the Russian Federation. Normally, local Environmental Committees have discretion to set the fees based on coefficients of ecological significance for their area. The base-charge volume limit is set to decline over a period of years to provide a further incentive to waste minimization.

39. A Russian Federation regulatory document approved on 27 November 1992 establishes the following per-ton charges, based on the value of the Ruble during the 4th Quarter of 1992:

Class I danger	14,000 R
Class II danger	6,000 R
Class III danger	4,000 R
Class IV danger (nontoxic)	2,000 R

40. Russian Federation officials find it difficult to appraise the impact of pollution fees because of the hyperinflation of the Russian economy. However, their view is that the initial value of the system is not in the revenue generated or the reduction of pollution but in the simple fact that the system exists.

41. The limited experience since 1991 has exposed some initial problems with this approach. In the absence of adequate inspection and monitoring, enterprises under-report both the quantities and the level of toxicity in an effort to dispose of wastes at the lowest possible cost. This problem is compounded by the lack of adequate laboratory facilities at most enterprises and in most regions. Most enterprises are poorly equipped to perform quantitative and qualitative waste analysis and therefore find it difficult to determine toxicity levels even if they were inclined to do so. Since very few enterprises are profitable and even fewer have the foreign exchange to purchase pollution abatement equipment, a common response is to pay the minimum possible pollution charge and to continue normal operations.

42. Article 24 of RSFSR Law No. 2060-1, "On Protection of the Environment," provides for a wide range of other economic incentives for environmental protection, to be provided by means of:

- establishment of tax breaks and other benefits for state-owned and other enterprises, institutions and organizations, including those engaged in environmental protection, which introduce low-waste and no-waste technologies and means of production, use secondary resources, and engage in other activities which serve to protect the environment;
- tax exemptions for environmental funds;
- transfer of a portion of funds from environmental funds to interest-bearing loans to enterprises, institutions, organizations and individual citizens to finance measures guaranteed to reduce pollutant emission or discharge;
- establishment of higher amortization rates for fixed production capital belonging to environmental protection funds;
- setting of special reduced prices and bonuses for use of environmentally sound products;
- introduction of a special system of taxation on environmentally harmful products, as well as products produced using environmentally hazardous technologies; and
- granting of advantageous loans to enterprises, institutions and organizations which are implementing effective environmental protection measures, regardless of their form of ownership.

43. None of these elements of the economic incentive system have been implemented yet in the context of industrial waste generation and disposal. This is clearly an important frontier for further regulatory innovation.

#### Environmental Funds

44. Article 21 of the law "On the Protection of the Environment" establishes Environmental Funds to perform urgent environmental protection tasks, restore environmental losses and provide compensation for damages. Payments into these funds, including pollution discharge fees, are distributed with 60 percent for the local (city and rayon) level, 30 percent to the republic, kray or oblast level, and 10 percent to the federal level. Pollution discharge fees are paid into the environmental funds

45. Officials reported that it has been difficult to effectively spend monies in the funds because there are so few environmental services industries in the country.

#### Hazardous Waste Legislation under Development

46. Concerned officials at the Ministry of EP&NR are convinced that abatement and remediation of the existing waste problem in the Russian Federation cannot proceed successfully without additional legislation and a means to finance the waste program. Inadequate legislative authority for regional and local regulatory bodies substantially impedes them from addressing waste issues. The ministry is actively developing a new set of laws on waste, including consumption, recycling, burial, waste management technologies, waste minimization, the rational use of natural resources, and specific problems such as packaging and labelling. The ministry is eager to study the experience of other countries in developing this legislation.

47. Four laws on waste being developed by the Ministry of EP&NR include:

- (1) Waste consumption and disposal (ordered by the Committee on Ecology and Nature Use);

- (2) Toxic waste (ordered by President Yeltsin), which will be both "general" and "comprehensive;"
- (3) Solid waste (ordered by the Supreme Soviet); and
- (4) State Policy on Radioactive Waste Management.

In addition, the Parliamentary Board's Committee on Ecology and Nature Use and the Presidential Adviser on Health (Mr. Yablokov) have prepared a draft law on Ecological Safety which may become fundamental.

Strategic Hazardous Waste Management Plans of the Ministry of Environmental Protection & Natural Resources

48. In December 1992 the Ministry of EP&NR completed a Concept Paper for a major program entitled simply "Waste." The program is comparable to systematic efforts by other countries to, for instance, upgrade the state of computerization or reduce the deterioration of major ecosystems. The "Waste" program is intended to focus all available resources to achieve the specific goals and objectives set forth in the program. Since the program will not be able to solve all the existing waste problems, it will include only the most acute problems for each type of waste from various sectors of industry, municipal management, agriculture and energy. The ministry hopes to develop the program and to have it approved by the Supreme Soviet by the end of 1993.

49. The major substantive sections of the "Waste" concept paper are:

1. Terms and definitions
2. Current state of the production, use and disposal of wastes
3. The objectives, tasks and structure of the State Waste Program
4. Data support for the development and implementation of the Program
5. Scientific and technological support for the development and implementation of the Program
6. Improvement of the waste management system
7. Improvement of the economic mechanism for waste management
8. Fundamental ecological economic assessment of activities under the program
9. Improvement of legislative regulation of the production, use and disposal of waste
10. Regulatory and methodological support for development and implementation of the Program
11. Establishment of waste monitoring system
12. Environmentally sound waste disposal
13. Proposals for specific types of wastes to be included in the Program

The Annex to the Concept Paper, entitled "Data on the volumes of production, utilization and storage of large-volume waste in the Russian Federation" is provided in Appendix 5.

50. The "Waste" program envisages a comprehensive, integrated approach that will involve all relevant legislative and executive bodies at the Federal level, the republics of the Russian Federation, the krays, oblasts, autonomous structures and cities. The program will focus on both waste generators and consumers and will adopt three strategic directions:

- (1) creating conditions for reduced waste production;
- (2) insuring increased level of waste utilization; and
- (3) creating ecologically safe conditions for waste storage and burial.

Federal Integrated Technological Program: Ecological Safety in Russia, 1993-1995

51. "Ecological Safety in Russia" is a scientific program to obtain definite scientific results, developed by the Ministry of EP& NR as an integrated research program in ecology. The first such program, entitled "The Ecology of Russia," was developed and completed in 1992. The program on ecological safety, to be carried out during the three-year period from 1993-1995, is a conventional research program with a structured set of scientific problems that have an internal logic. The estimated minimum cost of R&D under the program is 4.2 billion Rubles per year, based on the prices during the 4th Quarter of 1992.

52. The Institute of Applied Ecology will play an important role in conducting the applied research to develop the concept of ecological safety and to find solutions to the most acute environmental protection problems in Russia. The main task is to apply a comprehensive approach to ecological problems that can model multi-factored impacts of radiation exposure, the effects of certain chemical reagents, and social aspects of ecological problems. The most-polluted regions will be selected as the basis for the ecological models.

53. The Ecological Safety of Russia program includes sub-programs for applied research and for fundamental methodological research. The topics for applied research are:

1. Strategic problems of insuring ecological safety under modern conditions of development in Russia
2. Factors of ecological danger and ecological risk
3. Medical, sanitary and hygienic support for insuring ecological safety of humans
4. Recreation areas and ecological welfare of the population
5. Ecological monitoring. Ecological mapping. Information support for ecological safety.
6. Regional problems of ecological safety. Ecological emergency situations and disasters.
7. Russian priority applied problems of global ecological safety.
8. Problems of ecological safety in industry, power, energy, transport, and municipal management
9. Ecological problems of agriculture
10. Rational use and reproduction of natural resources
11. Preservation of biodiversity and protection of natural ecosystems
12. Ecological education. Ecological thinking. Ecological problems of historic and cultural centers.

The topics for fundamental methodological research are:

1. The theory of functioning and reconstruction of natural ecosystems
2. Analysis of ecological consequences of the forecasted social, political, economic and technological development of Russia (Assessment and forecast)
3. Scientific framework of nature management, protection and reconstruction of natural resources
4. Methodological aspects of the ecological risk problem

Inspection and Monitoring

54. The administrative decentralization program of President Yeltsin assigns to the regional (normally, an *oblast* or city) Environmental Committees the

primary responsibility for inspection and monitoring of toxic waste discharges from enterprises. Inspections are performed by a special expert inspection service supervised by the Department of Ecological Inspection in the Ministry of EP&NR. At the regional level, inspectors are supervised by regional Environmental Committees.

55. Inspectors are severely handicapped by inadequate training, transportation and testing equipment. There has been a limited effort to develop an environmental auditing system, but procedures to conduct such audits are virtually unknown, and inspectors are generally not able to suggest waste minimization practices. There is only a very small market for environmental services.

56. It is not clear who-- if anyone-- inspects enterprises in the military-industrial complex, but data from these enterprises appears not to be uniformly incorporated into the regional and Federal level waste monitoring systems.

57. The quality of the toxic waste monitoring system appears to vary considerably among the regions. Moscow City is reported to have the best system in the Russian Federation, but even in Moscow the individual in charge reported, "We simply don't know how to handle the monitoring problem."

58. Although it does not have ready access to state-of-the-art computer hardware and software, the Institute of Applied Ecology, and perhaps other bodies of the Ministry of EP& NR, have achieved initial baseline capability in remote sensing and geographic information systems (GIS). The institute has two staff units engaged in these technologies.

59. Laboratory capacity to test effluents is very low. Some Japanese and U.S.-manufactured mass spectrometers are in operation in the Russian Federation, but there is no consistency in testing. Laboratories that perform effluent analysis are not calibrated according to international standards. Officials would like to implement the OECD "Good Laboratory Practices Procedures" but have not been able to do so. Dioxin analysis is very expensive, costing \$3000 per sample, and only two organizations in the country have the capacity to test for dioxin. Lack of capacity to analyze dioxin is a particularly acute problem in the city of Ufa, in the Bashkiria Autonomous Republic.

#### Enforcement of Environmental Regulations

60. The team was not able to form a clear picture of the mechanisms to enforce the existing environmental regulations. It appears that the rapid political changes in the country have seriously impeded the functioning of the court system. There are reported to be a very large number of environmentally related cases pending in the courts, but against a background of rapidly increasing crime of all types, it is not clear to what extent prosecutors consider these cases to be a priority.

61. The system is further confused because although local authorities are responsible for solid waste, it is unclear whether or not they have the right to intervene to stop toxic waste violations in certain kinds of enterprises, presumably including those in the industrial-military complex. Local authorities have recourse to "legislative and economic techniques," but enforcement is impeded.

62. Anecdotally, there are several reported cases in which sanitary inspectors forced an industrial plant to close or undertake pollution abatement retrofitting after a violation was revealed. Regardless of whether

such a decision is taken at the regional or federal level, its implementation is coordinated by the regional bodies involved.

63. The Moscow City government has instituted a pollution abatement program that is offered as an explicit example of cooperation between the city government and all the industrial enterprises in the city.

#### Information

64. Although a great deal of data is collected by all levels of governmental bodies in the Russian Federation, officials often complain of the difficulties of compiling this data in a manner that offers an accurate picture of the present status of hazardous waste accumulated and generated in the country. Major impediments to good information include: the lingering legacy of the secrecy that characterize most of the military-industrial complex, the numerous administrative reorganizations which have taken place in the past two years, and a scarcity of computers and remote sensing equipment. The most important originates at the thousands of industrial enterprises in the country, and these are still not legally required to report accurately on wastes.

#### The 1990 Waste Inventory

65. The first nationwide inventory of industrial hazardous waste in the Russian Federation was published in 1990, based on data collected during 1989. At that time, there were 80 ministries that had information on hazardous waste, but the information was not generally shared or made available to the public, especially information from the ministries concerned with the military-industrial complex. The 1990 toxic waste inventory was thus the first time that federal authorities themselves learned the amount of waste and the ways in which it was disposed of.

66. The method of the 1990 inventory was a form that was filled out and collected from almost all enterprises in the country. The reporting form includes information on the volume of waste generated (and reported) by the enterprise, the amount used, the amount stored, the amount transferred to other units, and the amount buried, based on the four standard classes of toxicity. There was no independent checking of the forms. The concerned authorities recognize that the results are not fully reliable because the method was not sound and some enterprises under-reported, since one of the main reasons was that it was generally known that the quantity of wastes and their toxicity would be used as a basis for pollution fees.

67. The 1990 waste inventory was conducted by the State Committee for Statistics, on a territorial basis. It has been supplemented by data from statistic committees. The inventory did not make a detailed analysis of populations, priorities, or other factors. Summary data on production of toxic wastes in the Russian Federation, from the 1990 waste inventory, is given in Appendix 6.

#### Future National Waste Inventories

68. The Ministry of EP&NR will start in 1993 to develop an improved waste inventory method with assistance from the State Committee for Statistics. The ministry hopes to produce annual statistical inventories on waste with an improved format that will extend the inventory to other economic sectors including transportation and construction. The ministry hopes to issue the first of the new set of reports in 1993.

### Other Information on Hazardous Waste

69. The Committee on Sanitary Inspection has some population exposure data, some information on individual landfills, and some information on the impact of some landfills on the local population and the quality of water.

### National Report on the State of Environment

70. The Ministry of EP&NR has overall responsibility for producing national reports on the state of the environment. The Institute of Applied Ecology, under the supervision of the ministry, has specific responsibility for these reports. The Institute has already prepared four such National Reports on the State of the Environment, the most recent of which was issued in 1991. The Institute also participated in preparing the national report which was submitted to the UN Conference on Environment and Development in 1992.

71. To prepare such reports, the Institute of Applied Ecology compiles and integrates data held by the State Institute of Statistics and other ministries and committees with environmental responsibilities. The staff of the Institute of Applied Ecology does not have the capacity or authority to directly check the accuracy of the data it receives, but it tries to identify major discrepancies.

### Industry and Other Waste Producers

72. The major part of waste generated in Russia comes from industry. It is estimated that only 20-30 percent of all industries in the former USSR countries are operating pollution control equipment of any kind. When pollution abatement is put into place to reduce air and water emissions, the amount of waste collected for disposal will increase. The dominant amount of dangerous industrial waste are mine wastes that represents more than 50 percent of all industrial waste. Information on waste amounts in the different industrial sectors is given in Appendix 5. The industrial waste is also a major part of the 50 billion tonnes that have been accumulated in Russia so far. Of this amount 1.6 billion tonnes is considered to be hazardous waste. Some treatment and reuse of wastes take place in the industry. In the chemical industry for instance are more than 200 incinerators. In spite of this, 90-95 percent of the toxic waste is placed in landfills. The situation in the major industrial sectors causing waste problems is described below.

#### Organic Chemical Industry

73. The amount of toxic waste from the chemical industry each year is 890,000 tonnes. Somewhat less than 10 percent of that which is reportedly destroyed and in the order of 35 percent is recycled or re-used (mainly petroleum waste). Most of the waste is concentrated in areas with high chemical industry concentrations, including:

Dzerzhinsk, Nishny Novgorod  
 Remerovo, Siberia  
 Luganok, Ukraine  
 Volgograd, Russia  
 Toljati, Russia

74. Many of the industries in these areas reportedly have their own incinerators to destroy organic liquid wastes such as acids, organic acids, spirits, aldehydes, phenols, nitro and amino compounds, sulfurs, and phosphorous organic compounds, organic chlorides and pesticides. In the former USSR 200 industrial incinerators were in place with capacities to burn between 100 kg to 10 tonnes per hour. These units are normally equipped with water scrubbers. To effectively treat the off gases from those units which

include constituents such as NO<sub>x</sub>, dioxins, heavy metals and mineral acids, a much more advanced treatment is necessary. To meet the Russian Maximum Permissible Concentrations (MPCs) levels, a 3-to-5 stage treatment process is needed. To keep the costs down, the temperature in the incinerators is often lowered, critically reducing the effectiveness of the incineration. Under such conditions there is a great danger of forming highly toxic dioxins as 2,3,7,8, TCDD or dibenzofurans.

75. The City of Dzerzhinsk is considered to be an ecological disaster area. The factories release dangerous substances and the amount of hazardous waste is one of the largest in Russia.

76. Chapayevsk has three major chemical industries. The area is characterized by pesticide production and subsequent releases of dioxins. Also, chemical weapons have been produced there. The vicinity of the town is extremely polluted. Water sources are in some cases exceeding MPCs. A plant for destruction of chemical weapons was built in Chapayevsk, however, the incinerator does not operate there because of public opposition. The one billion pre-inflation rubles invested seems therefore to be lost because people oppose the fact that the plant is used for destruction purposes.

77. The generation of toxic organic waste in Moscow mainly organic chlorine solvents, CFCs, PCBs and pesticides is in the order of 10,000 tonnes per year.

#### Inorganic Chemicals and Metallurgical Industry

78. The Russian Federation has one of the worlds largest metallurgical industries. Consequently, metal containing waste is a major portion of the total 75 million tonnes of toxic waste produced every year. Approximately 27 million tonnes is metal containing waste containing Cd, Co, As, Ni, Pb, Mg, and Cr. The Ni-containing wastes are dominant and account for 25 million tonnes. The distribution of dangerous metal containing wastes in different industrial sectors is given in Appendix 5. The distribution of toxic metal waste based on individual elements is given in Appendix 6. (Only a part of the dangerous waste is considered to be toxic/hazardous.)

79. A large part of the waste from the metallurgical sector is linked to sludge and dust from treating waste waters and cleaning furnace gases. An increasing degree of control will increase those amounts. In the short run there will probably be no drastic changes in the amounts produced, but over longer time periods, the increase could be significant.

80. Another waste of concern from the inorganic chemical sector is that of fluorine containing compounds. There is on the order of approximately 450,000 tonnes per year of dust containing fluorine and cathode residues from the aluminum industry, which is a major contributor of those wastes. The fertilizer industry is also a significant contributor.

#### Engineering Industry

81. The engineering or machine building industry in Russia is also a major sector. Twenty major machine building complexes exist in Russia, and there are in addition about 3,500 individual enterprises. From information provided earlier in international cooperation programs, it is clear that used oil emulsions are a substantial waste problem in addition to CFCs. The electroplating operations are often integrated in the engineering industry. The amount of electroplating waste in Russia is in the order of 750,000 tonnes. Of those wastes, only 15 percent are treated. The electroplating practice therefore deserves special considerations. A closer description on electroplating follows.

### Electroplating

82. As noted, waste from the electroplating industry is one of the major waste problems in Russia. Electroplating baths are often discharged directly to the receiving waters of sewage treatment plants without any treatment. This action results in reduction in treatment efficiency of in the biological treatment process of the sewage treatment plants. Metals, for the most part, end up in the biosludge and consequently, the sludge cannot be used in agricultural applications. The sludge, depending on where it is stored, can pose a long-term problem as a result of heavy metal leaching, resulting in groundwater contamination.

83. There are approximately 5,000 electroplating shops in Russia, 1,000 of which are located in Moscow. Half of the electroplating plants have treatment facilities for waste baths and rinsing water but only 25 percent of the total plants are using their treatment facilities.

84. One of the primary reasons for this situation is that the standards the plating shops have to meet are extremely stringent. The allowable concentration is only 0.001 mg/l of each metal in the receiving water in the vicinity of the effluent discharge pipe. It is nearly impossible to meet this requirement. In addition, there are also limitations on the discharges of neutral salts which are very difficult to meet.

85. If the industry cannot meet the standards, theoretically they must pay a fine. Because they end up paying the fine even if they operate their treatment plant, it is cheaper to pay the fine and avoid the extra operational cost for the treatment plant and the extra cost for disposal of metal and metal hydroxide laden sludge. The standard method to treat baths and rinsing water from electroplating shops is by neutralization and precipitation after pretreatment of cyanides and hexavalent chromium. This method is depicted in Appendix 7. Thirty percent of the treatment plants in Moscow are equipped with dewatering units for the hydroxide sludge. Also in other parts of Russia, the electroplating industry is considered to be a problem, for example, in Chapayevsk.

86. In Moscow there are plans to build eight to ten centers for treating wastes from electroplating. The idea is to apply ion exchange techniques where possible to reduce the volumes of waste bath waters and in addition, have a very advanced treatment of wastes in centers to which they are transported. The proposed treatment is depicted in Appendix 8. The idea is to recover metals by electrolysis and evaporate the water so  $\text{Na}_2\text{SO}_4$  salt that can be sold on the market is one of the end products. This route was considered to be the only way to meet the stringent standards.

87. ECOTECHPROM is the organization that will be responsible to operate the centers in the Moscow region. At present, they have a contract with a shipyard to lease their existing wastewater treatment plant for that purpose. By summer 1993, the plant is expected to be in operation if ECOTECHPROM can obtain a license for the metal recovery operation.

### Mining

88. The mining industry is of great concern. The mining of heavy metals (such as Cu, Zn, Pb, and Ni) results in large amounts of mine wastes. Normally only a few percent of the ore is metal-bearing, and the rest is disposed of as waste. Mine tailings from the concentrators also contribute considerably to the waste problem because the formation of acid drainage is quicker in the fine material. The amount of metals in the residues is normally enough to form metal-bearing acids for several hundred years. The total amount of mine waste produced each year is 4200 million tonnes which is more than 50 percent of the dangerous waste.

### Special Wastes

89. As in many other countries, Russians have made international commitments to phase out PCBs. No final plan or program for the phase out is available yet, but Russia has started to work on a national plan for dealing with PCBs. So far some individual enterprises have started the work on reduction on their own.

90. Residues of banned pesticides are also a significant problem. Approximately 30,000 tonnes of pesticides are stored awaiting destruction. To give an impression of the additional amounts added to that each year, the 1990 figure, 10,000 tonnes will serve. Only ten percent of this amount was destroyed that year. With increasing awareness of the toxicity of some pesticides, the amount of contamination noted is expected to increase. Also the phase out of CFCs according to the Montreal Protocol will lead to a waste problem which at present is not solved in Russia.

### Medical Wastes

91. Another acute problem is disposal of infectious hospital wastes. The hospital wastes are usually combined with domestic wastes for solid waste disposal. They are not collected separately. There is one incinerator for hospital wastes in operation in Moscow, but this provides suitable treatment for only a minor part of the hospital waste.

### Domestic Waste

92. Most of the domestic wastes goes to landfills. A very small part is incinerated or composted. The seven sites for incineration of municipal waste and the two plants for processing waste to compost in Russia are only able to cope with 25 percent of the waste. (In the former USSR, there are 10 incinerators and five compost plants.)

### Environmental Emergency Preparedness and Response

93. The explosion at the Chernobyl nuclear reactor in April 1986 is often seen as the event that forced widespread recognition of the magnitude of environmental problems in the former Soviet Union. Inadequate preparedness for, and response to, the disaster has prompted several significant efforts to organize for environmental emergencies. Radioactive emergencies are clearly the highest priority, but toxic wastes are viewed as an important, if secondary, priority.

94. Section VIII of the law "On the Protection of the Environment" establishes "Environmental Emergency Zones" and "Environmental Disaster Areas." Other laws have created emergency management bodies. The State Committee on Emergencies and Response is developing a law on emergency situations that will include accidents at toxic waste storage sites.

95. In the Ministry of EP&NR, the Institute of Applied Ecology deals primarily with informatics and data analysis concerning emergency situations. The institute has a "special situation center" and a well-developed system for transmitting data with the regional information centers in the Russian Federation and with State Committee for Emergency Situations. In its capacity as a federal information center, the institute plays an analytic role in environmental emergencies.

96. The Institute of Applied Ecology has a database of all emergencies registered in the past three years. Information concerning environmental emergency incidents is put on-line to the institute, which assesses the scale of such incidents and advises on future risks. The institute maintains a

database of Potentially Hazardous Substances in support of its analysis of emergencies.

## II. HAZARDOUS WASTE MANAGEMENT NEEDS

97. The consensus view of all of the participants in this review (including the Russian representatives) was that the highest priority regarding the issue of hazardous wastes is to reduce the public exposure to such dangerous wastes. This can perhaps best be achieved by addressing the following needs, which are also summarized in Table 1:

- 1.1 Risk Assessment A clear need exists to improve risk assessment capabilities both at the Ministry and institutional level and at the enterprise level. Risk assessments are required in those enterprises handling, storing, transporting or accepting hazardous wastes for disposal. Once this has been achieved, then human exposure considerations can or should become an integral part of decision making.
- 1.2 Public Disclosure of Information The general public needs to be better informed regarding matters that affect their lives. Information transfer is a prerequisite to empowerment which is essential to improve the quality of future decision taking. Since full public disclosure of government data/finding etc is a major shift from historical practice, assistance will be required to initiate and implement appropriate information disclosure programs related to hazardous wastes.
- 1.3 Information and Labelling Systems to Inform Workers of Exposure Risks In order to safeguard workers and prevent their accidental exposure to dangerous hazardous waste materials, it will be necessary to ensure that all such materials stored either at the enterprise site or other storage areas be labelled in a manner that ensures that workers know what the risks are and what actions need to be taken should accidental exposure or contact occur.
- 1.4 Shared Accountability Between Health and Environment Officials at the Russian Federation, Republics, Oblast, Krays and Community Levels The currently observed compartmentalization and fragmentation of responsibility regarding hazardous waste management has given rise to an operating system where it is often very difficult to determine who is accountable for decision taking. A clear enunciation of the accountabilities of both environment and public health officials at all jurisdictional levels is absolutely essential if Russia is to be successful in protecting and improving public health in certain geographic areas and reducing the risks in others.
- 1.4 Information Transfer Between Institutions Unfortunately, with this economy in transition and the financial insecurity that stems therefrom, information, generated by, or in the possession of government or government supported institutions, is often seen as a source of power (and not readily disseminated) or a potentially saleable or revenue producing commodity. Cooperation between agencies and institutions can not be improved without first improving the flow of information, knowledge etc.
- 1.5 Augment Databases for Dangerous Substances A need was identified to identify and examine existing databases related to hazardous

materials with a view to upgrading information currently available in the Russian Federation as appropriate.

- 1.6 Increase Environmental Preparedness and Contingency Planning It will be necessary to identify organizations, institutional staff and staff at the enterprise level that may require environmental emergency response training. A need also exists to review emergency preparedness training methodologies available in other countries and to determine the most appropriate ones to meet Russia's needs. Once this has been done appropriate environmental emergency plans can be prepared and response equipment needs defined.

98. The second highest priority relates to the pursuit and fulfilment of the goal of minimizing the creation of wastes so as to avoid increasing the magnitude of the very serious existing hazardous wastes problems. The specific needs required to be addressed in this area are as follows:

- 2.1 Introducing New Technologies to Avoid/Minimize Waste Formation There is a need for exchanging technology description information on new or innovative technologies that can assist in avoiding or minimizing the initial formation of hazardous wastes. This exchange should take place at both the bilateral and multinational level and on a sector specific basis.
- 2.2 Enhancing Laboratory Capacity, Updating Analytical Procedures and Building Monitoring Capacity Russian scientists, during the course of this mission, have indicated their need to update their knowledge of analytical methods for measuring organic and inorganic chemicals. This is critical if hazardous waste production is to be reduced. The utilization of current western analytical methods, especially for measuring complex organic chemicals, will require an upgrading of the laboratory equipment.
- 2.3 Adjust the Legal Framework and Fee System to Favour Compliance Over Non-compliance The responsibility for environmental protection in general and by implication hazardous waste management, is spread throughout a myriad of agencies at the national, oblast, regional and urban settlement levels. The framework, fee and penalty structure, and lack of inspection and enforcement make the least cost option regarding hazardous waste disposal by enterprises to be one of non-compliance. Assistance is needed to review the legislation currently under preparation with a view to making it more directly applicable and clear on its assignment of accountabilities for responsibilities in the hazardous wastes area. A need also exists to: review in detail any existing legislative or regulations or other control measures (if any exists) which might apply to the creation or manufacture, transportation and storage of hazardous wastes (including low-level radioactive wastes and biological waste) with a view to suggesting a modified or more suitable structure; to modify the fee and fine framework to eliminate the compliance disincentives that currently exist; and finally, to work with the enterprises in developing a practical enterprise inspection and enforcement system.
- 2.4 Increase Awareness of Environmental Considerations at the Appropriate Levels in all Enterprises Our Russian colleagues have noted that there is an urgent need to make enterprise management staff aware of environmental concerns. It has been suggested that

an "International Center" be created with one function being information transfer and awareness raising.

- 2.5 Build Capacity for Training Enterprise Staff in Techniques to Reduce Waste Production There is a clear need to train Russian trainers. This means identifying, selecting, or if necessary developing, suitable teaching materials in Russian. It also means providing the necessary audio-visual aids and equipment and developing a system of seminars and some method of ensuring that the targeted enterprise management staff can or will attend. It was suggested that the Centre mentioned in 2.4 could also be used for that purpose.

99. The third priority can only be cost-effectively addressed when the overall capacity to deal with the hazardous waste situation is in place, and sources which add to the current problem, have been terminated or decreased to the degree possible. This priority issue is the treatment, detoxification or destruction of the hazardous wastes currently in storage and the cleanup of contaminated soils and waters both at the enterprise sites and at the various historic disposal areas, especially the landfill sites. The specific needs required to be addressed in this area are as follows:

- 3.1 Investment in Equipment for Detoxification or Destruction at the Enterprise or a Centralized or Regional Treatment Facility The magnitude of the existing problems with hazardous wastes at landfill sites is large. Much of this waste is disposed in this manner because there are no feasible disposal alternatives. Furthermore, any program to better manage hazardous waste will create a demand for detoxification or destruction. These facts suggest a very significant demand for investment in treatment or destruction equipment.
- 3.2 Improve Data on the Nature and Quantity of Stored Hazardous Wastes Very little, if any, data exists regarding wastes stored at the enterprises or other sites. Western experience in this regard (documentation management systems, data sheets, shipping documents, labelling and placarding and computerized inventory management) will have to be reviewed with a view to determining what can be practically utilized in the current situation.
- 3.3 Increase Information on Technologies Available for Clean-up Given the state of contamination of many of the existing landfills and other historical hazardous chemical disposal sites a clear and urgent need exists for site remediation. A review of available technologies needs to be undertaken to define the most cost effective options.
- 3.4 Clarify Responsibilities for Clean-up at the Governmental, Agency, Committee and Enterprise Level A hierarchical regime for responsibility and accountability does not appear to exist. There seems to be a myriad loosely configured management systems in place at the national, oblast, and regional levels. However, these do not appear to be interconnected in the context of a chain of command. Furthermore, the management roles, responsibilities and accountabilities of the various ecological fund committees is also not yet well understood. A need exists to clearly define a well understood and interconnected management regime and to assign clear responsibilities and accountabilities at all jurisdictional levels including within the enterprise itself. Without such

actions, performance measurement on any new hazardous waste management initiatives will be difficult if not impossible.

- 3.5 Improve Understanding of the Economics of Remediation Techniques Including Cost/Benefit Analyses There is a need to review the techniques available for assessing the economic considerations associated with site remediation, especially cost benefit analysis. A review of the experience and "lessons learned" with the Superfund program in the USA, the site remediation program in Canada and similar programs in other western countries, will provide a useful background for designing a suitable system for Russia.
- 3.6 Implementing in the Field or at the Enterprise Level, Current Soil and Groundwater Decontamination Techniques There is a need to identify and transfer modern techniques (such as membrane technology) to assist in addressing this widespread problem.

**Table 1: HAZARDOUS WASTES MANAGEMENT GOALS, NEEDS, AND STRATEGIES**

GOALS	NEEDS	STRATEGIES
<ul style="list-style-type: none"> <li>• Reduce public exposure to hazardous waste</li> </ul>	<ul style="list-style-type: none"> <li>• Improved risk assessment/incorporating human exposure concerns in decision-making</li> <li>• Full public disclosure of information</li> <li>• Information and labelling systems to inform workers of exposure risks</li> <li>• Shared accountability between Health and Environment Officials at the Russian Federation, republics, oblast, krays, and community levels</li> <li>• Facilitate information transfer between institutions</li> <li>• Augment databases for dangerous substances</li> <li>• Increase environmental preparedness/contingency planning</li> </ul>	<ul style="list-style-type: none"> <li>• Information transfer on risk assessment techniques</li> <li>• Strengthen role of NGO groups</li> <li>• Information out from National Level Institutes</li> <li>• Information transfer on existing hazardous material management databases</li> <li>• Clearly define responsibility and accountability in key management area</li> <li>• Create focal points with responsibility for information transfer</li> <li>• Enhance knowledge base</li> <li>• Identify who has responsibility</li> </ul>
<ul style="list-style-type: none"> <li>• Minimize creation of new waste</li> </ul>	<ul style="list-style-type: none"> <li>• Introduce new technologies to avoid/minimize waste formation.</li> <li>• Enhance laboratory capacity, update analytical procedures and build monitoring capacity</li> <li>• Adjust legal framework and fee system to favor compliance over noncompliance.</li> <li>• Increase awareness of environmental concerns at appropriate levels in all enterprises.</li> <li>• Build capacity for training industries to reduce wastes.</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer new knowledge on new clean technologies</li> <li>• Capacity building</li> <li>• Revise legislation to make practical and operational with clean responsibility and accountability</li> <li>• Increase corporate knowledge of issues</li> <li>• Change emphasis toward pollution prevention</li> </ul>
<ul style="list-style-type: none"> <li>• Reduce the volume of existing stored waste and clean up existing dump sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Investment in Equipment for Detoxification or destruction at the enterprise or a centralized or regional treatment facility</li> <li>• Improve data on nature and quantity of stored wastes.</li> <li>• Increase information on technologies available for clean-up.</li> <li>• Clarify responsibilities for clean-up at Ministerial level and at enterprise level.</li> <li>• Improve understanding of the economics of remediation techniques including cost/benefit analysis.</li> <li>• Implementing in the field or at the enterprise level current soil and groundwater decontamination techniques</li> </ul>	<ul style="list-style-type: none"> <li>• Increase information base for decision-making</li> <li>• Transfer international knowledge on clean up technologies</li> <li>• Reuse and make more workable existing legislation and regulation</li> <li>• Introduce market force consideration based on international knowledge</li> </ul>

### III. HAZARDOUS WASTES PILOT PROJECT(S)

#### Overall Philosophy

100. While seeking to affect improvements in sector management at the Federation level, the Hazardous Wastes Component reflects the need to understand the way the current hazardous waste management system in Russia is practiced in the field. Only then can gaps be identified in the legislative framework, policy, institutional, and technical areas. The mission team, therefore, emphasizes the benefits from pilot evaluation and testing. Pilot programs will concentrate on selected cities, oblasts, or Regions. Extrapolations to Federation-wide application then follows.

#### Pilot Projects, Studies, and Programmes

101. The very extensive programme of capacity building and reform will be implemented through a series of pilot projects, studies and programmes. The pilot projects are intended to provide an opportunity to develop new methods and procedures, train personnel and develop training materials, and test and demonstrate new approaches and systems. The pilot projects will also address both immediate needs and strategic issues. The project will also provide support for studies investigating key policy issues and strengthening the overall institutional framework of the sector. The programme will address the important problem of public education and increased awareness of the value of hazardous waste management and treatment and the steps needed to restore the ecological health of the country and prevent further degradation from this problem component.

102. There are advantages and disadvantages associated with picking just one site over several sites where various recommendations from the working group could be further developed or tested. Similarly, there are advantages and disadvantages associated with locating the hazardous wastes pilot at the same site or city as the air or water pilot projects. The decision process to select pilot areas will therefore consider, very carefully, the advisability of coordinating the hazardous waste sector activity with one or more of the other sectors. The advantages and disadvantages in this regard are currently being considered and will be taken into account in the final decision on pilot area selection.

#### Project Preparation Activities

103. The next steps in project preparation involve the selection of specific areas and locations for the pilot project(s), and the preparation of terms of reference and a detailed description of each pilot project, study or programme including local institutional arrangements for implementation, tasks, resource needs and costs, tentative schedule, and inputs to be provided by the government, the Bank, and possibly other donor agencies.

#### Selection of Pilot Projects

104. A number of locations where pilot projects could be established have been suggested to the this mission by the Ministry of Environmental Protection and Natural Resources (EP & NR) and other authorities. However, the World Bank (WB) has established some general criteria that must be applied to any pilot site considered by all of the sub-working groups. These are as follows:

1. Agreement that the site represents a priority problem area requiring solution
2. Commitment to the project at the national, oblast, regional, and community level

3. Base capacity for working on the problem
4. Capability of site to facilitate interim performance measurement
6. Project capability for defining clear responsibilities and accountabilities
7. Capability for demonstrating a visible "success" within three to four years.

#### Site Proposals

105. At least three locations have been suggested for conducting a hazardous wastes pilot. They are:

- 1) Volgograd
- 2) Chapayevsk
- 3) Moscow (one county)

Some of the reasons offered for suggesting these sites follow:

#### Volgograd

106. It was reported to the team that when the wind blows across waste storage ponds in Volgograd, the population experiences respiratory problems. This suggests a very serious human exposure problem. Unfortunately, no epidemiological or other cause/effect studies regarding human health and waste storage areas has been conducted. Furthermore, it was reported that there have been cases of deaths of drivers at former landfills. It is not clear whether this experience has been the experience at Volgograd.

#### Chapayevsk

107. A project currently set out in the "Ecological Safety of Russia Program" and likely to be presented to Parliament shortly focuses on site remediation work in the Town of Chapayevsk, in the Samara Oblast of the Volga Region. The town was formerly named Kuybushev. Chapayevsk and is located approximately 900- 1000 km NE of Moscow, (1 1/2 hr by plane, 18- 20 hours by train from Moscow). Chapayevsk is referred to as a "city of chemists", implying that it is a rich source of organic wastes. Chemical production includes both pesticides (likely dioxin problems) and electroplating. Until recently, the city has been a "closed city" because of the production of chemical weapons. There are also some munitions plants and one should therefore expect a litany of the most noxious wastes to be prevalent. It was also reported that there are quite a number of minor enterprises that produce heavy metal wastes.

108. Chapayevsk reportedly also offers the opportunity for integrated environmental monitoring, the assessment of public health, and evaluation of cause-effect relations with public health. The authorities, in implementing the existing action plan, intend to develop a system of nature-protection measures starting with modification of the technologies used and leading to the termination of the unreasonable policies pursued in recent years. The major problems or challenges in this town, as seen by Ministry staff are: provision of the population with clean drinking water; remediation of contaminated sites and building of new waste treatment facilities. They also acknowledged the need to address some social problems such as lack of housing, schools, foodstuffs etc.

109. Ministry staff reported that they believe the Chapayevsk problem can be solved by special government decrees. The present cost estimate for cleaning up Chapayevsk provided by Ministry staff is 2 billion Rubles (US \$3.3 Million in early 1993 exchange rates). Half of the sum, they believe, can be provided by local budgets, but the remainder is still to be found. Several ministers, ministries, and departments have already been invited to participate in the clean-up of Chapayevsk: the Ministries of EP & NR; Health; Water Management; State Epidemiological Inspection, Defense Industry; and others. It was

suggested that this could serve as a model of an integrated approach to solving similar problems in other parts of Russia.

110. It was further reported that the vicinity of the town is extremely polluted. Potable water supplies do not meet the required standards. The current clean-up program was developed by both the town and the oblast authorities and by the Ministries and the industrial enterprises located there thus ensuring the commitment required by the World Bank. Furthermore, Ministry staff expect this program to last for three years. It was also stated that the Ministry of EP&NR and other ministries will invest a considerable amount of money in it. They see their program as providing technological solutions to complex problems of air, water and surrounding soil. Simultaneously, they plan to conduct related human health studies. Such an integrated approach, in their view will enable them (with the help of the World Bank and others) to solve a complex of problems in a short period of time. The success, they feel, will depend on financing.

111. Ministry staff see the major component of the overall problem to be the extensive remediation requirements, including landfills. The need new technologies to solve these problems. There was also a suggestion that a need exists to isolate the population from dioxin exposure. The Ministry has indicated that a small, specialized monitoring centre will be set up in Chapayevsk. There are a number of small monitoring laboratories there now but the present staff is inadequate to perform the required monitoring. It is anticipated that the project will attract personnel from the Min EP&NR. If not, there are quite a number of qualified people in Samara, which is itself a scientific centre.

112. Another consideration regarding Chapayevsk is that there is a plant already built there (at a cost of 1 Billion pre-inflation Rubles) for the destruction of weapons. The chemical weapons destruction plant is an incinerator. However, public opposition to such a facility has prevented the plant from opening and thus constrained the possibility of addressing the local and serious pollution problem. The program on Chapayevsk is likely to be adopted by Parliament shortly. This is why the Ministry is inviting the World Bank to take part.

#### Moscow

113. Moscow is a large region with over 3,500 enterprises, which produce annually 6.5 million tonnes of waste, of which 1.7 million tonnes are toxic wastes. Since the Moscow region has a complete mix of enterprises, one would expect to find toxic or hazardous wastes from all industrial sectors of the economy thus increasing the potential for application of pilot study results. Until recently, there was no explicit strategy for disposal and processing of wastes in the city of Moscow (and the entire Soviet Union). The assumption was that waste problems would be solved at the enterprise level. In 1989 ECOTECHPROMRESURS was established and assigned responsibility for waste disposal within the City of Moscow. On 15 Dec 1992, a large comprehensive integrated program was adopted for "Management, Structure for the Utilization, Detoxification and Disposal" of industrial waste in Moscow. The program has three components:

1. Control: Economic and legislative tools for the production and location of wastes.
2. Issues of centralized treatment, re-use or detoxification of wastes.
3. Minimization of wastes at the enterprise level.

City staff hope that when this program enters into full force, Moscow will become an ecologically clean city.

114. The greatest problem for Moscow, as reported by City staff, is the problem of galvanic wastes. There are more than 1,000 galvanizing (metal finishing operations) enterprises in Moscow, including electroplating. City staff feel there are three levels to the problem:

1. Adequate waste processing at the enterprise level.
2. Establishment of district centres for waste storage and treatment within the city.
3. Wastes that cannot be disposed of within the city should be disposed of at two regional centres.

The City also plans to introduce techniques such as incineration for processing organic wastes.

115. To characterize waste, City staff start at the source and trace the technological process that created the waste. For the most part, there is a theoretical evaluation of the qualitative and quantitative composition of the hazardous wastes. Enterprises are responsible for collecting wastes at each site and to provide the Ministry information on the quality and quantity of the waste. Although it is and always was illegal, waste has been buried at any convenient site in the City. City staff have only now started to address site remediation at landfills. Site remediation is a major and serious problem for Moscow. For example, Gorki Park and some sports facilities are built on top of old landfills undoubtedly containing hazardous wastes whose pathway, fate and effects in the environment are largely unknown. City staff would like to work with the world Bank in testing their proposed approach perhaps in the building of a waste treatment plant or processing plant to recover useful components or even in the burial of toxic substances. Denmark, the United States, Sweden, and Israel and would like assistance in determining if this approach is the optimal one for Moscow. They would also appreciate financial assistance. A Moscow site (one county) would in the view of City staff, be an ideal model for all of Russia.

#### Orekhovo-Zuyevo

116. Staff in Moscow believe that Orekhovo-Zuyevo may be an appropriate site for a World Bank pilot project. It is a small town near Moscow. Representatives of Moscow were present. The largest plant in Orekhovo-Zuyevo is called Carboleet. It has many organic phenol-containing wastes. In addition, the community has effluents and sludge from electroplating production, wastes from a large bus building plant, textile factories, and chemical and pharmaceutical enterprises. It is also a storage area for pesticides for the Moscow Oblast area, especially banned and no longer used pesticides.

117. Orekhovo-Zuyevo is separated from a nearby community called Noginsk by only a few kilometers. Noginsk has many solid domestic and industrial wastes. Chemicals are produced in another nearby town called Kupavna. In summary, this area has several small communities that are characterised by a large number of wastes.

118. According to authorities in Moscow, local authorities in these communities are eager to work with the World Bank. They have laboratory equipment available, and an organization that is associated with work in thermal destruction of wastes has a facility in that area. In addition, industrial facilities are available for incineration. An incinerator that can burn six tonnes of waste per hour is available at the Carboleet plant. Ministry authorities believe that many of the requirements set forth by the World Bank can be met in this area.

119. A large center in the area could serve as a training facility for technology transfer. In addition, development of low waste technologies, waste collection, transportation, and other topics could be addressed in the Orekhovo area. For example, at the Carboleet plant, there is a possibility of performing research. Sampling and testing could be carried out at the Carboleet plant or the training facility. Similarly, testing could be performed at solid waste sites and incineration sites.

120. Currently, dioxins and heavy metals are being disposed of in a river near Orekhovo. Wastes from the City of Moscow and the Moscow Oblast are treated there. Orekhovo is located 85-90 km away from Moscow; however, the project could be included as a consideration within the Moscow region, since it is one of the rayons or districts within the Moscow Oblast. Orekhovo has an active City Division of Nature Protection unlike many other smaller cities. The regional Division of Nature Protection is not an organization within the City of Moscow.

#### Selection Process

121. Additional information is needed to assess the suitability of each of these areas for one or more of the pilot projects. A joint decision (Ministry staff and World Bank mission group) should be made during the next mission tentatively scheduled for April 1993. To prepare for this decision the Ministry, the Bank, and potential donor organization representatives will visit each candidate area to collect information during the next mission relevant to the criteria.

#### Project Management

122. All Technical Assistance activities supported by (1) loans from the World Bank and (2) expenditures by bilateral donors in conjunction with these sector improvements, will fall within the framework contained herein. Activities and outcomes funded by the World Bank loan will be managed by the Ministry of Environmental Protection and Natural Resources, following appropriate Bank procedures. Those carried out by the bilaterals will be managed by them or their designers.

#### Staffing and Coordination

123. Overall communications, coordination, and project direction will be carried by one standing group, and project-specific working groups as follows:

Management Task Force; this group will provide overall cross-objective and cross-activity guidance to this component of the overall problem. The group will consist of senior representatives from the major Russian Federation Ministries and Committees, the World Bank, current bilateral donors (U.S. and Canada), and other multi-national and bilateral donors who may join this effort. The membership of this group will be confirmed in the June 1993 Appraisal mission.

Project Working Groups; this group will be established as needed for project scoping, management, and supervision.

#### Project Schedule and Phasing

124. The hazardous waste component is designed as a multiphased effort, including:

Phase I: Pilot project selection

April - May 1993

Joint Mission completed - June 1993

Phase II: Final Project Prep & Approval (World Bank)

- Project Approval & Budgeting (WB & Bilaterals)  
 June - 1993  
 Appraisal Mission - June or July 1993  
 Phase III: Early Technical Assistance (Bilaterals)  
 June - December, 1993  
 Phase IV: Project Implementation: First Stage  
 (Pilot project activities and first priority  
 Federation-wide studies) 1993  
 Phase V: Project Implementation: Second Stage  
 (Pilot project completion; extrapolation  
 for Federation-wide application; support for  
 Federation restructuring; pre-feasibility for  
 investments) 1997-98  
 Phase VI: Project Completion and Review

#### Pilot Project Start-up Activities

125. Criteria for the selection of organizations to be participants in pilot activities would include the following type of considerations. It is important that all members of an activity accept these and participate in the activity with criteria guiding their actions.

1. PRESSURE FOR CHANGE: There must be significant pressure for change both internally within the organization and also in its external environment (supervising authorities, clients, etc.).
2. INTERVENTION AT THE TOP: There must be key managers or consultants at or near the top who are committed and who provide leadership in taking a searching look at the organization and its problems.
3. DIAGNOSIS AND PARTICIPATION: There must be active participation of several management levels in diagnosis of problem areas and improvement planning.
4. INNOVATION IN THE SEARCH FOR NEW SOLUTIONS: There must be a willingness to be innovative and inventive in the development of new ideas, methods and in finding solutions to problems.
5. EXPERIMENTATION/DEMONSTRATION OF PROPOSED NEW SOLUTIONS: There must be willingness to take risks and experiment with new solutions in a search for results - tested first on a small scale.
6. REINFORCEMENT FROM POSITIVE RESULTS: There must be monitoring, review and positive reinforcement over a long-term period in order to make short-term improvements permanent, and to ensure the spread of the change effort.

126. Each of the pilot project(s), studies or programmes will be initiated with a start-up workshop. The workshop will be designed to shorten the time needed to get the activity up and running and to eliminate typical start-up and early implementation problems. These workshops will have several objectives, namely:

- a. To allow the various governmental agencies to demonstrate their support for the effort,
- b. To define the roles for all the parties who will be involved in the conduct of the activity,
- c. To establish clear performance standards for all parties,
- d. To clarified roles, responsibilities and the chain of command for accomplishing the objectives,
- e. To allow team members to get to know each others talents and abilities, and to develop a relationship of trust, and
- f. To be sure a common set of objectives and an agreed upon action plan is understood by all parties.

127. The workshops will contain a series of team-building activities to explore the participants expectations for working together and to initiate team development. Understandings will be reached on roles, goals,

communication processes and reporting requirements. Procedures will also be developed for project management and responsibilities will be assigned. An action plan will then be developed for the first six to twelve months of the pilot project.

128. The workshop should be attended by members of the various Federation agencies and key enterprises likely to be directly involved in, or impacted by, the project, external and internal consultants, and members of the bi- and multilateral agencies funding this activity.

129. Criteria to be used to monitor the success of the pilot activities. The following characteristics have been found to be meaningful monitoring criteria to measure the effectiveness of organizational change. These are the principle characteristics of an effective organization which is productive, with high morale which makes a meaningful contribution to the larger group of which it is a part. Criteria such as this will be used to measure the progress of the pilot activities in order to make course corrections of the activity, or to terminate the activity.

1. The organization is flexible, high performing and self-renewing, capable of creative adaption to a changing environment.
2. The total organization, its units and individual managers manage work against goals and plans.
3. Clear organizational goals exist to which people are committed.
4. Built-in mechanisms exist for self-assessment and feedback on performance.
5. Open communication and high level of trust prevail along with a problem-solving climate.
6. Organization structure and systems are closely related to organization purpose, functions and environment.
7. Decision-making on routine and operational matters is delegated far down (to the appropriate level) in the organization.
8. Managers and supervisors are both acknowledged and rewarded for:
  - a. short-term accomplishments and production,
  - b. growth and development of subordinates, and
  - c. building an effective team.
9. Collaboration and teamwork are emphasized and inappropriate competition is discouraged,
10. There is integration of organization objectives with individual goals and a high level of self-direction and self-control by employees.

Appendix 1: List of Persons Met

Ministry of Environmental Protection and Natural Resources

Dr. Alexandr A. AVERCHENKOV  
Deputy Minister

Dr. Evgenii A. KONYGIN  
Deputy Director, Department of International Cooperation

Dr. Vladimir TRIFONOV  
Department of International Cooperation

Ms. Zinaida MUZYLEVA  
Dept. of International Cooperation

Mr. Victor G. ZHIPOEDOV  
Head, Department of Ecological Programs and Industrial Ecology

Mr. Rudolf S. VILEVALD  
Head, Waste Management Division  
Department of Ecological Control and Analysis

Dr. Djumshid A. DJANGIROV  
Head, Division of Industrial Ecology and Resource Use,  
Department of Ecological Programs and Industrial Ecology

Mr. Dmitri Anatol'evich ZIMIN  
Head, Division of Integrated Regional Programs  
Department of Ecological Programs and Industrial Ecology

Professor Victor GORLOV  
Deputy Director, Department of Environmental Safety and Standards

Dr. Eugeni V. PROTOPOPOV  
Specialist, Department of Environmental Safety and Standards

Mr. LYSTSOV  
Deputy Head, Department of Environmental Safety and Standards

Institute for Applied Ecology

Dr. Yevgeniy S. DMITRIYEV  
Director, State Institute for Applied Ecology

Dr. Dmitri KOLGANOV  
State Institute for Applied Ecology (He is responsible for information systems  
on toxics and wastes)

Moscow Power Engineering Institute

Dr. Vyacheslav I. VOLKOV  
Director, Research & Production Unit  
Ecoservis

Dr. Igor MOROZOV  
Chair, Department of High Temperature Technology

Dr. Viktor TOUMANOVSKI  
Head of Laboratory  
Department of High Temperature Technology

Dr. Vladimir IPPOLITOV  
Researcher, Department of High Temperature Technology

Dr. Vyacheslav SMIRNOV  
Deputy Scientific Director  
Department of High Temperature Technology

Other Institutes

Dr. Mikhail N. BERNARDINER  
Chief, Physical-Chemical Waste Treatment Department  
Scientific and Industrial Complex

Dr. Nickolai V. RUSAKOV  
Head of Laboratory  
A.N. Sysin Research Institute of Human Ecology and Environmental Health  
Russian Academy of Medical Sciences

ECOTECHPROM

Mr. Vasily V. IVANOV  
General Director, ECOTECHPROM  
Technical Department  
Moscow City Government

Ms. Galina M. GROSSMAN  
Director, ECOTECHPROMRESURS  
ECOTECHPROM  
Technical Department  
Moscow City Government

Mr. Dmitry V. BELOV  
Division Chief for Electroplating  
ECOTECHPROMRESURS  
ECOTECHPROM  
Technical Department  
Moscow City Government

Appendix 2: Structure of the Government of the Russian Federation  
Related to Hazardous Waste

Ministries

Ministry of Science, Technology and Higher Education

└ manages other related entities such as Moscow Power Institute

Ministry of Health

Ministry of Fuels and Energy

Ministry of Nuclear Energy

Ministry of Environment Protection and Natural Resources  
(formerly known as the Ministry of Ecology)

└ State Institute for Applied Ecology reports  
directly to this Ministry

State Expert Council on Ecology and Natural Resources-group of  
scientists, engineers, and mass media

State Commission on Mineral Resources

Department of Ecological Control and Analysis

Division of Wastes and Hazardous Materials

Department for Coordination of Regional Activities

Department of International Cooperation

Department of Environmental Law

Department of Information, Public Relations and Environmental  
Education

Department of Environmental Safety and Standards

Department of Economy of Environmental Protection and Natural  
Resource Use

Department of Ecological Programs and Industrial Ecology

Division of Industrial Ecology and Resource Use

Department of Natural Resource Management

Department of Protected Natural Areas

Department of Soil Protection and Land Resources

Department of State Marine Protection Service-reportedly have data on ocean  
dumping and reduced fish populations, etc.

Department of Scientific Technology

State Committees

State Committee for Emergency Situations (formerly called the State  
Committee for Social Protection, Regional Rehabilitation and  
Assistance to the Victims of Chernobyl and other Nuclear Disasters)

State Committee for National Policy

Committees

Committee on Sanitation and Epidemiological Control

└───Institute of Human Ecology and Environmental Health

Committee on Machine Building

Committee on Metallurgy

Committee on the Chemical and Oil Industry

Committee on Industrial Policy

Committee on Standardization and Certification

Committee on Precious Metals and Gems

Committee on Geology and Mineral Use-responsible for data on  
groundwater discharges

. . . Committee on Municipal Management (Housing & Municipal Services)

Committee on Land Resources and Land Use

Federal Services

Federal Service on Nuclear Monitoring and Safety

Federal Service on Industrial and Mining Safety

Federal Service for

Hydrometeorology and Environmental Monitoring

Federal Service for Geodesy and Cartography

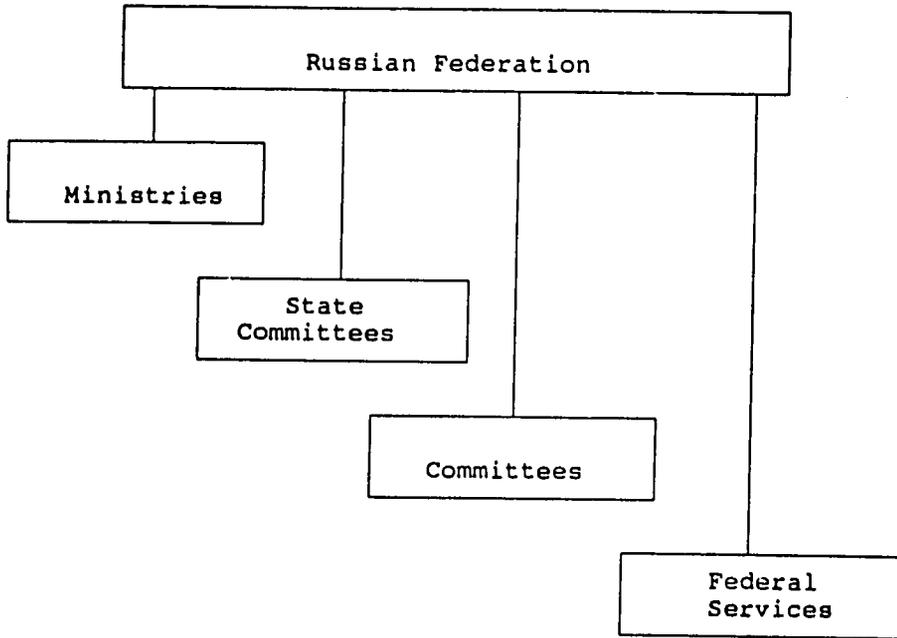
(Federal Services work with the committees and ministries)

Every region has its own Committee for Environmental Protection  
and every regional committee has it's own division that deals with waste.

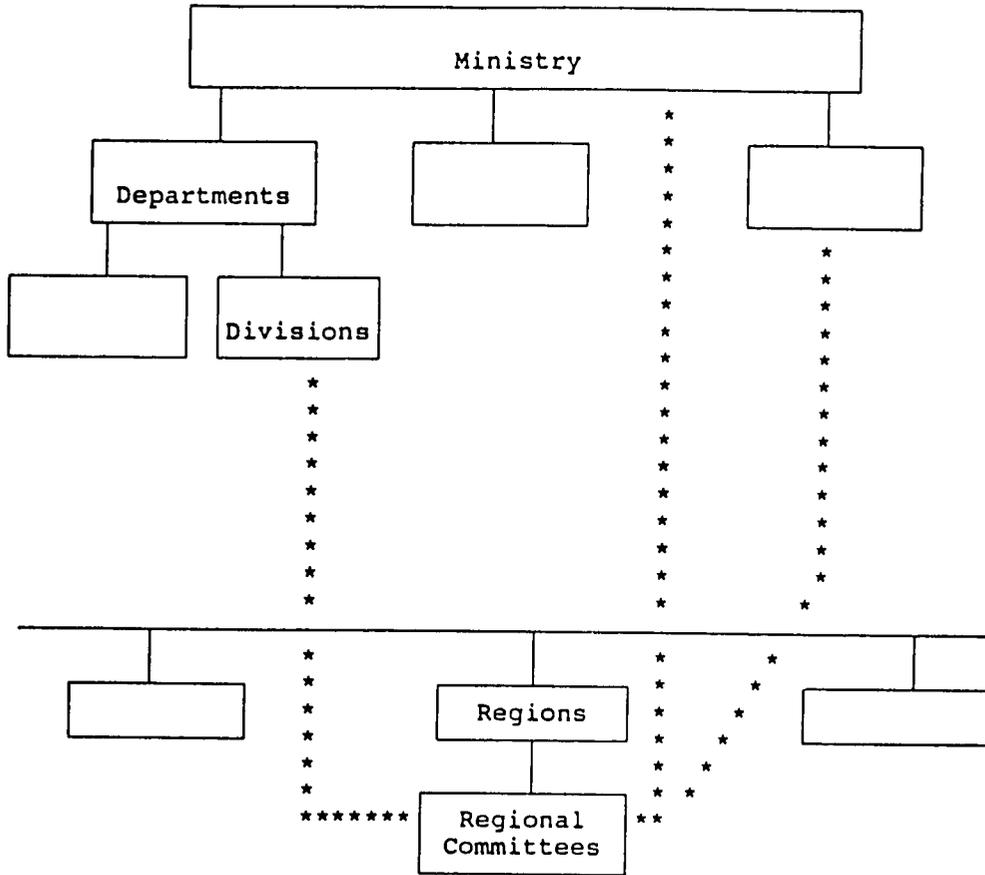
Committees are considered slightly lower in status than departments of Ministries  
since the people on the committees are not members of government. Committees  
draft legislation and give advice to the ministries.

In addition to Institutes that work with Ministries and Committees, there is  
another organization, the Moscow Scientific and Industrial Complex, that  
functions as a firm.

Reporting Relationships



Communications and Liaison Linkages



Minstries, Departments and Divisions at the National Level all have correspondence with regional committees.