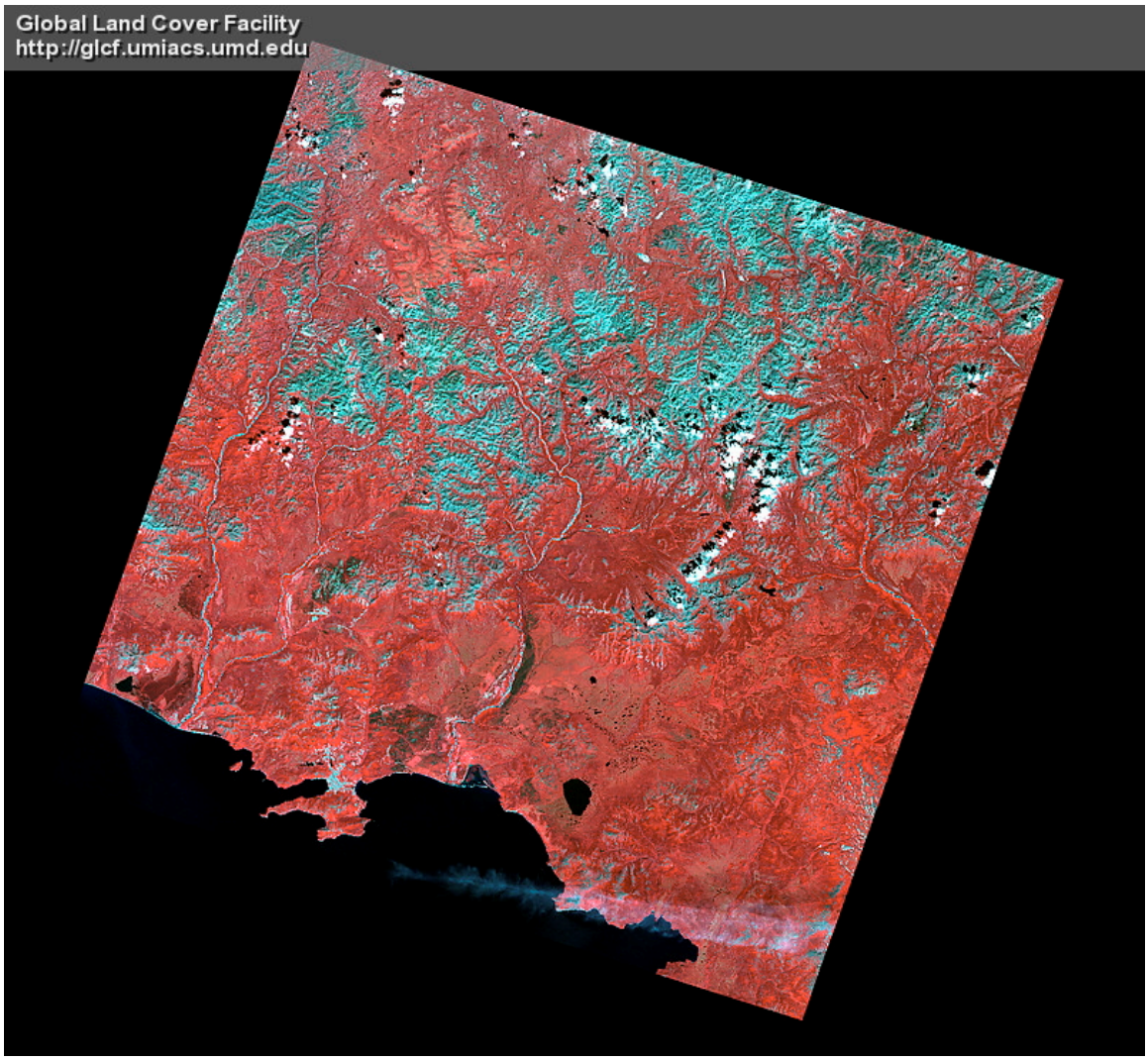
A GUIDE TO SUPPORT
THE EXPANDED USE OF CITIZEN ENVIRONMENTAL RIGHTS
IN MAGADAN AND EASTERN RUSSIA



Satellite Image of Southern Magadan Oblast, Russian Far East

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I. INTRODUCTION AND SCOPE

This Guide is compiled to help you become familiar, as citizens of Magadan Oblast, with your own environmental rights, and to encourage you to participate in public decisions that are related to mining activities in your vicinity.

By Russian law, all citizens have the right to influence any mining developments that could have major environmental, social or economic consequences in your region. This Guide will explain these rights for you, and show how they are exercised in other parts of Russia and the world.

Eastern Russia is a vast region with an epic amount of unexploited mineral resources. Much of the economic future of this region probably depends on how these resources are mined. The potential (and the need) is therefore great for your own citizen involvement in all natural resource and environmental policy-making in the region.

Gold and Mining in Magadan

Magadan Oblast has played a leading role in the development and exploitation of mineral resources since gold deposits were identified in the region by Yuri Bilibin and his colleagues in the early 1930s. Since that time, as gold prices on the international market rise and fall each year, mines in the region have been opening and closing as well. In recent times, gold prices have risen to the point that many companies want to dig out even more gold here in Magadan.

This rapid pace of mine development in the last few years provides a strong basis for building sustainable roles for you citizens who want to exercise your environment rights. Both individual citizens and community organizations can help set the development priorities for your communities for years to come. You and your fellow-citizens can express your opinions on the environmental values, socio-cultural values and indigenous economic values which the mining companies and governmental agencies must heed when they develop gold and other minerals in the region.

We recognize that the capacity to use environmental rights effectively requires an awareness of the legal, technical and socio-economic framework for mining. This Guide can help build this awareness by introducing key concepts, and identifying valuable additional resources which interested or affected citizens and citizen organizations can turn to. It also provides a compilation of information that can help enhance public interaction not only with mining companies, but with local and regional government officials, and with the media as well.

This mining Guide, therefore, focuses on your citizen rights as provided by the legal systems governing the Russia Federation. This Guide will show how this legal system compares with other systems, and how Russian mining policies compare to those used by international organizations, such as the World Bank and the European Bank. We will also provide a baseline of technical information on mining and mining practices, so that

you and your community organizations might be able to better understand the range of activities involved in the planning, operating, and reclamation of mines.

This Guide is not an encyclopedic work, and does not represent a truly comprehensive view of the subjects of environmental law, citizen involvement, and contemporary mining practices. It is designed to provide a very basic overview of the issues related to mining and environmental policy. It therefore aims to provide detailed introductory tools to you, as members of the public, as you all seek out ways to use your rights and participate in environmental policy decisions more effectively.

As residents of Magadan, you undoubtedly recognize that mining interests have been extremely prominent in political and social affairs in the region, and will continue to be so for some time to come. In essence, it is your economic future at stake here. And you should have the right to be informed on how this future will unfold with all the gold mines that are opening up in Magadan.

There are a number of Russian laws that support citizen use of environmental rights. In fact, these rights are specifically outlined and guaranteed by the Russian Constitution:

"Everyone shall have the right to a favorable environment, reliable information about its condition and to compensation for the damage caused to his or her health or property by ecological violations."

-From the Russian Constitution: Section 1, Chapter 2, Article 42

Citizen use of environmental rights is as fundamental to effective and open democratic governance as are free and fair elections. Without citizen action to ensure that these rights are achieved, you as citizens risk being frozen out of any decision-making that could be critical for your own health and for the ecological health of the region where you live. In other words, without citizen action, you may be destined to live in unfavorable environments. You might not end up having access to reliable information about environmental conditions where you live, work, hunt, fish and pursue traditional uses of nature. And you might not receive any compensation for any ecological damage that may be caused by the mines in your region.

The core goal of your environmental laws is to ensure that the environmental interests of all citizens and society, as established by the Russian Constitution and international best practices, are fully honored and respected. For this reason, this Guide encourages you to do the following:

- participate in the legislative processes of your country and region – and in the development of policies and regulations that govern mining;
- participate in the planning and permitting processes for new mines, especially during the preparation of environmental expertizas;
- participate in the monitoring of the enforcement of these laws so as to – ensure compliance with the laws and regulations for each mine.

II. HOW IMPORTANT ARE CITIZEN RIGHTS IN ADDRESSING ENVIRONMENTAL AND SOCIAL CONCERNS?

Each citizen is legally authorized to work with regulatory agencies and mining companies. In this way the general public ensures that laws and regulations are effectively enforced. They can also help ensure that laws are fully used to benefit society as a whole, and not remain merely words on paper, without effect.

Citizen rights to freely address environmental and social concerns are a globally-recognized measure of good governance and the rule of law. Many Russian organizations recognize the importance of these rights, including such renowned groups as the Center for Russian Environmental Law, and Ecoline. They are also fully recognized by international institutions such as the World Bank and the United Nations.

Citizen rights can make a more significant difference in society when they are used effectively; but they have little effect if they lie inactive and unused. The difference between the existence of citizen rights and the effective use of those rights is enormous.

USEFUL CONCEPTS

By taking advantage of your citizen rights in environmental law, you can guarantee that decisions that affect your future are not left solely to government officials and the mining companies themselves. You have the right to express opinions about proposed developments before decisions are made, and you may express these opinions without coercion in various "**public participatory forums**."

Within these public forums, you have the right to ask questions, and file comments and other documents. You can request timely responses to your questions from the government agencies and companies alike. These agencies and companies are REQUIRED to respond to you, simply because the Russian Constitutional states that you have rights to "reliable information" regarding environmental issues. You are legally able to find out any information about any significant mining plans in your region, or the ecological and social impacts of any mineral development projects. This right to be knowledgeable about environmental plans, conditions and impacts can be understood as a "**citizen's right-to-know**".

You should always receive reliable environmental information in time to respond before any decisions are made. Under the concept of "**prior informed consent**" it is your public right to *knowledgeably* participate in decisions that may be either "favorable" or damaging to the environment, and to express your own ecological and social values."

"Public participation" and "citizen right to know" are established principles in Russian environmental law. "Prior informed consent" may be achievable through strong and consistent effort, and is provided for, in a general way, by the Russian Constitution. But all of these concepts depend on the initiatives of citizens themselves, or on the public organizations that represent citizen interests. Your actions as citizens are safeguarded by

the Russian constitution. Still, it is up to you as citizens to take the initiative, and engage in these participatory forums. You must take action to ensure enforcement and adherence to your interests. Otherwise others will surely make decisions without your involvement.

Environmental laws, as with other laws, do not operate by themselves. In addition to citizen involvement, members of the public strongly benefit from the effective staffing and funding of responsible government agencies. The effective work of these agencies is as fundamental to effective protection as is your use of your environmental rights.

In sum, Russian laws, regulations and public pronouncements should reflect the rights of citizens in environmental matters. But the effective enforcement of those rights depends on the specific capacity and will of citizens and organizations that wish to use them.

Public-interest organizations are amongst the most important advocates for environmental rights, both throughout Russia and in other countries. Prominent among these type of Russian organizations, all of which provide tools for citizens to use their environmental rights are:

Ecoline
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Telephone/fax: (095) 978-90-61
Website: www.ecoline.ru
Email: office@ecoline.ru

Center for Russian Environmental Policy (CREP)
33, Leninsky prospekt, Suite 326,
Moscow, 119071, Russia
Telephone/fax**:** (095) 952 2423, (095) 952 3007, (095) 952 7347
Website: www.ecopolicy.ru
Email**:** ecopolicy@ecopolicy.ru

Ecoline has performed much research into processes of public participation and the citizen use of environmental rights. The Center for Russian Environmental Policy Studies has supported the use of the public's environmental rights in Russia as a core element in the development of civil society. The goal of each of these groups has been to enhance the public's ability to be aware of, and use their rights, particularly rights related to the Russian environmental impact statement process.

Public participation in Environmental Impact Assessments is the primary process in existing Russian law for individuals and organizations to identify and address environmental and social concerns, ***before*** mines actually open for operation. During this process, each citizen is allowed to review and approve any mining activities with potential for environmental consequences. This key component of citizens' environmental rights is discussed below, in a separate section of this Guide.

III. WHAT IS ENVIRONMENTAL LAW, AND HOW IS IT ENFORCED?

Environmental law is the portion of a nation's laws that govern the use, allocation and conservation of natural resources. This means that any decision that is made regarding proposed natural resource developments and management is subject to environmental law.

The Center for Russian Environmental Policy identifies the critical linkage between lawmaking and law enforcement in an environmental context as follows:

> "Law is a major instrument for realizing environmental policy. … Environmental policy is implemented along two lines: lawmaking and law enforcement. Environmental legislation lays the basis of state policy in the field of environmental protection and nature management and reflects its substance. The aim of environmental laws is to ensure environmental interests of society. The effectiveness of environmental policy and environmental regulation is determined
>
> by the actual state of public relations in the sphere of environmental protection and nature management. The basic problem in the law enforcement practice is to ensure inevitability of legal responsibility for causing damage to the natural environment or human health."

-- Center for Russian Environmental Policy at: http://www.ecopolicy.ru/en/?id_rec=25

Of course, one must recognize that, in the absence of a fully-funded set of government agencies in Russia, the role played by public interest groups and private citizens in monitoring the environment, and in participating at all stages of planning and development, is even more important than it may be elsewhere. Citizens can take on some of the key roles that once had fallen to government agencies to perform, when they were fully staffed.

Nevertheless, the adequacy of the staffing and funding of the government has a very significant influence on the degree to which the laws are effectively implemented. For, even with full public participation, no law can be properly enforced without an effective government agency overlooking the laws. The authors of this Guide recognize the value of having fully-funded state agencies looking after our interests.

In Russia currently, responsibility for implementation and enforcement of environmental laws has been largely consolidated within the Ministry for Natural Resources (MNR). As Russian law has evolved over the past decade, the responsibility for enforcement of environmental laws has been increasingly consolidated in the MNR and its constituent agencies. The environmental laws and regulations and other information governing the MNR is available on the Ministry website at http://www.mnr.gov.ru.

Regulations adopted in 2004 can be used to describe the scope of MNR and its various sub-agency's responsibilities. The MNR is allocated responsibility, within the scope

provided in the regulations in **"**Resolution of the Government of the Russian Federation # 370," of July 22, 2004, for:

"state policy formulation regulation related to study, renewal, and conservation of natural resources; management of subsoil and forest resources; use and conservation of water resources; the use of wildlife resources and their habitat; specially protected natural areas, as well as in the sphere of environmental conservation."

Important sub-agencies of the MNR that oversee mining in Russia include:

The Federal Subsoil Resources Management Agency responsible, within the scope provided in the regulations in **"**Resolution of the Government of the Russian Federation # 293 dated June 17, 2004, for management of Federal property in the sphere of subsoil use and considers and approves project and technical documentation for development of mineral deposits; and

The Federal Supervisory Natural Resources Management Service responsible, within the scope provided in the regulations in "Resolution of the Government of the Russian Federation # 400, dated July 30, 2004, for environmental impact assessment and exercising State environmental control (including state ecological monitoring).

The regulations that govern these agencies provide the basis for MNR to serve multiple functions, including formulating policy, approving projects, and assessing and monitoring projects, with little apparent oversight from other state agencies. Extracts of the regulations governing MNR are found in the Appendix and full versions are available on the MNR website at www.mnr.gov.ru.

IV. WHAT IS AN ENVIRONMENTAL IMPACT ASSESSMENT?

A key arena for the exercise of citizen rights in Russia and in most other countries is in the preparation and review of "Environmental Impact Assessments." This section of the Guide focuses on tools that will help you effectively use you're your rights of public participation during these assessments.

The "Environmental Impact Assessment" (EIA) is the process used for identifying consequences, or impacts, of future actions to natural resources, including land, earth, water and other species of plants and animals. It takes into account the complete human environment, including any impacts on cultural, social and economic conditions. Then, once projects are built and operated, environmental monitoring provides the means to measure effects on the environment and society, and evaluate whether environmental consequences were accurately predicted in the approved EIA associated with the project.

For our purposes, environmental assessments (EAs) focus on "current or proposed actions" as the basis for considering future impacts or effects that could result from the implementation of a proposed mine. Impacts, consequences and effects should not be understood as always negative. Impact assessments usually identify both the positive and negative impacts of a proposed action. While private environmental assessments may be conducted by the companies operating a mine official assessments are frequently required by national laws. There are also requirements for official assessments within the guidelines established by international financial institutions or other banks that might choose to issue loans or otherwise invest in a mining project.

EAs that are performed by national governmental agencies or by international organizations usually include requirements for public disclosure of the contents of the EAs themselves. There is usually some policy allowing opportunities for public comment in some form or manner. The extent to which publicly-required EAs are available to the public, or are subject to public comment and responsive to public comment, is an important measure of the openness of environmental policy and decision-making in each country.

Russian environmental law provides for two specific types of environmental assessments:

1) **State Environmental Reviews** (**"State Expertizas"**) conducted on behalf of Ministries of the Russian Federation; and
2) 2) **Public Environmental Review** (**"Public Expertizas"**) conducted by non-governmental organizations registered with local or national governmental agencies.

The following discussion of the scope of Russian EIA processes relies heavily on Ecoline's research and publications. This research is available on the www.ecoline.ru website (including an English version of "Strengthening environmental assessment provisions and practice in the Russian Federation," August 2000 at http://www.ecoline.ru/mc/eiac/eng/finalreport.html).

Under Russian law, project developers are usually required to prepare an "Assessment of Environmental Impacts" (OVOS) for submittal to the **State Expertiza** panel or Public Expertiza panel. For proposed mines, the OVOS serves as the primary source of information about the project developer's view of the economic and technical rationale for mining. The OVOS will describe the area affected by the proposed mine, as well as the anticipated social and economic consequences. It will contain the technical details of the mine construction and other related mining activities. And it will list out any alternatives that the project developer may have considered (including the alternative of NOT opening a mine at all).

Specific opportunities for public participation are provided for in these two interlinked procedures. However, the State Expertiza is a mandatory procedure in which a panel of experts appointed by an agency within the Federal Ministry Natural Resources, or a provincial committee, reviews the OVOS and other planning documents of the proposed development in order to evaluate the expected environmental impacts. A project cannot proceed if the State Expertiza panel reaches a 'negative' conclusion.

The Public Environmental Review or "Public Expertiza", on the other hand, is an independent technical investigation that can be used to supplement information gathered during the State Expertiza. The Public Expertiza is a non-mandatory procedure that can be initiated by officially registered public interest groups for "certain mining or other developments" with potential for environmental impacts as identified by law. Although the report and conclusions of a Public Expertiza provide a formal recommendation for the State Expertiza, the Public Expertiza alone cannot be the sole basis for stopping a mining project.

The rights of citizens and organizations in environmental matters in Russia emphasizes elements of the concept of "citizens' right to know" and their rights of access to information. Ecoline's research demonstrates that current environmental assessment laws of Russia reflect a serious deterioration in the rights of access to information in this country. For example, previous provisions of Russian law enabled public groups to appoint a representative to the State Expertiza panel. This is no longer the case. The current State Expertiza process frankly reflects major gaps in both the openness of environmental decision-making, and in the level of public participation. They do not provide procedures for a mandatory formal public hearing, or for formal public comment, or for formal responses to any public comment. It is this Guide's opinion that these key shortcomings are hindering the overall effectiveness of the environmental assessment process at this time.

Environmental Assessment Procedures with Mandatory Public Hearings and Public Comments that are Heeded by State Agencies

Perhaps these new limitations on our rights to public hearings in Russia should be examined, as well as the limitations to our citizens' rights to receive some kind of official response to public comments we have made during Russian State Expertizas . The

situation here in Russia contrasts sharply to the rights provided in other developed countries in regards to public hearings and public comment on environmental assessments. In almost all other developed countries these rights are more fully implemented, and are recognized as essential by international development organziations, such as the World Bank and the UN.

We can cite many examples where these rights are provided, both at a national level in:

the United States – through the National Environmental Policy Act (NEPA) – accessible at
http://ceq.eh.doe.gov/nepa/nepanet.htm;

Canada - the Canadian Federal Environmental Assessment review process is available on the Canadian Environmental Assessment Agency homepage at http://www.ceaa-acee.gc.ca/013/0001/0008/ea_e.htm,

and even in local state-level programs in North America, such as those in:

New Mexico including mining-related regulations of the New Mexico Energy, Minerals and Natural Resources Department at http://www.emnrd.state.nm.us/Mining/ and the New Mexico Environment Department at http://www.nmenv.state.nm.us; and

Montana – Department of Environmental Quality at http://www.deq.state.mt.us/index.asp.

The World Bank and European Bank for Reconstruction and Development (EBRD) have established and now use environmental assessment guidelines requiring mandatory public hearings and public comment opportunities. Please see:

World Bank's Environmental Assessment homepage at

http://lnweb18.worldbank.org/ESSD/envext.nsf/47ByDocName/EnvironmentalAssessment provides procedural and Environmental Assessment sourcebooks and other resource documents;

European Bank for Reconstruction and Development (EBRD) environmental assessment procedures are described at http://www.ebrd.com/about/policies/enviro/procedur/procedur.pdf; and

International Finance Corporation also relies on World Bank environmental assessment procedures, sourcebooks and guidelines as identified on its on its Environmental and Social Procedure homepage at http://www.ifc.org/ifcext/enviro.nsf/Content/ESRP.

The International Finance Corporation identifies EAs as the means to,

"provide a mechanism for coordination between the project sponsor and relevant government agencies on environmental and social issues and for addressing the concerns of affected groups and local interested parties. In addition, EA plays an important role in building the environmental and social management capability of the project sponsor."

So, as we can see, the evidence from the rest of the world is overwhelmingly in favor of full public participation during the environmental assessment process for any proposed mine.

Scope of the Russian Environmental Review Process

Ecoline has now determined that, due to the deterioration of Russian rights to mandatory public hearings and public comment opportunities, the "Public Expertizas" process now remains the main, if not only tool for public participation in the overall Environmental Review process.

Public Expertizas must be conducted in accordance with specific regulations applicable to actions of the Russian Ministry of Natural Resources (MNR). As stated above, the Public Expertiza must be initiated by an officially recognized non-governmental organization (NGO). It must hold public reviews before the State Expertiza panel has issued its "conclusions." And as part of the Public Expertiza, the NGO must notify the local governmental authority of its intent; however, no more than two Public Expertizas can be conducted per mining (or any other) development project, by law.

The registered NGO enjoys a significant "citizen right to know" opportunity when it initiates the Public Expertiza process. It has the right to gain access to all project documentation concerning the mine (or other development) in question. It can receive all the mining plans, except for information determined to constitute state, military or commercial secrets. This documentation is what makes up the OVOS. The law provides a right for the Public Expertiza panel to compile a report incorporating "observations" and "recommendations," on the information within the OVOS. This public panel can then issue a "conclusion" for use by the State Expertiza panel. As long as the Public Expertiza is registered, one of its experts can act as an observer in the State Expertiza process as well.

Ecoline has concluded that, "although dozens of Public Expertizas have been initiated, and in some cases have successfully influenced the decisions made on sensitive environmental issues, the opportunities for public participation within the State Expertiza remains unsatisfactory. This is due to the fact that the public lacks the resources to organize a meaningful Public Expertiza and are limited to those projects which are not classified as secret."

The regulations that control how OVOSs may be prepared also provide opportunities some times for public participation, in addition to those provided for State Expertizas and Public Expertizas. Public participation in the preparation of the OVOS is allowed at the discretion of the MNR. The OVOS regulations provide the MNR the option of holding public hearings and discussions in the mass media for a wide range of projects. However, Ecoline has determined that these OVOS requirements remain vaguely described and are largely discretionary in existing regulations, and infrequently provided in practice.

Ecoline's investigations have determined that in order to improve public participation, official guidelines must be adopted to make sure there is a long-enough period allowed for public comments before any assessment is issued. There must also be a procedural framework created for conducting public hearings. Ecoline notes that such guidelines have been developed, in theory, but have not yet been officially accepted by the MNR. Consequently, Ecoline has found, "the practice of public participation does not correspond to the potentially strong procedural provisions in the regulations."

Within the various groups such as Ecoline, there are many Russian specialists with Public Environmental Expertiza experience. These include:

- Marina Khotuleva, Ecoline/Moscow EIA Centre www.ecoline.ru;
- Vera Mischenko, Ecojuris www.webcenter.ru/~ecojuris;
- Egor Yazikov, Tomsk EIA Centre www.eia-tomsk.org;
- Leonid Zamana and Gahzit Tsibekmitova, Chita EIA Centre at the Institute of Natural Resources and Ecology of the Siberian Branch of the Russian Academy of Sciences at http://www-sbras.nsc.ru/eng/sbras/copan/cinr_main.html or http://www.chita.ru/~cinr/; and
- Galina Anasova, Buryat Center for Public Environmental Expertiza http://bro.burinfo.ru/win/bcoee/index.shtml.

V. WHAT STANDARDS OR BEST PRACTICES APPLY TO ENVIRONMENTAL IMPACT ASSESSMENTS AROUND THE WORLD?

The criteria that define all legally-required Environmental Impact Statements vary significantly from country to country, as they do for different international financial institutions. These specific environmental assessment requirements reflect political decisions that underlie their adoption in the first place.

In the legal history of the world, environmental assessments became a prominent requirement for development projects only in 1970, following the adoption the National Environmental Policy Act (NEPA) in the United States. A full copy of NEPA is at http://ceq.eh.doe.gov/nepa/nepanet.htm. After the adoption of NEPA, an executive agency in the US, the Council on Environmental Quality (CEQ) established the first formal regulations to provide guidelines for legally-required environmental assessments, as defined by NEPA. A full copy of these CEQ guidelines is listed at http://www.epa.gov/epacfr40/chapt-V.info/chv-toc.htm.

For mine sites, the resulting EIAs in the US and most all developed countries have usually contained six main elements:

1) Description of the proposed mining actions;
2) Purpose and need for the proposed mining;
3) Alternatives – "variants" - to the proposed mining that would address the purpose and need identified;
4) Description of the human and natural environment that would be affected by the proposed mining;
5) Description of the impacts or future consequences of both the proposed mining as well as any alternatives, and a comparison among the impacts of the alternatives; and
6) Recommendations or preferred actions on how to proceed.

Around the world, the legal requirement to prepare environmental assessments has broadened significantly since the 1970s. Environmental assessments have become a common element in the environmental laws of many countries, including Russia, and many international financial institutions, such as the World Bank Group organizations and the European Bank for Reconstruction and Development (EBRD). The World Bank has established the Environmental Assessment as one of the ten basic environmental and social safeguard polices driving its investments.

To implement these far-reaching policies around the world, a new profession of environmental assessor has developed. This profession includes all the expert preparers of environmental assessments that are performed under contracts by corporate, investor or other private interests.

The profession of environmental assessor has grown to the point where there is an International Association for Impacts Assessment (IAIA). Many national and

international institutions have established programs to train environmental assessors , and have defined "Best Practices in Environmental Assessment." The IAIA website at www.iaia.org provides an extensive body of information on impact assessments and best practices.

In 1996, the IAIA initiated a "Global Guidelines Project" and outlined "Principles of Best Practice for Environmental Impact Assessments (EIAs)." The To begin with, the IAIA defines Environmental Impact Assessment as:

"the process of predicting, evaluating and mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions being taken and commitments made."

Then the IAIA defines the objectives of an EIA as:

"To ensure that environmental considerations are explicitly addressed and incorporated into the development and decision-making;

To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of development proposals;

To protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and

To promote development that is sustainable and optimizes resource use and management opportunities."

Extensive additional information on EIA Best Practices is found in the complete version of "Principles of Best Practice for Environmental Impact Assessments (EIAs)" at http://www.iaia.org/Members/Publications/Guidelines_Principles/Principles%20of%20IA.PDF and elsewhere at www.iaia.org.

Now there are new environmental agreements that could have a strong affect on the future. With these agreements, the process of assessing environmental impacts will become much more thorough and strict. There are the International Environmental Assessment Treaties that were adopted in 1991 and 2003. First, the International Convention on Environmental Impact Assessment in a Transboundary Context – known as the 'Espoo (EIA) Convention' – was adopted in 1991 and came into force in 1997. The Espoo (EIA) Convention sets out the obligations of parties, which includes Russia, to assess the environmental impact of certain activities at an early stage of planning.

Then the Protocol on Strategic Environmental Assessment - the 'SEA, or Kiev, Protocol' was adopted in 2003. It requires evaluations of environmental consequences at a much earlier stage of planning for a mine or other development. The Protocol also provides for extensive public participation in government decision-making in numerous development sectors.

Information on these two recent international protocols, including copies in Russian and other languages, are available through the United Nations Economic Commission on Europe website at http://www.unece.org/env/eia/. Please note: the European Commission on Europe membership for the Russian Federation dates from March 28, 1947.

The IAIA has recently published criteria for the Strategic Environmental Assessment that identifies good-quality processes as those that 1) inform planners, decision makers and the affected public on the sustainability of strategic decisions; 2) facilitates the search for the best alternative; and 3) ensures a democratic decision making process.

Strategic Environmental Assessments include a series of steps or processes that incorporate much more than an EA study by itself. SEA is defined as:

"The systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or program and its alternatives to ensure that the environmental considerations and impacts, and alternatives, are addressed as early as possible and on a par with economic and social factors in policy, plan or program development; the preparation of a written report of the findings, and; the use of the findings in publicly-accountable decision-making."

The goal of SEA is: "to ensure the full integration of environmental considerations into the earliest appropriate stage of policy, plan or program development, on a par with economic and social considerations."

Quality SEA processes provide the public and decision makers much more than an EA itself if they are:

Integrated – addressing all strategic decisions related to a proposed action, addressing interrelationships among biophysical, social and economic impacts, and considers transboundary and regional concerns.

Focused – providing reliable and usable information, concentrating on key issues customizing the characteristics of decision making requirements that are cost and time effective.

Accountable – demonstrating compliance with the requirements of agencies responsible for strategic decisions, carried out with professionalism, impartiality and balance subject to independent checks and verification, and justifies how sustainability issues have been taken into account.

Participatory – explicitly providing the means to inform and involve interested and affected public and governmental bodies, addressing input and concerns expressed by interested and affected public and governmental bodies in decision making, has clear and easily-understood information, and provides access to all relevant information.

Iterative - Ensuring availability of assessment results early enough to influence decision making and future planning and sufficient information to judge whether a decision should be amended and provide a basis for future decisions.

(See http://www.iaia.org/Members/Publications/Special_Pubs/sp1.pdf for more information)

How does all this international experience really relate to us in Russia?

Ecojuris, a public interest environmental law center based in Moscow with a website at http://webcenter.ru/~ecojuris, has compiled a comparison of Russian Environmental

Expertizas and the proposed SEA process. Ecojuris found that use of SEA Protocol processes would greatly strengthen Russian Environmental Expertizas by:

1) Improving access to information, with greater openness and public participation;
2) Improving this public participation so that it covers all key issues;
3) Providing the public a right to comment on a draft plan for any mine or other development requiring the preparing agency to explain in writing how it has taken the public's comments into account in making its final decision and
4) Providing for consultations with all interested and affected government ministries, including, but not limited to the health, environment, fisheries, nature protection, transportation and forest management agencies.

(see http://webcenter.ru/~ecojuris/EPROJECTS/seo-er.htm)

The authors of this Guide concur with the conclusions of Ecojuris, and recommend that the Russian government strongly consider the adoption of SEA protocols in protecting our environmental rights in Russia.

How can commenting on EIAs make a difference?

Back to present time, once an EIA is prepared in Russia, the EIA panel may be legally required to provide opportunities for public comment, either orally at formal public hearings, or in the form of written comments. They must provide this opportunity before the EIA is used to support any proposed decision. These comments are filed with the agency preparing the EIA and may be considered by decision-makers in their review and approval of the proposed mine. The primary means for providing public comments on State Environmental Review process in Russia is now through the adjunct Public Environmental Review process.

While the agencies making the decisions are not required to incorporate each and every comment into their findings, any well-prepared, timely and insightful comments that you make as a citizen can strongly influence these decision-makers. Your comments can also serve to support public policy alternatives to a proposed mining action, by providing strong and accurate rationale for a preferred alternative over a proposed mining activity.

International and Russian experience shows that your public comments can often result in changes to a proposed new mine. Citizen comments even can result in a rejection of the proposed mine, or at least a delay in the proposed opening of operations. The quality of your citizen comments –such as the depth of detail you can cite, and the accuracy of your facts and insight of your opinions, --- all strongly influence whether your comments are effective at influencing a decision.

The quality of public comments on EIAs may range from simple statements - such as "I like the project" or "I hate the project" - to detailed, highly specific comments that support or challenge a portion of the EIA. While the number of "for" and "against" comments can make a difference in public policy, it is by writing or delivering specific, detailed comments that you as a citizen can ensure that the public policy debate addresses

substantive issues, and is more than just a popularity contest, or the result of political connections.

In essence, the principles for preparing effective public comments are to:

State Your Overall Goal: Your goal in commenting should be communicated with your main concerns, observations and recommendations. If you fail to make your comments both understandable and believable, then your message is likely to be wasted.

Be clear, concise, and organized. Decide what you need to say before you begin. In developing an outline, if you have a number of points, it is a good idea if you group your comments in a logical order. Jumping back and forth between several topics reduces the impact of your argument.

Be specific. Saying that you are against a project will not have much effect without clearly saying why your position is reasonable and appropriate. It is always a good idea to give as much support as possible to your comments. Include as much factual information as possible. For instance, you can compare how things were, to how they are, to how you believe they will be in the future—and why. Referring to the comprehensive plan for your region (if your community has one), or to information on similar projects or situations elsewhere, or to other environmental laws and/or documents can also be helpful. It is also important to be as accurate as possible in making these comparisons.

Identify possible solutions. Suggestions on reasonable mitigation (conditions to avoid, minimize, or reduce adverse impacts) may help shape a questionable project into a welcome addition to a community. After identifying your concern, whenever possible, suggest possible alternative solutions.

What comments are helpful? Comments in the following areas are particularly valuable. You should point out:

1. Any inaccuracies in the environmental checklist, EIS, or other documentation;
2. Areas of potential environmental impact that have not been identified;
3. Adverse environmental impacts that have not been adequately addressed;
4. Possible mitigation measures that could or should be added to the proposal;
5. Reasonable alternatives to the proposal;
6. The need for additional study(ies); and
7. The merits of the alternatives and mitigation measures already considered in the existing assessment document.

VI. WHAT DEGREE OF CITIZEN PARTICIPATION IS APPROPRIATE?

Citizens participate in public policy or environmental policy decision-making processes for many reasons. Each citizen has their own range of interests that motivate them. It is each citizen's right to decide whether participation is necessary or appropriate and how active that participation might be.

The degree to which citizen participation is effective depends on the amount of time they can commit to the environmental and social policy processes that concern or affect them. Making an effort to research a proposed project by reading available documents and attending public meetings is an effective initial level of citizen participation. Citizens or organizations with this initial level of interest in a mine project may rely on information from government agencies, or from the mining companies themselves, or from the media and civil society organizations, or from simple "word of mouth" in their communities.

More active involvement in the decision-making process will be necessary if the individual's or citizen organization's goal is to determine whether the proposal would have significant and lasting affects on any person or community in the region. This level of activity may not necessitate the initiation of a Public Expertiza, though this process provides a significantly broader opportunity to receive detailed information than would be available if a Public Expertiza process was not initiated.

An increased level of involvement is necessary when individuals and organizations seek to determine whether information on a mining project is reliable, accurate and comprehensive. This level of involvement will be difficult to pursue without initiation of a Public Expertiza process. Timely initiation of the Public Expertizas process is critically important to interested and affected individuals and organizations, mostly because it is a "one-time only" opportunity. Once a project decision is made and the mining begins to proceed, irrevocable actions with potentially significant short- and long-term consequences are likely to occur.

Since mining operations are often the major economic activity in regions where they are being proposed, as is the case for the current suite of mining projects in Magadan, they are likely to have environmental, economic and social consequences that last long beyond their period of operation. So, one should make sure that any attempt at public input will be as effective as possible in the time allowed.

VII. WHAT IS A MINE? WHAT TECHNOLOGIES ARE USED IN OPERATING A MINE?

This section provides an introduction to technological processes and market processes associated with mines and their environmental and social implications. Understanding the technological and the economical framework for mining is fundamental to the effective use of citizen rights.

In general, mines are built at locations where minerals are extracted from the ground; they are places where workers provide labor for pay and places where companies produce commodities for market. It is valuable for members of the public, residents of communities living near mines, and decision-makers to know how mineral deposits will be identified and exploited, and how mine will be closed and reclaimed. That awareness provides the basis for an accurate understanding of environmental impacts at particular mine sites or mining districts. The specific type of mining activity and specific development strategy at a mine site strongly affect options citizens have in using their rights to participate in mining decisions or to influence mining policy.

This section provides a general introduction to the phases of a mineral development project to establish a basic awareness of what happens when mines are planned and constructed. This introduction reflects just a overview of basic concepts and terms used in the mining industry and provides just a hint at the level of complexity of involved in mines and mineral development. Citizens interested in a particular mine or area where mines are being developed should seek additional more detailed information on the particular activities they are concerned about. This discussion relies heavily on Hartman, H. L. and Mutmansky, J. M., 2002,"Introductory Mining Engineering - Chapter 1: Introduction to Mining," at:
http://media.wiley.com/product_data/excerpt/11/04713485/0471348511.pdf

Mining is the activity, occupation, and industry associated with the extraction of minerals. In its broadest sense, mining describes the extraction of any naturally occurring mineral substance, whether solid, liquid, or gas from the earth. The physical and chemical processes of mineral extraction have social, economic and environmental implications that can be addressed by citizen use of legal and environmental rights.

The limited occurrence and availability of minerals as commodities in commerce and economic products accounts for the complexity of mineral economics and the business of **mining.** Minerals are unevenly distributed around the planet and are non-renewable; they cannot be reproduced or replaced though they can be reused or recycled in many instances. A mineral deposit may therefore be considered a depleting asset whose production is restricted to the area in which it occurs. These factors impose limitations on a **mining** company in the areas of business practices, financing, and production practices. Because its mineral assets are constantly being depleted, a **mining** company must discover additional reserves or acquire them by purchase to remain in the **mining** business.

Economic and market concerns drive mineral industry decisions governing the choices about when and if operations initiate mineral production and shutdown. Production costs tend to increase with depth and declining grade. Generally, financial considerations result in operations with lower costs per unit production are mined before more expensive, and therefore harder-to-mine, deposits. Commodity prices are subject to market price changes, directly or indirectly driven by supply and demand relationship, which can make the financial risk of a long-term minerals project quite risky.

A **mine** is an excavation made in the earth to extract minerals. Modern mines are built and operated using **mining engineering**, the practice of applying engineering principles to the development, planning, operation, closure, and reclamation of mines.

Mines rarely extract just the specific mineral for which it is developed as various types of mined minerals are also mined along with the specific target mineral. Geologically, the categories of materials extracted from earth at a mine usually include both **minerals**, which are naturally occurring inorganic elements or compounds having characteristic chemical, crystalline and physical properties, and r**ocks**, which are naturally formed aggregates of one or more types of minerals.

Economically identifiable differences among minerals at a deposit or location are the basis for several key mining concepts. A **mineral deposit** is a location where a specific mineral or groups of minerals are found to occur. **Ore** or an **ore deposit** is a mineral deposit, generally a solid mineral, which is sufficiently useful and valuable to be mined at a profit. Only after the economic profitability or viability of a **mineral deposit** has been firmly established is the term **ore** or **ore deposit** appropriately used to describe a mineral occurrence. Determination of the economic profitability or viability is the basis for determination whether the mineral deposit constitutes **ore reserves**, mineral deposits that meet economic viability criteria or **mineral resources**, mineral deposits that occur but not in sufficient concentration to extracted profitably at the time of evaluation. As mineral prices and availability change and as mining technology evolves, the determination as to whether a mineral deposit is considered **ore reserves** or a **mineral resources** can and will change.

Gangue is the term used to describe valueless solid minerals and rocks within an ore deposit that are managed either on site or discarded. **Waste** is the material associated with an ore deposit that must be mined to get at the ore and must be managed on site or discarded, and generally includes gangue, soil, water, and plant material encountered during mining.

Metallic ores are ores of the ferrous metals – including iron, manganese, molybdenum, and tungsten, base metals - copper, lead, zinc, and tin, precious metals - gold, silver, and the platinum group metals, and radio active minerals - uranium, thorium, and radium. **Nonmetallic minerals,** also known as industrial minerals, are non-fuel mineral ores that are not associated with the production of metals. These include phosphate, potash, halite, sand, gravel, limestone, sulfur. Nonmetallic minerals also include construction materials

such as marble, granite, sand, gravel, and many others. **Fossil fuels** are mineral substances used as sources of energy such as coal, petroleum, natural gas, coalbed methane, and tar sands.

As mines exploit minerals found in deposits with gangue and other wastes, technical methods and processes must be used to separate various minerals with economic values, called **values**, from waste. These methods and processes are used at the mine site where the ore is extracted and at milling or processing sites where ore is concentrated or treated to produce a valuable commodity for sale or use.

Mines generally process materials that contain very small amounts of valuable minerals, **ore** within rocks that contain vastly larger amounts of **waste**. Metal mines often process much more waste than ore. Metal mines general extract 3 – 10 times as much waste as ore resulting in the creation of enormous waste rock piles near the mine site. Waste from the mining is found in waste rock piles located near mines. These waste rock piles contain the vast majority of material produced at a metal mine.

Ore rarely contains a very high percentage of **values**. Gold mines typically produce ores that contain 1 – 10 grams per ton of gold. One gram per ton is equal to one part pert million. Other metal mines may produce ore that contains 1,000 – 10,000 grams per ton, equal to 0.1 – 1% ore concentration, or grade.

Metallic ores are processed at mills to separate the values from the waste in the ore. The waste from mills is called **mill tailings**. Mills and processing plants produce many times more waste than they do valuable final products. Gold processing plants produce 100,000 – 1,000,000 times as much **tailings** as they do gold. Other metal mines produce 1000 – 10,000 times as much **tailings** as valuable final products depending on the ore grade involved. **Tailings** usually contain the waste minerals resulting from crushing and processing to remove the values from the ore as well as reagents and water used in the milling process. Some mills and tailings facilities effectively recycle used reagents and waste water.

Surface mines are mines where mineral excavation methods are used that are entirely open to the atmosphere or operated from the surface. **Underground mines** are excavations that include openings for people, equipment, and workers to move below the earth's surface. The detailed procedure, layout, and equipment used in the mine constitute **the mining method** at the site. The **mining method** for a particular deposit is determined by the geologic, physical, environmental, economic, and legal circumstances that apply to that site Mining is not restricted to mines that are either surface operations or underground operations, many mines and mining districts involve combinations of surface and underground mining methods during their operating life.

Mining always involves associated facilities that are fundamental to the economic extraction of ore, including searching for the minerals and cleaning up the site after operations are completed. These associated facilities include energy supplies, water supplies, transportation systems, equipment repair and maintenance shops, employee

housing, dining facilities, medical facilities, security facilities, storage facilities for explosive, chemical reagents and fuel storage.

Mining is preceded by **prospecting** and **exploration** activities that involve **geologic investigations** that locate the deposit and **economic analyses** that prove ore extraction is financially feasible before a decision to develop and operate a mine are made. The material extracted from the deposit that is not gangue or waste is called **run-of-mine ore**, material that usually needs to be cleaned or concentrated before milling or further processing. The technology used to separate values from the run-of-the-mine ore **mineral processing.** Most metallic ores require additional concentration, refinement, or fabrication including **milling, conversion, smelting,** or **refining** before a valuable commodity is produced. The facilities where these processes occur, **called mills, convertors, smelters** or **refineries**, usually involve a range of chemical, physical, or electrical methods to produce values and usually produce large amounts of waste as by-products for other operations. Processing, refining, and fabrication usually involves the practice of **metallurgy.**

Modern mines, mineral processing and mill sites and their associated **waste disposal areas** are usually the subject of **closure** and **reclamation** plans which usually involve management activities during and after operations to ensure that effective closure plans are implemented when mining and mineral processing end.

VIII. WHAT IS THE LIFE CYCLE OF A TYPICAL MINE?

Each particular mine involves unique circumstances under which a sequence of activities occur involving the five commonly recognized stages of work that are fundamental to the mining cycle, the "lifecycle" of a modern mine, which are: **prospecting, exploration, development, exploitation, and reclamation**. These activities are sometimes conducted consecutively, one after the other, sometimes simultaneously – at the same time; and sometimes intermittently – with gaps in time, sometimes long gaps, between phases. This discussion relies heavily on "Introductory Mining Engineering - Chapter 1: Introduction to Mining," Hartman, H. L. and Mutmansky, J. M., 2002 at: http://media.wiley.com/product_data/excerpt/11/04713485/0471348511.pdf.

Knowing how mines work and how mining activities are spread out over time is fundamental to understanding how citizens can address the environmental and social impacts of mines.

The types of environmental and social impacts, the types of public policy decisions and the economical and financial aspects of mines vary wide for the different phases of mining activity.

Figure 1 is provides a useful illustration of the timing of activities in the mining cycle and the relationship between the phases of the mining cycle and the mining investment and return on investment cycle.

Figure 1 - **Mine Life Cycle and Mine Financial Life Cycle**

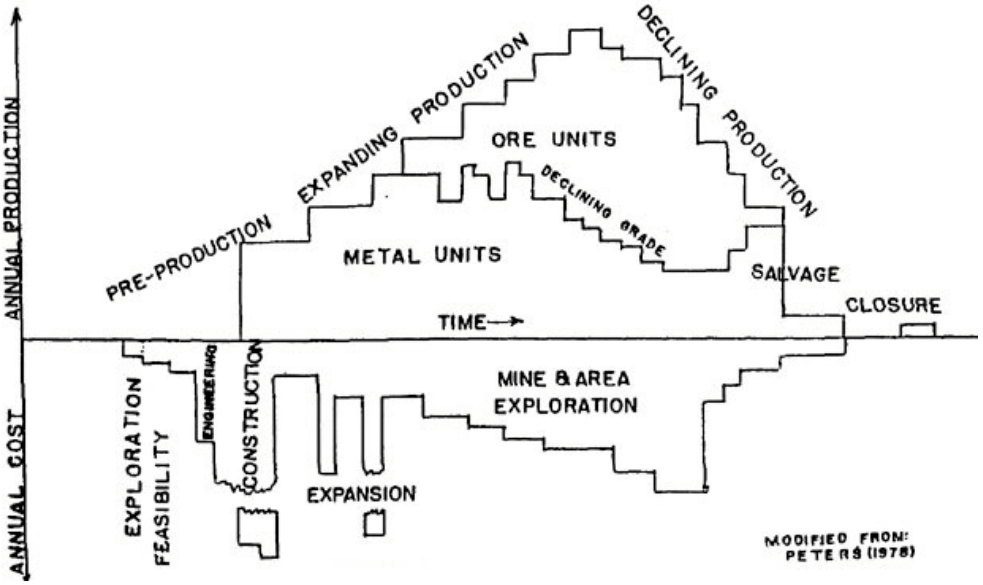


Figure 1 illustrates, in a generalized way, the birth and life of a mining operation. The activities that may result in the creation of a mine begin with prospecting, exploration,

testing, feasibility and engineering studies to demonstrate that the mineral deposit is a profitable ore reserve. Only after economic viability is demonstrated to the satisfaction of investors do financing and mine construction, or development, and ore exploitation occur. These phases generally entail a period of 7 – 15 years or more of spending with no financial return from the mine. Early years of mining, where high grade ore is available, generally involve efforts to increase production over designed capacity to accelerate "payback" of investments. As the mining progresses, ore grades generally decline and, in spite of production increases, production ultimately declines to a point where the mine becomes less profitable and enters a closure, reclamation and salvage phase – unless mine and area exploration reveals additional ore reserves and/or new technologies, or higher mineral prices enable the conversion of "waste" into "ore" by reducing cost or increasing value.

Figure 1 illustrates an idealized cash flow cycle. It shows that income, such as profit after all expenses including interest on investments, may not be generated for 20 years or more after exploration begins.

Prospecting and **exploration** are precursors to the extraction phase of mining. They are closely linked and commonly conducted in combination at a site if the investigation continues beyond an initial prospecting phase. This determination must show, based on exploration data and a proposed mining methods, that the cost of mining will be sufficient below the price minerals can be sold for to allow income, including profit, to be realized by the mine's owners. **Prospecting** and **exploration**, including the search for minerals to expand an ore deposit or find other ore deposits usually continues while development and exploitation - the extraction phase of mining - are also occurring. They are the primary activities associated with the Pre-Production – the exploration and feasibility phase of mining in Figure 1.

Development and **exploitation** are closely related stages that occur at a site following the determination that a **mineral** can be extracted from an **ore deposit** in a financially feasible manner. **Development** and **exploitation** relate to actual ore extraction and ore processing for recovery of valuable commodities. The **development** and **exploitation** phase of mining including milling, processing, smelting and refining activities to recovery minerals from ores extracted from mines. There are activities in the both the Pre-Production and Production phase of mining in Figure 1.

Reclamation has been recognized as an essential stage in the life of a "mine" for decades. **Reclamation** includes:

Closure of operating facilities to prevent future releases to air, land and water;
Remediation and/or **Restoration** of resources damage during mill and mine Operations; and
Rehabilitation of damaged lands and water to provide for healthful post-mining ecological systems and land use opportunities.

Closure, reclamation and **rehabilitation**, in contrast to simple abandonment when extraction ceases, are recognized as a necessary part of the mine **life cycle** around the

world**.** The recognition that **reclamation**, including **closure**, **remediation** and/or restoration, and **rehabilitation,** is a fundamental part of the life cycle of a mine reflects the demand of societies around the globe for a cleaner and healthier environment including safe post-mining land use and control of water, air and waste released by mines and mills. These societal standards are demonstrated in the evolution of guidelines, laws and regulations affecting mining. The overall process of developing a mine with future uses of the land in mind is termed **sustainable development**.

The phases of the mining lifecycle each involve a complex set of activities and technologies:

Prospecting and Exploration, the first stage in the utilization of a mineral deposit, is the beginning of the geologic investigations used to search for ores or other valuable minerals. Prospecting for mineral deposits involves direct and indirect techniques.

Direct prospecting techniques for discovery of minerals are normally limited to investigations of surface deposits. They consist of visual examination of minerals where a deposit is exposed (called an **outcrop**) or where loose fragments (called **float**) that have weathered away from the outcrop. Geologic studies of the entire area augment these simple, direct techniques. By means of aerial images, geologic maps, and structural assessment of an area, geologists gather directly observable data about the location and properties of mineral deposits. Precise mapping and analysis of mineral structure including microscopic studies of samples enable the geologist to locate the hidden as well as surface mineral content.

Indirect prospecting methods rely heavily on geophysics to reveal information about hidden mineral deposits. Geophysics is used to detect concentrations of minerals using physical measurements of gravitational, seismic, magnetic, electrical, electromagnetic, and radiometric variables of the earth. These methods can be applied by using instruments in the air, on aircraft and satellites, or on and beneath the earth to probe below the topography. Geochemistry, the quantitative analysis of soil, rock, and water samples, and geobotany, the analysis of plant growth patterns, can also be employed as prospecting tools

Exploration determines as accurately as possible the size and value of a mineral deposit. Exploration uses many of the direct and indirect techniques of prospecting, but in a more refined and detailed manner and at a larger scale. The line between prospecting and is not sharp, and distinctions between the two are extremely difficult in some cases.
Exploration generally shifts to surface and subsurface locations using measurements obtained to develop a comprehensive assessment of the extent and grade of the ore. Samples will be collected in a representative manner and subjected to chemical, metallurgical, X ray, spectrographic, or radiometric evaluations. These techniques are used to enhance the investigator's knowledge of the mineral deposit. Samples are collected by chipping outcrops, trenching, tunneling, and drilling.

Drilling involves boring into rocks at the site to study the geologic and structural makeup of the deposit. Rotary, percussion, diamond, reverse circulation and other drilling techniques can be used for purposes. Diamond drilling and other methods that provide a solid core samples from the hole created during drillings are often preferred because they return cores that yield knowledge of the geologic structure. Exploration geologists also sink instruments down drill holes to detect geophysical and radiometric characteristics from the boring. The core is normally split along its axis; one half is analyzed, and the other half is retained intact for further geologic study. An evaluation of the samples enables the geologist or mining engineer to calculate the tonnage and grade, or richness, of the mineral deposit.
The goal of exploration is to determine in a convincing manner whether the property is host to a specific mineral deposit or contains a financially viable ore body. For an ore deposit, this determination must be made through processes called **reserve estimation** which involve a very detailed examination of the ore body and the cost of mining and processing. At the conclusion of this stage the mine owner uses a **reserve estimate** to determine whether the site will be developed as a mine project, traded to another party, or abandoned. **Appendix C** to this Guide provide an **Introduction to Reserve Estimation Methods** and discusses some of the differences between Russia reserve estimation and reserve estimation principles and methods in Canada, Australia and other countries.

Development and Exploitation - **Development** is the phase in a mine's life when the planning and opening of a mineral deposit for exploitation are conducted. Development is the phase when access to the deposit is achieved, generally through **blasting** and **hauling** of waste rock, removal of soil, and diversion or drainage of surface and ground water to expose ore deposit.

Access to the deposit at surface mines is achieved by stripping the **overburden**, which is the soil and/or rock - **gangue** or **waste rock -** covering the deposit using heavy equipment to expose the near-surface ore for removal or extraction. Extensive **blasting** is frequently required to break up the overburden before it can be **loaded** and **hauled** to waste rock piles. Underground mines rely on the excavated openings and tunnels, called **adits** or **shafts,** from the surface to access more deeply buried deposits.

In both underground and surface mines, extensive, specific preliminary legal and financial activities are necessary to acquire water and mineral rights, buy surface lands, acquire access routes and power supplies, arrange for financing, prepare permit applications, and conduct an environmental impact statement (EIS) before **development** can occur. When these steps have been achieved the construction of facilities such as access roads, power sources, mineral transportation systems, mineral processing facilities, waste disposal areas, offices, and other support facilities must precede before actual mining can occur.

Exploitation is associated with the actual recovery, or **production**, of minerals from the earth in economically valuable quantities. Usually only enough development is done prior to exploitation to ensure that production, once started, can continue uninterrupted throughout the life of the mine. The **mining method** selected for exploitation is

determined by the characteristics of the ore deposit and the limits imposed by safety, technology, environmental concerns, and economics. Geologic conditions, such as the dip, shape, and strength of the ore and the surrounding rock, play a key role in selecting the method.

Traditional exploitation methods fall into two main categories based on the unique characteristics of the mine site, surface or underground. **Surface** includes mechanical excavation methods such as open pit and open cast (**strip mining**), and aqueous methods such as **placer** and **solution ground mining** is usually conducted using unsupported, supported, or caving mining methods and solution mining using boreholes to deliver solutions to dissolve minerals in the ore body.

In **open pit mining** using **mechanical extraction methods**, a thick deposit is generally mined in benches or steps; thin deposits may require only a single bench or face. Open pit or open cast is usually employed to exploit a near-surface deposit or one that has a low stripping ratio (ratio of overburden volume to ore volume). Open pit mining often necessitates a large capital investment but can result in productivity, low operating cost, and good safety conditions. The **aqueous extraction methods** are technologies that depend on water or another liquid (e.g., dilute sulfuric acid, weak cyanide solution, or ammonium carbonate) to extract the mineral.

Placer mining is a method used to exploit loosely consolidated deposits, called **placers,** like common sand and gravel that may contain ore deposits of gold, tin, diamonds, platinum, titanium, or coal. Placer mining can involve several mining methods, sometimes in combination, at specific sites. Mechanical extraction methods using bulldozers, loaders and trucks to strip barren portions of the placer and extract ore are common in many regions. **Dredging** is a placer mining method that uses floating vessels that dig "mobile" ponds in order to move across a placer, which extract minerals using either mechanical techniques such as a string of buckets on a chain, hydraulic or suction methods.

Solution mining includes both **borehole mining**, in which liquids are used to dissolve and extract minerals such as sodium chloride or sulfur, and **leaching**, in which solutions to dissolve minerals such as uranium or copper are injected through drillholes into ore deposits ("in place" or in situ leaching) or sprayed onto ore-bearing dumps or heaps. **Placer a**nd **solution mining** are among the most economical of all **mining methods** but can only be applied to limited categories of mineral deposits.

Underground mining methods—unsupported, supported, and caving—are differentiated by the type of wall and roof supports used in the mine, the configuration and size of production openings, and the sequence of extraction operations within the ore body. **Unsupported methods** are used to extract mineral deposits that are generally associated with strong ore and surrounding rock. These methods are called **unsupported** because they do not rely on artificial pillars to assist in the support of the openings. Unsupported methods include methods that rely on substantial amounts of roof bolting and localized support measures to prevent the roof of the mine opening from collapsing.

Room-and-pillar mining is a common unsupported method that is used primarily for flat-lying seams or bedded deposits where support of the roof of the mine opening is provided by natural pillars of the mineral left standing in a systematic pattern. **Stope-and-pillar mining** (a **stope** is a production opening in a metal mine) is a similar method used in metallic mines and other non-coal mines to extract thicker, more irregular ore bodies in which the pillars are spaced strategically in lower-grade ore so that higher-grade ore can be extracted. Caving methods are underground mining methods that involve large openings in which ore is blasted to rubble and extracted through holes in the base of the caved chamber.

Reclamation is the stage of mining that continues after exploitation is completed and includes the process of closing a mine by removing and salvaging equipment, remediating and/or restoring damaged water and land, and rehabilitating waste sites and mine opening. Rehabilitation often includes the recontouring and revegetation for the closure of a mine and rehabilitation of waste disposal areas.

Mine engineering practice recommends that the best time to begin the mine reclamation process is before the first excavations are initiated. To control the overall cost of mining plus reclamation, mine designers plan mines, including placement of wastes and conservation of topsoil so that the reclamation process is considered in all stages of the mining. This approach is reflected in the concept of **sustainability** in the industry. As used by mining industry organizations such as the National Mining Association, a major mining industry association in the United States with a website at www.nma.org, **sustainability** is defined as addressing present economic and environmental concerns in a manner that enhances the ability of future generations to meet their own economic and environmental needs.

In planning for the reclamation of a mine and/or mill, several major concerns must be addressed. A primary concern is safety of the site, particularly when the area is returned to unrestricted public use. Safety concerns generally require the removal, by demolition or salvage, of office buildings, processing facilities, transportation equipment, utilities, and other surface structures. Safety concerns include requirements for mining to seal all mine openings that present physical hazards such as vertical openings – shafts, horizontal openings - adits, and other openings that may present physical hazards. Existing highwalls at the edge of open pits and other geologic structures that present safety risks may, if not backfilled, restore original ground contours, require protective measures if they are accessible to people or animals to prevent injuries or death due to falls or slope failures.

The second major focus of mine reclamation is rehabilitation or restoration of land surfaces, the water quality, and waste disposal areas so that long-term water pollution, soil erosion, dust generation, or vegetation problems do not occur. The restoration of soils and native plants is a very important part of this process, as healthy plants help build stable soil structures and allow the area to return to its natural, or pre-mining state.

When waste rock or tailings with acid-producing properties are found at a mine, it may be necessary to isolate or encapsulate these materials in locations where rainfall has little effect on the material and acid production is prevented or minimized. The same controls may be necessary for waste rock and tailings that contain heavy metals to prevent potential pollution of streams and ground water supplies.

Planning the design of drill sites, road, process buildings, waste dumps, tailings ponds, and other disturbed areas, including the placement of impervious liner materials, before development and exploitation is essential to minimizing or preventing future pollution problems. Restoration and remediation work are also likely to be necessary to complete mine reclamation to the satisfaction of legal and regulatory requirements.

A third major focus of mine reclamation is providing for productive use of the land after is completed. Old mine sites have been successfully converted to both non-commercial uses - such as wildlife refuges, lakes, wildlife habitat, forest, and livestock pasture - and commercial uses - such as underground storage facilities, real estate developments, solid waste disposal areas, shopping malls, golf courses, airports, and other uses that can benefit society. Unreclaimed mine lands may have no productive post-mining land uses and may become sources of sediment or toxic materials that can damage down stream or down gradient lands.

By planning the mine for a subsequent development, mine planners can enhance the value of the mined land and help convert it to a use that the public will consider favorable. The successful completion of the reclamation of a mine will keep the mining company in compliance with legal and regulatory responsibilities and has potential to enhance public opinion of the industry. The reclamation stage of the mine is therefore of paramount importance to the mine operator and should be planned at the earliest possible time in the life of the mine.

As the closure, remediation and rehabilitation components of reclamation are completed after the end of the profitable production phase of mining is completed financial guarantees are increasing a part of the regulatory approach to insuring that reclamation is successfully completed. **Reclamation guarantees,** such as **Financial Assurances**, **Surety Bonds** or **Insurance Policies** to cover projected reclamation costs are required by many jurisdictions, often at the time a mine or mill is permitted. These requirements are common for mines and mills operating in the US, Canada, Australia and Western Europe, among other regions and referenced in mining and milling guidelines adopted by international institutions such as the World Bank group and United Nations Development (UNDP) and Environment (UNEP) Programmes. At present, they are NOT required by Russian law, however.

Mines often experience variations in their lifecycle due to changes in market conditions, irresolvable problems encountered during operations, and changes in ownership. These variations include cessation of production operations prior to completion of approved exploitation activities in response to unanticipated changes in economic, environmental or technical conditions. The cessation of mining may be temporary or permanent. When a

mines closes prematurely, or before proposed extraction operations are completed, the potential for future operations at the mine is undetermined or unknown.

In light of the potential for unforeseen closure, requirements for reclamation guarantees often mandate that the financial assurance in the full amount needed for reclamation at any phase of mining and milling be provided by the mine operator before a permit is issued to guarantee that all reclamation requirements will be completed satisfactorily without use of additional public funds. Similarly, financial guarantees for mine reclamation are typically required to be payable to a regulatory agency on demand, rather than a financial account under control of the mine operator. Insuring that reclamation guarantees are available independent of the financial status of the mine operator allows reclamation funds to be accessed in case of bankruptcy or mine abandonment by the owner and/or failure of the mine operator to perform reclamation in a timely or satisfactory manner as required.

IX. WHAT ARE BEST MANAGEMENT PRACTICES?

Best Management Practices are technologies and procedures that address specific goals such as minimizing environmental and social impacts, demonstrating social responsibility, minimizing long-term costs, and insuring sound financial accountability. Best Management Practices for mines and mills have been compiled by lenders and investors, international agencies, mining organizations, and non-governmental organizations. These compilations can be used as toolkits or checklists for evaluating and optimizing practices at individual mines or in individual mining regions.

Best Management Practices often identify technologies or actions that may exceed minimum standards set by regulatory or lending agencies, identifying a means to minimize social and financial costs and environmental impacts to a degree that goes beyond required performance. Best management practices have been developed to address both (one space) environmental performance and social responsibility.

The concerns and aspirations of interested and affected communities may reflect perspectives or objectives that are not addressed by mine proponent efforts, even if they represent their proposal as incorporating best practices or "state of the art" technologies. Therefore, use of specific "best management practices" should not be considered a guarantee that citizen and civil society organizations concerns and issues have all been addressed sufficiently.

Standards, as used in this Guide, refer to criteria applicable to mining operations by national or regional authorities, investors such International Financial Institutions, and commitments from companies that operate mines. Standards may be found in laws and regulations, in guidelines and requirements of international organizations, and in corporate commitments, by-laws or mission statements.

Specific Best Practices compilations and models that address investor, mining industry and governmental audiences include:

International Investor-Level Programs

The Equator Principles, "an industry approach for financial institutions in determining, assessing and managing environmental and social risk in project financing" is at http://www.equator-principles.com/principles.shtml. The Equator Principles address a wide variety of developments that have social and environmental impacts and identify best practices related to environmental assessment, social responsibility and environmental performance. They rely heavily on World Bank and International Finance Corporation Guidelines and Handbooks.

World Bank (WB) and International Finance Corporation (IFC) have environmental health and safety guidelines related to mining that are currently being updated. A World

Bank web portal for mining-related inquiries that include current policy, standards and guidelines information is at www.worldbank.org/mining.

Currently available guidelines include:

IFC Environmental Health and Safety Guidelines for Mining and Milling - Underground, 1995 – at: http://ifcln1.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_mining_underground/$FILE/mining_underground.pdf

IFC Environmental Health and Safety Guidelines for Mining and Milling - Open Pit, 1995 at: http://ifcln1.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_mining_openpit/$FILE/mining_openpit.pdf

WB Pollution Prevention and Abatement Handbook, 1998 at: http://lnweb18.worldbank.org/ESSD/envext.nsf/51ByDocName/PollutionPreventionandAbatementHandbook

WB Base Metals Industry Sector Guidelines in Pollution Prevention and Abatement Handbook – at: http://lnweb18.worldbank.org/essd/envext.nsf/51ByDocName/BaseMetalandIronOreMining/$FILE/HandbookBaseMetalAndIronOreMining.pdf

WB "Striking a Better Balance," Extractive Industries Review Final Report, a World Bank Consultation, 2004 at: http://www.eireview.org/eir/eirhome.nsf/(DocLibrary)/5E4FD60785F510DA85256E19006D9C73/$FILE/Volume%20I%20Final%20EIR%20Report.pdf

The Extractive Industries Review Home Page provides working papers, commentary, and policy analyses related to "Striking a Better Balance" at: www.eireview.org.

International Agency Compilations

Mineral Resources Forum (MRF) is a program of the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Environment Program (UNEP) that is "an information resource for issues related to mining, minerals, metals and sustainable development. It seeks to engage a diverse set of users from governments, mining, mineral and metal companies and other concerned civil society institutions, and to promote an integrated, inter-disciplinary approach to mineral issues and policies. The MRF is designed to accommodate a broad and growing range of technical and socio-economic issues that arise during the life cycle of mineral resources, i.e how resource are discovered and explored; exploited, transformed and traded; and finally consumed, disposed of, or recycled."

MRF provides research and best practices compilations related to environmental performance and corporate social responsibility at: http://www.natural-resources.org/minerals/csr/index.htm.

It includes research and best practice compilations related to all phases in the life cycle of mining at http://www.natural-resources.org/minerals/CD/guidelin.htm.

Mining Industry Compilation of Best Practices

Enviromine is a compilation of training programs and sources of information on environmental technology in mining at http://technology.infomine.com/enviromine/.

Examples of State or Province Level Programs – British Columbia Acid Mine Drainage Guidelines and New Mexico Mining Act and Water Quality Act and Associated Regulations

Acid Mine Drainage Guidelines – British Columbia, Ministry of Energy and Mines, 1998, at: http://www.em.gov.bc.ca/mining/mineper/ardguide.htm.

The New Mexico Mining Act - a statute providing authority to regulate most mining operations and reclamation plans for minerals other than coal - can be accessed on line from the New Mexico Statutes page at: http://www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=newmexico:statutes by searching the "Statutory Chapters of New Mexico Statutes Annotated 1978" for Statute 69-36-1 to 69-36-20.

New Mexico Mining Act Regulations adopted to implement New Mexico Mining Act Regulations are at: http://www.nmcpr.state.nm.us/nmac/_title19/T19C010.htm

New Mexico Water Quality Act - A statute providing for protection of waters of New Mexico, including ground waters for "reasonably foreseeable future use" can be accessed on line from the New Mexico Statutes page at: http://www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=newmexico:statutes By searching the "Statutory Chapters of New Mexico Statutes Annotated 1978" for Statutes 74-6-1 to 74-6-17.

New Mexico Water Quality Control Commission Regulations – adopted to implement The Surface and Ground Water Protection portions of the New Mexico Water Quality Act are at: http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0002.htm

New Mexico Water Quality Control Commission Regulations – adopted to implement Interstate and Intrastate Stream Standard portions of the New Mexico Water Quality Act are at: http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0004.htm.

Non-Governmental Organization compilations regarding public participation

Environmental Law Institute, "Improving Public Participation in the Environmental Impact Assessment Process in Mining," at http://www.elistore.org/reports_detail.asp?ID=10996&topic=Mining.

Environmental Law Institute, "Prior Informed Consent and Mining: Promoting Sustainable Development of Local Communities," at http://www.elistore.org/reports_list.asp?topic=Mining.

Non-Governmental Organization compilation regarding environmental performance, social responsibility and financial accountability

A non-governmental organization-derived set of best practices was compiled in 2000 by a North America coalition called the Western Mining Action Network. This "Citizens' Tool Kit: A Guide to Responsible Mine Decision Making Rights, Responsibilities," addresses a broad range of social and environmental matters involving companies, regulators, investors and citizens associated with mining projects. The Citizens' Toolkit includes a preamble and statement of principles defining Responsible Mining: Rights and Responsibilities, found below, and specific best practice recommendations for an extensive set of social, economic and technical considerations, included in the Appendix.

CITIZENS' TOOLKIT
A GUIDE TO RESPONSIBLE MINE DECISION MAKING
RIGHTS, RESPONSIBILITIES, AND PRACTICES

RESPONSIBLE MINING:RIGHTS AND RESPONSIBILITIES

Preamble

Each citizen has a fundamental right to a clean, safe and healthful environment. Because biological systems are interwoven: watersheds, wildlife, soils, plant communities, and biological diversity are closely linked with human health and well being. Mining activities can have a profound, significant and often irreversible negative impact on human health, safety, welfare and the environment. Therefore, laws and regulations governing mining activities, and company practices, should ensure protection of environmental, aesthetic, recreational, cultural, social and historic resources and human health, safety, and welfare.

Good decision-making about mine location, operation, and reclamation must be under-pinned by a set of public rights, which mining companies have a responsibility to respect.

This is necessary because modern mining operations almost always affect public resources and values. As a result, mining companies have an obligation to operate in a manner that respects these public rights and values.

Public Rights

The Right to a Healthy Environment: Each citizen has a fundamental right to a clean, safe and healthful environment (including water) as a basic part of our human inheritance.

Public Accountability: Mining companies should be accountable to the affected community in terms of mining's social and environmental impacts, in addition to following all laws, regulations, and standards. As a basic measure of accountability, citizens should have the right to compel the enforcement of environmental standards and to participate in decision-making.

The Right-to-Know: For accountability to exist, communities must have the right-to-know about all significant mining information and decisions and must have access to information used by companies and governments to make decisions, including environmental monitoring, and financial information.

The Right to Say No: Mining is not always the highest and best use of lands and/or resources. Other uses and/or values must be considered and weighed. Communities must have the right to protect important environmental, cultural, and economic areas from mining impacts and to select other potential uses of lands and resources.

Protection of Cultural Resources: Mining should not over-ride the protection of important cultural and religious resources. Any mine plan should demonstrate how these resources will be protected, to the satisfaction of the impacted community.

Protection of Public Health: Public health should not be jeopardized by mining. The burden of proof should be on mining companies to show that human health will not impacted.

Protection of Worker Rights and Health: Employees at mining operations shall have the right to organize and to representation. They shall have the right to a clean, safe and healthy workplace. They shall be hired without regard to age, race, sexual gender or orientation, and union or political association.

Protection of Economies: While communities can benefit economically from mining, mining can also have negative economic impacts. Alternative economic development opportunities should be evaluated, especially those that are sustainable in the long term. When a mining option is selected, the long-term benefits to communities should be maximized. Communities have the right to protect themselves against the costs of long term clean-up from mine activities.

Company Responsibilities

Follow National and International Laws and Regulations: Companies should follow should follow the most advanced environmental standards worldwide, even if a specific country has less stringent environmental requirements.

Use the Precautionary Principle In the face of threats of irreversible environmental damage, lack of full scientific understanding should not be an excuse for postponing actions which are justified in their own right. The precautionary approach could provide a basis for policies relating to complex systems that are not yet fully understood and whose consequences of disturbances cannot yet be predicted.

Corporate Burden of Proof: Mining companies should demonstrate that their proposed operation will not adversely impact the environment. The burden of proof should be on companies to demonstrate they will not harm the environment.

Protection of Water Resources: Water resources, *both at the mine site and offsite*, are particularly vulnerable to impacts from mining. Mining companies should guarantee that there will be no degradation of water quality or quantity and that the - health of watersheds will be protected.

Incorporation of Conservation Biology: The principles of conservation biology, including the ecological requirement for areas of unfragmented habitat, connectivity between key habitat areas, biological sustainability and diversity should form a basis for mine decisions.

Reclamation of the Land Affected by Mining: All abandoned and existing mines should be fully restored. Any mine proposal must include a plan for cleanup of abandoned mines on the site and the restoration of land and natural resources after the completion of mining.

Company Internalization of Liabilities and Costs: Mining companies must provide financial guarantees that assure that the taxpayer will not be left with the cost of clean up, reclamation, and long term monitoring and maintenance. The financial guarantees and conditions for release must include consideration of uncertainty in the estimates.

Environmentally Efficient Extraction of Minerals: Mineral extraction and processing should be environmentally efficient. This means minimizing water and energy use, maximizing reuse and recycling of materials, and minimizing waste.

Environmentally Efficient Use of Minerals: Minerals should be used efficiently. Recycling and reuse should be maximized and extraction of virgin materials minimized when it benefits the environment.

APPENDIX A

EXTRACTS FROM
MINISTRY OF NATURAL RESOURCES REGULATIONS

(Additional detailed information available on MNR website www.mnr.gov.ru.)

EXTRACT FROM:
THE REGULATIONS ON THE MINISTRY OF NATURAL RESOURCES OF THE RUSSIAN FEDERATION
approved by Resolution of the Government of the Russian Federation # 370, dated July 22, 2004

1. The Ministry of Natural Resources of the Russian Federation (MNR of Russia) is a federal executive body performing the functions related to state policy formulation and normative and legal regulation in the sphere of the study, renewal, and conservation of natural resources, including management of the State subsoil stock and forestry; the use and conservation of the inventory of water resources; the use, conservation, and protection of the stock of wooded forests and reproduction; operation and safety of multipurpose reservoirs and water-resources systems, protecting and other hydraulic structures (except navigation hydraulic facilities); the use of wildlife resources and their habitat (except wildlife resources assigned to hunting resources); specially protected natural areas, as well as in the sphere of environmental conservation (except the sphere of ecological supervision).

2. The Ministry of Natural Resources of the Russian Federation exercises coordination and control of the activity of the Federal Nature Management Supervision Service, the Federal Subsoil Use Agency, the Federal Forestry Agency, and the Federal Water Resources Agency being under its authority.

3. The Ministry of Natural Resources of the Russian Federation is guided in its activity by the Constitution of the Russian Federation, federal constitutional laws, federal laws, acts of the President of the Russian Federation and the Government of the Russian Federation, international agreements of the Russian Federation, as well as by the current Regulations.

4. The Ministry of Natural Resources of the Russian Federation carries out its activity in concert with other federal executive bodies, executive bodies of the subjects of the Russian Federation, and institutions of local governing, as well as with public associations and other organizations.

EXTRACT FROM:
THE REGULATIONS ON THE FEDERAL SUBSOIL RESOURCES MANAGEMENT AGENCY
approved by Resolution of the Government of the Russian Federation # 293, dated June 17, 2004

1. The Federal Subsoil Resources Management Agency is a federal executive authority performing the functions related to rendering State services and federal property management in the sphere of subsoil use.
2. The Federal Subsoil Resources Management Agency is under the authority of the Ministry of Natural Resources of the Russian Federation.
3. The Federal Subsoil Resources Management Agency within the established scope of activity:
exercises the authorities of the owner of the federal property required for performing the functions of federal state power bodies within the scope of the activity established in item 1 of the current Regulations, including the property transferred to federal state unitary enterprises, federal state institutions, and state enterprises within the jurisdiction of the Agency, in accordance with the procedure and within the limits specified in federal laws, acts of the President of the Russian Federation and the Government of the Russian Federation;
4. organizes the State geological study of the subsoil;
5. organizes the appraisal of geological study projects;
6. organizes the economic-geological evaluation and cost estimate of mineral deposits and subsoil sites in accordance with the established procedure;
7. organizes tenders and auctions for the right to use the subsoil in accordance with the established procedure;
8. organizes the State examination of information on explored mineral reserves, geological and economic information on subsoil sites granted for use;
9. rates mineral reserves as economic or subeconomic reserves, as well as determines mineral content standards for minerals that remain in overburden and enclosing (impoverishing) rocks, mine and ore processing dumps or waste on the basis of feasibility reports on operating quality requirements for calculation of explored reserves;
10. grants at a charge geological information on the subsoil obtained as a result of the State geological study of the subsoil;
11. issues decisions on the lack of minerals under the site of the forthcoming development and permissions on the development of mineral sites, as well as on location of underground structures in places of minerals occurrence;
12. ensures organizational support to the State system of subsoil use licensing;
registers applications for licenses, informs executive authorities of corresponding subjects of the Russian Federation about these applications;
13. makes decisions on granting of the right to use subsoil sites in accordance with the procedure established under legislation of the Russian Federation;
14. makes decisions on the approval of results of tenders or auctions for the right to use subsoil sites in accordance with the procedure established under legislation of the Russian Federation;

15. issues, draws, and registers licenses for the subsoil use;
16. introduces changes and additions into licenses for the use of subsoil sites, as well as redraws licenses;
17. makes decisions on the early termination, suspension, or limitation of the right to use subsoil sites, including according to the representation made by the Federal Nature Management Supervision Service and other authorized bodies;
18. presents statements about a concrete rate of regular payment for the subsoil use of each licensed subsoil site to the executive authority of the subject of the Russian Federation;
19. determines a concrete rate of regular payment within the limits of minimal and maximal rates established under legislation of the Russian Federation for the subsoil use of each site located on the continental shelf of the Russian Federation, the exclusive economic zone of the Russian Federation, or territories outside the Russian Federation that are under the jurisdiction of the Russian Federation, as well as leased from foreign states or used under the international agreement (unless otherwise stipulated in the international agreement);
20. considers and approves project and technical documentation for development of mineral deposits.

The Federal Subsoil Resources Management Agency also performs other functions in accordance with the Regulations on the Federal Agency.

EXTRACT FROM:
THE REGULATIONS ON THE FEDERAL SUPERVISORY NATURAL RESOURCES MANAGEMENT SERVICE
approved by Resolution of the Government of the Russian Federation # 400, dated July 30, 2004

1. The Federal Supervisory Natural Resources Management Service is a federal executive body performing control and supervision functions in the sphere of nature management.
2. The Federal Supervisory Natural Resources Management Service is under the authority of the Ministry of Natural Resources of the Russian Federation.
3. The Federal Supervisory Natural Resources Management Service exercises State management in the sphere of organization and functioning of specially protected natural areas of federal importance.
4. The Federal Supervisory Natural Resources Management Service is
an authorized state body for environmental impact assessment within the specified scope of activity;
a federal executive body exercising State environmental control (State ecological monitoring) in the specified scope of activity.
5. The Federal Supervisory Natural Resources Management Service performs the functions:
of an administrative organ for the Convention on International Trade in Endangered Species of Wild Fauna and Flora, dated March 3, 1973, in the Russian Federation with respect to endangered species of wild flora and fauna, except sturgeons; and
of a federal executive body specially authorized to exercise State control of Lake Baikal conservation.
6. The Federal Supervisory Natural Resources Management Service exercises control and supervision:
in the field of preservation, use, and reproduction of wildlife and wildlife habitat (except hunting and fishing resources);
in the field of organization and functioning of specially protected natural areas of federal importance;
of the geological study, rational management, and conservation of the subsoil;
of the condition, use, conservation, and protection of forest reserves, and of reforestation;
of the use and protection of water bodies;
of the observance of legislation of the Russian Federation and international rules and standards concerning the marine environment and natural resources of internal seas, the territorial sea, and exclusive economic zone;
of the mineral and living resources conservation on the continental shelf; and
of the safety of hydraulic engineering structures (of compliance with the safety norms and regulations), except industrial and power hydraulic engineering structures, as well as navigation hydraulic engineering facilities.
7. The Federal Supervisory Natural Resources Management Service:
exercises State land control within its authorities concerning lands of the inventories of water resources and forest resources, and lands of forests not included in the inventory of forest resources, as well as and specially protected natural areas;

in accordance with the established procedure issues licenses for (permits):
getting of fauna and flora species put into the Red Book of the Russian Federation;
marketing of wild animals belonging to species put into the Red Book of the Russian Federation;
getting of wildlife resources not assigned to hunting and fishing resources and their use;
keeping and breeding of wildlife objects not assigned to hunting and fishing resources in the semi-open conditions and artificial habitat;
import/export of zoological collections to/from the Russian Federation;
import/export of wild animals, their parts or products thereof (except hunting and fishing resources) to/from the Russian Federation;
import/export of endangered species of wild fauna and flora, except sturgeons, to/from the Russian Federation;
export of wild animals, wild plants, zoolite bones, ivory, horns, hooves, corals, and similar materials;
export of animal and vegetable crude drugs;
export of fish, crustaceans, mollusks, and other marine invertebrates, developing spawn, sperm of sturgeons, salmons, and ordinary fish (alive only;)
export of collection materials related to mineralogy and paleontology, semiprecious stones, and articles thereof;
export of information on the subsoil by regions and fields of fuel and energy resources and mineral deposits located in the Russian Federation and within the limits of the continental shelf and offshore zone of the Russian Federation;
creation, operation, and use of man-made islands, constructions, and units; conduction of drilling operations in connection with the geological study, mineral searches, exploration, and development, as well as laying of submarine cables and pipelines in the internal seas, the territorial sea of the Russian Federation, and the continental shelf of the Russian Federation within its authorities.
8. The Federal Supervisory Natural Resources Management Service also performs other functions in accordance with the Regulations on the Federal Service.

APPENDIX B
CITIZENS' TOOLKIT

A GUIDE TO RESPONSIBLE MINE DECISION MAKING
RIGHTS, RESPONSIBILITIES, AND PRACTICES
Western Mining Action Network, 2000

BEST PRACTICES BY AREAS OF PERFORMANCE

I. Public Participation

A. Operators must identify and notify any community or group of people (and the government) whose interests may be directly or indirectly affected by their activities in the area or whose interests in the land may be affected.
B. The operator must work with government authorities to involve the public during all stages of project identification, exploration, development, monitoring, and closure. This should include: notice requirements, a notification list of all involved and interested persons and organizations, public hearings near the proposed mine site as well as near major population centers, complete and convenient documentation capability - including all information generated in compliance with "community right to know" requirements.
C. Operators shall diligently maintain communications with affected groups about their activities, including attending meetings where requested.
D. Operators must involve the interested groups in monitoring programs, including gathering of baseline data, for the environmental or socio-economic impacts of their activities.
E. At the request of stakeholders (with adequate notice), operators must allow access to the site for purpose of public inspection and/or audit. To address concerns of liability, the company must allow public access to necessary safety and other training so as to facilitate stakeholder inspections. (Note: two weeks notice should be sufficient in most circumstances, however in the event of an accident, spill, or other emergency, 24 hour notice, or less, should be sufficient).
F. Operators must duly consider any recommendations resulting from a stakeholder site inspection and provide timely response in writing explaining how the recommendations are dealt with.
G. Prior to any mine decision, and as part of the mine decision making process, operators should set-aside funding for a stakeholder oversight committee. This independent committee would have the right to meet regularly with company officials, to obtain in a timely manner monitoring and other environmental information, and to call and have carried-out an independent environmental audit.

II. Land Use and Protection

A. Protected Areas

1. Owner/operators shall not conduct exploration or development activities within any formally designated, or planned, protected areas or in a location adjacent to these areas which could result in loss of integrity to the protected area. This includes areas protected for their biodiversity or cultural significance, and those that possess other

recognized resource values. This also includes protected areas or identified culturally or ecologically sensitive areas. Whenever there is doubt as to land status, companies should engage in community consultation to determine stakeholder views and interests.

2. Owner/operators should avoid exploration and development in ecologically and culturally significant areas that are identified or proposed for protection but not yet formally protected.
3. Owner/operators should recognize that on public or government controlled lands, citizens and governments have the right to choose other land uses, or preservation, over mining, even for lands not formally protected from mining. It is the obligation of the owner/operator to proceed with development planning in a manner that respects this right.

B. Recognition of existing land use designations

1. Operators shall ensure that their activities or proposed project will conform to all existing land use plans or designations.
2. Where no land use plan exists, operators should, in conjunction with local communities potentially affected by the project, conduct studies to identify and assess local land uses and resource values potentially affected by the project. Where competing values exist, the operator must recognize citizen's rights to select other land use options.

Such assessments should include:

traditional land use;
Landscape level ecological sensitivity mapping, including key or critical wildlife; populations and habitat;
Landscape level biodiversity mapping;
Culturally sensitive areas and heritage resources

C. Site Location Planning

1. Siting analyses should include: an assessment of worst case scenarios, impacts on protected areas, analyses of off-site impacts from noise, lights, dust, vibrations, and erosion, and evaluation of all reasonable alternatives, including the need for buffer zones.
2. In locating project infrastructure, operators should make all reasonable efforts to locate and operate facilities to conform to findings of the items above.
3. The environmental impact statement should include a full analysis of all alternatives land uses, including options for land preservation or alternative development.

D. Environmental and Economic Justification and Feasibility

1. Owner/operators should clearly identify all environmental, social and financial hazards, risks and costs posed by a proposed project. Information should be made available on corporate ownership structure, permits for rights of entry and operation, and the past environmental performance record (including fines and violations) of involved companies.
2. The assessment of environmental and social risks and costs should be conducted according to environmental impact assessment practices that impartially and fully

consider all alternatives to the proposed action (including No Action), employ independent scientific review and analysis, provide for meaningful public input and stakeholder participation, and ensure the decision-making process is both lawful and transparent to the public.

3. In advance of an operator making a significant economic decision or action that may affect a community it must disclose economic information on a full cost accounting basis to justify the decisions.
4. Companies should provide resources to allow stakeholders review and evaluation of risks and costs. Impacts should be addressed for company, community and government. Input into risks must include all community and social values.
5. Project feasibility estimates should reflect full cost accounting principles in risk calculation.
6. Liability associated with the project continues as long as there is a potential for ecological effects. Monitoring will be ongoing and will determine release of liability.
7. The full cost of all mine reclamation, closure and post-closure activities (i.e., monitoring and maintenance) must be accounted for.

E. Environmental Cost Accountability

1. Full environmental costs must be included in the consideration of operational alternatives and establishment of ore reserves, and the determination of an operating plan. Environmental costs, including the full costs of regulatory oversight, reclamation and closure, and post-closure monitoring and maintenance shall be considered a standard cost of doing business, and should be estimated conservatively in economic decision-making.
2. All operational activities, including exploration, mine development, processing, waste rock and tailings disposal, access and infrastructure requirements designed to utilize those means which most effectively minimize or eliminate the discharge of pollutants (see Waste Management section) and to facilitate full and complete reclamation and closure.
3. Mineral extraction and processing must be conducted in an environmentally efficient manner. Reuse and recycling of minerals should be maximized, waste production minimized, and water and energy use optimized.
4. Company shall be fully responsible for the remediation and restoration of receiving environments due to operational or catastrophic failures, including for damages to all impacted natural resources. This responsibility should take the form of financial guarantees for mine cleanup and reclamation up front, before a project begins.

F. Traditional Land Rights

1. Operators must recognize traditional or customary ownership and use of land even when a government does not formally recognize the legal status of customary land or the rights of indigenous peoples.
2. Operators must accord the same status to indigenous and/or historically recognized customary ownership of land and use as they do to legally recognized ownership and use.
3. Operators must provide effective notification to indigenous people of any actions which may disturb land, rights or customs.

4. Operators shall not carry out any activities within traditional territories without the informed prior consent of affected indigenous groups.
5. Operators will not disturb designated or identified traditional cultural properties.
6. At the earliest stage in a mining project a survey should be conducted by the operator, in collaboration with local communities, to identify which individuals, groups or communities have rights to, or interests in, land or other assets in the project area.

H. Government and Political Influence

1. The operator shall not participate in or perpetuate in the abuse of human rights or corruption of public officials.
2. Operators should conform to the provisions of any applicable international conventions on climate change, indigenous human rights, environmental protection, minority rights, etc. in conducting their activities.
3. Operators shall disclose finance interest and relationships with government officials, individuals and political parties.
4. Operators shall disclose spending on community and public relations.
5. Operators (and their parent companies) shall not support, politically or financially, trade associations or organizations that pursue anti-environmental policies.

H. Interference and Resettlement

1. Operators should not conduct any activities in areas where any forced removals from land have occurred.
2. Operators shall not conduct any activities that may thwart, alienate, or otherwise detrimentally affect the use of traditional territories and resources by indigenous people without their informed consent and agreement on compensatory measures.
3. Owners/operators should not forcibly remove, nor in any way support the removal of, indigenous people from their land or territories.
4. Operators must ensure that if the development of a mine means that local people must be relocated, then their resettlement and rehabilitation should be provided for through appropriate agreements negotiated justly and fairly with the affected people.
5. Where relocation is to occur as a result of a negotiated agreement, it should be carefully planned and implemented such that no affected person, group or community has their standard of living, economic, culture and social cohesion diminished as a result.
6. Operators shall ensure that the opportunities for meaningful participation by those affected in planning and implementing the resettlement program are encouraged and facilitated.
7. Operators shall give full consideration of the plans proposed by the affected people, particularly with respect to the identification of suitable resettlement sites.
8. Operators shall ensure that all those relocated are provided sufficient resources (including time and money), and opportunities to share in project benefits, in order to maximize chances for success of resettlement.
9. Where those being displaced are dependent upon a land-based economy as their primary source of income and livelihood (i.e. Agriculture, hunting, fishing, etc.).
10. Operators should use responsible efforts to ensure that the resettlement program includes replacement land of comparable or greater value to the people affected. If

suitable land is not available, as determined by the affected people, then appropriate alternative or compensatory arrangements should be negotiated with the affected people.

11. Operators shall make every attempt, including negotiating with the host government, to ensure that relocated people receive legal title for all resettlement land.

H. Workplace/Workforce

1. Protection must be guaranteed for "whistle blower" employees who identify on-site operational problems with environment or safety issues.
2. Companies must recognize that their workers have the right to refuse unsafe and environmentally unsound work.
3. Companies must recognize that their workers have the right of participation of workers in committees regarding health, safety and environment.
4. Companies should mandate zero tolerance for fatalities in design and operating practice and goal of zero preventable accidents (adopt policies that recognize that all accidents are preventable – no injury or fatality is acceptable).
5. Mining companies shall recognize the rights of the workforce to organize.

III. Baseline Data

1. The purpose of baseline data is to establish a reference of pre-existing values against which to measure environmental impacts, and to inform decision-making in mine and monitoring design and operation. New and expansions to existing mines must not be permitted without adequate baseline data.
2. Baseline data must be representative of the site in its natural state prior to mine operations, and there must be enough baseline data to adequately characterize the site.

3. Baseline data should be collected for actions impacting both natural and pre-existing degraded sites.
4. The frequency, duration and timing of baseline data should be determined as required to adequately characterize the site. Continuous sampling methods should be used where practicable. Cyclical events must be represented (high/low/average conditions). A minimum of two years of baseline data for all parameters is recommended, and duration may need to be longer in some circumstances.
5. Components of baseline data must include human socioeconomics, cultural properties, aesthetics (noise and visual), resident and migratory wildlife, water (groundwater and surface water), air, hydrology, geochemistry, soil, climate and vegetation.
6. Water data shall include at a minimum aquatic resources (periphyton, algae, fisheries), sediment, and water chemistry (complete anion/cation), and nutrients (nitrogen, phosphorous, and chlorophyll a).
7. Vegetation baseline data shall include at a minimum both annual and perennial plants, soils characterization, and shall account for seasonal variation in species present or identifiable. Data will be collected from various aspects (i.e., north or south facing slopes), slope angles, and elevations, and will reflect typical and extreme climate conditions. Vegetation baseline data should include analysis for uptake of potential metals of concern.

8. Baseline data shall be collected for an adequate period of time to establish temporal trends. Data from “control” or “reference areas” will be collected throughout the operational mine-life and reclamation and closure period.
9. Baseline data should be collected in control watersheds or similarly defined areas to allow a comparison of impacts with unimpacted watersheds or other definable areas.
10. Baseline data must be collected to characterize potentially affected site-specific, local, and regional habitat and biologically integrated areas and watersheds.
11. Baseline data must be based on statistical methods and be both rigorous and robust. All analytical methods and results must be verifiable and validated. Accepted standard reproducible procedures will be utilized that incorporate quality assurance and quality control (QA/QC) procedures.
12. Historical information from individuals and communities shall also be considered relevant as baseline information, and will be used to establish baseline conditions in the absence of other data for pre-existing disturbances.
13. All baseline data must be maintained in public records and in database form accessible to the public.

IV. Exploration

1. Mechanical disturbance of land related to exploration requires full notification, planning, permitting and bonding.
2. All baseline data will be gathered and land value/suitability analysis must be conducted prior to exploration.
3. Culturally and ecologically sensitive zones will be avoided by exploration activities.
4. Exploration in traditional use areas can occur only following consultation and agreement with the traditional users.
5. Surveys of threatened and endangered species, and species of local concern must be conducted prior to exploration. Similarly, archeological and paleontological resources must also be determined prior to exploration.
6. The operator shall use least invasive techniques practically possible.
7. Where there is risk of disturbance of critical seasonal activities and vulnerable landscapes and sites, seasonal access controls will be instituted.
8. At a minimum, accepted pollution minimization and environmental practices must be used, such as: proper fuel management, no discharge of drilling fluids; neutral drilling fluids; muds managed in tanks; minimize drill pad size or other footprint of the operation; utilization of stream buffers; noxious weed control; and road construction standards to minimize sedimentation.
9. Constructing roads in roadless areas must be prevented.
10. Exploration shall not be conducted in protected areas or identified culturally or ecologically sensitive areas, and the need for buffer zones around such areas will be recognized.
11. All mineral exploration projects must include a plan for a full reclamation of land and resources.
12. All abandoned and existing mineral exploration sites should be fully reclaimed.
13. Mining companies must provide financial guarantees that assure that the taxpayer will not be left with the cost of clean up, reclamation, and long term monitoring and maintenance, during the exploration phase.
14. The financial guarantees and conditions for release must include consideration of uncertainty in the estimates.
15. Exploration should only be conducted in a manner fully protective of the surrounding areas, and with the realization that development of any resources discovered will require additional justification, time to permit, and public consideration that may determine development is incompatible with other values.

V. Public Monitoring and Company Reporting

A. Public Participation and Access

1. The operator should provide access to monitoring sites and environmental management operations.
2. Stakeholders must be able to observe all sampling events, and inspect operations (with notice); citizen tours and community participation should be encouraged and permitted by the operator.
3. The public should have access to the mine site and to company officials.

B. Access to Information and Expertise

1. The operator shall provide all monitoring data and reports, operating logs, analysis records and other information as requested by citizens, related to environmental quality monitoring and environmental management operations.
2. Monitoring schedules shall be published and adhered to, and participation by stakeholder groups and the public will be allowed during monitoring. Stakeholder groups and the public will be allowed to request a reasonable number of additional or duplicate samples be taken and analyzed.
3. All relevant data must be publicly available and produced on a set schedule. Access to the data must be convenient, and data must be made available in a timely manner. Relevance of information to environmental and societal considerations over-rides proprietary claims.
4. Companies or government should provide funding for stakeholders to afford competent expertise to review, communicate with stakeholders, and comment and make recommendations on stakeholders' behalf.
5. Regular meetings (at least twice a year) should be held between company, regulators and stakeholders to evaluate data, performance, and any issues of concern. Full access to the site should be provided with appropriate notice (Typically two weeks, but 24 hours when an accident, spill or other emergency has occurred).
6. Reporting must be accountable and timely. Trigger levels should be established, and responses to exceedances of trigger levels should be defined in the monitoring plan. Trigger levels should be established to prevent, rather than respond to, environmental concerns.

C. Independent/Additional Monitoring

1. If deemed necessary by stakeholder groups, the operator shall conduct sampling and/or facilitate public groups in sampling at additional or alternative sites from those required by regulatory permits. Sampling at additional sites will be conducted in a manner consistent with regulatory permits.
2. The operator will address the implementation/optimization of environmental management plans and operations as identified and recommended by public and stakeholder groups.
3. In addition to auditing carried out by the operator, the operator will permit, and fund, independent environmental audits conducted on behalf of stakeholders. The stakeholders shall select the auditor and be allowed technical representation during all audit activities. The operator will be responsible to respond to all of the issues raised in such an audit. The audits will occur on at least a bi-annual basis and can also be called in response to emergencies.
4. The operator will agree to and establish a formal process to facilitate and allow citizens to participate in environmental decision-making through independent monitoring. The process will evaluate and make conclusions and recommendations with respect to the environmental monitoring programs; minimize the discharge of pollutants into the environment by evaluating environmental management and monitoring, and making constructive recommendations; develop a plan to optimize the existing environmental management and waste collection, storage, and treatment systems to minimize pollutant discharges to the environment; develop a plan that

incorporates any direct discharge to the environment as a measure of last resort; develop a plan that will detect any discernable risk and impact to environmental quality, allow for pro-active measures designed to prevent degradation of existing environmental quality, make recommendations to improve response to spills, leaks and other such incidents and emergencies, and make recommendations on any other issues as the citizens/stakeholders deem appropriate

E. Independent Environmental Auditing and Special Studies

1. Operators will agree to a mechanism to conduct independent environmental audits on at least a bi-annual basis.
2. Operators will allow such audits supervised by stakeholder groups, and facilitate and fund the participation of independent experts, selected by the stakeholder groups in conducting, evaluating and commenting on environmental audits. Operators will provide funding for such audits as a cost-of-doing-business, but will not be responsible for oversight of the audit.
3. In addition, in the event that trigger limits or threshold values, which would be established to detect environmental effects at their earliest stages, are exceeded, or any significant spill, accident or emergency occurs, then the operator shall allow stakeholders to carry-out a study to assess the cause and mitigating action necessary to address such occurrences by determining their origin; determining the physical characteristics including concentration, quantity and migration characteristics; determining and addressing any potential or actual environmental impacts; identification of a mitigation plan to prevent or address additional contamination; and re-evaluation of the existing management practices and monitoring plan to address their efficacy in relation to the occurrence. While the company may carry-out its own studies, the company will set aside funds in advance to allow stakeholders to carry out an independent study. The cost of such studies, and any required mitigation, shall be borne by the operator as a part of monitoring.
4. Company audits shall only be conducted by reputable firms able to demonstrate independence and objectivity to stakeholders and the public. Firms selected to conduct audits should not be integrally involved in other engineering or consulting activities to mining companies, or directly answerable to the operator for the results of the audit.
5. Independent stakeholder audits shall be overseen by stakeholder groups who will select the audit team, supervise the audit, and receive the audit report.
6. Stakeholders groups shall be facilitated to meaningfully participate in audits. This facilitation shall include financial support for technical advisors in audit activities, commenting on drafts, and responding to results.
7. Environmental audits shall include:
    a. Verification of operator's compliance with the terms, conditions, stipulations, and requirements of all environmental permits, laws and regulations.
    b. Verification of operator's compliance with the terms, conditions and performance objectives of any stakeholder or other public agreement.
    c. Critical evaluation of operator's waste control, minimization and reduction practices, and verification of operator's use of best management practices and evaluate the effectiveness of employed practices at controlling stormwater runoff,

erosion, and sediment loading, and otherwise complying with human health and other environmental standards.

d. Evaluation of the adequacy of operator's interim and final reclamation and closure plan and financial assurances; and to evaluate operator's accident prevention and emergency response plan to prevent, contain, and cleanup releases of potentially hazardous substances into the environment.
e. Evaluation of operator's environmental quality monitoring, waste rock and tailings analysis, and other reporting procedures, programs and plans.
f. Evaluation of effectiveness of regulatory agency performance.
g. Any environmental concerns or impacts identified.

8. The operator will address the implementation/optimization of environmental management plans and operations as identified and recommended by public and stakeholder groups in participating or commenting on environmental audits.
9. The operator will commit funding to address and carry out constructive recommendations to improve environmental and social impacts made by the public and stakeholder groups as a result of environmental audits and special studies.
10. For company audits, companies shall select performing firms and fund environmental audits in a manner (blind trust with independent selection) that ensures the auditing process is accountable and conducted at arms length. For independent stakeholder audits, companies will establish a procedure to set aside adequate funds for independent stakeholder audits.

F. Corporate Disclosure

1. Owner/operators should make publicly available all documents relating to environmental, social, human, political, civil and social rights and health and safety issues of their project including, but not limited to: site history, baseline data, sampling history, operational projections.
2. The identity and all information relevant to all mine operators and owners shall be made publicly available and shall include disclosure demonstrating ownership and control of the operator and any parent, subsidiary, or other affiliates, including controlling partners, directors and stockholders.
3. Disclosure of all environmental and health violations, penalties, and accidents at other mines or other mine facilities (such as smelters and processing facilities) by the company or related companies.
4. Owner/Operators should make publicly available all information related to the determination of bonding amounts and financial guarantees for environmental performance and reclamation as part of the mine permit/approval process. The public should have the right to comment on bonding assumptions and amounts prior to approval of the permit.
5. Inclusion of economic and financial information relating to the project feasibility and justification, including disclosure of government investment and public subsidies

VI. Environmental Management Systems

A. Environmental impact assessment

1. The EIA/EIS process must incorporate risk and alternatives analysis with representation and participation of those whose interests are directly or indirectly affected. The analysis must include catastrophic and accidental risk assessment. NOTE:: Where there is not an EIA/EIS process by law, the company should follow such a process at all of its operations.
2. Stakeholders must have input throughout the EIA/EIS process equivalent to the project proponent, including representation by scientific and technical experts, access to data, and technical and communications meetings, either funded by proponent or government.

B. Waste management

1. Open Pits/Pit Backfilling – Open pit mining is not a responsible mining practice if it permanently affects water quality or otherwise degrades the environment. The proponent of open pit mining must prove it won't result in the need for water treatment in perpetuity, and other unacceptable impacts. Pits must be backfilled to form stable, reclaimable slopes unless it can be demonstrated that backfilling will cause more environmental damage than non-backfilling alternatives.
2. Containment Systems and Liners - All waste facilities must be designed to prevent any potentially toxic or environmentally polluting leachate discharges. Groundwater recharge through waste facilities will be prevented if leachate quality is questionable, and minimized in all other cases. All containment systems shall employ redundant systems with leak detection and collection.
3. Covers – All covers must be designed to promote sustainable vegetation, minimize infiltration and maximize water uptake, and minimize long-term maintenance requirements. Where isolation of waste is desired, covers shall eliminate infiltration by employing either water barrier or water balance techniques.
4. Segregating and Blending Wastes – Waste rock segregation and isolation shall be practiced to minimize adverse impacts from any contained pollutants such as acid generating rock. Waste rock blending for hard-rock mines is not a demonstrated technology and should not be used as the primary means to prevent or mitigate pollutants from waste rock.
5. Mine Adit Closure – All mine adits shall be closed and blocked at the end of mining to prevent the unauthorized access to the mine. Where potential acid-generating conditions exist, mine openings should be designed to limit the inflow of oxygen to the mine, and to collect the discharge from the mine in case treatment of the discharge is required.
6. Backfilling Underground Mines – Where subsidence is considered likely, or where acid-generating materials are exposed in the wall-rock of the mine, backfilling should be performed to minimize its likelihood and impact. Backfilling shall also be used to minimize the size of waste and tailings disposal facilities.
7. Tailing Impoundments – Tailing impoundments should be designed and located so as to minimize footprint and environmental impacts. Impoundments should be designed to minimize hydraulic head, provide for leachate collection, and employ the most advanced technologies in their design and management. Where possible, tailings and

waste rock should be backfilled into the mine facilities. Dry and paste tailings disposal facilities that are located out of stream bottom environments are preferable to wet tailings disposal because the area required for tailings disposal is minimized, and can be located away from high-value stream environments.

8. Sub-Aqueous Tailings Deposition – Disposal of tailings in marine, lake and river environments must not be allowed because there are too many unknown potential impacts, and too few practical means of addressing unanticipated problems.
9. Heap Leach – Heap leach systems shall be designed with redundant liner systems and to be free-draining (no internal ponds, and be designed for worst-case (100-year 24-hour storm event) stormwater surge events. Heap leach processes shall only be used where the efficacy of detoxification and closure can be demonstrated and guaranteed. Upon closure, heaps shall be rinsed and detoxified. Rinse or drain-down leachate shall be treated onsite with no land application. Evaporation of the leachate and removal of any precipitate is the preferred means of disposing of process solutions. Reclamation covers shall be required over heap leach areas that hydrogeologically isolate them from ground or surface water. Monitoring shall continue until no movement of contaminants off-site is established, and bonds retained until all contaminants from the heap are eliminated.
10. Cyanide Processing – Cyanide or other toxic chemical process systems shall not be used where their location is adjacent to surface water or groundwater as complete assurance of process solution containment cannot be assured. In all cases, the assumption must be that the containment systems will fail, and the appropriateness of the processing method based on that assumption.

C. Preventing Metals Leaching and Acid Mine Drainage

1. The burden of proof is on the company to demonstrate that acid mine drainage will not occur or can be prevented before a mine operation is permitted.
2. Prediction - All ore, tailings and waste rock must be adequately characterized to the same level of confidence for geochemical and acid mine drainage characterization as of economic potential (proven ore reserves). The characterization shall be established using methods that include both mineralogy and climatology, shall also include the likelihood of such characterization being accurate based on industry track records, include recognition of sources of uncertainty in all characterizations, and be peer reviewed. Based on the history established thus far, any mine with appreciable sulfide mineralization, regardless of the presence of potentially neutralizing materials, shall be assumed to have significant acid rock drainage generation potential.
3. Blending - Blending of net acid-generating and net acid-consuming material in waste rock dumps should not be used as a primary method of acid drainage prevention.
4. Segregation/Isolation - When well-characterized and practically separable, net acid-generating material should be segregated or isolated in mapped waste rock dumps.
5. Capping - Covers shall be used on all waste facilities with geochemical/ARD concerns. The purpose of the cover is to exclude air and water from the waste. The recommended design cover for these facilities is a water barrier cover (where there is a barrier with a permeability of 10^{-8} cm/sec or less). A water balance cover (where net evaporation/transpiration exceeds net infiltration) may be used for facilities with steep slopes.

6. Decision not to Mine – Where geochemical/ARD risks and potential impacts cannot be reasonably and confidently mitigated, such as where water treatment in perpetuity is forecast as necessary to address ARD, or ecosystem damage from ARD is predicted, a lack of technical and economic feasibility and assurance shall be recognized and a decision made not to mine.

D. Dewatering Issues

1. The need for dewatering will be minimized so as to prevent all undesirable impacts on groundwater and surface water, including seeps and springs.

The need for dewatering shall be minimized by the use of:

a. Barrier methods;
b. Underground mining; and
c. Scheduling of dewatering pumping in an efficient manner.

2. When barriers are not feasible:

a. In arid areas, all dewatering water in excess of milling or other mining process requirements shall be recharged into the same aquifer from which the water was removed within the local basin upgradient from the dewatered area;
b. No recharge shall be allowed where the discharging water that will degrade the water quality in receiving water. Recharge of dewatering water shall not occur in places or in such a manner whereby the receiving aquifer will be degraded. This includes consideration of the water quality and the geochemical interactions with unsaturated soils or bedrock;
c. If dewatering water will degrade the receiving water, it must be treated to not degrade the receiving water;
d. Closure bond must account for impacts to water resources, such as potential water rights issues, from pit lake cone of depression refill.
e. Pit lakes should not be allowed to form if they have the potential to degrade groundwater or surface water quality.
f. If impacts and pumping rates are determined by the use of groundwater models, the closure bond must consider the uncertainty inherent in the model (i.e., consider worst-case results).
g. Impacts of dewatering shall be presented in the environmental impacts assessment process, and shall include:
    1. The maximum extent of the drawdown cone for each aquifer layer;
    2. The location and characterization of all springs and other surface water features;
    3. Drawdown cone contours both during and at the end of mining, and the expected re-establishment of those contours post-mining; 4. the expected decreases in baseflow of all effected streams, springs and other surface features.

E. Preventing Contaminated Mine Wastewater

1. Prevention - Zero discharge is recommended practice at all mine operations. No mine shall be designed/permitted to employ water treatment in perpetuity.
2. Method – Use Best Available Technology to prevent the discharge of pollutants. Methods should be favored that result in the minimum production of secondary waste

streams requiring further treatment or disposal. Wastewater treatment methods shall leave no harmful residual chemicals.

3. Discharge Standards – The goal for all discharges, surface and subsurface, is to meet existing water quality of receiving waters (non-degradation). Discharges that require dilution) to meet discharge standards shall not be allowed (i.e., no mixing zones), and instead shall be treated with the best-available treatment technology to meet pre-existing receiving water quality before discharge. No discharge shall be toxic existing biota in the receiving stream.
4. Sludge Disposal – All sludge from wastewater treatment operations shall be disposed of in a manner consistent with that of potentially polluting mine wastes, and be subject to similar characterization and other waste management protocols.

F. Reclamation, Cleanup and Post-Closure

1. The operator will recognize that the purpose of reclamation and post-closure planning and bonding is to ensure: responsible conduct of mining operations; proper closure, cleanup and reclamation; prevent potential catastrophe; and to minimize liability to the public.
2. The operator should also recognize that it is the responsibility of the regulatory authorities to require full cost for reclamation and post-closure activities conducted by those authorities in the event it becomes necessary.

G. Reclamation and Post-Closure Planning

1. The following provisions shall be required for all reclamation and post-closure plans, and specific performance standards shall be adopted to guide their administration:
    a. Salvage, storage and replacement of topsoil or other acceptable growth medium.
    b. Recontouring, stabilization and/or topsoil replacement of all disturbed areas.
    c. Revegetation of all disturbed areas consistent with future use. Revegetation to include seedbed preparation, mulching, fertilizing, seeding and planting, and shall encourage native species propagation and selection. The plan must also include provisions for noxious weed control. At least five years, and up to 10 years or more in some cases, should be allowed for evaluation of revegetation prior to acceptance. Criteria with which to measure the success/failure of revegetation should be established.
    d. Slope stability requirements including maximum accepted slope angles for cutbanks and fill slopes and other slopes to be reclaimed, including achievement of erosion control, static and seismic stability.
    e. Stream channel, stream bank and natural hydrologic flow restoration.
    f. Measures to protect air and water resources by preventing discharges not meeting state and federal standards.
2. Requirements for geochemical modeling and ARD prediction and protection.
3. Protection of public health and safety.
4. Protection of wildlife habitat and standards for habitat restoration.
5. Address aesthetic impacts, including visual impacts, on public, residential and natural (wilderness and other) areas.

6. Provide plans and funding for post-closure monitoring and maintenance of all mine facilities, including surface and underground mine, tailings and waste disposal facilities.

VII. Environmental Performance and Financial Assurance

1. All mine proposals shall contain plans for complete cleanup, reclamation and closure, and address cleanup of environmental impacts. Mines that do not have adequate reclamation and closure plans and commensurate bonding to assure those plans shall not be approved. Companies should not even propose such operations.
2. All bonds or other financial surety instruments shall be independently guaranteed and readily liquid. No form of self-bonding or corporate guarantee shall be permitted.
3. Bond release shall not occur until reclamation and closure is complete, all impacts have been mitigated, and effectiveness of cleanup is demonstrated for a sufficient period after mine closure. Post-closure bonding shall be required.
4. The public shall have the right to comment on the adequacy of the reclamation and closure plan, the adequacy of the bond, performance of activities, and release of the bond.
5. Government agencies responsible for mine approval and public financial institutions involved in mine financing shall do an independent determination of bond amounts and identify potential public liability for planned and unforeseen costs that could result in a bonding gap.
6. Companies shall carry insurance for accidents and catastrophes that are not otherwise covered by other forms of financial assurance.
7. Government agencies and public financial institutions shall immediately implement effective policies that require comprehensive cleanup and adequate bonding.
8. Communities have the right to call for an independent audit to verify adequacy of reclamation and closure plans and bonding calculations, and performance of reclamation and closure activities.
9. Financial assurance shall be sufficient for performance of all bonded activities including emergency response, remediation, reclamation, closure and long term post-closure monitoring, maintenance and operations.
10. Financial assurance shall be reviewed and upgraded on a regular basis, by the permitting agency with public input, and include the establishment of financial responsibility for corrective action before an emergency occurs. Procedures for forfeiture of financial assurance shall be defined and shall proceed immediately upon a finding of non-compliance.
11. All mines using dangerous processing chemicals such as cyanide shall carry additional bonding to insure against potential risks associated with these types of operations.

VIII. Reclamation and Post-Closure Financial Assurance Recommendations for Governmental/Regulatory Agencies

1. Bonds should be attached to the operating permit for the purpose of assuring completion of the reclamation and closure plan, and other requirements of any laws and rules and any permit conditions. Financial assurances must be received and

approved by the responsible agency or agencies prior to final permit issuance. Permit(s) should not be issued until receipt and approval of financial assurance by all regulatory agencies. Review of existing permits resulting in new financial assurance requirements should result in new financial assurances within 60 days of the determination of a modified bond amount.

2. Additional bonding should be required for mining operations that employ cyanide leaching or other toxic chemicals. The amount should consider such factors as the potential to impact nearby surface water and groundwater resources, the technical ability of the operator to respond to such releases, the type and scale of the operation, contingencies and safeguards built into the operations and reclamation and closure plans, and any other site-specific or other factors related to protection of public health and safety or the environment. The amount of the financial assurance should reflect the full potential cost of reclamation and closure, or remediation in the event of an accident, of operations employing chemicals.
3. State and federal agencies should require the following provisions in calculating the reclamation and closure bond amount:
    a. The amount of financial assurance necessary should be determined and set by the regulatory agency. The amount of financial assurance should be determined as if the agency were to perform the required reclamation and closure activities to achieve compliance with all applicable state and federal laws.
    b. Cost estimate information should be derived from verifiable sources such as: (i) Cost-estimating guides from appropriate sources; (ii) Catalog and bid-quotations for materials and supplies; (iii) Equipment ownership, operation and equipment cost handbooks; and (iv) comparable costs from similar project's conducted by state and federal agencies. Prevailing wage rates should be used to determination labor costs. The operator may be asked to provide information which may be used to verify quantities, distances, times, material take-offs, etc., but applicant provided cost estimates should not be used in bond determination.
    c. The amount of financial security should include, but not be limited to, consideration of the following: (i) Costs of owning or leasing, operating and maintaining equipment and vehicles; (ii) Costs of labor; (iii) Removal or disposal of all buildings, facilities and structures, foundations, debris and chemicals; (iv) Backfilling, contouring, engineered covers, regrading and topsoil placement; (v) Erosion control, drainage, and stormwater control features; (vi) revegetation costs including soil tests, seedbed preparation, fertilization and bacterial inoculation, seeding, mulching, netting, tackifiers, other stabilization techniques, tree and shrub planting, fencing and noxious weed control; (vii) Long-term means including operation and maintenance to assure stabilization and erosion control and efficacy of reclamation covers and other features; and (viii) Costs of remedial activities identified to clean up releases of ARD and other contaminants associated with mining or processing that are likely to cause a threat to public health and safety or the environment.
    d. The amount of financial assurance should include funding for interim operations as necessary to operate and maintain existing critical operations in

the event of mine closure due to bankruptcy, accidents or other causes whereby the state or federal agency would desire to continue critical operations until such time as reclamation and closure activities can be conducted and eventually completed. The amount of time to be funded for interim operations should be a minimum of two-years and up to five-years or more depending upon the type and scale of the anticipated interim operation activities. Interim operations should also include interim water quality and air monitoring during reclamation and closure activities.

e. The amount of financial assurance should include indirect costs such as would be incurred by the agencies in performing reclamation including (i) Agency investigation and oversight of reclamation and closure activities; (ii) Contractor mobilization/ demobilization costs; (iii) Cost of Final reclamation and closure engineering, procurement and construction management activities;(iv) Contractor insurance, performance bonding and profit; (v) Contingency; and (vi) Cost inflation.
f. The amount of financial assurance should be based on the cost of reclamation determined over the project life, with the amount of financial assurance currently held to be based on the expected disturbance and necessary reclamation and closure activities that could be incurred if the mine were to be reclaimed and closed at any time during the current bonding period. In all cases and at all times, the amount of financial assurance must equal or exceed the potential cost to the regulatory agencies in the event reclamation and closure becomes necessary.

4. The following forms of financial assurance should only be accepted: (i) cash; (ii) surety bonds; (iii) letters of credit; and limited forms of other financial assurance mechanisms that are readily liquid and can be assumed as cash in the event reclamation and closure by the agencies becomes necessary. No type or variety of self-guarantee or self-insurance should be accepted as financial assurance.
5. Regulatory agencies should conduct at least yearly, and preferably quarterly, on-site inspections of existing and new mining operations as necessary to ensure compliance with the terms of the operating permit and the approved reclamation and closure plan. During active reclamation and closure operations inspection should occur on an irregular basis, averaging at least once inspection per month. The inspection should note the procession of reclamation and closure activities in accordance with the approved plan, and should note any deficiencies, and take corrective action to correct such deficiencies. Particular attention should be paid during the inspection to water management, toxic chemical use, and occurrence of ARD or predicators to ARD formation.
6. Regulatory agencies should review the bond amount at least every three years, and adjust the bond amount as necessary to reflect actual current conditions and reclamation and closure requirements. This provision should not preclude modifications to reclamation and closure plans and bond amounts at other times as circumstances warrant.
7. Regulatory agencies should establish closure performance criteria to ensure compliance with applicable state and federal water and air quality regulations,

including detoxification/neutralization of waste materials, monitoring, and operation and maintenance of water collection, conveyance, treatment and discharge systems.

8. The operator should be required to prepare a detailed post-closure plan for a mining operation. The plan should include, at a minimum, a description of the activities, methods, procedures and processes necessary to ensure the continued effectiveness of reclamation measures and compliance with applicable performance standards including, as necessary: (i) Treatment of tailings to ensure continued neutralization or immobilization of any parameters of concern; (ii) Operation of monitoring systems; (iii) Inspection and maintenance activities to ensure compliance with all applicable reclamation, design and operating criteria; and (iv) Procedures for maintaining the final cover and controlling erosion and fugitive dust.
9. The regulatory agencies should cause the bond to be forfeited if: (i) reclamation and closure is not pursued in accordance with the reclamation and closure plan and actions taken to prevent deficiencies have not been taken within a reasonable time period (30 days); (ii) reclamation and closure activities are not properly initiated (within one year) and completed within a reasonable time in accordance with the reclamation and closure plan or in the event of abandonment (immediate forfeiture); (iii) in the event the surety refuses or fails to perform the work to the satisfaction of the agency within the time required; and (iv) in the event the mine operator is unable to maintain the financial surety. The surety on the bond or holder of the other security deposit should pay the amount of the bond or other security deposit required for such performance of reclamation and closure activities to the responsible state and/or federal agency upon the agency's demand.
10. Surety liability should be continued until the time of bond release. Liability of the operator and of the surety provider should remain until the bond is released in whole or part by the responsible agency. The provisions of the reclamation and closure surety should allow it to be modified and subsequently used to ensure post-closure requirements, or require separate post-closure bonding to be submitted prior to release of reclamation and closure bonding.
11. Regulatory agencies should establish the formation and means to support an emergency response and reclamation fund for the purpose of establishing permanent funds to be used at the discretion of the agency to perform reclamation where sufficient bonds do not exist and to perform emergency response activities for which no funding has been otherwise provided.
12. Full and unrestricted public participation should be provided in the process of establishing reclamation and closure plans and bond amounts, and as a part of the process of considering requests for the return of bonds. Consideration of reclamation and closure plans and bond amounts should be given full treatment in the EIS/NEPA permitting process and other permitting processes. Citizens should have the right to bring information to the attention of the regulators, and require that reclamation and closure plans and bond amounts be reconsidered and modified to reflect such information.

IX. International Conventions and Guidelines

Mining projects should demonstrate conformance with International Conventions and Guidelines including:

1. Agenda 21, UN Conference on Environment and Development, 1992
2. Berlin Guidelines: Mining and Environment Guidelines, The, 1991
3. Business Charter Sustainable Development, The, (International Chamber of Commerce), 1991
4. Caux Round Table Principles for Business Concepts and Principles of International Environmental Law: Hunter, Sommer and Vaughan, UNEP,1994
5. Convention for the Protection of the South Pacific Region, 1990 (the South Pacific Convention)
6. Convention on EIA in a Transboundary Context (Espoo Convention)
7. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Convention)
8. Convention on Wetlands of International Importance (the Ramsar Convention)
9. Environmental Impact Assessment and Ecological Sustainable Development in Australia: A Discussion Paper, ACF and WWFN, Australia, ESD Policy Unit 1993.
10. Environmental Summary of Lihir Gold Project: OPIC, 1995
11. Guidelines for Development-Based Displacement, Expert Seminar on Forced Evictions and Human Rights, Geneva, United Nations, June 1997.
12. Helsinki Rules on the Uses of Waters of International Rivers
13. International Council on Metals and the Environment Charter, 1993
14. International Labor Conventions and Recommendations 1919-1991 Vol 1; 1992
15. Organisation for Economic Cooperation and Development; Declaration on International Investment and Multinational Enterprises; OECD Doc.C(76) 99
16. Paris Convention for the Prevention of Marine Pollution from Land Based Sources, 1974
17. Montreal Rules for Transfrontier Pollution (the Paris Convention on LBS)
18. Principles for the Conduct of Australian Mining Companies operating in Papua New Guinea: Helen Rosenbaum, ACF, 1995
19. Protocol for the Prevention of Pollution of the South Pacific by Dumping, 1990 (the South Pacific Protocol)
20. Rio Declaration on Environment and Development, 1992
21. Stockholm Declaration, 1972
22. World Bank, Operational Directive 4.30, Involuntary Resettlement, Washington DC, June 1990.
23. World Bank Resettlement and Development. A Bank-wide Review of Projects Involving Involuntary Resettlement. Environment Department, Washington DC, April 1994.
24. World Bank Environment, Health and Safety Guidelines, Milling and Open Pit, 1995
25. UN Convention of the Law of the Sea,
26. Universal Declaration of Human Rights; General Assembly Resolution 217 A(III) 10 December 1948; as published in Amnesty International Handbook; Amnesty International Publications; London; 1992.
27. World Heritage Convention

APPENDIX C

INTRODUCTION TO RESERVE ESTIMATION METHODS

The difference between a mineral deposit and an ore body, is a detailed and verifiable determination that the mineral deposit can be mined at a profit. This demonstration is made using analyses that incorporate the methods and principles of economic geology and include **reserve estimates** and **bankable feasibility studies**. These analyses include detailed demonstrations of the:

- distribution of minerals in the deposit;
- specific mining and milling methods to be used for mineral recovery ;
- cost of all phases of developing mining, milling and reclamation; and
- financial analysis showing that the deposit can be mined profitably, based on a showing that value of the minerals produced is higher than the cost of borrowing money to build, operate and reclaim the mine, mill and their associated waste sites.

Reserve estimates are critical to the consideration of investors and banks that may fund the development of the ore. Modern reserve estimates are conducted according to international standards that allow the reserves estimates to be verified by independent analysts selected by investors and banks. Historic Russia methods of reserve estimate are significantly different that those used in Canada, Australia, the US, and other nations.

Internationally recognized reserved estimation method for measuring the amount of mineable gold and other commodities in the ground provide detailed criteria to insure that the reserve estimate are comprehensive and repeatable by independent analysts. Examples of these reserves estimate standards are:

- Canadian Institute of Mining Metallurgy and Petroleum (CIM) Standards and Guidelines for Valuation of Mineral Properties at http://www.cim.org/committees/CIMVal_Final_Standards.pdf and Definition Standards on Mineral Resources and Mineral Reserves at http://www.cim.org/committees/StdsApprNov14.pdf and
- Joint Ore Reserves Committee (JORC) code developed by the Australian rules, which measures ore grades in relation to mineable reserves. The JORC Code, at www.jorc.org, "provides a minimum standard for public reporting to ensure that investors and their advisers have all the information they would reasonably require to form a reliable opinion about reserve estimates and reports."

Both CIM, at www.cim.org, and JORC, at www.jorc.org, provide access to reserve estimation standards used in Canada, Australia, South Africa, USA, the United Kingdom, Western Europe, Chile and Peru. Figure 1 at the end of this appendix provides an overview of the mineral resource development process from a Canadian source incorporating the CIM mineral reserves estimation system.

A general overview of the Russian reserves estimation system is described in a recent "Avoiding Russian Roulette" in "Materials World: The Magazine of the Institute of

Materials, Minerals and Mining," at
http://www.iom3.org/materialsworld/april04/news2.htm.

In the Russian reserve estimation system "reserves" limited by a pre-determined cut-off grade or concentration of target minerals, are used as evidence of the economic viability of the project, and are relied upon by banks. The Russian system is more strictly prescribed and follows a predetermined exploration route that must be followed to meet the reserve classifications. Once determined, they become the basis for all subsequent mining, as well as royalties and tax that must be paid. So consequently, failure to meet the Russian codes has implications that reach far beyond an estimate of what is in the ground.

The Russian reserve categories in order from highest to lowest degree of proven and measured reserves are called "A," "B," "C1," and "C2." Mineral deposits that are not identified in sufficient detail to be labeled "reserves" are called "resources." In Russia these prognostic, or inferred resources are identified, from highest degree of exploration effort to lowest, as "P1," "P2," and "P3." Each level of reserve or resource estimation is defined by the level of exploration effort in terms of samples collected, trenches excavated, and the depth and spacing of drill cores. The level of confidence in the data increases as exploration progresses through to final proven reserve calculations. Not all deposits will contain "A" classification reserves if the degree of geological complexity of a deposit is also factored in. Upon completion of the ore reserve estimation program, the results (the calculation of the amount of ore and metal) becomes part of the Russian regulatory and taxation system, and the mining company is required to pay royalties accordingly. If by good fortune more metal is found during the mining operation than estimated, the company benefits rather than the state.

Figure 1 is a "Generalized Model of the Mineral Resource Development and Mining Process at: http://www.nrcan.gc.ca/mms/pdf/explor/2002/append02-e.pdf originally from in "Guide to the Evaluation of Gold Deposits," CIM Special Volume 45.

PHASE	MINERAL RESOURCE ASSESSMENT	MINERAL EXPLORATION					MINERAL DEPOSIT APPRAISAL				MINE COMPLEX DEVELOPMENT	MINE PRODUCTION	ENVIRON-MENTAL RESTORATION
		GRASS-ROOTS EXPLORATION											
	MRA	EX-1	EX-2	EX-3	EX-4	EX-5	DA-1	DA-2	DA-3	DA-4	MCD	MP	ER
STAGE	Various surveys, research and synthesis.	Exploration planning.	Regional reconnaissance and surveys.	Prospecting and ground surveys of anomalies.	Verification of anomalies and showings.	Discovery and delimitation of a mineral deposit.	Mineral deposit definition.	Project engineering.	Project economics.	Feasibility study, production decision.	Mine development, construction of processing plant and infrastructure.	Production, marketing and renewal of reserves.	Mine complex closure and decommissioning, site restoration.
OBJECTIVES	Supply information and tools required to develop the mineral potential of the nation for economic benefit, in the perspective of sustainable development.	Select target commodities. Establish exploration objectives and strategies. Select target areas and sites. Acquire claims or permits if appropriate.	Seek anomalies of interest over wide areas by various survey methods. Select the more promising targets. Acquire claims or permits.	Confirm the presence, exact location and characteristics of anomalies. Acquire claims, leases and properties.	Investigate the cause of anomalies. Find mineral showings. Acquire additional claims, leases and properties.	Discover, delimit and interpret grade, quality and tonnage of a new mineral deposit. Determine if it constitutes a mineral resource of "potential economic interest" to justify more intensive and detailed work.	Define the limits, controls and internal distribution of grades, mineralogy and mineral processing characteristics of the deposit. Acquire all data required for project engineering and cost estimation.	Determine, in an iterative fashion, the design, plans, schedules, capital cost and operating cost estimates for all aspects of the project. Establish technical feasibility and costs thoroughly and rea-	Obtain all the information required and determine, based on corporate objectives, parameters for the economic, financial and social-political evaluation of the project.	Diligently validate and integrate project data, interpretations, estimations, plans and evaluations to achieve MCD and production objectives. Decide on whether to undertake the mining project. Obtain permits and financing.	Complete mine development and construction on schedule and within budgets and specifications. Ensure efficient and timely mine complex start-up according to schedule, specifications and cash flow forecasts.	Achieve commercial production on schedule and meet cash flow forecasts and quantity and quality specifications. Achieve mine profitability and company survival in the perspective of sustainable development.	Restore mine site, outside plant and infrastructure to environmentally acceptable condition. Ensure the future quality of the environment.
EVALUATION METHODS	Geoscientific, mineral and economic surveys, research, compilations and synthesis by governments, research institutes, universities and industry.	Metal and mineral market research. Review of geological and ore deposit information and of the legal, fiscal and socio-political context in various areas.	Remote sensing, aerial photography and airborne geophysics. Prospecting, geology and geochemistry. Appraisal, rating and selection of anomalies.	Ground, geological, geochemical and geophysical prospecting and surveys. Compilation, appraisal and selection of significant anomalies.	Geological mapping and other surveys. Trenching, drilling and sampling. Appraisal of results, recommendations for further work, and selection of new tar-	Stripping, trenching, mapping, sampling, drilling and down-hole geophysics. Initial mineral processing tests. Environmental and site surveys. Mineral resource estimation and inventory.	Detailed mapping, sampling and drilling on surface or from underground. Systematic mineralogy and mineral processing tests. Detailed environmental and site surveys. Pre-feasibility studies.	Pilot tests, engineering design and planning. Capital and operating costs for mining, mineral processing, infrastructure, environmental protection and restoration. Technical risk analysis. Prefeasibility studies.	Market, prices, product development and financial studies. Environmental, economic, financial, and socio-political risk analysis. Pre-feasibility studies.	Exhaustive due diligence review of all data, interpretations, plans and estimates. Evaluation of profitability, given the geological, technical, financial and qualitative risks, and the up-side	Project management methods in a quality assurance perspective. Training program for personnel and detailed start-up plan to meet the requirements of this demanding period.	Production management methods to ensure continuous quality and efficiency improvements. Exploration, deposit appraisal and development of new zones or deposits on-mine-site and off-mine-site.	Mine closure and decommissioning. Environmental restoration and monitoring.
RESULTS	Maps, data bases, tools and models.	Exploration projects.	Regional anomalies.	Local anomalies.	Mineral showings.	Mineral deposit.	Deposit appraisal project.			Mining project.	Mining complex.	Mineral production.	Restored site.

MINERAL INVENTORY	UNDISCOVERED MINERAL POTENTIAL		INFERRED RESOURCE	DELIMITED MINERAL RESOURCE		MINERAL RESERVE	
	SPECULATIVE	HYPOTHETICAL		INDICATED	INDICATED AND MEASURED	PROVEN AND PROBABLE	
ESTIMATION ERROR (targeted margin of error of tonnage/grade estimates at the 90% confidence level)			± 100%	± 50%	Indicated: ± 50 to ± 30% Measured: ± 20 to ± 10% (often several sample grid dimensions are used in each category)	Proven (feasibility: ± 10%; mining: ± 5%)	
INVESTMENTS	Moderate	Low, but increasing multiple investments.		Larger and increasing multiple investments.		Very large industrial investment.	Full compliance
RISK LEVEL	Low	Very high, but decreasing risk of failure and financial loss.		High, but decreasing risk of failure.		Moderate to low industrial risk.	

Sources: Modified by D.A. Cranstone, A. Lemieux and M. Vallée, February 25, 1994, from M. Vallée, 1992. *Guide to the Evaluation of Gold Deposits*, CIM Special Volume 45, p. 4, and *SOQUEM Annual Report*, 1976-77, pp. 4 and 5. Revised by M. Vallée and G. Bouchard, January 2001.

APPENDIX D

MAGADAN MINING IMAGES – A SELECTION

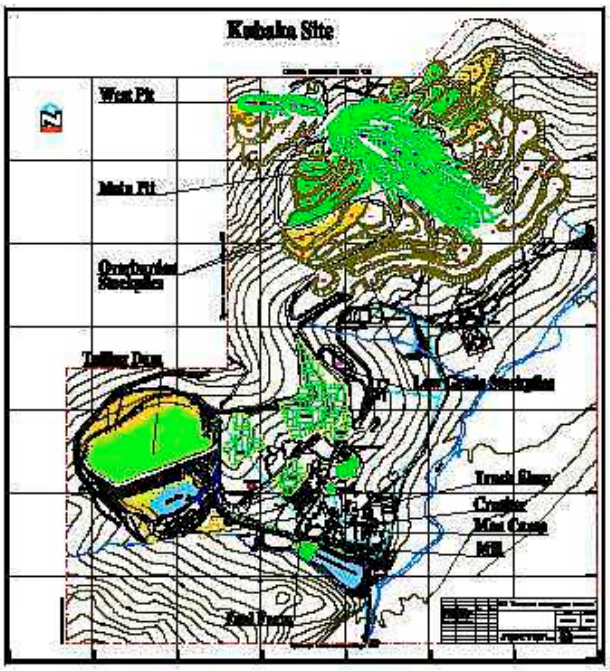
Loading mined material at Lunnoye mine – from www.polymetal.ru

Dumping waste rock at Lunnoye mine – from www.polymetal.ru

Loading mined material at Dukat mine – from www.polymetal.ru

Dukat Mine Site from Dukat Community – from www.polymetal.ru

Kubaka mine complex – from: http://www.kinross.com/op/pdf/Technical-Report-Kubaka-Project.pdf



Layout of Kubaka mine complex – from: http://www.kinross.com/op/pdf/Technical-Report-Kubaka-Project.pdf

Julietta mine –close-up view of adit, entrance to underground mine – from www.bema.com

Julietta mine complex site overview– from www.bema.com

Inactive Mining Equipment – Dragline (left) and Dredge (right) – From Magadan Center for the Environment (MACE), 2002

KARAMKEN: AN ABANDONED GOLD FACILITY SHOWS THE NEED FOR RECLAMATION IN MAGADAN OBLAST, RUSSIA

Paul Robinson
Southwest Research and Information Center
From *Voice from the Earth* Vol. 5, No. 3, Fall 2004
http://www.sric.org/voices/2004/v5n3/Karamken.html

View Downstream from Crest of Karamken Tailings Dam

Southwest Research and Information Center works with environmental leaders and community organizations in Siberia and the Russian Far East by providing technical assistance to support local efforts to address the environmental impacts of Soviet-era mines. Another focus is to insure that new mines use pollution prevention technologies and provide for guaranteed reclamation after closure. Local examples of mine impacts and the introduction of innovative technologies are critical to effective communications in Russia - as is true in any mining region around the world. One of the challenges facing local organizations has been the lack of specific examples of environmental problems at specific mines in Russia. This was the goal of Research Director Paul Robinson's visit during a July 2004 mining exchange to the Magadan and Kamchatka Regions - identify compelling examples of mine and mine waste impact problems in those regions. This goal was attained during a tour of the Karamken gold complex in Magdan region led by the Magadan Center on the Environment (MACE) and the North East Interdisciplinary Scientific Research Institute (NEISRI) in Magadan City.

The Magadan region is in the Russian Far East northwest of the Kamchatka Peninsula and has been a major center for extraction of gold, silver and other metals and minerals for more than 70 years. During the Stalin period, Magadan was synonymous with the Gulag chain of forced labor camps, where the camps were very often gold mines. Prior to the end of the Soviet Union, the Magadan Region was reported to have produced more than 3000 tons of gold from both placer and hard rock gold deposits. With the fall of the Soviet Union, many operating gold mines and mills were quickly shut down and abandoned. One of the largest of the abandoned gold complexes was at Karamken, 100

kilometeres (60 miles) north of Magadan City, the regional capital. The Karamken site is on a tributary to the Khasyn River, near a producing salmon fishery

Karamken was a modern facility by Soviet standards. Opened in 1978 to process gold ores from nearby hard rock deposits, during the 1980s the facility also processed gold and silver ores from throughout the Magadan Region, including the Kolyma River Basin of northern Magadan, the source of most of Magadan's mineral wealth. Shut down with the end of the Soviet Union in the early 1990s, the Karamken mill and tailings complex had been considered for the processing of ores from post-Soviet mines such as the Dukat silver-gold mine and the Aginskoe gold mine. However, neither of these plans to operate the Karamken complex came to fruition and the site, with its complex of mines, mill and tailings pond remains abandoned without any apparent reclamation and closure activities.

The site was the subject of field trip in July led by Ogla Yaroslavna Moskvina, Project Director at MACE, and Vladimir Egorivich Glotov, Deputy Director of NEISRI. The Karamken tailings site had been subject to a ground water pollution investigation during the mid-1990s that Dr. Glotov's Institute was involved in. His vast knowledge of the site made the visit particularly valuable.

The tailings (the waste from the cyanide-leach circuit for precious metal recovery) from the Karamken mill were deposited behind a 20-meter high, 300-meter long retention dam built across a perennial stream, Tyumanni Creek, that flowed into and through the town of Karamken downstream of the dam. The creek was blocked and diverted by a 200-meter long head dam. The integrity of the tailings retention dam, and the long-term containment of the tailings, depends on the effective diversion of all upstream flows, and the prevention of either overfilling, oversaturation, or erosion of the retention dam.

View of Inlet to Diversion Channel without Pillars to Prevent Intrusion of Ice into Diversion System

The head dam is impounded with a 0.5 x 0.5 square kilometer lake and was constructed using "thermistors" (devices to maintain frozen conditions) to insure a that the dam had a non-porous frozen core. The surface flow outlet for the lake is a diversion channel paralleling the east side of the tailings disposal area. The kilometer-long diversion channel was built with some portions lined with sheet metal and some portions lined with concrete panels. During operations, the diversion channel inlet was protected by a row metal posts driven into the lake bottom to form an "ice barrier" to prevent damage to the diversion channel from the 1-2 meter thick ice released during the Spring break-up in the upstream lake.

View of Vandalized Thermistors Designed to Keep Upstream “Head” Dam at Karamken Frozen

The head dam, ice barrier, and diversion channels have all suffered so significantly from neglect and vandalism that they are unable to perform their designed functions. Of the original 18 pilings driven in to the lake bottom to block ice only the stumps of two pilings are still visible. For all practical purposes the ice barrier no longer exists. All the thermistors have been vandalized and are no longer functioning. The head dam no longer has a frozen core and hasn't for years. The metal sheets in the diversion channel are bent and warped, allowing a significant portion of the water flowing from upstream to enter the tailings disposal area rather than flow around it.

As a result of the deterioration of the head dam and diversion system the tailings are no longer isolated from upstream water flows. Rather than a tailings disposal system where groundwater flow is blocked by a frozen dam core, the destruction of the thermistors leaves the head dam porous along its 200 meter length, with groundwater continuously

flowing into and though the tailings. And rather than conveying all surface water around the tailings, the damaged diversion channel allows surface water to continuously enter and flow through the tailings. The destroyed ice barrier no longer provides any protection for the diversion channel or head dam, allowing ice to build up at the inlet to the diversion. This leads to overflows into the tailings disposal area, as ice "pounds away" at the sides and base of the diversion channel.

Downstream the failures continue. According to Dr. Glotov, the tailings retention dam was designed to be constructed with a "key trench" cut into solid bedrock beneath the whole length of the dam to prevent groundwater flowing under the dam. It was also supposed to be solidly connected to the rock at either end of the dam with concrete to prevent groundwater flowing through the sides of dam. The retention dam relied on a pair of metal siphon tubes to convey excess surface water due to peak flood events over the top the of the retention dam. No back up spillway to convey excess water over the dam was designed or built. The overflow control siphons have been as badly vandalized as the thermistors and ice barriers at the upstream end of the tailings area. Only the skeleton of the siphon remains as the pumps and piping necessary to operate the siphons were removed and the metal left on site was heavily vandalized. As a result, no system is in place to convey peak flows over or around the tailings area.

View Towards Downstream Watershed Showing Vandalized Siphon Pipes on Crest Tailings Dam

The detection of cyanide in groundwater supplies in the town of Karamken downgradient of the tailings area led to investigations of the subsurface structure of the retention dam. Those investigation showed that the dam was not built as designed and was not "keyed into" underlying bedrock. Subsurface investigations through boreholes demonstrated that the retention dam actually overlay a 20-30 meter thickness of porous alluvial valley fill

and weathered bedrock. The investigation also showed a porous fault zone along the side of the dam that had not been detected, or not been revealed, in pre-construction studies. Therefore, rather than the retention dam being a barrier to groundwater flow, the dam allowed groundwater to flow under and around it. Indeed water was pushed downward and beyond the downstream end of the dam by the huge weight of water and tailings held back by the dam. Pollutants released under and through the retention dam exceeded cyanide standards 3 kilometers (more than 1.5 miles) downstream of the tailings area. Pollution control efforts downgradient of the dam were added after the pollution was discovered. These included a row of pumped wells immediately beyond the downstream "toe" of the dam and injection of clean water beyond the pumped wells to dilute pollutants.

The range of problems at the Karamken tailings site reads like a checklist of defects to prevent when closing and reclamation a tailings sites. The site suffers from:

- lack of an effective closure plan;
- lack of resources to implement an effective closure plan;
- dependence on control technologies that require extensive maintenance to function;
- inability to prevent wholesale vandalism;
- failure to isolate the site from surface water and groundwater flows; and
- failure to construct the facility as designed.

This set of characteristics leave the Karamken sites and the community and watershed downstream from it vulnerable to continuing pollutant releases and potential dam failure due to overtopping or oversaturation. While the problem is well recognized by specialists at NEISRI, activists at MACE, and regulatory agencies such as the Ministry of Natural Resources, no governmental or private funding source is available to address the short-term or long-term risks the sites present.

The complex set of problems at Karamken result from a combination of inadequate design, inadequate review during construction, lack of effective closure methods, and lack of resources to insure or maintain closure. The site is a visually striking example of how bad conditions can get without effectively designed or financially guaranteed reclamation and closure plans.

Though gold and silver mining is expanding in Magadan and other mining regions of Russia, the disclosure, independent assessment, and financial guarantee of reclamation plans commonplace in the U.S. and Canada have yet to be adopted. However, even U.S. and Canadian firms and facilities funded by international financial institutions fail to publicly disseminate reclamation plans, regulators have yet to conduct independent technical reviews of reclamation plans, and mine operators have yet to establish bonds, insurance or independent bank accounts to guarantee that reclamation plans are conducted. The pattern of activity and images from the Karamken site will serve as powerful example of the environmental consequences of abandonment of mine waste sites without effectively guaranteed closure.

Just as the disclosure, review and financial guarantee of reclamation designs has yet to emerge in Russia, no abandoned mine land reclamation program exists there either. The

backlog of leaky, rusty and risky mine waste sites in the former Soviet Union, including Russia and the newly independent states, is huge and a growing threat to ecological and community resources in areas that never saw much benefit from the original mining activity in the first place.

The prospect for a full and effective reclamation of the Karamken site under the current circumstances in Magadan Regions is somewhere between slim and none - much closer to none. And the potential for emergence of a future operator of the site, even in this period of high gold and silver prices, who might address reclamation as a part of a new phase of precious metal production, is reduced by the poor conditions at the site. These constraints prevent an effective response to the environmental risks at Karamken in the short run.

Whether a successful effort to reclaim the site can be mounted or not, Karamken stands as a visible warning to those who see the site or study its condition, of what to avoid in future mine and mill development in the Russian Far East and across that enormous country. While the site provides examples of problems to avoid, and therefore lessons to be learned, Karamken is still a very important site for those concerned about the environmental and watershed impacts of mining in Russia, one the world's most aggressive mining nations.