

MAINTENANCE OF ENVIRONMENTAL QUALITY

Introduction

This criterion on the maintenance of environmental quality covers the influence of the energy and mineral sectors on the environment, including air, surface water, groundwater, and land. It covers three broad areas of activity:

- Extraction - minerals, oil, gas (on-shore and off-shore) including all transportation on-site.
- Processing - oil refineries, minerals processing on site, base metal smelting, gold refining, etc.
- Transportation between extraction and the refinery/smelter. This includes transportation infrastructure impacts of the infrastructure's existence irrespective of use (i.e. its footprint), impacts of routine transport activity and impacts of accidents or spills. The transportation modes included are conveyor belt systems, pipeline, ship, train, and truck. Products are considered to leave this indicator system as they leave the processing plant (refinery, smelter); thus transport of products to the consumer is not included.

Environmental Impacts of Energy and Mineral Systems and Sustainable Development

The recovery of non-renewable resources causes varying degrees of environmental impacts. For example, open pit mining for the recovery of gold and copper results in large volumes of materials being moved. An open pit with or without a lake may be the resulting landform. The technology exists to reclaim much of the disturbed land, such as waste rock disposal facilities, heap leach facilities, and tailings impoundments for future beneficial use. Less impact results from the recovery of oil and gas where a single wellhead plus the associated infrastructure is required.

The MMSD North America report makes the following observation about mineral extraction (IISD, 2002):

At any one site, mining and mineral activity has a finite life span, while the implications of that activity (not only as a direct result of the activity but also through the products that are produced) go on indefinitely. In that sense, mining/mineral activities serve as a bridge to the future. The sustainability challenge is to ensure that the implications of mining are net positive for people and ecosystems over the long term: these are the aspects that need sustaining. Sustainability objectives can be served if mining/minerals projects and operations are designed and implemented in ways that build viable long-term capacities, strengthen communities and rehabilitate damaged ecosystems.

The sustainable development challenge is to design these energy and mineral recovery systems for post closure, i.e., to make sure that the ecosystem well being is maintained or

enhanced. Indicators must therefore be developed to measure the maintenance of environmental quality. These indicators should not focus only on the negative aspects but should also pay attention to the positive aspects of nonrenewable resource recovery. It is more common for the negative aspects to be measured and recorded than the positive aspects

Much has been learned about the environment and the impact of nonrenewable resource extraction. Successful mitigation measures can be implemented for some impacts while others are much more difficult to mitigate, e.g., acid drainage from sulfide bearing materials. Environmental impacts in mining are related to the geology of the ore body, e.g., does it contain sulfide mineralization or not, as well as the climate of the site. The surface water related discharges from dry sites are much less than those from sites in wetter climates.

The impacts can be measured relative to ambient conditions, i.e., baseline conditions or against some regulatory limit set for permitting purposes. The next section provides a brief regulatory perspective.

Overall, the expectations of the amount of care necessary with respect to the environmental impacts of human activities have increased. The public is less tolerant of poor environmental performance now than it might have been in the past and this is reflected in the large number of environmental regulations that are applicable to energy and mineral systems.

Regulatory Perspective

Environmental controls for energy and mineral systems in the United States are based on a large body of regulations, policies and guidelines. These range from international treaties, to national and state laws and regulations, to company policies and guidelines, and to site-specific commitments. This section provides a brief review of these environmental controls.

A number of international treaties and guidelines are in place that impact permitting, operations, and closure of energy and mineral facilities. Table X provides a summary of some of these treaties and guidelines.

Table X
International Treaties Impacting Energy and Mineral Systems
(Source: International Institute of Sustainable Development and World Bank)

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES – 1975)
- Montreal Protocol on Substances that Deplete the Stratospheric Ozone Layer – 1987

- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal – 1992
- Convention on Biological Diversity – 1993 Industrial Pollution Prevention and Abatement Handbook of the World Bank.

To be expanded

The US environmental regulatory framework is extensive. There were relatively little environmental controls in place prior to 1970. For example, tailings disposal directly into surface waters (such as rivers) was legal in Idaho until 1968. The Environmental Protection Agency was formed in 1970 by Executive Order. Since that time, many media specific and other laws and regulations for environmental protection have been established, e.g., the Clean Air Act, Clean Water Act, Safe Drinking Water Act, Surface Mining Control and Reclamation Act, etc. Some environmental controls are also exercised by the Federal land management agencies such as the U.S. Bureau of Land Management, and the U.S. Forest Service.

Many State regulations are in place as part of the environmental controls of energy and mineral systems. These regulations typically reflect the specific climatic and state policies with respect to the specific industries. They can be performance based or prescriptive depending on the State and the specific regulations. In most cases, they are fairly detailed and provide for extensive environmental controls.

The Federal and State regulatory frameworks for energy and mineral systems are well developed and implemented. The indicators to measure the maintenance of environmental quality do not all rely on just satisfying the regulatory frameworks but consider the environmental quality also in a broader context.

There are also a series of industrial activities that are in place, or are being developed, to provide further impetus to maintaining environmental quality. Industry organizations have developed their own guidelines and codes, e.g., the Sustainable Development Code of the National Mining Association (NMA, 2003) and the Environmental Code of the Northwest Mining Association (NWMA, 2003). While these do not have regulatory authority, they do represent a statement of principle by the specific organizations and a starting point for measuring individual company behavior.

Companies have also been very active in developing policies and guidelines for environmental matters and for sustainable development. A specific example is Kennecott Minerals, which published policies on health safety and environment and communities during the last few years (www.kennecottminerals.com). Many companies are actively developing similar policies and guidelines as an expression of their culture and operating philosophies. These policies and guidelines are typically strictly applied to all operations in the company.

Site-specific environmental commitments are outcomes of the environmental impact evaluations and permitting processes. These may range from specific monitoring

requirements to operating conditions for certain facilities. These commitments are regulatory driven, and must be adhered to at all times.

The EPA's report on the Environment (EPA, 2003) will focus on indicators within the present regulatory framework. The SMR indicators focus on areas where participants saw gaps in the regulatory-based indicators and which are important to understand progress towards maintaining environmental quality.

The SMR indicators steered away from specific Superfund issues, however they do address legacy sites in terms of progress towards the overall reduction in the number of these sites. It is important to have financial assurance measures in place to ensure that mine bankruptcies do not create additional sites that must be reclaimed using public funds.

Baseline Data

Baseline data of the sites are essential to develop a clear understanding of the ambient conditions prior to start of operations. While it is common practice to obtain extensive baseline data on many environmental parameters in the permitting of new facilities, the same has not been true for many of the facilities that have been operating for a long time, especially those that started operations before 1970. There were also periods when some baseline data were collected, but these were not as complete as those collected today.

A number of the indicators addressing the maintenance of environmental quality are dependent on having good baseline information. They may be difficult to populate in the absence of such data.

Indicator Categories

The indicators for the maintenance of environmental quality are divided into the following categories:

E.1. Ambient Environment. This sub-criterion addresses the ambient environmental quality as affected by environmental releases, or more generally, by the economic activities included in the system. This category also includes how these activities are managed to reduce environmental impact.

E.2. Management of Extraction and Processing. This sub-criterion examines the management of economic activities for energy and mineral systems to reduce the impact on the environment.

E.3. Reclamation/Remediation/Restoration of Extraction Sites (Minerals, Oil, Gas). The amount of physical reclamation that has occurred at operating facilities and abandoned sites is important while it is also important to have financial assurance mechanisms in place to prevent the creation of new abandoned sites.

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E.4. Environmental Releases. This includes routine releases into different environmental media as well as accidental releases.

References

To be completed