BMP guidelines

– for preparing an Environmental Impact Assessment (EIA) Report for Mineral Exploitation in Greenland

Bureau of Minerals and Petroleum

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These guidelines for preparing an Environmental Impact Assessment (EIA) report apply to mining companies operating in Greenland. Similar EIA guidelines have been prepared for activities regarding exploration and production of hydrocarbons.

The purpose of these EIA guidelines is, at an early stage of mining projects, to make mining companies aware that environmental issues have to be addressed as part of project approval. Thereby the companies will be informed of the environmental requirements at an early stage of a mining project, and the procedures and timetables of the EIA process in Greenland will be known to the mining companies so that this can be integrated already in the exploration phase.

The purpose of an EIA is to identify, predict and communicate potential environmental impacts of a proposed mining project in all its phases from before mine start to beyond closure, and to propose measures to address and mitigate these impacts. The effects of a project on the environment must be assessed in order to ensure maintenance of the species diversity and productivity of the ecosystem and to protect human health. Exploitation should be carried out in accordance with good international practice and in a safe and environmentally acceptable manner, e.g. by using best available techniques (BAT) and best environmental practice (BEP). The EIA is site and project specific.

Often social impacts are a part of the environmental assessment report of a mining project. However, it has been decided not to include social aspects in these guidelines but to address these in a specific Social Impact Assessment Report. Guidelines for such a report have been prepared by the BMP and can be found on the BMP website (www.bmp.gl).

An EIA report must be prepared when a company plans to exploit a mineral deposit. The EIA report must cover the entire exploitation period from mine development prior to the mine start until closure of the mine and a subsequent monitoring period (Figure 1). Environmental studies
must be able to predict impacts from the specific mining project and to describe baseline conditions before areas are affected by construction and operations. Studies must cover a period of some years before construction starts, so that the annual and seasonal variations of environmental parameters are taken into account in the baseline description. The number of years needed to conduct the environmental studies will depend on the project and the site. Often 2-3 years of studies are needed in advance of the EIA report preparation.

**Figure 1**
Environmental Impact Assessment (EIA) and its part of the history of a mining project
EMP: Environmental Management Plan
BMP guidelines for preparing an Environmental Impact Assessment (EIA) Report for Mineral Exploitation in Greenland
Scoping and environmental study plan
A detailed plan for the EIA process, including plans for environmental studies (baseline studies and project related studies as described below), must be forwarded to and approved by the BMP prior to the start of the EIA process. In preparation for this plan a preliminary assessment of the potential environmental impacts must be prepared by the company and must involve BMP/NERI. This scoping phase will be used to plan and time the environmental studies.

The EIA report
The following issues must be covered by the EIA:

- An extended, non-technical summary
- An introduction which describes the mine project, its background and objectives
- A thorough description of the state of the environment before mine start
- A description of the mine project with all phases from exploration to closure and beyond
- An assessment of environmental impacts of the project with an evaluation of alternatives compared to the preferred option
- An environmental management plan (EMP) which describes how the identified impacts are dealt with
- An environmental monitoring plan with a description of e.g. species, stations and parameters to be monitored
- Public consultation
- Conclusions
- References used in the EIA process and Glossary of terms and abbreviations

Appendix 1 outlines a proposed structure and content of an EIA in more detail.

The EIA must cover the entire region that might be affected by the project. If the project includes use of areas outside the mining area for e.g. roads, harbours, airstrips and shipping routes, effects of these activities must be covered as well.

In order to secure that data necessary to produce the EIA is available, a plan for acquiring data must be prepared and kept updated. This plan must be developed in cooperation with the BMP. Sampling procedures must be approved by the BMP and sampling will be subject to inspection. NERI will keep and update a database of all environmental data collected in connection with mining activities, both from the authorities and the license holding companies. Data must be submitted to NERI in formats agreed to by the license holding companies and BMP, and will be available to both the mining company and BMP/NERI.

An EIA for the project must be updated and further developed when needed, e.g. if there is a major change in the plans presented in the EIA or a major change in the composition of ore, waste rock or tailings.

All data collected in connection with the EIA including baseline and monitoring studies are made available to the public.
The EIA report shall be prepared in English and Greenlandic. An extended summary must be presented in Greenlandic, English and Danish.

**Public consultation**
The public should be involved throughout the EIA process and informed about the activities when the mine is in production. A public consultation meeting at an early stage of the process for input to the EIA report is recommended as a minimum. A public consultation meeting with relevant information about the EIA report and issues which have been addressed is recommended as well as a minimum, before the final EIA report is submitted for government approval.

Clear rules and procedures for the public involvement must be described in a White Paper containing objections and comments to the project. The **White Paper** is a document containing the public consultation comments or a summary hereof, comments from the company to the incoming answers and a suggestion to how these comments will be addressed in the EIA process or a factual reason why it will not be implemented. The White Paper including comments and how they have been addressed must be included in a separate document. Following the public consultation the EIA report must be revised accordingly and a final version produced as part of the basis for the final government approval. All objections, comments etc. can be made available to the public. The public consultation period is set to a minimum of 6 weeks.

**Environmental Baseline Studies**
The purpose of the Environmental Baseline Studies is to determine the state of the environment prior to mining activities. Studies are needed in order to assess the environmental impacts from the mining operation.

The Environmental Baseline Study can be divided into three parts:
- Chemical and toxicological aspects (pollution)
- Disturbance aspects (impacts on plant and animal populations)
- Local use study and local knowledge

**Chemical and toxicological aspects**
The Environmental Baseline Study shall identify species, localities and contaminants to be used in the subsequent monitoring studies during and after mining and shall have the ability to discover unintended environmental impacts of the project. The Environmental Baseline Studies must be capable to demonstrate if metal concentrations in the environment close to a deposit are naturally elevated.

The Environmental Baseline Study must be initiated some years prior to mine start. The reason is that seasonal and annual variation is known to occur and this must be incorporated in the baseline description.
Sampling localities, here called stations, should be located in a web with the centre placed close to the mining activities, e.g. roads, harbours and airstrips. Most stations should be placed near the mine, the process plant, and other important sites with activities. Stations should be placed wider apart when moving from the centres to about 10 km from these (e.g. along a coast, inland or along rivers and lakes). Further away from the centres, up to 40-50 km away, one or a few reference stations should be placed in an area expected to remain undisturbed by the mining operation. It is important when collecting samples to take local conditions into account, for example prevailing wind directions in order to monitor impacts from dust generation.

Samples collected during environmental baseline studies may not have to be analysed right away. A decision to analyse the samples can await the decision of mine start or the decision to prepare the EIA report. The samples collected or a second set of these must be forwarded to an environmental sample bank administered by National Environmental Research Institute (NERI).

**Disturbance aspects**
A mining project will affect plant and animal life. The degree of impact will depend on the project and on the plant and animal communities. Therefore baseline data about plant and animal life must be presented in the EIA. This includes an evaluation of the importance of the different areas affected by the project. The information will be available from field studies, from published information (including NERI reports) and as local knowledge. Such information also makes it possible to mitigate possible impacts.

**Local use study and local knowledge**
In the preparation of the EIA report and as an input to this report – it is important to conduct a local knowledge study aimed at mitigating conflicts between the local use of the area for hunting, fishing and tourism and the mining activities. Such a study can be performed as an interview study where representative groups of hunters, fishermen, tourist organisers, local industries etc. are interviewed according to prepared questionnaires and maps. Those interviewed must be able to comment on the presentation of their input to the reporting of the interview study. The study must be conducted in accordance with established scientific methods and with Greenlandic involvement.

**Project related environmental studies**
The project related studies must be able to identify and quantify sources of contamination of the project. In the pre-mining phase it is important to carry out studies on the chemical composition, the acid generating potential and the ecological toxicity of ore, waste rock, tailings and other products with a potential as a contaminant source. A test production of a bulk sample in a pilot plant will often give the necessary knowledge of these issues. It is important to emphasize that if the chemical composition of the bulk sample differs significantly from the mined ore and the waste produced then new studies should be performed. With knowledge of the chemical composition of ore, waste rock and tailings it is possible to target the chemical analyses on the biological and non-biological (sediments, water and dust) samples.
Environmental Study Program
A proposal with a description of an Environmental Study Program (including both baseline studies and project related studies) must be forwarded to BMP for approval prior to the start of the study program. This includes topographic maps showing the localisation of proposed sampling stations. The program shall include a description of the timing of the studies. If needed, the environmental study program must be updated.

Guidelines for contaminants in the environment
In general, the best available techniques (BAT) and the Best Environmental Practice (BEP) should be used by mining companies to reduce or avoid environmental impacts. Guidelines on acceptable contaminant levels in the environment may also be consulted in order to evaluate the risk of acute and chronic effects of contaminants in the environment.

Greenland has developed Water Quality Guidelines for freshwater and seawater to be applied to mining operations in Greenland. These are presented in Appendix 2.

Guidelines for air (dust) or noise quality have not yet been developed for Greenland. We recommend consulting guidelines from other jurisdictions such as Canada or Denmark (being an EU member state many Danish guidelines have been implemented from EU guidelines). It must be agreed with the BMP which guidelines to use.

Timeline of the EIA report
This section gives an overview of the steps in preparing the EIA report
1. Public consultation meeting for input to the EIA report
2. Proposal of list of contents is forwarded to BMP
3. BMP reviews proposal
4. EIA draft is forwarded to BMP
5. BMP reviews EIA draft
6. EIA is forwarded to BMP
7. Public consultation meeting about the EIA report
8. EIA is published for public consultation
9. Hearing answers from the public consultation are evaluated and EIA is revised
10. Final EIA is submitted to BMP for project approval
BMP guidelines for preparing an Environmental Impact Assessment (EIA) Report for Mineral Exploitation in Greenland
Appendix 1

Guidelines for preparing an EIA for Mineral Exploitation in Greenland

The following is a gross list of issues to be considered when preparing the EIA report. All chapters must be dealt with in the EIA, but not all bullet points may be relevant to the specific mine project. Prior to the start of preparing the EIA report a detailed list of contents of the EIA must be forwarded to BMP for approval. BMP can claim that issues not mentioned in the contents be included in the EIA.

Environmental studies (baseline studies and project related studies) must be initiated prior to mine start and will be a part of the EIA. Baseline studies must be performed in the premining phase because the state of the environment must be determined prior to a possible impact from the mining activities.

Social aspects are not included in these EIA guidelines.

1. Extended summary
A non-technical summary describing in short the project and a conclusion including preferred options compared to alternative solutions, important potential environmental effects, mitigating actions, decommissioning and remediation, uncertainties and public concerns. The summary shall be presented in Greenlandic, Danish and English.

2. Introduction
Description of the mine project, background and objectives
• Description of the mining company
• Geographical placement of the mine activities with presentation on regional and local maps
• Description of geography, geology, climate, environment, local population etc.
• Background and objectives of the mine project
• Description of alternatives (approximately given the same extent) to the proposed project, e.g. tailings placement and infrastructure
• Timetable for construction, mine start and operation
• Mineral Resources Act and other relevant legislation

3. The environment
A comprehensive description of the environment before the mine start
• Detailed description of climate, geology (e.g. earthquakes), geography (e.g. fast ice and icebergs, avalanches), freshwater and sea water quality and hydrology
• Baseline concentrations of metals and of other relevant pollutants
• Flora and fauna (e.g. rare and sensitive species, larger assemblies of animals during breeding, moulting, migration etc.) with distribution of vegetation communities and animal populations
• Important areas to wildlife (BMP designated areas), preserved areas (e.g. National Parks, Ramsar sites) and others
• Local inhabitants and their use of the area (for e.g. fishery, hunting, and agriculture)
• Tourism
• Archaeology

4. The project
This chapter contains all phases of the mine project from exploration to closure, including decommissioning and rehabilitation. Included are illustrations, diagrams and maps with plans in the description:
• Overview of mineral exploration in the area performed to date
• Description of mine plan, planned processes, plant facilities, vehicles, handling and storage of reagents and explosives
• Energy demands (energy sources and supply) and handling and storage of fuel
• Gas and dust emissions including the amount of greenhouse gases
• Water supply (quantity and quality, sources, demand in percent of source)
• Water discharge
• Workforce, accommodation, handling of human waste, rubbish and sewage
• Tailings, waste rock, other waste from production and discharge water (both direct and indirect, e.g. seepage)
• Transportation to and in the mining area (e.g. harbour, airstrip, roads)
• Storage of tailings and waste rock (stability of dams and pits)
• Alternatives to the preferred option of project
• Close down and decommissioning of the mine
• Rehabilitation of the mine area, including a description of permanent changes introduced to the mine area

5. Environmental impacts and mitigations
The criteria used to assess the different impacts must be clear and effects must be quantified where possible. It is important to include a discussion of environmental impacts from the alternative possibilities identified in chapter 2 and 4, and compare these to the preferred option. Issues where information is lacking, incomplete or uncertain should be identified. Long and short term effects during development, operation, during and following mine closure should be considered. Effects of possible malfunctions or accidents must be described. Topics that do not require further attention should be specified. If the project is likely to have a significant effect on a neighbouring country these effects must be described and the neighbouring country informed as soon as possible during the EIA process.

Physical changes
• Area impacted and possible landscape disturbed
• Erosion (land, river banks, costs along fjord etc.)
• Hydrological changes of rivers, lakes and fjords
• Qualitative and quantitative impacts on freshwater and sea water (e.g. changed turbidity)
• Dust
• Noise and vibrations
• Light, heat and radiation

**Ecological and chemical changes**
- Pollution from ore, tailings, waste rock and other sources (studies on e.g. chemical composition, leaching elements, acid drainage, toxicity on species from different genera and bio-accumulation, greenhouse gases, human health)
- Removal or damage of vegetation and effects on possible carbon sinks
- Disturbances of wildlife (degree of impacts on breeding, moulting, feeding and migration sites; some species may be attracted by the mine activities)
- Loss of habitats
- Creation of new habitats
- Loss of biodiversity
- Introduction of non-native species of flora and fauna
- General impact on ecosystems

**Local and other land use**
- Impediment of other land use, e.g. for hunting, fishery, conservation, exploration and exploitation of other mineral resources, other industry and tourism
- Increased demand on existing resources such as water
- The effect of opening up the area for other land use through major changes in infrastructure (e.g. building of roads, harbours, airstrips, houses and power supply (e.g. hydropower))
- Cumulative impacts: An evaluation of the impacts caused by the activities in combination with other industrial operators in the region and in combination with other human activities in the area (e.g. fishing and hunting)

6. Environmental management plan (EMP)
This section describes in detail how the mining company intends to reduce the different identified impacts and how effective the measures are. Impacts should be reduced by e.g. using best available techniques and best environmental practice. It should be assessed if the residual effects, after mitigating measures have been introduced, are significant and adverse. Compensatory measures are in those cases included in the EMP. Often the EMP develops during the lifetime of the mine based on the results of the environmental monitoring. The EMP describes as detailed as possible how the mitigating measures are organised and who is responsible for carrying out mitigating and monitoring measures.

7. Environmental monitoring
This section describes a program for which parameters and species are monitored, identified from the environmental impacts identified in the EIA process and the findings in the environmental baseline study. The environmental monitoring report assesses the results, compares with the baseline studies and where possible with environmental guidelines. The report is used to
propose necessary changes in monitoring and in mine management plans and procedures. Measurements/calculations of the emission of greenhouse gases are included in the monitoring program.

8. Public consultation
Comments from the public consultation of an EIA draft report are evaluated and included in the final EIA. A description is given on the information received and how it was incorporated in the report. Included in the final EIA is also a list of persons, institutions, organisations etc. who was consulted and who commented on the draft report.

The public should be involved throughout the EIA process and informed about the activities when the mine is in production. A public consultation meeting at an early stage of the process for input to the EIA report is recommended as a minimum. A public consultation meeting with relevant information about the EIA report and issues which have been addressed is recommended as well as a minimum, before the final EIA report is submitted for government approval.

Clear rules and procedures for the public involvement must be described in a White Paper containing objections and comments to the project. The White Paper is a document containing the public consultation comments or a summary hereof, comments from the company to the incoming answers and a suggestion to how these comments will be addressed in the EIA process or a factual reason why it will not be implemented. The White Paper including comments and how they have been addressed must be included in a separate document. Following the public consultation the EIA report must be revised accordingly and a final version produced as part of the basis for the final government approval. The public consultation period is set to a minimum of 6 weeks.

All data collected in connection with the EIA, with baseline and monitoring studies can be made available to the public.

9. Conclusions
This section describes the most important conclusions regarding e.g. preferred options compared to alternative solutions, important potential environmental effects, mitigation, decommissioning and remediation, uncertainties and public concerns.

10. References, authors and glossary
The glossary explains the terms used and contains a list of abbreviations.
**Appendix 2**

**Greenland Water Quality Guidelines in connection with mining activities**

The following Water Quality Guidelines will be applied to mining operations in Greenland. The guidelines have been developed from published information about Water Quality Criteria in USA, Canada, Australia/New Zealand, Norway, The European Union and Denmark.

<table>
<thead>
<tr>
<th></th>
<th>Freshwater (µg/l unless otherwise stated and pH)</th>
<th>Sea water (µg/l unless otherwise stated and pH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (As)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Chromium (Cr (III))</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Iron (Fe total)</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Cyanide (CN free)</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>pH</td>
<td>6.5-8.5</td>
<td></td>
</tr>
<tr>
<td>Phosphorus (P total)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Total suspended solids</td>
<td>50 mg/l(^1)</td>
<td>50 mg/l(^1)</td>
</tr>
</tbody>
</table>

\(^1\) Or maximum increase of 10% if baseline concentration is above 50 mg/l

The Greenland Water Quality Guidelines (GWQG) were developed in order to protect living organisms in streams, lakes and the marine environment from pollution by disposal of mine tailings, waste rock and other substances derived from activities in connection with mining in Greenland.

**Freshwater**

The guideline values have to be met at one or more specified points downstream the mining operation. It is the intention in each mining case to convert the ambient water quality guidelines to effluent standards by multiplying by the water flow at the measuring point and dividing by the effluent flow.
Seawater
The guideline values have to be met at a specified point in the sea. It is the intention in each mining case to convert the ambient water quality guidelines to effluent standards by multiplying by a calculated dilution factor.

The evaluation will also depend on the baseline conditions. For example, the concentration of suspended solids naturally may be very high in lakes and streams in Greenland and naturally exceeding the GWQG. This may also be the case for metals in specific geological settings. In such cases this will be taken into account when setting the discharge limits.

For elements or substances that are not in the Greenland list, we will use The Provincial Water Quality Objectives of Ontario or other published Water Quality Objectives to calculate discharge limits.

The GWQG were developed based on published information about Water Quality Criteria in USA, Canada, Australia/New Zealand, Norway, The European Union and Denmark from the past 15 years. Data from these countries are presented in Table 1. The criterion for selecting a specific value differs among the countries. The USEPA criterion is “a lowest no effect level” based on published information on chronic effects on biota (Ref. 3). The Provincial Water Quality Objectives of Ontario, Canada claim to be “set at a level of water quality which is protective of all forms of aquatic life and all aspects of the aquatic life cycle during indefinite exposure to the water” (Ref. 4). The Australian/New Zealand guidelines operate with different levels of protection, e.g. 99% and 95%, for a given compound, which signifies the percentage of species expected to be protected at a given concentration (Ref. 5). EU Water Quality Criteria (Ref. 6) and the Danish (Ref. 8) do not contain a description of the ecological criteria they are based on. The Norwegian guidelines are based on a classification of environmental quality in fjords and coastal waters (Ref. 7). The values selected in Table 1 are from the quality “good”.

For comparison Table 1 also contains baseline data from freshwater and fjords in Greenland and from near shore North Atlantic Ocean water.

The guideline value for an element/substance may vary considerably from country to country, because the criteria for setting values vary. For example, the USEPA values are generally the highest, because they are based on “a lowest no effect level”, which means that they do not contain a safety factor as are included in most of the other guideline values cited. Such a safety factor often is included to account for uncertainty in data and for that some species may be more sensitive than those tested. Also the safety factor can compensate for synergistic effects of elements meaning that e.g. two different elements can have a higher effect on the organism than the effect of the sum of the two when they are alone.

The Greenland guideline values mostly were selected among the lowest guideline values presented in Table 1, using a safety factor reasonable for Arctic conditions. Baseline concentrations
typically found in Greenland were also taken into account. The Greenland guideline values will secure that a good water quality will be maintained, if discharges are properly managed.

In addition to these guidelines, the following effluent guidelines for Biological and Chemical Oxygen Demand (BOD$_5$ and COD respectively) as well as total nitrogen and phosphorus (Ref. 8) will be used to set discharge limits:

<table>
<thead>
<tr>
<th>Concentration (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD$_5$</td>
</tr>
<tr>
<td>COD</td>
</tr>
<tr>
<td>Total N</td>
</tr>
<tr>
<td>Total P</td>
</tr>
</tbody>
</table>

Table 1. Water Quality freshwater guideline (µg/l dissolved, unless otherwise stated and pH). For comparison effluent standards are included

<table>
<thead>
<tr>
<th>Effluent standards</th>
<th>Freshwater Quality Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank effluent std. (ref. 1)</td>
<td>Danish EPA effluent std. (ref. 2)</td>
</tr>
<tr>
<td>USEPA (ref. 3)</td>
<td>Canada (Ontario) (ref. 4)</td>
</tr>
<tr>
<td>As</td>
<td>1000</td>
</tr>
<tr>
<td>Cd</td>
<td>100</td>
</tr>
<tr>
<td>Cr (III)</td>
<td>1000</td>
</tr>
<tr>
<td>Cu</td>
<td>300</td>
</tr>
<tr>
<td>Fe total</td>
<td>2000</td>
</tr>
<tr>
<td>Pb</td>
<td>600</td>
</tr>
<tr>
<td>Hg</td>
<td>2</td>
</tr>
<tr>
<td>Ni</td>
<td>500</td>
</tr>
<tr>
<td>Zn</td>
<td>1000</td>
</tr>
<tr>
<td>Cyanide, free</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>6-9</td>
</tr>
<tr>
<td>Total P</td>
<td>1.5 mg/l</td>
</tr>
<tr>
<td>Total suspended solids</td>
<td>50 mg/l</td>
</tr>
</tbody>
</table>

$^1$ Median of all freshwater analyses in NERI database

$^2$ Or maximum increase of 10% if baseline concentration is above 50 mg/l
Table 1 (cont’d). Water Quality seawater guideline (µg/l dissolved unless otherwise stated)

<table>
<thead>
<tr>
<th></th>
<th>USEPA</th>
<th>Australia/ New Zealand</th>
<th>EU (ref. 7)</th>
<th>Norway</th>
<th>Denmark</th>
<th>Near shore North Atlantic seawater composition (ref. 9)</th>
<th>Typical values found by NERI in Greenland fiords</th>
<th>Greenland proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
<td>36</td>
<td>2-4.8</td>
<td>1.1</td>
<td>1.1</td>
<td>&lt;4</td>
<td></td>
<td>5 Ref. 7</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>8.8</td>
<td>0.7-5.5</td>
<td>0.2</td>
<td>0.2</td>
<td>0.026</td>
<td>0.02-0.05</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Cr (III)</td>
<td>7.7-27.4</td>
<td>0.2-3.4</td>
<td>3.4</td>
<td>0.144</td>
<td>~0.4</td>
<td></td>
<td>3 Ref. 9</td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td>3.1</td>
<td>0.3-1.3</td>
<td>0.3-0.64</td>
<td>1</td>
<td>0.59</td>
<td>0.05-0.6</td>
<td>2 Ref. 10</td>
<td></td>
</tr>
<tr>
<td>Fe total</td>
<td></td>
<td></td>
<td>0.7</td>
<td></td>
<td>0.7</td>
<td></td>
<td>9 Ref. 11</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>8.1</td>
<td>2.2-4.4</td>
<td>7.2</td>
<td>0.05-2.2</td>
<td>0.34</td>
<td>0.01</td>
<td>0.06-0.3</td>
<td></td>
</tr>
<tr>
<td>Hg</td>
<td>0.94</td>
<td>0.1-0.4</td>
<td>0.05</td>
<td>0.001-0.048</td>
<td>0.05</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Ni</td>
<td>8.2</td>
<td>7-70</td>
<td>20</td>
<td>0.5-2.2</td>
<td>0.23</td>
<td>0.31</td>
<td>0.4-1.1</td>
<td></td>
</tr>
<tr>
<td>Zn</td>
<td>120</td>
<td>7-15</td>
<td>1.5-2.9</td>
<td>7.8</td>
<td>0.38</td>
<td>0.5-3.5</td>
<td>10 Ref. 12</td>
<td></td>
</tr>
<tr>
<td>Cyanide, free Total suspended solids</td>
<td>1</td>
<td>2-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Ref. 13</td>
<td></td>
</tr>
</tbody>
</table>

1) Very uncertain and variable
2) Or maximum increase of 10% if baseline concentration is above 50 mg/l

References to Appendix 2

Ref. 1. World Bank environment, health and safety guidelines. August 11, 1995