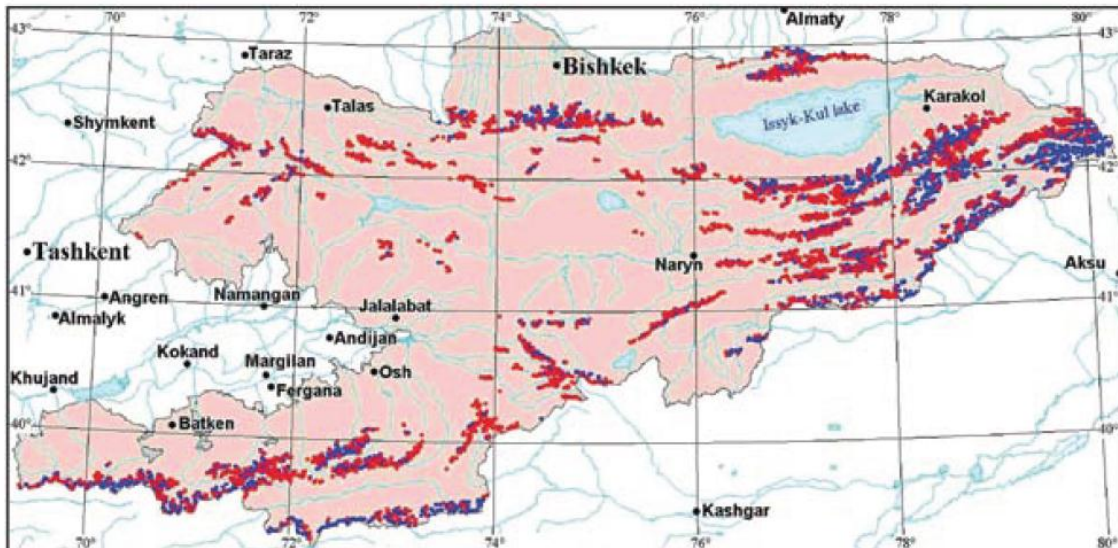




# Independent Assessment of the “Interagency Report” and the “Moran Comments” on Compliance with Environmental and Industrial Safety Standards at the Kumtor Gold Mine

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Final Report –23 April 2012



Predicted state of glaciation in 2025 in the Kyrgyz Republic due to Climate Change impacts compared to glacier catalogue developed in the 1960s (extinct glaciers marked with red, extant glaciers marked with dark blue)

**Submitted to  
Kumtor Gold Company**

**Submitted by Prizma LLC**  
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## Abbreviations

ABA	Acid Base Accounting	ICSID	International Centre for Settlement of Investment Disputes
AER	Annual Environmental Report		
ARD	Acid Rock Drainage		
BMY	Balykchy Marshalling Yard	IFC	International Finance Corporation
CAO	Compliance Advisor/Ombudsman	KGC	Kumtor Gold Company
CBF	Community Business Forum	KOC	Kumtor Operating Company
CCP	Conceptual Closure Plan	Kumtor	Kumtor Gold Company or Kumtor Operating Company
CEE	Central and Eastern Europe		
Centerra	Centerra Gold Company	KR	Kyrgyz Republic
Commission	Interagency Commission	LLC	Limited Liability Company
CR	Corporate Responsibility	MAC	Maximum Allowable Concentration
EBRD	European Bank for Reconstruction and Development	MAD	Maximum Allowable Discharge
ETP	Effluent Treatment Plant	MC	Moran Comments
EIA	Environmental Impact Assessment	mg/l	milligrams per liter
EITI	Extractive Industries Transparency Initiative	MIGA	Multilateral Investment Guarantee Agency
EMAP	Environmental Management Action Plan	NGO	Non-governmental Organization
EMS	Environmental Management System	masl	Meters above sea level
ERP	Emergency Response Plan	MC	Moran Comments
ESAP	Environmental and Social Action Plan	OPIC	Overseas Private Investment Corporation
ESIA	Environmental and Social Impact Assessment	QA/QC	Quality Assurance/Quality Control
GLOF	Glacial lake outburst flood	Prizma	Prizma LLC
ha	Hectares	RLC	Regional Liaison Committee
IAR	Interagency Report	SAR	Summary Audit Report
ICMI	International Cyanide Management Institute	SCER	Sary Chat Ertash Reserve
ICMC	International Cyanide Management Code	TDS	Total Dissolved Solids
		TMF	Tailings Management Facility
		TSS	Total Suspended Solids
		WAD	Weak acid dissociable (cyanide)

# 1 Executive Summary

## 1.1 Background

On February 14, 2012, the Kyrgyz Republic's First Prime Minister, Aaly Karashev, chaired a roundtable in Bishkek to review concerns relating to transparency, water quality, biodiversity, glaciers, geotechnical issues and mine closure associated with Centerra Gold's Kumtor Gold Mine. These concerns were being raised in the following two documents:

- (a) Evaluation of Compliance with Environmental and Industrial Safety Standards at Kumtor Gold Mine, a Report (the Interagency Report or IAR) of the Interagency Governmental Commission (the Commission) of the Kyrgyz Republic, dated December 28, 2011 (the Interagency Report), and
- (b) Dr. Robert E. Moran's comments (Moran Comments), dated September 2011 entitled Kumtor Gold Facilities, Kyrgyzstan: Comments on Water, Environmental and Related Issues: September 2011<sup>1</sup>.

As a result of discussions among shareholders of Centerra Gold about the validity of the content and conclusions of these documents, Prizma LLC (Prizma), an independent Corporate Responsibility (CR) and Environmental and Social Impact Assessment (ESIA) advisory practice, was retained in February 2011 to provide an Independent Assessment of assertions and conclusions contained in these documents.

## 1.2 Methodology & Structure

Using statements, assertions and conclusions contained in the Interagency Report (IAR) and the Moran Comments (MC) as a guide, we conducted a document and literature review. We also interviewed selected senior managers of Kumtor. At all times, we were provided with open access to any documents and reports requested, including during visits to Kumtor in Kyrgyzstan.

This Assessment contains six sections. This Executive Summary describes our methodology, contains a summary of our conclusions and recommendations, and presents the short biographies of the contributing authors: Don Proebstel, PhD, Senior ESIA and Biodiversity Advisor, and Mehrdad Nazari, MSc, MBA and LEAD Fellow, Senior Corporate Responsibility and ESIA Advisor. The Commission and relevant issues are described in Section 2. Key assertions made in the IAR and Moran Comments are analyzed in Section 3. These are structured and discussed under the following main headings:

1. Site access and transparency
2. Water quality (including arsenic and cyanide)
3. Biodiversity issues
4. Glaciers and water consumption
5. Geotechnical issues and the Petrov Lake Moraine Dam
6. Mine closure issues

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<sup>1</sup> <http://bankwatch.org/sites/default/files/Kumtor-MoranReport-31Jan2012.pdf> (e-file dated January 31, 2012).

Section 4 presents our Conclusions and Recommendations. The key documents and references we relied upon are listed in Section 5, which is followed by the Signature Page.

### **1.3 Summary of Conclusions and Recommendations**

We analyzed and assessed the Interagency Commission's report and the related Moran Comments. As part of this, we conducted a literature and document review and discussed our questions and findings with Kumtor's senior management. Below, we have presented our conclusions and recommendations.

#### **1.3.1 Site access and transparency**

Although delayed by one day to allow for mandatory medical check-up (a typical health & safety requirement for high altitude mines like Kumtor), the Commission and its official members (which did not include Dr. Moran) were granted site access and enabled to carry out their inspection.

Our review showed that Kumtor is annually subject to approximately 25-30 site visits by regulatory agencies and international auditors and consultants (also on behalf of international lenders). These site visits, inspections and audits have facilitated competent monitoring and supervision, and have resulted in material operational changes, including those related to significant geotechnical aspects of the operation. We also find that key stakeholders, including the Commission, appear to have access to key data, including those provided in Kumtor's detailed Annual Environmental Reports as well as key, relevant management personnel. The voluminous AERs cover, among other things, key environmental and social aspects, compliance status, health and safety issues, inspections, cyanide management and transport, geotechnical risks, planned activities and mine closure related topics. In addition, monitoring data and other summaries are also included in the AERs. These are distributed to a variety of Governmental agencies, local schools/libraries and civil society groups in Kyrgyzstan.

In our opinion, such access, reporting and outcomes do not support assertions that the Kumtor mine is not accessible, that regulators (or international lenders) lack political will or capacity to supervise Kumtor's mining operations and require changes and corrective action, when indicated. We note that, in addition to generating and distributing voluminous AERs, Centerra and Kumtor are also following best international reporting and disclosure practice through their adoption of the Global Reporting Initiative (GRI) and the Extractive Industry Transparency Initiative (EITI).

We recommend that Kumtor reviews opportunities to further expand its community-supported (joint) monitoring, reporting and assurance processes, and explore other avenues that could further support its commitment to transparency.

#### **1.3.2 Water quality and cyanide**

Our review (and the Commission's own discussion) highlights that the Commission's water sampling and/or analysis pertaining to arsenic levels in the Petrov Lake were unreliable. The Commission's sampling results could not be reproduced during follow-up sampling by a competent government agency representative. These additional results, which did not identify any concerns about presence of elevated arsenic, were consistent with Kumtor's own, long-term sampling results.



However, the Commission raises valid issues relating to elevated sulphate levels below certain waste rock dumps, which is consistent with Kumtor's own findings. This issue is also noted in Kumtor's Conceptual Closure Plan (CCP). It indicates that sulphate released from waste dumps may present a potential long-term compliance issue. However, the same CCP report also clarifies that the predicted sulphate levels are non-toxic and that the levels anticipated do not pose a serious threat to degradation of water quality in the Kumtor River. Furthermore, the latest CCP states that the ARD characterization studies have concluded that there is little to no risk of potential ARD occurring in the TMF and that ARD is not predicted from the waste dump facilities.

Our review of assertions contained in the Moran Comments relating to cyanide, discharges from the Effluent Treatment Plant (ETP), Kumtor's sampling and data quality, and impacts on fishery (none of which were adopted by the Commission in its recommendations) showed that they are without merit and speculative. Also, sampling of parameters like uranium has already taken place, as reported in Kumtor's 2010 AER, and did not identify any concerns.

We recommend that Kumtor should include (a) hydrocarbon analysis in its routine water sampling program, (b) complete the few remaining actions required to secure certification of its operations and transport by the standard-setting International Cyanide Management Institute, and (c) continue to consider necessity, practicality and feasibility of options that could assist in avoiding, reducing or mitigating potential for long-term elevated sulphate levels, or other potential long term impacts.

### **1.3.3 Biodiversity issues**

Our review and discussions show that Kumtor's engagement and activities were instrumental in establishing and promoting the Sary-Chat Ertash Nature Reserve (SCER) by the KR Government. Kumtor's presence, activities and contributions have also improved monitoring and resulted in an increase of wildlife in the region. We note that the Commission's report does not assert actual adverse biodiversity impacts emanating from Kumtor's operations.

The issues raised by the Commission appear more procedural in nature, appear to rely on inaccurate maps (see further below) and are twofold. First, concerns are raised about the KR Government decreed corrections in 2009 of the area of SCER which was overlapping with the Kumtor Concession. This correction appears to have resulted in a virtual (apparent) loss of approximately 260 ha (or 0.36%) of the SCER's area. In our opinion, such a correction, which appears fully aligned with the original intent of establishing the SCER, does not have a significant or tangible adverse impact on the viability and biodiversity value of the SCER.

Second, the Commission also raised concerns about two prospecting licenses (Karasay License, 125 km<sup>2</sup> and Koendy License, 134 km<sup>2</sup>) which were granted by the Government to KGC in 2009. These prospecting areas overlap, in part, with "Buffer Zones" to the SCER and other land use designation areas, such as hunting zones. It is our understanding that the "Buffer Zones" have yet to be formally adopted through Government decree.

In our opinion, the imprecise maps in circulation that show variable size, location and land use designations are inconsistent with KR Government Decree #76 and laws relating to the SCER. However,

the reliance of some stakeholders on these maps they deem to be accurate appears reasonable and can result in different interpretations of the interrelation of Kumtor and the SCER. It is our understanding that efforts are already in progress by the Kyrgyz Government to provide a definitive map relating to the size, location and boundaries of the SCER. We recommend that this process be designed to include stakeholders to improve its credibility and that its outcome be transparently communicated to interested parties.

We recommend that Kumtor and other stakeholders engage in a constructive dialogue that clarifies and considers (a) the decreed boundaries of the SCER, (b) the real impacts of Kumtor's current mining operations and its exploration activities (if any). In this context, stakeholders could explore modern tools, software and approaches, including Biodiversity Action Plans and cross-sectoral partnerships, which could be advanced with Kumtor's support. Such a dialogue could clarify facts and realize non-exclusive options that can generate positive biodiversity outcomes and meet shared nature conservation and socio-economic aspirations.

#### **1.3.4 Glacier ablation and water consumption**

The Kumtor mine is located in alpine terrain where some peaks and local valleys are occupied by active glaciers. Starting in 2007, operations at Kumtor's central pit have been adversely affected as a result of significant creeping (movement) of the historical waste dump and the glacial ice in certain areas, and these movements continue to date. As a result, Kumtor revised its operation strategy and has been removing glacial materials and associated waste rock. Our review determined that Kumtor has impacted an area of approximately 1.5 % of the five glaciers in the immediate vicinity of the Kumtor mine.

A number of studies have demonstrated that glacial ablation (retreat) near the Kumtor mine continues to occur at a significant rate, predating Kumtor's operation and from causes that are independent of Kumtor's mining activities. A review of other publications and, in particular, the 2009 National Communication of the Kyrgyz Republic to the UN Framework Convention on Climate Change, confirms that the glacial ablation observed at Kumtor is occurring throughout Kyrgyzstan. In fact, predictions by this UN submission point to a reduction of glaciated areas ranging from 64% to 95% by the end of this century. This effect is unrelated to, but can also be observed near, the Kumtor mine. In our opinion, assertions that appear to overplay the materiality of Kumtor's relatively limited anthropogenic influence on local glaciers are inconsistent with the expert scientists' opinions. These point to broader and much more dominant climatic drivers of impact.

Kumtor's water intake is approximately 6% of the inflows to the glacial Petrov Lake. Kumtor's 'upstream water consumption' equates to approximately 0.14% of the water flow available to the nearest residential users at Naryn, located approximately 200 km downstream. Dr. Moran seems to suggest that Kumtor's 'water consumption footprint' (water consumed and impacts on 1.5 km<sup>2</sup> of glacial areas) competes with the recharge from other glaciers, snow and rainfall over an area exceeding 5,000 km<sup>2</sup> (the mountainous portion of the basin above the town of Naryn) In our opinion, it is scientifically implausible that Kumtor's water consumption footprint could be construed as generating a material regional impact or that it could be driving 'water competition' that can be felt as far as Uzbekistan. The

well-known drivers of water competition (and wastage) in the region include agriculture and Soviet-era water distribution infrastructure.

### **1.3.5 Geotechnical issues and Petrov Lake moraine dam**

As disclosed by Kumtor, since its initial construction, the tailings dam foundation has experienced horizontal deformation. Although considered within the limits of deformation movement of dam structures elsewhere reported in the literature, Kumtor constructed a shear key and toe berm. These were designed, modeled and/or reviewed by leading Kyrgyz design institutes and international consultants, such as the KR Academy of Science, Institute of Physics and Rock Mechanics, and Golder Associates and BGC Engineering from Canada, to reduce the rate of movement, address regulatory concerns and ensure stability of the Tailings Management Facility (TMF) after closure.

In 2002 and 2006, Kumtor's operations were adversely affected as a result of two substantial failures of the bedrock high wall that forms the northeastern limit of the Central pit. These resulted in adjustments to mining plans since that time. Starting in 2007, operations at the Central pit have been adversely affected as a result of significant creeping of the historical waste dump and glacial ice, which has necessitated on-going management through unloading/removal to safeguard the pit and access to certain ore zones.

Given the context of Climate Change and glacial lake outburst flood (GLOF) events unrelated to Kumtor, KR regulators and Kumtor have been monitoring and studying the glacial Petrov Lake and its natural moraine dam structure. The most recent engineering review was carried out by BGC Engineering (2012). It evaluated if an outbreak flood could be a potential risk to mine operations or after closure. BGC developed and modeled general failure modes and likely flood scenarios, and reviewed potential impacts on the TMF and other structures.

BGC has concluded that the moraine dam at the present time can be classified as relatively stable. However, global warming is expected to destabilize the moraine dam over time and will likely generate a flood. Given the presence of a natural berm and the lower elevation of the Kumtor River channel between Petrov Lake and the TMF (see Figure 10 and Figure 11, page 39), BGC concluded that an outburst flood would follow the Kumtor river channel. In the context of a potential future GLOF event, all risks presently considered to be high can be reduced to moderate or lower levels through a combination of monitoring and construction efforts, as also recommended by the IAR. Based on the BGC study, Kumtor is currently planning to install an advance warning system for its workers that may be near the Petrov Lake from time to time, and protect the shear key of the TMF. The latter will reduce its vulnerability to erosion from a potential GLOF. In addition, Kumtor could consider lowering the water levels in the Petrov Lake to further increase the factor of safety.

Our document review indicates that geotechnical risks are being studied, monitored, reported and managed by Kumtor. These risks also remain supervised by Kyrgyz regulators. Given the time lag between AER cycles, we recommend that Kumtor should consider interim updates ('Frequently Asked Questions') and inform interested stakeholders about progress in dealing with its geotechnical issues, including those related to the Petrov Lake's natural moraine dam.

### 1.3.6 Mine closure related issues

Our review shows that Kumtor has been reviewing and testing Acid Rock Drainage (ARD)-related aspects beginning with the Environmental Impact Assessment (EIA) and continuing since the early stages of the Kumtor operation. A series of costed Conceptual Closure Plans (CCP) have been generated, as also summarized in Kumtor's AERs.

Kumtor's latest CCP notes that, while ARD is not predicted from the waste dump facilities, sulphide oxidation is occurring, and will continue to occur in the future, and produce drainage waters that are circumneutral but potentially elevated in sulphate relative to MAC values. However, the CCP report clarifies that the predicted sulphate levels are non-toxic, that the expected levels do not pose a serious threat to degradation of water quality in the Kumtor River.

The latest CCP estimates approximately \$30 million for total closure costs. These have been inflated by Kumtor to approximately \$37 million to represent the expected 2021 costs in the financials. According to Kumtor, the funding accrual by the end of February 2012 was approximately \$ 9.1 million. Kumtor confirmed that the remaining balance will be funded over the life of mine (LOM) and assumes the salvage value for the equipment to be zero at that time.

We recommend that Kumtor should further consider the necessity, availability and feasibility of options that could assist in avoiding or mitigating potentially elevated sulphate levels identified in the CCP, or other issues that may arise from ongoing monitoring. We also recommend that Kumtor (and Centerra) include social and biodiversity aspects in future closure plans, and continue with transparent reporting of closure planning and related financial provisioning.

## 1.4 Professional Background of Authors

This Assessment was completed by Mehrdad Nazari, MBA, MSc, LEAD Fellow, Senior Corporate Responsibility & ESIA Advisor, and Director of Prizma LLC. Don Proebstel, PhD, Senior Biodiversity & ESIA Advisor and Associate of Prizma LLC, also contributed to and co-authored this Assessment. The bios of both authors are summarized below. In completing this assignment, both authors have provided their independent professional judgment and were not unduly influenced by Kumtor.

**Dr. Proebstel's** professional experience spans 25 years. This includes positions as Senior Environmental and Social Analyst with the Overseas Private Investment Corporation (OPIC), Market Analyst with Pike Research, Vice-President Environmental and Sustainability at Gold Reserve Inc., a junior mining company, Senior Environmental & Biodiversity Consultant with AATA International, an environmental consultancy, Director of the World Salmonid Research Institute, working closely with the Russian Academy of Sciences, the Moscow State University and the Wild Salmon Center. Don is currently a scientific advisor to Natural Power Concepts, a Hawaii based renewable energy technology developer, and contributes to a case which is before the World Bank's International Centre for Settlement of Investment Disputes (ICSID). Dr. Proebstel holds a BS in Fishery and Wildlife Biology and a PhD in Conservation Biology from Colorado State University.

**Mr. Nazari** has over 20 years of professional experience. He serves as an Expert Witness on an international arbitration case before the World Bank's ICSID in Washington DC. He was also an Expert Panel Member advising the Compliance Advisor Ombudsman (CAO) office of the International Finance Corporation (IFC) on an extractive project that required an assessment of IFC's compliance with its policies and procedures. Previously, Mehrdad served as a Principal Environmental Specialist at the European Bank (EBRD, until 2003), conducting environmental and social appraisal, and monitoring investment projects. This included also the Kumtor operation<sup>2</sup>. Mehrdad was also Head of CSR Research at CoreRatings, London (formerly part of Fitch, now DNV), which provided services to asset managers and pension funds; and Project Manager with Dames & Moore (now URS), a leading environmental and engineering consulting firm. Mr. Nazari obtained his academic training in Germany, the UK and the USA (Fulbright grantee), focusing on geosciences, business administration, and sustainable development. He holds an undergraduate degree in Mineralogy (geochemistry) from JW Goethe University in Frankfurt, Germany; a Masters degree in Hydrogeology from University of Birmingham, UK; and an MBA degree from Henley Business School in the UK. He is also a Fellow of Rockefeller Foundation's Leadership for Environment & Development (LEAD) program, a licensed Sustainability Reporting Assurance Provider, a member of the International Association for Impact Assessment, and assists organizations with their stakeholder engagement and sustainability reporting.

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<sup>2</sup> During his tenure at the EBRD, Mr. Nazari spearheaded EBRD's follow-up activities relating to the accidental cyanide spill *en route* to the Kumtor in May 1998. This resulted in mobilization of a technical assistance grant through the EBRD and IFC, which was funded by UK's Department for International Development (DFID), to assist with community engagement, conflict resolution and biodiversity related initiatives (see also Nazari, *et al*, 2001, and Fauna & Flora International, 2003).

## 2 Interagency Committee

This section describes (1) the composition and funding of the Interagency Committee, (2) the purpose and activities of the Commission, and (3) the resulting “Preliminary Recommendations.” The analysis of the recommendations and underlying assertions is provided in Section 3.

### 2.1.1 Composition and Funding of Committee

According to the Interagency Report, the Commission was established pursuant to Decree No. 413-p of September 13, 2011 issued by the Government of the Kyrgyz Republic (KR). The original members of the Committee are listed in Table 1. We note that this list does not include Dr. Moran’s name.

**Table 1: Approved Members of the Interagency Commission (source IAR, 2011)**

Name	Affiliation
M. J. Alypsatarov	Acting Head, Road Division, Ministry of Transport and Communications of the Kyrgyz Republic
T.O. Omukeyev	Chief Expert, Department of State Expertise, State Agency for Architecture and Construction, Government of the Kyrgyz Republic
A.A. Rustamov	Deputy Director, State Agency for Environment and Forestry, Government of the Kyrgyz Republic
C.O. Sadabaeva	Chief Expert, Department for Supervision of Mining, Metallurgical and Chemical Companies, State Mining Safety Inspectorate, Ministry of Natural Resources of the Kyrgyz Republic
T.A. Sadubekov	Deputy Head, Division for Environmental Monitoring and Forestry, State Agency for Environment and Forestry, Government of the Kyrgyz Republic
A.A. Saparaliev	Head, Department for State Environmental Control, Ministry of Natural Resources of the Kyrgyz Republic
I.A. Torgoev	Director, GEOPRIBOR Scientific and Engineering Center, Geomechanics and Mineral Resources Development Institute, Academy of Sciences of the Kyrgyz Republic

Additional individuals were also approved and added as members of the Committee. Their names and affiliations are shown in Table 2. They include the Chair of the Commission, E.B. Imankozhoeva (also a Member of the Kyrgyz Parliament) and the Deputy Chair of the Commission, K.S. Moldogaziyeva (CEO of “Life Tree,” a Kyrgyz NGO and partner of CEE Bankwatch). We note that Dr. Moran’s name does not appear in this table either.

**Table 2: Additional “approved” Members of the Interagency Commission (source IAR, 2011)**

Name	Affiliation
E.A. Azizov	Engineer, Central Asian Institute for Applied Geosciences
Leuze, Mirjam	Photographer
E.B. Imankozhoeva (Commission Chair)	Member of the <i>Jogorku Kenesh</i> (Parliament) of the Kyrgyz Republic
S.A. Mambetov	Vice President, Association of Miners and Geologists of the Kyrgyz Republic
V. Martsynkevych	Environmental expert, Bankwatch <sup>3</sup>
K.S. Moldogaziyeva (Commission Deputy Chair)	CEO, Human Development Center “Life of Tree”
R.A. Usubaliev	Senior research officer, Central Asian Institute for Applied Geosciences

The Interagency Report notes that the Ministry of Natural Resources had declined to finance the Commission’s work. In response, the NGO “Life of Tree” had raised the funds, presumably in cooperation with CEE Bankwatch, to finance the Commission’s activities.

### **2.1.2 The Purpose and Activities of the Commission**

The mission of the Committee’s work was described as an “evaluation of compliance with environmental and industrial safety standards at Kumtor Mine” and “identification of environmental compliance risks and weak points in the company’s operation.” The focal points of the evaluation as noted in the IAR are quoted below:

- “Condition of the tailing pond and its dam
- Condition of the Petrov Lake and measures taken by the company with respect to the lake's increasing size and possible break-out threat
- Storage of solid industrial waste and condition of adjacent glaciers
- Open-pit mine
- Visit to the areas of the company's planned operational expansion, new concession area (Sary-Tyr, South-West, Muzdusuu, North-East, and Petrov Glacier)

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<sup>3</sup> According to its website ([www.bankwatch.org](http://www.bankwatch.org)), the CEE Bankwatch Network is an international non-governmental organization (NGO) with member organizations from countries across central and eastern Europe (CEE). This NGO monitors the activities of international financial institutions which operate in the region and promotes environmentally, socially and economically sustainable alternatives to their policies and projects.

- Mine's reclamation plan and its implementation
- Emergency action plan and its implementation"<sup>4</sup>

The Commission's work involved a review of existing documents and records, a site visit and limited sampling of water, soil and snow. The outcome and "Preliminary Recommendations" of the Commission's work were presented in the Interagency Report. The appendices of this report included also a commentary provided by Dr. Moran, which were also published by CEE Bankwatch<sup>5</sup>.

We note that biodiversity-related topics, which seem to have triggered several significant assertions and recommendations (see also items 9, 12 and 13 in Section 2.1.3 below), were not identified to be among the Commission's main tasks.

### 2.1.3 Preliminary Recommendations of Interagency Report

The Interagency Report presented a total of 13 "Preliminary Recommendations." These were grouped and addressed to (a) Kumtor, (b) Government and responsible authorities, and (c) the *Jogorku Kenesh* (Parliament). All 13 Preliminary Recommendations are reproduced in full and without any commentary further below. The approximately 30 main assertions contained in the Interagency Report are listed in Appendix 1. The bullet point-style assertions contained in the Summary section of the Moran Comments are presented in Appendix 2. For the purpose of our Independent Assessment, all assertions were structured by categorizing and grouping them into one or more key topics (headings) which are analyzed and discussed in Section 3.

#### **"To Kumtor Operating Company:**

1. Disclose all relevant materials, reports and reclamation plan, provide answers to the questions asked by the Commission (see report).
2. Provide the Annual Environmental Report on the national language.
3. Exceeding of the maximum allowable concentrations of some elements in the moraine stream and glacial water may be a sign of pollution of the Chon-Sary-Tor Stream. Absence of toxic elements at the final sampling point (K11) is evidence of water concentration dilution to the maximum allowable concentration level or to a level that is slightly above the required level (for ammonia compounds).

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<sup>4</sup> IAR, 2011, p. 5

<sup>5</sup> According to its website ([www.bankwatch.org](http://www.bankwatch.org)), the CEE Bankwatch Network is an international non-governmental organization (NGO) with member organizations from countries across central and eastern Europe (CEE). This NGO monitors the activities of international financial institutions which operate in the region and promotes environmentally, socially and economically sustainable alternatives to their policies and projects.



4. In terms of exceeding of maximum allowable concentration of arsenic in the Petrov Lake: it is necessary to take samples of drinking water at the mine and conduct spectral analysis of ore and blast dust (or use the data of the previous relevant geochemical studies).
5. Many Commission members believe that water treatment facilities should be installed at places where the streams from the mine, waste dumps and moraine merge, as the reduction of the total volume of water discharged into the Kumtor and Naryn Rivers the level of pollution will inevitable rise.
6. Consider the issue of constructing a new tailing pond at a distance from the glaciers.

**To Kyrgyz Government and responsible authorities**

7. Monitoring and safety measures to prevent the break of the Petrov Lake dam.
8. In our opinion, it is now too early to provide a new concession zone to the company for development as it has not yet completed mining of the available deposits using underground method, and given the accumulating negative impact of operations in the new concession zone located in the vicinity of the Sary Tor, Muzdu Suu (?) glaciers and the buffer area of the Sarychat-Eertash Nature Reserve.
9. With respect to the Sarychat-Eertash Nature Reserve: the State Agency for Environmental Protection and Forestry should initiate state ecological expertise to examine the legitimacy of assignment a part of the protected area of the Sarychat-Eertash Nature Reserve.
10. The State Mining Safety Inspectorate should be authorized to run industrial safety inspections more frequently in view of the risks associated with Kumtor and to ensure a proper level of industrial safety on the site.
11. The process of approval of the Commission's membership and dates of the mine visit showed the shortcomings of the Decree on Rules and Procedures of the Kyrgyz Government and revealed lack of efficient liaison between the Government and the Jogorku Kenesh. A more efficient decision-making mechanism should be established by the Government.
12. Because the whole complex of the problems and risks at the Kumtor mine have been identified during the Commission visit (with allowed concentrations for a number of chemical elements to be exceeded, instability of the pit walls, Petrov Lakes break-out potential, illegal land Natural park land transfer for the new concession Kumtor area) – we recommend to temporarily suspend the Kumtor mine for further analysis and elimination of all violations and problematic issues.

**To the Jogorku Kenesh:**

13. The Committee of the Jogorku Kenesh for Land, Agrarian Issues, Water Resources, Environment and Regional Development should consider the issue of violation by transfer of lands occupied by the Sarychat-Eertash Nature Reserve to Kumtor Operating Company of the Kyrgyz laws, 'Procedure of transfer (transformation) of land plots from one category to another category, or from one type of land to another type of land' approved by the Decree No. 19 issued by the Kyrgyz Government on January 22, 2008, and Agreement on New Terms and Conditions for the Kumtor Project signed by and between the Government of the Kyrgyz Republic, Kyrgyzaltyn OJSC, Centerra Gold Inc., Kumtor Operating Company and Cameco Corporation on April 24, 2009, and consider an option to revoke the license given to Kumtor Operating Company for the Karasay and Koendinsky License Areas."<sup>6</sup>

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<sup>6</sup> IAR, 2011, p. 22-23

Figure 1: Location of the Kumtor Mine in the Kyrgyz Republic, Central Asia (source: Redmond *et. al.*, 2011)

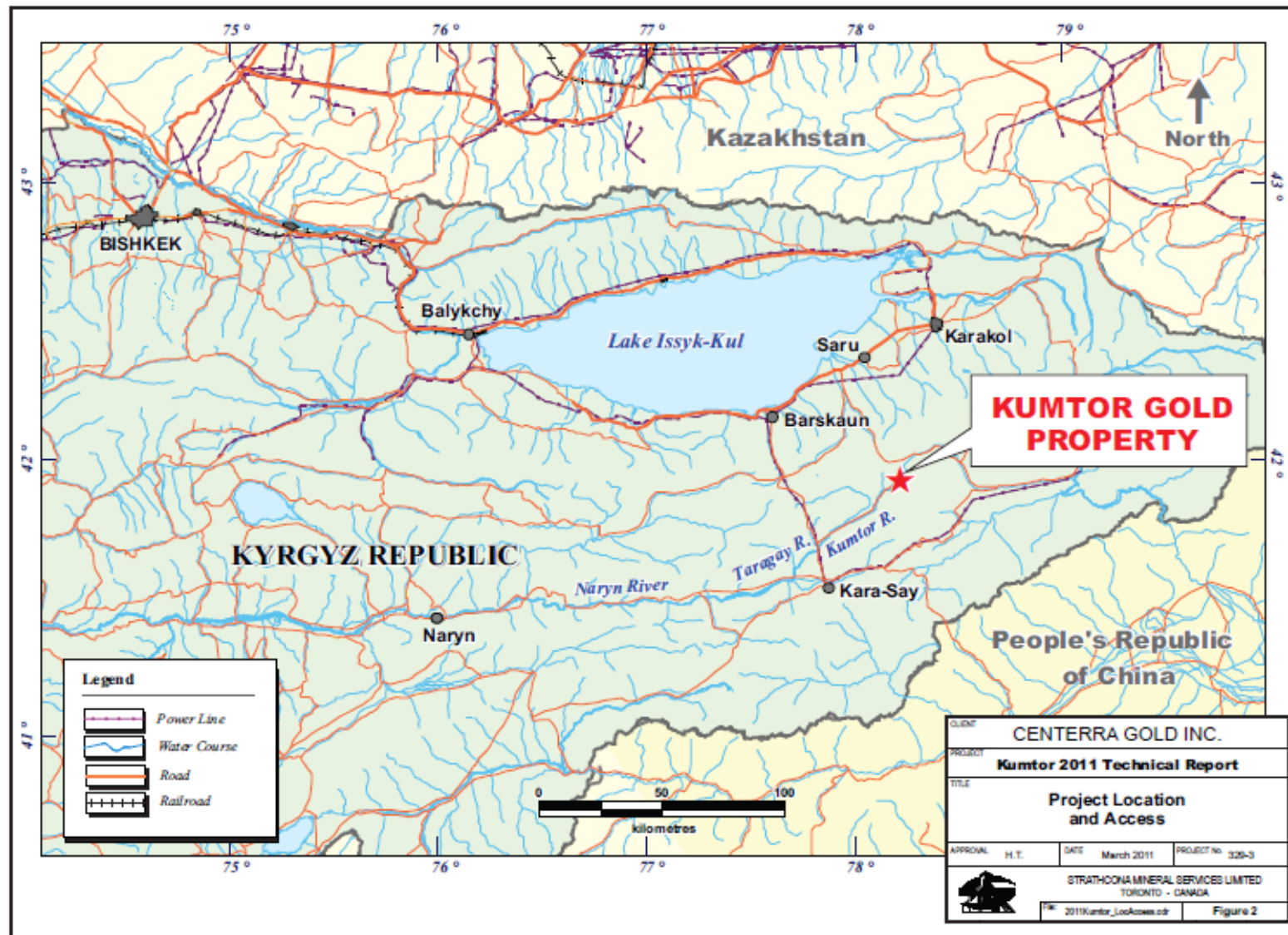
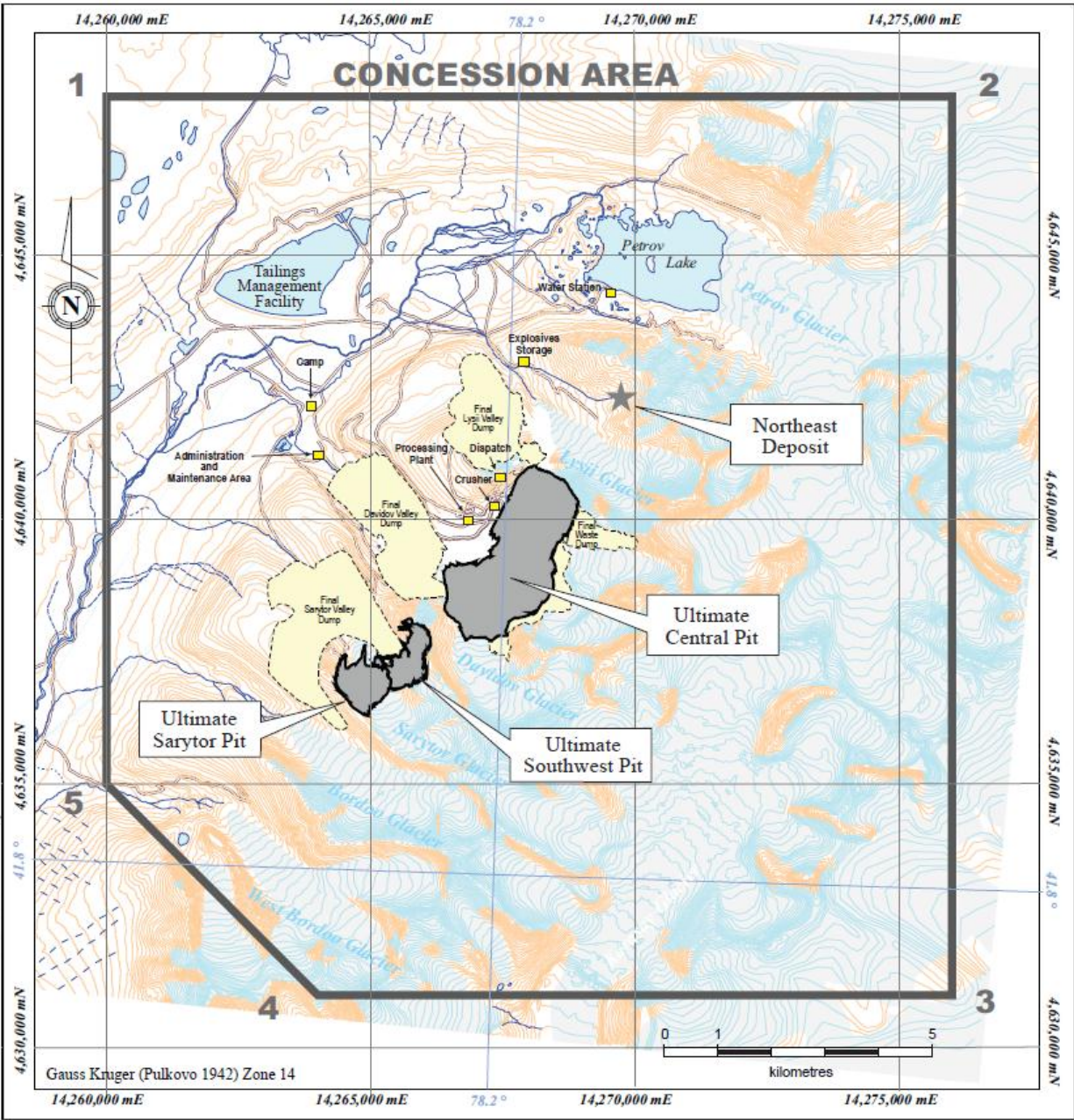


Figure 2: Concession Area and Site Map of the Kumtor Mine (source: Redmond *et. al.*, 2011)



## 3 Analysis of Key Assertions

### 3.1 Introduction

Key assertions contained in the Interagency Report and the Moran Comments are presented in Appendix 1 and Appendix 2, respectively. These are grouped under the following major topics:

1. Site access and transparency
2. Water quality
3. Biodiversity Issues
4. Glaciers and water consumption
5. Geotechnical issues and Petrov Lake Moraine Dam
6. Mine closure issues

Each topic is discussed and analyzed in turn below.

### 3.2 Site access and transparency

The Interagency Report and the Moran Comments appear tainted by a ‘conspiratorial tone’<sup>7</sup>. Questions were raised about the existence of Kumtor’s communication that had requested a delay of the Commission’s site visit. This delay was being requested by Kumtor due to a concurrent site visits already planned by other Members of the Kyrgyz Parliament and Government representatives. The Interagency Report also appears to question the motives behind the need for medical check-ups<sup>8</sup>, a typical requirement for high altitude mines, which resulted in a one-day delay to the Commission’s site visit.

In his report, Dr. Moran, who was not a member of the Commission (see also Section 2.1.1), appears to belittle the competency and capacity of Kyrgyz agencies and international lenders (and their consultants)<sup>9</sup>. He also appears to question the professional capabilities and ethical conduct of numerous

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<sup>7</sup> “On the first day, September 19, 2011, the security guards at the checkpoint did not allow us to enter the site explaining that there was an investment meeting with deputies [Member of Kyrgyz Parliament and Government Agencies] and that in response to the order of the Kyrgyz Government the administration of Kumtor Operating Company sent a letter to change the date of the Commission’s visit. However, no letter of such kind ever was delivered to Jogorku Kenesh” (see IAR, 2011, p. 10-11).

<sup>8</sup> “Also, the senior managers of Kumtor were insisting that the Commission members should undergo a medical examination Bishkek. However, in 2005 we underwent medical examination directly on the site, just like a group of deputies who arrived earlier. After long negotiations, the Commission members were transported to a guesthouse in village Tamga, and it was agreed that in the morning after a medical examination in Tamga we would get to the mine in order to complete our assignment” (IAR, 2011, p. 10-11).

<sup>9</sup> “KOC controls the mine / processing site like a private [fiefdom], restricting access only to those it largely controls. Despite claims by Centerra-KOC and the EBRD, the company does not truly allow open access to outside technical experts with respect to water and water quality sampling” (see Moran, 2012, page 1). Dr. Moran was also quoted in a media article saying that “Kumtor [operators] have clearly done their very best not to be open,” and “[t]hey’re happy to let in people who don’t quite know what they’re going to see. They don’t want people who know what they’re looking at” (Eurasia.net, 2012)



international environmental and engineering consultants, as well as leading Kyrgyz institutes that have conducted numerous site visits. These issues are discussed further below.

### 3.2.1 Scheduling the Commission's Site Visit

With regard to scheduling of the Commission's site visit, we note that the Interagency Report indicates September 5-7, 2011 as the original schedule for their site visit.<sup>10</sup> However, the relevant Government Decree No. 413 was apparently not issued until September 13, 2011. A series of four letters (along with English translations) are reproduced in Appendix 4. They shed light on why Kumtor was proposing a schedule change and clarifies motives as summarized below:

- The letters show that schedule changes were initiated by E. Imankojoeva, the Chair of the Commission and a Member of the Parliament of the Kyrgyz Republic. In her letter, dated September 14, the Chair of the Commission requested a delay to the mine site visit from September 14-16 to September 19-21, given delays in obtaining the relevant Government resolution<sup>11</sup>.
- In a follow-up letter by N. Momunaliev, KR Minister, Head of Government Office, dated September 15, Kumtor was requested to assist with the Commission's site visit (now planned by the Commission from 19-21 September).
- Kumtor replied to this letter on September 16. In this letter, Kumtor highlighted the challenge of arranging the Commission's site visit given a previously scheduled visit by another group that also included Kyrgyz Parliamentarians<sup>12</sup> and required access to the same specialist staff at the mine site. This Kumtor letter also highlighted the requirement for medical check-ups prior to site visit in line with Kumtor's policies.

In our opinion, these letter exchanges do not show any wrong motives much less any wrong doings by Kumtor. In our opinion, there is no merit to the assertions in the Commission's report that Kumtor did not – or did not promptly - communicate the need for schedule changes through the appropriate channel, or that that these changes were unreasonable given concurrent site visits and inspections by multiple parties involving Kyrgyz Parliamentarians and Government agencies. We also note that, in any case, the Commission was provided with unrestricted site access and carried out its inspection and sampling program (even if delayed by one day).

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<sup>10</sup> See IAR, 2011

<sup>11</sup> According to the IAR, the Government Decree No. 413-p was not issued until September 13, 2011.

<sup>12</sup> On September 19, 2011, a group of Jogorku Kenesh (Parliament) members, including Ravshan Jeenbekov, Dastan Bekeshov, Abdyjapar Bekmatov, Zamir Alymbekov, member of Bishkek City Kenesh Jusup Boshkoyev and others visited the Kumtor mine site. This visit was organized by KOC at the request of various factions of the Kyrgyz Parliament who wished to visit the gold mine. This was already the second group of Members of Kyrgyz Parliament who had visited the Kumtor mine in 2011. On June 23-24, Parliamentary Working Group paid a visit to the Kumtor mine. The parliamentary delegation was made up of four lawmakers – Raikan Tologonov (the Working Group head), Urmat Amanbayeva, Elmira Jumaliyeva, and Mirlan Bakirov. Other Working Group members included representatives of ministries and government agencies, independent environmental, geology and glaciology experts as well as civil society activists (see KOC, 2011, and Appendix 3).

### 3.2.2 Requirement for medical check-ups

Kumtor's long-standing and well-known policy and practice - notwithstanding any rare exceptions - that requires visitors to the mine to undergo a medical examination is a typical, health and safety-driven and entirely reasonable requirement for high altitude mines, including the Kumtor mine. In our opinion, given the elevation of the Kumtor Mine of 3,600 to 4,400 meters above sea level, imposing and insisting on such medical check-ups is not indicative of inappropriate motives, as apparently implied by the Commission's report. In fact, it is a sign of good international health and safety practice.

### 3.2.3 Transparency of information

With regard to transparency of information, we note that the Moran Comments and, to a lesser extent, the Interagency Report, allege lack of, limited, or delayed access to important environmental information. At the same time, both documents refer to and quote - at times selectively - from existing data, reports and publications, including Kumtor's most recent AERs<sup>13</sup>. The use of this information already confirms the availability of and access to such documents.

In fact, it is evident that Kumtor has been routinely producing and distributing its AER for many years. These AERs are produced in both English and Russian languages. The latter is due to continued use of the Russian language in the capacity of an official language in Kyrgyzstan<sup>14</sup> (which was part of the Former Soviet Union). The distribution list of Kumtor's Russian-language AERs includes key Government agencies, university libraries and schools, and civil society and other organizations as shown in Table 3. A spot check conducted by Prizma confirmed the presence of Kumtor's AER in the library of the KR National Academy of Sciences. Kumtor also posted its English-language 2010 AER on its website<sup>15</sup>.

In an effort to clarify the assertion that Kumtor does not provide access to outside technical experts and government regulators, we reviewed information regarding most recent (2011) site visits to the mine site. Kumtor provided information showing visits by consultants, Government agencies, Members of Kyrgyz Parliament and external consultants, as summarized in Appendix 3.

Our review confirmed that regular inspections from the Ministry of Natural Resources occur approximately three times per year; regional environmental inspectors from the Issyk-Kul region inspect approximately six times per year, and annual inspections are carried by the State Administration for Emergency Response. In addition, occupational health and safety and technical issues are independently inspected six times per year by Gosgortekhnadzor, which is the Federal Mining and Industry Regulatory Agency. The firm Eco-Service, SPF Ltd conducts its inspections approximately six times per year (to

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<sup>13</sup> The references in the Moran Comments, for example, include the 43-101 Technical Report on the Kumtor Gold Project (one in a series of such reports produced since 2004) which discusses a variety of geotechnical aspects and is disclosed pursuant to requirements of the Toronto Stock Exchange for listed mining companies. Such disclosures for TSX listed companies are subject to defined competencies, independence and disclosure requirements and carry serious liability risks. The Moran Comments also noted review/access to KOC's 2009 and 2010 Annual Environmental Report, in addition to other sources.

<sup>14</sup> [http://en.wikipedia.org/wiki/Kyrgyz\\_language](http://en.wikipedia.org/wiki/Kyrgyz_language)

<sup>15</sup> See [http://www.kumtor.kg/en/environment-protection/otchet\\_ob\\_ohrane\\_okrujayushey\\_sredy/](http://www.kumtor.kg/en/environment-protection/otchet_ob_ohrane_okrujayushey_sredy/)

provide field supervision of the ETP, eastern pulpline and some other facilities). These inspections are typically reported annually by Kumtor in its AERs.

**Table 3: Distribution list of Kumtor’s Russian-language Annual Environmental Reports (source Kumtor)**

Key Stakeholders	Recipients of Kumtor’s AERs
<b>Governmental Authorities</b>	State Agency of Env.Protection, Gosgortekhnadzor, Ministry of Natural Resources, Ministry of Natural Resources, Issyk-Kul regional Dpt. of SAEP, Issyk-Kul regional Dpt. of SAEP, “Issyk-Kul” biosphere territory (Balykchy), San-Epidem.Supervision Dpt., Issyk-Kul regional San-Epidem.Supervis. Dpt., Issyk-Kul State Administration, Jety-Oguz State Administration, Naryn Oblast State Administration, Naryn Regional Env. Comm., KyrgyzAltyn, “Eco-Service” Design Company
<b>Libraries, Universities &amp; Schools</b>	KR National Library, Library of the KR Nat. Acad. of Sciences, Karakol City Library, Balykchy Town Library, Naryn City Library, Tamga Village Library or School, Tosor Village Library or School, Kichi-Jargylchak Village Library or School, Chon-Jargylchak Village Library or School, Ak-Shyrak Village Library, Barskoon Village library or School, Kyzyl-Suu Village Library, Bokonbaevo Village Library, Karakol University, Institute of Biology
<b>Civil Society &amp; NGOs</b>	ZdravPlus, Karakol, ИППДО Фонд Сороса, “Ai-Symal” NGO, Barskoon, “Jety-Oguz Aiymy” NGO, Kysyl-Su, “Kut-Bilim” NGO (Kara-Koo), NGO “Journalist’s House”, Karakol, “Yak-Tuor” Company, Karakol, Issyk-Kul State Histor.& Cultural Museum, “Kelechek” Ecological NGO, Bishkek, Tree of Life (Kalia Moldogazieva), Natalia Ablova

More broadly, Kumtor has a well-established Regional Liaison Committee (RLC), the structure of which is depicted in Figure 3. The purpose of this RLC is to more effectively engage with Kumtor’s local communities and other stakeholders. Kumtor’s 2010 AER notes that the RLC held three meetings to discuss the funding of social and economic projects, Kumtor sponsorships reports, human resources matters, environmental problems and other current issues.

We note also that Centerra Gold Inc. (Centerra), Kumtor’s parent company listed on the Toronto Stock Exchange<sup>16</sup>, joined the Extractive Industry Transparency Initiative<sup>17</sup> (EITI), a leading global standard that promotes revenue transparency. Centerra has also published its inaugural 2010 Corporate Responsibility Report<sup>18</sup> using the benchmark-setting Global Reporting Initiative (GRI) framework. Our document review

<sup>16</sup> Centerra became a publicly listed company in June 2004 (TSX: CG). The Kyrgyz State-owned mining company owns approximately 33% of Centerra with the balance being held by public shareholders.

<sup>17</sup> <http://eiti.org/>

<sup>18</sup> <http://www.centerragold.com/corporate-responsibility/corporate-responsibility>

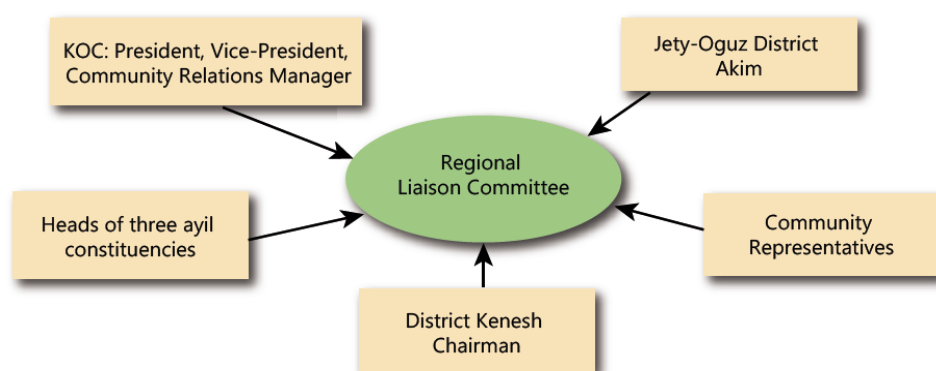


also shows that Kumtor has audited its cyanide transport and management<sup>19</sup> using the standard-setting International Cyanide Management Code (ICMC), and was found to be substantially compliant with ICMC (WESA, 2012a, 2012b).

Although we noted the Commission’s recommendation for Kumtor to generate AERs also in Kyrgyz language, other measures, such as expanding community briefings and focus group meetings, are likely to be more effective to further disseminate the content of Kumtor’s AERs to key stakeholders.

Overall, in our opinion, Kumtor’s disclosure of its environmental performance, distribution and access to such information and – more broadly – its commitment to follow best international transparency and reporting practices, is well in line with, or exceeds, good international mining practice.

**Figure 3: Kumtor’s Regional Liaison Committee Structure (source Kumtor, AER 2010)**



### 3.3 Water quality

The Interagency Report and Moran Comments raise a number of water quality issues. In this section, we focus our analysis and discussion on (1) the Commission’s sampling results relating to the Petrov Lake that appear to show elevated arsenic levels, (2) the relevance of drinking water standards, which were used by the Commission, in view of the standards and defined compliance points which actually apply to Kumtor, (3) issues relating to cyanide, (4) other water and data quality issues, and (5) sampling for uranium and other parameters.

A number of water quality issues related to the deposition of waste rock on glaciers (a discontinued practice since 2009) are discussed in Section 3.5. Other potential water quality concerns which relate to mine closure are addressed in Section 3.7.

<sup>19</sup> As noted in Wesa 2012, a November 2011 audit showed that KOC’s operations are in substantial compliance with the International Cyanide Management Code. A corrective action plan has been formulated and is currently being reviewed. KOC, which transports sodium cyanide from its Balykchy Marshalling Yard (BMY) in Balykchy, KR to the mine site, was also subject to a separate code-compliant ICMI audit in October 2011. The Summary Audit Report (SAR) was issued on January 27, 2012 and has been accepted by ICMI (with minor follow-up requirements), which is expected to be web-posted by mid-2012.

### 3.3.1 Arsenic levels

As part of its sampling efforts, the Commission took several water samples and submitted these for analysis to two laboratories in Kyrgyzstan. No information was provided in the Commission's report that described the sampling methodology, laboratory analysis procedures and protocols, or any related Quality Assurance/Quality Control (QA/QC) procedures that may have been applied.

The IAR reports elevated arsenic concentration in one sample taken from the Petrov Lake and notes that it exceeds Kyrgyz drinking water standards.<sup>20</sup> The glacial Petrov Lake serves as the water intake for Kumtor's operations, including its work camp. However, the Commission's report also describes the results of re-sampling conducted in December 2011 in response to the Commission's notification of the Ministry of Natural Resources. The results of the second round of sampling did not reproduce the Commission's original results, as detailed below.

On behalf of the Ministry of Natural Resources, a re-sampling was conducted by a chemical engineer from the Central Laboratory of the Ministry of Natural Resources at the Petrov Lake as well as potable water from Kumtor's mine camp. The analytical results did not confirm the Commission's sampling efforts. In fact, consistent with Kumtor's long-term data base of sampling results from the Lake and potable water at the mine camp, the re-sampling efforts showed arsenic concentrations that were below the detection limit of 0.005 milligrams per liter (mg/l). These levels are well within the limits set for drinking water in Kyrgyzstan and are also one order of magnitude lower compared to analytical results from the Commission's sampling efforts.

In our opinion, the Government's re-sampling combined with Kumtor's data highlights sampling and/or analytical errors associated with the Commission's sampling activities conducted during its site visit in September 2011. It is reasonable to assume that the same sampling and/or analytical errors potentially applied to all of the Commission's samples collected during that site visit. This raises questions about the validity of related assertions in both the Interagency Report and the Moran Comments.

### 3.3.2 Applicable water standards

As noted in the Interagency Report, the Commission appears to be using the Hygienic Rules GN 2.1.5.1315-03 on Maximum Allowable Concentrations (MAC) of Chemicals in Water for Drinking, Household and Domestic Use as its benchmark to evaluate the data obtained from its sampling round. This suggests that, in addition to concerns about validity of the Commission analytical results highlighted in Section 3.3.1, the Commission also appears to have applied the wrong benchmark in terms of applicable water standards. The Kumtor River, which receives treated effluents, direct discharges and run-off, is classified as a "Communal Use Stream" (and not a drinking water source stream). This signifies the need for the Commission to use other MAC values as the appropriate benchmarks (see also discussion on compliance boundary provided in Section 3.3.3 further below).

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<sup>20</sup> "Sampling results showed that the maximum allowable concentration level of arsenic (a rather toxic element) is exceeded in the Petrov Lake, and significantly exceeded the required levels in the Lysyi Glacier Stream" (see IAR, 2011, p. 13).

It is also important to note that the nearest residential users are located some 200 km downstream of the Kumtor mine at Naryn, which is near the sampling location W1.8 (see Figure 1 and Figure 4). This has important implications in terms of contributions and/or dilution by dozens of other tributaries which form part of the same hydrological system.

### **3.3.3 Kumtor's compliance point**

The Commission's assertions that samples taken within Kumtor's boundaries may be exceeding certain MAC values in water samples conjure up compliance concerns. It is, therefore, important to note the location of the compliance point that actually applies to Kumtor. This point is at the sampling location W1.5.1, which is shown conceptually in Figure 4.

The Commission's apparent identification of elevated concentrations of constituents elsewhere (i.e. 'spot checks' within the Kumtor mine infrastructure) can provide useful performance information (assuming results are reliable). However, 'spot conditions' within and around the Kumtor concession area do not provide the most appropriate basis to determine Kumtor's compliance status, an important omission in both the IAR and the Moran Comments. Also, such 'spot checks,' even if reliable, would not provide a good basis to determine the need for, or location of, additional water treatment plants, a recommendation that was neither a unanimous conclusion nor the only option or solution that could be considered, if needed.

Importantly, the IAR notes the following:

“However, at the final point at the mine exit the analysis data show almost no deviations at all which may be evidence of safety of water discharged from the treatment facilities and the safety of water sources for the downstream settlements.”<sup>21</sup>

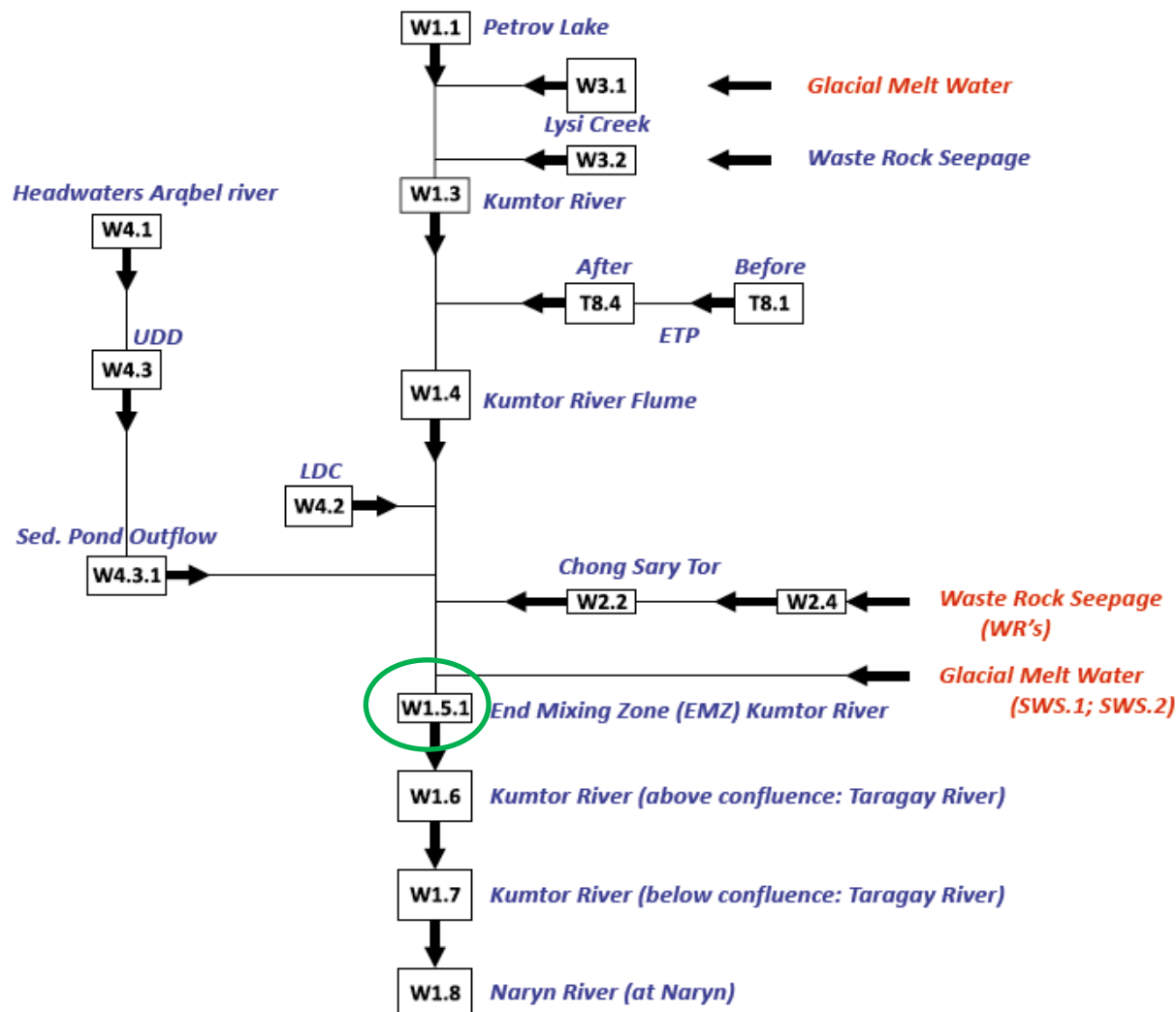
This statement in the Commission's report is not indicative of a necessity for additional water treatment plant(s) and does not support some of the Commission's preliminary recommendations.

In our opinion, the Commission's sampling results are insufficient to justify the need for any additional treatment plants. However, some of the Commission's results, which are consistent with Kumtor's own reporting (including 2010 Conceptual Closure Plan), indicate a need for Kumtor to further consider certain water quality aspects related to, for example, waste rock storage on glaciers, in future mining plans and mine closure plans. These aspects are discussed further in Section 3.7.

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<sup>21</sup> See IAR, 2011, p. 15

Figure 4: Schematic diagram of Kumtor's monitoring locations and compliance point at W1.5.1 (marked with a green circle, source: Kumtor 2010 AER)



### 3.3.4 Issues relating to cyanide

The Moran Comments make several references specifically related to cyanide monitoring and management, imparting that cyanide is improperly managed by Kumtor, that monitoring data are “totally inadequate”<sup>22</sup> to define the specific forms of cyanide that remain in the tailings, that the widely used and commonly accepted INCO process is “still toxic to organisms”<sup>23</sup>, and alleges that effluents from the ETP are discharged throughout the year given “inadequate storage volume of the tailings facility”<sup>24</sup>.

Before addressing the key issues raised above, we note that none of those assertions were actually adopted in the Commission’s report or its recommendations. With regard to the “inadequate storage

<sup>22</sup> See Moran, 2012, p. 2

<sup>23</sup> See Moran, 2012, p. 12

<sup>24</sup> See Moran, 2012, p. 12

volume of the tailings facility,” the Commission’s report provides a perspective which is very different from the Moran Comments:

“The height of the dam above the water is within required standards of industrial safety. Sizes of the banks meet current standards and design decisions. Filling the tailings is on schedule and in the according sections as it has been designed. The upper and lower slopes of the dam no visible leaks have been found. Crest of the dam is in satisfactory condition. Raising the dam’s height is conducted in accordance with design decisions. Tails transportation system, pulp collection system for the leachate collection, emergency pools-storages, diversion of surface water channels, sewage treatment facilities are in satisfactory condition.”<sup>25</sup>

We note that Kumtor’s Effluent Treatment Plant (ETP) is, in fact, based on the patented INCO Ltd. SO<sub>2</sub> Cyanide Destruction Process. This is a commonly accepted process to treat cyanide in the gold mining industry. This process has also been permitted for Kumtor’s operation by the KR regulators. Based on our review, nothing has come to our attention that would suggest that Kumtor’s cyanide treatment process is not functioning as designed or that effluents from the ETP are (or would have to be) discharged throughout the year as implied by Dr Moran’s comments that “continual effluent discharge seems possible, even likely.” Kumtor and regulators monitor the process (and cyanide levels) at critical points to determine the effectiveness of the treatment process.<sup>26</sup> Cyanide is sampled daily by Kumtor and also subject to QA/QC protocol as described in Section 3.3.5. The cyanide reported by Kumtor includes up to three commonly analyzed forms<sup>27</sup>. Kumtor’s 2010 AER also discusses results from stored tailing porewater sampling and analysis conducted for the 2010 Conceptual Closure Plan that includes cyanide<sup>28</sup>.

As detailed in Kumtor’s AER 2010, the ETP has a tailings effluent treatment capacity of 1,700 m<sup>3</sup>/hr. Even at reduced availability, the ETP can treat over 1 million m<sup>3</sup> of effluents per month of operation. The ETP usually operates from early May to mid-October (in 2010 from May 9<sup>th</sup> through October 16<sup>th</sup>). Kumtor reported that, in 2010, the ETP processed approximately 5.2 million m<sup>3</sup> of tailings effluent. For comparison, Kumtor’s 2006 AER shows that the ETP operated from May 27 to October 25, 2006 and treated 3.5 million m<sup>3</sup> of water and discharged 3.6 million m<sup>3</sup>, which included surface runoff reporting to Pond #3. The volumes treated and discharged in 2006 through 2010 are well within the design capacity

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<sup>25</sup> IAR, 2011, p. 20

<sup>26</sup> According to KOC, one such inspection was carried out on May 20, 2010: “Deputy Chief M.B. Omurov, Department Chief M.M. Kulataev, Chief Specialist A. Bukarova, and Leading Specialist O.A. Shestova of YREFD and Chief State Inspector of Jety-Oguz Regional State Environmental Department Ch. Chukunbaev conducted the inspection of Kumtor mine ETP (Effluent Treatment Plant). The effluent was sampled before and after the treatment to analyze the effectiveness of ETP operation, the availability of permission documents was checked. The Permission on effluents’ discharge to the River Kumtor was issued on the base of inspection results and analysis of samples conducted by the accredited Laboratory of SAEP& Forestry” (KOC, 2011, see p. 3.4)

<sup>27</sup> Cyanide<sub>Total</sub>, Cyanide<sub>Free</sub> and Cyanide<sub>Wad</sub>

<sup>28</sup> According to Lorax Environmental, 2011, porewater samples collected were sent to and analyzed by Global ALS in Vancouver, British Columbia, Canada. Cyanide speciation analyzed comprised Cyanide-total and Cyanide-weak acid dissociable (WAD).

of the ETP and the discharge periods indicated. Cyanide levels have not exceeded the MAC-limits at the relevant compliance point in the Kumtor River (W1.5.1).

Additional safeguards relate to the maximum capacity and emergency storage ability of the TMF impoundment as signified by the freeboard between the water level of the supernatant pond and the embankment dam crest. It is our understanding that the Kyrgyz Government requires a freeboard of 1.5 m while Kumtor maintains a minimum freeboard in excess of 4.0 m. It is also our understanding that the design emergency tailings pond holding capacity is over 10 million m<sup>3</sup>. This means that Kumtor maintains ample effluent storage capacity that would not necessitate “continual effluent discharges” (as suggested by Dr. Moran) from the TMF even under extreme upset conditions.

In terms of cyanide management, we note that the Commission did not adopt Dr. Moran’s assertions and did not raise concerns about Kumtor’s approach in this area. We also note that the 2010 AER refers, *inter alia*, to the following:

- a) Government agency inspections of the cyanide storage (including at the mine site and marshaling yard) as part of the sodium cyanide permitting process,
- b) Licenses for Importation and Transit Permits for dangerous goods (cyanide) are in good standing,
- c) Emergency Response Plan-related mock exercises carried out in 2010 included a scenario which involves a spill of sodium cyanide, and
- d) Two external audits were carried out in 2011 to determine Kumtor’s readiness for certification<sup>29</sup> under the International Cyanide Management Code for transportation and management of cyanide (see also Appendix 3, sub-section f).

The latter supports also Centerra’s comments about its continued efforts to align its activities with guidance issued by the standard-setting International Cyanide Management Institute (ICMI) in its 2010 Corporate Responsibility Report. A review of Kumtor’s documentation also shows that its latest Emergency Response Plans continue to be submitted to the competent Kyrgyz agency (see Appendix 5).

Considering the above, it is our opinion that there is no reasonable basis for the speculative assertions presented in the Moran Comments relating to Kumtor’s cyanide analysis and management, or the duration of Kumtor’s treated effluent discharge. Although previous iterations of Kumtor’s ERP should have been accessible to the Commission through the KR Ministry of Emergencies, the ninth iteration (Dec 2011) would not have been available in time for the Commission’s report. We note that due to security and safety implications, full versions of ERPs are not normally disclosed or distributed to the broader public.

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<sup>29</sup> As noted in WESA (2012a), a November 2011 audit showed that KOC’s operations are in substantial compliance with the International Cyanide Management Code. A corrective action plan has been formulated and is currently being reviewed. KOC, which transports sodium cyanide from its Balykchy Marshalling Yard (BMY) in Balykchy, KR to the mine site, was also subject to a separate code-compliant ICMI audit in October 2011 (WESA 2012b). The Summary Audit Report (SAR) was issued on January 27, 2012 and has been accepted by ICMI (with minor follow-up requirements), which is expected to be web-posted by mid-2012.

### 3.3.5 Other water quality and QA/QC issues

Referring to Kumtor's 2010 AER, the Commission notes elevated levels for aluminum, iron and nickel, all upstream (above) Kumtor compliance point at W1.5.1. As noted in Kumtor's 2010 AER, these parameters did not exceed MAD standards or, in the case of iron and aluminum, were similar to background levels. A review of Kumtor's EIA shows that background levels ranged from 0.23 to 9.9 mg/l (average 3.0 mg/l) for iron; and from 0.25 - 7.9 mg/l (average 3.0 mg/l) for Aluminum in 20 samples taken at 10 representative sites throughout the Project area.<sup>30</sup>

While the Commission's Report makes specific reference to the concentration of nickel in samples from three Sary-Tor streams, collected on September 20, 2011, the data provided in Table 1 (Field Measurements and Laboratory Determinations) of the Moran Comments show analytical data for only one stream originating at the Davidov Glacier (on which waste rock was deposited until this practice ceased in 2009) and no results are presented for Sary-Tor nor Lysyi Glacier outflow streams corresponding to Kumtor sample sites SWS.1, W 2.4 and W 3.2, respectively.

Nickel concentrations are reported annually in Kumtor's AERs, which acknowledge that interaction of nickel with sulfides tends to mineralize nickel and notes the buffering capacity of the Kumtor River (pH between 7.5 and 8.5), which also decreases the concentrations downstream. We also note that, at the compliance point (W 1.5.1), the concentrations of nickel are below Kyrgyz MAC of 0.02 mg/l (and are also below the IFC Environmental, Health and Safety Guidelines for Mining of 0.5 mg/l).

While the Commission does not challenge the reliability of Kumtor's water quality monitoring data, the Moran Comments appear to ignore readily available information that addresses these aspects and, instead, speculates – based on hearsay - that Kumtor's monitoring data may be unreliable.<sup>31</sup>

Our review shows that Kumtor proactively determines the reliability of water quality measurements through annual QA/QC protocol in line with good international practice. In fact, the QA/QC protocol is described in Kumtor's AERs and is aimed at providing consistent collection and handling of samples and data, and recognizes that errors can occur as a result of inconsistent sampling procedures, improper preservation and poor laboratory techniques. Kumtor's QA/QC process includes the submission of approximately 10% of the samples analyzed at Kumtor's contract laboratory and involves duplicate, blind and random blank samples. The results of this QA/QC process are also reported in Kumtor's AERs and we do not find these to be indicative of material shortcomings.

The contract laboratory for Kumtor is Alex Stewart Assayers (located in Kara-Balta, Kyrgyzstan) and required daily analysis of the ETP discharge is conducted at the onsite Kumtor laboratory. In 2009, the Saskatchewan Research Council and Lakefield Research Laboratories in Ontario, Canada, performed duplicate analysis for Kumtor. Lakefield Research specializes in cyanide chemistry and analysis.

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<sup>30</sup> See Kilborn Western Inc, EIA p. 2-25, p. 2-36

<sup>31</sup> "Kyrgyz government staff have commented that they did not observe the addition of preservatives in the field to historic KOC water samples. This observation plus inconsistencies in the KOC monitoring data suggest that much of the historic KOC monitoring data may be unreliable." See Moran, 2012, p.3

It is our opinion that the assertions relating to water sampling and data quality in the Moran Comments are speculative and contrary to processes described in Kumtor’s EMP/EMAP, which includes accepted methods of handling, preservation and documentation of water samples. It is noteworthy, that while questioning Kumtor monitoring data, the Moran Comments provide no information as to the methodology of water sampling and analysis collected by the Commission and fail to acknowledge the material inconsistencies relating to the arsenic results in samples from the Petrov Lake (see also Section 3.3.1).

### **3.3.6 Kumtor’s impacts on local fisheries**

Although not adopted as a concern by the Commission, the Moran Comments notes that “[l]ocal citizens have reported that fish populations in the Kumtor River downstream of the mine are greatly depleted since operations began. Kumtor does not report any toxicity testing data, which would clarify this claim. Toxicity testing, such as Whole Effluent Toxicity tests (WET) tests, are routinely performed on Canadian and U.S. mine effluents and reported to their governments”<sup>32</sup> and, in the body of his report, he also notes that “one former Soviet exploration geologist indicated that fish populations in the Kumtor River were previously much larger”, cites a study of toxicity of metals in salmon and states also that “Salmon are quite closely related to mountain trout.”<sup>33</sup>

The baseline data (EIA) and other facts do not support the Moran Comments. First, the local fish populations were not a significant fishery. The EIA reports that no fish were found at the headwaters of the Kumtor River at Petrov Lake. Only two species of fish were identified approximately 30 km downstream of the mine at the confluence of the Kumtor River and Taragay River. These comprised the Osman (*Diphychus severzowi*), which reached a maximum length of only 12-17 cm (4-6 inches) in the samples and the common loach (*Nemachilus stolaczkai*), which, based on the baseline data, reaches a maximum length of 13 cm (4.2 inches) in the Kumtor River.

Similar to other inferences in the Moran Comments and contrary to an evaluation based on a scientific approach, the Kumtor mine is the only proposed cause for the alleged decline of this “fishery”, while other potential drivers, such as overfishing, impacts from overgrazing of stream-banks by sheep, horses and other livestock, or other possible interactions and sources are not considered or discussed. Dr. Moran’s assertion and reliance on “one former Soviet exploration geologist” lacks scientific substance and credibility.

We also note that Dr. Moran’s statement regarding the relationship of salmon to mountain trout is perplexing. Salmonid fishes (family Salmonidae) are not remotely related to either the osman (family Cyprinidae- minnows) or the loach (family Cobitidae). If the author is suggesting that Osman or loach are mountain trout, or are remotely related to salmon, he is in error. In fact, these groups of fishes are separated by over 50 million years of evolution.

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<sup>32</sup> Moran, 2012, p. 1-2

<sup>33</sup> Moran, 2012, p. 13



### 3.3.7 Uranium and other parameters

The IAR also refers to a comment in the Moran addendum, which suggests that Kumtor's AER should include analysis of uranium and a series of other parameters considering information from past Soviet-era findings. The statement may also stem from Kumtor's history, which includes an original agreement with the Kyrgyz government and Cameco, a noted uranium producer, which held the first Western interest in Kumtor and the right to develop the Kumtor gold deposit<sup>34</sup>. While there is evidence of the presence of uranium in the general area of the Kumtor River basin from Soviet-era exploration, this does not apply to the Kumtor deposit.

Uranium is not among the list of parameters that are regulated by the Kyrgyz government for the Kumtor Project and is also not typically monitored or required by international lenders (IFC, 2007). That notwithstanding, we observed that Kumtor has indeed monitored nearly all of the parameters on the Moran (and Commission) list, including uranium. The 2010 AER reports, for example, notes that these parameters were among those evaluated in the TMF pore water samples. Uranium is reported in very low concentrations (0.000056 mg/l to 0.00781 mg/l) as are other elements such as arsenic, antimony, selenium, strontium and thallium.<sup>35</sup>

Given demonstrated low concentrations and lack of requirements by KR Government, international standards or lenders, and monitored low concentrations in the tailings, there seems to be no reasonable justification for monitoring of uranium and other parameters requested in the Moran Comments. However, we do recommend that Kumtor should include hydrocarbon analysis in its routine water sampling program and report the results in future AERs.

## 3.4 Biodiversity issues

The Kumtor mine is located in a region which contains a high number of endemic species, including notable 'charismatic species' such as snow leopards, Menzbiers, marmots, golden eagles, lammergeyers, ibex and Marco Polo sheep. We note that the concerns and recommendations contained in the Interagency Report pertaining to biodiversity do not raise concerns about any actual adverse biodiversity impacts emanating from the Kumtor mine or Kumtor's operations more generally. Similarly, the Moran Comments do not raise any biodiversity concerns associated with Kumtor's operations.

However, the Commission raises concerns about the correction of previously overlapping boundaries of the Kumtor Concession with the SCER<sup>36</sup>. Also, the IAR is raising concerns about Kumtor having been granted prospecting/exploration rights by the KR Government in areas that, in part, overlap areas described as "Buffer Zones" to the SCER in certain maps (described further below). It is our understanding that the "Buffer Zone" has yet to be approved/decreed by the Government of the KR.

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<sup>34</sup> See also <http://www.centerragold.com/operations/kumtor-history>

<sup>35</sup> See KOC AER 2010, p 7.16 – 7.18

<sup>36</sup> The IAR asserts that "4,380 hectares of the Nature Reserve's land was assigned to Kumtor Operating Company to accommodate the needs of the company and ensure further development of prospecting and mining operations at Kumtor Mine" (see IAR, 2011, p. 20). It is unclear how the Commission arrived at this number. According to Kumtor and reviewing relevant maps, it appears that the overlapping areas involved only 260 ha.

In its last recommendation, the Committee suggest that the “Committee of the Jogorku Kenesh [Parliament] for Land, Agrarian Issues, Water Resources, Environment and Regional Development should consider the issue of violation by transfer of lands occupied by the Sarychat-Eertash Nature Reserve to Kumtor Operating Company” and, referring to Kumtor’s prospecting areas, “consider an option to revoke the license given to Kumtor Operating Company for the Karasay and Koendinsky License Areas.”<sup>37</sup> We will address these issues below.

### 3.4.1 Brief history the SCER and Buffer Zone

A review of materials provided by Kumtor<sup>38</sup> shows that the KR Government Decree #76 of March 10, 1995 formally established the SCER with an area of 72,080 ha. . Unlike the Kumtor Concession, whose coordinates are precisely defined (in degrees, minutes and seconds), the demarcation of the SCER relies on maps generated without use of modern technologies and software, and an imprecise and descriptive process. The maps about the SCER in circulation and use appear to show variances in size of the SCER which deviate from the Government Decree that established the Reserve. In the example shown in Figure 5, the size of the SCER is stated as 74,976 ha. In contrast, we note that the exact coordinates of Kumtor’s Concession are detailed in the New Terms Agreement which was approved by the Government and ratified by the Parliament in 2009.

In 1999, the Resolution of Jety-Oguz District Administration (but not a central Government Decree) established a “Buffer Zone” for the SCER. This area is shown in an orange outline in Figure 5. The Buffer Zone is only partially contiguous with the SCER. It also overlaps in part with areas covered by Kumtor’s prospecting licenses (Karasay License with a size of 125 km<sup>2</sup> and Koendy License with a size of 134 km<sup>2</sup>). Other land use zones, such as hunting areas, have also been defined as outlined in purple, turquoise and black outlines in Figure 5. Although these and other maps are in circulation, it is our understanding that “Buffer Zones” for SCER have yet to be defined and approved through a Government decree, as required by KR Law 182 “On specially protected areas”. In other words, a Resolution by Jety-Oguz District Administration is not sufficient to make changes to the SCER, including expanding the total size of the protected area and/or defining “Buffer Zones”.

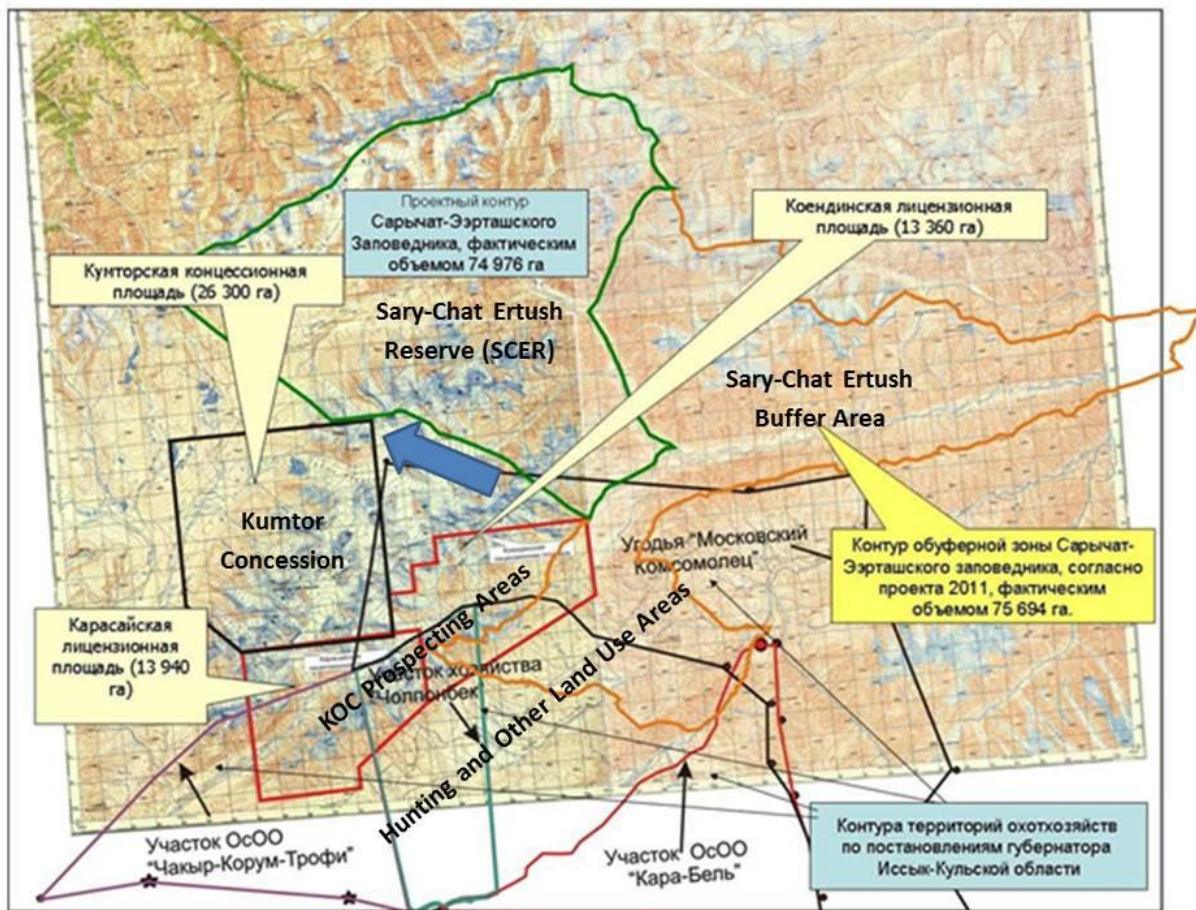
In addition, the Resolution of Jety-Oguz District Administration has also not considered other legal provisions pertaining to the size of the core and other zones of specially protected areas. According to Article 2 of the KR Law on Specially Protected Nature Areas, the core zone of the Reserve should be at least 75% of its total area. This means that up to 25% of the total area could receive other types of designations. A “Buffer Zone” of 62,060 ha, as defined by the Resolution of Jety-Oguz District Administration, would equal about 86% of the total size of 72,080 ha allocated to the SCER by Government Decree #76. Even if an additive process is considered, which would result in a sum total area of exceeding 134,000 ha (Core and “Buffer Zones”), the portion of the “Buffer Zone” would be about 46%. This would materially exceed provisions limiting non-core zones to 25% of the total protected area.

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<sup>37</sup> IAR, 2011, p. 23

<sup>38</sup> Bashkirov, 2011

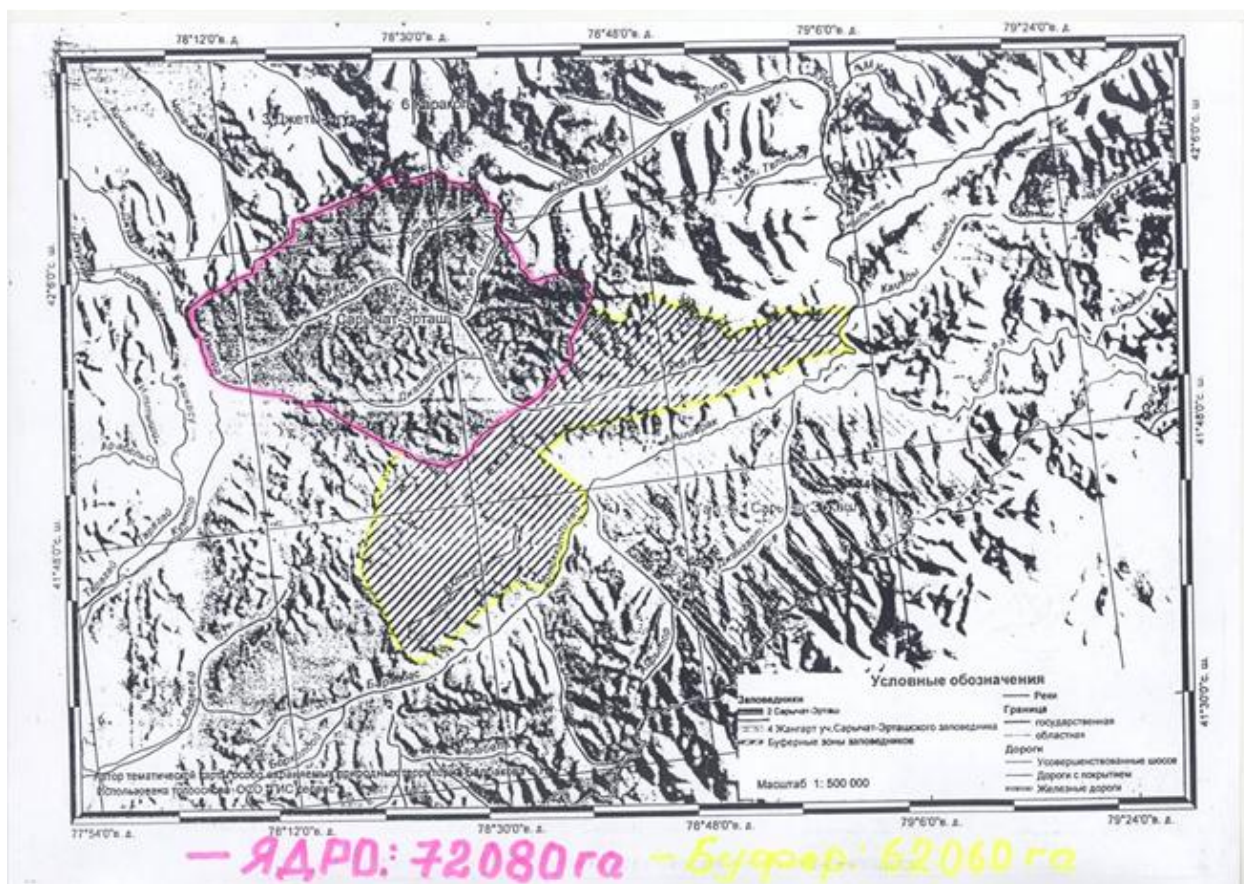
Figure 5: Location of Kumtor's concession and prospecting areas, the SCER, buffer zones and other land use areas (blue arrow points to corrected area involving approximately 0.36% of the SCER's area, source: Bashkirov, 2011)



The map based on Farida Balbakova, which shows the SCER and "Buffer Zone" and is reportedly in use by a various KR Government agencies, is shown in Figure 6. Kumtor's analysis of these maps using MapInfo software shows the size of the SCER's Core Zone to be about 103,473 ha (instead of 72,080 ha as per Government Decree #76). Similarly, an analysis of the "Buffer Zone" shows an additional area of 87,771 ha (not contained in Government Decree #76 that established the SCER, and exceeding the size of 62,060 ha contained in the Resolution of Jetty-Oguz District Administration).



Figure 6: Map showing SCER and “Buffer Zone” based on Farida Balbakova (source Bashkirov, 2011)



### 3.4.2 Kumtor’s impact on biodiversity

The EIA generated for the Kumtor operation had identified the presence of a number of “Red Book” listed (Rare, Threaten and Endangered Species) species in the region. Dedicated reviews by the International Snow Leopard Trust on behalf of multilateral lenders had confirmed that mining activities *per se*, if combined with no hunting policies and other responsible mining practice, were not posing a material risk to the regional biodiversity. Instead, the NGO review identified, *inter alia*, overgrazing in the high altitude meadows, related and unrelated poaching (high-value species for trophy hunting and traditional medicinal markets), and lack of sufficient resources to support conservation efforts as the main biodiversity risks in the region.

This triggered efforts by Kumtor, international lenders and the Kyrgyz Government to formally establish the SCER, which was achieved in 1995. The proximity of the Kumtor mine to the adjacent designated biodiversity conservation area provided a more controlled access to the Reserve (discouraging poaching) and effectively created a large “safe haven” for biodiversity. Also, Kumtor – along with other stakeholders such as the EBRD, IFC, FFI and ISLT - were able to directly support conservation initiatives, including through its wildlife monitoring activities, support for biodiversity conservation groups, and capacity building at the SCER.

In response to an accidental spill of cyanide from a Kumtor truck *en route* to the mine in 1998<sup>39</sup>, Kumtor participated in other donor-funded initiatives<sup>40</sup>. These involved international conservation NGOs, such as Fauna and Flora International<sup>41</sup> and the International Snow Leopard Trust<sup>42</sup>, and their local NGO counterparts. Some of these, such as the Community and Business Forum (CBF, now Bashat), were established and supported as part of this process and have emerged as influential Kyrgyz NGOs.

To date, Kumtor has directly supported surveys of snow leopard, Marco Polo sheep, and ibex populations to gain insight into population dynamics, predator-prey relationships, and stability of these and other species in the SCER. Most recent surveys described in Kumtor's 2010 AER have concluded that populations of argali, marmot, fox and birds have indeed increased over time. Interviews with Kumtor staff indicated that Marco Polo sheep, ibex, martin, marmots, wolves, foxes and large raptors, such as Golden Eagle, vultures and falcons, are regularly observed within the Kumtor Concession area, which is essentially a biodiversity refuge due to no hunting policies of Kumtor.

In our opinion, the imprecise maps in circulation that show variable size, location and land use designations are inconsistent with KR Government Decrees and laws relating to the SCER. However, the reliance of some stakeholders on these maps they deem to be accurate (as apparently also in use by some KR Government agencies) can reasonably result in different interpretations of the interrelation of Kumtor and the SCER. It is our understanding that efforts are already in progress by the Kyrgyz Government to provide a more definitive map relating to the size, location and boundary of the SCER and provide clarification of buffer areas (if any) and hunting zones. We recommend that this process be designed to be inclusive to improve its credibility and its outcome to be transparently communicated to interested stakeholders.

The KR Government corrections in 2009 of the area of SCER which was overlapping with the Kumtor concession resulted in a virtual (apparent) loss of 260 ha (or 0.36%) of the SCER's area. In our opinion, such a correction, which appears fully in line with the original intent of establishing the SCER in the mid-1990s, does not have a material adverse impact on the viability and value of the SCER.

We note that the Commission is not stating any causal linkage between Kumtor's current operation and significant adverse biodiversity impacts in the region. However, for any new mining project developments (which could potentially emerge from exploration activities in the Karasay and Koendy license areas), further considerations should be given to Biodiversity Action Plans (as part of customary Feasibility and ESIA studies) and other conceptual conservation models<sup>43</sup> within the context of KR's National Biodiversity Strategies and Action Plans<sup>44</sup>.

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<sup>39</sup> Jakob and Arenson, 1998 (the CANMED Report)

<sup>40</sup> See also Nazari *et al*, 2001, and IFC, 2006 (<http://tinyurl.com/7b5d5cd>)

<sup>41</sup> See also <http://www.fauna-flora.org/explore/kyrgyzstan/> and Fauna & Flora International, 2003.

<sup>42</sup> <http://snowleopardblog.com/projects/kyrgystan>

<sup>43</sup> Nazari, M. & Proebstel, D., 2008

<sup>44</sup> See also <http://www.cbd.int/nbsap/>

### 3.5 Glaciers and water consumption

Based on and consistent with Kumtor's monitoring results, engineering studies and disclosed reporting over the past decade, the IAR and the Moran Comments highlight the movement of the Davidov Glacier and, to a lesser extent, the Lysy Glacier and the Sary-Tor Glacier. As reported also by Kumtor, the movement of the Davidov Glacier has been influenced by previous waste rock storage practices. These comprised direct deposition of waste rock on and near the Davidov Glacier, a practice which has been discontinued since 2009. In an effort to keep the glaciers at a safe distance from the open mine pit and manage related water flows, Kumtor has been removing parts of the glaciers (and waste rock previously deposited on/near the glacier).

The interpretation offered, particularly in the Moran Comments, relating to glacial melting/retreat (ablation), the scale of Kumtor's water consumption and regional hydrological impacts are analyzed below.

#### 3.5.1 Scale of Kumtor's impact on glaciers

Based on review of AERs and aerial photographs provided by Kumtor, the mining operation has impacted a minor portion of the lower ends (snout or lobe) of the Davidov and Lysyi glaciers. Our estimated size of the affected areas is approximately 0.7 km<sup>2</sup> for the Davidov Glacier and 0.4 km<sup>2</sup> for the Lysyi Glacier. According to the baseline study, the five major glaciers in the immediate Kumtor project area (Petrov, Lysyi, Davidov, Sary-Tor and Boordo glaciers) have a combined surface area exceeding 100 km<sup>2</sup>, with a minimum elevation of 3,800 meters above sea level. Thus, the impacted area, including areas used for waste rock deposition and areas removed, is less than approximately 1.5% of the major glaciers immediately surrounding Kumtor and far less on a regional scale.

#### 3.5.2 Glacial ablation and retreat

We also reviewed studies relating to the retreat (ablation) of glaciers near the Kumtor mine and across the Kyrgyz Republic. These include the discussions and predictions of Climate Change impacts on glaciers across Kyrgyzstan contained in the Second National Communication of the Kyrgyz Republic to the United Nation Framework Convention on Climate Change. The predicted state of glaciation in 2025 compared to KR's glacier catalogue developed in the 1960s is presented in Figure 7. KR's UN submission notes that

“[f]or the Republic as a whole, the reduction of glaciation area from 64 percent up to 95 percent from year 2000 till year 2100 is predicted, depending on the accepted variant of climatic scenario.”<sup>45</sup>

Kuzmichonok's study<sup>46</sup> of the Davidov Glacier (see Figure 8) and Duishonakunov's data<sup>47</sup> of the Petrov Glacier (see Figure 9), both adjacent to the Kumtor mine, show that the impacts observed are similar to those observed elsewhere in Kyrgyzstan. These studies and data generated or analyzed by eminent

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<sup>45</sup> Iliasov and Yakimov, 2009, page 126

<sup>46</sup> Kuzmichonok, 2007

<sup>47</sup> Duishonakunov, 2010

Kyrgyz scientists point to Climate Change as the main driver of melting and retreat of glaciers near the Kumtor mine and elsewhere in Kyrgyzstan.

In our opinion, assertions in the Moran Comments that overplay the materiality of Kumtor's limited anthropogenic influence on glaciers are inconsistent with the expert scientists' opinions and the regional/national picture of glacial ablation/retreat documented in seminal studies and publications.

**Figure 7: Predicted state of glaciation in 2025 compared to glacier catalogue developed in the 1960s** (Extant glaciers marked with dark blue, extinct glaciers marked with red. Source: Iliasov and Yakimov, 2009)

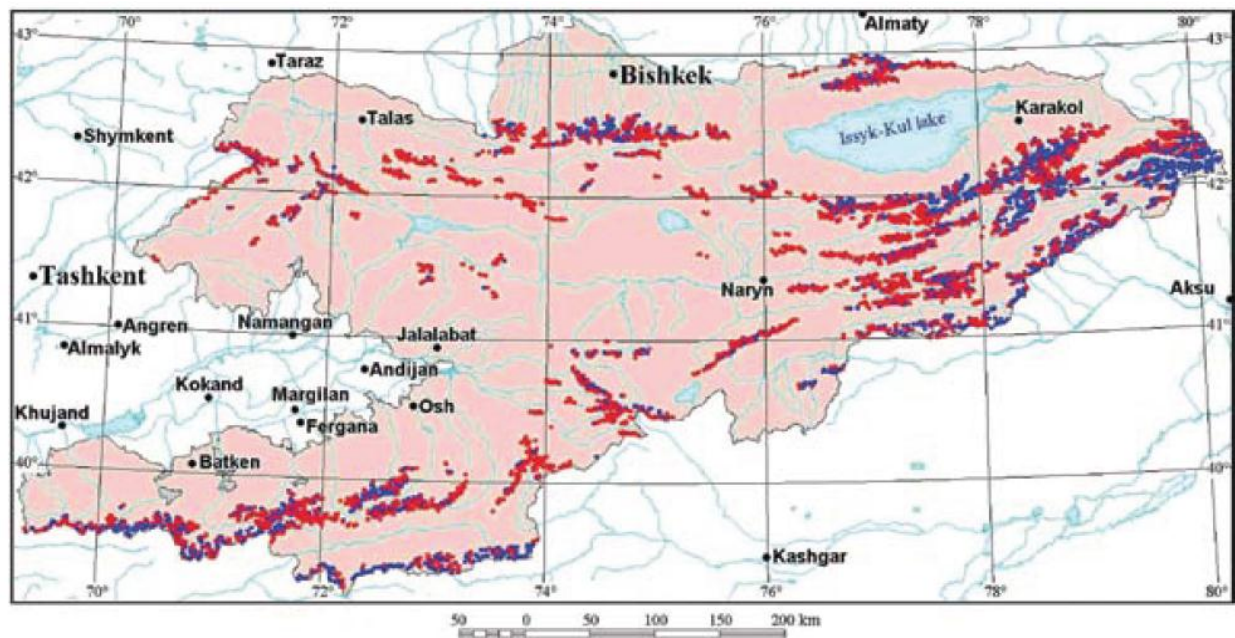




Figure 8: Retreat of the Davidov Glacier near Kumtor Mine since 1869 (source: Kuzmichonok, 2002)

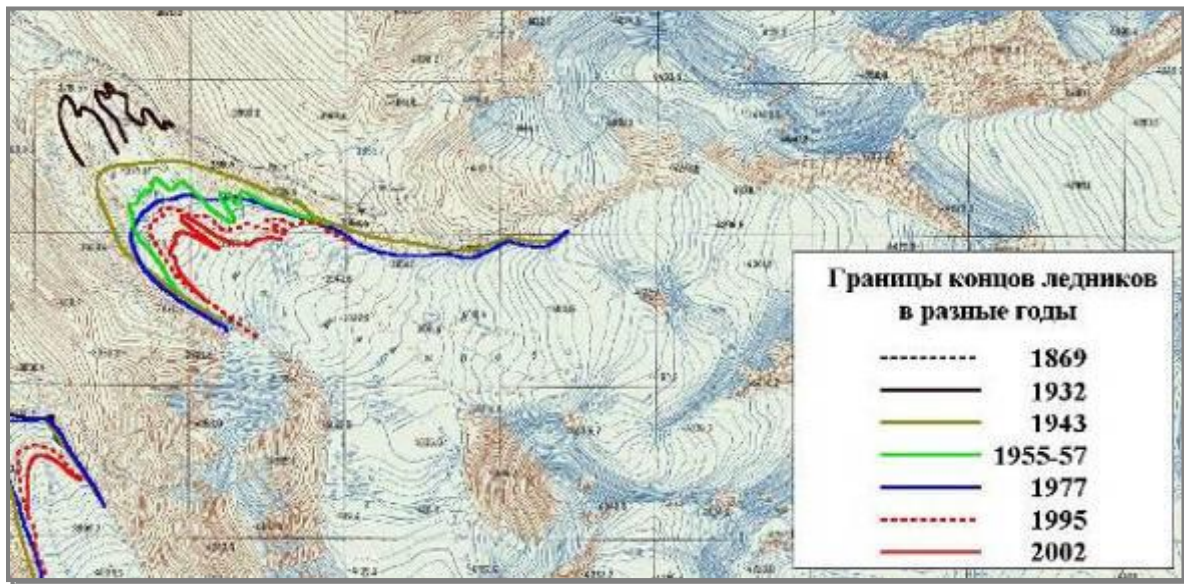


Figure 9: Retreat of the Petrov Glacier from 1957 to 2006 (source Musuraliev *et. al.*, 2008)





### 3.5.3 Dust impacts from Kumtor

Our data review also showed that Kumtor had conducted an assessment of dust levels deposited on the glaciers to determine what, if any, impacts the mining operations are having on the glaciers. This research, which was also discussed in Kumtor AER 2009<sup>48</sup>, was carried out by V.A. Kuzmichonok, Head of the Laboratory of Mathematics-Cartographic modeling process of KR Institute of Water Problems and Hydro Energy. The results of that study confirm that mining and any related dust deposition is not a driver for glacial retreat in the Kumtor region. As shown in the preceding section, climatic conditions are the dominant (overwhelming) drivers of glacial ablation near the Kumtor mine and across Kyrgyzstan.

### 3.5.4 Kumtor's impact on regional hydrology

The estimates provided in the EIA indicate that the five glaciers in the Kumtor region occupy approximately 100 km<sup>2</sup>, with the majority of the surface area occupied by the Petrov Glacier (approximately 24 km long and 4 to 5 km wide). As summarized in Section 3.5.1, the scale of Kumtor's impact on the Davidov and Lysyi Glaciers is less than approximately 1.5 km<sup>2</sup> or 1.5% of the areas of only those glaciers which are located in the vicinity of the Kumtor mine.

Although glaciers are a part of the regional recharge process, other dominating contributors – given their scale - include precipitation in the form of snow and rainfall. The Kumtor River is one of many tributaries to the Naryn River which, in turn, is over 535 km long with a total area of the catchment basin of over 58,000 km<sup>2</sup>. The mountainous portion of the basin above the town of Naryn, that recharges the river annually, has an area of over 5,000 km<sup>2</sup>. To illustrate the mismatch in scale, Dr. Moran seems to suggest that Kumtor's recharge impact related to its impact on 1.5 km<sup>2</sup> of glacial areas competes with the recharge from other glaciers, snow and rainfall over an area exceeding 5,000 km<sup>2</sup>.

In our opinion, Dr. Moran's assertions that water quantity impacts associated with 1.5 km<sup>2</sup> of glaciated areas impacted by Kumtor's mining operations has an effect on the "entire local/regional hydrologic system" are inconsistent with sound scientific/hydrological approach and quite inaccurate.

### 3.5.5 Regional impact of Kumtor's water consumption

We note that the Commission does not raise concerns relating to Kumtor's water consumption and/or any associated regional impacts. The Moran Comments, however, note that the "[e]xtraction of such vast quantities of water by Kumtor inevitably reduces the supplies available to downstream users for all their daily activities (agriculture, livestock, drinking, domestic, etc.), impacts fish populations, and increases the overall competition for water downstream."<sup>49</sup> Other sections of the Moran Comments detail the "vast quantities" and, at the same time, highlight reliance on hearsay and include material omissions, such as context, scale, treated discharges and location of the nearest residential water users 200 km downstream of the Kumtor mine. We will address these issues below.

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<sup>48</sup>Kuzmichonok, 2009, also discussed in KOC 2009 AER, page 7.3

<sup>49</sup> Moran, 2012, p. 6

In 2010, Kumtor's total water intake (which does not equal "consumption") from Petrov Lake for both the camp and the mill was 5.79 % of the total inflow from Lake Petrov, which is actually growing in size. The vast majority of this intake eventually reports to the TMF and, following treatment to meet defined standards, is discharged back to the Kumtor River. In quantitative terms, the measured volume of Kumtor's water intake was 5.952 million m<sup>3</sup> (or 5.952 billion liters). The water quantity discharged back to the Kumtor River (following treatment) was 5.2 million m<sup>3</sup> in 2010. This post-treatment discharge volume equates to approximately 87% of Kumtor's intake from the Petrov Lake. Therefore, Kumtor's net consumption in 2010 was approximately 0.752 million m<sup>3</sup> or 752 million liters.

We note that the residential "downstream user" is the village of Naryn, which is approximately 200 km downstream of Kumtor (see Figure 1). The annual flow of the Naryn River at Naryn, to which the Kumtor River and dozens of other tributaries discharge, is approximately 525 million m<sup>3</sup> per year. Thus, the water consumption by the Kumtor mine is approximately 0.14% of the water flow available at Naryn.

In our opinion, it is quite inaccurate to suggest that Kumtor's water consumption represents a substantial decrease of the amount of water available to downstream users. Also, it is implausible to raise Kumtor's operation and water use as a major driver of 'water competition' on a regional scale that, according to the Moran Comments, could apparently be felt as far away as Uzbekistan. It is well-known that the water competition in Central Asia is driven by wasteful agricultural practices and aging Soviet-era water distribution infrastructure.

### 3.6 Geotechnical risks and glaciers

The Interagency Report notes that the "review of [Kumtor's 2010 AER] gave rise to further questions and evidences that the company has not solved the problems that have mounted up over the recent years including reinforcement of the tailing pond dam, storage of dump waste etc." However, in the same report, competent government agency staff noted that that "visual checks revealed no violations of rules and requirements applicable to the tailing pond's operation"<sup>50</sup> and that the "Mining Safety Inspectorate considers the state of the production safety as satisfactory."<sup>51</sup> Other concerns described relate to the growing size of the glacial Petrov Lake, which is contained by a natural moraine dam. The IAR asserts that a failure of the natural moraine dam could adversely impact the engineered Tailings Management Facility (TMF). They also suggest the need for Kumtor to continue monitoring and adopting preventative measures. These issues and Kumtor's follow-up actions are discussed further below. Other concerns noted by the IAR relate to movement of the Davidov Glacier due - in part - to past storage of waste rock on top of the glacier, a practice discontinued in 2009 (see Section 3.5).

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<sup>50</sup> IAR, 2011, p. 20

<sup>51</sup> IAR, 2011, p. 19

### 3.6.1 Status and improvement of the TMF

The results from the Commission's inspection of the TMF were discussed in the opinion provided by Commission member, T.O. Omukeyev, Chief Expert, Department of State Expertise, State Agency for Architecture and Construction. He noted that:

“visual checks revealed no violations of rules and requirements applicable to the tailing pond's operation. The height of the dam above the water is within required standards of industrial safety. Sizes of the banks meet current standards and design decisions. Filling the tailings is on schedule and in the according sections as it has been designed. The upper and lower slopes of the dam no visible leaks have been found. Crest of the dam is in satisfactory condition. Raising the dam's height is conducted in accordance with design decisions. Tail[ing]s transportation system, pulp collection system for the leachate collection, emergency pools-storages, diversion of surface water channels, sewage treatment facilities are in satisfactory condition.”<sup>52</sup>

The IAR also contained the opinion of A. Makhmutov, Deputy Director of the State Mining Safety Inspectorate. Noting that Kumtor had been responsive to inspections and requirements by the State Mining Inspectorate, he listed a number of measures that had been adopted by Kumtor, including the following:

- Suspending mining and blasting works in places where the monitoring showed glacier movement exceeded 50 mm/hr,
- Commissioning studies and engineering solutions to address concern about the displacement of Davidov Glacier and its moraine,
- Strengthening the dam to mitigate horizontal displacement, and
- Conducting monitoring and providing weekly reports to the Inspector for analysis and control.

In his conclusion, he noted that the “Mining Safety Inspectorate considers the state of the production safety as satisfactory,”<sup>53</sup> although he raised concerns about any limitations of inspections.

In addition to noting in the IAR that key geotechnical monitoring results are submitted by Kumtor on a weekly basis, we observe that the Kumtor is annually subjected to some 25 to 30 inspections by a variety of groups as detailed in Section 3.2.3 and Appendix 3.

Based on the above, it is our opinion that Kumtor has been actively managing, reporting and disclosing material geotechnical risks, that key KR Government agencies have been engaged and monitor these aspects, that they have intervened and required follow-up action and changes, and that Kumtor has been responsive to such requests with the aim to manage and reduce geotechnical risks.

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<sup>52</sup> IAR, 2011, p. 20

<sup>53</sup> IAR, 2011, p. 19

### 3.6.2 Status of Petrov Lake natural moraine dam

Given the context of Climate Change and regional glacial lake outburst flood (GLOF) events unrelated to Kumtor, Kumtor and KR regulators have been monitoring and studying the glacial Petrov Lake and its natural moraine dam structure (see Figure 10). The significance of a potential GLOF involving the Petrov Lake is twofold. First, the relative proximity of the Petrov Lake to Kumtor's TMF has raised questions about potential for a GLOF to impact the TMF structure. Second, this lake serves as the water source/intake for the Kumtor operation.

As detailed also in the IAR, Kumtor commissioned a variety of studies to characterize the Petrov Lake and its moraine dam. Some results have also been published as conference posters or lecture notes<sup>54</sup>. The most recent engineering review was carried out by BGC Engineering (2012). The goal of the BGC study was to evaluate if an outbreak flood could be a potential risk to mine operations or after closure and help identify appropriate mitigation measures.

As noted also in the IAR, the available information has allowed the identification of the likely location of potential future breach of the moraine dam where it exhibits its thinnest location, lowest freeboard and presence of talik (a layer of unfrozen ground that overlays the permafrost). BGC developed and modeled failure modes (basal sliding, overtopping, piping), likely flood scenarios (ranging from 3,000 to 20,000 m<sup>3</sup>/s peak water outflows) and modeled their potential flows and impacts on the TMF structure (see Figure 11).

BGC concluded that the moraine dam at the present time can be classified as relatively stable. However, global warming is expected to destabilize the moraine dam over time. It is likely that this destabilization will generate a flood once ground ice in the dam has degraded sufficiently to allow piping or overtopping. BGC also noted that all risks presently considered to be high, should such a flood event occur, can be reduced to moderate or lower levels through a combination of monitoring and construction efforts. Based on this study, Kumtor is currently planning to install a warning system for workers in the immediate vicinity below Petrov Lake and protecting the shear key of the TMF to reduce the vulnerability of the tailings dam to flood waters that are modeled to pond and flow at the dam base. In addition, Kumtor could consider lowering the water levels in the Petrov Lake to further increase the factor of safety.

Based on the above, there appears to be no imminent danger of GLOF and Kumtor has been adopting a prudent approach that is also consistent with IAR's recommendations.

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<sup>54</sup> See also Cerny *et. al.*, 2009 and Duishonakunov, 2010

Figure 10: Location of Petrov Lake's natural moraine dam and Kumtor's Tailings Management Facility (masl = meters above sea level, source: modified from BGC, 2012)

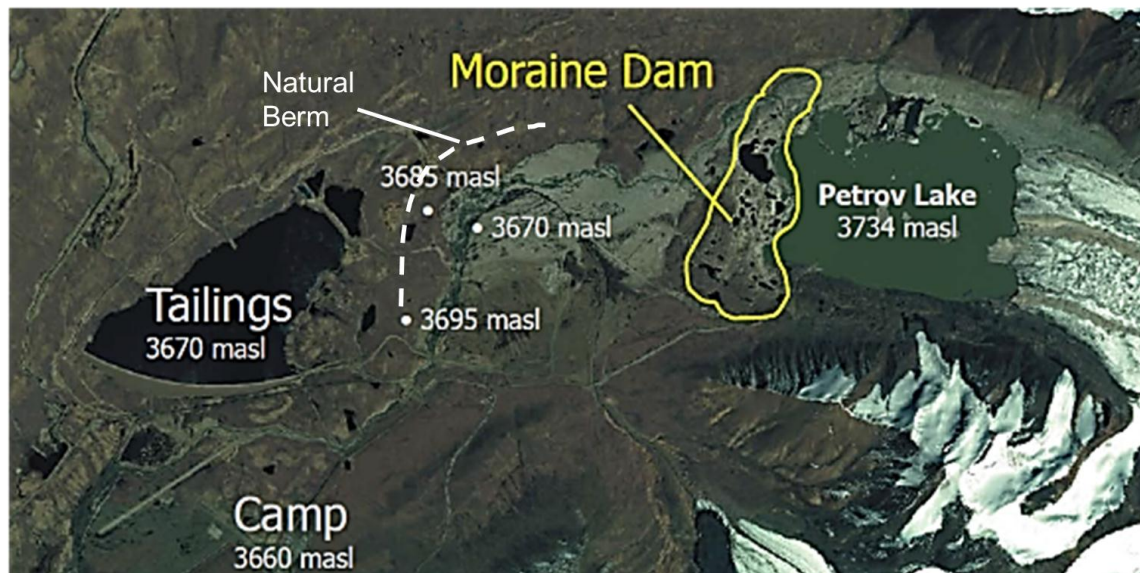
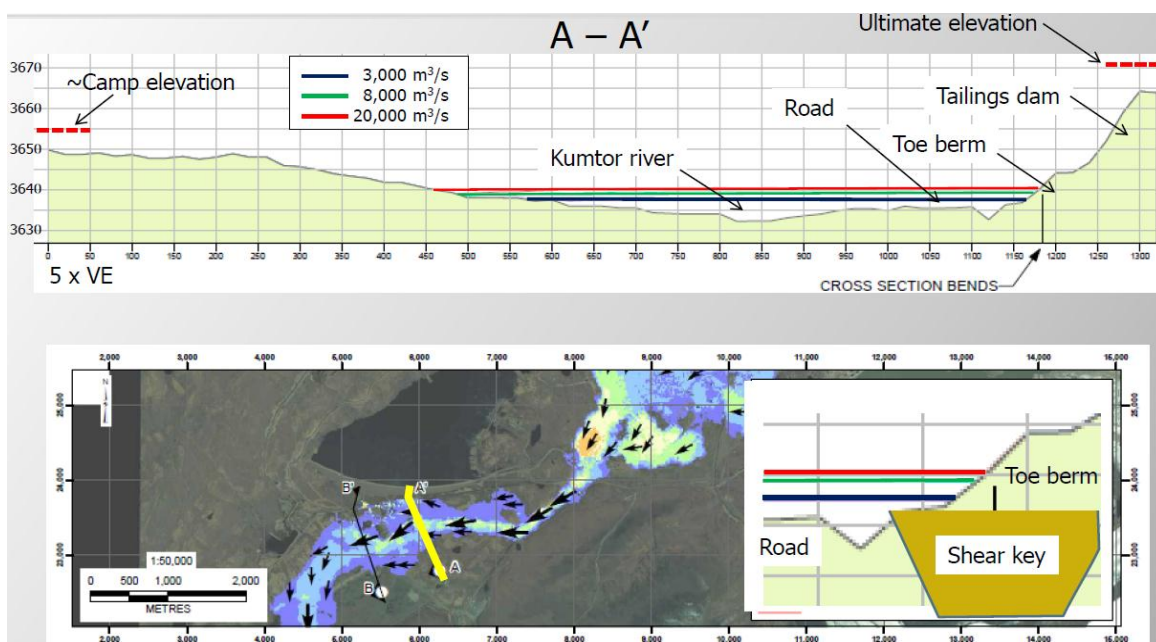


Figure 11: Predicted outcomes of floods from breaches of Petrov Lake's natural moraine dam (source BGC, 2012)



### 3.7 Mine closure issues

We note that the Interagency Commission did not raise any particular concerns about mine closure, except requesting that Kumtor should disclose its most recent reclamation plan. However, a number of other issues raised in the IAR, including long-term water quality issues or an apparent need identified for additional water treatment plants, are addressed in this section. This section also addresses assertions relating to mine closure funding contained in the Moran Comments.

#### 3.7.1 Closure planning

Our review confirmed that Kumtor has been commissioning international consultants, including Golder Associates and Lorax Environmental, to develop and update Conceptual Closure Plans (CCP). The most recent CCP for 2010 (dated August 2011) notes the following:

“Since 1999, KOC has a regularly updated conceptual decommissioning and reclamation plan as required by the KOC Environmental Management Action Plan (EMAP) and by the multi-national lenders to the project.”<sup>55</sup>

We were unable to find the basis to the Commission statements that, referring to plans for continued Acid Rock Drainage (ARD)-related testing, note that “there is a risk that acids may form in the tailings upon the completion of operations at Kumtor Mine.”<sup>56</sup> It appears that the Commission misinterpreted that section in Kumtor’s 2010 AER.

The analysis of the tailings material to facilitate management, plan for closure and maintain compliance with relevant standards has been ongoing from the early days of Kumtor’s operations. The 2010 AER summarizes a substantial body of geochemical testing and closure planning that has occurred to date, and specifically presents details on extensive testing and analysis program for 2010, and also outlines planned studies.

Among other things, the TMF material is monitored and reported annually in several ways, including results of analysis of ARD characteristics of the tailings (acid-base accounting, pH paste as an indicator of buffering capacity, neutralization potential, sulfur and metals concentration evaluation and tracking of cyanide concentration). Kumtor also commissioned sampling of tailings cores at multiple locations within the TMF and porewater sampling at multiple locations/depth within the TMF.

Based on the above, nothing has come to our attention that would suggest that Kumtor is not considering its closure obligation. Also, a number of CCPs have been submitted to the relevant Government agency. We also note that the current Life of Mine for the Kumtor operation is 2021 (see also discussion of funding for mine closure in Section 3.7.3).

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<sup>55</sup> Lorax Environmental, 2011, p. 1-4

<sup>56</sup> IAR, 2011, p. 9



### 3.7.2 Elevated sulphate levels

Although data presented in CCPs indicate that the ARD potential of both waste dumps and tailings is very low, sulphate released from the waste dumps may present long-term issues relative to MAC limits that require further attention. The latest CCP notes that:

“While ARD is not predicted from the waste dump facilities, sulphide oxidation is and will continue to occur and produce drainage waters that are circumneutral but potentially elevated in sulphate.”<sup>57</sup>

The latest CCP study also notes that:

“Forecasting water quality at the end of operations suggests that there is a likelihood that sulphate concentrations at the EMZ [End of Mixing Zone] will routinely exceed 500 mg/L. However, it should be noted that sulphate at these concentrations is non-toxic to aquatic organisms and the levels anticipated do not pose a serious threat to degradation of water quality in the Kumtor River.”<sup>58</sup>

The results identified by Kumtor are generally consistent with the following comments made by the Commission:

“According to the analysis of wastewater samples, performed by State Agency for Environmental protection, high amounts of sulphate (up to 1110 mg / l) and suspended solids (up to 984 mg / l) in the effluent drainage were identified in the runoff from the mine pit, waste dumps and in the effluent from the glacial moraine.”<sup>59</sup>

We recommend that Kumtor should further consider how these issues can be addressed and mitigated, as needed, as part of its on-going mine and closure planning processes.

### 3.7.3 Closure funding

The Kumtor mine has operated 14 years and the current Life of Mine plan expects operations to continue through 2021. As described in the Kumtor Environmental Management Action Plan (EMAP), which was required by multilateral lenders, the closure plan is designed to meet international guidelines, as defined by IFC and the World Bank, in addition to regulations of the Kyrgyz Republic and certain Canadian standards. The Conceptual Closure Plan (CCP) is updated from time to time to account for on-site developments and evaluation of on-going monitoring and testing. The Final Closure Plan is expected to be developed within approximately three years prior to ultimate mine closure. The most current (2010) CCP, which builds on previous plans and studies, estimates the closure costs at approximately \$30 million. This figure has been inflated by Kumtor to approximately \$37 million to represent the expected 2021 costs in the financials. Kumtor maintains a dedicated Reclamation Trust Fund. According to Kumtor, the funding accrual by the end of February 2012 was approximately \$ 9.1

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<sup>57</sup> Lorax Environmental, 2011, p. ii

<sup>58</sup> Lorax Environmental, 2011, p. v

<sup>59</sup> IAR, 2011, p. 9-10

million. Kumtor confirmed that the remaining balance will be funded over the life of mine (LOM) and assumes the salvage value for the equipment to be zero at that time.

In our opinion, Kumtor's commissioning and reliance on competent consultants, multiple iterations of CCPs (supported by some 14 years of 'real operational data' and predictions that also considered ARD aspects of the open pit, tailings and waste rock), to plan and make financial provisions for mine closure appears reasonable and in line with good international mining practice. Although current LOM is expected to continue until 2021, we recommend that Kumtor also considers social aspects (particularly retrenchment) and biodiversity issues (particularly access to the SCER) in future CCPs.



## 4 Conclusions and Recommendations

We analyzed and assessed statements and assertions in Interagency Commission's report and the related Moran Comments. As part of this, we conducted a literature and document review and discussed our questions and findings with Kumtor's senior management. Below, we have presented our conclusions and recommendations. These are structured under the following headings:

1. Site access and transparency
2. Water quality
3. Biodiversity issues
4. Glaciers and water consumption
5. Geotechnical risks and Petrov Moraine Dam
6. Mine closure aspects

Each topic is presented in turn below.

### 4.1 Site access and transparency

Although delayed by one day to allow for medical check-up, the Commission and its members were, in fact, provided with site access and enabled to conduct an inspection and carry out sampling activities. Our review also showed that Kumtor is annually subject to approximately 25-30 site visits by regulatory agencies and international auditors/consultants. We also find that key stakeholders, including the Commission, had access to key data, including those provided in Kumtor's detailed AERs. These AERs are distributed to a variety of Governmental agencies, local schools/libraries and civil society groups in Kyrgyzstan.

Such access, reporting and outcomes do not support assertions that the Kumtor mine is not reasonably accessible, that regulators (or international lenders) lack political will or capacity to supervise Kumtor's mining operations and to require changes and corrective action, when indicated. We note that, in addition to generating and distributing voluminous AERs, Centerra and Kumtor are also following best international mining practice in terms of public reporting using the GRI and EITI.

We recommend that Kumtor reviews opportunities to continue to expand its community-supported (joint) monitoring<sup>60</sup>, reporting and assurance processes, and explore also other avenues, such as additional stakeholder engagement, that could further support its commitment to transparency.

### 4.2 Water quality and cyanide

Our review (and the Commission's own discussion) highlighted that the Commission's water sampling and/or analysis pertaining to arsenic levels in Petrov Lake were unreliable and could not be substantiated. Our review of the Moran Comments relating to cyanide and Kumtor's data quality also

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<sup>60</sup> See, for example Compliance/Advisory Ombudsman (2008)

showed that they are without merit and speculative, and were not adopted by the Commission's recommendations.

However, the Commission raised valid issues relating to elevated sulphate levels from waste dumps. Kumtor's CCPs also notes that sulphate levels may present a potential long-term compliance issue (relative to MAC standards). However, the same CCP report clarified that the predicted sulphate levels are non-toxic and that the levels anticipated do not pose a serious threat to degradation of water quality in the Kumtor River. Furthermore, the latest CCP states that the ARD characterization studies have concluded that there is little to no risk of potential ARD occurring in the TMF and that ARD is not predicted from the waste dump facilities.

We recommend that Kumtor should include (a) hydrocarbon analysis in its routine water sampling program, (b) complete the few remaining steps to secure certification of its operations by the International Cyanide Management Institute, and (c) continue to consider necessity, practicality and feasibility of options that could assist in avoiding, reducing or mitigating potential for long-term elevated sulphate levels, or other any water quality issues that may develop in the future.

### **4.3 Biodiversity issues**

We note that the Commission's report does not assert actual adverse biodiversity impacts emanating from Kumtor's operations. In fact, Kumtor's engagement and activities were instrumental in establishing the Sary-Chat Ertash Nature Reserve (SCER). Also, the presence of the Kumtor mine and related activities (such as no hunting policy, reduced access to poachers) have contributed to increase of wildlife in the region.

In our opinion, the inaccurate maps in circulation that show variable size, location and land use designations are inconsistent with KR Government Decree #76 and laws relating to the SCER. The reliance of some stakeholders on these inaccurate maps (and the apparent absence of definitive maps issued by the government) explains some of the concerns being raised about the perceived interrelation of Kumtor and the SCER.

We note that the precise coordinates of Kumtor Concessions were part of the New Terms Agreement which was approved by the Government and ratified by the Parliament in 2009. The KR Government corrections in 2009 of the area of SCER, which was overlapping with the Kumtor Concession, resulted in a virtual (apparent) loss of 260 ha (or 0.36%) of the SCER's area. In our opinion, such a correction, which appears fully in line with the original intent of establishing the SCER in the mid-1990s, does not have a significant or tangible adverse impact on the viability and value of the SCER.

The Commission's concerns also relate to prospecting licenses granted to Kumtor by the Government as these appear to overlap with "Buffer Zones" to the SCER. It is our understanding that such "Buffer Zones" have yet to be adopted through Government decree. We also note that prospecting and exploration activities, if conducted and reclaimed responsibly, would not be expected to result in significant biodiversity impacts.

It is our understanding that efforts are already in progress by the Kyrgyz Government to provide definitive maps describing the size, location and boundaries of the SCER, and clarify the presence of buffer areas (if any) and hunting zones. We recommend that this process be designed to be inclusive (to improve its credibility) and its outcome to be transparently communicated to interested stakeholders.

We also recommend that Kumtor and other stakeholders engage in a constructive dialogue that considers the real impacts of Kumtor's current operations, and potential impacts that may relate to potential future developments (if any) and mine closure. In this context, stakeholders could explore modern tools and approaches, such as Biodiversity Action Plans and cross-sectoral partnerships, which could be advanced with Kumtor's support. Such a dialogue could explore and realize non-exclusive options that can generate positive biodiversity outcomes and meet shared nature conservation and socio-economic aspirations.

#### **4.4 Glacier ablation and water consumption**

The Kumtor mine is located in alpine terrain, where some peaks and local valleys are occupied by active glaciers. Kumtor has been removing glacial materials and associated waste rock, also for safety reasons. This has contributed to an impacted area of approximately 1.5 % of the five glaciers in the vicinity of the Kumtor mine.

A number of studies have demonstrated that glacial ablation (retreat) near the Kumtor mine continues to occur at a significant rate, predating Kumtor's operation and from causes that are independent of Kumtor's mining activities. A review of the 2009 National Communication of the Kyrgyz Republic to the UN Framework Convention on Climate Change confirms that the glacial ablation observed at Kumtor is consistent with developments across the country. Predictions by this UN submission point to a reduction of glaciation areas ranging from 64% to 95% by the end of this century. These impacts point to broader and much more dominant climatic drivers (and not mining impacts).

Kumtor's water intake is approximately 6% of the inflows to the glacial Petrov Lake. Kumtor's 'upstream water consumption' equates to approximately 0.14% of the water flow available to the nearest residential users at Naryn, located approximately 200 km downstream.

In our opinion, it is scientifically implausible to consider Kumtor's water consumption to be material in a regional context when considering the size of the recharge area and contributions from other glaciers, tributaries, snow and rainfall over an area exceeding 5,000 km<sup>2</sup> (the mountainous portion of the basin above the town of Naryn). It is even more implausible to assert that Kumtor's water consumption could be driving 'water competition' that can be felt as far as Uzbekistan. Well-known drivers of water competition (and wastage) in the region include the agricultural sector and outdated Soviet-era water distribution infrastructure.

#### **4.5 Geotechnical issues and glaciers**

As disclosed by Kumtor, since its initial construction, the tailings dam foundation has experienced horizontal deformation. Although considered within the limits of reported deformation movement of dam structures, Kumtor constructed a shear key and toe berm. These were designed, modeled, and/or

reviewed by leading Kyrgyz design institutes and international consultants, such as the KR Academy of Science, Institute of Physics and Rock Mechanics, Golder Associates and BGC Engineering, to reduce the rate of movement, address regulatory concerns and ensure stability of the TMF after closure.

In 2002 and 2006, Kumtor's operations were adversely affected as a result of two substantial failures of the bedrock high wall that forms the northeastern limit of the Central pit. In liaison with KR regulators, these events resulted in adjustments to mining plans since that time. Starting in 2007, operations at the Central pit have been adversely affected as a result of significant creeping (movement) of the historical waste dump and glacial ice. This has necessitated on-going management through unloading and removal (as discussed further above).

Given the context of Climate Change and regional glacial lake outburst flood (GLOF) events unrelated to Kumtor, KR regulators and Kumtor have been monitoring and studying the glacial Petrov Lake and its moraine dam structure.

As detailed also in the IAR, Kumtor commissioned a variety of studies to characterize the Petrov Lake and its moraine dam structure. The most recent engineering review was carried out by BGC Engineering (2012). According to BGC, global warming is expected to destabilize the moraine dam over time and will likely generate a flood. However, the timing of this event is not predicted to be imminent. Given the presence of a natural berm and the lower elevation of the Kumtor River channel between Petrov Lake and the TMF (see Figure 10 and Figure 11, page 39), BGC concluded that an outburst flood would follow the Kumtor river channel. BGC also noted that all risks presently considered to be high, in case of a future GLOF event, can be reduced to moderate or lower levels through a combination of monitoring and construction efforts.

Based on this study, Kumtor is planning to install an early warning system (to protect nearby workers in case of an GLOF event) and protect the shear key of the TMF to reduce its vulnerability to erosion. In addition, Kumtor could consider lowering the water levels in the Petrov Lake to further increase the factor of safety.

Our document review and discussions indicates that geotechnical risks are being studied, monitored, reported and managed by Kumtor, and remain supervised by KR regulators. Given the time lag between AER cycles, we recommend that Kumtor should consider interim updates ('Frequently Asked Questions') and inform interested stakeholders about progress in dealing with its geotechnical issues, including those related to the Petrov Lake's natural moraine dam.

#### **4.6 Mine closure related issues**

Our review shows that Kumtor has been reviewing and testing ARD-related aspects since the early stages of the Kumtor operation. A series of costed Conceptual Closure Plans (CCPs) have been generated, as summarized also in Kumtor's AERs.

Kumtor's CCPs, as well as data generated by the Commission, indicates that sulphate released from the waste dumps may present a potential long-term issue. However, the same CCP report clarified that the predicted sulphate levels are non-toxic to aquatic organisms, that the levels anticipated do not pose a

serious threat to degradation of water quality in the Kumtor River, and did not predict any material Acid Rock Drainage (ARD) risks.

The most recent (2010) CCP estimates the closure costs at approximately \$30 million. These have been inflated by Kumtor to approximately \$37 million to represent the expected 2021 costs in the financials. Kumtor maintains a dedicated Reclamation Trust Fund. According to Kumtor, the most up-to-date balance of this Fund is \$9.1 million (as of February 2012). Our conversation and review of Kumtor's decision records also confirmed that the remaining balance will be funded over the life of mine (LOM) and assumes the salvage value for the equipment to be zero at that time. In our opinion, Kumtor's commissioning and reliance on competent consultants, multiple iterations of CCPs to plan and make financial provisions for mine closure appears reasonable and in line with good international mining practice.

We recommend that Kumtor should further consider necessity, practicality and feasibility of options that could assist in avoiding or mitigating potentially elevated sulphate levels identified in the CCP, or other closure concerns that may arise. We also recommend that Kumtor considers social aspects and biodiversity issues in future CCPs, and continues with transparent reporting of closure planning and related financial provisioning.

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<sup>68</sup> <http://bankwatch.org/sites/default/files/Kumtor-MoranReport-31Jan2012.pdf>

## 6 Signature Page

This report entitled Independent Assessment of the Interagency Report and the Moran Comments on Compliance with Environmental and Industrial Safety Standards at the Kumtor Gold Mine, has been prepared for the Kumtor Gold Company by Don Proebstel, PhD, and Mehrdad Nazari, MSc, MBA, LEAD Fellow.

This report is dated this April 23rd, 2012 and respectfully submitted,

A handwritten signature in dark ink, appearing to read 'Mehrdad Nazari', is written over a horizontal line.

**Mehrdad Nazari, MBA, MSc, LEAD Fellow**

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## Appendix 1: Listing of Key Assertion from the Interagency Report

ID	Assertion (reference)	Category	Comment
IA-1	Kumtor did not provide all requested documents in a prompt fashion.	Transparence	As noted in the IAR, the 2010 AER was furnished to the Commission by Kumtor November 4, 2011
IA-2	"This [2010 AER] report gave rise to further questions and evidences that the company has not solved the problems that have mounted up over the recent years including reinforcement of the tailing pond dam, storage of dump waste etc."	Geotechnical Issues	See Section 3.6
IA-3	"In particular, the report mentions that the maximum allowable concentration of aluminum in the Petrov Lake doubled above the 2009 levels. It also states that the concentration of iron in the point W 1.1 rose compared to 2009. On page 6.5 of the report it is stated that the concentration of nickel corresponds to "its historic level; however, it does not contain any references to that level." (page 9)	Water Quality Petrov Lake Transparency	See Section 3.3.5
IA-4	"[W]ater samples collected during the Commission's visit also demonstrated the rise of maximum allowable concentration of nickel in the area of three Sary-Tor streams (under the Davidov moraine, dump waste, and mine)" (page 9)	Water Quality	See Section 3.3.5
IA-5	"Kumtor's water bodies fall into the category of water bodies for cultural and domestic use. It is therefore inadmissible to use outdated maximum allowable concentration data for such toxic element as arsenic." (p. 9) "It is inadmissible to set the maximum allowable concentration level for arsenic at 0.05 mg/l as this is in breach with the hygienic standards effective in Kyrgyzstan and creates risks that the danger of increased contents of this element in the Petrov Lake will not be taken seriously. Although the company has a	Water Quality Applicable Standards	See Sections 3.3.1, 3.3.2 and 3.3.3

ID	Assertion (reference)	Category	Comment
	modern drinking water purification system, an additional analysis of drinking water at the mine is necessary to ensure sufficient safety. To separate the impact of the operational process and increased natural content of some chemical elements in water at the mine, it is necessary to have the geochemical and hydrogeological data for the periods before gold mining operations started in the area.” (p. 21)		
IA-6	“[T]he total water consumption at the mine was 118.3 mln m <sup>3</sup> in 2010. However, no data for the previous years are given, and the 2009 report does not contain any relevant information.” (page 9)	Water Consumption	See discussion on water consumption in Section 3.5.5
IA-7	“Unsorted domestic waste is stored in the tailing pond. How legitimate is a disposal like that?”	Waste Management	The AER 2010 notes that domestic waste continues to be buried in a cell within the tailings basin boundary (and not the tailings pond). A number of recycling programs are in place. No environmental/compliance concerns have been noted.
IA-8	“The [AER 2010] report further refers (page 7.1) to lack of data evidencing that the produced tailings are not acid-forming and do not leach metals, and says that the company is continuing research on the issue. Hence, according to this report of Kumtor Operating Company, there is a risk that acids may form in the tailings upon the completion of operations at Kumtor Mine.” (p 9)	Water Quality Mine Closure (ARD)	See Section 3.7
IA-9	[With reference to moving glaciers towards the pit area] “we would add that this not only complicates the operations, but also create risks for pit walls fallout and emergency situations in future.” (p 9)	Geotechnical (Safety)	There is no dispute that Kumtor will need to continue to manage this aspect to avoid a variety of risks. See also Section 3.6.
IA-10	“The report states that in 2010 the volume of water discharged from the mine through the pipelines was 7,984,228.56 m <sup>3</sup> /hour. This gives rise to a question where this water is disposed and is it treated	Water quality	Discussion of water consumption is provided in Section 3.5.4. The AER notes that the “tailings water effluent continued to be treated at KOC’ Effluent Treatment Plant where cyanide was

ID	Assertion (reference)	Category	Comment
	preliminarily?” (p.9)		destroyed in the effluent and heavy metals were removed to ensure that all water quality objectives were met before the treated effluent was released to the Kumtor River” and that the “ETP operated efficiently as expected during last years of operation. In 2010, the ETP treated 5.2 M m3 of water and discharged 5.54 M m3 including surface runoff water accumulated into Pond #3 during winter-spring period.”
IA-11	“According to the analysis of wastewater samples, performed by State Agency for Environmental protection, high amounts of sulphate (up to 1110 mg / l) and suspended solids (up to 984 mg / l) in the effluent drainage were identified in the runoff from the mine pit, waste dumps and in the effluent from the glacial moraine. This indicates the possible formation of acid runoff from dumps and the mine and the fact that the existing sumps and ponds drainage system of the Central pit does not fully cope with the task of cleaning from suspended particles of that water volumes.” (p.9-10)	Water Quality Mine Closure (ARD)	See Section 3.7
IA-12	“The Ministry of Natural Resources of the Kyrgyz Republic therefore submitted proposals to the Kumtor company to improve the situation with effluents from manufacturing operations from the mine and waste rock, consider the expansion of sedimentation ponds at the mine and cleaning of waters from rock dumps and glacial moraines.” (p 10)	Water Quality Mine Closure	See Section 3.7
IA-13	“Section 12.4 ‘Operational Plans of Kumtor Operating Company for 2012’ states that the wall deformations of south-eastern edge of the south-western depression seriously complicated mining operations at Kumtor Mine and that the creeping part is moving to the area	Geotechnical Risks	There is no dispute that Kumtor will need to continue to manage this aspect to avoid a variety of risks. See also Section 3.6.

ID	Assertion (reference)	Category	Comment
	of ore bodies with high gold content. This is the evidence that in addition to complicated operations there is a threat to the stability of edges and the mine itself, which further increases chances for emergency situations.” (p 10)		
IA-14	“[T]he company should disclose its Emergency Action Plan and take steps to prevent any such emergency situations and to improve safety levels.” (p.10)	Transparency	Kumtor’s 2010 AER describes the Emergency Response Plan, the organizational structure involved, and a number of mock emergency exercises completed. A full disclosure of ERP is typically not conducted to avoid risk of sabotage, looting of equipment etc.
IA-15	For the time being, neither the Ministry of Natural Resources nor the company provided the following materials to the Commission: -Mine Reclamation Plan (which was supposed to be renewed in October 2011) -Emergency Action Plan - Feasibility study (or preliminary feasibility study) and EIA for the new concession area.” (p. 10)	Transparency	See also Section 3.7
IA-16	On the first day, September 19, 2011, the security guards at the checkpoint did not allow us to enter the site explaining that there was an investment meeting with deputies and that in response to the order of the Kyrgyz Government the administration of Kumtor Operating Company sent a letter to change the date of the Commission’s visit. However, no letter of such kind ever was delivered to Jogorku Kenesh.”	Transparency	See Appendix 4: Exchange of letters seeking coordination of site visit by Interagency Commission. See also Section 3.2.
IA-17	“Also, the senior managers of Kumtor were insisting that the Commission members should undergo a medical examination Bishkek. However, in 2005 we underwent medical examination directly on the site, just like a group of deputies who arrived earlier. [...] [I]t was agreed that in the morning after a medical	Transparency (Medical Exam)	See also Section 3.2.

ID	Assertion (reference)	Category	Comment
	examination in Tamga we would get to the mine in order to complete our assignment.” (p 11)		
IA-18	Table 1 of IA Report shows elevated levels of Arsenic in several samples collected on September 20, 2011, and analyzed when compared to MAC levels of Kyrgyz Republic	Water Quality Petrov Lake Lysy Glacier	See Section 3.3.1.
IA-19	Table 1 of IA Report (p. 12) shows one or more elevated levels of Ammonium Nitrogen, nickel, cyanide, sulfates, iron in several samples collected at different locations on September 20, 2011 when compared to MAC levels for Water for Drinking, Household and Domestic Use of Kyrgyz Republic		See Section 3.3.1 and Section 3.3.5
IA-20	Based on “preliminary” discussion “we concluded that it is necessary to install water treatment facilities in the place, as the water further gets to the Kumtor River and Naryn River and may pollute the river bed” (p 13)	Water Quality	See Section 3.3.1 and Section 3.3.5
IA-21	“Sampling results showed that the maximum allowable concentration level of arsenic (a rather toxic element) is exceeded in the Petrov Lake, and significantly exceeded the required levels in the Lysyi Glacier Stream.” (p. 13)	Water Quality	See Section 3.3.1.
IA-22	Dzhumaev [external expert consulted by the Commission) “fully agrees with an international expert hydrogeologist from the United States Robert E. Moran(Michael-Moran Assoc., LLC) on the need to expand the list of definitions of chemical elements such as antimony, thorium, radium, strontium, thallium, selenium, petroleum products, organic pollutants.” (p. 13)	Water Quality	See Section 3.3.1 (and Kumtor AER 2010 p.7.17 – 7.18)

ID	Assertion (reference)	Category	Comment
IA-23	Glaciologists R. Usabaliyev and E. Azisov explain that elevated sulfate levels in the samples collect from Davidov Glacier show immediate impact from waste rock dumps stored on the surface of that glacier. (p. 16) “It is therefore necessary to offer alternative options to a number of operational processes that take place near the glaciers (e.g. ice unloading) to reduce the pace of the glacier moving and melting.” (p.21)	Glaciers Water Quality	See Sections 3.5 and 3.6.
IA-24	I.A. Torgoyev, details a number of studies carried out in relation to the Petrov Lake and Glacier between 2006 - 2009. The opinion identifies specific geotechnical risks relating to the tailings dam and potential linkages with natural hazards from Petrov Lake. The opinion lists recommendations from those studies and that the AER 2009 already notes that these measures were to be implemented by 2010, and that – as of September 2011 – there was no information about the status of the measures. (p. 17-18) He also notes that “[i]t is obvious that global warming that caused the accelerated melting of the Petrov Lake and significant increase in the area and volume of water in the lake, continues to aggravate the risks of the lake dam break” and that “it is crucial to take the proposed preventive measures to decrease the risks of the dam break (including monitoring and research) as soon as possible.” (p. 19)	Geotechnical Risks Tailings Dam Petrov Lake	The comments confirm that both Kumtor and KR regulators has been actively involved in numerous studies that have reviewed the various issues of concern. See Section 3.6
IA-25	According to the Deputy Director of the State Safety Inspectorate, Kumtor has followed requirements to further strengthen the tailings impoundment structure and the “Mining Inspectorate considers the state of production safety as satisfactory”. However, the apparent limitation imposed for once yearly visit by Government Decision #533of 06.11.2007 is considered	Transparency (Inspections)	Annually, Kumtor is subject to some 25-30 inspections and site visits. See Section 3.2.3.

ID	Assertion (reference)	Category	Comment
	insufficient. (p. 19) “[t]he ongoing operations require stronger monitoring by the State Mining Safety Inspectorate, and the Inspectorate's suggestion to inspect the mine on a more regular basis to ensure the operational safety at the mine is absolutely substantiated.” (P. 21-22)		
IA-26	T.O. Omukeyev, Chief Expert, Department of State Expertise, State Agency for Architecture and Construction identified no current violations but points to apparent (historic) mistakes during the original construction of the tailings facility (insufficient removal of icy loam layer at the dam bottom) and mistake of storing waste rock on a glacier. (p. 20)	Tailings Structure Glacier Water Quality	See Section 3.6.1
IA-27	The Division also believes that new territories should not be provided to the company for mining purposes. For the time being, the deposits under the existing license have not been fully mined, which does not create incentives for the company to complete underground works that are more expensive compared to open-pit method. (p. 20)		Not raising any environmental issues and not discussed further in this report.
IA-28	Kumtor Mine borders on the Sarychat-Eertash Nature Reserve. (p. 20)	Biodiversity	The Kumtor Concession area (not the mine) borders on the Reserve. See also Section 3.4.
IA-29	According to the IA Report, the review of document “Pursuant to the Decree No. 356 issued by the Government of the Kyrgyz Republic on June 5, 2009 On amendment of the decree No. 76 issued by the Government of the Kyrgyz Republic on March 10, 1997 ‘On Sarychat-Eertash Nature Reserve’, 4,380 hectares of the Nature Reserve’s land was assigned to Kumtor Operating Company to accommodate the needs of the company and ensure further development of prospecting and mining operations at Kumtor Mine.”	Biodiversity	Our review and discussions with Kumtor indicates that overlapping between the SCER and Kumtor Concession corrected was approximately 260 ha (and not 4,380 ha). See also Section 3.4.
IA-30	Referring to Decree No. 19 issued by the Kyrgyz	Biodiversity	Please see Section 3.4 for discussion of these

ID	Assertion (reference)	Category	Comment
	<p>Government on January 22, 2008, “which states (clause 8) that ‘transfer of lands covered by protected nature reserves into other categories is subject to positive opinions of state environmental experts or other relevant documents as required by the Kyrgyz environmental laws in case the continued use of such lands according to the intended purpose is no longer possible in the result of loss of their special nature protection, scientific, historic, cultural, aesthetic, recreational, health or other valuable significance... Furthermore, Kumtor Operating Company has a license for prospecting in Karasay and Kandinsky Licensing Areas which are a buffer area of this Nature Reserve. It is necessary to revoke it or start an additional study of the impact that the prospecting has on the Nature Reserve’s ecosystem”. (p. 20)</p> <p>“Hence, this is a clear violation, and the Jogorku Kenesh and the Kyrgyz Government should solve this issue.” (p. 21)</p> <p>“Kumtor Operating Company has obviously violated the applicable laws in getting licenses for prospecting and mining and assignment of lands occupied by the protected Sarychat-Eertash Nature Reserve” and “it is necessary “to conducts the state environmental expertise and transformation of the assigned land.” (p. 22)</p> <p>“In general, assignment of protected nature areas for mining is illegal under the Kyrgyz laws, so it is necessary to raise the question about revocation of Kumtor Operating Company's license for the protected areas.” (p. 22)</p>	Permitting	aspects.
<b>IA-31</b>	“According to the 2010 report of Kumtor Operating Company and opinions of the Commission, the ore	Geotechnical Risks Mine Safety	See Section 3.6.



ID	Assertion (reference)	Category	Comment
	mine's condition is unstable which is further aggravated by the mine deepening works. From this point of view, the perfect solution would be to stop the mining operations and intensify the mine edge reinforcement efforts. " (p. 21)		

## Appendix 2: Listing of Key Assertion in the Summary Section of Moran's Comments

ID	Assertion (reference)	Category	Comment
<b>MC-1</b>	"KOC controls the mine / processing site like a private fiefdom, restricting access only to those it largely controls. Despite claims by Centerra-KOC and the EBRD, the company does not truly allow open access to outside technical experts with respect to water and water quality sampling." (p. 1)	Transparency	It is common knowledge to practitioners that high altitude mines – including Kumtor - require advanced medical check-ups and numerous evidence of continuous (monthly to yearly) inspections by various government agencies and international lenders. MC and IAR discussion of facts contained in various AER and other reports is evidence of access to such data. See also Section 3.2.
<b>MC-2</b>	"Unimpacted glacial melt-waters and springs above the Kumtor Mine operations are uncontaminated and contain almost no dissolved minerals. Waste rock has been placed on some glaciers, together with airborne dust. Meltwaters from these glaciers are releasing arsenic and uranium (as a minimum) into the environment." (p. 1)	Water Quality Glaciers	See also Sections 3.3 (Arsenic), 3.3.3 (Kumtor compliance points), 3.6 (Geotechnical, waste on glaciers)
<b>MC-3</b>	"KOC has mined out parts of the Davidov and Lysyi Glaciers, and possibly others, to facilitate access to the ore." (p.1)	Glaciers	Issue is not disputed and disclosed for many years. Limited scale (<1.5%) with respect to adjacent glaciated areas. Not material given natural glacial retreat. See sections 3.5.
<b>MC-4</b>	"Mine operations are contaminating local ground and surface waters by releasing elevated concentrations of numerous contaminants (uranium, arsenic, aluminum, iron, copper, molybdenum, manganese, nickel, zinc, chloride, sulfate, nitrate, ammonia, cyanides) into the environment. Some of these constituents also exceed international water quality standards and aquatic life criteria (see Addendum). Additional organic contaminants are also likely being released into the environment from the use of explosives, process	Water Quality	Commission's sampling evidently wrong. See Sections 3.3. Kumtor's AER demonstrate overwhelming compliance. Recommendation added to include hydrocarbons in Kumtor's water monitoring program.

ID	Assertion (reference)	Category	Comment
	chemicals, fuels, greases, antifreeze, etc.” (p. 1)		
<b>MC-5</b>	“Both KOC monitoring and Kyrgyz Commission (2011) water quality data show that contaminants are being released into the environment from mine facilities.” (p.1)	Water quality	Misleading comment and omitting actual compliance performance.
<b>MC-6</b>	“Contamination sources include: natural rock contaminants from the waste rock, open pit walls and floor, tailings impoundment (both “treated” discharges and indirect seepage); and fuels and greases (mechanical equipment), process chemical spills, explosives, antifreeze and other chemicals.” (p. 1)	Water Quality	This is a generic assertion and does require any further discussion. Ignores actual compliance performance.
<b>MC-7</b>	“These sediments and contaminants flow downstream into the Naryn (later Syr Darya) River. Some contaminant and sediment particles will be trapped behind the various downstream reservoirs. Other contaminants will flow into neighboring Uzbekistan.” (p. 1)	Water Quality	Kumtor mine operation identified as competing for water in a regional context (including as far as Uzbekistan), despite of numerically insignificant water take, lack of significance in scale, major omission in the estimates provided in the Moran Comments. See also Sections 3.5.4 and 3.5.5
<b>MC-8</b>	“Local citizens have reported that fish populations in the Kumtor River downstream of the mine are greatly depleted since operations began. KOC does not report any toxicity testing data, which would clarify this claim. Toxicity testing, such as Whole Effluent Toxicity tests (WET) tests, are routinely performed on Canadian and U.S. mine effluents and reported to their governments.” (p. 1-2)	Water Quality Monitoring	Impact on fish population based on unscientific hearsay and despite scientific evidence of pre-mining Environmental Impact Assessment (EIA) already noting no fish species at the headwaters of the Kumtor River and Petrov Lake, presence of only two non-commercial, small species of fish 30 km downstream, and presence of elevated levels of various chemical constituents prior to start-up of Kumtor’s mining operations.
<b>MC-9</b>	“The Kumtor operations use roughly 4.38 billion liters of water per year, which increases the competition for water in these arid regions with other downstream users. Much of this water has degraded water quality once it returns to the hydrogeologic system.” (p. 2)	Water Consumption	Inaccurate statement and material omissions discussed in Section 3.5.
<b>MC-10</b>	“Disposal of waste rock on the local glaciers and other mining-related operations have aggravated the already-	Glaciers Water	Materially inaccurate assertion discussed in Section 3.5.

ID	Assertion (reference)	Category	Comment
	extreme melting and retreat of the local glaciers, which are the main source of recharge water to the entire local / regional hydrologic system.” (p. 3)	Consumption	
<b>MC-11</b>	“Wastes: As of the end of 2010, Kumtor operations have created approximately 981,354,000 tonnes of waste rock and about 53 million cubic meters (about 89 million tons) of tailings. Both wastes contain numerous contaminants that are released into the environment. Their volumes will continue to increase and the wastes will remain onsite forever, requiring continual maintenance.”	Mine Closure	Discussed in Section 3.7
<b>MC-12</b>	“Kumtor uses roughly 8 to 10 tons per day of cyanide to remove gold and silver from the ores. That is roughly 3650 tons of cyanide per year. KOC monitoring data are totally inadequate to define the specific forms of cyanide that remain in the tailings and which are being released into the environment.” (p. 2)	Cyanide	Assertions appear to be design to sensationalize cyanide topic. Kumtor’s use of good international industry practice to transport cyanide (audited against International Cyanide Management Code benchmark), use patented INCO SO <sub>2</sub> Cyanide Destruction Process, which is a commonly accepted gold industry practice, elaborate sampling and analytical procedures in line with documented Environmental Management Plan (aligned with ISO 14,000) and QA/QC processes, and many years of disclosed monitoring results that show overwhelming compliance with Maximum Allowable Concentration (MAC), including for cyanide.
<b>MC-13</b>	Waters of Lake Petrov are being contaminated by mine operations, probably via a combination of airborne dust / rock particles and inflows of contaminated ground and surface waters from exposed, mineralized rock. (p.2)	Petrov Lake Water Quality	Commission’s analytical results unreliable as discussed in Section 3.3.1. Lake Petrov located above/upstream of mining infrastructure; on-going and significant contributions of natural glacial till (natural minerals and sediments trapped and released by the glacier during melting and retreat). During few days over past ten years dust level exceeded trigger values and resulted in corrective action (additional dust suppression) as disclosed and

ID	Assertion (reference)	Category	Comment
			reported in Annual Environmental Reports.
<b>MC-14</b>	“Kyrgyz observers have alleged that tailings waters are discharged to the Kumtor River during all months of the year, even in winter.” (p. 2)	Water Quality	Reliance on unscientific hearsay and discounting 20-30 annual inspections by various Government agencies and consultant over 15 years of operation which has not identified this issue. Kumtor’s routine practice is to, first, properly treat all tailings water prior to discharge, and second, discharge treated tailings water only during the summer months (May through October).
<b>MC-15</b>	“The tailings impoundment, the Petrov Lake dam and waste rock piles are unstable as they sit on glacial deposits and permafrost, which is now melting. Any significant seismic event could cause a catastrophic collapse of these materials, especially when they are water-saturated.” (p. 2)	Geotechnical Issues Natural Hazards	Discussed in Section 3.6
<b>MC-16</b>	“No detailed, statistically-reliable databases have been collected (or made public) that define baseline, pre-operational conditions for water quantities (ground and surface waters), water quality, stream and spring flows, spring locations, aquatic biology, soil chemistry, etc. Thus, the public has no standard against which to define contamination has occurred or not. Such detailed data are routinely required to be publicly-released as part of premining environmental studies in Canada, the USA, the E.U., etc.” (p. 2)	Mine Closure (Baseline, EIA)	The original EIA provides baseline condition (disclosed also at World Bank’s Info Shop and EBRD’s library since 1994/5, and through Kumtor). Long term disclosure of AER provides ample data to determine impacts. Material ‘environmental footprint’ of the mine is well understood and need to be addressed as part of Mine Closure. See section 3.7.
<b>MC-17</b>	No detailed geochemical testing (static / Acid-base accounting, and Kinetic testing) data has been made public that would define whether these rocks are expected to release acidic, contaminated drainages. KOC-Centerra has misleadingly stated that the waste rock do not contain significant sulfide contents. Such tests are routinely required to be publicly-released as part of pre-mining environmental studies in Canada,	Mine Closure Acid Rock Drainage	Relevant information – including both acid-base accounting and kinetic testing results over the years - in the original EIA and/or many subsequent Annual Environmental Reports. Kumtor has commissioned three Conceptual Closure Plans/Upates which have also been shared with relevant Government agencies. See also Section 3.7.

ID	Assertion (reference)	Category	Comment
	the USA, the E.U., etc.” (p. 2)		
<b>MC-17</b>	“Pit or waste rock waters have frequently coated Kumtor rocks with yelloworange stains and several drainages contain white chemical precipitates (see Addendum photo). This suggests that KOC may be adding alkaline chemicals to the drainages (from waste rock and pit) to mask the presence of acidic effluents.” (p. 2-3)	Mine Closure Acid Rock Drainage	Kumtor’s monitoring and reporting describes effluents as in compliance at the relevant compliance points. ARD testing has confirming a neutralizing effect from minerals in the rock and pit walls. See also Section 3.7.
<b>MC-18</b>	“KOC-Centerra has been unclear regarding the types and quantities of all metal products that are extracting from the Kumtor concentrates refined at the Kyrgyzaltyn refinery.” (p. 3)		This aspects does not seem to touch on any environmental performance issues.
<b>MC-19</b>	“Most of the detailed KOC technical documents are not readily-available to either the public or the Kyrgyz regulators, nor have they routinely been translated into either Russian or Kyrgyz.” (p. 3)	Transparency Access to information	Kumtor has been generating and disclosing AERs which contain summaries of other technical reports. Technical reports, such as those related to mine closure, are typically shared with the relevant Government agencies.
<b>MC-20</b>	“Kyrgyz regulators are not allowed to make unannounced audits of the Kumtor site, nor do they have adequate resources (funds, staff, analytical capabilities, etc.) to reliably oversee the water quality monitoring performed at the site. In addition, it is clear the regulators lack the necessary political support to perform truly independent, competent oversight.” (p. 3)	Site Access Transparency Competency of Regulators	Kumtor actually granted access to the Interagency Commission following mandatory medical check-ups (which are typically required for high altitude mines). Kumtor is subject to approximately 25 site visits/inspections by Kyrgyz government agencies (which have made significant demands for changes and which have been complied by Kumtor) and other external reviews/audits. Dr. Moran appears to belittle the Kyrgyz Government agencies, leading Kyrgyz Institutes and international lenders and their consultants, questioning their competency and conduct.
<b>MC-21</b>	“Kyrgyz government staff have commented that they did not observe the addition of preservatives in the field to historic KOC water samples. This observation plus inconsistencies in the KOC monitoring data suggest	Water Quality (Historic)	Kumtor routinely uses professional and trained consultants and technicians, has a long established Environmental Management Plan and sampling procedures, applies international–level QA/QC



ID	Assertion (reference)	Category	Comment
	that much of the historic KOC monitoring data may be unreliable.” (p. 3)		procedures. It is unclear why there would not have been any contemporaneous and corroborative complaints by Kyrgyz government representatives to rectify such a situation. It is unclear which data are deemed to have ‘inconsistencies’.
<b>MC-22</b>	“Because KOC hampered the State Commission audit team’s activities in September 2011, it is imperative that a more open and detailed, independent audit of Kumtor water quality be conducted in the near future.” (p. 3)	Site Access Transparency	Kumtor actually granting access to the Interagency Commission. See also Section 3.2. Kumtor already subject to approximately 25 annual site visits/inspections, including two groups involving Kyrgyz Parliamentarian supported by specialists in 2011.
<b>MC-23</b>	The Kumtor Reclamation Trust Fund contains inadequate funds necessary to truly remediate and maintain this site, long-term. Thus, the actual costs for long-term maintenance and environmental remediation will likely be subsidized by the Kyrgyz government, or be neglected.” (p. 3)	Mine Closure (Funding)	Expected mine life is 2021. Conceptual Closure Plans that have been developed in line with Kyrgyz and international lenders’ requirements. The most recent CCP, which has been shared with the relevant Government agency, calls for \$30 million of closure expenditures (inflated by Kumtor \$37 million to represent the expected 2021 costs in the financials). Financial accruals are being made in line with good industry practice. See Section 3.7.

### Appendix 3: Log of Main Site Visit, Inspections and Audits at Kumtor (source: Kumtor)

The following information was provided by Kumtor during document reviews and interview of Kumtor staff and management in Bishkek in February 2012. The visits listed below includes site visits conducted by (a) Members of Parliament, (b) Gosgortekhnadzor (GGTN) under KR Ministry of Natural Resources, (c) the Issyk-Kul Territorial Department of Environment Protection and Development of Forest Ecosystems of the State Agency of Environment Protection and Forestry under the KR Government (ITDEPDFE), (d) the Issyk-Kul Province State Sanitary and Epidemiologic Supervision Center (IPSSDESC), (e) Eco-Service and AsiaRudProject Design Organizations, and (f) International Audits.

#### (a) Site Visits by Member of Kyrgyz Parliament

**On June 23-24, 2011**, a Parliamentary Working Group paid a visit to the Kumtor mine. It was Kumtor Management's idea that members of the Working Group and the Jogorku Kenesh Committee for Fuel-and-Energy Complex and Mineral Resources visit the gold mine.

The parliamentary delegation was made up of four lawmakers – Raikan Tologonov (the Working Group head), Urmat Amanbayeva, Elmira Jumaliyeva, and Mirlan Bakirov. Other Working Group members included representatives of ministries and government agencies, independent environmental, geology and glaciology experts as well as civil society activists.

The Working Group visited key mine facilities and met with Kumtor employees. In the presence of experts, samples were taken for heavy metals and cyanide behind the tailings dam, at the point of treated water discharge into the Kumtor River, at some location above and four kilometers below the discharge point, as well as from the River Sary-Tor and from the mud pit.

"Based on the results of our investigations, we have arrived at the conclusion that there are no deviations whatever from the maximum safe level of dust and radiation as well as from foods and potable water standards. Relevant reports will be submitted to the national parliament and disclosed, in due time, by the Parliamentary Working Group," said Gulushkan Tailakova, head of the First-Response Monitoring Department, the Karakol-based watchdog of the National Health Inspectorate in Issyk-Kul province.

**On September 19, 2011**, a group of Jogorku Kenesh members, including Ravshan Jeenbekov, Dastan Bekeshov, Abdyjapar Bekmatov, Zamir Alymbekov, member of Bishkek City Kenesh Jusup Boshkoyev and the accompanying persons visited the Kumtor mine site. The visit was organized by Kumtor Operating Company Management at the request of various factions of the Kyrgyz Parliament who wished to visit the gold mine in order to see the real state of things at the mine. It should be noted that this is the second group of MPs to have visited the Kumtor mine site this year.

The visitors expressed interest in the mine's operation, social and living conditions, safety standards, and the mine's performance. They visited all the key facilities, including the open pit, underground declines and the gold mill, and saw the primary stages of ore mining and processing.

Ravshan Jeenbekov, MP, who had last visited the Kumtor mine site fifteen years ago, said there were a lot of things in the mine's operation that could be seen as a model to be copied by other companies as its production was based on international experience and strict standards. "Actually, our intention was to see that, first, environmental standards and, second, safety standards are fully complied with. Third,

we wanted to see that maintenance of tailings facilities is in agreement with the regulations adopted throughout the world. Our visit has convinced us that all this is in case here,” Ravshan Jeenbekov concluded.

**September 19, 2011** at 16:37, without getting approval of Kumtor management, Member of KR Parliament Erkingul Imankojoeva accompanied by 11 people came up to the Kumtor Mine with the demands to be given access to conduct an environmental and operational safety audit as per the KR Government Resolution # 413-r of September 13, 2011.

#### **(b) Site visits by Gosgortekhnadzor (GGTN) under KR Ministry of Natural Resources**

**April 5:** K.E. Ermatov, GGTN Director and I.V. Gilfanov, GGTN Departments Chief conducted an unplanned inspection of Mill facilities. The inspection results were discussed with the mine Management.

**April 13:** Ch. Sadabaeva, GGTN State Inspector and A. Stetsiuk, Chief Specialist and representative of Kyrgyzstandart, conducted an unplanned calibration of the Mill gas analyzers.

**May 17:** O. Tashmatov, GGTN State Inspector, conducted a planned industrial safety inspection of Contractors operating at Kumtor mine, and storage conditions and usage of explosive materials. The Act was drawn up as per the inspection results and the appropriate recommendations to eliminate the impairment of industrial safety normative documents are issued.

**June 23-25:** The representatives of GGTN and Geo-Ecological Department of the KR Ministry of Natural Resources together with the representatives of Eco-Service designed organization conducted an inspection of Kumtor mine Effluent Treatment Plant at the area of build up of pump station #1 up to 3662.5m below sea level for commissioning.

**June 24:** The representatives of GGTN and Geo-Ecological Department of the KR Ministry of Natural Resources conducted an inspection of tailing dam and gravel pit of Kumtor mine for commissioning.

**November 28-December 2:** I. Gilfanov, Ch. Sadabaeva, A. Apuhtin, together with GGTN Department Chief and state inspectors under KR MNR, with participation of T. Ajibaeva, Advisor of Natural Recourses Minister, and G Shabaeva, Geo-Ecological Department Chief conducted a control inspection on industrial safety of mining, explosive and exploration industrial safety, conditions of storage, production, and usage of explosive materials, an inspection of operation of loading cranes, pressurized vessels, steam boilers, oil storages, refueling station and area of gas-flame machining of metals, Mill and TMF facilities of Kumtor mine and environmental management. The Act was drawn up as per the inspection results and the appropriate recommendations to eliminate the impairment of industrial safety normative documents are issued, the responses to any concerns were dealt with during the required response time.

**(c) Site visits by the Issyk-Kul Territorial Department of Environment Protection and Development of Forest Ecosystems of the State Agency of Environment Protection and Forestry under the KR Government (ITDEPDFE)**

**March 18:** M. Junusov, the SAEPF inspector, and J. Seikebaev, the ITDEPDFE inspector, conducted inspection of Kumtor transport for smoking of exhaust gas.

**March 28:** Inspector Ch. Chukumbaev and O. Shestova, Chief Specialist of ITDEPDFE, with participation of T. Chynybaev, Engineer of Eco-Service Design Organization, conducted inspection of Sewage Treatment Plant (STP) and Effluent Treatment Plant (ETP) of the Kumtor Mine drainage; samples of wastewater before and after treatment, after disinfection were taken in order to analyze effectiveness of STP and ETP operations. Based on the findings of inspection and sample analysis conducted at the certified SAEPF laboratory, a permit was issued to start discharge of treated water to the Kumtor River.

**October 20:** O. Shestova, Chief Specialist and T. Ibraev, the ITDEPDFE inspector, conducted proving sampling of water from the Tailings Dump (before treatment of drainage), at the discharge point of industrial waste water and at the control point (end of mixing zone). Based on the findings of the inspection, protocols of sample analysis were issued and a relevant Act was drawn up.

**November 11-12:** J. Kojoeva, Chief Specialist of SAEPF, A. Bukarova, Chief Inspector, and M. Karagulov, Chief Specialist of ITDEPDFE, conducted a planned inspection of environment protection activities at the Kumtor mine. Mine facilities were observed, and availability of permits was checked. Based on the findings of inspection, the Order was issued, which was replied within established deadlines.

**December 9-11:** With the purpose of identifying the impact of industrial waste, particularly of the Tailings Dump, to the Kumtor mine fauna, T. Ibraev, the ITDEPDFE inspector, jointly with A. Davletbakov, Zoologist of the KR National Academy of Science, conducted shooting of birds for further submission of bird organs to the Center of Veterinary Diagnostics for analysis. Findings of analysis are given in the Chapter 7 of this Report.

**December 14:** T. Ibraev, the ITDEPDFE inspector, with participation of the specialist of Central Laboratory under the Ministry of Natural Resources, conducted control sampling for content of arsenic in the water. Samples were taken from the Petrov Lake and the dining facility of the Mine Camp. Findings of analysis proved that there was no arsenic contamination.

**(d) Site visits by Issyk-Kul Province State Sanitary and Epidemiologic Supervision Center (IPSSESC)**

**August 29:** G. Tailakova, B. Satybaev, and G. Jakypova, IPSSESC lead specialists and laboratory assistant, in presence of E. Kojomkulov, Manager of HSE Systems, Sh. Tynystanov, Safety Manager, and M. Esenalieva, Camp Administrator, inspected the sanitary and hygienic conditions of labor and dwelling facilities of the camp and production facilities of the Kumtor Mine.

**September 5:** G. Tailakova, L. Bekturova, and R. Mambetova, IPSSESC lead specialists and laboratory assistant, in presence of E. Kojomkulov, Manager of HSE Systems, Sh. Tynystanov, Safety Manager, M. Esenalieva, Camp Administrator, and A. Voitenko, Doctor, inspected the sanitary and hygienic conditions of the kitchen, took samples of water and food supplies, and swabs from dishes, hands, and working clothes of the kitchen staff for further sanitary and hygienic analyses.

**October 27:** G. Tailakova, B. Satybaev, and G. Jakypova, IPSSC lead specialists and laboratory assistant, in presence of E. Kojomkulov, Manager of HSE Systems, Sh. Tynystanov, Safety Manager, and M. Inkijekov, Dewatering Coordinator, inspected the working station of the driller helper of the Kumtor Mine Dewatering Department, and performed sanitary inspection of the Mine facilities.

**(e) Site visit by Eco-Service Design Organization and AsiaRudProject Design Organization**

**June 30:** T. Chynybaev, Design Engineer, inspected the Kumtor Mine ETP facilities in part of build-up Pump Station No.1 pad up to 3662.5 meters above sea level.

**July 12:** V. Erohin and O. Filonenko, Design Engineers, made an examination of the area in terms of the project to move the ETP facilities.

**June 24-26:** S. Pak and I. Degtayrev, Design Engineers, in terms of design supervision, made an examination of gravel pit.

**(f) International Audits**

**June 27 – July 6:** WESA Consult Company [www.wesa.ca](http://www.wesa.ca) conducted an audit assessment of Kumtor readiness to comply with International Cyanide Management Code.

**November** - WESA Consult Company [www.wesa.ca](http://www.wesa.ca) conducted an audit regarding the Company compliance with International Cyanide Management Code.

**October 2012** - Tailings Dam Inspection by Golder Associates – Irwin Wisleskey

#### Appendix 4: Exchange of letters seeking coordination of site visit by Interagency Commission

*Out # CR/565*  
September 16, 2011

**To: N. M. Momunaliev**  
**KR Minister –**  
**Head of the KR Government Office**

**Dear Mr. Momunaliev,**

On September 16, 2011, Kumtor Operating Company (KOC) received your Letter #15-266/8 of September 15, 2011 with the request to provide assistance to the Inter-Departmental Committee established by the Resolution # 413-r of September 13, 2011 to arrange a Kumtor site visit within the period September 19 – September 21, 2011.

However, within the same period September 19 – September 21, 2011, the KR Parliament Committee is going to visit the Kumtor Mine as per the schedule approved earlier.

Taking into account the fact it would be impossible to arrange a Kumtor site visit for two representative committees (KR Parliament Committee and Inter-Departmental Committee) simultaneously, we request that you agree on the Kumtor site visit dates for the Inter-Departmental Committee to be postponed for a later period after September 21.

To ensure presence of appropriate Company specialists during the Kumtor site visit of the Inter-Departmental Committee, we request that you advise us what Mine facilities members of the above committee would like to see.

As per the Company policy, prior to the departure of the Committee members for the Kumtor Mine, they must attend a simple medical examination at the KOC Medical Office. K. Shatmanov, KOC CR Manager, will coordinate arrangements with regard to the above medical examination. Also, all visitors must travel to site in KOC transportation from Barskoon to the site property. These safety precautions are for their protection as well as KOC.

Sincerely,



**Robert Wunder,**  
President, KOC



Министру Кыргызской Республики –  
Руководителю аппарата Правительства  
господину Момуналиеву Н.



« 16 » сентября 2011 года  
иск: СК/565

Уважаемый Нурханбек Сакенович,

16 сентября т.г. ЗАО «Кумтор Оперейтинг Компании» (КОК) получила Ваше распоряжение (№15-266\8 от 15.09.2011 года) с просьбой оказать содействие в визите комиссии, созданной распоряжением № 413-р от 13.09.2011 года, на рудник Кумтор в период 19-21 сентября 2011 года.

Однако, в этот же период 19-21 сентября на рудник выезжает комиссия Жогорку Кенеша Кыргызской Республики, визит которой на рудник был согласован ранее.

В связи с тем, что обеспечить визит на рудник одновременно двух представительных комиссий (Жогорку Кенеша и межведомственной) не представляется возможным, мы просим Вас согласовать перенос визита межведомственной комиссии на более поздний срок, после 21 сентября.

Для обеспечения присутствия соответствующих специалистов компании в период посещения межведомственной комиссией рудника Кумтор, просим Вас согласовать с компанией объекты рудника, которые хотели бы посетить члены вышеупомянутой комиссии.

Согласно политике компании, до выезда членов комиссии на рудник, они должны пройти медосмотр в медицинском пункте компании. Организацию медосмотра членов комиссии будет координировать менеджер компании К.Шатманов. Также примите к сведению, что проезд визитеров от пункта пересадки возле села Барскоон до рудника согласно политике компании осуществляется транспортом компании. Эти процедуры безопасности позволят защитить как визитеров, так и компанию.

С уважением,

Роберт Вандер,  
Президент  
ЗАО "Кумтор Оперейтинг Компани"

COPY

Kumtor Operating Company  
Centerra Gold Inc.  
24 Ibraimov Street  
Bishkek, Kyrgyz Republic, 720031

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Факс: 996 (312) 90-07-28  
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KR MINISTER, HEAD OF THE GOVERNMENT OFFICE

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September 15, 2011  
Ref # 15-26618

IN 379  
Sept. 16, 11  
RW/AS

To: Mr. A. A. Sazanov,  
KGC President

I hereby kindly request that you provide assistance to the Committee mentioned in the attachment.

N. Momunaliyev

Time: 2011/09/15 KR Parliament/Viceministry re date of Committee visit-orig\_241

KR PARLIAMENT MEMBER

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September 14, 2011  
Ref # 2759-04-41

**To: N. Momunaliev,  
KR Minister,  
Head, Government Office**

**Dear Mr. Momunaliev,**

In accordance with Clause 2 of the Resolution # 413-r dated September 13, 2011, on establishment of the Committee to evaluate compliance of the Kumtor Mine with requirements of environment, industrial, and economic safety, the Committee should visit the Mine within the period of September 14-16, 2011.

However, as we received the resolution on September 14 this year, it is impossible for the Committee to visit the Kumtor Mine in the said period.

In order to avoid any obstacles with access to the Mine, I kindly request that you forward the Resolution to KOC together with a letter of request signed by you informing that the committee will visit the Mine within the period of September 19-21, 2011.

Respectfully yours,

E. Imankojoeva

**Appendix 5: Cover letter submitting Kumtor’s latest Emergency Response Plan (Version 9) to the KR Ministry of Emergency Management**

**To: M. Sh. Kasymaliev,  
Deputy Minister,  
KR MEM**

**# HSE\1627**

February 20, 2012

**Dear Mr. Kasymaliev,**

KOC specialists have updated KOC Emergency Response Plan (ERP, version 9, edited on December 2011). The previous ERP version was approved by the Ministry of Emergency Management, on May 22, 2008.

Please review and approve the updated KOC ERP (edited in December 2011).

*Attachment: KOC Emergency Response Plan (version 9, edited on 2011).*

**Respectfully yours,**

**Tony Meade,  
VP, KOC**

Заместителю министра  
чрезвычайных ситуаций  
Кыргызской Республики  
господину Касымалиеву М.Ш.

№ Н.5Е/1627

«30» февраля 2012 года



Уважаемый Мукамбет Шадыканович !

Специалистами ЗАО «Кумтор Оперейтинг Компани» (КОК) проведено обновление Плана действий в чрезвычайных ситуациях (ПДЧС, выпуск 9, редакция от декабря 2011 года). Предыдущая редакция ПДЧС была согласована Министерством чрезвычайных ситуаций 22 мая 2008 года

Прошу Вас рассмотреть и согласовать обновленный вариант ПДЧС КОК (в редакции от декабря 2011 года).

*Приложение: План действий в чрезвычайных ситуациях КОК (выпуск 9, редакция от декабря 2011 года).*

С уважением,

Вице-президент КОК

Энтони Мил

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