

# SUMMARY AUDIT REPORT TRANSPORTATION

for the November 2011  
International Cyanide Management Code Audit



Prepared for:  
**Centerra Gold Inc. and  
Kumtor Operating Company**



Submitted to:  
**International Cyanide Management Institute**  
888 16th Street, NW, Suite 303  
Washington, D.C. 20006

**FINAL REPORT**

March 20, 2012

Submitted by:  
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## SUMMARY AUDIT REPORT

**Name of Cyanide Transportation Facility:** Kumtor Operating Company

**Name of Facility Owner/Operator:** Kumtor Operating Company

**Name of Responsible Manager:** Michael Fischer, President

**Address:** 24 Ibraimov Street  
**State/Province:** Bishkek, Kyrgyz Republic, 720031

**Country:** Kyrgyzstan

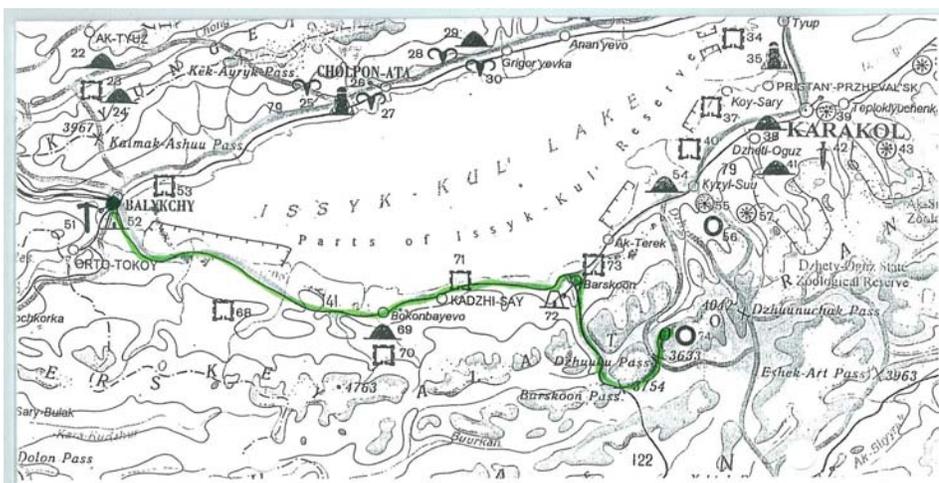
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Centerra Gold Inc., owns the Kumtor gold mine in Kyrgyzstan through its wholly owned subsidiary Kumtor Gold Company (KGC). Kumtor Operating Company (KOC) was created to operate the gold project on behalf of KGC. KOC purchases cyanide in solid briquettes from Anqing Shuguang Chemical Co. Ltd. (Shuguang). KOC receives and takes ownership of the cyanide at their Balykchy Marshalling Yard (BMV) located approximately 240 km from the mine site. The cyanide is delivered to the yard on railcar in 380 kg wooden Intermediate Bulk Containers (IBCs) packed in locked and sealed 20-foot steel shipping containers. KOC is responsible for the temporary storage of cyanide at BMV and the transportation of cyanide from BMV to the Kumtor mine site. This ICMI Verification audit is limited to the section of the cyanide transportation route between the BMV site and the Kumtor mine.

The location of the transportation route from BMV to Kumtor mine site is shown in the following figure:



**SUMMARY AUDIT REPORT**  
***Auditors' Finding***

This operation is

**in full compliance with the International Cyanide Management Code**  
in substantial compliance  
not in compliance

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Date(s) of Audit: October 27 – November 5, 2011

I attest that I meet the criteria for knowledge, experience and conflict of interest for ICMC Verification Audit Team Leader, established by the International Cyanide Management Institute and that all members of the audit team meet the applicable criteria established by the *International Cyanide Management Institute* for ICMC Verification Auditors. I attest that this Summary Audit Report accurately describes the findings of the verification audit. I further attest that the verification audit was conducted in a professional manner in accordance with the *International Cyanide Management ICMC Verification Protocol for Cyanide Transportation* and using standard and accepted practices for health, safety and environmental audits.

Name of Facility:

**CENTERRA GOLD – Kumtor Operating Company**



\_\_\_\_\_  
Signature of Lead Auditor

20 March 2012



\_\_\_\_\_  
Signature of Auditor

20 March 2012

**SUMMARY AUDIT REPORT**  
**Audit Findings**

**1. TRANSPORT:**            **Transport cyanide in a manner that minimizes the potential for accidents and releases.**

**Transport Practice 1.1:**    ***Select cyanide transport routes to minimize the potential for accidents and releases.***

The operation is             **in full compliance with Transport Practice 1.1**  
   in substantial compliance with  
   not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

Kumtor Operating Company (KOC) uses their Mack trucks to transport containers directly from Balykchy Marshalling Yard (BMY) at Balykchy to the Kumtor Mine site. The transport of cyanide is carried out with two convoys at one time. The 240 km route, typically takes 6 to 7 hours, at controlled speed, and specific inspection stops and rest breaks.

The road route was selected based on input from KOC and national and local authorities, and consideration of population density, infrastructure, road conditions, proximity to surface water, and time of year. This same route has been used and upgraded over the years. The BMY was relocated in March 2011 to an industrial area southwest of Balykchy town. In addition to being conveniently located for rail and motor road access, the new location is 11 km shorter, no longer proximate to a residential area of Balykchy and transportation convoys no longer have to travel through residential, school and populated areas.

There are two routes available from BMY to the mine site. The route used follows the south side of Issyk-Kul Lake to Barskoon, approximately 150 km, and then takes the Kumtor Technical Road from Barskoon to the Kumtor mine. The other route follows the north and east sides of Issyk-Kul Lake through Karakol to Barskoon and then takes the Kumtor Technical Road. The southern route has been deemed as the safest for communities and the environment, as it is the shortest (by one-half), and has the least settlements to pass through. This shorter route passes on the bypass through one district centre ((Bokonbaevo village) and 12 villages, with a few holiday (summer) resorts.

The Kumtor Technical Road is the only route from Barskoon to the Kumtor mine. The section of the route is approximately 89 km long and includes several switchbacks that take it over the Sary-Moinyk Pass (3,444 m) and Barskoon Pass (3,819 m). The upper area of Barskoon Pass has several avalanche-risk areas. After the Barskoon Pass, the road is relatively flat to the mine site.

KOC has a process to inspect the route, particularly the Technical Road several weeks prior to each cyanide shipment to identify and address potential risks. In addition, the Kyrgyz Republic (KR) Dor Transproject Institute carries out inspections of the bridges on the Technical Road approximately every 2 months and findings are addressed by KOC. Weather and road conditions

are constantly scrutinized by KOC Security prior to a cyanide convoy. KOC has a contract with a local company to maintain and clear the road in the Barskoon Pass to Sary-Moinyk Pass areas and KOC maintains the road from Sary-Moinyk to mine site. Avalanche risk on the Technical Road is evaluated prior to convoys, and forced avalanche discharge is conducted as required.

If conditions on the road become impassable due to ice or snow or other condition, KOC security patrol closes the road, informs security dispatch and awaits further instruction. Specific actions are documented for stopping places, actions of the security night road patrol, security day road patrol, convoy commander, mine operations department, road blocking officer, security dispatch, and the drivers. Prior to every convoy, the status of the road conditions is documented for the Technical Road and reviewed and signed by each driver.

KOC has implemented a specific policy and procedure for the transportation of dangerous goods, with specific requirements for cyanide convoys. This policy and procedures includes the exact formation of trucks and ancillary vehicles, the responsibilities of convoy commander and the BMY dispatcher, distances, stops, reference to emergencies, and required communications. The speed, distance between vehicles, and proximity to surface water are also addressed. All other traffic is halted by road police attached to the convoy until the convoy passes.

KOC holds meetings with local communities to address the risks related to transport of sodium cyanide through their villages. Trained KOC emergency responders travel with the convoy, as such services are not provided by the communities, although communities have been included in emergency scenario training, and have been advised of the potential medical requirements in the instance of a cyanide spill.

**Transport Practice 1.2: *Ensure that personnel operating cyanide handling and transport equipment can perform their jobs with minimum risk to communities and the environment.***

**in full compliance with Transport Practice 1.2**

The operation is in substantial compliance with  
not in compliance with

All drivers and equipment operators (container transport, cranes, and trucks) that transport and/or handle cyanide have Class D driver's licenses, mine drivers' licenses, Transportation of Dangerous Goods (TDG) certificates, permits for driving truck and trailer, and licenses to operate lifting equipment. The minimum length of service requirement as a KOC dangerous goods driver is two years (typically 5 years for cyanide). Each worker (and driver) is required to pass an annual medical examination to work at high altitudes. Each driver has a certificate that verifies they are familiar with the transportation of cyanide, and indicates the date of training, briefing, medical examination and validity.

KOC has competent crane, container transport operators, and truck drivers to move containers from the train to the BMY hazardous goods interim storage warehouse and from the warehouse onto the truck trailers for transport to the Kumtor mine site. KOC staff, drivers, crane operators, security and

Emergency Response Team (ERT) staff are fully trained in transportation of dangerous goods (including cyanide transportation and handling), and cyanide awareness training.

Refresher training is conducted by the KOC Safety Coordinator for the Kumtor drivers, crane operators, security and ERT prior to the first convoy of a cyanide shipment. Morning briefings held prior to railcar offloading include cyanide awareness, and held prior to convoy departure include road safety hazards, awareness and rules of the convoy. All KOC staff must complete and pass a baseline medical examination and regular medical tests (blood pressure, pulse, O<sub>2</sub>, % alcohol) with KOC nursing staff prior to being permitted to drive to the mine.

**Transport Practice 1.3: Ensure that transport equipment is suitable for the cyanide shipment.**

**in full compliance with Transport Practice 1.3**

The operation is in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

On arrival of the cyanide consignment by rail from Shuguang to the BMY compound, the shipping containers are off-loaded from the railcars and warehoused on-site prior to loading onto trucks for transport by road to the mine site. KOC operates the BMY storage compound and owns, operates and maintains the equipment used to off-load the containers from the railcars and load the trucks, and owns and operates the trucks that transport the containers to the mine.

The tractor trailer units and the SANY Container Reach Stacker (Buura) are inspected and maintained by Fleet Maintenance. The tractor trailers are inspected mechanically prior to transporting goods between BMY and the mine site. The vehicles transporting hazardous goods, including cyanide, undergo the State Technical examination conducted by KR Traffic Safety Department two times per year. In addition, the Convoy Commander conducts a final safety inspection of each loaded cyanide truck just prior to departure of a cyanide convoy to the mine site. Labels of equipment and available documentation confirm that the load capacity of the lifting equipment and the tractor trailers are well within the maximum gross weight of a loaded cyanide shipping container. KOC procedures specify that only one container may be transported per truck.

KOC does not subcontract cyanide handling or transport.

**Transport Practice 1.4: Develop and implement a safety program for transport of cyanide.**

**in full compliance with Transport Practice 1.4**

The operation is in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

KOC receives sodium cyanide as solid briquettes packed in 380 kg Intermediate Bulk Containers (IBCs) that are transported in sealed shipping containers that are secured to the transport trailer by double locked bolts and tie-down webbing. All IBC's and shipping containers are appropriately signed and posted to international and local regulations to identify the shipment as sodium cyanide. The trucks that transport the cyanide containers to the mine site are placarded with international TDG signage and the UN#1689 product identifier number.

KOC has implemented a safety program for cyanide transport. The program includes mechanical checks of trucks prior to each departure of a cyanide convoy to the mine, visual inspections of trucks en route during rest stops of the convoy, only assigning the newest and most reliable trucks to cyanide convoys, using only approved parts for truck repair and maintenance, limiting the number of driver hours and truck convoy speed, prescribing rest stops to be taken during the convoy, driver use of "nap-zappers", ensuring loads are secure, continually monitoring weather and road conditions, requiring all convoy personnel to complete medical and alcohol tests prior to departure of a convoy, and conducting a safety meeting prior to departure of a convoy. KOC maintains records that document these procedures.

**Transport Practice 1.5:** *Follow international standards for transportation of cyanide by sea and air.*

The operation is  **in full compliance with Transport Practice 1.5**  
in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

Not Applicable. KOC does not transport cyanide by air or sea.

**Transport Practice 1.6:** *Track cyanide shipments to prevent losses during transport.*

The operation is  **in full compliance with Transport Practice 1.6**  
in substantial compliance with  
not in compliance with

KOC has communication via radio between each transport vehicle of the convoy, the BMY dispatch, and mine site security along the whole of the convoy route. There are no black out areas. The convoy commander and security personnel also have cell phones. There is frequent communication between drivers and the convoy commander during transportation and procedures in place to track the progress of the cyanide shipment, including specific places along the route where calls to dispatch are required to verify the location of the convoy.

To track shipments and prevent inventory loss, KOC conducts an inventory of containers and checks the integrity of the container seals in conjunction with Shuguang representatives prior to unloading at the BMY freight train area. Further inventory checks are made by BMY staff during transfer of the containers from the railcar into the hazardous goods interim storage warehouse,

transfer from the warehouse onto the trucks, and finally on delivery of the shipment at the Kumtor mine site.

Documentation of the shipment received at the Kumtor mine site warehouse includes the “Dangerous Goods Shipping Document” for ground transport from BMY to the Kumtor mine site, and the “Bill of Lading” prepared at BMY and includes Truck No., Plate No., Seal no., and Drivers License No. Documentation includes shipping records for the transport, handling and customs declarations of the cyanide shipment from the Shuguang process plant, through China, Kazakhstan and Kyrgyzstan to BMY. Material Safety Data Sheets (MSDS) are part of this documentation and are available with the transport at all times. Following receipt at the mine, the cyanide inventory and movement of cyanide is tracked using a computerized system.

**2. INTERIM STORAGE: *Design, construct and operate cyanide trans-shipping depots and interim storage sites to prevent releases and exposures.***

**Transport Practice 2.1: *Store cyanide in a manner that minimizes the potential for accidental releases.***

**in full compliance with Transport Practice 2.1**

The operation is  in substantial compliance with  
 not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

Cyanide containers unloaded from the railcars at BMY are stored in the hazardous goods interim storage warehouse. This warehouse is dedicated for storage of cyanide during cyanide shipments. The facility has a lined, curbed concrete floor to provide spill containment, and is approved for temporary cyanide storage by the Kyrgyz Government. Cyanide warning signs and signage displaying personal protective equipment requirements and prohibition for smoking, eating and drinking are posted on and near the entrance door. Beside the warehouse is a curbed, concrete reagent spill containment pad where cyanide containers are loaded onto trucks and the trucks are parked overnight prior to start of a convoy. Portable cyanide caution warning signs are placed temporarily around the reagent pad while trucks loaded with cyanide containers are parked overnight.

The interim storage warehouse is locked and sealed to prevent unauthorized access when cyanide is stored. BMY is surrounded by a security fence and there are security guards in the yard 24 hours a day, manning three watch towers and the BMY main gate. There are a total of nine security cameras that monitor the yard. The cameras are motion sensitive and report to the security gate house.

During the period between off-loading the containers from the railcars and loading the containers onto convoy trucks for transport to the mine site, the warehouse is dedicated to the storage of the cyanide containers. No other materials are permitted to be stored in the warehouse during this period.

The potential for cyanide to come into contact with water is minimal as during storage the cyanide remains packed in the original IBC boxes, which are locked and sealed in the shipping containers, which are themselves protected from contact by water by the roof, walls, and concrete floor of the warehouse. The concrete floor in the warehouse as well as the concrete reagent pad at BMY and the concrete pad at the Kumtor mine storage area, provide additional controls to prevent cyanide coming into contact with water in the event of a spill.

To prevent the potential for build-up of hydrogen cyanide gas (HCN), the BMY warehouse is equipped with a supply and exhaust ventilation system which is in continual operation while the cyanide containers are stored.

**3. EMERGENCY RESPONSE: *Protect communities and the environment through the development of emergency response strategies and capabilities***

**Transport Practice 3.1: *Prepare detailed emergency response plans for potential cyanide releases.***

The operation is  **in full compliance with Transport Practice 3.1**  
in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

KOC has an Overall Emergency Response Plan (ERP) for the mining operations which incorporates a specific ERP for the BMY. The BMY ERP was developed to identify certain types of potential emergency situations at the BMY and is appropriate and specific for the selected transportation route from BMY to the mine site. The KOC ERP and the BMY ERP are closely aligned for instructions with respect to cyanide. The ERP refers to KOC's Dangerous Goods Road Transportation Policy and Procedures which stipulate how dangerous goods are transported, and includes additional requirements for cyanide on the route from BMY to mine site. KOC's policy and procedures and operating instructions for transportation of cyanide from BMY to the Kumtor Mine are the definitive documents for risk mitigation and emergency preparedness.

The ERPs address potential emergencies associated with all dangerous goods (diesel, oil, lime, caustic soda, nitric acid, ammonium nitrate, etc.) including cyanide, as well as other emergencies. There are specific actions identified in the ERPs in the event of a cyanide spill at BMY or in transit to the mine site. The ERPs and specific operating instructions identify actions for solid cyanide spills; for solid cyanide spill with water contact; and for evolution of hydrogen cyanide gas. The plan is specific to the type of truck and trailers used to transport cyanide and type of shipment; IBCs boxes packed in 20-foot shipping containers.

KOCs Dangerous Goods Road Transportation Policy and Procedures consider all aspects of the transport infrastructure, including the road and weather conditions, prohibiting transport during difficult road conditions (night time, mud flood or avalanche danger, etc.) and imposing speed limits on the convoy through sections of the route.

The BMY ERP has generic descriptions of chemical response, but includes specific roles and responsibilities for cyanide spills and releases, both at BMY and in transit. Additional guidance is outlined in operating instructions which are referenced in the BMY ERP.

Outside responders do not have specific roles in the ERP as they generally do not have the infrastructure or capacity to assist. KOC has therefore developed the capability (equipment, trained response and medical personnel) and the ERT to take the lead during an emergency. Nevertheless, KOC would immediately notify government bodies and/or location medical centres, as appropriate. The BMY ERP provides information on sixteen villages along the transportation route, including the names of the Chief of the Medical Centre and phone numbers.

***Transport Practice 3.2: Designate appropriate response personnel and commit necessary resource, for emergency response.***

The operation is  **in full compliance with Transport Practice 3.2**  
in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

KOC BMY has a trained volunteer Emergency Response Team (ERT) of eight members. The team trains twice a month for responding to emergency situations, including cyanide and other chemical spills. The training includes and addresses calling for assistance, use of PPE, first aid for cyanide exposure and measures to halt cyanide spread. Annual training plans are developed and include specific aspects for first aid, PPE including SCBA, safety rules, ventilation, and practical exercises (fire extinguisher, SCBAs, fire hoses and pumps, elimination of chemical substance spillage). There is occasional inclusion and interaction with the KR and local Ministry of Emergency Situations staff. In addition to the ERT, all KOC personnel who are involved with handling, transport or use of cyanide are provided with initial cyanide awareness training, and mandatory annual refresher training.

Descriptions of specific emergency response duties and responsibilities of personnel are provided in the Overall ERP as well as the BMY ERP. In addition, there are written orders and instructions that specify the individuals appointed in charge of safety and safe transportation of cyanide along the route from BMY to the Kumtor mine site and the roles, duties and responsibilities of all staff (ERT, security and drivers) involved with cyanide at BMY and during transport.

The BMY facility has a First Aid building adjacent to the reagent pad, and includes emergency shower and eye wash stations, first aid equipment, PPE (including SCBAs) and spill response materials in the event of a spill on the pad or in the warehouse. KOC maintains a detailed list of ERT equipment and inventory for the mobile response units (MRU) and security response units (SRU) that accompany the convoy. The equipment in these units is verified and documented the day prior to the convoy, and the record included with the Convoy Commanders documentation. The equipment includes SCBAs which are inspected monthly and used quarterly, to ensure the quality of the compressed breathing air. KOC has two fully-equipped ambulances at the mine site.

There is initial and mandatory annual cyanide awareness refresher training for every KOC employee who has the potential to handle or be in the presence of cyanide. In addition, a meeting is held with convoy drivers and personnel the morning of a cyanide convoy to review safety procedures, precautions, location of cyanide first aid kits, and the travel plans.

**Transport Practice 3.3:    *Develop procedures for internal and external emergency notification and reporting.***

The operation is                       **in full compliance with Transport Practice 3.3**  
in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

KOC has procedures and current contact information for notifying regulatory agencies, and medical facilities if an emergency occurs. Regulatory authorities, security and the police/militia are all involved and/or present during each cyanide convoy and the convoy is in continual contact with the KOC dispatch and mine site security.

**Transport Practice 3.4:    *Develop procedures for remediation of releases that recognize the additional hazards of cyanide treatment chemicals.***

The operation is                       **in full compliance with Transport Practice 3.4**  
in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

KOC's spill remediation procedures include recovery of solids and disposal of spill clean-up debris. KOC does not permit the use of neutralization chemicals for spill clean-up, except for addressing spills at the Kumtor mine storage pad where, as a Kyrgyz regulatory requirement, ferric sulphate is to be available for use to neutralize a spill.

**Transport Practice 3.5:    *Periodically evaluate response procedures and capabilities and revise them as needed.***

The operation is                       **in full compliance with Transport Practice 3.5**  
in substantial compliance with  
not in compliance with

*Summarize the basis for this Findings/Deficiencies Identified:*

The ERP is reviewed and evaluated for adequacy, based on the actual transportation 'lessons learned' and the findings of previous audits, at least annually. Kyrgyz regulation also requires ERPs to be updated and submitted annually to the government for review.

Mock emergency drills are planned and conducted quarterly in addition to the regular ERT training. During 2011, two of the mock drills undertaken included sodium cyanide spillage at BMY. The KOC ERT is part of an ERT annual challenge, which includes ERTs from other gold mining companies and its sister, Centerra's Boroo Gold Company. In September 2011, the KOC ERT placed second of eight teams.

## **CLOSING STATEMENT**

The statements made in this report, and the conclusions presented in this report represent our professional opinion and are based on the conditions observed on the dates set out in the report, the information available at time this report was prepared, the scope of work, and any limiting conditions noted herein.

WESA provides no assurances regarding changes to conditions subsequent to the time of the assessment. WESA makes no warranty as to the accuracy or completeness of the information provided by others or of the conclusions and recommendations predicated on the accuracy of that information.

This report has been prepared for Centerra Gold Inc. and Kumtor Operating Company. Any use a third party makes of this report, any reliance on the report, or decisions based upon the report, are the responsibility of those third parties unless authorization is received from WESA in writing. WESA accepts no responsibility for any loss or damages suffered by any unauthorized third party as a result of decisions made or actions taken based on this report.