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> Waste Management System at the Kumtor Mine Site: Successes and Challenges.

> > October 3, 2018

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- Kumtor Mine is the largest western-operated gold mine in Central Asia and has been operating since 1997, having produced approximately 11.5 million ounces of gold by the end of 2017
- > Altitude 3,600 4,400 m, high arctic tundra, permafrost
- > Active glaciers
- Temps: -34°C to +19°C, average -8°C
- Average annual precipitation is 428 mmH₂O, 75% as snow
- General Watercourse: Petrov lake & Kumtor River

Location of the Kumtor Mine Site





The Kumtor gold deposit is located on the north-west slope of the Ak-Shyirak mountain range of the Tien-Shan Mountains in the north-east quarter of the Kyrgyz Republic.

The deposit is 60 km southeast of Lake Issyk-Kul and 60 km northeast of the border with the of China.



In 2013, KGC in cooperation with consultants developed a comprehensive Waste Management System, including the principles, such as:

minimization of waste negative impact on the environment
effective use of financial resources intended for labor payment and equipment purchase.

In 2017, KGC achieved the previously set Waste Management Objectives, namely:

100% recycling of industrial waste, excluding tires;

■ 50% reduction in solid domestic waste volumes to be landfilled;

100% recycling of food waste from the kitchen.





The following types of waste are generated at the mine:

- Solid domestic waste: food waste, household garbage, packaging;
- Industrial waste: scrap metal, plastic, rubber, waste tires, waste oil and liquids, wooden boxes, reagent packaging, including big bags, cardboard;
- Hazardous waste: packages from reagents of high-toxic substances, mercury lamps, batteries;
- Stripping: waste rock dumps;
- Metallurgical processing waste: *tailings;*
- Medical waste.



- 1. Waste segregation by types at places;
- 2. Waste removal for recycling Plants from working areas;
- 3. Removed sorting out area, loading/unloading process .

Waste Generation





- ✓ Solid Domestic Waste
- ✓ Hazardous Waste
- ✓ Oil-Contaminated Waste
- Tailings Storage Facility
- Waste Rock Dumps
- Safety Box (medical waste)

Waste Generation Volumes (2017)



4.20 KGC Waste Generation 2017 (tonnes)

Generated	Disposal Method
7,511.2	100% Recycled
97.2	Partially recycled since 2015
425.4	100% recycled and donated to local communities
300.4	100% Recycled
1,718.2	100% Recycled
10 052.4	
438.0	Landfilled
87.8	Landfilled
18.4	100% recycled*
0.8	Temporarily stored
5 45.0	
947.8	100% recycled
	Generated 7,511.2 97.2 425.4 300.4 1,718.2 10 052.4 438.0 87.8 87.8 18.4 0.8 545.0

*Note: An additional 7.6 tonnes of batteries were recycled from temporary storage areas.

Kumtor waste generation (Mine waste rock & Tailings)





Waste rock Dumps

Tailing pond

Waste Record System







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DATE	BOL#	WEIGHT(KG)	TRUCK#	DRIVER NAME	COMPANY	CONTRACTS	LOADING AREA
26-Feb-18	202368	4,350	4053/2721	TENTIMISHEV	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
26-Feb-18	202369	7,560	4078/2759	OSMONOV	KGC	Contract #C-5425/2 Kant TRP Itd	MEGA SHOP
01-Apr-18	203771	11,240	4067/2783	OMURALIEV	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
01-Apr-18	203773	2,520	4091/2777	ROMAHOV	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
28-Apr-18	204920	5,220	4084/2772	BIALIEV	KGC	Contract #C-5425/2 Kant TRP ltd	CAT WHSE
29-Apr-18	204941	8,420	4087/2758	USUPBAEV	KGC	Contract #C-5425/2 Kant TRP Itd	MILL AREA
05-May-18	205019	2,780	4096/2717	MOLDAIPOV	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
05-May-18	205020	4,940	4089/2720	BAKTIEV	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
22-May-18	205140	8,840	4050/783	ABROSKIN	KGC	Contract #C-5425/2 Kant TRP Itd	MILL AREA
04-Jun-18	207061	10,925	4033/2779	KAKCHEKEEV	KGC	Contract #C-5425/2 Kant TRP ltd	MEGA SHOP
15-Jun-18	207156	5,170	4033/2724	ASHYRBAEV	KGC	Contract #C-5425/2 Kant TRP ltd	MEGA SHOP
26-Jun-18	206425	3,235	827/999	Bektursunov	Private	Contract #C-5208/2-1 Kant TRP Itd	BMY
08-Jul-18	207940	3,895	4084/2723	BYALIEV	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
10-Sep-18	209630	5,000	4049/2771	Baizakov	KGC	Contract #C-5208/2-1 Kant TRP Itd	FLEET SHOP
10-Son-18	200631	11 180	4058/2783	Sharehonaliov	KGC	Contract #C-5208/2-1 Kant TRD Itd	FI FET SHOP



Continuous improvement of the waste management system:

Waste Accounting Methods :

- Volume and calculation methods for generated waste accounting was replaced by weight method
 - ✓ All waste is weighed

Reduction in waste storage areas:

- Waste sorting out (separate collection) by types only at places
- Different color special bins

Waste recycling



Increase waste types for recycling (filters, oil rags)

Continuous Improvement

Compost Unit Installation

- 5-bin waste segregation system was introduced in the dinning room/kitchen
- Food waste recycling (Compost Unit)
- There are opportunities to improve food waste collection and recycling (for example, in workshops, at the Mill and other facilities).









Continuous Improvement



Result:

- ➤ Good date base (MP);
- Effective use of financial resources intended for waste management;
- Reduction in landfills and waste volumes;
- 100% recycling of industrial waste: metal, plastic, rubber, wood, paper, waste oil, rags, big bags, filters are sent from site to our local partners for recycling waste

Continuous Improvement















Air filters
✓ Pressed and collected in c-cans

- Mine equipment waste tires
 - We continue to study the opportunity of waste recycling Plant in the KR market
- Mercury lamps
 - ✓ Sorting out is required hazardous waste
- ➤ IT equipment
 - We continue to study the opportunity of waste recycling Plant









Recycle domestic waste by composting

- ✓ <u>Reduce waste volume to be landfilled</u>
- ✓ *Produce organic fertilizer for subsequent use during the mine reclamation*
- ✓ *Eliminate a food source for wild animals*
- Big tires recycling
 - ✓ Capabilities of one company are limited
 - ✓ Searching for an alternative company
- Further optimization using contractor workforce involved in the waste management process
 - ✓ Optimal work schedule on site
- ✓ ZERO Waste
 - Motivation of local companies to expand operation capacity



Reduce the use of plastic bags for food

✓ Used lunch box or paper bags

Use recycling packages for food products

- ✓ Glass containers
- ✓ Returnable packaging)

*Awareness of employees

✓ Posters









Environmental Responsibility

- Site Clean up Flash Mob at the Mine Facilities
- Separate waste collection in Bishkek office
- Ambassadors Program (Kumtor Ambassadors)

The main goal of the **Ambassador** is to be a worthy representative or bearer of KGC values:

- ✓ Clean-up events on the Issyk-Kul beaches,
- ✓ On the Issyk-Kul passes,
- \checkmark In the parks,
- ✓On the territories of child-care and other institutions.





Environmental Responsibility



Plastic Waste Bin



IMPORTANT TO BEAR IN MIND!

- Before discarding, plastic bottle, container or bag shall be emptied to remove food residue, rinsed or washed.
- Never discard plastic with food or fat residue – recycling companies in Bishkek do not accept dirty plastic. All dirty plastic stuff is eventually sent to landfills where it is burnt with a methane release.
- If bottle or container has a paper label on it – it should be removed and discarded into a scrap paper box.

Scrap Paper Box



Bin for Collection of Batteries



ACCEPTED FOR RECYCLING:

- Paper (printing, writing, sketching, drawing and other types of white paper, corrugated cardboard), used newspapers, books, magazines, brochures, hand-outs, catalogues, pocket books, copybooks, notebooks, posters and other types of printing industry products published **on** white paper.

IMPORTANT: Scrap paper is accepted for recycling only with bindings, staples, covers and backs removed.

To produce 1 ton of paper, 12 to 24 trees are required. However, trees can be cut not earlier than 10 years after planting!

DO YOU KNOW?

One AA battery, carelessly discarded into waste bin, can contaminate about 20 square meters of land with heavy metals.

Batteries contain many different metals – mercury, nickel, cadmium, lead, lithium, manganese and zinc which have a property to accumulate in living organisms, including human bodies, thus causing a significant harm to health.

Environmental Responsibility



Use of bioremediation method at the Oily Rags Landfill (trials)

The capability of microorganisms, which was previously isolated from hazardous waste landfill at the Kumtor mine, was evaluated for biodegradation of the oil contaminated soil. A reduction from 10440 to 3097 mg/kg was achieved during one month. Cleaning technology with hydrocarbon-reducing microorganisms can improve the waste management strategy as minimizing the negative impact of waste on the environment and effective use of financial resources.

Support to young scientists, joint scientific work with the students from Kyrgyz-Turkish Manas University.







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