

The second meeting of the Working Group on tailings safety and prevention of accidental water pollution in Tajikistan

25-26 May 2023



"Inventory of tailings in the Syr Darya River basin – Overview of the main hazards and risks"

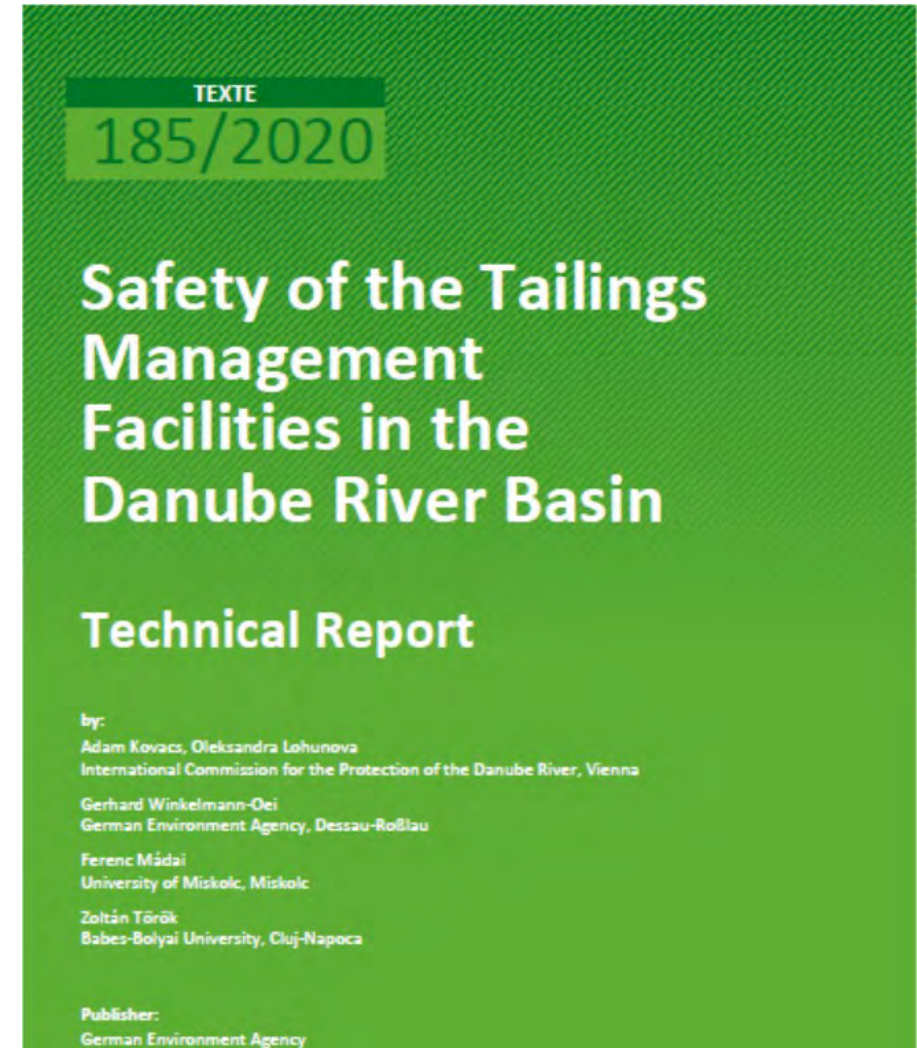
Dmitry Rudakov

Consultant to the UNECE Industrial Accidents Convention



# Methodology and objectives of the inventory

- Methodology for tailings (version 2020), hazard and risk index method of tailings.
- The template for data collection and analysis was refined based on the results of the project on the safety of tailings in the Danube River basin (Romania) in 2019-2020
- Inventory objectives:
  - 1) collection and refinement of data on tailings in the Syr Darya River basin;
  - 2) calculation of hazard and risk indices of tailings;
  - 3) ranking and preparing data for mapping



# State-administrative map of the territory of the Syr Darya river basin



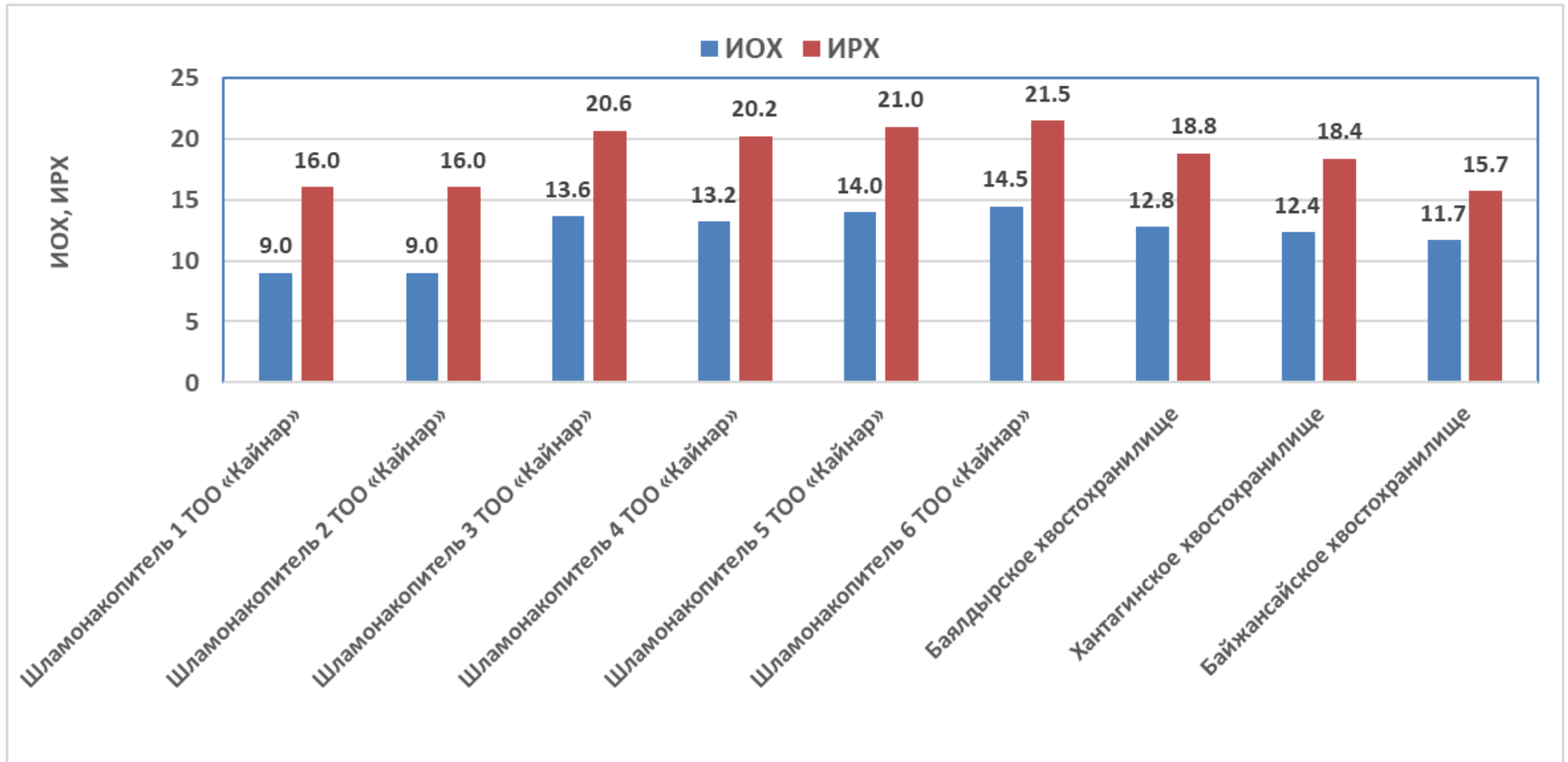
# Key data on tailings facilities in the basin countries

Parameter	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan	Total or average
Number of operating tailings / Total number of tailings	4/9	7/30	<b>0/10</b>	8/12	19/61
Share of operating tailings, %	44,4	23,3	<b>0</b>	66,6	31,1
Total amount of tailing materials, mln m <sup>3</sup>	514,359	130,049	<b>27,450</b>	704,550	1376,41
Share of tailings in operating tailings, %	86,2	89,8	<b>0</b>	98,9	91,3
Average tailings toxicity (UBA* scale)	1,27	2,97	<b>3,99</b>	3,00	2,37
Waste load on the territory of the country in the Syr Darya basin, m <sup>3</sup> /km <sup>2</sup>	1491	1176	<b>2495</b>	11735	2614
Waste load per capita in the Syr Darya basin, m <sup>3</sup> /person	150,03	40,17	<b>15,78</b>	45,35	57,54
Number of tailings with transboundary significance	0	19	<b>10</b>	4	33

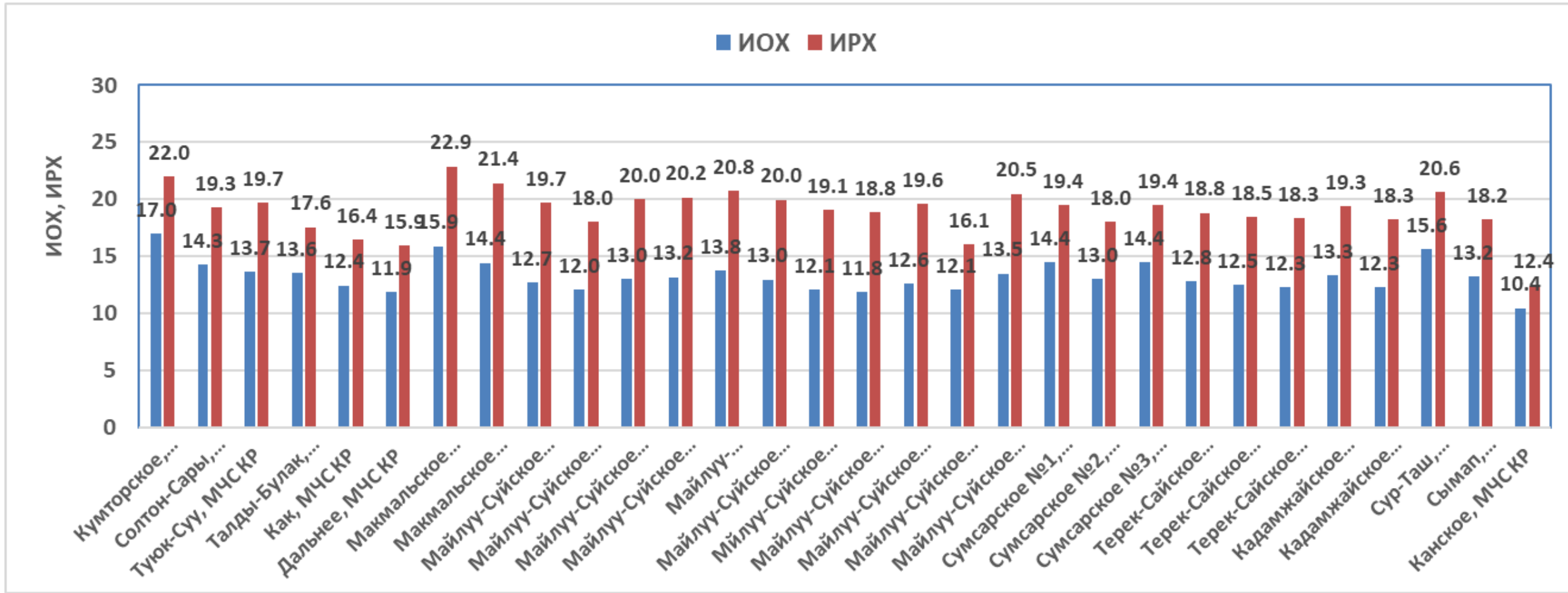
# Status and amount of waste in tailings

Country	Number of tailings				Tailings storage capacity, mln m <sup>3</sup>				Dominant tailing materials
	Operating	Closed	Abandoned	Recultivated	Minimum	Maximum	Average	Total	
Kazakhstan	4	4	0	1	0,100	286,624	57,151	514,359	Phosphorus production waste, non-ferrous metal mining pulp
Kyrgyzstan	7	18	5	0	0,020	100,000	4,335	130,049	Sludge extraction of radioactive ores and ores of non-ferrous metals
Tajikistan	0	10	0	0	0,070	19,400	2,745	27,45	Radioactive and non-ferrous ore sludge
Uzbekistan	12	3	1	0	0,165	409,100	58,713	704,55	Non-ferrous ore sludge and phosphorus sludge

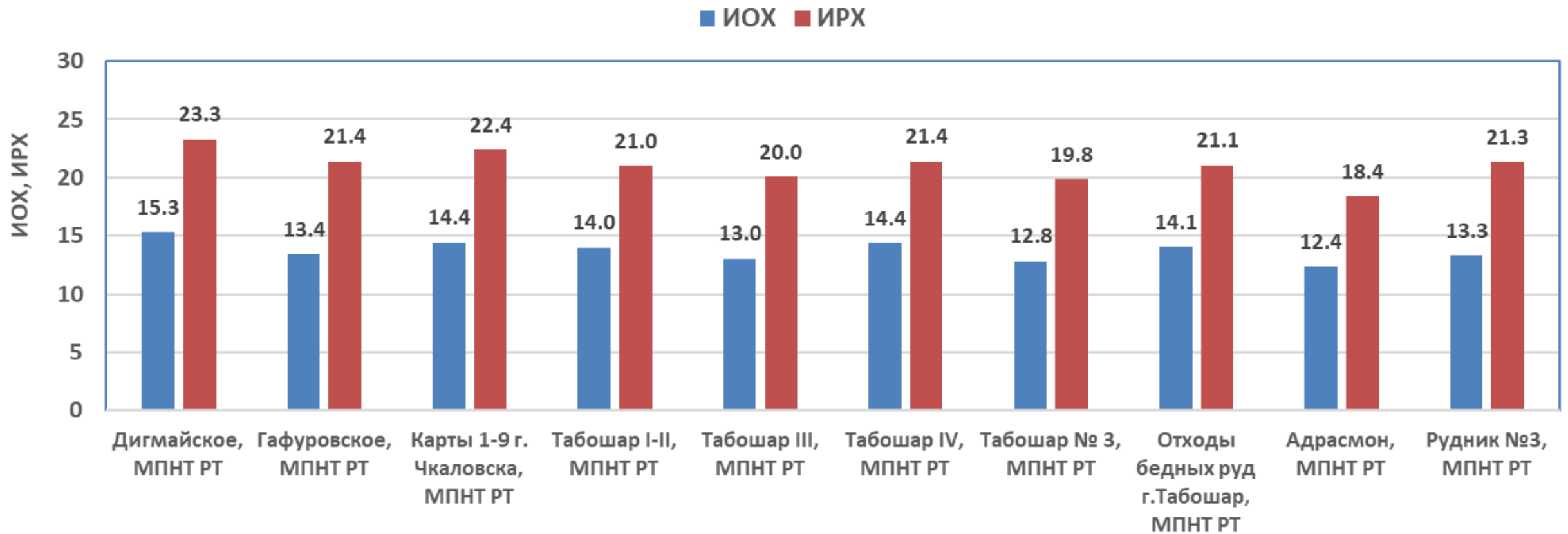
# Ranking of tailings by hazard index (THI) and risk index (TRI) of tailings storage facilities. Kazakhstan



# Ranking of tailings by hazard index (THI) and risk index (TRI) of tailings storage facilities. Kyrgyzstan

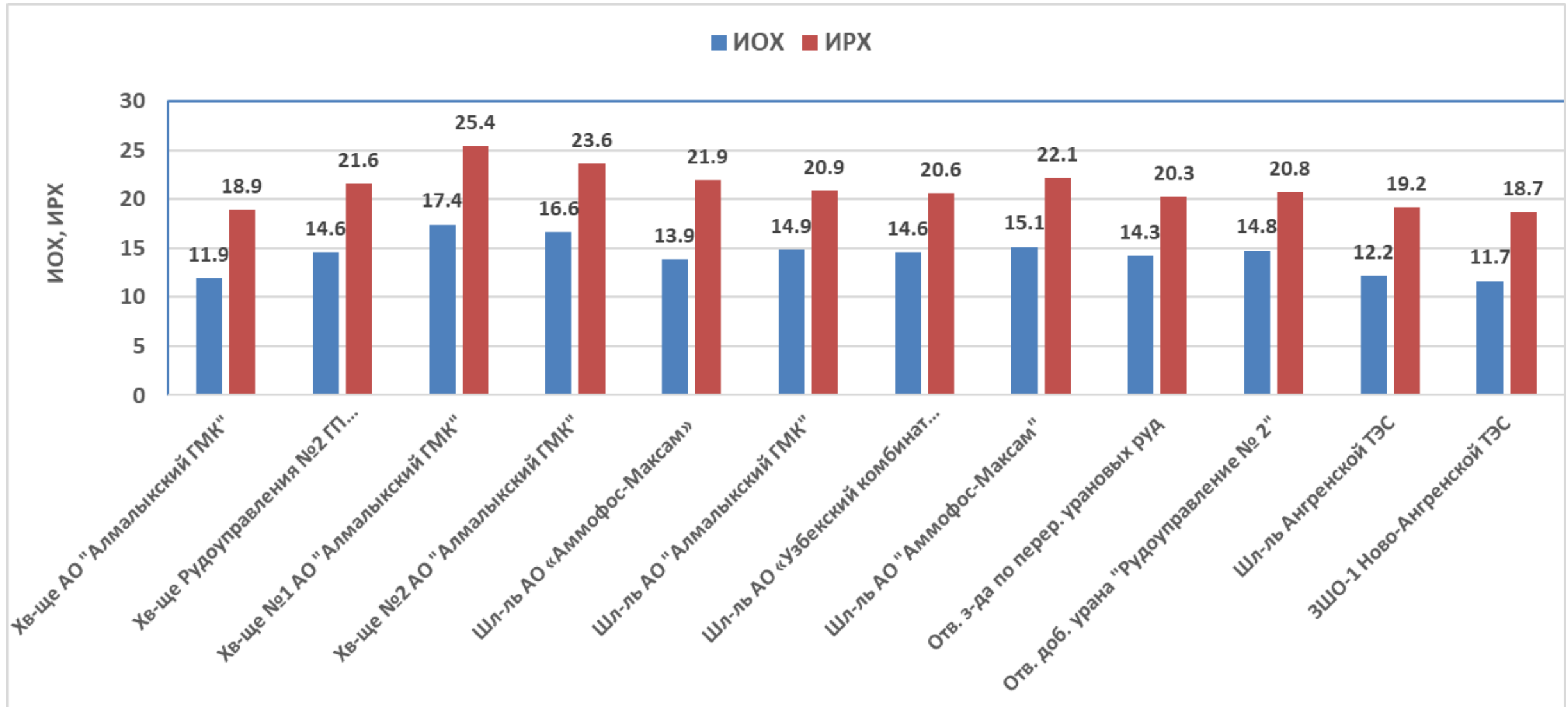


# Ranking of tailings by hazard index (THI) and risk index (TRI) of tailings storage facilities. Tajikistan





# Ranking of tailings by hazard index (THI) and risk index (TRI) of tailings storage facilities. Uzbekistan



# The most dangerous tailings

## Kazakhstan

Name of the tailing	Location	Capacity of tailing mln m3	Toxic substances	THI	THI rank	TRI	TRI rank
Sludge accumulator 5 "Kainar " LLP	Shymkent	286,624	Phosphorus	14,46	12	21,46	10
Sludge accumulator 6 "Kainar " LLP	Shymkent	95,5	Phosphorus	13,98	22	20,98	17

## Kyrgyzstan

Name of the tailing	Location	Capacity of tailing mln m3	Toxic substances	THI	THI rank	TRI	TRI rank
Kumtor, "Kumtor Gold Company"	Naryn	100	Cyanides	17,0	2	22,0	7
Makmalskoe No. 1, "Makmalzoloto" plant	Kazarman village, Toguz-Toro district	7,5	Cyanides	15,88	4	22,88	4
Sur-Tash, Aidar-Ken Mercury Plant	Aydarken	4,0	Hg, Sb	15,6	5	20,60	22
Sumsar No. 1, Ministry of Emergency Situations of the KR	Sumsar, Chatkal region	0,28	Pb, Zn, Cd, As	14,45	13/14	19,45	35/36

# The most dangerous tailings

## Tajikistan

Name of the tailing	Location	Capacity of tailing mln m3	Toxic substances	THI	THI rank	TRI	TRI rank
<b>Digmay, MPNT RT</b>	Goziyon	19,4	Radionuclides: U, Pu, Th, Rh, Po; Cd, Pb, Zn, Cyanides	15,29	6	23,29	3
<b>Maps 1-9 of Chkalovsk, MPNT RT</b>	Buston	2,6	Radionuclides: U, Pu, Th, Rh, Po	14,41	15	22,41	5

## Uzbekistan

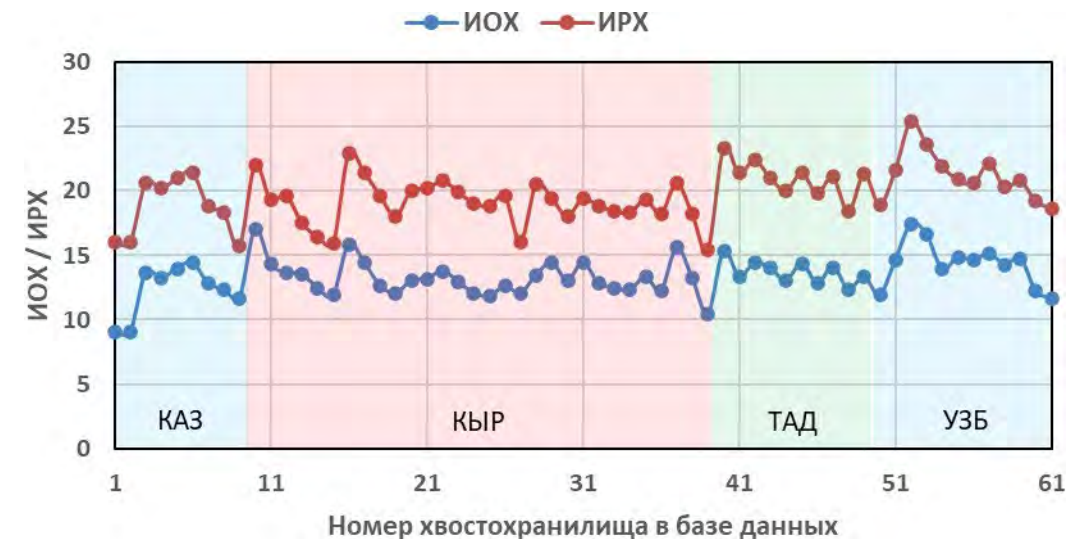
Name of the tailing	Location	Capacity of tailing mln m3	Toxic substances	THI	THI rank	TRI	TRI rank
<b>Tailing No. 1 of Almalyk MMC JSC</b>	Almalyk, Pskent district, Tashkent region	269,5	Se, Cd, P2O5	17,43	1	25,43	1
<b>Tailing No. 2 of Almalyk MMC JSC</b>	Almalyk, Pskent district, Tashkent region	409,1	Se, Cd, P2O5	16,61	3	23,61	2

# Tailings with potential transboundary effects

Country	Location	Total quantity
<b>Kyrgyzstan</b>	Naryn, Mailuu-Suu, Sumsar, Chatkal region, Kadamjay, Aydarken	19
<b>Tajikistan</b>	Goziyon, Gafurov, Buston, Istiklol, Adrasman, Khujand	10
<b>Uzbekistan</b>	Chadak, Pap district, Namangan region, Almalyk, Pskent district, Tashkent region	4

# Comparative analysis of the hazard and risk of tailings in the Syr-Darya river basin

	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
THI/TRI min	9,00 / 15,69	10,45 / 15,45	12,38 / 18,38	11,65 / 18,65
THI/TRI max	14,46 / 21,46	17,00 / 22,88	15,29 / 23,29	17,43 / 25,43
Average THI/TRI	<b>12,24 / 18,69</b>	<b>13,24 / 19,07</b>	<b>13,71 / 21,01</b>	<b>14,34 / 21,17</b>



# Conclusion

- In general, the most hazardous tailings are located in Uzbekistan and Tajikistan, compared to the less hazardous ones in Kyrgyzstan and Kazakhstan. Most of them store waste from the extraction of gold, non-ferrous metals, uranium, and phosphorus production.
- The basin countries have specific hazards and risks associated with tailings. Kazakhstan has the highest per capita burden; Uzbekistan has the highest volume of waste per country, Tajikistan has tailings with materials of higher toxicity.
- Thirty-three of the 61 tailings are of transboundary importance, with the majority located in Kyrgyzstan (19) and Tajikistan (10), at the same time, 2 out of 4 transboundary tailings in Uzbekistan store hundreds of millions of m<sup>3</sup> of waste.

Thank you for your attention!