

8 January 2020

**Church of England Pensions Board and
Council on Ethics Swedish National Pension Fund**

Ivanhoe Mines' Disclosure on Tailings Storage Facility Management

Annex 2 Disclosure requirements

Overview Question:

Please:

- a) Provide an overview of your tailings management system and how you manage risk.

Ivanhoe Mines has three principal projects in Africa, each with a unique shareholding structure. Kamo-a-Kakula and Platreef are greenfield projects which are both in development phase and Kipushi is a brownfield project where Ivanhoe Mines and its partner, Gécamines, are refurbishing a historical zinc and copper mine that had been flooded following a period of abandonment.

- The Kamo-a-Kakula Project comprises a newly discovered, very large stratiform copper deposit with adjacent prospective exploration areas, located within the Central African Copperbelt in Lualaba Province, Democratic Republic of Congo (DRC). The Kamo-a-Kakula Project lies approximately 25 km west of the town of Kolwezi, and about 270 km west of Lubumbashi. Kamo-a-Kakula is a joint venture between Ivanhoe Mines (39.6%), Zijin Mining Group (39.6%), Crystal River Global Limited (0.8%) and the Government of the Democratic Republic of Congo (20%).
- The Platreef Project, which includes an underground deposit of thick, high-grade PGE-nickel-copper-gold mineralization discovered by Ivanhoe's geologists, is located in the northern limb of the Bushveld Complex approximately 11 km from Mokopane and 280 km northeast of Johannesburg, South Africa. Ivanhoe owns 64% of the Platreef Project through its subsidiary, Ivanplats, and is directing all mine development work. The South African beneficiaries of the approved broad-based, black economic empowerment structure have a 26% stake in the Platreef Project and the remaining 10% is owned by a Japanese consortium of Itochu Corporation; JOGMEC; ITC Platinum, an Itochu affiliate; and Japan Gas Corporation.
- The Kipushi Project is located adjacent to the town of Kipushi in the southern Haut-Katanga Province in the DRC, adjacent to the border with Zambia. The town of Kipushi is situated approximately 30 km southwest of Lubumbashi, the provincial capital. The Kipushi Mine is a

past-producing, high-grade underground copper-zinc mine in the Central African Copperbelt, which operated from 1924 until 1993. Due to a combination of economic and political factors, the mine was put on care and maintenance in 1993. The mine produced approximately 60 Mt at 6.78% Cu and 11.03% Zn including, from 1956 through 1978, approximately 12,673 tonnes of lead and 278 tonnes of germanium. Ivanhoe and Gécamines own, respectively, 68% and 32% of the Kipushi Project, through their holdings in KICO, the mining rights holder. Ivanhoe's interest in KICO was acquired in November 2011 and comprises mining rights for copper and cobalt and associated minerals, as well as the underground workings and related infrastructure, inclusive of a series of vertical mine shafts.

Given the unique history, shareholding and project progress of each mine in Ivanhoe's portfolio – the current status of tailings design, implementation and management is as follows:

- Kamoakakula Project – the tailings storage facility is in design phase with the commencement of construction planned for Q2 2020.
- Platreef Project – Platreef is currently doing studies in order to minimize CAPEX, one of these initiatives include toll treating the first production ore. Hence no final established dates is available for the TSF.
- Kipushi Project – there is an inactive historical tailings storage facility (consisting of three dams) north-east of the current mining license area which was used during the Gécamines production years. Although the historical tailings storage facility is a legacy issue for which Gécamines was responsible, Ivanhoe Mines recognises the social and reputational risk posed by the proximity of the historical tailings facility to Ivanhoe's current operations. A recent independent review indicated that although the dams appear generally safe, an additional safety assessment of the structural integrity of the dam wall at Dam 3 needs to be undertaken (the final containment site). Having near completed a Feasibility Study on the Kipushi Project, no further use of the historic tailings facilities is intended. The FS dictates that a new downstream tailings storage facility is planned for when production resumes.

- b) Confirm whether your approach to tailings management has changed or will change in light of the recent tailings disasters at Brumadinho, Mariana, Mt Polley and others. Have you, for example, reviewed all tailings storage facilities with upstream dam construction, and taken steps necessary to protect local communities and the environment e.g. buttressing, evacuation?

Ivanhoe Mines expressed its concern regarding the recent tailings storage facility failures in its most recent public Sustainability Report (p. 4 Message from our Co-Chairmen) and consequently appointed two international independent experts with 44 and 48 years (respectively) of experience in tailings management, to conduct engineering audits of its planned tailings

storage facilities to further safeguard employees and neighbouring communities. The result of this review was received on 13 May 2019 and its recommendations were subsequently implemented in the design phase of the three new tailings facilities Ivanhoe Mines is planning to develop at its projects. A high level management plan for the historical tailings facility at Kipushi is underway, pending Gécamines' approval.

	Notes																																										
<p>1. "Tailings Facility" Name/identifier</p>	<p>Please identify every tailings storage facility and identify if there are multiple dams (saddle or secondary dams) within that facility. Please provide details of these within question 20.</p> <ol style="list-style-type: none"> 1. Kamo-Kakula tailings storage facility 2. Platreef tailings storage facility 3. Kipushi historical tailings storage facility 4. Kipushi new tailings storage facility 																																										
<p>2. Location</p>	<p>Please provide Long/Lat coordinates</p> <ol style="list-style-type: none"> 1. Kamo-Kakula tailings storage facility <p>This tailings storage facility has not yet been established. The coordinates for the proposed location are:</p> <table border="1" data-bbox="759 1211 1350 1760"> <thead> <tr> <th colspan="3">Proposed Kamo-Kakula TSF Coordinates (subject to final assessment)</th> </tr> <tr> <th>Coordinate ID Point Number</th> <th>X UTM ZONE 35 South</th> <th>Y UTM ZONE 35 South</th> </tr> </thead> <tbody> <tr><td>1</td><td>308326.129</td><td>8800145.978</td></tr> <tr><td>2</td><td>309562.999</td><td>8799669.667</td></tr> <tr><td>3</td><td>308971.452</td><td>8798094.770</td></tr> <tr><td>4</td><td>308426.000</td><td>8797557.000</td></tr> <tr><td>5</td><td>308733.297</td><td>8796604.379</td></tr> <tr><td>6</td><td>309632.141</td><td>8795782.360</td></tr> <tr><td>7</td><td>308095.656</td><td>8794668.408</td></tr> <tr><td>8</td><td>306858.785</td><td>8795574.934</td></tr> <tr><td>9</td><td>306781.961</td><td>8796865.582</td></tr> <tr><td>10</td><td>306735.866</td><td>8798517.303</td></tr> <tr><td>11</td><td>306912.562</td><td>8799070.438</td></tr> <tr><td>12</td><td>307580.933</td><td>8799723.444</td></tr> </tbody> </table> <ol style="list-style-type: none"> 2. Platreef tailings storage facility <p>This tailings storage facility has not yet been established. The coordinates for the proposed location are:</p>	Proposed Kamo-Kakula TSF Coordinates (subject to final assessment)			Coordinate ID Point Number	X UTM ZONE 35 South	Y UTM ZONE 35 South	1	308326.129	8800145.978	2	309562.999	8799669.667	3	308971.452	8798094.770	4	308426.000	8797557.000	5	308733.297	8796604.379	6	309632.141	8795782.360	7	308095.656	8794668.408	8	306858.785	8795574.934	9	306781.961	8796865.582	10	306735.866	8798517.303	11	306912.562	8799070.438	12	307580.933	8799723.444
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Coordinate ID Point Number	X LO 29 Hartbeesthoek 1994	Y LO 29 Hartbeesthoek 1994
1	-193.561	-2662006.483
2	744.868	-2662006.483
3	1327.748	-2661784.112
4	1750.987	-2661969.039
5	2262.500	-2662169.208
6	2328.768	-2662843.538
7	2342.760	-2663101.203
8	1754.424	-2663866.934
9	1278.312	-2664255.349
10	555.837	-2663898.104
11	169.310	-2663469.773
12	-53.640	-2662993.099
13	-161.694	-2662348.379

3. Kipushi historical tailings storage facility

The coordinates for the extent of the three historical tailings areas are:

Kipushi TSF Coordinates (historical site)		
Coordinate ID Point Number	X UTM ZONE 35 South	Y UTM ZONE 35 South
1	528187.2	8698880
2	528341.1	8698758
3	528619.2	8698737
4	529070	8698604
5	529431.8	8698542
6	529820.5	8698434
7	529823.2	8698251
8	529828.6	8697911
9	529861	8697592
10	529858.3	8697492
11	529437.2	8697581
12	528945.8	8697703
13	528665.1	8697816
14	528373.5	8697965
15	528065.7	8698078
16	527739.1	8697940
17	527652.7	8698016
18	527434	8698094
19	527412.4	8698275
20	527490.7	8698475
21	527493.4	8698645
22	527550.1	8698815
23	527768.8	8698823
24	527895.6	8698742
25	528022.5	8698866

	<p>4. Kipushi new tailings storage facility</p> <p>This tailings storage facility has not yet been established. The coordinates for the proposed location are:</p> <table border="1" data-bbox="759 414 1350 1093"> <thead> <tr> <th colspan="3">Proposed Kipushi (new) TSF Coordinates (subject to final assessment)</th> </tr> <tr> <th>Coordinate ID Point Number</th> <th>X UTM ZONE 35 South</th> <th>Y UTM ZONE 35 South</th> </tr> </thead> <tbody> <tr><td>1</td><td>525421.387</td><td>8698315.662</td></tr> <tr><td>2</td><td>525926.118</td><td>8698316.118</td></tr> <tr><td>3</td><td>525958.563</td><td>8698128.180</td></tr> <tr><td>4</td><td>526059.601</td><td>8698084.397</td></tr> <tr><td>5</td><td>526034.903</td><td>8697929.472</td></tr> <tr><td>6</td><td>526205.544</td><td>8697836.292</td></tr> <tr><td>7</td><td>526328.512</td><td>8697393.421</td></tr> <tr><td>8</td><td>526327.918</td><td>8696703.543</td></tr> <tr><td>9</td><td>525929.416</td><td>8696700.900</td></tr> <tr><td>10</td><td>525087.597</td><td>8697233.158</td></tr> <tr><td>11</td><td>525159.239</td><td>8697394.405</td></tr> <tr><td>12</td><td>525420.621</td><td>8697394.189</td></tr> <tr><td>13</td><td>525420.851</td><td>8697671.264</td></tr> <tr><td>14</td><td>525438.903</td><td>8697757.053</td></tr> <tr><td>15</td><td>525452.795</td><td>8697903.573</td></tr> <tr><td>16</td><td>525421.119</td><td>8697993.459</td></tr> </tbody> </table>	Proposed Kipushi (new) TSF Coordinates (subject to final assessment)			Coordinate ID Point Number	X UTM ZONE 35 South	Y UTM ZONE 35 South	1	525421.387	8698315.662	2	525926.118	8698316.118	3	525958.563	8698128.180	4	526059.601	8698084.397	5	526034.903	8697929.472	6	526205.544	8697836.292	7	526328.512	8697393.421	8	526327.918	8696703.543	9	525929.416	8696700.900	10	525087.597	8697233.158	11	525159.239	8697394.405	12	525420.621	8697394.189	13	525420.851	8697671.264	14	525438.903	8697757.053	15	525452.795	8697903.573	16	525421.119	8697993.459
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<p>3. Ownership</p>	<p>Please specify: Owned and Operated, Subsidiary, JV, NOJV, as of March 2019</p> <p>(See introduction for complete information)</p> <ol style="list-style-type: none"> 1. Kamoakakula Project: JV 2. Platreef Project: Subsidiary 3. Kipushi: JV 																																																						
<p>4. Status</p>	<p>Please specify: Active, Inactive/Care and Maintenance, Closed etc. We take closed to mean: a closure plan was developed and approved by the relevant local government agency, and key stakeholders were involved in its development; a closed facility means the noted approved closure plan was fully implemented or the closure plan is in the process of being implemented. A facility that is inactive or under C&M is not considered closed until such time a closure plan has been implemented.</p> <ol style="list-style-type: none"> 1. Kamoakakula tailings storage facility 																																																						

	<p>Tailings storage facility in design phase.</p> <p>2. Platreef tailings storage facility</p> <p>Tailings storage facility in design phase.</p> <p>3. Kipushi historical tailings storage facility</p> <p>Inactive, high level management plan under development.</p> <p>4. Kipushi new tailings storage facility</p> <p>Tailings storage facility in design phase</p>
5. Date of initial operation	<p>1. Kamo-Kakula tailings storage facility projected date of operation: Q2 – 2021.</p> <p>2. Platreef tailings storage facility projected date of operation: Not yet finalised due to further study work being done for the project.</p> <p>3. Kipushi historical tailings storage facility initial date of operation: 1924</p> <p>4. Kipushi new tailings storage facility projected date of operation: Q3 2021</p>
6. Is the Dam currently operated or closed as per currently approved design?	<p>Yes/No. If 'No', more information can be provided in the answer to Q20</p> <p>The three new dams are in design phase and the Kipushi historical dam has been inactive for 26 years under Gécamines management.</p>
7. Raising method	<p>Note: Upstream, Centreline, Modified Centreline, Downstream, Landform, Other.</p> <p>1. Kamo-Kakula tailings storage facility</p> <p>Downstream with engineered earth-filled walls.</p> <p>2. Platreef tailings storage facility</p> <p>Upstream design (approved by independent international review) feasible for South African conditions due to low seismic loading conditions and high-nett evaporation. Design</p>

	<p>will be subject to review prior to project execution.</p> <ol style="list-style-type: none"> 3. Kipushi historical tailings storage facility 3 x Low rise dams wall in river 4. Kipushi new tailings storage facility Downstream with engineered earth-filled walls.
<p>8. Current Maximum Height</p>	<p>Note: Please disclose in metres</p> <p>Three of Ivanhoe's tailings storage facilities are still in design phase. For Platreef's tailings dam, the projected maximum height is 70 metres and for Kamoakakula's 55 metres, whereas Kipushi's will be 20 metres.</p>
<p>9. Current Tailings Storage Impoundment Volume</p>	<p>Note: (m3 as of March 2019)</p> <ol style="list-style-type: none"> 1. Kamoakakula tailings storage facility Zero (construction likely to start in Q1 2020) 2. Platreef tailings storage facility Zero (not under construction) 3. Kipushi historical tailings storage facility 45 Million tonnes 4. Kipushi new tailings storage facility Zero (not under construction)
<p>10. Planned Tailings Storage Impoundment Volume in 5 years' time.</p>	<p>(m3 as planned for January 2024)</p> <ol style="list-style-type: none"> 1. Kamoakakula tailings storage facility Approximately 8000m³ Kamoakakula plans to place between 50% to 60% of the tailings back underground as mine backfill 2. Platreef - As per above, this information isn't available currently. 3. Kipushi historical tailings storage facility - Nil 4. Kipushi new tailings storage facility 1,297,085 m³ at a dry density of 2.0 t/m³.

<p>11. Most recent Independent Expert Review</p>	<p>For this question we take ‘Independent’ to mean a suitably qualified individual or team, external to the Operation, that does not direct the design or construction work for that facility.</p> <p>13 May 2019 Conducted by John Wates of Johannesburg and Peter Lighthall of Victoria BC Canada, both independent specialist consultants with over 44 and 48 years respectively of experience in tailings management.</p>
<p>12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?</p>	<p>(Yes or No) We take the word “relevant” here to mean that you have all necessary documents to make an informed and substantiated decision on the safety of the dam, be it an old facility, or an acquisition, or legacy site. More information can be provided in your answer to Q20</p> <ol style="list-style-type: none"> 1. Kamo-a-Kakula tailings storage facility Yes 2. Platreef tailings storage facility No – Design has been done to FS level. 3. Kipushi historical tailings storage facility Yes low risk of failure 4. Kipushi new tailings storage facility No – Design has been done to FS level.
<p>13. What is your hazard categorisation of this facility, based on the consequence of failure?</p>	<p>KICO (Kipushi Project) – Very low risk with minimum impact area. The Kakula TSF was classified according to the South African National Standards, Code of Practice for Mine Tailings (SANS 0286:1998), as the DRC does not have its own safety classification system. It is classified as high hazard.</p>
<p>14. What guideline do you follow for the classification system?</p>	
<p>15. Has this facility, at any point in its history, failed to be confirmed or certified as stable, or experienced notable stability concerns, as identified by an independent engineer (even if later certified as stable by the same or a different firm).</p>	<p>(Yes or No) We note that this will depend on factors including local legislation that are not necessarily tied to best practice. As such, and because remedial action may have been taken, a “Yes” answer may not indicate heightened risk. Stability concerns might include toe seepage, dam movement, overtopping, spillway failure, piping etc. If yes, have appropriately designed and reviewed mitigation actions been implemented? We also note that this question does not bear upon the appropriateness of</p>

	<p>the criteria, but rather the stewardship levels of the facility or the dam. Additional comments/information may be supplied in your answer to Q20.</p> <ol style="list-style-type: none"> 1. Kamoia-Kakula tailings storage facility No 2. Platreef tailings storage facility No 3. Kipushi historical tailings storage facility No 4. Kipushi new tailings storage facility No
<p>16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?</p>	<p>Note: Answers may be "Both".</p> <p>Both for all facilities.</p> <p>For Kamoia-Kakula we have external specialists: Epoch Resources</p>
<p>17. Has a formal analysis of the downstream impact on communities, ecosystems and critical infrastructure in the event of catastrophic failure been undertaken and to reflect final conditions? If so, when did this assessment take place?</p>	<p>Note: Please answer 'yes' or 'no', and if 'yes', provide a date.</p> <ol style="list-style-type: none"> 1. Kamoia-Kakula tailings storage facility Yes, 14 February 2019 (Epoch) Yes, 13 May 2019 (Independent review) 2. Platreef tailings storage facility Yes, 13 May 2019 (Independent review) 2017 – Independent review, contracted by Itochu through Kiso-Jiban Consultants – February 2017 3. Kipushi historical tailings storage facility Yes, 13 May 2019 (Independent review) 4. Kipushi new tailings storage facility Yes, 13 May 2019 (Independent review)
<p>18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?</p>	<p>Please answer both parts of this question (e.g. Yes and Yes)</p> <p>Yes, for all three new facilities as part of formal Environmental and Social Impact Assessments and associated management plans.</p> <p>Yes, for all three new facilities as part of the closure and rehabilitation plans.</p>

	<p>Long-term planning for the historical Kipushi tailings facility is currently under discussion with Gécamines.</p> <p>Kipushi new tailings storage facility</p> <ul style="list-style-type: none"> a) Conceptual closure plan in place b) Includes long term monitoring
<p>19. Have you, or do you plan to assess your tailings facilities against the impact of more regular extreme weather events as a result of climate change, e.g. over the next two years?</p>	<p>(Yes or No)</p> <p>Since the tailings storage facilities at Ivanhoe's projects are not yet constructed medium term planning does not include additional assessment. However, all three sites are planned with 1:100 year flood risk in mind.</p>
<p>20. Any other relevant information and supporting documentation.</p>	<p>Note: this may include links to annual report disclosures, further information in the public domain, guidelines or reports etc. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.</p> <p>Ivanhoe Mines prides itself in its safe, modern and innovative approach to mine design and development. We prioritize the safety of our workers and host communities through careful consideration of the impact of our Projects on our stakeholders. Our mine design team works closely with international experts while designing tailings storage facilities for each of our three principal Projects, taking factors such as geological, hydrogeological, environmental and social conditions into careful consideration. These designs are subject to stringent internal and external review requirements to ensure that all possible risks have been accounted for and appropriate mitigation measures are planned, implemented and monitored.</p> <p>Our TSF plans provide for returning anything between 50 – 80% of the tailings underground as backfill. Consequently our tailings footprints will be relatively small compared to other operations. On page 67 of our 2018 Sustainability Report. Ivanhoe discloses its approach to different categories of tailings storage facility design criteria for each of its principal projects.</p> <p>https://www.ivanhoemines.com/site/assets/files/4354/ivanhoemines_sr18.pdf</p>

Signature Tony Giardino
 Tony Giardino, President

Date January 8, 2020