



# DIRECTORY OF TAILINGS STORAGE FACILITIES 2021

This table provides detail on South32's operated tailings storage facilities (TSFs) including Worsley Alumina, Cannington, Cerro Matoso, South Africa Manganese, Australia Manganese, Illawarra Metallurgical Coal and the Hermosa project. This table also provides detail on the TSFs at our non-operated facilities of Mineração Rio do Norte S.A (MRN) (14.8% South32 interest) and Alumar (36% South32 interest).

Comments are provided in row 20 to provide additional context.  
Notes on the directory questions are provided on page 32.

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## Directory of Tailings Storage Facilities 2021 continued

### Worsley Alumina, Western Australia

	BRDA 1	BRDA 2	BRDA 4	BRDA 4X
1. Tailings Facility name				
2. Location	-33.22257, 116.08045	-33.21850, 116.07326	-33.22227, 116.06523	-33.21081, 116.06397
3. Ownership	JV, Operated	JV, Operated	JV, Operated	JV, Operated
4. Status	Closed	Active	Active	Active
5. Date of initial operation	1983	1987	1994	2002
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes	Yes
7. Raising method	Upstream	Upstream	Upstream, Modified Centreline	Upstream, Downstream
8. Current maximum height (lowest downstream toe to crest)	26	24	55	45
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	10	13	35	20
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	10	13	42	30
11. Most recent independent expert review	June 2020	June 2020	June 2020	June 2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Low	High B	High B	High B
14. What guideline do you follow for the classification system?	ANCOLD	ANCOLD	ANCOLD	ANCOLD
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?	No	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both	Both
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?	2012	Yes, 2018	Yes, 2018	Yes, 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.		18. This facility was closed in 2009 and is subject to ongoing monitoring.	9. The volume of residue in the BRDA is being re-assessed.	9. The volume of residue in the BRDA is being re-assessed.

**Worsley Alumina, Western Australia** continued

1. Tailings Facility name	BRDA 5	SEP 1	SEP 2A	SEP 3
2. Location	-33.24424, 116.05635	-33.23063, 116.08190	-33.22632, 116.08137	-33.22863, 116.07973
3. Ownership	JV, Operated	JV, Operated	JV, Operated	JV, Operated
4. Status	Active	Active	Inactive	Active
5. Date of initial operation	1994	2017	1987	1984
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes	Yes
7. Raising method	Upstream, Downstream	Downstream	Downstream	Downstream
8. Current maximum height (lowest downstream toe to crest)	52	7	15	12
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	85	0	0	0
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	99	0	0	1
11. Most recent independent expert review	June 2020	June 2020	June 2020	June 2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	yes	Yes	yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	High B	Low	Low	Low
14. What guideline do you follow for the classification system?	ANCOLD	ANCOLD	ANCOLD	ANCOLD
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?	No	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both	Both
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?	Yes, 2018	No	Yes, 2020	No
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	9. The volume of residue in the BRDA is being re-assessed.		The pond is currently empty.	

## Directory of Tailings Storage Facilities 2021 continued

### Cannington, Queensland Australia

1. Tailings Facility name	Cell 1	Cell 2	Cell 3
2. Location	-21.85425, 140.91047	-21.84960, 140.90638	-21.84501, 140.90129
3. Ownership	Owned, Operated	Owned, Operated	Owned, Operated
4. Status	Active	Inactive	Inactive
5. Date of initial operation	1997	2002	2014
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Upstream	Upstream	Upstream
8. Current maximum height (lowest downstream toe to crest)	15	17	10
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	5	7	3
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	6	7	5
11. Most recent independent expert review	June 2021	June 2021	June 2021
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	High B	High C	High C
14. What guideline do you follow for the classification system?	ANCOLD	ANCOLD	ANCOLD
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, 2020	Yes, 2020	Yes, 2020
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	18. TSF closure included in Cannington site closure plan. Closure capping trials are currently underway.	18. TSF closure included in Cannington site closure plan. Closure capping trials are currently underway.	18. TSF closure included in Cannington site closure plan. Closure capping trials are currently underway.

**Cerro Matoso, Colombia**

1. Tailings Facility name	Sajana TSF
2. Location	7.89259, -75.52460
3. Ownership	Owned, Operated
4. Status	Inactive
5. Date of initial operation	2008
6. Is the dam currently operated or closed as per currently approved design?	No
7. Raising method	Upstream
8. Current maximum height (lowest downstream toe to crest)	34
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	11
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	11
11. Most recent independent expert review	December 2019
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Low
14. What guideline do you follow for the classification system?	ANCOLD
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?	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both
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?	No
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes
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?	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	14. No formal hazard categorization undertaken. The risk is considered low as there is no community downstream of TSF and CMSA is owner of the all potentially affected areas. The facility is not used and is undergoing formal closure planning. 17. Draft closure report being developed by third party consultant.

## Directory of Tailings Storage Facilities 2021 continued

### South Africa Manganese

1. Tailings Facility name	Mamatwan - Adams pit	Metalloys - New North Plant Sludge Dam	Metalloys - New West Plant Sludge Dam	Wessels - Tailings Slimes Facility (TSF)
2. Location	-27.38106, 22.98732	-26.56793, 27.98768	-26.56065, 27.98650	-27.11151, 22.85964
3. Ownership	JV, Operated	JV, Operated	JV, Operated	JV, Operated
4. Status	Active	Active	Active	Active
5. Date of initial operation	1988	1998	1998	1973
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes	Yes
7. Raising method	Other	Downstream	Downstream	Upstream
8. Current maximum height (lowest downstream toe to crest)	40	5	4	6
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	1.47	0.07	0.1	0.505
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	1.36	0.07	0.1	1
11. Most recent independent expert review	August 2016	2017	August 2016	June 2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	No	Yes	Yes	No
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Not applicable	Small Category 1	Small Category 1	Low
14. What guideline do you follow for the classification system?	Not applicable	GNR	GNR	SANS 10286
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?	No	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Internal	Both	Both	Both
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?	Not Applicable - No downstream receptors	No	No	No
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) No	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) No
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?	Yes	Yes	Yes	Yes

South Africa Manganese continued

	Mamatwan - Adams pit continued	Metalloys - New North Plant Sludge Dam continued	Metalloys - New West Plant Sludge Dam continued	Wessels - Tailings Slimes Facility (TSF) continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>6. Currently operated</p> <p>8. In-pit disposal with no dam wall and therefore no dam height.</p> <p>13 &amp; 14. No formal hazard classification has been undertaken as the facility is located in-pit. It is likely to be considered a low under SANs 10286 or ANCOLD.</p> <p>15. No instability along the slope / dump.</p> <p>16. In house - covered by the rock engineering ground stability monitoring areas. External - no situation in the past led to such requirement.</p> <p>18. Closure included in the Mamatwan closure plan after rehabilitation of area as part general surface rehabilitation with monitoring for 5 years.</p> <p>19. Planning to assess climate change over the next two years</p>	<p>9. Metalloys is under Care and Maintenance and the start-up date is unknown.</p> <p>13. Department of Water and Sanitation in terms of GNR 139 of February 2012 promulgated in terms of the Water Act, 54 of 1956 and Chapter 12 of the National Water Act (Act No. 36 of 1998), Regulations regarding the safety of dams in terms of Section 123 (1) of the National Water Act, 1998.</p> <p>17. Dams are lined ponds with low risk.</p> <p>18. Closure is included in Metalloys site closure plan and the facility to be capped at closure and monitored for 5 years)</p>	<p>9. Metalloys is currently under Care and Maintenance and the start-up date is unknown.</p> <p>13. Department of Water and Sanitation in terms of GNR 139 of February 2012 promulgated in terms of the Water Act, 54 of 1956 and Chapter 12 of the National Water Act (Act No. 36 of 1998), Regulations regarding the safety of dams in terms of Section 123 (1) of the National Water Act, 1998.</p> <p>17. Dams are lined ponds with low risk.</p> <p>18. Closure is included in Metalloys site closure plan and the facility to be capped at closure and monitored for 5 years)</p>	<p>10. The dam is currently being re-mined on southern side to recover the concentrate product and sold to the market. Minimal concurrent deposition is occurring during re-mining operations.</p> <p>18. Closure is included in the overall Wessels closure plan with rehabilitation of area as part general surface rehabilitation.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Australia Manganese

1. Tailings Facility name	GEMCO - TSF5	GEMCO - TSF6	GEMCO - TSF7
2. Location	-13.97455, 136.43397	-13.97972, 136.43365	-13.97673, 136.42793
3. Ownership	JV, Operated	JV, Operated	JV, Operated
4. Status	Inactive	Inactive	Inactive
5. Date of initial operation	1972	1999	1999
6. Is the dam currently operated or closed as per currently approved design?	No	No	No
7. Raising method	Centreline	Centreline	Centreline
8. Current maximum height (lowest downstream toe to crest)	8	9	15
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	5	1	7
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	5	1	7
11. Most recent independent expert review	December 2020	December 2020	December 2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Partial	Partial	Partial
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Significant	Significant	Significant
14. What guideline do you follow for the classification system?	ANCOLD	ANCOLD	ANCOLD
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, 2012	Yes, 2012	Yes, 2012
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	12. Historic facility and not all the documentation is available. 18. Closure included in GEMCO site closure plan and implementation planned for 2020 - 2023.	12. Historic facility and not all the documentation is available. 18. Closure included in GEMCO site closure plan and implementation planned for 2020 - 2023.	12. Historic facility and not all the documentation is available. 18. Closure included in GEMCO site closure plan and implementation planned for 2020 - 2023. Closure operations have commenced on this facility



## Australia Manganese continued

1. Tailings Facility name	GEMCO - TSF8	GEMCO - TSF10	GEMCO - TSF11
2. Location	-13.99272, 136.43852	-13.98817, 136.43248	-13.99637, 136.44885
3. Ownership	JV, Operated	JV, Operated	JV, Operated
4. Status	Inactive	Inactive	Active
5. Date of initial operation	2007	2010	2013
6. Is the dam currently operated or closed as per currently approved design?	No	No	Yes
7. Raising method	Centreline	Centreline	Downstream
8. Current maximum height (lowest downstream toe to crest)	8	14	15
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	2	2	10.34
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	2	2	12
11. Most recent independent expert review	December 2020	December 2020	December 2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Partial	Partial	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Low	Significant	High A
14. What guideline do you follow for the classification system?	ANCOLD	ANCOLD	ANCOLD
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?	Yes	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, 2012	Yes, 2012	Yes, 2019
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>12. Historic facility and not all the documentation is available.</p> <p>15. TSF8 experienced a failure of its embankment on the north western corner on 3 January 2010. Prior to the failure seepage had been noted by a dozer operator who had been working in the area. Approximately 135,000m<sup>3</sup> of water and tailings spilled into an adjacent unused pit. No one was injured and the entire spill was contained on the lease. TSF8 was decommissioned immediately after the event and the damaged embankment was repaired.</p> <p>18. Sands in TSF8 will be reclaimed and reprocessed as part of its closure plan and the footprint is included in GEMCO site closure plan.</p>	<p>12. Historic facility and not all the documentation is available.</p> <p>18. Sands in TSF10 is scheduled to be mined and re-processed as part of its closure plan and the footprint is included in GEMCO site closure plan.</p>	<p>18. TSF closure is included in GEMCO site closure plan. Dam beak Analysis Completed, Levee wall extended to include mine plan.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Australia Manganese continued

1. Tailings Facility name	GEMCO - TSF13	GEMCO - TSF18	GEMCO - TSF16
2. Location	-14.01340, 136.44860	-13.99477, 136.43000	-13.99868, 136.43625
3. Ownership	JV, Operated	JV, Operated	JV, Operated
4. Status	Active	Active	Inactive
5. Date of initial operation	2018	10.06.2020	2016
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Centreline	Centreline	Centreline
8. Current maximum height (lowest downstream toe to crest)	13	13	15.7
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	6.37	4.9	4
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	14	7.3	5
11. Most recent independent expert review	December 2020	December 2020	June 2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	High C	Significant	Significant
14. What guideline do you follow for the classification system?	ANCOLD	ANCOLD	ANCOLD
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, 2017	Yes, April 2018	Yes, 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	12. TSF 13 as-built report has been completed. 18. TSF closure is included in GEMCO site closure plan.	1. TSF 18 was previously TSF 14 that has been raised. 18. TSF closure is included in GEMCO site closure plan.	1. TSF 16 is the foundation of TSF 20. 18. TSF closure is included in GEMCO site closure plan.

	<b>Illawarra Metallurgical Coal, New South Wales, Australia</b>	<b>Hermosa, Arizona, United States of America</b>
1. Tailings Facility name	West Cliff Emplacement Area (Stages 1 - 4)	Filtered tailings facility
2. Location	-34.22193, 150.81717	31.46583, -110.72788
3. Ownership	Owned, Operated	Owned, Operated
4. Status	Active	Active
5. Date of initial operation	1975	2018
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes
7. Raising method	Landform	Upstream
8. Current maximum height (lowest downstream toe to crest)	63	27
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	1.08	1
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	22	1.175
11. Most recent independent expert review	April 2021	July 2019.
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Partial	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Not applicable	High C
14. What guideline do you follow for the classification system?	Not applicable	ANCOLD
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?	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	External	Both
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?	No	Yes, 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) No	a) Yes and b) Yes
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?	No	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>9. FY21 volume. Volume of historic combined coarse &amp; fines coal wash emplacement stockpile unknown at this stage. Awaiting aerial survey results to confirm.</p> <p>12. Historic facility and not all the documentation is available.</p> <p>13 &amp; 14. Not a tailings dam - dry coal wash emplacement of combined coarse and fines using valley infill.</p> <p>17. Formal analyses has been undertaken for the downstream water dam.</p> <p>18. West Cliff Coal Wash Emplacement Area Management Plan included in Bulli seam closure plan, which includes progressively rehabilitation approach, water management, monitoring commitments.</p> <p>19. Downstream water management facility has been evaluated against larger storms and is managed with increased freeboard.</p>	<p>8. Tailings at end of March, 19 are ~27m (40 ft) above compacted engineered fill starter embankment.</p> <p>11. This is a new facility and first audit was completed in 2019.</p> <p>12. An Operations, Maintenance and Surveillance (OMS) manual has been developed for Stages 1 and 2, but would need to be updated for future expansions (Stages 3 and 4).</p> <p>18. The tailings facility design report includes long term monitoring for closure. A Closure Plan has been created for the permitted tailings facility and conceptual closure for the future expansions (Stages 3 and 4).</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina - MRN

1. Tailings Facility name	SP-01	SP-2/3	SP-4N
2. Location	1° 40.993'S, 56° 25.079'W	1° 41.067'S, 56° 24.228'W	1° 41.109'S, 56° 25.610'W
3. Ownership	MRN	MRN	MRN
4. Status	Inactive	Inactive	Inactive
5. Date of initial operation	1989	1989	1994
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Single raise	Upstream / unknown	Centerline
8. Current maximum height (lowest downstream toe to crest)	18 (See notes on column 20)	23,2 (See notes on column 20)	26,5 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	2.02	5.934	6.7
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	2.47	6.704	7.2679
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: High Final classification: B
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	See notes on column 20	See notes on column 20	See notes on column 20
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?	No	No	No

	SP-01 continued	SP-2/3 continued	SP-4N continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>4. The facility is designated as "inactive" since it is not currently receiving any tailings discharge.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are enough to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance</p>	<p>4. The facility is designated as "inactive" since it is not currently receiving any tailings discharge.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are enough to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance</p>	<p>4. The facility is classified as "active" because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volumes of tailings stored were obtained considering the topography of October / 2020.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In the case of the reservoirs that have completed their closure projects (SP-1, SP-2/3 and SP-6) the Planned Tailings Storage Impoundment Volume in 5 years time considers the volume already deposited in the structures added to the volume for the conformation (using dry tailings), that is, the closing works are considered to have already been completed.</p> <p>12. The available documents are enough to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

	SP-4S	SP-5E	SP-5W
1. Tailings Facility name	SP-4S	SP-5E	SP-5W
2. Location	1° 41.489'S, 56° 25.646'W	1° 41.009'S, 56° 26.252'W	1° 41.079'S, 56° 26.693'W
3. Ownership	MRN	MRN	MRN
4. Status	Inactive	Inactive	Inactive
5. Date of initial operation	1994	1997	1997
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Centerline	Centerline	Centerline
8. Current maximum height (lowest downstream toe to crest)	24,5 (See notes on column 20)	27,5 (See notes on column 20)	23 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	5.35	6.21	8.03
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	5.844192	6.821799	8.414696
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: High Final classification: B
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	See notes on column 20	See notes on column 20	See notes on column 20
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?	No	No	No

	SP-4S continued	SP-5E continued	SP-5W continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>4. The facility is classified as “active” because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance</p>	<p>4. The facility is classified as “active” because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>4. The facility is classified as “active” because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

1. Tailings Facility name	SP-06	SP-7A	SP-7B
2. Location	1° 40.648'S, 56° 25.491'W	1° 40.329'S, 56° 26.059'W	1° 40.205'S, 56° 26.406'W
3. Ownership	MRN	MRN	MRN
4. Status	Inactive	Inactive	Inactive
5. Date of initial operation	2005	2000	2001
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Upstream / unknown	Centerline	Centerline
8. Current maximum height (lowest downstream toe to crest)	16,5 (See notes on column 20)	21 (See notes on column 20)	22,6 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	0.239	3.49	5.64
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	0.459	3.954155	6.48299
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	See notes on column 20	See notes on column 20	See notes on column 20
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?	No	No	No



	SP-06 continued	SP-7A continued	SP-7B continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>4. The facility is classified as “active” because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volume were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>4. The facility is classified as “active” because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volume were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>4. The facility is classified as “active” because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volume were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

1. Tailings Facility name	SP-7C	SP-08	SP-09
2. Location	1° 40.191'S, 56° 26.704'W	1° 40.388'S, 56° 27.154'W	1° 40.475'S, 56° 27.659'W
3. Ownership	MRN	MRN	MRN
4. Status	Inactive	Active	Active
5. Date of initial operation	2002	2005	2006
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Centerline	Single raise	Single raise
8. Current maximum height (lowest downstream toe to crest)	31,7 (See notes on column 20)	24 (See notes on column 20)	26,5 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	7.75	12.86	9.53
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	8.591309	13.62645	10.56054
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: High Final classification: B	Risk category: Low Potential Damage: High Final classification: B
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	See notes on column 20	a) Yes and b) No	a) Yes and b) No
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?	No	No	No

	SP-7C continued	SP-08 continued	SP-09 continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>4. The facility is classified as "active" because it corresponds to the registration at SIGBM-ANM, however it is not currently in operation.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

	SP-9A	SP-10	SP-11
1. Tailings Facility name	SP-9A	SP-10	SP-11
2. Location	1° 40.095'S, 56° 27.725'W	1° 40.995'S, 56° 27.179'W	1° 40.988'S, 56° 27.763'W
3. Ownership	MRN	MRN	MRN
4. Status	Active	Active	Active
5. Date of initial operation	2007	2009	2010
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Single raise	Single raise	Single raise
8. Current maximum height (lowest downstream toe to crest)	21 (See notes on column 20)	23,5 (See notes on column 20)	23,9 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	1.84	5.52	5.45
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	2.369587	7.720942	7.279625
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: High Final classification: B	Risk category: Low Potential Damage: Medium Final classification: C
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	See notes on column 20	a) Yes and b) No	a) Yes and b) No
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?	No	No	No

	SP-9A continued	SP-10 continued	SP-11 continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

	SP-12	SP-13	SP-14
1. Tailings Facility name	SP-12	SP-13	SP-14
2. Location	1° 41.189'S, 56° 28.144'W	1° 41.643'S, 56° 28.070'W	1° 41.951'S, 56° 28.211'W
3. Ownership	MRN	MRN	MRN
4. Status	Active	Active	Active
5. Date of initial operation	2010	2011	2012
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Single raise	Single raise	Single raise
8. Current maximum height (lowest downstream toe to crest)	18,75 (See notes on column 20)	18,5 (See notes on column 20)	18,1 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	4.39	2.57	2.17
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	5.300884	2.911661	3.459818
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) No	a) Yes and b) No	a) Yes and b) No
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?	No	No	No

	SP-12 continued	SP-13 continued	SP-14 continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

	SP-15	SP-16	SP-19
1. Tailings Facility name	SP-15	SP-16	SP-19
2. Location	1° 41.950'S, 56° 28.502'W	1° 41.241'S, 56° 28.777'W	1° 40.907'S, 56° 28.126'W
3. Ownership	MRN	MRN	MRN
4. Status	Active	Active	Active
5. Date of initial operation	2014	2016	2019
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Single raise	Single raise	Downstream
8. Current maximum height (lowest downstream toe to crest)	20,5 (See notes on column 20)	20 (See notes on column 20)	22 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	4.37	5.1	1.42
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	5.348332	8.617628	1.640712
11. Most recent independent expert review	March-21	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C	Risk category: Low Potential Damage: Medium Final classification: C
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	Yes, June 2018	Yes, June 2018	Yes, August 2019
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) No	a) Yes and b) No	a) Yes and b) No
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?	No	No	No



	SP-15 continued	SP-16 continued	SP-19 continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored were obtained by subtracting the available volume from the total capacity of the reservoir. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the available volume is equal to the volume necessary for surface levelling added by the volume necessary for flood routing. In the other reservoirs, the available volumes were obtained considering the topographic survey of October/2020 and correspond to the volume available for tailings deposition added by the volume necessary for flood routing.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In cases where the closure projects have been completed (SP-1, SP-2/3 and SP-6), the Planned Tailings Storage Impoundment Volume in 5 years time considered the volume already deposited in the structures added to the volume necessary for surface levelling of the tailings (considering the use of dry tailings).</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>13. The classification was already validated by the mining regulatory agency.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – MRN continued

	TP-01	TP-02
1. Tailings Facility name	TP-01	TP-02
2. Location	1° 41.005'S, 56° 24.659'W	1° 40.588'S, 56° 26.272'W
3. Ownership	MRN	MRN
4. Status	Inactive	Active
5. Date of initial operation	1989	2002
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes
7. Raising method	Single raise	Single raise
8. Current maximum height (lowest downstream toe to crest)	21,9 (See notes on column 20)	19,5 (See notes on column 20)
9. Current tailings storage impoundment volume (Mm³)	7.17	10,00 (See notes on column 20)
10. Planned tailings storage impoundment volume in 5 years time (Mm³)	8.76416	10,00 (See notes on column 20)
11. Most recent independent expert review	March-21	March-21
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Risk category: Low Potential Damage: High Final classification: B	Risk category: Low Potential Damage: High Final classification: B
14. What guideline do you follow for the classification system?	ANM/DNPM Ordinance n°70.389/17	ANM/DNPM Ordinance n°70.389/17
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?	Yes	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both
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?	Yes, April 2017 (risk analysis) / June 2018 (dam break study)	Yes, April 2017 (risk analysis) Yes, June 2018
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	See notes on column 20	a) Yes and b) No
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?	No	No

	TP-01 continued	TP-02 continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>4. The facility is designated as "inactive" since it is not currently receiving any tailings.</p> <p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volumes of tailings stored were obtained considering the topography of October / 2020.</p> <p>10. Planned Tailings Storage Impoundment Volume in 5 years time considered the total capacity of the reservoir, discounting the volume needed for flood routing. In the case of the reservoirs that have completed their closure projects (SP-1, SP-2/3 and SP-6) the Planned Tailings Storage Impoundment Volume in 5 years time considers the volume already deposited in the structures added to the volume for the conformation (using dry tailings), that is, the closing works are considered to have already been completed.</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>15. A prior study raised a concern regarding a specific section within this structure - a spillway was added to address this concern, as recommended in the study. The concern no longer exists and the structure has never failed to obtain a declaration of stability as required under applicable regulations.</p> <p>17. There is a Dam Break study.</p> <p>18. Closure plan is under development, where long term monitoring will be specified.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>	<p>7. This classification is according to the agency ANM.</p> <p>8. The height specified in this column refers to the downstream slope of the structure, except for TP-03, in which case the height of the upstream slope was specified. The change in maximum heights is due to the fact that the definition changed in the legislation, which previously considered height from the top of the crest to the foundation (Ordinance 70.389/2017). After Law 14.066 / 2020, the maximum height is considered from the top of the crest to the toe of the slope.</p> <p>9. The total volume of tailings stored was obtained by subtracting the available volume from the total capacity of the reservoir. The available volume was obtained using the bathymetry of February / 2021 and was considered to be equal to the volume between the tailings surface and the spillway elevation.</p> <p>10. The volume presented for TP-02 is the current volume. It is important to note that TP-02 is a thickening pond and that its volume will vary throughout the year based on the elevation of the of water on its surface.</p> <p>12. The available documents are sufficient to ensure the safety of the structure, including an independent stability report and As Is documentation.</p> <p>17. There is a Dam Break study.</p> <p>19. The structures are being evaluated for a PMP rainfall. The project until then considered the service during the operation to a rainfall of 10,000 years of recurrence. However, MRN don't have a study for the impact of climate changes, but we intend to make one study / plan, following GISTM guidance.</p>

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – Alumar

1. Tailings Facility name	Residue Storage Area (RSA) 1	Residue Storage Area (RSA) 2	Residue Storage Area (RSA) - Interface 2/3
2. Location	-2.730, -44.317	-2.726, -44.315	-2.727, -44.313
3. Ownership	Owned and Operated - Majority Joint Venture (JV)	Owned and Operated - Majority Joint Venture (JV)	Owned and Operated - Majority Joint Venture (JV)
4. Status	Closed	Closed	Closed
5. Date of initial operation	1984	1990	2016
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Downstream	Upstream	Upstream
8. Current maximum height (lowest downstream toe to crest)	28	31	9
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	2.4	5.1	1
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	2.4	5.1	1
11. Most recent independent expert review	2020	2020	2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Low	Significant	Significant
14. What guideline do you follow for the classification system?	Internal – based on Canadian Dam Association Guidelines	Internal – based on Canadian Dam Association Guidelines	Internal – based on Canadian Dam Association Guidelines
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	See #20	See #20	See #20
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.</p> <p>18. Progressive closure being implemented in accordance with well-established standards.</p>	<p>8. Additional 5.2m of upstream deposition in 1 m lifts.</p> <p>17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.</p> <p>18. Progressive closure being implemented in accordance with well-established standards.</p>	<p>17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.</p> <p>18. Progressive closure being implemented in accordance with well-established standards.</p>

**Brazil Alumina – Alumar** continued

1. Tailings Facility name	Residue Storage Area (RSA) 3	Residue Storage Area (RSA) 4	Residue Storage Area (RSA) 5
2. Location	-2.728, -44.311	-2.724, -44.307	-2.718, -44.303
3. Ownership	Owned and Operated - Majority Joint Venture (JV)	Owned and Operated - Majority Joint Venture (JV)	Owned and Operated - Majority Joint Venture (JV)
4. Status	Closed	Closed	Inactive
5. Date of initial operation	1997	2005	2011
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Upstream	Upstream	Upstream
8. Current maximum height (lowest downstream toe to crest)	27	27	22
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	6	8.3	11
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	6	8.3	11
11. Most recent independent expert review	2020	2020	2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	Significant	High	High
14. What guideline do you follow for the classification system?	Internal – based on Canadian Dam Association Guidelines	Internal – based on Canadian Dam Association Guidelines	Internal – based on Canadian Dam Association Guidelines
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?	No	No	Yes
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	See #20	See #20	See #20
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes

## Directory of Tailings Storage Facilities 2021 continued

### Brazil Alumina – Alumar continued

	Residue Storage Area (RSA) 3 continued	Residue Storage Area (RSA) 4 continued	Residue Storage Area (RSA) 5 continued
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	<p>17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.</p> <p>18. Progressive closure being implemented in accordance with well-established standards.</p>	<p>17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.</p> <p>18. Progressive closure being implemented in accordance with well-established standards.</p>	<p>15. During December 2020 WALM observed non alkaline seepage was identified by third party inspection. The facility remains inactive and in the process of closure. An additional rock buttress and new surface drains are being installed in H2 2021.</p> <p>17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.</p> <p>18. Progressive closure being implemented in accordance with well-established standards.</p> <p>19. WALM inspected the RSA 5 in December 2020 and would not certify RSA 5 based on observed seepage. RSA 5 Facility has been closed for several years and is in process of HDPE liner cover being installed. The RSA 5 facility is double HDPE lined within the residue storage (containment) area, and tests indicated freshwater seepage. Additional monitoring installed and a reinforcement buttress is being constructed in H2 2021.</p>

**Brazil Alumina – Alumar** continued

1. Tailings Facility name	Residue Storage Area (RSA) 6	Residue Storage Area (RSA) 7	Residue Storage Area (RSA) 8
2. Location	-2.727, -44.302	-2.723, -44.297	-2.725, -44.291
3. Ownership	Owned and Operated - Majority Joint Venture (JV)	Owned and Operated - Majority Joint Venture (JV)	Owned and Operated - Majority Joint Venture (JV)
4. Status	Inactive	Active	Active
5. Date of initial operation	2017	2019	2020
6. Is the dam currently operated or closed as per currently approved design?	Yes	Yes	Yes
7. Raising method	Not Raised	Not Raised	Not Raised
8. Current maximum height (lowest downstream toe to crest)	24	23	25
9. Current tailings storage impoundment volume (Mm <sup>3</sup> )	5.1	3.5	3.8
10. Planned tailings storage impoundment volume in 5 years time (Mm <sup>3</sup> )	5.1	3.5	9.8
11. Most recent independent expert review	2020	2020	2020
12. Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/or closure?	Yes	Yes	Yes
13. What is your hazard categorisation of this facility, based on the consequence of failure?	High	High	Very High
14. What guideline do you follow for the classification system?	Internal – based on Canadian Dam Association Guidelines	Internal – based on Canadian Dam Association Guidelines	Internal – based on Canadian Dam Association Guidelines
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?	No	No	No
16. Do you have internal/in house engineering specialist oversight of this facility? Or do you have external engineering support for this purpose?	Both	Both	Both
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?	See #20	See #20	See #20
18. Is there a) a closure plan in place for this dam, and b) does it include long term monitoring?	a) Yes and b) Yes	a) Yes and b) Yes	a) Yes and b) Yes
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?	Yes	Yes	Yes
20. Any other relevant information and supporting documentation. Please state if you have omitted any other exposure to tailings facilities through any joint ventures you may have.	17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.  18. Progressive closure being implemented in accordance with well-established standards.	17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.  18. Progressive closure being implemented in accordance with well-established standards.	17. The location has developed Emergency Response Plans (ERP's) that cover the potential impacts from a major loss of containment from a residue storage area. These ERPs are informed by Dam Break studies at each location.  18. Progressive closure being implemented in accordance with well-established standards.

**Notes on the directory questions**

1. A tailings storage facility is typically either an earth-fill embankment dam or a landform used to store fine grained material by-products of the mining operation washing or separation and metal liberation process. Tailings can be liquid, solid, or a slurry of fine particles. Solid tailings are often used as part of the structure itself and the facility is typically raised in succession throughout the life of the particular mine. Every tailings storage facility is identified and if there are multiple dams (saddle or secondary dams) within that facility, this is detailed within question 20.
2. Longitude and Latitude coordinates.
3. Owned and Operated, Subsidiary, Joint Venture: Operated, Non-Operated Joint Venture, as of 30 June 2020. The Boddington Gold Mine (100% Newmont GoldCorp owned) has TSFs on tenements held by the participants in the Worsley Alumina Joint Venture (86% South32 owned). These TSFs are not included in this disclosure.
4. Active, Inactive, Care and Maintenance or Closed. 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 care and maintenance is not considered closed until such time a closure plan has been implemented.

5. When initial operation commenced.
6. Yes or No. If No, more information is provided in question 20.
7. Upstream, Centreline, Modified Centreline, Downstream, Landform, Other. Refer to the containment descriptions below.
9. As of 30 June 2020.
10. As planned for June 2025.
11. Independent means independent of South32.
12. Yes or No. All necessary documents are in place to make an informed and substantiated decision on the safety of the dam, be it an old facility, or an acquisition, or legacy site.
15. Yes or No. A Yes answer may not indicate heightened risk. Stability concerns might include toe seepage, dam movement, overtopping, spillway failure or piping. If yes, detail on mitigation actions are provided. We also note that this question does not bear upon the appropriateness of the criteria, but rather the stewardship levels of the facility or the dam.
16. Answers may be Both.
17. Yes or No. If Yes, date is included.
18. Both parts of the question is answered i.e. a) Yes and b) Yes.
19. Yes or No.
20. Further context on answers and numbers refer to questions.

**Abbreviations used**

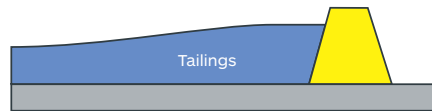
- ANCOLD:** Australian National Committee on Large dams  
**ANM:** Brazilian National Mining Agency  
**BRDA:** Bauxite Residue Disposal Area  
**DNPM:** Brazil National Department of Mineral Production  
**ERP:** Emergency Response Plans  
**GNR:** Government National Regulations (Regulations Regarding Safety of Dams)  
**OMS:** Operations, Maintenance and Surveillance manual  
**RSA:** Residue Storage Area  
**SANS:** South African National Standards  
**SEMA:** Brazilian Environment Secretariat  
**SEP:** Solar Evaporation Pond  
**SIGBM:** Brazilian Integrated Management System for Dam Safety  
**SP:** Settling Pond  
**TARP:** Trigger Action Response Plan  
**TP:** Tailings Pond  
**TSF:** Tailings Storage Facility



**Tailings storage facilities and containment approaches**

We apply the most appropriate containment approaches in the TSF design. Containment approaches include single lift water retaining facilities, multiple raise facilities and in-pit disposal.

**Single lift water retaining facility**

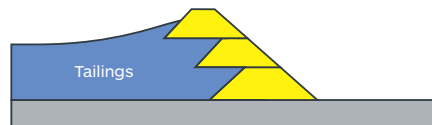


These facilities are investigated, designed and constructed to their full height before any tailings disposal occurs, and meet water retaining standards.

**Multiple raise facilities**

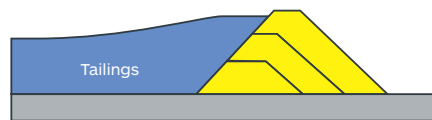
These facilities are investigated, designed and constructed as a single lift dam initially then during the operational life, raised several times to reach their full height. Tailings are deposited into the facility between raises. Raised construction is the most common approach in TSF management. The three principal construction methods for TSF raising are upstream, downstream and centreline. South32 utilises all three methods as detailed below.

**Upstream method**



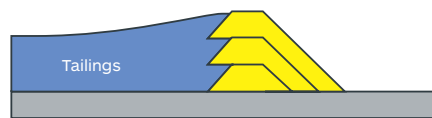
An initial single lift (starter) embankment is constructed. Tailings are then discharged from the starter embankment, which then forms a tailings beach. Beach refers to the surface slope of the tailings after being deposited by water from a discharge point. The tailings beach then forms part of the foundation for the next raise of the tailings embankment. This process continues as the embankment increases in height. Central to this process is the formation of a competent tailings beach by limiting the rate of filling (rise), depositing thin layers and allowing the tailings to dry and desiccate. This process is further enhanced by the removal of the remaining excess water from the surface, known as supernatant water.

**Downstream method**



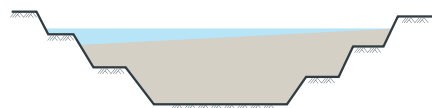
An initial starter embankment is constructed. Tailings are then discharged from the starter embankment. Subsequent raises are constructed by placing fill downstream of the initial embankment. The rate of raising is less restrictive because the design is not structurally reliant on the tailings to have any strength.

**Centreline method**



An initial starter embankment is constructed. The tailings are then discharged from the starter embankment. A portion of subsequent raises are then founded on the deposited tailings beach as well as by placing fill downstream of the starter embankment.

**In-pit**



In-pit tailings disposal typically uses a depleted pit and normally has minimal or no containment walls.

**Tailings disposal techniques**

TSFs are designed to achieve compaction and consolidation of the tailings material. This is achieved by designing the tailings disposal method to manage the removal of water from the tailings slurry. South32 employs several tailings disposal techniques, including the disposal of conventional unthickened tailings slurry, thickened tailings and filtered tailings that are stacked.

- Conventional slurry occurs where the slurry is either deposited unthickened or with some thickening at a low solids content (high water content).
- Thickened tailings involve dewatering the tailings using mechanical thickeners, to recover water for re-use in the mineral processing. This also increases the density of the tailings and therefore requires less area for tailings disposal. Following deposition in the tailings dam, further mechanical reworking of the tailings may be undertaken, using special amphibious mixers (amphirollers) combined with ploughing of the tailings, to assist with drying and strengthening.
- Filter tailings involve the mechanical dewatering of the tailings prior to disposal. These tailings are then either trucked or conveyed to the disposal area. Some of the filtered tailings are subject to additional compaction, to limit oxygen ingress or to meet a density requirement.





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