UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

SECURITIES AND EXCHANGE COMMISSION, Plaintiff, v. VALE S.A., Defendant.	Civil Action No. 22-cv-2405 **Complaint** **Jury Trial Demanded**

Plaintiff Securities and Exchange Commission ("Commission"), for its Complaint against Defendant Vale S.A. ("Vale") alleges as follows:

SUMMARY

1. Vale, one of the world's largest iron ore producers, deceived investors concerning the safety and stability of dams that it built to hold waste from its mining operations. While taking full of advantage of the capital markets in the United States, Vale committed securities fraud by intentionally concealing the risks that one of its older and more dangerous dams, the Brumadinho dam, might collapse. Specifically, Vale (1) improperly obtained stability declarations for the dam by knowingly using unreliable laboratory data; (2) concealed material information from its dam safety auditors; (3) disregarded accepted best practices and minimum safety standards; (4) removed auditors and firms who threatened Vale's ability to obtain dam stability declarations; and (5) made false and misleading statements to investors.

2. On January 25, 2019, the Brumadinho dam did collapse, releasing nearly 12 million cubic tons of mining waste, or "tailings" – a toxic sludge of iron, manganese, aluminum, copper, and other rare earth minerals – in a deluge rushing downhill toward the Paraopeba River. The dam waste buried more than 150 people alive – and killed a total of 270 people overall – while also poisoning the Paraopeba River and its tributaries and causing immeasurable environmental, social, and economic devastation. The Brumadinho dam collapse was one of the worst mining disasters in history.

3. In the days after the dam collapsed, Vale's market capitalization declined by over $4 billion. Its American Depositary Shares, which trade on the New York Stock Exchange, lost more than 25% of their value, and in the wake of the collapse, Vale's corporate credit rating was downgraded to junk status.

4. Vale owned and operated the Brumadinho dam at its Córrego do Feijão mine in Minas Gerais, Brazil from which Vale produced more than eight million tons of iron ore annually in the years leading up to the collapse. While profiting from the mine's production, Vale intentionally concealed alarming signs of the dam's instability from the investing public and Brazilian authorities. Vale also deliberately manipulated multiple dam safety audits; obtained numerous fraudulent stability declarations; and regularly and intentionally misled local governments, communities, and investors about the dam's integrity.

5. According to experts retained by Vale after the collapse, the Brumadinho dam, which was known as Dam "1" or Dam "B1", failed due to a geophysical phenomenon known as liquefaction. Liquefaction describes a condition in which saturated dam waste deposits spontaneously lose strength and stiffness, fundamentally compromising a dam's stability and dramatically increases the probability of collapse. Liquefaction typically requires a triggering

event, such as an earthquake, vibrations from heavy equipment, or even heavy rainfall, but it can also be triggered incrementally through a process known as "creep." Vale's expert panel on the technical causes of the failure concluded that ongoing internal strains due to "creep," or the "accumulation of strain under constant load," together with the cumulative rainfall over the prior years and the heavy rainfall towards the end of 2018, were probable causes of the dam's failure through liquefaction. According to their report, the dam's persistently high water levels, poor to minimal drainage, and steep slope combined with the weak and brittle nature of the tailings to create the conditions for failure. The panel concluded that the resulting ongoing internal creep and heavy rainfall led to the dam's collapse.

6. Vale was well aware of the risks of liquefaction when the Brumadinho dam collapsed in 2019. Just over three years earlier, in November 2015, another dam, known as the Fundão dam, near the city of Mariana, Brazil and co-owned by Vale, failed as a result of liquefaction. This dam collapse lead to 19 deaths and caused significant environmental and social harm in what is commonly referred to as the Mariana dam disaster.

7. The Mariana dam disaster prompted significant changes to Brazil's dam safety regulations, which imposed substantial new reporting requirements on Vale and enhanced its obligations to evaluate its tailings dams. Vale was specifically required to carefully evaluate its upstream tailings dams with the potential to inflict high damage, such as the Brumadinho dam, and to disclose any safety issues.

8. Among these regulatory changes, in 2016, Vale was subject to an "Extraordinary Audit" of the Brumadinho and several other tailings dams in Minas Gerais. Also, beginning in 2017, Vale was required by federal law to conduct semi-annual audits called "Regular Safety Inspections" (every March and September) and more comprehensive audits called "Periodic

Reviews" every three years for its high damage potential dams like the Brumadinho dam. Each of these audits required the issuance of dam stability declarations, or "DCEs"[1] (hereinafter referred to as "stability declarations"), for Vale's tailings dams.

9. In addition to the new regulatory obligations, Vale also made a renewed public commitment to dam safety following the Mariana dam disaster. It vowed "Mariana Never Again" and publically declared its "commitment to sustainability" and achieving "zero harm" to employees and surrounding communities.

10. According to its public disclosures, Vale purportedly honored its commitment. It announced that it was allocating significant capital to dam safety and stability and asserted that each of its more than 100 iron ore tailings dams were safe and operating normally. Vale also repeatedly claimed that it adhered to the "strictest" and best international practices for dam safety and "rigorously" complied with regulatory requirements. Vale's public statements were intended to leave no doubt that it had learned from the Mariana dam disaster and had mitigated the future risk of failure at its other tailings dams.

11. But Vale's public assurances belied the significant known safety risks associated with the Brumadinho dam and other tailings dams in Vale's portfolio.

12. Since at least 2003, Vale had been aware of information indicating that the Brumadinho dam was dangerously fragile. Following the Mariana dam disaster, Vale identified the Brumadinho dam as one of six critical dams that required attention and presented significant liquefaction failure risk. Vale also performed field tests that provided further confirmation of the dam's precarious and unsafe condition. Safety auditors and engineers retained by Vale also assessed the Brumadinho dam and determined that it posed risks that were unacceptable under

[1] "DCE" is an acronym for Statement of Stability Condition which in portugese is Declaração da Condição de Estabilidade.

established international best practices that Vale had pledged to implement and claimed to apply. One internal report even warned that Vale could expect at least one tailings dam in Minas Gerais to fail *every five years*, a far cry from "Mariana never again."

13. Despite these risks, Vale knowingly or recklessly suppressed the findings of its own retained experts. The Vale executives and employees who were responsible for monitoring the stability of Vale's dams deceptively manipulated the processes that they supposedly safeguarded. Rather than confront the high reputational and economic costs arising from the unacceptable safety risks posed by its Brumadinho and other dams, Vale engaged in a pattern of deceptive acts designed to skirt the applicable regulatory requirements related to dam safety. Over a period of more than two years, from February 2016 through October 2018, Vale knowingly or recklessly obtained eight fraudulent and deceptive stability declarations in connection with corrupted audits of the Brumadinho dam.

14. At the time it obtained these stability declarations, Vale knew they were based on unreliable and flawed laboratory data or a flagrant disregard for minimum standards of safety that Vale purported to follow. Vale knew that assessments of the Brumadinho dam, based on best engineering practices, had revealed that the dam did not even meet Vale's own safety standards much less international standards for dam safety.

15. Vale obtained these fraudulent stability declarations through a pattern of deceptive acts. For example, Vale removed auditors when they refused to bend to Vale's will and utilized "blackmail" to coerce other auditors to comply with Vale's demands. Vale cut backroom deals with one of its auditors, which promised to issue stability declarations in exchange for lucrative contracts from Vale, so long as Vale agreed to undertake certain long-term corrective actions on

the dam – even though both Vale and the auditor knew that those corrective actions could not resolve the near-term safety risks posed by the Brumadinho dam.

16. While Vale's fraud and deception caused immeasurable human suffering, it also caused significant harm to investors. Vale's concealment of the true condition of the Brumadinho and other tailings dams caused Vale's sustainability reports, periodic filings, and other Environmental, Social, and Governance ("ESG") disclosures to be materially false and misleading. Vale's deceit misled investors regarding several material issues: the stability of Vale's dams; the nature of Vale's safety practices in the wake of the Mariana dam disaster; and the actual risk of catastrophic financial consequences should any of its high-risk dams, like the Brumadinho dam, collapse.

17. Through its myriad of false statements, material omissions, and other deceptive acts or practices, Vale violated the antifraud provisions of the federal securities laws.

JURISDICTION AND VENUE

18. The Court has subject matter jurisdiction over this action pursuant to Securities Act Sections 20(b) and 22(a) [15 U.S.C. §§ 77t(b) and 77v(a)] and Exchange Act Sections 21(d), 21(e), and 27 [15 U.S.C. §§ 78u(d), 78u(e), and 78aa].

19. In connection with the conduct alleged in this Complaint, Defendant has, directly or indirectly, made use of the means or instruments of transportation or communication in interstate commerce, or the means or instrumentalities of interstate commerce, or of the mails, or any facility of any national securities exchange.

20. Venue is proper in this District pursuant to Securities Act Section 22 [15 U.S.C. § 77v] and Exchange Act Section 27 [15 U.S.C. § 78aa]. Certain of the acts, practices, transactions, and courses of business constituting the violations alleged in this Complaint occurred within this

District. In particular, during the relevant period, some Vale investors resided in this District, and Vale's false periodic filings were disseminated within this District.

DEFENDANT

21. Vale S.A. is a Brazilian stock corporation headquartered in Rio de Janeiro. Vale's American Depositary Shares ("ADS") and several series of its notes are registered with the Commission pursuant to Section 12(b) of the Exchange Act. Vale's ADS and notes trade on the New York Stock Exchange under the ticker symbols "VALE" and "VALE/[year due]," respectively. Vale also files periodic reports, including Forms 20-F and 6-K, with the Commission pursuant to Section 13(a) of the Exchange Act and related rules thereunder.

FACTS

I. BACKGROUND

A. The Brumadinho Dam

22. The Brumadinho dam was an earthen dam that was 86 meters tall and held close to 12 million cubic meters of mining waste, which according to one public estimate, was the equivalent volume of 50,000 Olympic-sized pools. Like the Fundão dam, the Brumadinho dam was built using the relatively inexpensive but more dangerous upstream construction method, which meant that the dam's walls were built on top of the tailings themselves rather than on solid ground, making them particularly weak and susceptible to failure by liquefaction. By the time of the collapse, the Brumadinho dam had undergone ten raises over thirty-seven years, had no significant internal drainage and a history of high water levels, and was even more prone to liquefaction as a result. According to a report by Vale's expert panel on the technical causes of the Brumadinho dam's collapse, the dam's persistently high water levels and lack of sufficient internal

drainage caused a significant portion of its tailings to be and remain saturated, a prerequisite for liquefaction failure.

B. Brazil's Dam Safety Audit Regime and Vale's Public Reporting

23. Before the collapse of the Brumadinho dam, Vale repeatedly assured investors through SEC periodic filings, presentations, sustainability reports, and ESG webinars that its dams had been audited to address the risk of liquefaction. These various public documents, issued between October 2016 and December 2018, affirmatively stated that Vale had not identified any anomalies with the dams and that its independent stability declarations were in compliance with Brazilian regulations and international best practices.

24. In truth, the Brumadinho dam did not meet minimum recommended safety standards that Vale had pledged to implement and claimed to apply. Nevertheless, between August 2016 and January 2019, Vale fraudulently obtained eight positive stability declarations for the Brumadinho dam in connection with each of the several different audits that occurred in this period. To obtain these stability declarations, Vale suppressed adverse information about the dam, used flawed and unreliable data to perform safety analyses, strong-armed independent auditors, and ignored international safety standards and best engineering practices that it claimed to follow.

25. In a tragic irony, Vale obtained these stability declarations by undermining the very regulatory regime designed to avoid another Mariana dam disaster. In the wake of that disaster, Brazilian federal and state governmental bodies issued new and updated dam safety regulations requiring dam safety audits by external and independent auditors specifically addressing liquefaction risks. These regulations were particularly important for Vale, because the Fundão dam that collapsed in the Mariana dam disaster belonged to Samarco Mineração S.A., a joint

venture between Vale and another entity, each as 50% owners. In short, these new regulations were designed to put dams like the Brumadinho dam under a regulatory microscope.

26. In 2016, for example, new regulations promulgated by the state of Minas Gerais required Vale to conduct an "Extraordinary Audit" on its upstream tailings dams, with an express focus on and detailed analysis of liquefaction. This Extraordinary Audit was designed to satisfy the otherwise pre-existing state requirement to conduct annual safety audits known as "Technical Safety Audits." In 2016, Brazilian federal authorities also required Vale to conduct a "Liquefaction Study" on the Brumadinho dam.

27. In 2017, Brazil's federal regulators increased the frequency of certain dam safety audits known as "Regular Dam Safety Inspections" from annual to semi-annual (in March and September). Brazil also required dams classified as having high damage potential, including the Brumadinho dam, to undergo a more extensive and in-depth safety audit known as a "Periodic Safety Review" every three years, with the first of these periodic reviews to be completed in late 2017, though the deadline was extended to June 2018.

28. In each of the various state and federal audits, inspections, and reviews described herein, Vale's external dam safety auditors were required to issue a report and a stability declaration, certifying whether the dam was stable based on the application of industry standards and "good engineering practices" as set forth by Brazilian dam safety regulations and authorities. As the owner and operator of the dams, Vale also signed the stability declarations to certify the stability of its dams and then filed them with Brazilian state and federal regulatory authorities. Vale did not file the related audit reports with authorities, but made them available for review as necessary.

29. Vale's public statements, including through SEC periodic filings on Forms 20-F and 6-K in in 2017 and 2019, sustainability reports issued in 2017 and 2018, and a December 2018 ESG webinar, touted the stability declarations and reassured investors that its dams were stable and safe. In its 2017 Sustainability Report issued in 2018, for example, Vale affirmed that "100% of the audited structures were certified to be in stable condition" with stability declarations issued "by the responsible auditors," and that all of their dams "are completely normal."

30. Vale's 2017 Sustainability Report further represented to investors that "[i]n addition to applying best practices pertaining to dam safety management, Vale submits its structures to audits conducted by specialized external consultants, and rigorously complies strictly with applicable legislation."

31. But as detailed below, because Vale secured each of the stability declarations for the Brumadinho dam through fraud and deceptive acts, these statements were materially false and misleading.

C. Dam Safety Factors

32. All of the applicable safety audits, reviews, or inspections detailed above relied on a measure of dam safety known as a "safety factor," which the Brazilian Association of Technical Norms ("ABNT") defined as "the value of the ratio between the strength (maximum available shear stress) and the mobilized strength shear stress acting along the breach surface," *i.e.,* the ratio of the strengthening forces that stabilize the dam to the straining forces that destabilize it. Consequently, a safety factor of "1.0" or "unity" represents, in theory, that the dam is at risk of imminent collapse (*i.e.*, that the stabilizing and destabilizing forces are at equal value, such that any increase in the destabilizing force would trigger liquefaction or collapse). A higher safety factor implies greater dam stability. The ABNT, which sets the standards by which stability declarations

are issued in Brazil, required the minimum safety factors for liquefaction risk to be established "based on good engineering practices."

33. Two types of calculated safety factors express liquefaction risk, because dam failure due to liquefaction occurs in two phases – first, the liquefaction of mine waste, followed by the rupture of the dam wall.

34. The first type of safety factor concerns a dam's "peak, undrained condition," which expresses a degree of confidence that the tailings within the dam will avoid liquefaction in the event of a trigger, such as an earthquake, a rapid rise in water levels, vibrations from equipment traffic or detonations, ongoing internal strain, or some combination of these or similar disturbances.

35. Consistent with "good engineering practices" the minimum safety factor for the peak, undrained condition of an upstream tailings dam like the Brumadinho dam is 1.3 or higher. Vale's own January 2017 presentation to its Executive Board recognized that 1.3 was the necessary minimum safety factor for the peak undrained condition, explaining that "auditors and worldwide practices recommend the adoption of a safety factor of 1.3."

36. Each of the four engineering auditor firms Vale hired in the relevant period to conduct safety audits and failure probability assessments of the Brumadinho dam also affirmed in reports to Vale that 1.3 was the requisite minimum safety factor for the peak, undrained condition. Even the engineering firm that had designed and completed the Brumadinho dam's final raisings stated in its August 2016 through March 2017 reports that, "For situations in which the failure poses risk of high material damages and may result in fatalities, the minimum SF [safety factor] would be 1.3." Moreover, the national and international experts that Vale hired to serve on a panel to advise it on dam safety risk management in the wake of the Mariana dam disaster known as the

"Independent Panel of Experts in Risk and Safety Management of Geotechnical Structures" or "PIESEM" also reiterated to Vale by at least November 2017 that the minimum safety factor for the peak, undrained condition should equal or exceed 1.3.

37. Under international guidelines and best practices acknowledged by Vale, a safety factor of less than 1.3 for the peak, undrained condition indicated that the dam's tailings were at an unacceptably heightened risk of liquefaction in the event of a trigger. As a result, a dam with a peak, undrained safety factor less than 1.3 could not properly be certified as stable and safe.

38. The second safety factor relevant to assessing liquefaction risk concerns the "residual, undrained condition," which expresses the dam's ability to avoid a collapse if the materials within the dam liquefied. The minimum safety factor under international guidelines and best practices for the residual, undrained condition was 1.1. A safety factor of less than 1.1 for the residual, undrained condition indicated that the dam was at an unacceptable heightened risk of collapse if liquefaction occurred

D. Vale's Management of Geotechnical Risks – the GRG

39. In December 2015, in response to the Mariana dam disaster, Vale appointed a high-level executive within its Iron Ore Division to serve as the "Manager of Geotechnical Risk Management" and/or the "Executive Manager of Risk Management and Mine Closure" (hereinafter "Executive One"). Executive One was primarily responsible for evaluating and managing Vale's dam safety risks, improving Vale's dam safety and related controls, and ensuring Vale complied with legislation related to dam safety, including external audit requirements.

40. Executive One was charged with forming and leading the corporate geotechnical risk management group (the "GRG"), with full control and responsibility over dam safety risk

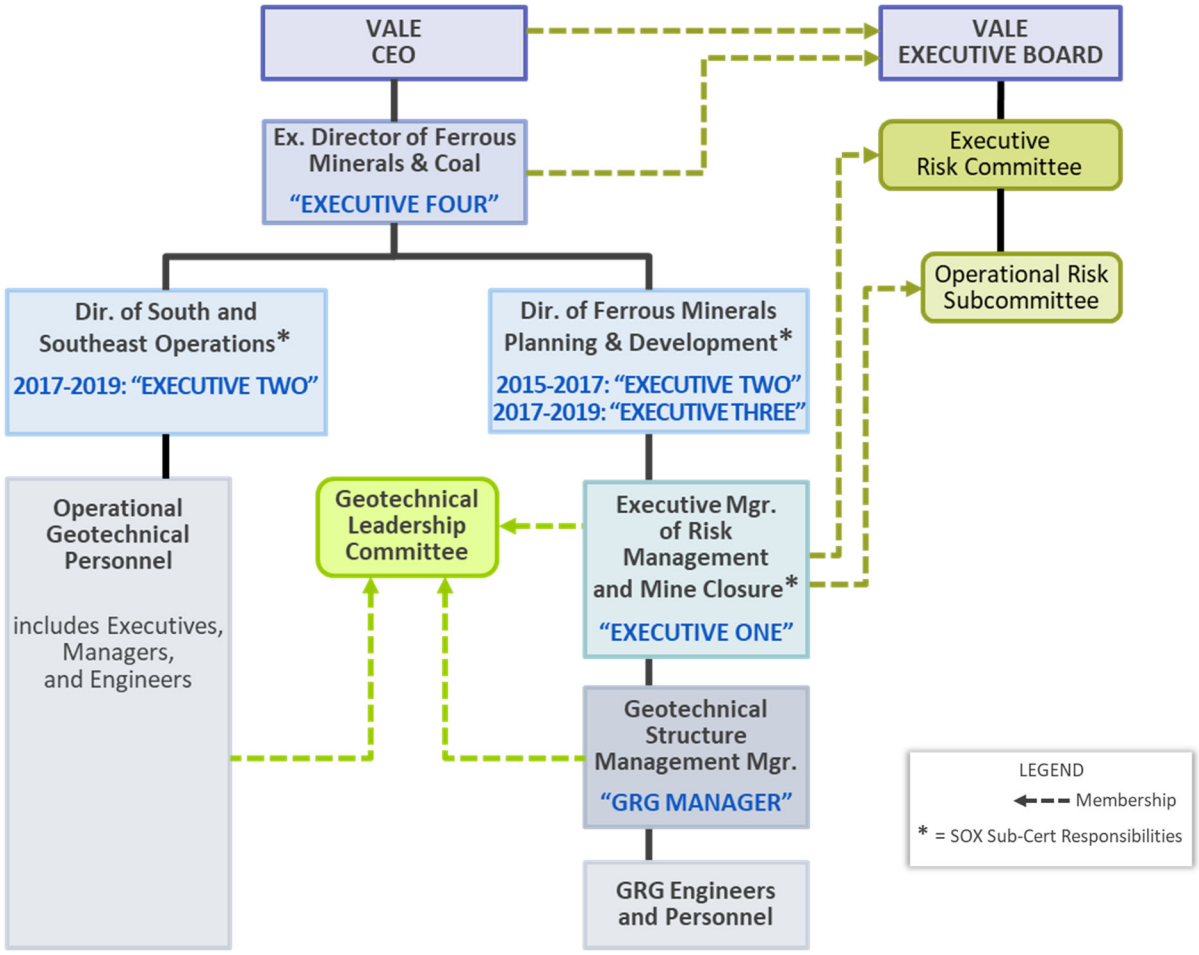
management in the Ferrous Minerals Planning and Development arm of the Iron Ore Division, which was Vale's largest business line with operating revenues in excess of $20 billion in 2018.

41. Executive One supervised a Geotechnical Structure Management Manager ("GRG Manager") and reported to the Director of Ferrous Minerals Planning and Development ("Planning Director"). During the relevant period, two individuals served as the Planning Director. The first individual ("Executive Two") served in this role from 2015-2017 and as Director of South and Southeast Operations ("Operations Director") from 2017-2019. The second individual ("Executive Three") served in the role of Planning Director from 2017-2019. At all relevant times, the Planning Director position (Executives Two and Three) reported to the Executive Director of Ferrous Minerals and Coal ("Executive Four"), who in turn reported to the President and Chief Executive Officer ("CEO") of Vale.

42. Due to his overarching responsibility for managing dam safety risks for the entire Iron Ore Division, Executive One was a member of several senior level advisory committees to Vale's Executive Board, including its Operational Risk Subcommittee and its Executive Risk Committee, which was chaired by Vale's Chief Financial Officer. Executive One and GRG Manager also were members of the Geotechnical Leadership Committee, which Vale established to monitor dam conditions and manage Vale's dam risks. The GRG Manager and Executive One had responsibility for certifying the effective operation of dam safety internal controls. Executive One also made presentations about dam safety risk management to Vale's Board of Directors and its Advisory Committees, provided and reviewed dam safety information for public disclosures, and had sub-certification duties under the Sarbanes-Oxley Act ("SOX"). Vale relied on Executive One's certifications for its disclosures about dam safety to investors, which falsely represented the safety of dam "1" (the Brumadinho dam).

43. In managing the audits and dam safety risks, Vale GRG personnel, including the GRG Manager, Executive One, Executive Two, and Executive Three, worked with operational geotechnical management personnel at Vale. The operational geotechnical personnel who were responsible for the Brumadinho dam's operations and safety reported to the Operations Director.

44. Executive Two and Executive Three both reported to Executive Four, were senior executives at Vale, had extensive managerial responsibilities, and had SOX sub-certification duties. Vale relied on their certifications for its disclosures about dam safety to investors, which falsely represented the safety of dam "1" (the Brumadinho dam). An organizational chart summarizing Vale's dam safety risk and operational structure during the relevant period is provided in **Figure 1.**



45. At all relevant times after the Mariana dam disaster, GRG and operational geotechnical personnel, including GRG Manager and Executive One, knew or were reckless in not knowing that the Brumadinho dam's safety factor for the peak, undrained condition was well below the required minimum of 1.3. They also knew or were reckless in not knowing that the Brumadinho dam's calculated safety factor for the residual, undrained condition (*i.e.,* the safety factor expressing the risk of collapse in the event of liquefaction) was likewise well below the required 1.1 minimum, at approximately .39 to .46. The GRG Manager, Executive One, Executive Two, and Executive Three, also knew or were reckless in not knowing that Vale's stability declarations could not be relied upon to support its claim that its dams were safe and normal and that the Brumadinho dam posed intolerable and unacceptable risks to life.

46. Despite Vale's knowledge of these low safety factors that precluded the issuance of positive stability declarations, Vale improperly obtained a series of false dam stability declarations for the Brumadinho dam, which it then fraudulently touted to investors.

II. VALE'S IMPROPER INFLUENCE OVER THE BRUMADINHO DAM SAFETY AUDITS (2016-2018)

A. Vale Obtains False Stability Declarations in Connection with the Extraordinary Audit (February 2016 – March 2017) through a Series of Deceptive Acts

47. In connection with the Extraordinary Audit as well as the related Liquefaction Study required by Brazilian state and federal authorities, Vale secured stability declarations in August and September 2016 from its dam safety auditor, Auditor A.

48. As set forth below, at the time it obtained these two stability declarations, Vale knew, or was reckless in not knowing, that they were based on flawed and unreliable laboratory data that deceptively inflated the peak, undrained safety factor to the required minimum value of 1.3.

49. In or around February 2016, Vale retained Auditor A to conduct the Extraordinary Audit and Liquefaction Studies. Vale GRG personnel, including Executive One, understood that an internationally recognized liquefaction expert ("Liquefaction Expert") would be serving as Auditor A's consultant on the projects.

50. A Vale GRG engineer told Executive One in or around February 2016 that the Liquefaction Expert "has extensive experience in static and dynamic liquefaction analysis" and his method "is one of the most widely applied methodologies for liquefaction analysis" in Brazil. As a result, in or around May 2016 the same GRG engineer specifically told Auditor A to "perform the liquefaction analyses following [the Liquefaction Expert's] proposals."

51. On or about May 24, 2016, Vale's GRG Manager sent a presentation prepared by Vale personnel titled "General Aspects of Liquefaction" (the "May 2016 Presentation") to Executives One and Two. The presentation highlighted that the Brumadinho tailings were susceptible to liquefaction. The shear strength, or resistance ratio, calculated using field tests and the Liquefaction Expert's methodology, ranged from .23 to .27, which resulted in a critically low safety factor of 1.04 – a safety factor just barely above unity (which represents a risk of imminent collapse) revealing the fragile and precarious condition of the dam.

52. The May 2016 Presentation also stated that there was a 40% probability that the Brumadinho dam had a safety factor less than or equal to 1.0—an alarmingly low safety factor indicative of imminent rupture. It noted that the most likely trigger would be a rapid rise in the water level, which could "occur because of significant rainfall."

53. The May 2016 Presentation reported findings that the Brumadinho dam's annual probability of rupture due to liquefaction was 1 in 10,000 / year or 1×10^{-4}. According to international standards, the maximum level of tolerable risk considering loss of life for the most

exposed individual if failure occurred is *less than* 1 in 10,000 per year, "except in exceptional circumstances." Thus, Vale knew by May 2016 that the Brumadinho dam's annual probability of failure due to liquefaction did not meet international standards and presented an unacceptable and intolerable risk to human life.

54. The May 2016 Presentation further showed that another of Vale's upstream tailings dams with high-damage potential, Dam Sul Superior, also was susceptible to liquefaction and had an annual probability of rupture due to liquefaction of 3 in 10,000 / year or 3×10^{-4}. This too failed to meet international standards and presented an unacceptable and intolerable risk to human life.

55. The May 2016 Presentation also provided a "Fast Evaluation of the Probability of Rupture of Dams" and noted that Vale's 17 upstream tailings dams in Minas Gerais were susceptible to liquefaction and had an annual probability of rupture (as a portfolio) of .3%.

56. The May 2016 Presentation concluded: "Rupture of approximately 1 dam every 5 years."

57. On June 13, 2016, Auditor A and the Liquefaction Expert conducted a field visit to the Brumadinho dam that raised further alarm and resulted in recommendations to take immediate remedial measures to reduce liquefaction risk. During and after the June 13, 2016 field visit, Auditor A and the Liquefaction Expert discussed with GRG engineers and other personnel, including Executive One, the need to immediately reduce the dam's liquefaction risk by increasing the width of its beach and removing the water in its reservoir.

58. Auditor A and the Liquefaction Expert raised several additional issues, including: the requisite 1.3 and 1.1 safety factors; the fact that none of Vale's dams were likely to meet the 1.1 residual, undrained safety factor; the need to consider an unknown trigger; and the need to use reliable data that is most representative of the tailings inside the dam. In particular, the

Liquefaction Expert explained that none of the laboratory data or tests of samples that Vale had obtained from the Brumadinho dam was reliable. The Liquefaction Expert therefore recommended that Vale discard the laboratory data and use only field tests (*i.e.* tests of core samples from the dam evaluated on site) to calculate the resistance ratios and undrained safety factors for the Liquefaction Study and Extraordinary Audit.

59. Executive One and Executive Two continued to monitor the progress of the Liquefaction Study and remedial work on the Brumadinho dam and communicated issues raised by Auditor A and the Liquefaction Expert to Vale's Executive Four.

60. Based on these updates, including concerns about triggering liquefaction, Executive Four ordered the immediate cessation of the dam's operations on July 7, 2016, and asked that "preventative" reinforcement measures be evaluated. Executive One, Executive Two, and Executive Three (who was then serving as the Planning Director), and others received Executive Four's order. Executive Two also told Executive One that the decision was based on discussions they had had with Auditor A about problems at the Brumadinho dam.

61. Soon thereafter, and in recognition of the serious safety risks posed by the dam, Vale's GRG and operational geotechnical personnel began preparations to decommission the Brumadinho dam, permanently ending and ultimately reincorporating it into the surrounding environment. But before they could begin the decommissioning process, Vale first had to reduce the dam's dangerously high water levels, which posed serious liquefaction risk.

62. On July 8, 2016, the day after Vale shut down the Brumadinho dam, the Liquefaction Expert issued a memo (the "July 8 Memo") as part of the Liquefaction Study as well as for the Extraordinary Audit.

63. The July 8 Memo memorialized the Liquefaction Expert's observations from the field visit and his recommendations for the shear strength or resistance ratio to use in the analysis for the Brumadinho dam. It also confirmed in writing what the Liquefaction Expert and Auditor A had verbally told Vale's GRG personnel, including Executive One, in meetings and conversations both during and after the June 13, 2016 site visit.

64. The Liquefaction Expert's July 8 Memo specifically found that using any existing laboratory data to assess the Brumadinho dam's ability to withstand liquefaction would be inappropriate and unreliable given objective deficiencies with the data. After discarding all laboratory data as unreliable, the Liquefaction Expert concluded that "the average yield strength ratio is approximately 0.24 and the average liquefied strength ratio is approximately 0.08" for the Brumadinho dam.

65. These strength parameters or resistance ratios were similar to what Vale had previously found and, in effect, confirmed Vale's analysis from the May 2016 Presentation: The Brumadinho dam's peak undrained safety factor was approximately 1.04 – a safety factor far closer to unity (which would represent a risk of imminent collapse) than the requisite minimum 1.3 standard for safety.

66. The July 8 Memo also stated:

> Because of the gradation and placement of the tailings, as well as the continuing high water levels in many of the ponds, I believe that static and dynamic liquefaction are a significant concern. . . . While the tailings are stable under drained conditions, a disturbance that causes undrained shearing to occur may be sufficient to trigger liquefaction in the tailings, and could potentially lead to a global failure. The potential for triggering liquefaction, as well as the consequences of liquefaction (i.e., post-triggering stability) must be analyzed further.

67. The July 8 Memo further recommended:

> [T]hat [Auditor A] and Vale consider the possibility that an "unknown" mechanism triggers liquefaction. As much of the tailings likely will have low liquefied shear

> strengths, this "unknown" triggering mechanism is likely to result in a post-triggering factor of safety (FS) that is less than unity (1.0). Therefore, as I discussed with the [Auditor A] and Vale teams while on-site, I recommend that Vale consider performing overall risk analyses for their more critical tailings dams and structures.

68. The July 8 Memo also ominously noted that "[i]f the factor of safety against flow failure (FSFlow) is <1, flow failure of the structure is likely."

69. The following week, on July 15, 2016, Auditor A issued a preliminary Liquefaction Stability Analysis report ("July 15 Analysis") for the Brumadinho dam, which attached the Liquefaction Expert's July 8 Memo. This July 15 Analysis was part of the ongoing Liquefaction Study due later that month, which would also inform the Extraordinary Audit.

70. Auditor A's July 15 Analysis stated that the only way to get to a "satisfactory" 1.3 safety factor for the Brumadinho dam was to use the unreliable laboratory data that the Liquefaction Expert's July 8 Memo expressly recommended not be used.

71. The July 15 Analysis stated that using the Liquefaction Expert's method of discarding all laboratory data and relying solely on the reliable field test data would result in resistance ratios of .23 to .25 (once again confirming Vale's May 2016 findings). The report further noted, however, that if they used the unreliable laboratory data, the results would increase to .30 and .40, and "satisfactory results can be obtained practically only when considering the highest of the resistance ratios considered (0.4) . . . ."

72. After acknowledging the importance, post-Mariana dam disaster, of "re-evaluating the safety of [the Brumadinho dam] considering the possibility of liquefaction," the July 15 Analysis concluded that "[t]he analyses carried out now showed low safety coefficients considering the hypothesis of undrained rupture and the application of [the Liquefaction Expert's] method." The Liquefaction Expert's method of analyzing stability considering liquefaction and

discarding the unreliable laboratory data was the most accepted in the industry and represented best engineering practice.

73. On July 20, 2016, the Liquefaction Expert issued the final version of his July 8 Memo (the "July 20 Memo"), which included his recommendations for the Liquefaction Study of the Brumadinho dam, and the Extraordinary Audit. Consistent with the July 8 Memo, the July 20 Memo found that existing laboratory data could not be relied upon or used to assess liquefaction strengths for the Brumadinho dam.

74. Instead, the Liquefaction Expert reported that he must rely solely on field tests and again found strength ratios of .24 peak and .08 residual, which implied a safety factor far closer to unity than the requisite 1.3. Although the Liquefaction Expert noted that "additional laboratory tests" could be used in the future if they had certain characteristics of reliability as outlined in the memo, no such laboratory tests were ever done for the Brumadinho dam.

75. The Liquefaction Expert never received or reviewed any additional laboratory data that met the criteria for reliability, and he never approved or agreed with the use of higher strength or resistance ratios for the Brumadinho dam.

76. In recognition of the Liquefaction Expert's and Auditor A's findings, Vale's GRG and operational geotechnical personnel, including the GRG Manager, drafted a PowerPoint presentation that was sent in or around mid-to-late July 2016 to Executive One, providing responses to frequently asked questions about Vale's dam safety after the Mariana disaster.

77. The presentation highlighted the fact that the Brumadinho dam was one of six upstream tailings dams that required "attention" in light of the liquefaction studies and that dams that did *not* meet minimum safety factors would be subject to corrective actions such as drying the reservoir, increasing the beach surface, and possible reinforcements.

78. Vale knew in July 2016 that the Brumadinho dam did not meet minimum safety factors for the undrained condition and that laboratory data could not be used. Less than a month later, however, Vale obtained a false and misleading Extraordinary Audit report on or around August 31, 2016, and related false stability declarations in August and September 2016. Vale submitted the August 31, 2016, Extraordinary Audit report and the Liquefaction Study to Brazilian federal dam safety regulators in December 2016.

79. Auditor A's Extraordinary Audit report supported its finding of stability by falsely claiming that the Brumadinho dam met the requisite minimum 1.3 safety factor, a result it achieved only by relying on the laboratory data that the Liquefaction Expert had expressly recommended be discarded as unreliable. In the Extraordinary Audit report, Auditor A falsely justified its use of the laboratory data by using a weighted approach (2/3 of the field data and 1/3 of the laboratory data) that the Liquefaction Expert had suggested *for a different dam* whose laboratory data did not have the same objective deficiencies and, therefore, was considered at that time to be reliable enough to use at least in part. In this way, Auditor A and Vale falsely increased the resistance ratio for the Brumadinho dam to .36, rather than the accurate .24 found by the Liquefaction Expert. The .36 resistance ratio was just high enough to inflate the safety factor up to the requisite 1.3, whereas the Liquefaction Expert's results would have found a safety factor far closer to unity – again revealing the fragility of the dam and its inability to be certified as stable.

80. Vale's GRG personnel, including Executive One, accepted Auditor A's false results despite knowing that the Liquefaction Expert had expressly discarded as unreliable the data being used in the Extraordinary Audit.

81. Because the results of the Extraordinary Audit depended on unreliable data that conflicted with the Liquefaction Expert's advice and good engineering practice that Vale

purportedly applied, the report contained an express "warning" to Vale to "[p]erform [a] supplemental geotechnical investigation to confirm the undrained parameters of the liquefaction analyses," "review the stability analyses," and consider executing downstream reinforcements "if the resistance parameters do not result in [an] adequate safety factor for the undrained condition."

82. Vale did not meaningfully heed this warning. Working together with Auditor A, Vale's GRG and operational personnel only "supplemented" the analysis in the Extraordinary Audit with similarly deficient and unreliable laboratory tests that the Liquefaction Expert never approved and which, again, led to artificially inflated safety factors. Using this faulty and unreliable data, Auditor A provided Vale, in February or March 2017, the recommended supplemental report (hereinafter "Supplementary Technical Report") purporting to confirm the .36 resistance ratio and 1.3 safety factor found in the Extraordinary Audit.

B. Vale Obtains False Stability Declarations for September 2017 Audits (August – September 2017) though a Series of Deceptive Acts

83. Because Vale filed positive stability declarations in connection with the Extraordinary Audit in August and September 2016, Brazilian regulations did not require Vale to conduct further audits of the Brumadinho dam until the state mandated annual audit and federally required regular safety inspection ("semi-annual audit"), both due in September 2017.

84. In February 2017, Vale hired a different auditor, Auditor B, to perform these state and federal audits. Vale was not required to conduct a new investigative campaign for these audits, meaning Auditor B did not have to collect new data from the dam site. Instead, Auditor B relied on Vale to provide relevant information necessary to assess the safety of the Brumadinho dam in the undrained condition.

85. To ensure receipt of positive stability declarations, Vale's GRG and operational geotechnical personnel deliberately concealed key information from Auditor B during its

September 2017 state and federal audits, as described in detail below. As a result of being misled, Auditor B relied on and adopted the findings of the Extraordinary Audit, which were inaccurate because they relied on faulty laboratory data.

86. On August 20, 2017, Auditor B provided Vale's GRG and operational geotechnical personnel responsible for the Brumadinho dam with a draft of its audit report, in which it expressed concern that no new or reliable laboratory data had been obtained to support the .36 strength parameter underlying the 1.3 safety factor found during the Extraordinary Audit.

87. Auditor B's draft audit report also recommended that the related Supplemental Technical Report issued by Auditor A be revised, considering that reliable field data supported a much lower .24 strength parameter. This .24 parameter matched the findings of the Liquefaction Expert's July 20, 2016 memo and was consistent with the 1.04 safety factor calculated by Vale in May 2016.

88. By August 25, 2017, Vale's GRG engineers, managers and executives, including the GRG Manager and Executive One, had additional information substantiating Auditor B's concerns and the true liquefaction risks for the Brumadinho dam.

89. Specifically, in February 2017, in connection with a GRG initiative to quantify (in economic terms) the risks associated with dam rupture probabilities, including due to liquefaction, Vale had hired two third-party engineering firms, Engineering Firm One and Auditor C, to work as a consortium on a failure probability analysis for the Brumadinho dam ("Dam Rupture Probability Analysis"). When new Brazilian legislation was issued in May 2017 requiring a Periodic Review for high damage potential dams like the Brumadinho dam by November or December 2017 (subsequently extended to June 2018), Vale understood that aspects of the Dam Rupture Probability Analysis would serve as the foundation for and be incorporated into the Periodic

Review. Vale further hired Auditor C to conduct the Periodic Review, understanding that it would incorporate and rely on the work it was already doing with Engineering Firm One on the Dam Rupture Probability Analysis. In this way, both Engineering Firm One and Auditor C had responsibility for the Periodic Review.

90. Unlike Auditor B, which was wholly dependent on the information Vale provided about the dam's safety, Engineering Firm One and Auditor C were required to conduct a completely new and comprehensive stability analysis to diagnose the general safety status of the dam and determine anew the appropriate safety factors for the Brumadinho dam in the undrained condition. Auditor C would then use these new results to determine whether it could issue a new stability declaration for the Periodic Review.

91. By August 25, 2017, these two firms informed Vale's GRG engineers, managers, and executives, including the GRG Manager and Executive One, that they had reviewed the Extraordinary Audit and Supplemental Technical Report but disagreed with the .36 undrained strength parameter used to derive the 1.3 safety factor because it was based on unreliable laboratory data. Vale's GRG personnel, including the GRG Manager and Executive One, understood that Engineering Firm One's and Auditor C's refusals to use the laboratory data, methods, and results of the Extraordinary Audit directly threatened Vale's ability to obtain stability declarations for the Brumadinho dam. Although this was critical new information relevant to the integrity and accuracy of Auditor B's work on the audit due in September 2017, Vale never shared this information with Auditor B.

92. Between August 23 and August 27, 2017, Vale's GRG personnel, including the GRG Manager and Executive One, met with representatives of Auditor A and other hired consultants to discuss the "impasses" with the Periodic Review auditors and how the conflict

between the September 2017 audits (conducted by Auditor B) and the Periodic Review (conducted by Auditor C) jeopardized Vale's ability to obtain stability declarations for its high damage potential dams, including the Brumadinho dam.

93. On August 28, 2017, after internally discussing Auditor B's "questions" about the data used in the Extraordinary Audit with Vale's GRG and operational geotechnical personnel, Vale's Senior Geotechnics Engineer responsible for the Brumadinho dam responded to Auditor B's August 20 draft audit report. She instructed Auditor B to delete its recommendation to revisit the parameters derived from laboratory data.

94. Vale's GRG and operational geotechnical personnel did not inform Auditor B that Engineering Firm One and Auditor C disputed the basis of the Extraordinary Audit results on which Auditor B was relying for the September audit.

95. Vale's GRG and operational geotechnical personnel also deliberately concealed from Auditor B that the Liquefaction Expert for the Extraordinary Audit had found *all* existing laboratory data for the Brumadinho dam unreliable and recommended use of only the .24 strength parameter that yielded a safety factor closer to 1.04.

96. And, while Vale's GRG and operational geotechnical engineers provided select data to Auditor B in an attempt to support the Extraordinary Audit results, at the same time they deliberately concealed the Liquefaction Expert's July 20 Memo and Auditor A's July 15 Analysis report, both of which would have confirmed Auditor B's suspicions. As described above, these reports spelled out the problems with laboratory data and made clear that appropriate use of reliable field data yielded "unsatisfactory" results – namely a safety factor far less than the 1.3 safety factor required for a stability declaration.

97. Because of Vale's deceit and improper interference and influence in the audit process, Auditor B deleted the recommendation as directed by Vale personnel and issued a final report adopting the findings of the Extraordinary Audit, including the .36 resistance ratio and 1.3 safety factor for the peak, undrained condition.

98. Vale further secured from Auditor B positive stability declarations for the Brumadinho dam that it filed with state and federal authorities on August 31, 2017, and September 4, 2017, knowing that the declarations were based on unreliable data and, therefore, deliberately concealed significant risks associated with the dam's safety.

C. Vale Obtains Another False Stability Declaration for the March 2018 Semi-Annual Audit (October 2017 – March 2018) though a Series of Deceptive Acts

99. Vale obtained yet another illegitimate and false stability declaration from Auditor B in connection with the semi-annual audit due in March 2018, the findings of which mirrored those in September 2017. To do so, Vale deliberately concealed additional relevant information, described in detail below, from Auditor B that further discredited the results of the Extraordinary Audit.

100. In late October 2017, Engineering Firm One and Auditor C issued an initial draft of their Dam Rupture Probability Analysis of the Brumadinho dam, which applied the Liquefaction Expert's methodology, analyzed the reliable field data, and found that the dam's safety factor in the undrained condition was 1.06 – once again far short of the 1.3 safety factor required. Both Engineering Firm One and Auditor C had continued to refuse to use any laboratory data for the Brumadinho dam.

101. Vale again deliberately concealed the results of Engineering Firm One and Auditor C's analysis from Auditor B, this time in connection with the semi-annual audit due in March 2018.

102. For example, at the same time that Auditor C and Engineering Firm One were conducting their review of the Brumadinho dam, PIESEM was also having a weeklong meeting from November 13-17, 2017. The PIESEM was a panel of outside experts specializing in geotechnical engineering, liquefaction, dam safety and risk management whom Vale hired to provide advice on strengthening its dam safety risk management, improving its engineering practices, and ensuring adherence to international best practices. The international PIESEM members included the Liquefaction Expert, a geotechnical expert who had served on the Tailings Review Board studying the Fundão dam collapse, and an expert on probabilistic failure analyses and dam safety risk assessment and management. Vale GRG personnel, including engineers, the GRG Manager, and Executive One, set the agenda for the PIESEM meetings, arranged for Vale's auditors to make presentations about the liquefaction analyses they were doing on their highest risk and high damage potential dams, including the Brumadinho dam, and otherwise attended and participated in the meetings.

103. On November 16, 2017, Engineering Firm One informed the PIESEM and Vale about its findings concerning the Brumadinho dam, including that all laboratory data should be discarded as objectively unreliable, that the strength parameter used in the Extraordinary Audit was unsupported and inflated by the use of unreliable laboratory data, and that the true peak undrained safety factor was 1.06.

104. Engineering Firm One also noted that the Brumadinho dam had previously fallen short of the 1.3 minimum safety factor, had problems with seepage, internal drainage, and high water levels throughout its life, and even after closure, was draining so slowly that the water levels remained too high.

105. After Engineering Firm One's presentation, the head of Auditor A, who had conducted the Extraordinary Audit and was a Brazilian member of the PIESEM panel, expressed concern that disregarding laboratory tests would "condemn" all upstream tailings dams for the "original sin of liquefaction." But the other panel members, including the Liquefaction Expert, concurred with Engineering Firm One's methodology and results, especially its conclusion that all laboratory data for the Brumadinho dam was unreliable and properly excluded from its liquefaction analysis.

106. On November 17, 2017, during an oral presentation to Vale, including the GRG Manager, Executive One, Executive Two, Executive Three, and numerous other Vale GRG and operational geotechnical personnel, the PIESEM panel discussed the lack of data integrity in certain of the liquefaction assessments arising from the improper use of unreliable laboratory data. They informed Vale, including the GRG Manager, Executive One, Executive Two, and Executive Three, that its "[l]iquefaction assessment needs clear procedures and guidelines" given these data integrity issues, and that the results to date nevertheless showed Vale's dams needed remedial action to increase safety.

107. The PIESEM panel also reiterated its recommendation that Vale "[d]evelop and implement procedures for performing external audits in order to ensure reliability, quality and avoid conflicts of interest from the procurement phase to the conclusion of the work." The PIESEM panel also confirmed the minimum safety factors to assess liquefaction—a safety factor of 1.3 for the peak, undrained condition and 1.1 for the residual, post-trigger undrained condition. Later that same day, Vale's GRG personnel, including the GRG Manager, Executive One, Executive Two, and Executive Three, received a copy of the presentation with a note that the PIESEM would be issuing a full report in about one month.

108. Vale did not share with Auditor B any of the relevant events from the November 2017 PIESEM meeting, including the report of Engineering Firm One or the recommendations of the PIESEM panel.

109. On November 20, 2017, Engineering Firm One and Auditor C issued another draft of its Dam Rupture Probability Analysis for the Brumadinho dam, confirming that they had completed their deterministic evaluation of liquefaction failure risk. Consistent with Engineering Firm One's presentation to the PIESEM the prior week, the November 20 analysis found a 1.06 peak safety factor and .39 residual, post-trigger safety factor – meaning that the Brumadinho dam still did not meet minimum safety requirements.

110. The report also spelled out the myriad reasons the laboratory data was unreliable and could not be used in the analysis, noting that their methodology and approach was the "most accepted in the global technical community" and consistent with the recommendations of Vale's PIESEM.

111. The report also informed Vale that the Brumadinho dam's annual probability of failure due to internal erosion was approximately 2×10^{-4}, a level that twice exceeded the maximum tolerance level and again meant that the dam posed an unacceptable and intolerable risk to human life.

112. Vale did not provide Auditor B with this report or otherwise inform Auditor B that it had obtained results from a new, thorough, and comprehensive deterministic assessment of the Brumadinho dam's stability that superseded the Extraordinary Audit and revealed the dam to be faulty and unreliable.

113. Recognizing that these results showed the Brumadinho dam was in a fragile and unsafe condition and undermined Vale's ability to obtain a stability declaration for the Brumadinho

dam, Vale's GRG personnel set up a meeting on December 11, 2017, at Vale's offices with Engineering Firm One and Auditor C to discuss the "final results" of their Deterministic Liquefaction Assessment for the Brumadinho dam.

114. Vale GRG and operational geotechnical engineers, managers, and executives, including the GRG Manager and Executive One, participated in the meeting, during which Vale expressed concern about the critically low 1.06 safety factor and asked Engineering Firm One to suggest reinforcement and strengthening measures that would increase the safety factor up to the required minimums.

115. Vale did not inform Auditor B about the December 11, 2017 meeting or concerns Vale raised at that meeting.

116. Vale GRG personnel, including the GRG Manager and Executive One, received the PIESEM report on December 20, 2017. It reiterated the minimum requisite 1.3 and 1.1 safety factors for the undrained condition, emphasized that laboratory data could not be relied upon and should be discontinued for now, and again recommended Vale's liquefaction analyses be based primarily on field tests. Again, Vale did not share this report with Auditor B.

117. On December 21, 2017, Vale's GRG and operational geotechnical engineers, managers and executives responsible for the Brumadinho dam, including the GRG Manager and Executive One again met with Engineering Firm One and Auditor C to discuss the liquefaction study results for the Brumadinho dam and the short, medium, and long term measures needed to increase the dam's safety up to minimum required levels.

118. During this meeting, Vale asked Engineering Firm One to provide a technical analysis by January 12, 2018, justifying its refusal to use laboratory data in the liquefaction analysis, and a technical analysis due by January 19, 2018, providing reinforcement options for the

Brumadinho dam that would immediately address the liquefaction risks and increase the dam's safety factors.

119. During the December 21, 2017 meeting, as reflected in the meeting minutes prepared by GRG personnel, Vale also discussed the urgent need to lower the water levels in the Brumadinho dam "[s]o as to increase the safety factor for the non-drained condition" up to 1.3 prior to the June 2018 deadline for issuance of the stability declaration from the Periodic Review. Vale decided to install deep horizontal drains ("DHPs") even though this would not increase the safety of the dam sufficiently before June 2018. They also discussed reinforcement berms and other adjustments, but were aware that they could not implement such measures to increase the safety factor as needed before the June 2018 deadline for obtaining the stability declaration, without triggering liquefaction.

120. Vale GRG and operational geotechnical personnel were so concerned about their ability to obtain a stability declaration for the Brumadinho dam that Executive One asked Auditor C if it would issue a safety declaration in the context of the Periodic Review irrespective of the safety factor.

121. Vale GRG and operational geotechnical personnel also asked Engineering Firm One and Auditor C to provide by January 19, 2018, a proposal for conducting additional laboratory tests, in flagrant disregard of the PIESEM panel's oral and written recommendation that Vale not use laboratory data for the current liquefaction analyses due to inconsistencies and data integrity issues.

122. On or about the evening of December 21, 2017, a GRG engineer sent the GRG Manager and another GRG engineer an email specifically highlighting the PEISEM panel's finding that Vale was using unreliable laboratory data, its recommendation that Vale's liquefaction

assessments use field tests, and its recommendation that Vale's "use of laboratory tests for estimating undrained strengths should be discontinued."

123. Nevertheless, by December 27, 2017, and after several discussions about how they could secure the stability declaration in the Periodic Review, Vale's GRG and operational geotechnical engineers, managers and executives decided to pressure Engineering Firm One and Auditor C to accept the laboratory data, knowing that no remedial actions would increase the Brumadinho dam's safety factors to minimum levels before the Periodic Review's stability declaration was due.

124. Vale's GRG and operational geotechnical engineers, managers and executives also understood that increasing the Brumadinho dam's internal drainage with the installation of DHPs was an "immediate action and condition" for the Periodic Review report by Auditor C, given the dam's unacceptably low safety factor in the undrained condition.

125. However, Vale deliberately withheld from Auditor B the Brumadinho dam's true, 1.06, safety factor, which precluded issuance of a stability declaration. It also deliberately concealed from Auditor B that the dam's condition required immediate remedial measures to increase safety and that the firms conducting the failure probability analysis and Periodic Review found that all laboratory data for the Brumadinho dam was unreliable and could not be used in the liquefaction analysis.

126. On January 12, 2018, Vale GRG personnel received Engineering Firm One's report detailing the reasons that the laboratory data for the Brumadinho dam had to be discarded and why the Extraordinary Audit report and Supplementary Technical Report were flawed and inaccurate as a result. In simple terms, the laboratory tests provided results that were inconsistent, facially

implausible, unsupported in the engineering literature, and otherwise unrepresentative of the tailings in the Brumadinho dam that were susceptible to liquefaction.

127. Engineering Firm One's analysis also detailed the inconsistency between Auditor A's July 15 Analysis (which Vale concealed from Auditor B) and the flawed August 2016 Extraordinary Audit and Supplementary Technical Report upon which Vale knew Auditor B was continuing to rely.

128. Vale concealed the existence and substantive content of Engineering Firm One's January 12, 2018 report from Auditor B.

129. On January 19, 2018, Vale GRG personnel received Engineering Firm One's technical analysis of alternatives to raise the Brumadinho dam's safety factor as requested during the December 2017 meetings. Although Vale had told Engineering Firm One that "the interventions must be immediately implemented and must raise the factor of safety to a value that complies with the established [1.3] safety criteria regarding liquefaction," the report confirmed what the parties previously had discussed – that none of the options would be able to achieve the necessary increase in safety in the short term without themselves triggering liquefaction. The report noted that although Vale had decided to install DHPs and mine the tailings, Vale should consider that this solution "does not achieve satisfactory safety conditions for the dam over the short term."

130. Vale withheld Engineering Firm One's January 19, 2018 technical analysis from Auditor B and did not otherwise inform Auditor B about its substance at any time during the March 2018 semi-annual audit.

131. Given these reports and Auditor C's and Engineering Firm One's continuing refusal to use laboratory data, Vale's GRG and operational geotechnical engineers, managers, and

executives, including GRG Manager and Executive One, worked with Auditor A and another consultant in February and March 2018 to develop and present counterarguments to the reports and to pressure Engineering Firm One and Auditor C to use the laboratory data necessary to inflate the safety factor and obtain a stability declaration. Again, however, Engineering Firm One and Auditor C rejected their arguments and continued to discard the laboratory data.

132. On or about March 19, 2018, Auditor C issued another draft of its Periodic Review that again confirmed the Brumadinho dam's critically low 1.06 safety factor in the undrained condition and concluded that "stability analyses in the undrained condition resulted in safety factors below the recommended minimums. In view of the above, it is recommended that its safety be adjusted by means of geotechnical interventions." The report further reiterated the fact that "[a]s far as liquefaction analysis is concerned, the methodology employed, although relatively new, is the most accepted in the global technical community."

133. Still, Vale GRG and operational geotechnical engineers, managers, and executives, including GRG Manager and Executive One, pursued the laboratory tests and pressured Engineering Firm One and Auditor C to refine and reassess the liquefaction analysis for the Periodic Review. On March 21, 2018, Vale GRG and operational geotechnical engineers met with Engineering Firm One, Auditor A, and Auditor C to "to assess the undrained condition" of the Brumadinho dam and demand "reassessments to be incorporated into the Periodic Review." These Vale personnel specifically asked Engineering Firm One to redo the field tests and reassess laboratory tests. Minutes of the meeting documenting Vale's demands of Engineering Firm One were sent by Vale's GRG engineer to all participants and the GRG Manager and Executive One.

134. Engineering Firm One again refused to reassess its work – explaining to Vale's GRG's engineers and managers, including the GRG Manager, that there was no new data; the

PIESEM had already blessed their approach, which aligned with best engineering practices; and there was no indication that their analysis was incorrect.

135. As discussed below, Vale responded by removing Engineering Firm One from further work on the liquefaction analyses for the Dam Rupture Probability Analysis and Periodic Review for the Brumadinho dam.

136. On March 12, 2018, unaware of Vale's pressure campaign and ongoing dispute with the firms handling the Periodic Review, Auditor B provided Vale with a draft of the semi-annual audit report on the Brumadinho dam. On March 23, 2018, Auditor B provided Vale with a stability declaration for the Brumadinho dam, and on March 29, 2018, Vale received the final audit report.

137. In its report for the March 2018 semi-annual audit, Auditor B incorrectly stated that the Brumadinho dam's safety factor met the minimum 1.3 required for a stability declaration. The report made clear that Auditor B had relied on the results of the Extraordinary Audit and Supplemental Technical Report that Vale provided. Vale thus knew or was reckless in not knowing that the March 23, 2018, stability declaration was illegitimate, based on unreliable laboratory data, and did not align with the results being generated in the Periodic Review, all of which Vale deliberately concealed from Auditor B.

D. Vale Manipulated Auditor C to Obtain a False Stability Declaration in the Periodic Review (March –June 2018) through a Series of Deceptive Acts

138. From March through June 2018, Vale continued its pressure campaign, leveraging the promise of future Vale contracts to persuade Auditor C to issue a stability declaration that concealed the Brumadinho dam's critically low safety factors and heightened risk of liquefaction.

139. In addition to requiring semi-annual audits and Periodic Reviews, Brazilian legislation enacted in May 2017 required Vale to submit reports concerning the "as built" or "as is"

design of its tailings dams. To comply with the legislation and obtain the "as is" design for approximately 65 of Vale's dams, including the Brumadinho dam, that did not have an "as built" design or other conclusive structural information, Vale requested bids and proposals from a number of suppliers in January 2018, including Auditor C.

140. From February through early April 2018, Vale held meetings and discussions with Auditor C and other firms to discuss their proposals and negotiate the price and other terms and requirements for the "As Is" contract. Vale's GRG Manager and Executive One were involved in the process of determining which firm would be awarded the contract.

141. Valued at over $2.1 million, the "As Is" contract was almost five times larger than the ongoing contract to conduct the Periodic Reviews, making it a significant and lucrative opportunity for Auditor C, which was trying to expand its business relationship with Vale.

142. As a result, in or around March 2018, when Vale removed Engineering Firm One from further work on the liquefaction analyses for the Dam Rupture Probability Analysis and Periodic Review for the Brumadinho dam because they refused to "refine" their liquefaction studies, Auditor C succumbed to the pressure and opted to appease Vale.

143. On March 23, 2018, Vale GRG engineers called Auditor C and asked it to take over Engineering Firm One's work and assume sole responsibility for the liquefaction analyses for both the Dam Rupture Probability Analysis (which had been under Engineering Firm One's primary purview) and the Periodic Review of the Brumadinho dam.

144. Auditor C in turn provided Vale with a price proposal for reassessing the liquefaction analyses. Vale's GRG engineers and managers, including GRG Manager, noted Auditor C's willingness to "evolve" and partner with Vale on the liquefaction studies, and GRG

Manager, who was responsible for approving the proposal, said that they could "close it" with Auditor C.

145. On March 26, 2018, Vale GRG engineers and managers, including GRG Manager, directed Auditor C to proceed with the new liquefaction studies for the Periodic Review and thanked Auditor C for "the partnership developed throughout this work and the will to evolve along with Vale in such a complex subject."

146. In early April 2018, Vale's GRG personnel, including the GRG Manager, continued to stress, in discussions and meetings with Engineering Firm One and Auditor C, that the results of the Dam Rupture Probability Analysis and the Periodic Review needed to be consistent with each other, not only for the Brumadinho dam but also for other dams in the Córrego do Feijão complex for which "the rupture probabilities are quite high." Vale operational geotechnical personnel also expressed concern that Auditor C might not issue a positive stability declaration for the Brumadinho dam for the Periodic Review given the conclusions set out in its March 19, 2018 draft Periodic Review report, which had excluded laboratory data consistent with the PIESEM and Liquefaction Expert's recommendations. They also disagreed with Auditor C's "very conservative approach to the undrained strength ratio" and refusal to adopt Auditor A's findings from the Extraordinary Audit.

147. Thus, during an April 10, 2018 meeting with Auditor C, Vale's GRG and operational geotechnical personnel directed Auditor C to reassess its March 19, 2018 draft Periodic Review given the new liquefaction analyses and use of laboratory tests and submit a revised report.

148. As Auditor C worked on the agreed upon "new" studies, Vale personnel continued to pressure it to ensure Vale obtained positive stability declarations not only for the Brumadinho dam, but also for other dams.

149. For example, on or around April 11, 2018, after learning that two other high damage potential upstream tailings dams, Forquilha I and Forquilha II, "were not passing" because their safety factors fell below the 1.3 safety factor standard, a Vale GRG engineer "started screaming again" and, together with another GRG engineer, directed Auditor C to apply new liquefaction studies and use laboratory tests – just as they were doing for the Brumadinho dam.

150. However, as Auditor C came to realize that the new studies would not have their intended result – the Brumadinho dam's safety factor would still be significantly below the 1.3 standard – it complained that Vale would throw their backs "against the wall" and use the "As Is" contract – for which they were in the middle of active negotiations – as "blackmail."

151. For example, on May 7, 2018, Auditor C's engineers expressed concern that "[t]he non-drained analyses are still not good enough (Security Factor < 1.30)" and purposely delayed a meeting with Vale's GRG engineer as a result.

152. On May 13, 2018, in internal emails, Auditor C's engineers further expressed safety concerns:

> [Engineer] is finishing the liquefaction studies for Dam I..., but everything points to it not passing the test, i.e. the safety factor for the highest section being less than the minimum of 1.3. In this respect, strictly speaking, we cannot sign the Declaration of Condition of Stability of the dam, which as a result, will result in immediate stoppage of all activities at the Córrego do Feijão Mine.

153. They further complained that the Vale GRG engineer whose meeting they had tried to delay had nevertheless:

> called last Friday to find out how the studies were going and, in the knowledge that Dam 1 might not pass, stated that every effort should be made to increase the safety factor, such as lowering of the water table and re-mining the tailings, etc. But these are all long-term solutions that would take at least two to three years in order to achieve the desired effect. It is also said that the Forquilha III Dam … also might not pass, but that the company will sign the Declaration of Condition of Stability (DCS) based on the same set of promises in relation to improvements and interventions.

154. They then discussed the fact that they were going to be having a meeting with the GRG Manager, who was involved in the ongoing "As Is" contracting process, and the operational geotechnical manager responsible for the Brumadinho dam and "they will ask us if we are going to sign [the stability declarations], or not. … [A]s always, Vale will throw us against the wall and state: if it doesn't pass, will you sign it or not?"

155. The next day, on May 14, 2018, prior to their meeting with Vale, Auditor C personnel continued to discuss the fact that the Brumadinho dam did not qualify for a positive stability declaration, but noted that how they proceeded "could be an opportunity to change our relationship with Vale. For the better or for the worse."

156. During the May 14, 2018 meeting, which Vale GRG personnel had scheduled to finalize the results of the Periodic Review, Executive One reminded Auditor C of the impending statutory deadline for the stability declaration in the Periodic Review and pointedly asked whether Auditor C would issue it, even though the Brumadinho dam's safety factor still was critically low and did not meet the 1.3 required by good engineering practices.

157. Under pressure to sign the stability declaration or risk losing the "As Is" contract, Auditor C's engineer agreed to provide the stability declaration as requested, on the condition that Vale adopted the long-term remedial measures recommended by Auditor C.

158. After the meeting, Auditor C personnel discussed watering down and reworking the results of the Periodic Review and agreed "that unless we sign the declaration we will certainly be left out of any future plans, including Lot 3 as is!" Another Auditor C engineer commented that they needed to make sure Auditor C's leadership agreed with the signing of the stability declaration "under risk of Vale using this 'As Is' contract as blackmail."

159. Auditor C personnel further recalled that Vale had removed Engineering Firm One from the project when they refused to conduct the additional laboratory testing, thereby presenting Auditor C with an "opportunity" but also raising the question of whether "[w]henever an analysis does not pass, Vale will [sic] involve another company until they find a beneficial result for them?"

160. Having received their oral commitment and agreement to sign the stability declaration for the Brumadino dam, Vale rewarded Auditor C as promised, informing them late the following night that they had been awarded the "As Is" contract.

161. Auditor C, in turn, confirmed their agreement to sign the stability declaration with an email to Vale's GRG engineer on May 18, 2018 requesting the "subsidies for signing the [stability declaration]," namely the proof of additional measures Vale was taking to improve the safety of the dam. That GRG engineer circulated the email to other GRG and operational geotechnical personnel, including the GRG Manager, who in turn forwarded it to Executive One on May 20, 2018 with a note that "[w]e urgently need to receive the material, as our deadline for issuing the [stability declaration] is 06/15/18."

162. Also on May 20, 2018, Auditor C issued a revised draft of the Periodic Review report. Based on their "reinterpretation" of field data, Auditor C found that the Brumadinho dam's safety factor for the peak, undrained condition was now 1.09 based on a strength parameter of .26, as opposed to earlier results that showed a strength parameter of .24.

163. Even with the "reinterpretation," the Brumadinho dam still did not meet the 1.3 safety factor. So Vale simply changed the rules. To give the appearance that the 1.09 safety factor was sufficient to issue a stability declaration, Auditor C's revised Periodic Review report did not refer to the 1.3 recommended minimum safety factor that Vale's other reports on the Brumadinho

dam had contained. The revised Period Review report now falsely stated that a safety factor greater than 1.05 was sufficient for issuance of the stability declaration.

164. The Periodic Review report also included express prohibitions against inducing vibrations and other activities because of the likelihood that they would trigger liquefaction at the Brumadinho dam:

> To increase dam safety in terms of the liquefaction failure mode, it is recommended that measures be adopted to reduce the probability of triggers occurring. Thus, one should avoid inducing vibrations, prohibit detonations nearby, avoid traffic of heavy equipment on the dam, impede heightening the water level in the tailings, not perform works that remove material from the toes of slopes or works that lead to overloading the reservoir or the dam. It is also recommended that seismological registering be installed in the area around the dam.

165. The Periodic Review report further detailed the long-term remedial measures Vale had agreed to perform, including reducing the high water levels in the dam with the installation of DHPs and re-mining the tailings, even though such measures would not yield a sufficient increase in safety in the short term.

166. Also on May 20, 2018, Auditor C provided a revised draft of the Dam Rupture Probability Analysis for the Brumadinho dam. In contrast to the draft Periodic Review Report that Auditor C had altered under pressure from Vale, the draft Dam Rupture Probability Analysis clearly stated what Vale and Auditor C both knew at the time – 1.3 was the relevant reference and minimum standard for the undrained safety factor.

167. Finding that the peak, undrained safety factor for the Brumadinho dam was 1.09 and the residual, undrained safety factor was .44, the draft Dam Rupture Probability Analysis stated that because "the minimum safety factor of 1.3 is recommended for peak analysis and 1.1 for post-peak analysis," "it is known that only a trigger would be sufficient to start the liquefaction process."

168. The draft Dam Rupture Probability Analysis further stated that the probability that the Brumadinho dam's safety factor was less than 1.3 was 100%, and that "the probability of liquefaction occurring is given by the probability of the trigger itself," which is 1 x 10^{-3}, or 1 in 1,000 years."

169. Over the next several days, Auditor C continued to finalize the reports, but in a May 30, 2018 text message ultimately told Vale's GRG engineer, that despite their best efforts, the results detailed in the May 20, 2018, draft Periodic Review were final, including the .26 resistance ratio and 1.09 safety factor. The GRG engineer forwarded the message to Vale's GRG Manager, who in turn forwarded it to Executive One stating, "We have the [stability declaration], but the security factors are the ones mentioned above. The company did its best, but it was impossible to change them. In fact, we have to solve the root of the problem, as we discussed today!"

170. On or around June 9, 2018, when Vale requested the latest version of the Periodic Review Report, Auditor C provided them with the May 20, 2018 version.

171. On June 11, 2018, during installation of one of the DHP drains requested by Auditor C to reduce the Brumadinho dam's high water levels, a mixture of tailings and water gushed out at the drilling site. This event raised serious safety concerns about the dam's fragile condition among Vale's GRG engineers, managers and executives, including the GRG Manager, Executive One, Executive Two, and Executive Three.

172. This internal erosion or hydraulic fracturing incident continued to be monitored between June 12 through early June 14, 2018. The incident also caused Vale to cease the installation of any additional DHP drains, which meant that the remedial measures necessary to lower the dangerously high water levels in the dam, which Vale had promised to undertake as "subsidies" for getting the stability declaration from Auditor C, would not be implemented.

173. On June 12, 2018, fully aware of the immediate need to lower the water table and increase the safety factor, Executive Three asked Executive One to speed up the decommissioning of the Brumadinho dam because they "cannot wait any longer," and even suggested seeking a waiver of environmental licensing approvals in order to immediately begin re-mining (*i.e.* processing and removing) the tailings, which would at least lower the height of the dam. Executive One, however, cautioned that any such action could itself trigger liquefaction and cause the dam to collapse.

174. Nevertheless, despite the June 11, 2018 DHP incident and serious concerns it raised, and based on the May 20, 2018 version of the Periodic Review Report, Vale secured a positive stability declaration for the Brumadinho dam on June 12, 2018 from Auditor C, as promised. Vale then signed and submitted the stability declaration to authorities the next day.

175. On June 15, 2018, the GRG Manager informed Executive One that although they had received stability declarations for all of their high damage potential, upstream tailings dams, "it is important to mention that some structures, despite the result, warrant full attention in complying with the pertinent recommendations from external auditors, in order to guarantee, first of all, the safety of the structures and also to obtain the [stability declaration] in the next External Audit (September/18)."

176. The GRG Manager further highlighted four dams that specifically needed attention and indicated that the Brumadinho dam should "lower the water table in the structure and implement the effective decommissioning works (controlled mining) and/or reinforce the structure." The GRG Manager also noted that based on the failure probability analyses, "other structures will also have to be treated for risks, considering that they exceed the tolerance defined by our Geotechnical Risk Management (GRG) governance."

177. The Brumadinho dam was also part of this list of structures highlighted by the GRG Manager as its annual probability for failure due to internal erosion had already been determined to be 2 x 10^{-4}, or twice the maximum tolerance level, and its probability for failure due to liquefaction was calculated by July 2018 to be 3 x 10^{-4}, or *three times* the maximum tolerance level.

178. On June 15, 2018, Executive One forwarded the information he received from the GRG Manager to Executive Three, noting that similar information would be conveyed to Executive Four. Executive Three, in turn, forwarded the information to Executive Two, then serving as Operations Director.

E. Vale Obtains False Stability Declarations for September 2018 Audits by Replacing Auditor B with Auditor C (June – September 2018)

179. Having improperly but successfully pressured Auditor C to provide a false stability declaration in connection with the Periodic Review, Vale's GRG personnel next turned to securing a stability declaration in connection with the federal and state audits due in September 2018.

180. But, as described in detail below, when Auditor B learned of the Brumadinho dam's critically low 1.09 safety factor and DHP incident, it questioned whether it was appropriate to certify the Brumadinho dam's stability. Vale's GRG personnel, including Executive One, responded by again stepping in to manipulate the process, removing Auditor B from the audits and hiring Auditor C on an "emergency" basis to deliver the stability declaration instead.

181. On or around May 21, 2018, Auditor B conducted its site visit to the Brumadinho dam as part of the process for the audits due in September. During the site visit, Auditor B observed the DHP drilling and expressed their concerns to Vale, including the need to be careful given risks to the Brumadinho dam.

182. Between late May and approximately June 11, 2018, Auditor B also learned about the results of Auditor C's Periodic Review, which had calculated critically low 1.09 and .46 safety

factors for the peak undrained and residual undrained conditions. Alarmed by the "discrepancies in criteria" for evaluating the liquefaction failure mode between Auditor C's Periodic Review Report and their own March 2018 semi-annual report, which was based on documentation and information Vale had provided at that time – namely the Extraordinary Audit and Supplemental Technical Report – Auditor B raised concerns to Vale's GRG personnel about its ability to timely issue the stability declaration. Auditor B also questioned the basis for the declaration of stability given that Vale itself recognized the minimum standard to be 1.3 for the peak, undrained condition.

183. Vale responded by removing the Brumadinho dam from Auditor B's scope of work. During the week of June 11, 2018, a Vale GRG engineer telephoned Auditor B to inform it "that due to differences in criteria used for [the] geotechnical safety assessment for the Liquefaction failure mode," Auditor B would no longer be responsible for audits of the Brumadinho dam. Auditor C, which had completed the Periodic Review, would now be responsible for the audits and stability declarations due in September 2018.

184. On June 27, 2018, Vale's GRG engineer received an email from Auditor B confirming its removal and noting that its concerns had been compounded by further public reports about the June 11, 2018 DHP incident.

185. Auditor B stated, "In light of the above, we express our concern and we very respectfully request clarification on such information circulating in the market, as well as an update on the current conditions of the dam, given that the Stability Condition Declaration (DCE) issued in March 2018" was still in effect until September 2018.

186. Vale's GRG engineer responded the same day by confirming Auditor B's removal due to "technical differences" on the liquefaction issue.

187. On August 28, 2018, and with Executive One's participation and approval, Vale and Auditor C entered into a one-year contract for Auditor C to conduct the September 2018, March 2019, and September 2019 audits for the Brumadinho dam, which previously had been part of Auditor B's contract. Due to the "emergency nature" of the hiring, Vale did not require purchase requisitions or adhere to normal aspects of the contracting process.

188. A few days later, on September 1, 2018, Auditor C signed and issued Vale a positive stability declaration for the Brumadinho dam based on the same analysis and safety factors it had found during the Periodic Review. Vale filed the stability declaration with state authorities the same day. Vale also filed the stability declaration for the September audit with federal authorities on September 26, 2018.

F. The Brumadinho Dam Was Known Within Vale As a Critical, Conditionally Unsafe Dam at High Risk for Liquefaction

189. Vale GRG personnel, including GRG Manager, Executive One, Executive Two, and Executive Three, knew at all times that the stability declarations it obtained were not reliable for assessing dam safety, and that the Brumadinho dam was in fact a critical, high risk, and conditionally unsafe dam that posed an unacceptable risk of failure due to liquefaction and internal erosion.

190. As they explained during the first PIESEM meetings in March 2017, Vale's GRG engineers, managers and executives understood after the Mariana dam disaster that the undrained condition – which assessed the dam's ability to withstand liquefaction failure – was the most important and relevant aspect of the stability analysis. They also understood that the stability declarations for the Brumadinho dam provided a false sense of security because they did not properly reflect liquefaction risk. The PIESEM panelists further confirmed Vale's understanding when, on the last day of the meetings, they discussed how external audits were not sufficient to

identify relevant dam safety and risk management issues, and that probabilistic analyses needed to be considered together with deterministic analyses related to the safety factor. The PIESEM panelists also stressed the need for Vale to ensure the independence of auditors hired by Vale to conduct the external audits.

191. In July and August 2017, internal reports concerning the integration of dam safety risks into Vale's overall business risk matrix specifically highlighted the Brumadinho dam for attention. In fact, these internal reports recognized that the Brumadinho dam's rupture would have catastrophic consequences for Vale, including more than $1.4 billion of financial losses and the deaths of more than 240 people. These reports also reflected the knowledge of the GRG Manager, Executive One, Executive Two, and Executive Three concerning the annual probability of failure for the Brumadinho dam was at least 1 in 10,000/year, which meant that it posed an "unacceptable" risk when considering international standards related to individual loss of life tolerance levels.

192. The reports also indicated that controls for addressing the liquefaction risk had not yet been properly or fully developed.

193. On November 15, 2017, Vale GRG personnel presented the PIESEM with a report that further identified the Brumadinho dam as one of three dams that specifically presented high risks of liquefaction, and one of ten dams that exceeded societal tolerance limits for safety given its probability of failure and the likely death of over 200 people without warning sirens. Even with warning sirens, the Brumadinho dam was still one of six dams that exceeded societal tolerance limits for safety.

194. As part of the Dam Rupture Probability Analysis, Engineering Firm One and Auditor C had already calculated the Brumadinho dam's annual probability of failure due to

internal erosion to be 2 in 10,000 / year, the report showed the dam was, in fact, a "high priority," "conditionally unsafe" dam that posed an "unacceptable" risk to life and required disclosure to authorities and the public, according to the U.S. Army Corps of Engineers' Dam Safety Action Classification ("DSAC") tables.

195. This draft of the Dam Rupture Probability Analysis also reiterated that Vale would define the maximum level of tolerance to be *less than* 1 in 10,000 per year, in accordance with international standards, and that all risks above that level would be "included in Vale's Business Risk Matrix and presented to the board of directors, CEO and Administrative Council."

196. Through the PIESEM meetings they attended and the resulting presentations and reports they received, the GRG Manager, Executive One, Executive Two, and Executive Three obtained further confirmation that Vale's stability declarations could not be relied upon for assessing dam safety risks. These meetings and reports highlighted the minimum recommended safety factors of 1.3 and 1.1 for the peak and residual undrained conditions, and Vale's data integrity problems, improper use of laboratory tests, and inconsistencies in the liquefaction analyses.

197. Through June 15, 2018, email correspondence among the GRG Manager, Executive One, Executive Two, Executive Three, and other Vale personnel also recognized that the stability declarations obtained during the Periodic Review did not mean the dams were safe because, "despite the result," many like the Brumadinho dam demanded "attention" and remedial action and exceeded Vale's maximum risk tolerance levels.

198. By July 10, 2018, Auditor C had determined that the Brumadinho dam's probability of failure due to liquefaction was 3 in 10,000/year, or *three times* the maximum level of acceptable risk.

199. On or around July 20, 2018, GRG personnel also noted in a draft presentation for Executive One that "a safety factor that complies with the legislation is not always guaranteed to maintain the stability of the dam." It then proceeded to show that despite all the dams obtaining stability declarations in the Periodic Review process, 9 out of 17 dams, including the Brumadinho dam, had a greater than 10% probability of liquefaction without a trigger, and the Brumadinho dam did not even meet the 1.3 minimum safety factor for the peak undrained condition.

200. In an August 23, 2018 draft GRG report on dam management for Vale's Executive Board and Executive Four reviewed by Executive One and Executive Three, Vale's GRG personnel again acknowledged that although all the dams had obtained stability declarations, many dams, including the Brumadinho dam, still posed risks that demanded remediation. With respect to the Brumadinho dam, the report noted that it had received stability declarations but also highlighted as "attention points" the dam's "potential for liquefaction and internal erosion" with planned decommissioning.

201. Even a September 2018 GRG report presented to the Executive Risk Committee of Vale's Executive Board showed that Vale had 10 high risk dams that presented an intolerable and unacceptable risk of failure in the "Attention Zone." As the PIESEM had previously informed Vale during the November 2017 and again later in October 2018 meetings, the dam's placement in the "Attention Zone" meant that remedial measures were necessary to lower the risks to acceptable levels as a matter of urgency and priority. "[A]ll prevention and mitigation controls" were to be applied even though "a reduction in probability is not feasible in the short term."

202. A September 2018 report by a GRG engineer, reviewed by the GRG Manager and Executive One, and presented to the Operational Risk Subcommittee of the Executive Risk

Committee further identified each of the 10 dams in the Attention Zone by name, including the Brumadinho dam.

203. During a presentation during the PIESEM meeting on October 3, 2018, Vale's GRG also identified the Brumadinho dam as one of four dams that presented high risks of failure due to liquefaction, and one of three dams that presented high risks of failure due to internal erosion. At this same meeting, the PIESEM received Auditor C's presentations about plans to decommission the Brumadinho dam, the challenges in doing so without triggering liquefaction, and the dam's Periodic Review results, including issuance of a stability declaration despite the critically low 1.09 and .44 safety factors in the peak and residual undrained conditions. The PIESEM then reiterated points it had made in prior PIESEM meetings concerning minimum recommended safety factors of 1.3 and 1.1 for the peak and residual undrained conditions, Vale's data integrity problems, improper use of laboratory tests, and inconsistencies in the liquefaction analyses. Vale's GRG personnel, including GRG Manager, Executive One, Executive Two, and Executive Three, received the PIESEM's October 2018 presentations and reports containing these points.

204. In fact, the October 2018 PIESEM's discussion about decommissioning challenges for the Brumadinho dam, Vale's GRG personnel, including Executive One, expressed deep concern about triggering liquefaction at the dam. For example, Vale's GRG personnel discussed with the PIESEM concerns about seismic triggers, strain and creep, as well as other potential triggers and were aware that the Brumadinho dam's water levels were not dropping fast enough.

205. Given the high failure risks, Vale's GRG personnel even discussed with the PIESEM the possibility of building a berm in addition to mining the tailings and lowering the

water levels with drains. Even in taking this step, Vale's GRG personnel feared that the vibrations and equipment used to do this work would itself trigger liquefaction and dam rupture.

206. Thus, although Vale executives, including the GRG Manager, Executive One, Executive Two, Executive Three, Executive Four and members of the Executive Board, all understood the need to decommission the dam and take steps to increase the Brumadinho dam's safety to levels that would remove it from the "Attention Zone," Vale's GRG personnel, including at least the GRG Manager and Executive One, fully understood that no short term options existed.

207. Although Vale could do nothing in the short term to reduce the failure risks for the Brumadinho dam to tolerable and safe levels, Vale nevertheless did not inform authorities, the local community or investors of this fact. Publically, Vale continued to advance the false narrative that the Brumadinho dam satisfied various safety standards, including good engineering practices that it claimed to follow.

G. The Catastrophic Collapse

209. On January 25, 2019, the Brumadinho dam suddenly and catastrophically collapsed when a toxic sludge of liquefied mine waste ruptured the dam's earthen walls. Within 10 seconds, collapse of the dam's slope was complete, and in less than five minutes nearly 75% of the tailings had flowed out of the dam. Without warning, the sludge instantly killed dozens of workers when it demolished a cafeteria downhill from the dam. It went on to destroy entire buildings, flattening an inn and killing at least seven of its guests, as it continued to engulf residential areas and deposit toxic sludge in fields used for farming and other agricultural purposes.

210. In all, the collapse killed 270 people. The toxic sludge even reached the Paraopeba River, nearly five miles from the dam site, where it poisoned the river and its tributaries. Environmental groups have since declared it to be a "dead river".

211. The Brumadinho dam collapse caused immeasurable environmental and social harm and remediation efforts have already cost communities in Brazil billions of dollars.

212. In the days after the Brumadinho dam collapse, moreover, Vale's ADS fell by nearly 25%, wiping out approximately $4.4 billion in market capitalization. Vale's corporate credit rating was also downgraded to junk status and its board suspended all dividend payments. In the first quarter of 2019, Vale reported a quarterly loss and negative earnings (EBITDA) for the first time in its history.

H. The Aftermath of the Catastrophic Collapse

213. Following the Brumadinho dam collapse, on February 11 and 18, 2019, Auditor C notified Vale that it was withdrawing all previously issued stability certifications for Vale's dams. Auditor C told Vale that it had lost faith in the stability declarations and said: "Considering the recent Brumadinho dam collapse tragedy, we consider it necessary that Vale revisit previous reports on dam safety issued in the past to Vale."

214. By letter sent to Vale on or about March 12, 2019, Auditor C reiterated its inability to confirm the stability of Vale's dams and that "the Factor of Safety for global stability may be less than indicated in the previously issued reports … for all dams due to methods of calculation that might not have captured the lowest factors of safety in the dams and optimistic choices of strength parameters for some of the materials in the dams used in these calculations."

215. In the days following the collapse, Vale's Board of Directors created an "Independent Extraordinary Assessment Advisory Committee" to investigate and assess "the causes of and liability for the breach of Dam 1 [Brumadinho dam] at the Córrego do Feijão Mine." The Committee reported "directly" to Vale's Board of Directors and was "responsible for assisting it in matters related to the investigation of the causes and responsibilities for the Dam

breach, which occurred on January 25, 2019." The Committee was also responsible for providing reports and presentations to the Board of Directors on developments in the investigation and communicating as appropriate with authorities.

216. On February 20, 2020, the Committee provided to Vale its final "Independent Investigation Report" and an "Executive Summary of the Independent Investigation Report," both of which it produced in the course of its work for the Board of Directors. Vale subsequently posted the Executive Summary to its website.

217. In the Executive Summary, the Committee concluded that Vale knew in 2016 and 2017 that the Brumadinho dam was unsafe. The Committee found that "since 2003, Vale had information indicating the fragile condition of B1." It further reported, "In 2016, studies based on field tests performed at B1 indicated that the dam was in a fragile condition. Studies performed in 2017 also indicated a condition of only marginal stability, but Vale's geotechnical area resisted accepting the 2017 results." The Committee found that, had Vale used an appropriate methodology, the safety factor it obtained for the 2016 Extraordinary Audit "would have been very close to 1, thus indicating a situation of imminent failure." The Committee also found that Vale's attempts to improve the safety of the dam were "limited and unsuccessful" and in any event "would not have been effective in the short term to elevate the stability of B1 to satisfactory conditions." Finally, the Committee explained that "it was known that in the event of dam failure, Vale's capacity to respond was limited and the impacts would be significant … and with minimal reaction time."

218. The Committee's conclusions in its Executive Summary also described deceptive conduct within Vale and the company's compromised and corrupted audit practice. The Committee criticized Vale's "work environment," which it found "lacked transparency." As the

Committee explained, "Information about B1 in the ALARP/Attention Zone [indicating the dam was unacceptably unsafe] was confined to meetings of the Operational Risk Subcommittee. As presentations rose to the higher levels of the Vale administration, the names of the structures within the ALARP/Attention Zone were removed." The Committee also concluded that Vale's external dam auditors "were not able to act truly independently" and that by hiring them to perform additional services outside the scope of the audits, Vale created "potential conflicts of interest and potential for impairment of the effectiveness and impartiality of the outcomes of audits."

III. VALE KNOWINGLY OR RECKLESSLY MADE MATERIAL FALSE AND/OR MISLEADING STATEMENTS TO INVESTORS

219. In the years following the Mariana dam disaster, Vale's statements to the public deliberately concealed the precarious and unsafe condition of the Brumadinho dam and the true safety risks presented by the dams in Vale's portfolio.

220. Vale told investors that all of Vale's iron ore dams in Brazil had been audited, had received stability declarations from external auditors, and were 100% normal and safe. Those statements were all false and/or misleading.

221. In truth, Vale deceptively and repeatedly manipulated the audit process and its auditors. In truth, Vale obtained illegitimate stability declarations for the Brumadinho dam that did not comply with international safety guidelines. In truth, the Brumadinho dam was not normal or safe, and Vale inarguably knew of its precarious condition. It had unacceptably low safety factors and unacceptably high annual probabilities of failure, and it posed intolerable and unacceptable risks to life. Vale hid these truths from its investors with its false and misleading public statements regarding dam safety and dam safety risk management.

A. 2016 False and/or Misleading Statements or Omissions

222. In an October 6, 2016, investor presentation, Vale claimed its dams had been audited in 2016 to address the "potential for liquefaction," using a "rigorous" process that was "conservative" in modeling for liquefaction. Vale further stated that the external audits for 2016 (including the Extraordinary Audit): (1) were done with the "presence of international auditors, incorporating the vision of good practice in the world"; (2) entailed a "rigorous review of existing engineering studies"; (3) incorporated new regulations requiring "analysis on undrained condition"; and (4) incorporated "learnings related to the accident of the Fundão dam." Vale also told investors: "The actions related to dam safety are taken beyond the legislation requirements," and "[a]ll Vale's dams in the Iron Ore Business are safe."

223. These statements were false and misleading. As detailed above, Vale's process for conducting the 2016 Extraordinary Audit and Liquefaction Study was neither rigorous nor conservative. As the Liquefaction Expert had expressly told both the auditor and Vale, Vale's laboratory data was unreliable, yielded artificially high and inaccurate results, and should not be used. Nor was Vale's process in compliance with legislative requirements, which dictated that the safety factor for the undrained condition should be determined by the auditor in accordance with "good engineering practices." The Liquefaction Expert told Vale how to comport with good engineering practices, and Vale deliberately ignored him.

224. Vale's statements touting the presence of international auditors misleadingly omitted that the auditor for the Brumadinho dam had used unreliable data to inflate the safety factor and create the false appearance that the dam met minimum standards for safety.

225. Finally, Vale's claim that all of its dams in the iron ore business were safe was false or misleading. Without the unreliable laboratory data, the Brumadinho dam could not achieve a

"satisfactory" safety factor necessary to obtain a stability declaration. The Liquefaction Expert's approach revealed the dam's true safety factor for the peak, undrained condition, which was far closer to unity than the requisite 1.3. The dam was not safe.

226. Vale made these statements knowingly or recklessly. At the time, Vale's GRG personnel, including Executive One, knew or were reckless in not knowing all of the relevant facts, including that Vale and its auditor had not followed the Liquefaction Expert's advice or adhered to good engineering practices, that the audit relied on faulty data for the purpose of inflating the safety factor, that the actual safety factor was unacceptably low, and that the dam was not safe.

B. 2017 False and/or Misleading Statements or Omissions

227. Vale's 2016 Form 20-F dated April 10, 2017, and its Form 6-K dated May 30, 2017, both of which were filed with the Commission, similarly contained materially false and misleading statements to investors. In its Form 20-F discussion about Environmental Regulations, Vale stated:

> In May 2016, the state of Minas Gerais issued a decree ordering an immediate assessment of the stability conditions of the upstream dams and suspending new licensing procedures for building or heightening upstream dams, until the state environmental authority defined new rules and procedures. We have conducted extraordinary audits on the stability conditions of our upstream dams, and no anomalies were identified. We filed a report with local governmental authorities in September 2016.

228. In its May 30, 2017, Form 6-K discussion about Environmental Regulations as applied to dams, Vale again told investors:

> In May 2016, the state of Minas Gerais issued a decree ordering an immediate assessment of the stability conditions of upstream dams and suspending new licensing procedures for the construction or lifting of upstream dams until the state environmental authority defined new rules and procedures. Vale carried out extraordinary audits on the stability conditions of its upstream dams and no anomalies were identified. Vale has filed reports with local government authorities in September 2016.

229. In both its 2016 Form 20-F and Form 6-K, Vale's statement that it had conducted extraordinary audits on its upstream dams without identifying any anomalies was false and misleading. Vale misleadingly omitted to state that the Brumadinho dam's Extraordinary Audit was corrupted by the purposeful use of unreliable data, rendering the resulting stability certifications false. This statement is also false and misleading because, in the course of their work on the Liquefaction Study and Extraordinary Audit, Vale and its auditor learned that the Brumadinho dam was in such a precarious condition that Vale's Executive Four decided to immediately suspend operations due to concerns about triggering liquefaction.

230. Vale made these statements knowingly or recklessly. At the time, GRG personnel, including Executive One, knew or were reckless in not knowing that the Extraordinary Audit relied on flawed data. And Executive One, Executive Two, Executive Three, and Executive Four knew or were reckless in not knowing that operations at the dam were suddenly terminated because of the risk of triggering liquefaction.

231. Vale further made false and misleading statements while discussing its "environmental responsibility" and its management of dam safety in its 2016 Sustainability Report issued on April 28, 2017, made available to investors on its website, and referenced in its SEC filings, including the Form 6-K, filed on May 30, 2017. Vale stated:

> In 2016, 145 dams were audited in the ferrous metals area, and the respective statements of stability conditions were filed within the deadline, in order to meet Vale's safety management requirements and legal parameters, including ... [those for the] Extraordinary Tailings Dam Safety Technical Audits with upstream heightening, and Decree No. 46,993/2016, which deals with the issuance of a corresponding statement of stability conditions....
>
> * * *
>
> At Vale, all dams, even if no longer in operation, remain under its responsibility and are monitored, audited, and maintained normally under the same criteria and safety levels adopted during their operation.

232. These statements were false and misleading. Vale misleadingly omitted that its auditor for the Brumadinho dam used faulty and unreliable data to artificially inflate the calculated safety factor up to the required minimum and that the stability certification obtained for the Brumadinho dam, as part of the Extraordinary Audit, was therefore false and improperly obtained.

233. Vale made these misstatements knowingly or recklessly. GRG personnel, including Executive One, knew or were reckless in not knowing about the flaws in the audit and the resulting illegitimacy of the stability certification.

C. 2018 False and/or Misleading Statements or Omissions

234. In or around April 10, 2018, Vale's President and CEO perpetuated Vale's false and misleading narrative when he falsely told investors at a meeting in Sao Paulo that Vale's tailing dams are in a state of "impressive" quality. As reported in an April 10, 2018 article in *Valor Econômico* entitled, "The state of the dams today is 'impeccable', says Vale's president," the CEO stated, "As soon as I started as president, I thought about the state of the dams. If there was another accident like Mariana's, my management would be short." He continued, "I don't know if this work was done after Mariana or if it was already like that, but today the dams are impeccable."

235. Vale's statements to investors and the public were materially false and misleading. The Brumadinho dam was a fragile, high risk, conditionally unsafe dam that did not meet minimum safety factors for the liquefaction risk and had an annual probability of failure two times higher than the maximum risk tolerance level for loss of life. At the time of the misstatements, internal Vale reports reflected that the Brumadinho dam was one of three dams that specifically presented high risks of liquefaction, and one of ten dams that exceeded societal tolerance limits for safety given its probability of failure and the likely death of over 200 people without warning sirens. Even with warning sirens, the Brumadinho dam was still one of six dams that exceeded

societal tolerance limits for safety. Each of these facts undermines Vale's conclusion that its dams were "impeccable," but Vale intentionally withheld them from investors.

236. Vale's statements were knowing or reckless. Vale GRG and operational geotechnical personnel, including the GRG Manager, Executive One, Executive Two, and Executive Three, knew or were reckless in not knowing the information cited above that made the statements false and misleading.

237. In its 2017 Sustainability Report issued on April 17, 2018, and made available to investors through its website and referenced in its SEC filings, including Form 6-K filed on May 30, 2018, Vale continued its false narrative of safety. Vale falsely stated:

- "At the end of the year, the area ended another cycle of external dams auditing, in which 100% of the audited structures were certified to be in stable condition, physically and hydraulically."
- "In 2017, external audits were carried out on 107 structures in the Ferrous area, located in Brazil. All of them had their physical and hydraulic stability certified, and were issued Statements of Stability Condition (DCE, acronym in Portuguese) by the responsible auditors."
- "Vale maintains the management of its dams in permanent alignment and updating with the good and strictest international practices, standards of which exceed the legal requirements. In this sense, it bears emphasizing that the Brazilian dam safety legislation is quite stringent, also based on good international practices and very judicious, both in terms of safety management requirements and emergency management."
- "In addition to applying best practices pertaining to dam safety management, Vale submits its structures to audits conducted by specialized external consultants, and rigorously complies strictly with applicable legislation."
- "Another highlight this year was implementing the International Panel of Experts on the Ferrous area, composed of international and national technicians who work in risk management, geotechnics and water resources. The panel's purpose is to evaluate governance, processes, studies, projects and technical analyses of geotechnics and hydrology."

- "[A]ll the structures in the Ferrous area are completely normal and stability-certified by the audit completed in September 2017."

238. Each of these statements in the 2017 Sustainability Report was materially false and misleading.

239. By emphasizing "external audits" and "responsible auditors," Vale falsely conveyed the message that the audit process had integrity and was independent, when in fact Vale's GRG personnel corrupted the audit at every turn. Vale's GRG personnel concealed material information that would have altered the audit results and directed revisions to the reports that improperly justified use of data Vale knew was unreliable.

240. Far from being a stable and safe dam, the Brumadinho dam was at all relevant times an extremely dangerous dam whose stability could not be certified. The dam's peak undrained safety factor was only slightly above unity – meaning that it was unlikely to be able to withstand a trigger – and its annual probability of failure exceeded maximum tolerance levels for risk to life. In fact, as Vale's own GRG report about tolerance levels and risk presented to the PIESEM in November 2017 showed, the Brumadinho dam was not a "normal" and "adequately safe" dam by *any* measure, but was actually a "high priority conditionally unsafe," DSAC Class III dam that presented intolerable and unacceptable risks to individuals and society that required disclosure to authorities and the public.

241. Vale's statement that all of its dams obtained stability declarations was misleading because it omitted to also state that Auditor B had issued stability declarations for the Brumadinho dam in September 2017 and March 2018 while incorrectly believing the dam met the 1.3 safety factor. Vale's statement misleadingly omitted several important facts: 1) the Extraordinary Audit, upon which Auditor B relied, used unreliable data; 2) new analyses, which Vale concealed from

Auditor B, showed the dam's safety factor to be barely above unity; and 3) there was no remedial action that could sufficiently increase the dam's safety without triggering liquefaction.

242. Also false and misleading were Vale's claims that it adhered to the "good and strictest international practices," applied "best practices," and "rigorously" and "strictly" complied with legislative requirements. As detailed above, at the time Vale made these statements, Vale's GRG personnel were actively pressuring Auditor C to issue a stability declaration for the Brumadinho dam despite its inability to meet the requisite 1.3 minimum safety factor. Vale's GRG personnel had even removed Engineering Firm One from further liquefaction studies on the dam because it refused to deviate from best practices and give Vale the results it wanted.

243. Finally, although Vale touted the implementation of the PIESEM, Vale misleadingly omitted to state that it had secured stability certifications in complete disregard of the PIESEM's recommendations regarding laboratory data. Although the PIESEM had agreed with Engineering Firm One that the Extraordinary Audit had improperly used unreliable data and arrived at inflated and false results, Vale still ensured Auditor B's reliance on the Extraordinary Audit, faulty laboratory data, and the .36 strength parameter that would artificially yield a 1.3 safety factor. Vale ignored the PIESEM's and Liquefaction Expert's multiple recommendations to use only field data and consistent standards for its liquefaction analyses.

244. Vale's misstatements in the 2017 Sustainability Report were knowing or reckless. Vale GRG and operational geotechnical personnel, including the GRG Manager, Executive One, Executive Two, and Executive Three, knew or were reckless in not knowing the information cited above that made the statements false and misleading.

245. Vale continued to make similar false and misleading statements in its ESG Webinar published on its website on December 11, 2018. In this webinar, Vale again falsely proclaimed

that "[a]ll of Vale's iron ore dams are safe and operating within normal limits," and "100% of Vale's iron dams have their Stability Dam Declaration issued by the External Auditors." It further misleadingly stated that "[i]n 2018, all Vale's iron ore tailings dams were audited," and highlighted improvements to internal processes for dam safety that go above and beyond legal requirements. Vale stated, "[i]n addition to regulatory compliance, Vale works proactively with complementary processes and initiatives." Amongst the legal requirements, it noted compliance with the "semiannual external audit with DCE" and the "dam safety periodic performance review with DCE." As "[a]dditional improvements," Vale highlighted their geotechnical risk analyses and their use of the PIESEM stating, "[t]he panels of national and international experts are of great importance and contribute by bringing a critical view on Vale's management model, the methodologies used throughout the process and acting as consultants on safety issues."

246. Each of these statements were materially false and misleading. Vale misleadingly omitted to state that it had obtained stability declarations for the Brumadinho dam in March 2018 only by withholding material information from its auditor (Auditor B) that directly contradicted the audit results, ensuring its auditor used faulty data, and ignoring the external experts' recommendations for conducting liquefaction analyses.

247. Vale further misleadingly omitted to state that it had obtained the stability declarations for the Brumadinho dam in June 2018 by pressuring its auditor to "evolve" and partner with Vale, or risk losing lucrative contracts, and to disregard minimum standards for dam safety, like the 1.3 safety factor for the peak, undrained condition.

248. Vale also misleadingly omitted to state that it had obtained the declaration for the Brumadinho dam in September 2018 only by continuing to disregard minimum safety standards, ignoring the PIESEM's recommendations and best engineering practices, and replacing an auditor

who questioned its ability to issue a stability declaration after it learned of the dam's critically low safety factors. In truth, Vale did not comply with regulatory requirements for dam safety, and the GRG risk analyses showed that the Brumadinho dam presented unacceptable risk of failure and two to three times exceeded maximum risk tolerance levels for life loss. Contrary to its public statements, Vale's GRG analyses also showed that the Brumadinho dam was one of 10 dams in an "Attention Zone" because of their high risk, high consequences, and unacceptable failure probabilities. And while Vale touted its creation of the PIESEM, it failed to disclose its disregard of the PIESEM's recommendations, including adherence to the 1.3 safety factor and use of only field data due to the flawed nature of certain laboratory data. Vale also did not disclose that the PIESEM had repeatedly found inconsistences and problems with the audits and liquefaction assessments, thereby suggesting that Vale's stability certifications were unreliable.

249. Vale's misstatements in the 2018 ESG Webinar were knowing or reckless. Vale GRG and operational geotechnical personnel, including the GRG Manager, Executive One, Executive Two, and Executive Three, knew or were reckless in not knowing the information cited above that made the statements false and misleading.

D. Vale Continued to Make False Statements After the Brumadinho Dam Collapse

250. Three days after the Brumadinho dam had collapsed, Vale similarly made materially false and misleading statements in its Form 6-K filed with the Commission on January 28, 2019..

251. In its Form 6-K, Vale falsely and/or misleadingly disclosed:

> The [Brumadinho dam] had Stability Condition Statements issued by [Auditor C], an international company specialized in Geotechnics. The Stability Condition Statements were issued on 6/13/18 and 9/26/18, related to the Periodic Safety Review of Dams and Regular Dam Safety Inspection processes, respectively, as determined by the DNPM Decree 70.389/2017. The dam had a Safety Factor in accordance with the world's best practices and above the reference of the Brazilian Standard. Both of the abovementioned

stability declarations attest to the physical and hydraulic safety of the dam."

252. This statement was misleading because it omitted to explain that before Auditor C issued safety certifications, it had repeatedly told Vale's GRG personnel that the Brumadinho dam did not and would not "pass" because the safety factors were unacceptably low. It further misleadingly omitted to explain that Auditor C only changed its opinion after Vale applied ceaseless pressure and awarded Auditor C lucrative contracts, thereby corrupting the audit process. The statement was also false because the dam did not have a safety factor in accordance with "the world's best practice." The "world's best practices" recommended that upstream tailings dams meet or exceed a 1.3 safety factor for the peak, undrained condition and a 1.1 safety factor for the residual undrained condition. As Auditor C found, the dam's safety factors were 1.09 and .44 respectively.

253. Vale's material misstatements in the 6-K were knowing or reckless. Vale GRG and operational geotechnical personnel, including the GRG Manager, Executive One, Executive Two, and Executive Three, knew or were reckless in not knowing the information cited above that made the statements false and misleading.

E. Vale GRG's Role, Responsibility and Control Over Vale's False Statements

254. Throughout the relevant period, Vale personnel responsible for dam safety risk management, including GRG personnel, the GRG Manager, Executive One, Executive Two, and Executive Three, were the underlying source of each of Vale's false statements to investors in SEC filings, the 2016 and 2017 Sustainability Reports, and the 2018 ESG Webinar. For example, they provided Vale's finance and investor relations personnel with the information about Vale's dams receiving stability declarations and purported compliance with legislative requirements. They

knowingly or recklessly created the false narrative that all of Vale's dams were safe and operating normally.

255. Vale's GRG personnel provided the information for dissemination to investors knowing, as they told the PIESEM during the March 2017 meetings, that "[i]n Brazil, an auditor statement not attesting the safety condition may be understood by society, regulatory agencies, Public Authorities and press as an imminent risk of failure." Especially after the Mariana dam disaster, Vale internal reports acknowledged that dam safety issues had "significant importance with regard to Corporate issues," specifically noting the Sustainability Report, SOX Certifications of dam safety controls, and investor meetings.

256. Executive One, as the head of the GRG, had control over and responsibility for the reporting of dam safety matters at Vale. He and his team, including the GRG Manager and other GRG personnel, routinely provided information on dam safety matters, including the audit results, risk analyses and dams in the Attention Zone, to the Operational Risk Subcommittee and the Executive Risk Committee of the Executive Board, Vale's environmental group, and Vale's Finance and Investors Relations groups. Executive One also repeatedly provided information on dam safety matters to Vale's Board of Directors.

257. Executive One also reviewed and certified Vale's public statements, including in the 2016 Form 20-F and 2016 Sustainability Report.

258. For example, on March 21, 2017, Executive One signed a Certification in connection with Vale's 2016 Form 20-F, representing that he had "reviewed the Annual Report," and that the information originating from or relating to his business area "does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with

respect to the fiscal year covered by the Annual Report." He further represented that he did not have any knowledge of: "any fact that has materially affected, or is reasonably likely to materially affect, the Business Area's internal control over financial reporting; or "[a]ny fraud, whether or not material, that involves management or other employees who have a significant role in the Business Area's internal control over financial reporting."

259. Similarly, on March 29, 2017, Executive One signed a Certification in connection with Vale's 2016 Sustainability Report, representing that he had read the report, his business area had procedures and internal controls to ensure all relevant information was communicated to him, all relevant information had been provided by his area, and that he did not have any knowledge of any incorrect information about a material fact or the omission of a material fact necessary to make the statements in the report not misleading.

260. As discussed above, Executive One's representations in these certifications for the 2016 Form 20-F and the 2016 Sustainability Report were false because he knew or was reckless in not knowing that the Brumadinho dam's Extraordinary Audit was corrupted by the purposeful use of unreliable data, rendering the resulting stability certifications false. He knew or was reckless in not knowing that if Vale and its auditor had adhered to good engineering practices as required by regulation and discarded the laboratory data its Liquefaction Expert had said was unreliable, Vale would not have been able to successfully complete the Extraordinary Audit and file positive stability declarations in August and September 2016.

261. Similarly, Executive Two and Executive Three had responsibility for dam safety and risk management, reported on these issues to senior executives, including Executive Four, and to the Board of Directors, and reviewed and approved or certified Vale's public statements. For example, on March 21 and 30, 2017, Executive Two and Executive Three, respectively, signed a

SOX Certification with the same representations that Executive One made as to the 2016 Form 20-F.

262. Executive Three also reviewed, approved and certified the statements in Vale's 2016 and 2017 Sustainability Reports. On March 8, 2018, for example, Executive Three signed a Certification in connection with Vale's 2017 Sustainability Report representing that he had read the report, his business area had procedures and internal controls to ensure all relevant information was communicated to him, all relevant information had been provided by his area, and that he did not have any knowledge of any incorrect information about a material fact or the omission of a material fact necessary to make the statements in the report not misleading.

263. As discussed above, however, these representations were false because Executive Three knew or was reckless in not knowing that the declarations of stability Vale had obtained for its upstream tailings dams, including the Brumadinho dam, could not be relied upon and did not properly reflect safety conditions. Executive Three knew or was reckless in not knowing that the PIESEM had raised concerns about the lack of data integrity, the improper use of laboratory data, and inconsistencies in the liquefaction analyses. In fact, even though the PIESEM had recommended Vale discontinue the use of laboratory data, at the time he signed the Certification, GRG personnel were actively pressuring Engineering Firm One and Auditor C to use laboratory data to inflate the Brumadinho dam's safety factor up to minimum 1.3 standard because it, otherwise, would not receive a stability declaration.

264. The GRG Manager, Executive One, Executive Two and Executive Three also had responsibility for providing information regarding, and certifying the operation of, Vale's dam safety risk and SOX internal controls. For example, Vale had specifically identified within its SOX internal controls the risk of "Dams or Dykes not authorized/monitored and/or audited outside

established standards resulting in an impact on safety, on environment or a [sic] financial impacts." Vale's stated control for this risk was:

> Every six months audits are conducted on dams that fall under the National Dam Safety Policy PNSB, and the 2nd semester audit must be external. In this audit, the person responsible must issue the Regular Safety Inspection Report of the Dam with the Stability Condition Declaration DCE, certifying that the dams are operating with their physical and hydraulic conditions attested to. This information is registered in the SIGBM (DNPM System replaced by ANM).

265. Executive Two signed a SOX 404 sub-certification letter, dated February 17, 2017, guaranteeing and certifying that "all Internal Controls," including the dam safety control concerning dam safety audits, "were reviewed, executed and presented satisfactory results regarding the associated risks and are free from significant and material error." On February 20, 2017, Executive Two, and on March 2, 2017, GRG Manager and Executive One, further signed off on or certified the effectiveness of the specific dam safety control as the process owners responsible for dam management safety risk.

266. The following year, Executive Three also signed a SOX 404 sub-certification letter, dated February 8, 2018, guaranteeing and certifying that "all Internal Controls" including the dam safety control concerning dam safety audits, "were reviewed, executed and presented satisfactory results regarding the associated risks and are free from significant and material error." On February 2, 2018, GRG Manager, Executive One and Executive Three signed off on or certified the effectiveness of the specific dam safety control as the process owners responsible for dam management safety risk.

267. In truth, and despite these sign offs and certifications by GRG Manager, Executive One, Executive Two and Executive Three, Vale had improperly obtained illegitimate and false stability certifications for the Brumadinho dam through audits that did not comply with

"established standards." As described above, Vale obtained stability declarations for the Brumadinho dam only by manipulating the audits, ensuring the use of unreliable data that falsely inflated the results, and ignoring standards and good engineering practices.

F. Vale's Misstatements and Deceptive Conduct Were Material to Investors

268. Especially after the Mariana disaster, dam safety was material to Vale's investors.

269. Vale's ability to obtain favorable results in each of the relevant safety audits and secure positive stability declarations was important to Vale's investors because those processes signaled that its dams were safe. The integrity of Vale's audits was therefore also material to investors because a corrupted audit process could give investors no comfort that there would not be another catastrophe like the Mariana disaster.

270. The safety of the Brumadinho dam in particular was material. The Brumadinho dam was a critical upstream tailings dam with "high damage potential" and the ability to inflict catastrophic harm to the surrounding environment and communities. It mattered to Vale's investors whether this dam was safe, whether it met the internationally accepted standards for safety, and whether it was audited by truly independent auditors who had access to the relevant information and then used only reliable data.

271. Vale's deceptive conduct and misstatements described herein obscured the true risk of liquefaction at the Brumadinho dam and were therefore material.

272. Indeed, shortly after the true condition of the Brumadinho dam became known to investors as a result of its catastrophic collapse, Vale's market capitalization declined by over $4 billion, its American Depositary Shares lost more than 25% of their value, and its corporate credit rating was downgraded to junk status.

G. Vale Offered and Sold Securities During The Period of False Statements and Received Ill-Gotten Gains Through Its Fraud

273. In February 2017, Vale's wholly owned subsidiary, Vale Overseas Limited, issued $1 billion 6.25% notes due 2026, guaranteed by Vale S.A. The bonds were listed on the NYSE. At the time the bonds were issued, Vale had falsely reassured its investors that all of its dams in the Iron Ore Business were subject to rigorous safety review and that they were safe. Following the dam collapse, Fitch downgraded Vale's corporate credit rating to BBB- and placed the company on a negative watch. Moody's downgraded Vale's corporate credit rating to Ba with a negative outlook.

274. In August 2017, at a time when the price of its common stock was materially inflated as a result of undisclosed safety issues with the Brumadinho dam, Vale issued more than 170 million common American Depositary Securities in connection with a corporate restructuring.

275. Following the collapse of the Brumadinho dam, Vale incurred more than $7 billion of provisions and expenses related to dam's rupture. Had Vale timely disclosed the true condition of the dam, it would have incurred significant out-of-pocket expenses associated with remediation of the dam and experienced reduced output from the Córrego do Feijão mine. Throughout the relevant time period, Vale benefitted by postponing the costs of remediation, until the dame collapsed in January 2019.

IV. THE STATUTORY PERIOD HAS BEEN TOLLED

276. On December 3, 2020, Vale executed a "Tolling Agreement" tolling and suspending the period beginning on October 26, 2020, through October 25, 2021.

CLAIMS

FIRST CLAIM FOR RELIEF
Violations of Section 10(b) of the Exchange Act and Rule 10b-5 Thereunder

277. Paragraphs 1 through 275 are realleged and incorporated by reference as if fully set forth herein. Vale and its executives knowingly or recklessly engaged in deceptive conduct and made materially false and misleading statements to investors about the safety and stability of its dams. Vale and its executives knew or were reckless in not knowing that the Brumadinho dam did not meet safety guidelines and Vale had obtained stability declarations for the dam by using unreliable and flawed laboratory data, they concealed material facts and information from Vale's auditors, they disregarded best practices and minimum safety standards, they removed auditors and firms who threatened Vale's ability to obtain stability declarations, and they signed false certifications related to Vale's public statements to investors.

278. Vale, knowingly or recklessly, by use of the means or instrumentalities of interstate commerce or of the mails, in connection with the purchase or sale of securities, directly or indirectly:

a. Employed devices, schemes, or artifices to defraud;

b. Made untrue statements of material fact or omitted to state material facts necessary in order to make the statements made, in light of the circumstances under which they were made, not misleading; and/or

c. Engaged in acts, practices, or courses of business which operated or would operate as a fraud or deceit upon any person.

279. By reason of the foregoing, Vale violated, and unless enjoined, is reasonably likely to continue to violate Section 10(b) of the Exchange Act[15 U.S.C. § 78j(b)] and Rule 10b-5 thereunder [17 C.F.R § 240.10b-5].

SECOND CLAIM FOR RELIEF
Violations of Section 17(a) of the Securities Act

280. Paragraphs 1 through 275 are realleged and incorporated by reference as if fully set forth herein. Vale and its executives knowingly or recklessly engaged in deceptive conduct and made materially false and misleading statements to investors about the safety and stability of its dams. Vale and its executives knew or were reckless in not knowing that the Brumadinho dam did not meet safety guidelines and Vale had obtained stability declarations for the dam by using unreliable and flawed laboratory data, they concealed material facts and information from Vale's auditor, they disregarded best practices and minimum safety standards, they removed auditors and firms who threatened Vale's ability to obtain stability declarations, and they signed false certifications related to Vale's public statements to investors.

281. Vale, in the offer or sale of securities, by the use of the means or instruments of communication in interstate commerce or by use of the mails, directly or indirectly:

a. Knowingly or recklessly employed any devices, schemes, or artifices to defraud;

b. Knowingly, recklessly or negligently obtained money or property by means of an untrue statement of material fact or an omission to state a material fact necessary in order to make the statements made, in light of the circumstances under which it is made, not misleading; and/or

c. Knowingly, recklessly or negligently engaged in transactions, practices, or courses of business, which operated or would operate as a fraud or deceit upon the purchaser.

282. By reason of the foregoing, Vale violated and, unless enjoined, is reasonably likely to continue to violate Section 17(a) of the Securities Act [15 U.S.C. § 77q(a)].

THIRD CLAIM FOR RELIEF
Violations of Section 13(a) of the Exchange Act
and Rules 12b-20, 13a-1 and 13a-16 Thereunder

283. Paragraphs 1 through 275 are realleged and incorporated by reference as if fully set forth herein. Vale and its executives knowingly or recklessly engaged in deceptive conduct and made materially false and misleading statements to investors about the safety and stability of its dams. Vale and its executives knew or were reckless in not knowing that the Brumadinho dam did not meet safety guidelines and Vale had obtained stability declarations for the dam by using unreliable and flawed laboratory data, they concealed material facts and information from Vale's auditor, they disregarded best practices and minimum safety standards, they removed auditors and firms who threatened Vale's ability to obtain stability declarations, and they signed false certifications related to Vale's public statements to investors.

284. By reason of the conduct described above, Vale filed or furnished the following reports and/or statement which either made an untrue statement of a material fact or omitted to state a material fact necessary in order to make the statements made, in light of the circumstances under which they were made, not misleading: (a) Vale's Form 20-F furnished to the Commission on April 10 2017; (b) Vale's Form 6-K furnished to the Commission on May 30, 2017; and (c) Vale's Form 6-K furnished to the Commission on January 28, 2019.

285. By engaging in the conduct described above, Defendant violated, and unless enjoined, will again violate Section 13(a) of the Exchange Act [15 U.S.C. § 78m(a)] and Rules 12b-20, 13a-1, and 13a-16 thereunder [17 C.F.R. §§ 240.12b-20, 240.13a-1, and 240.13a-16]

PRAYER FOR RELIEF

WHEREFORE, the Commission respectfully requests that the Court enter a Final Judgment:

I.

Permanently enjoining Defendant Vale, and all persons in active concert or participation with Vale, from violating the federal securities laws alleged in this Complaint;

II.

Ordering Defendant Vale to disgorge all ill-gotten gains obtained within the statute of limitations, with prejudgment interest thereon, pursuant to Section 21(d)(8) of the Exchange Act [15 U.S.C. § 78u(d)(8)];

III.

Ordering Defendant Vale to pay civil monetary penalties pursuant to Section 20 of the Securities Act [15 U.S.C. § 77t] and Section 21(d) of the Exchange Act [15 U.S.C. § 78u(d)]; and

IV.

Granting any other and further relief this Court may deem just and proper.

Jury Demand

The Commission demands a trial by jury.

Dated: April 28, 2022
Washington, D.C.

/s/ Derek S. Bentsen

Derek S. Bentsen (NY Bar No. 4932406)
David A. Nasse (*pro hac vice* motion pending)
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