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Case No: HT-2022-000304
Case No: HT-2023-000058

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
TECHNOLOGY AND CONSTRUCTION COURT (KBD)

Royal Courts of Justice, Rolls Building
Fetter Lane, London, EC4A 1NL

Date: 14/11/2025

Before :

MRS JUSTICE O'FARRELL DBE

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Between :

MUNICÍPIO DE MARIANA
and the Claimants identified in the Schedules to the Claim Forms **Claimants**

- and -

(1) BHP GROUP (UK) LIMITED
(formerly BHP BILLITON PLC and thereafter BHP GROUP PLC)

(2) BHP GROUP LIMITED **Defendants**

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Alain Choo-Choy KC, Andrew Fulton KC, Nicholas Harrison, Jonathan McDonagh, Russell Hopkins, Ibar McCarthy, Grace Ferrier, Antonia Eklund, Anisa Kassamali and Hannah Taylor (instructed by **PGMBM LAW LTD t/a Pogust Goodhead**) for the **Claimants**

Daniel Toledano KC, Shaheed Fatima KC, Victoria Windle KC, Nicholas Sloboda KC, David Lowe, Oliver Butler, Daniel Burgess, Tamara Kagan, Maximilian Schlote, Stephanie Wood, Veena Srirangam, Jade Fowler, Michael Kotrly and Joe Johnson (instructed by **Slaughter and May**) for the **Defendants**

Reading dates: 7th, 8th, 9th, 10th, 11th, 14th, 15th, 16th, 17th & 18th October 2024
Hearing dates: 21st, 22nd, 23rd, 24th, 28th, 29th, 30th, 31st October 2024
5th, 6th, 7th, 11th, 12th, 13th, 14th, 26th, 27th, 28th, 29th November 2024
2nd, 3rd, 4th, 5th, 9th, 10th, 11th, 12th, 16th, 17th, 18th, 19th December 2024
13th, 14th, 15th, 16th, 17th, 20th, 21st, 22nd, 23rd, 24th, 27th, 28th January 2025
5th, 6th, 7th, 10th, 11th, 12th, 13th March 2025

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APPROVED JUDGMENT

Index

Mrs Justice O'Farrell :

1. INTRODUCTION

1. At approximately 3.45pm on 5 November 2015, the Fundão Dam in Southeast Brazil collapsed, releasing in excess of 40 million cubic metres of liquified iron ore tailings in a flowslide. The dam collapse and ensuing flow of tailings killed 19 people. It caused extensive environmental and socio-economic damage. It destroyed the village of Bento Rodrigues, immediately downstream from the dam, and caused widespread devastation to the surrounding communities, waterways, land and infrastructure.

2. On collapse, the tailings spilled over the Santarém dam, immediately downstream of the Fundão Dam, into the community of Bento Rodrigues. Upon reaching the Doce River, the tailings flowed through the Doce River basin, a distance of more than 600km, crossing a number of municipalities in Minas Gerais and Espírito Santo. On 20 November 2015, the tailings reached the Atlantic Ocean on the coast of Espírito Santo.

3. The tailings polluted the River Doce system over its entire course to the sea, some 400 miles from the dam. The dam collapse has been described as Brazil's worst ever environmental disaster. The cost of remediation and compensation is estimated to exceed US$30 billion as per the Reparations Agreement.

4. The area affected by the dam collapse fell principally within two states, Minas Gerais, where the dam was situated, and Espírito Santo, in which the River Doce reaches the Atlantic Ocean. The local government authority with responsibility for the area which included the dam itself, and the nearby villages which were destroyed, is the municipality of Mariana, the leading claimant.

5. The dam was owned and operated by Samarco Mineração SA ("Samarco"), a Brazilian company jointly owned, in 50% shares pursuant to a joint venture agreement, by Vale S.A. ("Vale") and BHP Brasil Ltd ("BHP Brasil"). The second defendant ("BHP Australia") is the ultimate parent company of BHP Brasil. Between 2001 and 2022 the first defendant ("BHP UK") and BHP Australia (referred to jointly as "BHP") operated together as a single economic entity under a dual listed company structure, with listing in the UK and Australia. From 2022, all shares in BHP UK were acquired by BHP Australia.

6. There have been numerous proceedings initiated in Brazil and other jurisdictions around the world arising out of the collapse of the dam, some of which have been compromised, some of which are stayed and some of which are ongoing. There have also been a number of schemes set up to compensate those affected by the collapse of the dam. This litigation does not seek to replicate or supersede those legal proceedings or compensation schemes. The proceedings in this jurisdiction have been brought against BHP UK and BHP Australia (collectively referred to as "the BHP Group" or "BHP") and are founded on the corporate listing of those associated companies of Samarco in the UK at the time of the collapse.

7. There are over 600,000 Claimants, who each seek compensation in respect of losses suffered as a result of the environmental damage, relying on the following claims under Brazilian law:

i) Articles 3(IV) and 14 of the Environmental Law and/or Article 927 of the Civil Code impose strict liability on BHP for loss and damage caused by the collapse of the dam by reason of their ownership and/or control of Samarco, the entity responsible for the damage; funding or other participation in the activity leading to the damage; and/or benefiting from the activity of others which led to the damage.

ii) BHP are liable for the loss and damage suffered by the Claimants under Article 186 of the Civil Code, by reason of their voluntary act or omission, negligence or imprudence in: (a) disregarding advice and warnings as to the risks of collapse and/or (b) failing to take satisfactory action to address such risks.

iii) BHP are liable for the loss and damage suffered by the Claimants under Articles 116 and 117 of the Corporate Law, for abuse of power as controlling shareholders, by permitting activities involving a significant risk of substantial damage to the community.

8. BHP deny liability on the following grounds:

i) BHP were not polluters within the meaning of Article 3(IV) of the Environmental Law so as to attract strict liability for the loss and damage caused by the dam collapse. They carried out no polluting activity, nor did they cause environmental degradation through any relevant omission.

ii) The allegations of fault-based liability are denied. BHP met the expected standard of conduct of parties in their position and breached no specific legal duty. It is denied that there was any causal link between any activity or omission on the part of BHP and the dam collapse and/or the Claimants' alleged losses.

iii) BHP did not owe any duties to third parties under the Corporate Law and/or did not breach any such duties by act or omission.

iv) BHP's position is that all, or many, of the claims are time-barred by prescription under Brazilian law.

v) BHP's position is that Claimants who have accepted compensation, pursuant to settlement agreements with Renova, Samarco, BHP Brasil, Vale and/or through the Novel System and the Reparations Agreement compensation schemes, are precluded from pursuing the claims in these proceedings by reason of the terms of the release and/or waiver provisions in such settlements.

vi) It is also said that the Municipality Claimants do not have capacity/standing to bring proceedings in this jurisdiction.

9. This First Stage Trial determines key liability issues as set out in the agreed list of issues and summarised below:

i) whether the structural instability of the dam, and therefore its risk of collapse, was foreseeable or only ascertainable with the benefit of hindsight;

ii) whether BHP are strictly liable as "polluters" in respect of damage caused by the collapse pursuant to Articles 3(IV) and 14 of the Environmental Law (alternatively pursuant to Article 927 (sole paragraph) of the Civil Code);

iii) whether BHP are liable by reason of fault in respect of damage caused by the collapse, pursuant to Article 186 of the Civil Code;

iv) whether BHP are liable as controlling shareholders of Samarco by reason of abuse of power in respect of damage caused by the collapse, pursuant to Articles 116 and/or 117 of the Corporate Law;

v) whether any of the claims are time-barred by prescription;

vi) whether any of the claims are precluded by reason of the waiver and/or release agreements;

vii) whether the Municipalities have standing and/or capacity to bring their claims in these proceedings.

2. THE FUNDÃO DAM

Design of the dam

10. The Fundão Dam formed part of the Samarco Germano-Alegria mining complex, located in the state of Minas Gerais, in the south-east of Brazil. Samarco's primary business is the production of iron ore pellets for the global steel market. The iron ore is mined at the Germano and Alegria pits. The raw iron ore is crushed and concentrated by a process of beneficiation, comprising grinding, re-grinding, desliming, flotation, and thickening. The resulting concentrate is combined with water to form a slurry, which is pumped through pipelines some 400km long from the mine to a private port in Ponta Ubu, Anchieta, in the state of Espírito Santo. Samarco's pellet plants are located at the port, where the slurry is filtered to reduce its water content and combined with limestone, coal and bentonite, or organic binder, to produce iron ore pellets.

11. Maps and diagrams can be found in Annex 1 to this Judgment to assist with orientation of the dam and details of the relevant features.

12. Iron ore tailings are waste products from the beneficiation process. They comprise: (i) "sands", sand and silt-sized particles, that are relatively free draining, with satisfactory resistance after drainage; and (ii) "slimes", fine-grained, clay-like particles, that are relatively impermeable, with lower resistance.

13. From about 2008 the iron ore tailings from Samarco's operations at the third pellet plant were stored in the Fundão Dam. The dam was constructed using the upstream method, whereby the height of the dam was raised in successive increments ("benches"), built progressively upstream over previously deposited tailings.

14. The dam was designed by Pimenta de Ávila using the "drained stack" concept. The design provided for sands to be deposited behind an earthfill or rockfill starter dam, that would be constructed at the downstream toe up to an elevation of 830 metres ("Dike 1"). Drainage would be effected by high-capacity foundation drains of gravel and rock at the base of the dam, connected to additional drainage on the upstream face of the

dam, to prevent water from accumulating and saturating the deposited sands. Supernatant water, primarily from precipitation and water carrying the tailings to the dam, would be decanted from the slimes and sands by two reinforced concrete galleries on each side of the dam to below Dike 1. The slimes would be deposited behind a dam constructed further upstream up to an elevation of 850 metres ("Dike 2"). The dikes were strategically positioned within the dam to accommodate 70% of the tailings as sands and 30% as slimes. As the level of the slimes increased above 850 metres, they would be retained by the sandy tailings, which would be deposited at a higher elevation relative to the slimes. A 200 metre wide beach, stretching from the crest of the dam to the top of the slimes, was required to hold back the slimes from encroaching on the structural part of the dam and preserve the free-draining characteristics of the sands.

Construction and operation of the dam

15. Construction of the Dike 1 starter dam, with its requisite drains and galleries, was completed by October 2008.

16. Shortly after full-scale discharge of sand tailings began, on 13 April 2009, large seepage flows carrying fines appeared on the downstream slope above the main foundation drain, conditions symptomatic of the process of piping or internal erosion ("the Piping Incident"). Engineering investigations revealed serious construction flaws in the foundation drain and its filters, including a portion of the drain's outlet that had never been completed, allowing water pressure within it to increase, causing the slope to erode and slump.

17. An emergency action plan for the dam was implemented. The measures taken included lowering the water reservoir behind Dike 1 and construction of a rockfill stability berm over the affected portion of the dam slope. Following assessment of the nature and extent of the construction defects, it was decided that the foundation drains should be sealed and decommissioned.

18. A revised design was necessary to replace the inoperative foundation drains at the base of the dam. The revised design included an additional internal drainage structure, a blanket drain, the construction of which was underway by November 2010 and completed by April 2011. The blanket drain was formed by layers of gravel placed 4 metres below the crest of the starter dam at El. 826m, extending over the full width of the Dike 1 impoundment at that elevation and for a distance of about 120 metres from its axis. The intention was that the blanket drain would become embedded within the tailings during future raising of the dam, intercepting seepage that could otherwise emerge on the slope and reduce its stability. In order to augment capacity for discharging the collected seepage flows, the blanket drain also contained slotted pipes called "Kananets".

19. A further revision to the design of the dam was necessitated to provide additional slimes capacity. The need for additional capacity arose because deposition of slimes behind Dike 2 had begun earlier than anticipated, reduced pellet production led to reduced sand tailings available for placement, and sand tailings were diverted to the Germano Dam during investigations into the foundation drain defects. This combination resulted in the level of slimes being higher, instead of lower, than the projected level of sands behind Dike 1. The requirement for increased slimes storage was accommodated by the construction of a third dike upstream from Dike 1 ("Dike 1A"). From April 2010 until

January 2011, slimes were pumped over the crest to the toe of Dike 2, between El. 813m and El. 824m behind Dike 1A, in an area originally designed to take sand tailings.

20. In July 2010 the galleries that evacuated surface water from the dam impoundments were found to be structurally deficient. A vortex appeared in the reservoir above the main gallery at the right abutment, indicating that tailings and water were entering the gallery. Inspections revealed cracking and structural damage from foundation settlement and construction defects. Collapse of the galleries would risk uncontrolled release of tailings from the reservoir or, worse, failure of the dam.

21. In January 2011 a programme of jet grouting was initiated to repair the main and secondary galleries but by July 2012, it was apparent that it had not remedied the defects. After a sinkhole appeared in the tailings overlying the secondary gallery in November 2012, repair efforts were abandoned. Instead, both galleries were plugged by filling them with concrete from their outlets to a point beneath the projected crest of the 920 metres raise in order to prevent their collapse. They were replaced by spillways, large plastic pipes placed in trenches, constructed between 2012 and 2014.

22. The above structural problems with the main and secondary galleries made it necessary to re-route water and slimes from the Dike 2 impoundment into the rear of the Dike 1 reservoir by means of an overflow channel. The overflow channel was constructed and operated, initially from January 2011 to July 2012, and subsequently from July 2013 to December 2013. The introduction of slimes into the Dike 1 reservoir between El. 824m and El. 850m increased the difficulty of maintaining physical separation from the sand tailings and the stipulated beach of 200 metres. The interface between the slimes and the sands could only be controlled by adjusting the amount of sand spigotted (using cannons) from the dam crest in relation to the amount of slimes carried in water from the overflow channel.

23. On 6 April 2011 the Samarco Board approved a project to increase total pellet production by 38.6%, from 22 million tonnes per annum ("mtpa") to 30.5 mtpa ("the P4P project"). The scope of the P4P project included: (i) construction of a third concentrator at the Germano Complex, with a concentrate production capacity of 9.5 million dry metric tonnes ("dmt") per year; (ii) construction of an iron ore pipeline running along the two existing pipelines from the Germano Complex to the Ubu site with a concrete conveyance capacity of 20 million dmt per year; (iii) construction of a fourth pelletising plant at the Ubu site, with a production capacity of 8.25 million dmt of pellets and fines; and (iv) upgrading the storage and shipping system to a total handling capacity of 33 million dmt per year. The addition of a third concentrator plant increased the production of iron ore slurry used to produce iron ore pellets. This increased the volume of iron ore tailings, in the form of sands and slimes, required to be stored in the dam.

24. In September 2011 Pimenta de Ávila prepared a revised design for the geometric layout of the dam at El. 920m. The revised design changed the axis of the dam at this elevation, extending it into the adjacent Grota da Vale area, downstream of the waste pile for the Fábrica Nova mine owned by Vale. The stated purpose of the new design was to maintain the factor of safety for the Fundão tailings disposal system above FOS 1.5 following the installation of Dike 1A, which incorporated slimes into the area originally intended for sand tailings, and to facilitate Samarco's desire to create additional tailings storage. Pimenta produced a technical note dated September 2011, setting out

justification for the revised design. Pimenta also produced a technical opinion dated May 2012 recommending an additional internal drainage system. The revised design was implemented but the proposed drainage solution was not adopted.

25. On 26 June 2012 a seepage breakout appeared at El. 845m on the Dike 1 crest at the left abutment. This incident was attributed to water damming in the Grota da Vale upstream of the seepage location, related to the expansion of the dam in this area, and the need for water management that was not anticipated by the designer of the blanket drain. The matter was resolved by excavating the saturated material and installing a drain, consisting of geotextile, granular material and coarse rockfill. From about May 2015 water from the drain was discharged into a pipe to the left abutment concrete channel, diverting it away from the toe of the left abutment.

The Setback

26. By October 2012, structural analyses carried out indicated that the defective secondary gallery could not support tailings higher than El. 845m, some 10 metres below the elevation already reached by the tailings at the left abutment. It was necessary to halt further placement of tailings at that location, to avoid overloading the secondary gallery, pending completion of the repairs to the same. As a temporary measure, it was decided to realign the dam at the left abutment by moving the dam crest back from its former location, creating a plateau at about El. 855m above the area of the gallery to be repaired, so that embankment raising could continue ("the Setback").

27. Apart from a preliminary sketch, no design was produced for the Setback. Pimenta de Ávila did not prepare any calculations or design for the Setback and was not consulted in respect of the same.

28. The work to create the Setback started in October 2012. Initially it was moved approximately 80 metres upstream from the original embankment. On 25 November 2012 a sinkhole appeared upstream from the Setback crest. As a result, in December 2012 the Setback was moved further upstream by 70 metres, a total displacement of 150 metres. Subsequently, efforts to repair the secondary gallery were abandoned and both galleries were plugged by filling them with concrete. Those works were completed on 22 August 2013. Although backfilling of the plateau started at that time, the Setback remained in place at the time of the collapse of the dam.

29. In February 2013 VOGBR, an independent engineering firm engaged as a consultant by Samarco, produced a technical report on the drainage system for the dam. VOGBR carried out numerical simulation to assess the water level in the reservoir following the planned raising of the dam to 920 metres. It advised on the implementation of additional drainage structures, without which the groundwater level could rise near the dam's abutments.

30. During 2013 there were various seepage, saturation, and cracking incidents at the left abutment:

    i) In March 2013 saturation of the slope and ponding of water occurred at El. 855m.

    ii) In June 2013 further seepage occurred at El. 855m.

iii) On 15 November 2013 seepage and cracking of the slope appeared at El. 860m.

iv) On 26 December 2013, further seepage occurred at El. 860m, together with cracking on the left abutment crest at El. 875m.

31. By January 2014 it had become apparent that the El. 826m blanket drain was no longer sufficient to control the phreatic surface and that additional drains would be needed at the left abutment, as noted by the Independent Tailings Review Board ("the ITRB") in Report No.8.

32. From about March 2014, the P4P project produced a significant increase in iron ore tailings waste, both sands and slimes. During this period initial studies were commissioned for a project to raise the height of the dam from its designed maximum El. 920m to El. 940m. Increasing the height of the dam to El. 940m would necessitate additional drainage structures at the left abutment, which would be integrated subsequently with an independent drainage system entering from the adjacent Grota da Vale and Fabrica Nova waste pile.

33. Construction of additional drains in the left abutment area required the Setback to be maintained until they were completed. This entailed further delay in restoring the original alignment of the dam.

34. On 18 July 2014 there was a seepage outbreak at the right abutment, accompanied by slope movements, evidencing that the blanket drain at El. 826m was not effective in draining portions of the dam that were distant from the drain.

35. On 27 August 2014 the left abutment showed serious signs of distress, namely, (i) extensive cracks at the crest, upstream tailings beach and downstream slopes of the Setback; (ii) uplift at the toe of the slope at the El. 865m bench; (iii) saturation at the toe of the El. 865m bench; and (iv) upwelling with artesian flow at the toe of Dike 1. This indicated saturation of the tailings in this location and that the slope had marginal stability. On 28 August 2014, a reinforcement berm was constructed to stabilise the slope and in September 2014 piezometers were installed on the Setback.

36. On 30 January 2015 further seepage was identified on the right abutment at an elevation of El. 860m.

37. Further incidents of saturation of the slope at the left abutment occurred on (i) 16 April 2015, at El. 867m; (ii) 18 May 2015, at El. 820m; and (iii) 9 July 2015, at El. 820m.

38. By August 2015, the left abutment blanket drain at El. 860 m was completed, allowing the resumption of fill placement in the Setback area.

39. By October 2015 surface drainage and pipes had been constructed to take water from the Grota de Vale area across the plateau and alongside the Setback.

40. During October 2015, work continued to raise the dam crest to El. 900m, preparations were made for cyclone sand placement on the El. 875m bench, and work was carried out to extend the reinforcing berm by raising the El. 875m and El. 895m benches.

The dam collapse

41. On 5 November 2015 the Fundão Tailings Dam collapsed.

42. At the date of the collapse, the crest of the dam had reached El. 900 m, with an overall height of approximately 110 metres.

43. On 5 November 2015, shortly after 2pm, a series of three small-magnitude earthquakes (magnitude 2.2M_w, 2.6M_w and 1.8M_w respectively) occurred over a period of four minutes, less than 2 kilometres from the dam. A number of people in the Germano plant complex felt a tremor lasting several seconds but it was not considered serious and they continued working.

44. At 3.45pm shouts came over radio that the dam was collapsing. The failure initiated near the left abutment blanket drain. A jet of dirty water was discharged from the drain. Movement and cracking occurred at the exposed drain and along the adjacent edge of the plateau at around El. 857m. A cloud of dust formed over the left abutment. The Setback plateau moved forward, detaching itself from the slope above, which deformed, undulating like a wave and bringing the dam crest with it. A crack formed at or above the El. 875m bench and the central and right sides of the dam began to disintegrate.

45. The tailings that had been solid were transformed into a free-flowing liquid. They overtopped the downstream Santarém Dam, flowed into the town of Bento Rodrigues and then flowed along the length of the River Doce to the Atlantic coast.

3. POST-COLLAPSE

The Panel Report

46. An investigation into the immediate cause of the Fundão Dam failure was commissioned by BHP Brasil, Vale and Samarco. The firm of Cleary Gottlieb Steen & Hamilton LLP ("CGSH") was engaged to conduct the investigation with the assistance of a panel of experts. The Fundão Tailings Dam Review Panel ("the Panel") included four members, all specialist geotechnical engineers in water and tailings dams, namely, Norbert R. Morgenstern (Chair), Steven G. Vick, Cássio B. Viotti, and Bryan D. Watts.

47. The Panel Report was published on 25 August 2016. From eyewitness descriptions and videos, the Panel established the following circumstances in which the dam collapsed. First, the Fundão failure initiated at the dam's left abutment, not at the right side or its downstream toe. Second, the failure occurred due to flow liquefaction of the tailings, a process whereby water pressures in the interstitial voids between the tailings particles increased to such an extent that the mass of material lost strength and flowed like a liquid. Third, the transformation from solid to liquid was complete and abrupt, leaving a fluid of apparent viscosity and hydraulic behaviour little different from water in just seconds.

48. The Panel reached the following conclusions on the key questions it was asked to answer.

49. The first question posed was: "Why did a flowslide occur?" The Panel concluded that the original design concept for the Fundão Dam employed an unsaturated sand zone to

support the weak slimes zone. Unsaturated sand is not amenable to liquefaction and hence the original design was robust in this regard. However, difficulties were encountered in executing the design and a modified design was put forward and adopted. As part of this modification, a change in the design concept was also adopted and saturated conditions were permitted to develop in the sand.

50. The flowslide required three conditions to develop: (1) saturation of the sand; (2) loose uncompacted sand; and (3) a trigger mechanism. Depositing sand tailings by hydraulic means resulted in loose conditions. The growth in the saturated conditions was well-documented. Hence, all the conditions prevailed for liquefaction to develop resulting in a flowslide, provided it was triggered.

51. The second question posed was: "Why did the flowslide occur where it occurred?" The Panel concluded that the flowslide initiated on the left abutment, where the dam had been set back from its former alignment. Studies of the depositional history associated with the growth of the dam revealed that slimes encroached into the area preserved for sand deposition alone. The design incorporated a 200 metre zone separating the two deposits, but historical information revealed that slimes had encroached into the area on a number of occasions. The presence of slimes introduced a barrier to downward drainage and a zone of potential weakness that might affect stability. Deposition in the area of the right abutment was almost slimes free.

52. The Setback was implemented to accommodate repairs to a deficient conduit at the base of the impoundment as well as the construction of additional horizontal blanket drains to facilitate subsequent dike-raising. This change in geometry resulted in substantial embankment loading over slimes-rich deposits. This distinguished the left abutment area from the right and accounted for the location of flowslide initiation.

53. The third question posed was: "Why did the flowslide occur when it occurred?" The Panel noted that initiation of a flowslide requires not only the presence of saturated contractant tailings but also a trigger mechanism to initiate the process that mobilises undrained shearing and hence flowsliding. Following an evaluation of potential trigger mechanisms, the Panel concluded that lateral extrusion initiated the failure. The lateral extrusion mechanism developed as the dam increased in height, loading the slimes-rich zone vertically which tended to extrude or spread laterally, rather like squeezing toothpaste from a tube. This resulted in stress changes in the overlying sands which reduced their confinement, leading to collapse.

54. This mechanism for collapse was modelled by tests in the laboratory and by computational modelling that predicted to an acceptable degree that collapse should have occurred about the time that the dam was raised to the height that was attained on 5 November 2015.

55. The role of the earthquakes that occurred just prior to collapse was also investigated by the Panel. Calculations with recommended design motions revealed that about 5 mm of displacement may have been induced in the slimes. Given the proximity of the dam to collapse due to prior construction loading, the Panel concluded that this was likely to have accelerated the failure process but that the failure was already well-advanced.

56. There is no challenge to the main findings and conclusions in the Panel Report but some of the assumptions made and any wider conclusions that properly should be drawn are

in dispute. It is recognised that the purpose of the Panel Report was to ascertain the immediate cause of the collapse. The Panel's investigation entailed detailed historical, laboratory and computer modelling analysis, with the benefit of hindsight. By contrast, in these proceedings the Court is concerned with arguments, on the basis of the factual and expert evidence, as to the probable underlying cause(s), foreseeability of risk and responsibility for the collapse.

Proceedings and compensation schemes in Brazil

57. Following the disaster, criminal proceedings were instigated against various defendants in the Brazilian courts. There were also civil proceedings at federal and state level, comprising individual claims and class actions ("CPAs"), including CPAs referred to as "the ADIC CPA", "the 20bn CPA" and "the 155bn CPA".

58. On 17 November 2015 the ADIC CPA was filed against Samarco by the Association for the Defence of Collective Interests ("ADIC") in the Federal Court, alleging violation of diffuse, collective and homogeneous individual rights of all those impacted by the collapse in the States of Minas Gerais and Espírito Santo.

59. On 30 November 2015, the 20bn CPA was filed against Samarco, Vale and BHP Brasil by the Federal Government, the states of Minas Gerais and Espírito Santo, and nine government entities. The 20bn CPA sought orders that the named defendants should present plans to address the environmental and economic consequences of the dam collapse, take measures to ensure that the specific matters in those plans were dealt with, and fund the implementation of those plans through a private foundation in a minimum amount of R$20 billion (c.£2.6 bn), then the estimated quantum of damage caused by the disaster.

60. On 2 March 2016, the parties to the 20bn CPA agreed to settle the proceedings, without any admission of fault or liability, by entering into a transaction and conduct adjustment term ("the TTAC"), an agreement governed by Brazilian law. Under the TTAC, the Brazilian defendant companies, including Samarco, BHP Brasil and Vale, agreed to provide full redress to all persons, sole traders, communities and the environment in the areas affected by the collapse of the dam, through 42 programmes.

61. On 5 July 2016 a Brazilian private foundation, Fundação Renova ("Renova"), was established by Samarco, Vale and BHP Brasil as the vehicle through which they would carry out the programmes of remediation and compensation. The programmes implemented by Renova included the 'PIM System', a mediated process, and the 'Novel System', a judicially ordered and supervised compensation scheme.

62. In May 2016, the Federal Public Prosecutor filed the 155bn CPA against Samarco, Vale, BHP Brasil, the Federal Government and others, challenging the sufficiency of the relief provided for in the TTAC and demanding better relief for the victims of the collapse, estimating the damage caused at a minimum of R$155 billion (c.£20 bn).

63. On 25 June 2018, the parties reached an interim settlement agreement in the form of the Governance and Conduct Adjustment Agreement ("the GTAC"). The GTAC was signed by all parties to the 20bn CPA and the 155bn CPA. It provided a framework by which the parties would undertake negotiations towards a final settlement of the 155bn CPA. Pending such final settlement, the 155bn CPA proceedings were stayed.

64. On 26 October 2018 Samarco, BHP Brasil and Vale entered into a Term of Commitment within the 20bn and 155bn CPA proceedings.

The Reparations Agreement

65. On 25 October 2024, following renegotiation of the TTAC and subsequent agreements, BHP Brasil, Samarco and Vale entered into a final agreement with the Brazilian public authorities, namely, the Judicial Agreement for Full and Definitive Reparation Related to the Failure of the Fundão Dam ("the Reparations Agreement"). The objective of the Reparations Agreement is the full and definitive reparation, restoration, recovery, compensation, and/or indemnification of socio-environmental damages and collective and public socio-economic damages of any nature (including social, moral, and non-economic damages) resulting from the dam failure.

66. The Reparations Agreement terms do not exclude the possibility of the continuation or filing of individual legal proceedings. In addition, excluded from the scope of the agreement are future, supervening or unknown damages as at the date of the Reparations Agreement.

67. On 6 November 2024 the Federal Supreme Court homologated the Reparations Agreement, deciding that it met the criteria of legality and reasonableness. The value of the Reparations Agreement compensation scheme is R$170 billion (c.£22 bn) and is one of the largest environmental settlements in history.

68. The effect of the Reparations Agreement is that all Brazilian lawsuits relating to the dam failure have been extinguished, save that it preserves the right of action of municipality federative entities, individuals and indigenous peoples, Quilombola and traditional communities. The Reparations Agreement provides that adherence to it by those groups or participation in individual indemnification initiatives presupposes the withdrawal, retreat and/or extinction of lawsuits filed abroad with claims made as a result of the failure of the dam, including but not limited to these proceedings.

69. Some, but not all, of the Claimants have agreed to accept compensation under the Reparations Agreement and are required to discontinue proceedings in this jurisdiction.

4. THE PROCEEDINGS

70. On 2 and 5 November 2018, the Claimants issued proceedings against the first defendant in the Business and Property Courts in Liverpool, Technology and Construction Court ("TCC") by way of Part 7 claims (E50LV008 and E50LV010). On 3 May 2019, a further claim form was issued against both BHP defendants (HT-2019-LIV-000005). On 22 August 2022, with the consent of and at the request of the parties, those claims were transferred to the London TCC and given case number (HT-2022-000304). On 24 February 2023 a new claim form was issued against BHP (HT-2023-000058).

71. An additional claim was issued by Claimants who had missed the deadline for joining this action (HT-2023-000346); that claim has been stayed pending the outcome of these proceedings.

72. The claims, seeking compensation for losses caused by the dam collapse, are brought jointly and severally against the BHP defendants. The Claimants are all Brazilian and currently comprise: (i) 586,906 individuals; (ii) 1,433 businesses; (iii) 69 faith-based institutions; (iv) 32 municipalities; (v) 7 utility companies; and (vi) 23,750 indigenous and Quilombola community members.

73. On 7 August 2019 BHP applied for the claims to be struck out as an abuse of process; alternatively for the claims to be stayed on *forum non conveniens* grounds, pursuant to Article 34 of Brussels Recast or the Court's case management powers. The claims were struck out for the reasons set out in the judgment of Turner J dated 9 November 2020 at [2020] EWHC 2930 (TCC). The appeal against that judgment was successful, as set out in the Court of Appeal's judgment dated 8 July 2022 at [2022] EWCA Civ 951, and BHP's applications were dismissed. On 1 June 2023 the Supreme Court refused permission to appeal against the order of the Court of Appeal.

74. On 2 December 2022 BHP served a Part 20 claim against Vale SA, seeking declaratory relief and a contribution to any sums that BHP might be found liable to pay to the Claimants. On 20 December 2022, Vale filed its acknowledgement of service, indicating that it intended to contest the court's jurisdiction. On 13 April 2023 BHP issued a further Part 20 claim against Vale, in respect of any liability arising out of the 2023 claim form issued by the Claimants. Vale issued jurisdiction challenges in respect of the Part 20 claims. Those applications were dismissed by the Court for the reasons set out in the judgment dated 7 August 2023, reported at [2023] EWHC 2030 (TCC). Following a settlement agreement reached between BHP and Vale, pursuant to which they agreed to share responsibility for any liability on a global basis, on 12 July 2024 the Part 20 proceedings against Vale were discontinued.

75. The claims are advanced under Brazilian law. The loss and damage suffered by the Claimants is pleaded in general terms for each category of claimant and can be summarised as follows:

    i) The individuals claim compensation for physical and psychological injury, property damage, the need to move home, increased living expenses, loss of earnings, interference with fishing activities, loss of water and electricity supplies, and interference with their use and enjoyment of the river and land.

    ii) The business Claimants claim compensation for property damage, loss of profits, loss of income or increased costs, loss of business opportunities, loss of value and damage to reputation.

    iii) The churches and faith-based institutions claim compensation for property damage, destruction or damage to artefacts of spiritual, artistic, historical and/or social significance, costs of property security and storage, loss of income, loss of water supply and loss of spiritual ties with the congregation.

    iv) The municipalities claim compensation for damage to property, the environment, cultural heritage, tourism and quality of life, costs of remediation, lost income and investment, loss of reputation and costs of settling claims arising out of the collapse.

v) The utilities claim compensation for costs of repair, remediation and testing of the water treatment plants, the water supply system and associated equipment, loss of revenue and loss of reputation.

vi) The indigenous groups and the Quilombola Claimants claim compensation for environmental damage to their lands, damage to their practices, traditions and cultural heritage, psychological harm, loss of drinking water supply and property damage.

76. During case management hearings, it was agreed that the Court should determine key liability issues and significant defence issues at a first stage trial before considering the entitlement and quantum of any individual or group claims.

77. The First Stage Trial was heard by the Court between October 2024 and March 2025. The Court had the benefit of an electronic document system, displaying documents in English and Portuguese, with simultaneous translation services for those witnesses giving their evidence in Portuguese, so that the written and oral evidence could be followed in English and/or Portuguese. Facilities at the Business and Property Courts, Rolls Building in London included an overflow court to which the hearing was transmitted for those who wished to attend the hearing. Live links for remote observation were provided to centres set up by the lawyers in Brazil for the parties, as well as to other remote observers who provided their details and applied for access to the hearing. Notwithstanding the geographical and language barriers, these arrangements enabled many of the Claimants and other interested parties, who wished to follow the hearing, access to the same.

Factual witnesses

78. The Claimants did not call any factual witness evidence.

79. BHP relied on evidence from the following factual witnesses, who produced witness statements and gave oral evidence:

i) Mr Christopher Campbell, Vice President, Strategy & Business Development in the Iron Ore Customer Sector Group ("CSG") at the BHP Group from mid-2010 until the end of 2011; alternate director of Samarco from December 2010 until April 2012; President Designate, Iron Ore from 2009 to 2010; and Head of Group Public Affairs from 2012 to 2013;

ii) Mr Peter Lynch, former shared services manager at BHP in Chile from September 2006; senior manager for BHP South America with responsibility for internal audit processes from November 2007; seconded from BHP to the Renova Foundation in 2020; member of the Risk, Audit and Compliance Committee of Samarco following retirement in 2022;

iii) Mr Christopher Corless, Head of Risk and Governance at BHP Iron Ore, between September 2011 and May 2015;

iv) Mr Jorge Max Wetzig Abdale, Engineer in Group Risk Assessment and Assurance ("RAA") at BHP, based in Chile, from December 2011; Principal, Asset Integrity for RAA (renamed as Internal Audit & Advisory), based in

Melbourne, from February 2018; Principal, Engineering Governance and Technical Stewardship, at BHP's Maintenance and Engineering Centre of Excellence, based in Brisbane, from July 2022; acting Manager of Governance and Technical Stewardship from January to 29 April 2024;

v) Mr Jonathan (Natie) Victor, Commercial Manager and Director in BHP's Manganese division in Australia from 2005 to 2007; Manager Commercial (BHP Nickel West) from September 2007; Manager Risk and Governance from 2010; Manager of Risk for BHP's Iron Ore operations from September 2012; Head of Risk for Iron Ore from May 2015; Head of Risk for Minerals Australia from 2018 until 2020;

vi) Mr Matthew Gillespie, member of the Finance Department of the BHP group from May 2008 to January 2015; acting Financial Controller for BHP's Iron Ore customer sector group ("CSG") between May 2010 and October 2012; Financial Controller for BHP's Iron Ore CSG from October 2012 until January 2015;

vii) Mr Peter Beaven, who held various roles within Carbon Steel Materials, Manganese, Base Metals and Copper CSGs at BHP between 2003 and 2014; Chief Financial Officer ("CFO") of the BHP group from 2014 to 2021.

Expert witnesses

80. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in Brazilian Environmental Law:

i) Professor Ingo Wolfgang Sarlet for the Claimants;

ii) Professor Marcelo Buzaglo Dantas (in substitution for Professor Édis Milaré, who was forced to withdraw from the case as a result of ill-health) for BHP.

81. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in Brazilian Civil Law:

i) Professor Nelson Rosenvald for the Claimants;

ii) Professor Gustavo Tepedino for BHP.

82. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in Brazilian Corporate Law:

i) Professor Viviane Muller Prado for the Claimants;

ii) Professor Marcelo Trindade for BHP.

83. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in Brazilian Law on Prescription:

i) Professor Nelson Rosenvald for the Claimants;

ii) Professor Gustavo Tepedino for BHP.

84. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in Brazilian Law on Waivers and Releases:

    i) Professor Nelson Rosenvald for the Claimants;

    ii) Professor Gustavo Tepedino for BHP.

85. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in Brazilian Law on the standing and capacity of the Municipalities to bring proceedings in this jurisdiction:

    i) Professor Ingo Wolfgang Sarlet for the Claimants;

    ii) Professor Gustavo Tepedino for BHP.

86. The Court received reports, including a joint expert report, and heard oral evidence from the following experts in geotechnical issues:

    i) Professor Antonio Gens for the Claimants;

    ii) Dr Allen Marr for BHP.

87. The Court had the benefit of an agreed joint statement on Brazilian Licensing Law from Professor Walter Senise, Professor Talden Farias and Professor Terence Trennepohl, together with their clarification documents. In those circumstances, the parties did not require the licensing experts to give oral evidence and the Court did not have any additional questions for those experts.

88. It is clear that each of the above factual and expert witnesses had a wealth of qualifications, experience and/or expertise in their respective disciplines and used their understanding and knowledge to assist the Court. The Court is immensely grateful to them.

89. Further, I express my thanks to counsel and the legal teams on both sides for their meticulous preparation of the case, their clear and percipient cross-examination and submissions, and for their co-operation in ensuring that the hearing was conducted in a respectful and efficient manner.

5. THE ISSUES

90. The first stage trial issues were agreed by the parties and set out in a detailed document. They can be summarised as follows:

    i) the cause(s) of the collapse of the Fundão Dam and whether the risk of collapse was foreseeable;

    ii) whether BHP are strictly liable as "polluters" in respect of damage caused by the collapse pursuant to Articles 3(IV) and 14 of the Environmental Law ("the Environmental Law issues");

    iii) whether BHP are strictly liable in respect of damage caused by the collapse pursuant to Article 927 (sole paragraph) of the Civil Code;

iv) whether BHP are liable based on fault in respect of damage caused by the collapse, pursuant to Article 186 of the Civil Code ("the Fault-Based Civil Liability issues");

v) whether BHP are liable in respect of damage caused by the collapse, pursuant to Articles 116 and/or 117 of the Corporate Law ("the Corporate Law issues");

vi) whether BHP have any limitation defences based on the rules of prescription under Brazilian Law ("the Prescription issues");

vii) whether any of the claims are precluded by the rules of waiver/release under Brazilian Law by reference to the sample agreements entered into with Renova, Samarco, BHP Brasil, Vale and/or through the Novel System ("the Waiver/Release issues");

viii) whether the Municipalities have standing and/or capacity to bring their claims in these proceedings ("the Municipalities issues").

6. CAUSE(S) AND FORESEEABILITY OF THE COLLAPSE

91. There is consensus that the immediate cause of the collapse of the Fundão Dam was liquefaction of the tailings making up the structural portion of the dam. The probable mechanism was lateral extrusion of the slimes, causing reduction of lateral confinement of the overlying uncompacted and saturated sands, resulting in liquefaction failure.

92. The dispute is centred on whether it was known, or should have been known, by those responsible for tailings storage at the dam, that the stability of the dam was compromised before the collapse; whether it was reasonable to continue to raise the height of the dam; and whether it was foreseeable that the dam was likely to suffer a liquefaction collapse.

93. The Claimants' position is that the liquefaction risks were readily foreseeable and detectable prior to the collapse; this did not depend on the identification of any precise liquefaction trigger. It was apparent by August 2014, at the latest, that the dam was showing serious signs of distress, and that further raising of the crest should have stopped until the dam was made safe.

94. BHP's position is that lateral extrusion as a trigger for liquefaction was not widely recognised; there was not any recognised process to test for lateral extrusion; and therefore failure by liquefaction flowslide was unforeseeable. There were uncertainties regarding the reliability of the data and methods used by the Panel to ascertain the cause of collapse, which were undertaken with the benefit of hindsight. Far from any warning that the dam might be compromised, the reports produced by independent engineers prior to the collapse indicated that the dam was in a condition of satisfactory stability.

95. This issue can be broken down conveniently into consideration of:

i) the underlying geotechnical causes of the collapse;

ii) whether a liquefaction study/stability analysis would have identified the risk of collapse;

iii) what, if any, action could or should have been taken to avoid or mitigate the risk of collapse.

Underlying cause(s) of the collapse

96. The geotechnical experts, Professor Gens and Dr Marr, agree the failure mechanism of lateral extrusion liquefaction as described in the Panel Report. This mechanism is predicated on the presence of saturated, loose sands overlying soft slimes, with confinement of the slimes within the constructed profile. As the structure increased in height at the left abutment, there was an increase in the vertical loading on the slimes, which caused them to extrude or spread laterally. This caused a corollary elongation in the overlying sandy tailings. The sands lacked the ability to sustain plastic deformation; they experienced a reduction in horizontal stress and significant increase in shear stress. This induced the saturated sandy tailings to liquefy and collapse.

97. It is agreed by the geotechnical experts that the conditions for liquefaction of sand tailings are:

i) a sufficient body of tailings which are loose and contractive;

ii) saturation of the tailings; and

iii) a trigger for liquefaction.

98. Professor Gens' opinion is that the main factors causing or contributing to the collapse were:

i) the presence of a large body of saturated and contractive tailings in the structural part of the dam (the part of a dam which is supposed to be a body of non-liquefiable materials together with the embankments);

ii) the encroachment of slimes towards the downstream face of the dam, which made it more difficult for downward drainage of the tailings to reach the El. 826m blanket drain;

iii) the alignment of the Setback which made drainage more difficult and moved the structural part of the dam closer to the slimes; and

iv) the continued raising of the dam when the structure had an insufficient margin of safety.

99. There is a large measure of agreement between the experts but Dr Marr's opinion is that, with the benefit of hindsight, the main factors causing or contributing to the collapse were:

i) some of the tailings were contractive and became saturated over time;

ii) slimes placed behind Dike 1 and the Setback are likely to have led to one or more slimes layers existing beneath the dam as it shifted back;

iii) the failure of the galleries led to the creation of the Setback, and the placement of the Setback over previously deposited slimes.

100. Professor Gens and Dr Marr agree that the three earthquakes that occurred shortly after 14:00 on 5 November 2015 did not play a significant role in the collapse, which occurred at 15:45. Even if the earthquakes might have been a contributing trigger, without the other factors they would not have caused the collapse.

101. The geotechnical experts agree that a liquefaction failure can only occur in a tailings dam where there are (i) contractive and (ii) saturated materials within the structural portion of the dam. Before consideration of whether the risk of collapse was foreseeable, the starting point must be to consider where, when and how such materials came to be present in the dam prior to the collapse.

(i) Contractive materials

102. Soils are porous materials with a skeleton made up of solid particles and pores between them. It is common ground that all the materials that made up the dam were non-plastic or of low plasticity. It is also common ground that contractive sands that are saturated can liquefy when sheared. Contractive materials are looser and have the tendency to decrease in volume when shear stress is applied to them. In contrast, dilatant materials are denser and have the tendency to increase in volume when shear stress is applied to them.

103. Whether a material's response is contractive or dilatant depends on the density of the material and the imposed mean effective stress level. Mean effective stress is a calculated average value of the effective stresses acting at each subsurface location, with effective stress being the force per unit area supported by the soil particles, that is, the average effective stress carried by the soil skeleton.

104. The sand tailings were placed in the Fundão Dam by hydraulic deposition, whereby the mineral particles were suspended in water before being transported to the dam. They were spigotted behind Dike 1 through multiple outlets spaced along a pipeline. Hydraulically-placed and uncompacted materials, such as the sand tailings in the dam, are often contractive.

105. In cross-examination, Dr Marr agreed that the method of placing the sand tailings was likely to produce contractive material:

> "Q. But there's another data point, isn't there, which is the inherent likelihood that when one is dealing with loose, sandy tailings, hydraulically deposited, we've seen from Martin and McRoberts and the other articles that they're inherently likely to be contractive, aren't they?
>
> A. Loose and hydraulically placed, yes, I agree."

106. In their joint statement, the geotechnical experts agree that an assessment could be made as to whether the tailings were contractive by: (a) using field Cone Penetration Tests ("CPTs") with pore pressure data and/or Standard Penetration Tests ("SPTs") to determine if material was potentially liquefiable; and (b) using sampling and laboratory testing to determine void ratios and shear behaviour of materials compared to their critical state line.

107. CPTs involve advancing a thin steel rod continuously into the ground with a cone tip equipped with sensors which measures the force at the tip, and the friction in part of the rod. A CPT can be equipped with a separate sensor to measure pore pressure ("a CPTu").

108. Piezometers can be used to measure the pore pressure within the ground at the point in which they are installed.

109. SPTs are tests performed inside a borehole, whereby a tube is driven into the ground using hammer blows with set parameters (63.5kg hammer falling a distance of 75cm) to determine the number of blows required to drive the tube 30cm into the ground.

110. Prior to the dam failure, a number of ground investigations were carried out by geotechnical services companies, from which the contractive/dilative behaviour of the soils at the left abutment could be considered.

    i) In April 2014 Fugro conducted six CPTs, spanning across Dike 1. These holes were limited in depth but provided information on the ground condition near the instability that developed in August 2014.

    ii) Between September 2014 and March 2015 Fugro conducted an investigation across the Fundão Dam (near Dike 1) and across the Germano basin. The investigation across Fundão comprised 6 CPTs and 5 SPTs. The remaining CPTs, SPTs and other tests were undertaken across the Germano basin.

    iii) Between June 2014 and May 2015, Fugro installed 32 piezometers on Dike 1. At 10 of these piezometers, there were permeability tests done. Generally, there was an installation log and a SPT log for each piezometer installation. The piezometers were reviewed to determine the piezometric elevation across Fundão Dam and specifically across the left abutment.

    iv) In June 2015 Fugro performed 9 CPTs and Geocontrole performed 8 SPTs at Fundão.

111. The Panel Report considered the CPT data from the above investigations. It concluded that the April 2014 CPT data did not indicate contractive behaviour, but rather dilatant or close to the contractive/dilatant boundary. The relevant September 2014 to March 2015 data, namely, CPTs F-01 to F-05, from El. 854m to El. 889m, revealed contractive characteristics of beach material, consistent with the existence of potential collapse behaviour.

112. The Panel concluded that the June 2015 testing did not produce relevant data because they were taken from the embankments and/or close to the natural ground near the abutments; as such, they were more likely to test compacted fill used in the raisings and or natural soils beneath the dam, that would not normally be susceptible to liquefaction.

113. Based on a statistical analysis of the relevant CPTu data available prior to the collapse, the Panel Report concluded that approximately 70-80% of the sandy tailings within 75 metres of the dam crest were contractive, and 95% or more at greater distances up to 180 metres from the dam crest.

114. On 22 January 2016 VOGBR produced a technical note, published after, but commissioned prior to, the dam collapse, in respect of Project 940, in which it analysed certain available CPTu and SPT data. VOGBR considered that the available CPTu data indicated contractive tailings at the left abutment.

> "Considering the CPTu tests, the susceptibility to liquefaction of the sandy tailings is evident. In view of the depth restriction of the tests, it was considered that all sandy tailings are susceptible, that is, they exhibit contractile behavior."

115. Although it noted that the SPT tests indicated dilative behaviour, VOGBR considered that such tests were more vulnerable to interference and inconsistent with the other data. On that basis, it concluded that the results should be disregarded.

116. Dr Marr's view is that the CPTu data in respect of the left abutment relied upon by VOGBR in its liquefaction analysis did not clearly indicate large volumes of contractive material within the structural part of the dam. He interpreted the data as indicating that variable zones of dilative and contractive material existed within the tailings; the tailings were dilative at shallower depths but became more contractive at depth.

117. Professor Gens carried out his own analysis of SPT data from tests performed in boreholes during piezometer installation in the Setback area in September 2014: 16PI010, 16PI012, 16PI013, 16LI014, 16LI015 and 16LI017. That analysis showed a predominance of contractive materials. This was consistent with the SPT data available from tests performed in the Setback area between September 2014 and March 2015. CPTu tests at F-01, F-02, F-03, F-04 and F-05 showed that approximately 70% to 80% of the sand tailings within 75 metres of the dam crest at the Setback were contractive; approximately 95% of the sand tailings beyond that distance from the dam crest were contractive. As he noted in his first and supplemental reports, a large proportion of the SPT results at all depths indicated that the tailings in that area were contractive.

118. Although Dr Marr made a number of criticisms regarding the selection and plotting of data points by the Panel, he accepted in cross-examination that the SPT data showed the presence of contractive materials below the phreatic surface and the CPTu data points also indicated the presence of contractive materials:

> "Q. Well, in order for there to have been a liquefaction failure, there needed to have been contractive and saturated materials, didn't there?
>
> A. Correct.
>
> Q. And so it's inherently likely, isn't it, that data which tended to suggest the presence of such materials that was generated at the time is likely to be accurate?
>
> A. Data suggesting that there was a presence of contractive material at the time is likely to be correct.
>
> …

> Q. In relation to that test for the data points in which we're most interested in, there's nothing equivocal about this data. This is very clear CPTu data pointing to the presence of contractive materials?
>
> A. That test, yes, that location.
>
> …
>
> Q. Yes. So it may have excluded some of those data points, but nevertheless the conclusion which any competent engineer would have drawn from the CPTu data available from those data points, just to the top of the setback, is that there was contracted material there?
>
> A. Correct."

119. Thus, the CPTu and SPT data available from the campaigns carried out between September 2014 to March 2015 strongly support the conclusion of Professor Gens that there was a large body of contractive, potentially liquefiable materials in the structural part of the dam, in particular, on the left abutment at the Setback.

(ii) Saturation of the tailings

120. As stated above, soils are porous materials, comprising solid particles and voids, or pores. If the pores in the soil are full of water, the soil is saturated; if the pores in the soil contain both air and water, the soil is unsaturated. The phreatic surface (the water table) is the level between points at which the pore water pressure is equal to atmospheric pressure. In coarse materials, the material below the phreatic surface is saturated; the material above the phreatic surface is unsaturated.

121. In their joint statement, the geotechnical experts agree that the location of the phreatic surface throughout the tailings storage area can be determined using data from dam monitoring, such as piezometric recordings, CPTu measurements, visual observations, and seepage analyses.

122. The geotechnical experts also agree that the International Commission on Large Dams ("ICOLD") produces guidance on best practice in the industry in the form of bulletins and guidelines. This includes guidance regarding the importance of good drainage for the safety of tailings dams.

123. ICOLD Bulletin 74 (1989) advises at Chapter 4.2.4:

> "Seepage control is a critically important aspect in the design, construction, and operation of tailings dams as it directly affects: the stability of the downstream slopes, internal erosion due to piping, and pollution of ground and surface waters downstream of the dam.
>
> …

> Adequate filters and drains should be provided to allow seepage flows to safely pass through foundations, abutments, and embankments and be collected and measured. For tailings dams the water quality of seepage flows should also be determined."

124. ICOLD Bulletin 97 (1994) sets out the purpose of drainage in tailings dams, including lowering the phreatic surface, reducing pore-water pressures, and limiting internal erosion, stating:

> "Internal drainage is of vital importance to the reliability and safety of tailings dams."

125. ICOLD Bulletin 139 (2011) at Chapter 4.14.1 reiterates that the provision of adequate filters and drainage facilities is an essential component of design and successful operation of any tailings dam.

126. The importance of adequate drainage in preventing a risk of liquefaction was recognised by Pimenta de Ávila, the designer of the dam, in an article published in 2011, entitled "The Drained Stacking of Granular Tailings: A Disposal Method for a Low Degree of Saturation of the Tailings Mass":

> "A tailings mass with a low degree of saturation presents a lower risk of liquefaction of the tailings mass and achieves higher densities, in response to the loads applied by the reservoir filling.
>
> …
>
> The tailing disposal method presented in this paper includes a "pervious dam" as the starter dike, instead of a seepage barrier structure to retain both the tailings and the water. In addition to the pervious starter dike there is an internal bottom drainage system connected to the starter dike that provides a way to drain a substantial part of the water from the voids of the tailings.
>
> The main objectives of this method of disposal are:
>
> - To obtain a non-saturated embankment, with improved stability;
> - To obtain greater tailings density, aiming to increase the reservoir capacity;
> - To achieve a lower hazard potential in a case of a failure;
> - To improve the closure conditions with less cost for the environmental rehabilitation;
> - To achieve safer conditions for the application of the upstream method of construction, with a low risk of liquefaction and failure."

127. As described earlier in this Judgment, the original design of the Fundão Dam was based on the concept of the drained stack. It provided for a high-capacity foundation drainage system to be formed at the base of the starter dam at Dike 1, which would allow water to drain from the sands, thereby reducing saturation. Two decant concrete galleries were designed to evacuate surface water. Slimes would be deposited behind the sands so that they would not impede the drainage of the sands. Separation of the waterborne slimes would be maintained by a 200 metre width beach of sands separating the crest of the sand tailings behind the starter dam at Dike 1 and the crest of the slimes tailings behind Dike 2.

128. The geotechnical experts are agreed that the dam's initial design, and the construction of the starter dam, conformed with industry standards at the commencement of operations in 2008. Unfortunately, the construction of the original foundation drain did not comply with the design and was defective, as evidenced by the 2009 Piping Incident and subsequent investigation.

129. A report dated 7 May 2009 on inspection and review of the Piping Incident by Robertson Geoconsultants Inc, independent consultants engaged by Samarco, expressed the opinion that the seepage flow was caused by: (i) a breach of the filter layers by subaerial or subaqueous erosion of the filter layers protecting the core of the underdrains; (ii) particulate intrusion and partial plugging of the drains with complete plugging of the main underdrain occurring on 13 April 2009; (iii) seepage and pressure transmission from the underdrain into the chimney drain likely increased embankment earth fill and foundation pore pressures; and (iv) rising pressure heads in the underdrain to an elevation above the height of embankment fill, resulting in upward seepage flow along a channel of weakness, causing erosion and channel widening and formation of a pipe.

130. The main and secondary foundation drains were determined to be dysfunctional and were sealed. They were replaced with the blanket drain at El. 826m but, as Professor Gens explains in his first report, the performance of the blanket drain was sub-optimal as a substitute. Leaving aside the disputed capacity and efficiency of the drain, it was positioned at El. 826m and therefore would leave undrained all material deposited below it, some 15 to 20 metres of material behind the starter dam. Further, although when initially placed, the drain covered the full width of the Dike 1 impoundment, as the dam height was raised, the impoundment width increased, following the natural V-slope of the valley, expanding beyond the limits of the drain to the sides of the abutments. This had the effect of funnelling seepage flow from the full width of the dam into the much narrower blanket drain, raising the saturation level in the tailings. Finally, as the impoundment moved upstream, it became more distant from the blanket drain, also increasing the volume of saturated tailings.

131. Dr Marr agreed in cross-examination that the blanket drain at El. 826m was unlikely to be sufficient to control seepage through the dam once it reached higher elevations.

132. This amounted to a material departure from the original design concept in that the dam no longer acted as a drained stack. More widespread saturation was allowed and accepted, both beneath and beyond the perimeter of the blanket drain. Such increase in the extent of saturation introduced the potential for sand liquefaction, as accepted by Dr Marr in cross-examination.

133. Data from piezometers installed on the Setback, following the August 2014 incidents of seepage, cracking and slope movement, confirmed that tailings behind and below the Setback slope were saturated. The piezometric readings were set out in Appendix B to the Panel Report at Figures B6-13 (October 2015) and B6-14 (December 2014), showing an elevated phreatic level. In particular, the readings indicated that, although they levelled off in the months prior to the collapse, the pore pressures in the materials increased significantly between October 2014 (when they were installed) and October 2015.

134. Dr Marr agreed with Professor Gens' assessment that there was evidence of potential saturation problems:

> "Q. But do you not accept that there was abundant evidence, as summarised there by Professor Gens, of at least the potential for saturation problems?
>
> A. In parts of the Dam, yes.
>
> Q. And including in the left abutment, which was eventually the area of collapse?
>
> A. Yes, left abutment. Yes."

135. Between 2013 and 2015 there were many seepage, saturation, and cracking incidents at the right and left abutments, indicating that the blanket drain was not effective.

i) In March 2013 saturation of the slope and ponding of water occurred at El. 855m.

ii) In June 2013 seepage occurred at the left abutment at El. 855m.

iii) On 15 November 2013 seepage and cracking of the slope appeared at the left abutment at El. 860m.

iv) On 26 December 2013, upwelling occurred at El. 860m, together with cracking on the left abutment crest at El. 875m.

v) On 18 July 2014 there was seepage at the right abutment at El. 855m.

vi) On 27 August 2014 the left abutment showed serious signs of distress, namely, (i) extensive cracks at the crest, upstream tailings beach and downstream slopes of the Setback; (ii) uplift at the toe of the slope at the El. 865m bench; (iii) saturation at the toe of the El. 865m bench; and (iv) upwelling with artesian flow at the toe of Dike 1.

vii) On 30 January 2015 there was seepage at the right abutment at El. 860m.

viii) On 16 April 2015, saturation of the slope at the left abutment occurred at El. 867m.

ix) 18 May 2015, saturation of the slope at the left abutment occurred at El. 820m.

x) On 9 July 2015, saturation of the slope at the left abutment occurred at El. 820m.

136. The geotechnical experts agree in their joint statement that the above incidents evidenced that the blanket drain was not efficient for draining portions of the dam that were distant from the location of the drain.

137. This was confirmed by Dr Marr in cross-examination:

> "Q. Isn't another way of putting it that the Dam was encountering problems with saturation which demonstrated that the existing drainage was inadequate?
>
> A. Yes, the existing drainage meaning particularly the 826 drainage blanket.
>
> … as the Dam raised and got higher, when you got out to the sides beyond the blanket drain there was the concern that there would be leakage not picked up or flow not picked up by that blanket drain, and that's what this is.
>
> Q. Yes, yes. And that's a problem which afflicts both the right and the left abutments, isn't it?
>
> A. Potentially, yes.
>
> Q. And in the left abutment you have the additional problem of the Setback and the proximity of the slimes?
>
> A. Correct.
>
> Q. And so the seepage incidents were field evidence, weren't they, of the presence of saturated material in structural parts of the Dam, in particular at the left abutment?
>
> A. Yes.
>
> Q. So if that material was also shown to be contractive, you had the ingredients for a liquefaction flowslide?
>
> A. You had some of the ingredients, yes."

138. More generally, the above incidents indicated poor drainage of the dam, which was of critical importance to the stability of the dam. Dr Marr agreed in cross-examination that those incidents gave an indication over time of the degree of saturation increasing, which would indicate an increasing possibility of liquefaction.

139. Drawing together the expert evidence on this issue, it is very likely, based on the available borehole, CPTu, SPT and piezometric data, together with field evidence of seepage and cracking, that from at least 2014 until the failure of the dam, there were sufficient contractive, saturated materials susceptible to severe loss of strength, within the structural portion of the dam, so as to constitute a risk of liquefaction and collapse.

(iii) Encroachment of the slimes

140. The geotechnical experts agree that ICOLD guidance considers the impact of slimes encroaching into the sand zones upstream of a tailings dam. Although each case is fact specific, caution is advised. Chapter 7.4 of ICOLD Bulletin 97 (1994) warns of the dangers of unfavourable material zoning, artificially increased anisotropy (different behaviour of material under stress depending on orientation, a feature of loose sands) and formation of slime layers. Incorporation at the design stage of an effective drainage system is suggested to counter these deficiencies by providing a drainage system that crosses likely slimes layers.

141. ICOLD Bulletin 121 (2001) states in Chapter 4:

> "Also layers of materials of low permeability can produce perched phreatic surfaces.
>
> …
>
> [in] the exceptional circumstances of the dam being constructed of material that, when in place, proved to be less permeable than the tailings it was retaining, the phreatic surface in the dam can rise to dangerous levels, causing instability… It must be pointed out that a permeability value is not a property of a particular material. The value varies with the density of the fill, its degree of saturation and particularly with the values of existing effective stresses."

142. Professor Gens and Dr Marr agree that the above ICOLD guidance provides a cautionary message that encroaching slimes layers introduced into the structural zone can impede vertical drainage, raise the phreatic surface, produce perched phreatic surfaces, and provide a weak surface that can lower stability.

143. The original design contemplated separation of the slimes from the sands and drainage throughout the full depth of the sands. Once the Dike 1 impoundment reached the same elevation as the crest of Dike 2, the slimes and sands would be merged into a single impoundment but with the sands remaining at a higher level than the slimes to contain the same.

144. There is consensus between the geotechnical experts that at various stages in the dam's construction and operation, there was encroachment of the slimes into the area of the dam occupied by the sands (or vice versa), particularly as follows.

145. First, from at least November 2009 to January 2011, slimes were pumped over Dike 2 and deposited behind Dike 1A, an area originally intended for sands, between El. 813m and El. 824m.

146. Second, from February 2011 to July 2012, and from July 2013 to December 2013, the overflow channel was operated. It transported slimes from the Dike 2 reservoir into the Dike 1 reservoir, originally intended for sands, between El. 824m and El. 850m (by July 2012); and between El. 863m and El. 870m (by December 2013). Use of the overflow channel made beach management more difficult because the sands and slimes

were no longer physically separated; the interface between them could be controlled only by adjusting the amount of sand spigotted from the dam crest in relation to the amount of slimes-laden water being introduced.

147. Third, between October and December 2012, the Setback was formed at the left abutment, creating a plateau at about El. 855m and moving the crest of the dam upstream from the structurally unstable secondary gallery, thereby positioning it over the layers of slimes already deposited.

148. Professor Gens' view is that the placing of the slimes behind Dike 1A, the opening of the overflow channel and construction of the Setback brought the slimes closer to the exposed face of the dam. The presence of slimes, with lower strength and permeability than the sandy tailings, close to the downstream side of the dam, was detrimental to the drainage of the dam, reduced its stability and resulted in development of the lateral extrusion mechanism.

149. Dr Marr's view is that the overflow channel and the Setback had the potential to result in larger quantities of slimes closer to the downstream slope of the dam. The opening of the channel meant that slimes would be closer to the downstream slope than if the channel had not been opened but it did not necessarily mean that slimes would come within the structural portion of the dam, provided that an adequate beach length was maintained. The Setback would not necessarily lead to slimes being closer to the downstream face of the slope but could do so if the downstream face of the slope was built over previously deposited slimes.

150. ICOLD Bulletin 74 (1989) provides the following guidance as to maintenance of beach width for upstream tailings dams at Chapter 6:

> "The total tailings or overflow from cyclones should be discharged from the upstream face of the dam in such a manner that a low permeability tailings beach having a uniform width is maintained across the face of the dam
>
> The tailings pond should be operated in such a manner that a maximum width of beach is maintained between the free water in the pond and the upstream face of the tailings dam. This distance will vary depending on site topography and the particular mining operation; however a minimum width of beach of approximately 100 m should be maintained if possible.
>
> […]
>
> Seepage flows and piezometric pressures should be minimized by maintaining a wide tailings beach."

151. The geotechnical experts agree that the significance of ICOLD guidance on beach width is that a facility should keep the beach as wide as operations will allow. The beach width has a direct effect on how liquid flows through the dam and pore-water pressures close to and within the structural part of the dam, which influence stability and safety of the dam. The beach width also has an effect on how close to the downstream face of the dam the slimes are deposited. The experts consider that minimum beach width is a

site-specific determination; there is no universally accepted minimum beach width because it depends on the design and construction of the dam to control seepage and stability and how the specific dam performs as it is constructed and operated.

152. The design of the Fundão Dam required that the sands in the structural part of the dam should be free-draining. Although the design provided for the Dike 1 and Dike 2 impoundments ultimately to merge, the intention was that the sand tailings would retain the slimes deposited behind them such that the two materials would not intermingle. In furtherance of that intention, the Operations Manual for the dam specified a 200 metre minimum beach width to ensure that the low-permeability slimes would not be deposited where they could impede drainage through the sands.

153. Contrary to the design, the Panel found that, during operation, the required beach width of 200 metres was not consistently maintained. The monthly beach measurements by Samarco showed that during 2011 and 2012, beach widths often violated the 200 metre minimum, at times encroaching to as little as 60 metres from the crest. This allowed slimes to settle out in areas where they were not intended to be present.

154. The Panel concluded that the slimes which caused the collapse were deposited between February 2011 and July 2012, being the period in which the overflow channel was initially used. During that period, the elevation of the dam increased from El. 840m to El.850m.

155. Dr Marr raised a number of legitimate concerns as to the reliability of the underlying data and assumptions made by the Panel in carrying out its assessment as to the location of the slimes, namely: (i) uncertainty as to the maximum pond area; (ii) uncertainty as to the settlement of the slimes; and (iii) a lack of evidence of slimes in the field testing data.

156. As to (i), there is uncertainty as to the maximum pond area at any given time. Slimes are transported in water and settle out of the water to form deposits. The area within which slimes can settle is determined by the area of the pond. The distance between the edge of the pond and the crest of the dam defines the extent of the beach.

157. There were four sources of data in respect of the beach width: (a) Samarco topographic surveys; (b) Samarco monthly geotechnical monitoring reports; (c) Samarco rate of rise spreadsheets; and (d) Samarco monthly tailings discharge reports. The Panel used the first two sources but discarded the other two sources. In respect of source (c), the rate of rise data, it was noted that the location of the measurements used in the spreadsheets was unknown. In respect of source (d), the monthly tailings discharge data, it was noted that there were inconsistencies between the data in those reports and the topographic surveys; the topographic surveys often showed shorter beach widths. Where there were inconsistencies, the Panel used the minimum beach width for the consolidated beach width data series.

158. It follows from the identified gaps and inconsistencies in the data, that the Panel's assessment of any particular beach width based on that data are indicative but should not be assumed to be accurate.

159. Prof Gens accepted in cross-examination that uncertainty as to the outer limits of the pond created uncertainty as to the total area within which the slimes might have settled:

> "Q. But it's fair to say -- I think you would have to agree with this, Professor, as a matter of fairness – that what we can see here is that the precise boundaries of the pond at any given time were uncertain, weren't they?
>
> A. Yes, I agree that it was uncertain. I think the Panel had a tough job on their hands to try to reproduce the history of the Dam, but they did also a very good job. They were gathering the whole evidence and producing it for us.
>
> Q. And the Panel recognised, didn't it, that uncertainty that I've just mentioned in its after-the-event analysis, didn't it?
>
> A. Yes.
>
> Q. And the actual area of the pond -- let's just talk about that -- the actual area of the pond is the maximum area within which slimes suspended in the pond water could have settled; correct?
>
> A. Well, I'm not sure about that because you introduced the effect of the overflow channel. The overflow channel was a stream of water coming from the other direction going towards whatever the kind of structure they were using at the moment, so it was not only the pond coming from the spigotting which was actually producing slimes. There were slimes externally introduced by the overflow channel and that increased uncertainty of the location of the slimes.
>
> Q. But it's also right that, if the actual boundary of the pond is uncertain, then the area within which the slimes could have settled is also uncertain?
>
> A. It is."

160. As to (ii) the assumed settlement of the slimes, Professor Gens accepted in cross-examination that there was inherent uncertainty as to the actual settlement of the slimes:

> "Q. Yes, and even if the pond boundary had been known with certainty, without further testing it's not possible to know the extent to which slimes did in fact settle; correct?
>
> A. Well, I think the Panel did a good job trying to get that information from all the data they had, including aerial photograph, but I also agree that after all this effort the uncertainty was quite significant.
>
> Q. And the point is that slimes settle out of water relatively slowly, don't they?
>
> A. Correct.
>
> Q. And they settle more slowly the finer they are?

> A. Correct.
>
> …
>
> Q. Just in principle, the amount of settlement will depend on the amount of slimes suspended in the pond at the time of the encroachment and the properties of those slimes suspended and the length of time during which the encroachment lasted; correct?
>
> A. Yes. I mean, once the fine particles were there, it would take a longer or shorter time to settle, but they would eventually settle so they will be there eventually."

161. The above uncertainty prevented an accurate determination of the location and thickness of the slimes based on measured beach widths.

162. As to (iii), the evidence of slimes in the data produced by contemporaneous field testing campaigns was limited. The Panel Report concluded that there were no CPT or SPT test holes identified from the 2015 crest of the Setback that went to bedrock which could have been used to confirm the presence of slimes. However, it identified two boreholes that provided relevant data:

i) SP-07 exhibited two discrete clay layers corresponding to slimes; a 2 metre thick layer at El. 836.36m and a deeper 2 metre layer at El. 828.36m;

ii) CPTu-04 penetrated slimes layers up to several centimetres thick.

163. The Panel concluded that it was reasonable from those drill holes to categorise discrete layers of slimes as ranging from a few centimetres to a few metres in thickness, with the remainder of the slimes material intermixed with sand in varying proportions. Such characterisation was consistent with the zone of interlayering and intermixing of slimes and sands assessed by the Panel.

164. Although Professor Gens and Dr Marr concur that the field testing at the dam does not provide clear evidence of identifiable slimes layers in the left abutment, nonetheless they both conclude that there was evidence of the presence of slimes at the left abutment. In particular, Dr Marr's evidence was that 8 of the 17 drill holes at the left abutment which contained data between El. 840m and El. 850m showed the presence of slimes. In cross-examination Dr Marr accepted that it is likely that the Setback brought the slimes closer to the structural part of the dam:

> "Q. … Isn't it the case, particularly based upon the panel's findings and the facts of the collapse, that the Setback did in fact move the structural face of the Dam over deposited slimes?
>
> A. Thank you for that question. It's not certain but it's more likely than not in my opinion."

165. The Panel assessed the distribution of slimes at the left abutment, using a mass balance analysis, by comparing slimes production records with the potential slimes volumes between El. 840m and El. 850m, assuming a dry unit weight of the slimes taken from

measurements of slimes sampled post failure in the adjacent Germano Dam. The mass balance analysis was used to provide an indication of the volumetric proportion of constituent slimes layers within a specified zone, ranging from nearly 100% slimes, through interbedded slimes containing 20% or more slimes, to isolated slimes containing less than 20%.

166. Professor Gens agreed in cross-examination that the Panel's estimation of slimes erred on the side of assuming more slimes in the impoundment, rather than less. He also agreed that the Panel's analysis of the proportion of slimes in the interbedded zone was subject to a large degree of uncertainty.

167. Notwithstanding the uncertainties regarding the precise location and volume of the slimes, the geotechnical experts agree that the combination of the overflow channel and the Setback resulted in the presence of slimes closer to the downstream face of the dam slope than designed. Whether in continuous layers or thin and discontinuous layers, there were slimes in areas where they were not intended to be. Having regard to all the evidence on this issue, the Panel's conclusion, that slimes were present at the left abutment, in particular between El. 840m and El. 850m, and that their concentration increased with distance behind the dam, is a reasonable one and likely to be correct.

(iv) Height of the dam

168. The geotechnical experts agree that, all other things being equal, each increase in the height of a dam will decrease the relative stability of the dam. Although the Panel concluded that the rate of rise of the dam did not affect dam stability, they found that the increased height of the Setback, resulting from the continued raising of the dam, increased the loading on the slimes, which caused static liquefaction at the left abutment.

169. Dr Marr considers that there is insufficient data to conclude that the height of the dam played a significant role in the collapse. However, this does not take into account the obvious link between increased height of the dam in this area and increased loading on the slimes, giving rise to increased pore water pressures.

170. I accept Professor Gens' opinion that raising the dam progressively decreased the factor of safety against global stability due to increased driving stresses and higher pore water pressures. In particular, in this case, the increase in height of the dam at the left abutment increased the vertical loading on the slimes beneath, initiating the lateral extrusion trigger that resulted in liquefaction. The likely mechanism of failure strongly supports a causative link between the height of the dam and the collapse.

(v) Conclusions on geotechnical cause of collapse

171. For the reasons set out above, the available data shows that the tailings at the left abutment became susceptible to liquefaction because contractive, saturated materials were present within the structural portion of the dam.

172. The hydraulic method of deposition of the uncompacted sand tailings, together with the CPT and SPT data, indicated that the tailings in the structural part of the dam were likely to be contractive.

173. A departure from the original drained stack design allowed for saturation of the sand tailings. The numerous incidents of seepage, saturation and cracking, and the piezometer readings at the left abutment in 2014-2015 indicated that the internal drainage in the dam was inadequate.

174. The result was the presence of contractive, saturated material in the structural part of the dam. Thus, there was evidence of the susceptibility of the sand tailings to liquefaction.

175. The likely trigger for liquefaction was lateral deformation of the slimes under loading. The overflow channel and creation of the Setback were significant factors in introducing slimes into the structural zone of the dam. The presence of slimes at the Setback was evident from deliberate use of the overflow to transport them to that area and the borehole data. The creation of thin, thick or continuous layers of slimes at the Setback was exacerbated by the failure to maintain the designed beach width of 200 metres. The presence of layers of slimes in the structural portion of the dam created an additional impediment to downward drainage of the sand tailings and introduced a zone of potential weakness that could affect stability.

176. Despite those circumstances, work continued to raise the dam at the left abutment. This involved depositing sand tailings on top of the slimes. As the height of the dam increased, so did the loading on the slimes, providing the trigger for collapse.

177. In summary, continuing to raise the dam at the left abutment caused increased loading on the slimes, which deformed laterally under compression and led to liquefaction of the contractive, saturated sand tailings.

Identifying risk of collapse

(i) Liquefaction

178. The geotechnical experts agree that, prior to the collapse, the potential for liquefaction causing collapse of a tailings dam was well-understood as a phenomenon, although the triggering mechanism of lateral extrusion was not widely understood by typical practising engineers.

179. As Professor Gens observes in his supplemental report, by the time of construction of the Fundão Dam, static liquefaction had been identified as the cause of a number of catastrophic collapses of tailings dams around the world, resulting in significant human loss and/or environmental damage. The examples he gives include: the Stava Tailing Dam, Italy (1985), Sullivan Mine Tailings Dam, Canada (1991), Merriespruit Mine Tailings Dam, South Africa (1994) and Aznalcóllar Tailings Dam, Spain (1998). It is a point well-made that as a result of those high-profile cases, any competent geotechnical engineer involved in tailings dams must have been aware that static liquefaction was a potential cause of failure of a tailings dam.

180. A wealth of guidance in respect of the risk of liquefaction of tailings, based on decades of research and experience, was to be found in academic papers and industry publications available prior to the collapse, including the following.

181. ICOLD Bulletin No.97 (1994) in Chapter 3 states:

> "The grain size distribution and lack of cohesion of tailings make them susceptible to liquefaction under dynamic loading or even as a result of rapid change in static loading or location of the phreatic line."

182. ICOLD Bulletin No.106 (1996) in Chapter 3.5 states:

> "In a body of low density tailings, the pore pressure during shear may rise to equal σ [(total vertical stress)], so reducing τ [(soil shear strength)] to zero. This situation is called liquefaction: the mass behaves as a dense liquid and if it is free to flow (dam breach) it can exert considerable force on any object in its path. It is because of this that a release of tailings can cause so much more damage than a corresponding release of water.
>
> The shearing strains produced by seismic shocks in loose tailings can cause liquefaction and the shearing strains along a potential slip surface can result in considerable loss of shear strength which must be taken into consideration when assessing dam stability."

183. Based on Table 3 from a paper by Martin and McRoberts, "Some Considerations in the Stability Analysis of Upstream Tailings Dams" (1999), the mechanisms or processes understood as potential triggering mechanisms for liquefaction have been identified as including:

i) changes in pore pressure due to factors including seepage breakout on the face of the dam, deterioration in performance of underdrainage measures, increased pond levels, accelerated rates of construction and foundation or embankment movements; and

ii) triggering collapse surface by reduction in mean effective stress; where an element of soil below the collapse surface has a low shear stress and high mean effective stress, due to low or absent phreatic surface, saturating the slope reduces mean effective stress but leaves shear stress constant; the reducing mean stress results in contact with the collapse surface and liquefaction is triggered.

184. Bulletin No. 121 (2001) considers a number of case studies regarding tailings dam failures, noting that most resulted from inadequate control of water balance or construction and a lack of general understanding of the features required for safe operation. Factors affecting stability were identified as including:

i) the rate of deposition and the detailed properties of the tailings;

ii) provision of adequate drainage;

iii) control of hydrology to avoid overtopping or dangerous rises of the phreatic surface within the dam body.

185. Bulletin 121 states at section 6.2.7:

> "Failure of a tailings dam itself, while causing an inconvenience, may not have seriously damaging consequences nor cause any loss of life. The serious danger of a breach is the possibility of a subsequent flow slide of liquefied tailings."

186. In the preface to Bulletin 121, reference was made to recommendations given by Pierre Londe, President of ICOLD, applicable to tailings dams, including:

> "Look out for loose saturated sandy formations and study their liquefaction potential."

187. Thus, there is ample evidence, as recognised by the geotechnical experts' agreement, that when the Fundão Dam was designed, constructed and operated, the tailings dam industry was aware of the phenomenon of flow liquefaction, albeit not necessarily familiar with all possible trigger events.

(ii) Assessing liquefaction risk

188. The geotechnical experts agree that, prior to the collapse, different methods to identify and analyse liquefaction were available and recognised in the geotechnical and tailings dams technical community. They express this in slightly different ways, but from the joint statement, the key steps in this case comprise the following:

i) Determine whether the tailings are susceptible to liquefaction.

ii) If the tailings are susceptible to liquefaction, evaluate the likelihood that the risk of liquefaction will materialise.

iii) Determine the likely impact if the risk materialises; if an unacceptable Factor of Safety against flow failure is obtained, conduct a "dam break" or runout analysis to assess the liquefaction risk.

189. The experts agree that, if a material is susceptible to static liquefaction, the liquefaction potential can be evaluated by: (a) a limit equilibrium stability analysis and check on the factor of safety; (b) the Olson and Stark (2003) flow failure assessment procedure with peak and post-peak undrained strengths; and/or (c) application of Poulos et al. (1985) and Martin and McRoberts (1999) recommendations to use steady state strength in a limit equilibrium stability analysis and require a factor of safety of greater than 1.0.

190. As to the risk of liquefaction, Dr Marr's view is that prior to the collapse, there were a number of methods available to identify and analyse liquefaction risk in relation to upstream tailings dams, each of which relied on information from field testing, laboratory testing and semi-empirical methodologies. The selection of the methodology and inputs used were matters of engineering judgement. Applying standard approaches to those analyses based on the test data available, his opinion is that it would be reasonable for a geotechnical engineer working in 2015 to have concluded that there was no significant risk of liquefaction of the dam.

191. I reject that opinion on the basis that it is contrary to the overwhelming evidence described above, namely, available evidence of soil strengths, density and pore pressure

measurements, alongside saturation of the tailings, all pointing very firmly towards a clear susceptibility for liquefaction.

192. Further, Dr Marr's opinion is that, at the time of the collapse, lateral extrusion was not widely recognised by practising or even academic geotechnical engineers as a trigger for liquefaction in tailings dams. For that reason, in his view, a geotechnical engineer analysing the dam prior to the collapse would not have considered lateral extrusion as a potential trigger for liquefaction. With regard to other mechanisms and processes for triggering liquefaction in tailings dams, there were a number of mechanisms and processes which had been identified in the geotechnical industry as potential triggers of liquefaction in tailings dams, specifically those set out in Table 3 of Martin and McRoberts (1999). However, those mechanisms were not well understood at the time of the collapse except by a few specialists working in the subject.

193. Professor Gens considers that it is not necessary, and rarely possible, to identify a defined triggering event, given the variable causes of liquefaction. Reference to Martin and McRoberts (1999) explains that there are many possible triggers of liquefaction events, such that it is difficult in practice to exclude the possibility of one happening. The inability to predict the form in which a potential trigger might present is not an excuse for failing to assess the liquefaction risk.

194. I accept that in general geotechnical engineers could not reasonably be expected to be familiar with the phenomenon of lateral extrusion as a trigger for liquefaction. However, the precise nature of the trigger is not necessary in order to perform a stability analysis. The geotechnical literature adduced by the experts shows that there was widespread recognition of a risk of liquefaction, regardless of the trigger, if certain circumstances subsisted. Those circumstances were present in the dam in 2014-2015.

(iii) Stability Analysis

195. An established method used to determine the liquefaction potential in a tailings dam is a stability analysis. The evaluation of the stability of a slope is usually performed using the limit equilibrium method ("LEM"). The method assumes a possible sliding surface, divided into slices. The driving forces and resistance forces for each segment are computed, using a number of assumptions, drained or undrained strengths, and value or estimate of pore pressures.

196. The sum of all resistance forces divided by the sum of all driving forces gives a Factor of Safety. A Factor of Safety below 1.0 implies that the slope is failing. A Factor of Safety above 1.0 implies that the slope will not fail. Allowing for uncertainty surrounding such calculations given the margin for error in any measured or assumed values, the minimum Factor of Safety that should be used is generally higher than 1.0.

197. Parameters used in an LEA include the strength and density of the soil and the pore pressure at the sliding surface under consideration. Effective stress on a material is the difference between total stress and pore water pressure. An effective stress analysis ("ESA") uses drained shear strength parameters. An undrained strength analysis ("USA") uses undrained shear strength parameters.

198. Drained conditions refer to a free-draining condition, where water flows in or out of soil in response to a change in stress (i.e. the intensity of force on an area) so that no

excess pore water pressure results in the soil. Undrained conditions refer to a non-free draining condition where water cannot flow through soil at a sufficient rate to allow increased pore water pressures to dissipate.

199. Professor Gens' opinion is that the limit equilibrium stability analysis and the check on the Factor of Safety for evaluating the static liquefaction potential must be carried out using undrained peak strength in an undrained strength analysis ("USA"). He notes that this is explicitly recommended in ICOLD Bulletin 139 (2011), Chapter 4.7 "Static Liquefaction", which recommends a Factor of Safety higher than 1.5 for loose sandy tailings. He also relies on the reference in Bulletin 139 to Martin and McRoberts (1999), a paper which states that:

> "Design analyses must include both undrained strength analysis (USA) and effective stress analysis (ESA), with design controlled by the analysis type giving the lowest factor of safety."

200. This is echoed in a publication by the Australian National Committee on Large Dams ("ANCOLD"), a member of ICOLD, entitled "Guidelines on Tailings Dams" (May 2012). That guidance advises at section 6.1.3 that a drained loading condition should not be used to evaluate the stability of saturated, contractive materials; in such a case, the undrained condition should be used:

> "Static liquefaction is another important slope failure mechanism whose potential needs be evaluated as part of the undrained loading condition. As defined by Fell et al. (2007), static liquefaction occurs at relatively low stresses and is characterised by large pore pressure development and a brittle stress-strain response, resulting in close to zero effective stresses."

201. In cross-examination, Dr Marr agreed that, based on the guidance set out in ICOLD Bulletin 139, an engineer would have to be completely confident of a non-saturated condition before using drained strength for the purposes of the calculations to assess stability of the tailings and that the Martin and McRoberts advice was sensible:

> "Q. So that may go slightly further than the recommendation in ICOLD that you use the undrained strength in relation to loose tailings, but you would agree that what's reflected in Martin and McRoberts is nevertheless a sensible recommendation for a geotechnical engineer dealing with an upstream tailings dam?
>
> A. A sensible recommendation they made but not universally used or adopted.
>
> Q. Yes. But whether or not it was adopted universally in the way that Martin and McRoberts advocate, it should certainly be used and adopted as ICOLD advocate when one is considering loose contractive tailings?
>
> A. Yes."

202. Hence, the geotechnical experts agree that, in accordance with industry guidance published prior to the collapse of the dam, when tailings are contractive and saturated, undrained shear strength parameters should be used as part of any stability analysis.

203. It emerged that there is no material issue between the experts as to the circumstances in which a USA should use peak undrained strength or post-peak (or "residual" or "liquified") undrained strength. The peak strength of a material is the maximum shear stress it can withstand before its capacity to sustain a load is reduced, resulting in collapse. The post-peak strength is the material's strength after it has been deformed as a result of large shear strains. A material's peak strength may be significantly higher than its post-peak strength but this depends on the density (or void ratio) and whether the soil is drained or undrained. These strengths can be determined from laboratory and/or field tests.

204. Professor Gens considers that alternative calculations should be carried out using both peak and residual strength when tailings are saturated and contractive. Dr Marr agrees that post-peak/residual strength should be used when there is material susceptible to liquefaction but not necessarily in other cases. It is not necessary for the Court to determine the alternative approaches by the experts because, as set out above, it is clear that the tailings were susceptible to liquefaction. Therefore, stability analyses were required to be carried out using both peak and post-peak undrained strength.

205. There is a disagreement between the geotechnical experts as to the value of any Factor of Safety which ought to be achieved in an LEA to show adequate stability. Professor Gens' opinion is that a Factor of Safety of at least 1.5 is needed when using peak undrained strength; and a Factor of Safety of 1.1 to 1.2 is needed when using residual undrained strength. Dr Marr's opinion is that a Factor of Safety of 1.5 for an USA would not be understood by tailings engineers to be necessary; and almost all upstream tailings dams would not achieve a minimum Factor of Safety of 1.0 to 1.2 for residual strength. His view is that the Olson method is an appropriate approach for USA.

206. Support can be found for a cautious approach in Bulletin No.139 (2011), which provides the following information on static liquefaction:

> "For normal embankments, it is generally accepted that a factor of safety of 1,5 in stability analyses is adequate, when using the maximum deviator stress shear resistance. However, for loose sand on tailings, the factor of safety shall be higher, to give adequate margin of safety. A more conservative safety factor is recommended.
>
> A useful reference for management against static liquefaction is Some Considerations in the Stability Analysis of Upstream Tailings Dams (Martin and McRoberts, 1999)".
>
> Only in cases where good drainage provisions are made, allowing a guarantee of a non-saturated condition, may the available effective resistance be used.

207. Professor Gens' interpretation of the above is that ICOLD advises that, when performing a stability analysis to assess the risk of static liquefaction, a higher Factor of Safety should be used for loose sand or tailings. In contrast, Dr Marr considers that specific guidance in the ICOLD document is ambiguous and open to interpretation. His position is that it is a matter of individual judgment on the part of an engineer to decide whether/how to perform an USA and what Factor of Safety is acceptable.

208. Professor Gens' opinion is supported by Professor Charles Ladd of MIT in his Terzaghi Lecture of 1986, published in 1991. Professor Ladd explains the flaw in using a conventional effective stress analysis (ESA) for contractive and saturated materials, namely, it assumes that a potential failure will occur so slowly that the drained shear strength of the soil will resist failure; it assumes a consolidated, drained case. It does not consider undrained shear failure, which is the most likely condition where rapid failure occurs. He is clear in advocating for a limit equilibrium analysis that calculates the factor of safety against an undrained failure for tailings dams.

209. This is adopted in the Martin & McRoberts paper (1999), referenced in the ICOLD guidance. It identifies as one of the fundamental rules for design, construction and operation of upstream tailings dams, that design analyses must include both undrained strength analysis (USA) and effective stress analysis (ESA), with design controlled by the analysis type giving the lowest factor of safety.

210. The ANCOLD 2012 guidance recommends Factors of Safety, including 1.5 for undrained peak strength in USA and a range of 1.0-1.2 when using liquefied residual shear strength. However, section 6.1 notes that there are no firm rules for acceptable Factors of Safety, as they need to account for the consequences of failure and the uncertainty in material properties and subsurface conditions.

> "Situations which can lead to an overestimation of factor of safety can usually be related to the assumptions made regarding shear strength and pore pressures, not to problems in the analysis itself, e.g.:
>
> incorrect assessment of location of phreatic surface and pore water pressure conditions;
>
> relatively high horizontal permeability and elevated phreatic surface levels;
>
> …
>
> static liquefaction as stress conditions change e.g. by upstream construction where failure occurs at stresses less than given by effective stress parameters. This occurs when the loose tailings generate positive pore pressures during shearing."

211. Brazilian Standard ABNT NBR 13028 (2006) prescribes specific minimum Factors of Safety for stability analyses using effective stress; the Factor of Safety is required to exceed 1.5 for normal operating (i.e. drained) conditions; but leaves specific Factors of Safety for stability analyses using undrained strength up to the designer.

212. In his field inspection report dated 22 December 2014, following the August 2014 incidents, Pimenta de Ávila recommended a Factor of Safety of greater than 1.5 with peak undrained strength, and a Factor of Safety of at least 1.2 when using post-peak (liquefied or residual) strength, for the design of the Setback reinforcement berm. Although he considered the post-peak Factor of Safety to be conservative, Dr Marr agreed in cross-examination that, when a dam designer has prescribed a target Factor of Safety using undrained strengths, that is the standard that should be followed.

213. In summary, by 2014-2015, there was clear evidence that the tailings at the left abutment were susceptible to liquefaction. For the reasons set out above, I accept Professor Gens' opinion that the most appropriate evaluation of stability was the limit equilibrium method, using an undrained strength analysis. The required Factor of Safety, as advised by Pimenta de Ávila, the designer of the dam, was greater than 1.5 using peak undrained strength and a Factor of Safety of 1.1 to 1.2 using post-peak (liquefied or residual) strength.

(iv) LEA assessment

214. The Panel Report included the results of its limit equilibrium analyses ("LEAs"), indicating Factors of Safety that were below 1.5 for the left abutment, FOS 1.35 in August 2014 and FOS 1.14 on 5 November 2015. The Factors of Safety using residual or liquefied strength were predictably much lower, including FOS 0.36 at the left abutment.

215. The Panel reviewed data from pre-failure site investigations but also undertook an independent, additional site investigation programme at adjacent locations in the Germano Dam. An extensive laboratory testing programme was conducted on reconstituted samples of sand tailings and slimes collected from the Fundão and Germano Dams. Laboratory testing was carried out to test the theory of lateral extrusion. Comprehensive computer modelling was undertaken by the Panel, including consolidation analysis of the slimes in the left abutment, drained and undrained LEAs of the abutments, stress deformation analysis of the left abutment, and seepage finite element analyses.

216. The geotechnical experts agree that some of the tests, analyses and models used by the Panel were not intended to evaluate the stability of the dam but to try to understand the mechanism underlying the failure and, therefore, would not usually form part of a stability review.

217. Caution must be exercised when studying these results used in the Panel Report, having regard to the purpose for which the Panel Report was produced. In carrying out its analyses and modelling, the Panel deliberately chose a number of different scenarios and soil parameters, including a base case that did not involve failure, because the purpose of the investigation was to understand how, why, when and where the failure occurred. In particular, the Panel sought to understand why the failure occurred on the left abutment but not the right abutment. It was not concerned with consideration of the LEAs that might have been carried out in 2014-2015 or what they would have predicted in terms of risk of failure.

218. Professor Gens' opinion is that LEAs using information that was available in 2014-2015 would have revealed that the Factor of Safety of the dam was insufficient. He has

carried out an independent LEA for the left abutment as set out in Appendix 1 to his first report. He performed a back analysis of the August 2014 slope failure to estimate the peak undrained shear strength of the tailings, through which he obtained an undrained strength ratio of 0.25. He explained that this value was typical for sand tailings and consistent with the results of the CPTu tests available before the failure. Dr Marr accepted in cross-examination that it was unnecessary to make any distinction between the sands and slimes for the zone of failure considered and that the ratio used by Professor Gens was within the range of what would be expected. The other parameters used in his LEA were based on information from in situ and laboratory tests, available or easily obtainable at the time of the dam collapse.

219. Professor Gens estimated the following Factors of Safety for the Setback at the left abutment, using the LEA with peak and post-peak/residual undrained strengths:

i) August 2014: Peak Factor of Safety 1.02; Residual Factor of Safety 0.38;

ii) September 2014 (post-cracking, with the stability berm in place): Peak Factor of Safety 1.36; Residual Factor of Safety 0.51;

iii) August 2015: Peak Factor of Safety 1.24; Residual Factor of Safety 0.4;

iv) November 2015: Peak Factor of Safety 1.2; Residual Factor of Safety 0.38.

220. All the above Factors of Safety using peak strength were below FOS 1.5, indicating a high risk of liquefaction failure. There was no challenge to the analysis carried out by Professor Gens and no alternative stability analysis has been produced by BHP. On the basis of this stability analysis, using data available before the collapse, I accept Professor Gens' opinion that the dam's precariousness and the high risk of liquefaction failure could have been predicted.

Foreseeability and avoidance of collapse

221. Professor Gens' opinion is that the slope failure that took place in August 2014 was an unmistakable sign of the marginal stability of the dam. A stability review using the information available at the time would have identified, at least in September 2014, if not earlier, that the dam was at serious risk of collapse due to liquefaction. Limit equilibrium analyses using available information at the time would have revealed that the Factor of Safety of the dam was insufficient.

222. Dr Marr accepted in cross-examination that there was evidence of instability of the dam:

> "Q. And so I was putting it to you yesterday that an engineer with just the data available would have identified that there was an unacceptably high risk of liquefaction. An engineer actually on the ground also had the benefit of the field evidence of seeing a slope failure, didn't they?
>
> A. Not from liquefaction but from instability, localised instability.
>
> Q. Localised instability and clear evidence of saturation; yes?

> A. Yes.
>
> Q. Which, of course, as we keep on coming back to, is one of the conditions of liquefaction?
>
> A. Yes."

223. Dr Marr also accepted that the August 2014 incident was a warning that should have prompted a stability analysis:

> "Q …Now, ignoring any question of hindsight, just based upon the information available, both in terms of data and observable field evidence and the history of incidents, a prudent geotechnical engineer would have realised there was a potential problem here, wouldn't they?
>
> A. Yes.
>
> Q. And they would have put the pieces of the jigsaw together and ensured that there was a proper stability analysis incorporating a proper liquefaction study; yes?
>
> A. Yes, I think so."

224. Finally, Dr Marr agreed that it was imprudent to continue to raise the dam along the alignment of the Setback in the absence of proper written analysis of the stability of the Setback and the attendant risks.

225. A stability analysis, carried out using undrained shear strength parameters, would have identified Factors of Safety below FOS 1.5. It is inconceivable that a decision would have been taken to continue raising the height of the dam in those circumstances.

226. It is important to recognise that the collapse of the dam occurred in the absence of any supervening destructive events, "Act of God" or *force majeure*. There was no catastrophic storm, earthquake or flood that could explain the disaster.

227. BHP's case is that the collapse was sudden and unexpected; it was not foreseeable and could not have been prevented. That alarming proposition suggests that any of the thousands of tailings dams throughout the world could be at risk of imminent failure, without warning, causing widespread devastation and the risk of injury or loss of life. It would follow that all tailings dams were inherently dangerous.

228. It is perhaps comforting that that is not the case. Upstream tailings dams are not inherently dangerous. In their 1999 paper, Martin & McRoberts state:

> "There is nothing fundamentally wrong with upstream tailings dams provided that key principles are adhered to in the design, construction, and operation of such dams."

229. They set out the fundamental rules for the safe design, construction and operation of upstream tailings dams, including the following:

i) A sufficiently wide beach, relative to the ultimate height of the dam, must be maintained at all times, to achieve segregation of the coarser tailings sizes from the slimes and to form a relatively strong, wide, drained/unsaturated, and/or dilatant outer shell.

ii) There must be sufficient underdrainage and/or a pervious foundation to maintain the sand shell in a relatively drained condition, and to prevent seepage from issuing from the face of the tailings dam.

iii) Design analyses must include both undrained strength analysis (USA) and effective stress analysis (ESA), with design controlled by the analysis type giving the lowest factor of safety.

iv) Regular performance monitoring, reviews, and ongoing involvement by the designer is essential to check that design intent is being satisfied, to confirm design assumptions, and to identify any design changes that may be required.

230. There is a wealth of engineering research and experience that provides comprehensive guidance on the design and operation of tailings dams. This is summarised succinctly in ICOLD Bulletin 121:

> "The art and science of geotechnical engineering and geology, plus the detailed research studies of the behaviour of embankment dams, has given designers sufficient information to enable of the design of safe tailings dams."

231. As Dr Marr observed, we know how to design a safe tailings dam.

232. The guiding principles for a tailings dam such as the Fundão Dam are that there should be effective drainage of the sand tailings, there should be a body of coarse, unsaturated materials in the vicinity of the raised embankments and weak, impermeable materials should be kept away from the structural part of the dam. The risk of collapse could have been averted by following them. Those guiding principles, the subject of various reports and recommendations throughout the life of the dam, were not followed. The result was catastrophic collapse.

7. THE BRAZILIAN LEGAL SYSTEM

233. It is common ground that Brazilian Law is applicable to the claims brought by the Claimants in these proceedings, subject to discrete issues of agency and attribution (to which English and/or Australian law applies).

234. Where, as in this case, the parties rely on foreign law, that law must be pleaded and proved as a fact to the satisfaction of the court on the balance of probabilities, save where it is agreed (or in other limited circumstances not applicable in this case).

235. The principles which the court must apply when assessing the evidence of foreign law, such as in this case, were summarised in *Perry v Lopag Trust Reg* [2023] 1 WLR 3494 (PC) at [11]-[16], including the following:

> "[11] First, the task of the trial judge when there are disputed questions of foreign law is to determine what the highest relevant

court in the foreign legal system would decide if the point were to come to it: *Dexia Crediop SpA v Comune di Prato* [2017] 1 CLC 969 ("*Dexia*"), para 34; *Morgan Grenfell & Co Ltd v SACE Istituto per I Servizi Assicurativi del Commercio* [2001] EWCA Civ 1932 ("*Morgan Grenfell*"), para 50. It is not sufficient for a party to identify a judgment of a foreign court of first instance which may be on point and assert that the task of the appellate court is simply to analyse that judgment.

[12] Secondly, if the foreign legal system is a common law system which adopts a similar approach to legal reasoning and statutory interpretation to that of English law, the English judge at first instance is entitled and required to bring to bear his or her knowledge of the common law and the rules of statutory construction in analysing the foreign law…

[13] Thirdly, where the foreign law is in a foreign language the trial judge will often be dependent on translations of the relevant texts, which may or may not be precise and which may or may not be disputed, and on the evidence of the foreign law experts to understand the meaning and nuances of the foreign language in the relevant text…

[14] Fourthly and more widely, where the first instance judge is dependent upon the evidence of foreign law experts, who disagree as to the interpretation and application of a foreign law, and has to decide issue by issue whose evidence to prefer, the judge will have regard to all the evidence presented to him. The judge will reach a view based on an assessment of each expert having regard to each expert's evidence as a whole, and the way in which each expert answered the questions posed in chief and on cross-examination to justify his or her opinions. The judge will thus evaluate the experts' reasoning. Not all the matters which have influenced the judge in forming a view on which evidence to prefer will always be recorded in any detail in a judgment or can be ascertained from reading a transcript of the proceedings. The judge will have regard to "the whole of the sea of evidence presented to him whereas an appellate court will only be island hopping". Those words of Lewison LJ in *FAGE UK Ltd v Chobani UK Ltd* [2014] FSR 29, para 114 are in such circumstances as applicable to a case involving expert evidence on foreign law as they are to cases involving the evidence of witnesses of fact more generally. See the judgment of Longmore LJ in *Dexia* at para 42.

[15] There is thus a spectrum of circumstances in which the principal variable is the degree to which the judge can use his or her skill and experience of domestic law and of the domestic rules of statutory interpretation to ascertain the foreign law and apply it to the case in question. For example where a judge is an English lawyer, at one end of the spectrum there are cases in

> which the foreign law is a common law system which applies the same or analogous principles and means of legal analysis as English law. In such cases there will be considerable scope for the trial judge to bring to bear his or her legal skills and experience in domestic law in determining and applying the foreign law… At the other end of the spectrum are cases of disputed foreign law in which the skill and experience of the judge in domestic law has a minimal role to play in the ascertainment and application of foreign law, as in *Byers*. In such cases the court at each level of the hierarchy is dependent on the written and oral evidence of expert witnesses, tested by cross-examination. The trial judge's findings on the content and application of foreign law have a close kinship to other findings of fact …"

236. Having regard to the approach which this court must adopt, before considering in detail the issues of Brazilian law that arise in this case, it is necessary to identify the Brazilian legal system, the legal framework and the principles of interpretation that would be applied by the highest relevant court in Brazil if those issues were to come before it. On this topic, as might be expected, there is a large measure of agreement between the experts, as set out in the reports of Professor Sarlet, Professor Tepedino and Professor Rosenvald.

237. The Brazilian legal system is a civil law system aligned with the Roman-Germanic tradition. The primary source of Brazilian law is written norms (legal rules and principles), comprising the 1988 Constitution of the Federative Republic of Brazil ("the Constitution"), international treaties, infra-constitutional legislation and certain other enactments, such as decrees and resolutions.

238. The Constitution has hierarchical superiority over other written laws, requiring the other written laws to be interpreted in accordance with its principles and rules. The Constitution contains fundamental civil, political, economic, social, cultural and environmental rights, which have direct applicability. This includes Article 225 of the Constitution, which provides that everyone has the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life; both Government and community have the duty to defend and preserve it for present and future generations.

239. Infra-constitutional legislation includes Law 6.938/1981 ("the Environmental Law"), Law 10.406/2002 ("the Civil Code"), Law 6.404/1976 ("the Corporate Law"), Law 13.105/2015 ("the Code of Civil Procedure") and Law 8.078/1990 ("the Consumer Defence Code").

240. All categories of written law may contain rules (norms that require, prohibit or permit conduct in definitive terms) and principles (abstract norms that grant rights or impose duties without prescribing or requiring a particular behaviour), which may be express or implicit. Principles assist the courts in interpretation and application of the written law, ensuring that legislation is interpreted as a unitary whole, resolving any conflicts, and in accordance with the Constitution. They can help to clarify the aims and objectives of the law, for the purpose of developing an area of law, or to justify changes or exceptions to the law.

241. The written law may be general or special in nature. The Civil Code is a general law and the Environmental Law, Corporate Law and Consumer Defence Code are special laws. Where general and special laws regulate the same issue differently, the special law prevails but only to the extent that there is a conflict. Insofar as there is no conflict, the provisions of the relevant general law continue to apply and serve to complement the proper interpretation and application of the relevant special law.

242. General or special law may contain general clauses. General clauses are open, abstract, norms which are intentionally drafted with indeterminate legal content, and which are then developed through specific cases. Examples of general clauses of relevance to the issues in this case include Article 186 of the Civil Code, Article 927 (sole paragraph) of the Civil Code and Article 116 (sole paragraph) of the Corporate Law.

243. The Supreme Federal Court ("the STF") is responsible for safeguarding the Constitution and is the highest court of record for the interpretation and application of the Constitution (Article 102 of the Constitution). The Superior Court of Justice ("the STJ") is the superior court of general jurisdiction with final authority over the interpretation and application of Federal legislation (Article 105 of the Constitution). The Federal Courts have jurisdiction over matters involving the Federal public administration, its agencies and international organisations. Appeals from first instance Federal Courts are heard by the appropriate Regional Federal Court ("the TRF"). The State Courts have jurisdiction over all other matters. Appeals from first instance State Courts are heard by the appropriate State Appellant Court ("the TJ"). Appeals from the TRF and the TJ are to the STJ, unless they concern constitutional matters, in which case they are heard by the STF.

244. Written law must be interpreted and applied to the concrete facts of a particular case in a manner which is both compatible with the Constitution's rules and principles and consistent with the preservation of a unified legal system. That unity is maintained through the application of four complementary interpretation methods: (i) the literal interpretation, which focuses upon the ordinary grammatical meaning of the language used by the legislator; (ii) the historical interpretation, which takes into account the historical context and circumstances in which the relevant law was introduced; (iii) the teleological interpretation, which focuses upon the legislator's intended purposes and objectives; and (iv) the systematic interpretation, which focuses upon achieving coherence with the other laws that make up the legal system (with the Constitution having superior hierarchical importance in this regard).

245. Case law is a secondary source of law, which assists in the interpretation and application of the written law. Where case law is consistent on a particular issue, it is to be regarded as settled. Settled case law arising from decisions of the STJ and the STF provides the best evidence of how the written law should be interpreted and applied.

246. Case law of the STF and the STJ is binding in limited circumstances as provided in Article 927 of the Civil Procedure Code. Decisions of the STF are binding on all other courts regarding matters of constitutional law for which the STF has primary responsibility. Binding precedent statements (*enunciados de súmula vinculante*) of the STF, which require a decision by two thirds of the court, often formulated as a determinative thesis in the judgment, are binding on all lower courts. A binding precedent statement of the STJ is not binding on the STF but is binding on all other courts. Judgments in repetitive extraordinary and special appeals, concerning identical

questions of law arising out of the same factual circumstances, are binding on lower courts and the court handing down the decision.

247. Even when case law is not binding, such as non-binding precedents (*enunciados das súmulas)* in the STF or STJ, it remains highly persuasive and judges are required to explain any divergence from relevant decisions by distinguishing the facts or by reference to alternative jurisprudence. The *ratio decidendi* is found in the determining grounds of the judgment that have been expressly endorsed by the majority of the members of the judging panel. Non-determining *obiter dicta* that have been expressly agreed by a majority of the members of the judging panel may also have persuasive value. The determining grounds of an STJ judgment that have been expressly endorsed by a majority of the members of the judging panel typically are summarised at the start of the judgment by the Justice who delivered the winning vote. The purpose of the summary is to synthesise the legal rule which was developed for the purposes of resolving the case, but it does not displace the detailed reasoning set out in the substantive part of the judgment.

248. Where the law is silent on an issue, the court must decide the case by filling any apparent gaps in the written law using analogy, customs and general principles of law. Analogy consists of applying a legal provision designed for a given situation to a comparable situation where doing so would fulfil the underlying purpose of that legal provision. Customs are widely known and repeated social practices which are integrated into the legal system. General principles of law are derived from a process of inductive reasoning, according to which a fundamental precept is extracted from a body of law and then applied by the court to the relevant case.

249. Legal doctrine, the work of jurists in the construction of theoretical concepts and principles, is not a source of law but, depending on the quality and depth of its reasoning it can, and often does, aid courts in the interpretation and application of written law. Doctrine that has been specifically endorsed by the STJ or STF in case law is particularly persuasive. Statements approved by legal conferences organised by the Federal Justice Council ("the CJF") are regarded by the Superior Courts as a particularly valuable doctrinal source because they are approved by a wide pool of judges, public prosecutors, academics and lawyers with particular expertise in the relevant subject matter.

8. ENVIRONMENTAL LAW

250. The Claimants' primary case is that BHP are strictly liable for damage caused by the collapse of the Fundão Dam under Article 3, IV and Article 14, paragraph 1 of the Environmental Law. They contend that BHP were directly or indirectly responsible for the mining and/or tailings disposal activities that caused the damage. As such, they fall within the definition of a "polluter" in Article 3, IV. Article 14, paragraph 1 imposes strict liability on polluters on a joint and several basis for damage caused to the environment or third parties by their activities.

251. BHP's case is that they were not the operators of the activity that caused the environmental damage and therefore did not fall within the definition of a "direct polluter" for the purpose of Article 3, IV. They did not owe any specific legal or contractual duty of safety with regard to the operation of the Dam and were not in breach of any such duty; therefore, they did not fall within the definition of "indirect

polluter" for the purpose of Article 3, IV. There was no causal link between any act or omission on the part of BHP and the environmental damage. In any event, any liability of BHP as indirect polluter would be subject to subsidiary execution.

252. Article 225 of the Constitution sets out as a fundamental principle of environmental rights that:

> "Everyone has the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both Government and community shall have the duty to defend and preserve it for present and future generations.
>
> …
>
> §2. Anyone who exploits mineral resources is obliged to restore the degraded environment, in accordance with the technical solutions required by the competent government body, as provided for by law.
>
> §3. Conducts and activities considered harmful to the environment shall subject the offenders, be they natural or legal persons, to criminal and administrative sanctions, without prejudice to the obligation to redress the damage caused."

253. The National Environmental Policy was established under the Environmental Law, which sets out in Article 2 its general purposes and objectives:

> "The National Environmental Policy aims to preserve, improve, and recover the environmental quality conducive to life, aiming to ensure, in the country, conditions for socio-economic development, the interests of national security and the protection of the dignity of human life."

254. The aims of the National Environmental Policy include at Article 4, VII of the Environmental Law:

> "The imposition on the polluter and predator of the obligation to recover and/or compensate for the damage caused and, on the user, of a contribution for the use of environmental resources for economic purposes."

255. Article 14, paragraph 1 of the Environmental Law provides:

> "Without prejudice to the application of the penalties provided for in this article, the polluter is obliged, regardless of fault, to indemnify or repair the damage caused to the environment and to third parties affected by its activity … "

256. "Polluter" is defined in Article 3, IV of the Environmental Law as:

> "a natural or legal person, of public or private law, that is directly or indirectly responsible for any activity resulting in / causative of the degradation of environmental quality".

257. "Environment" is defined in Article 3, I of the Environmental Law as:

> "Environment, the set of conditions, laws, influences and interactions of a physical, chemical and biological order, which allows, harbours and governs life in all its forms."

258. "Degradation" is defined in Article 3, II of the Environmental Law as:

> "Degradation of the quality of the environment: the adverse alteration of the characteristics of the environment."

259. "Pollution" is defined in Article 3, III of the Environmental Law as:

> "pollution: the degradation of the environmental Quality resulting from activities that directly or indirectly:
>
> a) harm the health, security and well-being of the population;
>
> b) create adverse conditions for social and economic activities;
>
> c) unfavourably affect biota;
>
> d) affect sanitary or aesthetic environmental conditions;
>
> e) release materials or energy in disagreement with established environmental standards."

The Dispute

260. In the Joint Environmental Law Experts' Statement dated 17 April 2024, Professor Sarlet and Professor Milaré agree that the requirements for civil liability for environmental damage are: (i) conduct/activity; (ii) degradation/damage; and (iii) a causal link between (i) and (ii).

261. The key issues on which they are in dispute are as follows:

i) First, whether there is a conceptual distinction between the *direct* polluter and *indirect* polluter for the purpose of Article 3, IV; in particular, whether it is a necessary requirement for characterisation as a polluter within the definition in Article 3, IV, that an entity that is *indirectly* responsible for the activity that causes environmental degradation must: (a) owe a specific legal or contractual duty of safety in respect of the polluting activity; and (b) omit to observe that duty.

ii) Second, whether the applicable test for the causal link required for liability under Article 3, IV and Article 14, paragraph 1 is (a) the theory of equivalence of conditions or *conditio sine qua non* ("but for") test pursuant to the full risk

theory; or (b) the theory of direct and immediate causation pursuant to Article 403 of the Civil Code.

iii) Third, whether there is a presumption of joint and several liability for direct and indirect polluters and/or the principle of subsidiary enforcement applies, with the consequence that the direct polluter(s) must necessarily be pursued and subjected to enforcement prior to enforcement of any judgment against an indirect polluter.

Professor Sarlet's opinion

262. Professor Sarlet's opinion, as set out in his written reports, dated 4 June 2024, 2 August 2024 and 18 October 2024 respectively, and the Joint Statement dated 17 April 2024, can be summarised as follows.

263. Brazil has enacted a special legal regime for civil liability for environmental damage, namely, the Environmental Law, reinforced by Article 225 of the Constitution. The special regime is strict, joint and several, and unlimited. It is governed by the principles of the polluter pays, full redress and priority (benefit of the doubt) given to the environment. It is independent of the general regime of civil liability set out in the Civil Code, although some of the general rules may apply, where the matter is not regulated by the regime of environmental civil liability and there is no conflict between the rules and principles.

264. Article 3, IV of the Environmental Law introduced a broad, evaluative concept of polluter, informed by the full risk theory. Professor Sarlet considers that there is no clear distinction between direct and indirect responsibility for a polluting activity. Although they express different degrees of connection with the relevant activity, Article 3, IV imposes a singular test of responsibility; all those who are responsible for an activity that is causative of environmental degradation are treated equally by the Environmental Law. By expressly including the word "indirectly" in the definition, the polluter concept must extend beyond those who actually carry out the activity or whose conduct directly causes damage.

265. The Brazilian courts determine whether a person or entity has direct or indirect responsibility for the activity causing environmental degradation using a multifactorial and evaluative approach, as exemplified by the statement of Justice Benjamin in the *Mangroves* case (discussed below). Such approach includes factors such as control and influence over the activity, participation and involvement in the activity, nature and extent of role in creating or contributing to the risk of the activity, financing of the activity, and benefit from the activity.

266. The concept of "activity" includes direct and immediate acts and omissions undertaken by individuals but is broader and more complex, extending to a network of conduct, acts, omissions, and legal relationships undertaken and established in a concatenated manner between different actors. For the purpose of the definition of polluter in Article 3, IV, the activity must be one that causes environmental degradation, implying a risk of causing damage to the environment and to third parties.

267. Professor Sarlet's evidence is that in the *Mangroves* case the STJ does not explicitly differentiate between (1) the link between the risk of the activity and the damage and

(2) the link that is established between the actor and the activity causative of environmental degradation. However, although not expressly stated, a careful analysis of the STJ reasoning and the examples of conduct that are sufficient to establish responsibility makes it possible to identify that the reference to *causal link* refers to causation in a broad sense, so as to encompass both naturalistic and normative causation, which is consistent with the broad concept of polluter established in Article 3, IV.

268. For the purpose of establishing liability under Article 14, paragraph 1 of the Environmental Law, it is necessary to prove a factual cause and effect relationship between the activity and the damage. The theory of causation that is associated with the full risk theory is the theory of equivalence of conditions, which treats every condition that contributes to the result as causative, subject to a caveat that the theory of equivalence of conditions is applied in a fair and reasonable manner, having particular regard to the alleged polluter's role in creating or contributing to the particular risk that has materialised into damage. The theory of direct and immediate (or adequate or necessary) causation contained in Article 403 of the Civil Code does not apply because the Environmental Law already regulates the requirement for a factual causal link and Article 403 is incompatible with the full risk theory that applies to environmental civil liability.

269. Environmental civil liability is joint and several, pursuant to the full risk theory and as provided for in Article 942 of the Civil Code. There is a right of recourse by a polluter who is sued against the other polluters, at which point the relative responsibility of each polluter will be assessed. However, the non-binding *Simula 652* of the STJ, which provides for subsidiary enforcement where one of the polluters is a State entity, does not apply in other (non-State) cases. Liability in environmental matters is always joint and several (and never secondary), even in the case of State liability, as established in the STJ case law. Subsidiary enforcement only applies in favour of the State; it does not apply in favour of private actors.

Professor Milaré/Dantas' opinion

270. Professor Milaré's position, set out in his written reports, dated 4 June 2024, 22 July 2024 and 20 September 2024 respectively, and the Joint Statement dated 17 April 2024, as adopted by Professor Dantas in his supplemental report dated 22 November 2024, can be summarised as follows.

271. Environmental civil liability is governed by specific environmental laws, except where there is no specific provision on a particular point, in which case the general rules established in the general laws, such as the Civil Code, must apply. The 'polluter pays' principle, 'prevention' principle and 'precaution' principle underpin the environmental legal regime and assist in interpretation of the rules, but risk theories are not applicable legal rules. In isolation, they do not establish a basis for environmental civil liability; they do not replace the express requirements that must be satisfied to establish civil liability of polluters.

272. Professor Dantas' position is that there are two distinct bases on which a party will be liable as a polluter (defined in Article 3, IV) in respect of environmental damage pursuant to Article 14, paragraph 1, namely, (i) as a direct polluter; or (ii) as an indirect

polluter. Although the Environmental Law does not set out the distinguishing criteria for each category, such distinction can be found in legal doctrine and case law.

273. A direct polluter for the purpose of Article 3, IV is the material author of the damage, that is, the natural or legal person that operates or exercises the activity that causes the environmental damage.

274. A different test is used to identify an indirect polluter for the purpose of Article 3, IV. The following requirements must be met in order to establish that a natural or legal person is liable as an indirect polluter: (i) the person must have a specific legal or contractual duty of safety with respect to the activity that caused the environmental damage and must have omitted to comply with that duty; (ii) there must be environmental damage; and (iii) there must be a direct and immediate causal link between the omission to comply with the specific legal or contractual duty of safety and the environmental damage caused.

275. Professor Dantas' view is that the standard applicable to assessment of the causal link required to establish direct and indirect polluter civil liability is defined by the theory of direct and immediate causation, under Article 403 of the Civil Code. It requires that the specific conduct, namely, the activity (in the case of a direct polluter) or omission (in the case of an indirect polluter), must have resulted in the damage, that is, it must have been the decisive or determining cause of the damage. Article 403 of the Civil Code provides for the application of the theory of direct and immediate causation in the context of all types of civil liability, whether fault-based or strict liability, contractual or extra-contractual.

276. Professor Dantas notes that the Environmental Law does not contain specific rules concerning whether polluters are jointly and severally liable for environmental damage. He also notes that pursuant to Article 265 of the Civil Code, joint and several liability cannot be presumed; it stems from the law or the will of the parties. Therefore, joint and several liability in environmental civil liability will exist only when there is a specific legal (or contractual) provision. Article 942 of the Civil Code provides that where more than one person commits a wrong, such co-authors will be jointly and severally liable. His view is that Article 942 applies to a situation where two or more authors are liable for the same damage under the Environmental Law.

277. Professor Dantas relies on STJ *Restatement of Precedent 652*, which recognises that where the State is an indirect polluter and is jointly and severally liable with the direct polluter(s), the State's liability is of subsidiary execution, namely, it is enforceable only if and when the direct polluter(s) fail to compensate in respect of the damage. Although STJ *Restatement of Precedent 652* refers to indirect polluter liability on the part of the State, the principle of subsidiary execution must apply equally to indirect polluter liability on the part of private parties to give effect to the Brazilian legal principles of *isonomy* (equality before the law) and *legal certainty*. In this regard, it is of note that Article 3, IV of the Environmental Law does not distinguish between State polluters and private polluters.

Environmental Law obligation

278. I start by examining the obligation of the polluter to rectify or compensate for environmental damage under the Environmental Law before turning to each of the specific issues in dispute.

279. Article 14, paragraph 1 of the Environmental Law provides that:

> "the polluter is obliged, regardless of fault, to indemnify or repair the damage caused to the environment and to third parties affected by its activity."

280. The Environmental Law provides a special legal regime for civil liability in environmental claims in furtherance of the norms set out in Article 225 of the Constitution. This is encapsulated in the summary by Reporting Justice Francisco Falcão in *Capibaribe* STJ Special Appeal No. 2.065.347 (2024), a CPA concerning the discharge of raw sewage into the estuary of the Capibaribe River:

> "More than special, environmental civil liability is very special, as it is governed by its own peculiar principles, based, among others, on the polluter pays principle, the full redress principle, the principle of the *propter rem* nature of environmental obligations and the principle of *in dubio pro natura*. This very special legal regime is reinforced by the general concern for dissuasion, which, in addition to *restoration in natura*, ecological compensation for losses of biota and compensation for the remaining damage, including moral damage, also focuses on educating and preventing future aggression by other people. From this perspective, civil liability actually guarantees the credibility and authority of the obligations established by Environmental Law. Hence the care to only apply common rules, among which those of the Civil Code, when perfectly compatible with the unique objectives and references of the microsystem, so that, under no circumstances or justification, the profit is internalised in the degrader's pocket and, on the other hand, the negative impacts are socialised on the environment with the community and future generations."

281. Under the Environmental Law, civil liability for parties causing damage to the environment is strict, as set out in the *Liberian Ship Case* STJ Special Appeal No. 467.212 (2003) Reporting Justice Luiz Fux and in *Krupp* STJ Special Appeal No. 578.797 (2004) also Reporting Justice Fux, citing with approval the work of jurist Sergio Cavalieri Filho to this effect:

> "In effect, the National Environmental Policy Law (Law 6.938/81) adopted the strict civil liability system (article 14, paragraph 1) and was fully received by the current legal order, so that the discussion about the agent's conduct (fault or intent) to attribute the duty to compensate is irrelevant and impertinent.
>
> Regarding strict liability, in terms of damage caused to the environment, Sergio Cavalieri Filho teaches, in Civil Liability Program:

…

> " … It is clear from the Constitution and the teleological meaning of the Environmental Policy Law (Law 6.938/81), that this liability is based on full risk, as maintained by Nélson Nery Júnior (Justitia, 126/74). If it were possible to allege unforeseeable circumstances or force majeure as causes that exclude civil liability for ecological damage, most cases of environmental pollution would be excluded from the scope of the law." (pages 175/176)

> Therefore, the adoption by the law of strict civil liability meant a noticeable progress in combating the devastation of the environment, since, under this system, the conduct of the person causing the damage is not subjectively taken into account, but the occurrence of the harmful result for humans and the environment. Therefore, for the obligation to repair the damage to be verified, it is sufficient to simply demonstrate the causal link between the damage inflicted on the environment and the action or omission of the person liable for the damage."

282. Exploitation of an activity that poses a risk to the environment was considered to be sufficient to attract strict liability in *Cubatao* STJ Special Appeal 67.285 (2004). The case concerned chemical pollution of the Cubatao River during excavation works by Techint, a contractor engaged by the global oil and gas producer, Petrobras. When deciding the issue of standing, Reporting Justice Castro Meira, in a unanimous opinion, found that Petrobras would have strict, and joint and several liability for the damage under the Environmental Law:

> "The appellant's liability goes beyond mere fault *in vigilando* or *in eligendo*, as it is strict.
>
> PETROBRAS develops a risky activity. The exploitation, refining and commercialization of oil and its byproducts can cause damage to the environment, regardless of whether they have resulted from its direct action or through the outsourcing of activities, as it is so common today, when the modern company seeks to focus on its essential objective, handing over to contracted companies the execution of ancillary tasks. It is not uncommon for service providers, in turn, to also do the same, in relation to certain aspects of a work, through subcontracting.
>
> If it were necessary to previously investigate the direct liability for pollution, it would be extremely difficult to establish it, considering that this is not always revealed in an initial examination. Thus, it could be attributed to a sub service provider or perhaps to one of its most humble employees, if the appellant's argument could prevail in the sense that it did not determine the service provider to pollute the Cubatão River.

> In order to overcome the possible obstacles in this regard, even before the Civil Public Action Law, Law 6.938/81 was enacted, which, when dealing with the Brazilian Environmental Policy, established strict liability by defining as "polluter, the individual or legal person, public or private, directly or indirectly liable for activity causing environmental degradation" (article 3, IV), making it clear that it is "required, regardless of the existence of fault, to indemnify or redress the damages caused to the environment and to third parties, affected by his activity" (article 14, paragraph 1).”

283. The principle of strict liability under the Environmental Law is based on the full risk theory, as explained by Justice Luis Felipe Salomão, Reporting Justice in *Cataguases* Repetitive Theme 707, Special Appeal 1.374.284 (2014). The case arose out of the collapse of a bauxite mining tailings dam. The unanimous judicial panel held the mining company liable for damage caused by leaking toxic mud waste regardless of any fault:

> “In fact, in relation to environmental damage, the full risk theory comes into effect, hence the strict character of liability, with express constitutional provision (article 225, paragraph 3, of the Federal Constitution) and legal provision (article 14, paragraph 1, the Brazilian Environmental Law), therefore, the allegation of exclusion of liability is out of place, sufficing, to that effect, the occurrence of a harmful result to man and the environment arising from an action or omission of the party that is responsible.
>
> For all, Annelise Monteiro Steigleder teaches that, according to the provisions of article 14, paragraph 1, of the Brazilian Environmental Law, the liability for environmental damage is strict, assuming that there is an activity that poses risks to health and the environment, and the causal link “is the agglutinating factor that allows the risk to be integrated into the unit of an act that is the source of the obligation to compensate”, so that the one who exploits “economic activity places itself in the position of guarantor of environmental preservation, and the damage that concern the activity will always be linked to it;” for that reason, the request for exclusion of civil liability by the person in charge of the environmental damage is not valid.”

284. The polluter pays principle follows the full risk theory, as stated by Reporting Justice Paulo de Tarso Sanseverino in *Brazuca* STJ Special Appeal No. 1.363.107 (2015). The case concerned a claim against Brazuca, the owner of a gas station, and Petrobras, the fuel distributor, arising out of the leakage of chemicals from fuel tanks, which Petrobras had contractual responsibility to maintain, stored in the warehouse of the gas station. In delivering the unanimous decision of the 5-justice panel, Reporting Justice Sanseverino stated:

> “… it is sufficient in this case to apply the environmental legislation, which affirms the full risk theory to the polluter/payer and establishes joint and several liability among

> all the actors that have benefited from the activity that resulted in the environmental damage."

285. The court rejected Brazuca's claim that Petrobras should bear sole responsibility for the damage based on its obligation to maintain the fuel tanks:

> "This Court has already settled this issue, highlighting the case law of the First Chamber on the subject, in the sense that, in the existence of multiple polluting actors, the liability among them is joint and several for the full redress of the environmental damage.
>
> The civil liability for environmental damage, whether due to damage to the environment itself (public environmental damage), or to violation of individual rights (private environmental damage), is a strict liability, based on the full risk theory, pursuant to article 14, paragraph 1, of the Brazilian Environmental Law …
>
> The polluter-pays principle, enshrined in this legal provision, has full application, and civil liability is not only strict, but follows the Full Risk Theory.
>
> …
>
> Among the opinion of the legal scholarship, the Honourable Justice Herman Benjamin states that, in the civil liability for the environmental damage, the exculpatory defence of vicarious liability, fault of the victim, act of God, or force majeure are not accepted (BENJAMIN, Herman. Responsabilidade Civil pelo Dano Ambiental. 14.3. The full risk in: Responsabilidade civil [Civil Liability], v.7 - Environmental law/ Nelson Nery Junior, Rosa Maria de Andrade Nery organizers. -- São Paulo: Editora Revista dos Tribunais, 2010. page 501/501) …
>
> …
>
> According to Justice Herman Benjamin's lesson, the civil liability for environmental damage stems directly from the fact that the polluter is developing a risk activity from which damage to the environment or to third parties has occurred, thus separating any analysis of the subjectivity of the agent's conduct, also not admitting some of the traditional civil liability exemptions, such as an act of God, force majeure, third party act or the victim's own fault.
>
> …
>
> Thus, although for grounds other than those contained in the appellate court decision, a jointly and severally judgment against the defendants must be upheld not on the basis of the Consumer

> Defence Code, but based on environmental legislation itself, which embraces the full risk theory to the polluter pays, reporting on the joint and several liability between all agents who take advantage of the risk situation for the environment."

286. The full risk theory gives rise to a system of restorative justice, as explained by Justice Nancy Andrighi, Reporting Justice in *Esso* STJ Special Appeal No. 1.612.887 (2020):

> "Under the system of Law 6.938/1981, environmental damage is governed by the full risk theory, which is justified by the polluter pays principle and the redistributive vocation of environmental law.
>
> The polluter pays theory is redistributive in nature and takes as its starting point the distinction between the internalities and externalities of productive activities.
>
> > In fact, this theory "is inspired by the economic theory that the external social costs that accompany the production process (e.g. the cost resulting from environmental damage) should be internalised, i.e. that economic actors should take them into account when drawing up production costs and, consequently, assume them" (MILARÉ, Édis. Princípios fundamentais do Direito do Ambiente. Justitia, São Paulo, v. 59, n. 181/184, p. 134-151, Jan/Dec 1998).
>
> Under this principle, the polluter is therefore obliged to bear the costs of preventing, repressing and repairing the pollution.
>
> This model offers greater protection for the environment, society's collective heritage, by imposing on economic agents the internalisation of external costs in the dynamics of investments involved in their private activity, avoiding the "privatisation of profits and socialisation of losses."
>
> Therefore, according to the understanding consolidated in the case law of this Court in several judgements, including repetitive special appeals (themes 438, 681 and 707 of this STJ), it is not possible for the responsible party to argue any cause exonerating them from liability, which arises from the mere exercise of the environmental risk activity."

287. Thus, as set out by Professor Sarlet and Professor Milaré in their reports, and agreed by Professor Dantas in cross-examination, in furtherance of the fundamental principle of environmental rights set out in Article 225 of the Constitution:

    i) The Environmental Law provides for a special regime in respect of civil liability in environmental claims based on the full risk theory: *Capibaribe* STJ 2.065.347.

ii) Pursuant to the full risk theory, the exploiter of an activity that poses a risk to the environment is subject to a covenant of accountability for all resulting environmental damage: *Cataguases* STJ 1.374284; *Esso* STJ 1.612.887.

iii) Article 14, paragraph 1 of the Environmental Law imposes on the polluter an obligation to indemnify or repair damage caused to the environment and any third parties affected by the polluter's activity, the principle of full redress.

iv) Article 14, paragraph 1 imposes strict liability for environmental damage on those who fall within the definition of polluter in Article 3, IV, implementing the polluter pays principle; it is not necessary to establish fault: *Liberian Ship Case* STJ 467.212; *Krupp* STJ 578.797; *Cubatao* STJ 67.285.

v) The full risk theory precludes polluters from escaping liability under the Environmental Law by invoking civil liability exclusions, such as *force majeure*, acts of third parties, or supervening acts: *Cataguases* STJ 1.374284; *Esso* STJ 1.612.887.

vi) Where there is more than one possible polluter, as a matter of principle they can be jointly and severally liable for environmental damage: *Brazuca* STJ 1.363.107.

288. Having identified the nature and extent of the obligation of the polluter, I turn to the test that is applicable to determine the basis on which a person or entity will be classified as a polluter for the purpose of Article 14, paragraph 1.

Polluter definition

(i) Written law

289. Article 3, IV of the Environmental Law defines a polluter as:

> "a natural or legal person, of public or private law, that is directly or indirectly responsible for any activity [resulting in / causative of] the degradation of environmental quality".

290. On a literal reading of the provision, there are two limbs to the definition, namely, (i) direct or indirect responsibility for the activity; and (ii) causal link between the activity and environmental degradation.

291. It is common ground that the polluter can be a natural person or a legal person; the polluter can be a public law person or a private law person; and the polluter can be directly or indirectly responsible for the activity that causes environmental degradation.

292. As set out above, Professor Sarlet and Professor Dantas hold differing views as to the applicable test to determine categorisation as a polluter for the purpose of the Environmental Law. Professor Sarlet focuses on the person or entity responsible for the activity, directly or indirectly, as a matter of legal imputation. Professor Dantas draws a distinction between the direct polluter, who is the operator of the activity that caused the damage, and the indirect polluter, who fails to comply with a specific legal duty of safety, thereby causing the damage.

293. The express wording of Article 3, IV defines polluter as directly or indirectly responsible for the polluting activity, which may be understood as providing support for Professor Sarlet's position. Elsewhere in the Environmental Law, no distinction is drawn between a polluter that has direct responsibility and a polluter that has indirect responsibility.

294. In cross-examination, Professor Sarlet was asked about the distinction between direct and indirect responsibility:

> "Q. Do you agree that there can only be an indirect polluter if there is a direct polluter?
>
> A. There can be an indirect polluter if he or she contributed to the activity that generated the damage.
>
> Q. So is your answer "Yes" to my question?
>
> A. My answer is that as a rule we have a direct and an indirect polluter.
>
> Q. Yes, but my question is: we can only have an indirect polluter if we first have a direct polluter; do you agree with that?
>
> A. Yes, that's the rule."

295. However, he maintained that direct and indirect polluters were not conceptually distinct for the purpose of environmental damage liability:

> "Q. You say there, and I quote: "There is obviously a certain form of factual subsidiarity -- ie there can only be an indirect polluter if there is a direct polluter." That's right, isn't it?
>
> A. As I said before, as a rule, that is exactly it.
>
> Q. And it follows, doesn't it, from that sentence in your paragraph 40, that a direct polluter is a separate concept from an indirect polluter?
>
> A. The direct or indirect polluter are only different in terms of the degree they are linked to the activity and the activity that caused damage, but for liability purposes they are made equivalent. There is no difference between them in terms of the equivalence for liability. They're joint and severally liable for the damage and optionally the claimant can choose who they are going to sue, whether the direct or indirect polluter. So they are equivalent in terms of liability and responsibility. The basis might be different on a case-by-case basis.
>
> Q … a direct polluter is a separate concept from an indirect polluter? Do you agree with that?

> A. Yes, I do agree because they represent different levels of proximity with the activity and, obviously, the proximity to the damage caused. But I would say again, when it comes to holding people accountable, they're both liable under the law, so the law refers to those who are directly responsible or indirectly responsible. This is what the law says."

296. The Environmental Law sets out clearly the polluter pays principle and the definition of polluter. However, it does not contain guidance as to what constitutes direct or indirect responsibility for an activity and there are no examples given of the circumstances in which responsibility will be attributed to an individual or entity for the purpose of Article 3, IV. Therefore, it is necessary to consider the case law and other legal materials relied on by the experts in their reports, and their oral evidence, to identify the approach to this provision under the Brazilian Legal System and ascertain how it would be interpreted if the facts of this case came before the STJ.

(ii) The Mangroves case

297. The concept of the polluter for the purpose of Article 3, IV of the Environmental Law has been considered in a series of STJ decisions, of which the leading case is *Mangroves* STJ Special Appeal No. 650.728 (2007). This case concerned a claim for environmental damage under Article 14, paragraph 1 of the Environmental Law caused by the draining and landfilling of a mangrove swamp to construct a sports centre. The judicial panel unanimously rejected the defence that the land was already degraded by third parties through the disposal of rubbish. In a landmark judgment, Reporting Justice Benjamin, now the President of the STJ, established a broad concept of polluter for the purpose of Article 3, IV:

> "The undetermined authorship of the dump does not exempt the owner of the area, who can - and should -, as the judgment and the appealed decision rightly point out, be held responsible not only for what he has done, but also for his omission in failing to immediately bring to the attention of the authorities the violation of the law which, if practised by a third party, would end up benefiting him. For the purposes of establishing the causal relationship in environmental damage, the following are equated: those who do it, those who don't do it when they should, those who let them do it, those who don't mind if they do it, those who finance it, and those who benefit when others do it."

298. Justice Benjamin restated this broad concept of polluter in *Jacupiranga* STJ Special Appeal No. 1.071.741 (2009), a case in which a unanimous judicial panel held that the State of Sao Paulo was jointly and severally liable as an indirect polluter, through its failure to act to prevent damage to a conservation area by others, or to effect restoration of the land:

> "…whatever the legal classification of the degrader, be it public or private, under Brazilian law, civil liability for environmental damage is strict, joint and several, and unlimited, and it is governed by the principle of polluter-pays, of full redress, of priority of redress *in natura*, and of the favour *debilis*; the latter

legitimates a series of techniques to facilitate access to justice, among which is included the reversal of the burden of proof in favour of the environmental victim.

…

Strictly speaking, in environmental civil liability, more than being provided on the Civil Code, joint and several liability derives primarily from article 3, item IV, of Law no. 6.938/81, a legal provision whose wording imposes the conclusion that "all of those who contribute in any way to the occurrence of environmental damage shall be held liable for the full extent of the damage", without prejudice to the right of recourse. If there are several polluters involved in the environmental damage, "the defendant cannot allege to be exempted due to the fact that they were not the only polluter, that there are many others and that it is not possible to identify the one who, by their actions, triggered – as the last straw – the damage" (Jorge Mosset Iturraspe, *Responsabilidad por Daños* [Liability for Damage], Part VI, *Responsabilidad Colectiva* [Collective Liability], Rubinzal-Culzoni, Buenos Aires, 1999, page 161).

…

… joint and several liability does not always emerge in a clear manner. There are more subtle situations in which (legal) joint and several liability arises from tenuous circumstances of a certain (material) joint and several liability, in its vulgar or colloquial sense. This is what occurs with the silence of convenience, which is a theme of the greatest relevance in Environmental Law. It is not unusual for the damage to be caused by multifaceted combinations of activities and substances, which will be of impossible complexity for the layman or even for a technician or an expert, who stumbles upon industrial secrets or find themselves as outsiders and are seen as intruders in the chain of professional and personal relationships that unites the group held liable for the damage. In those situations, paraphrasing Aguiar Dias in his classic authority, the silence of the real actor and his companions creates joint and several liability among all (José de Aguiar Dias, Da Responsabilidade Civil [On Civil Liability], 7 th ed., vol. 2, Rio de Janeiro, Forense, 1983, page 901.)

…

The concept of *polluter* in Brazilian Environmental Law is extremely broad, and it is intertwined, by express legal provision, with the concept of *degrader of the environmental quality*, that is, all and any "individual or legal entity, whether governed by public or private law, that is liable, *directly or indirectly*, for an activity that is causative of environmental

> degradation" (article 3, item IV, of Law no. 6.938/1981, emphasis added.)
>
> On the other hand, for the purpose of determining the causal link in urban-environmental damage and of possible passive joint and several liability, those who do, those who do not do when they should do, those who do not mind if they do, those who are silent when it is within their competence to report, those who finance for others to do, and those who benefit when others do, are all equivalent (see Special Appeal no. 650.728/SC). There is, unquestionably, strict civil liability, under the terms of article 14, paragraph 1, of Law no. 6.938/81. The case law of the Superior Court of Justice is settled in numerous cases in this regard.
>
> Therefore, under the terms of Law no. 6.938/1981, the public body is strictly, unlimitedly, jointly and severally liable for environmental and urbanistic damage that it, "direct or indirectly", may cause. The situation is simpler when the Government itself, through a commissive act, materially causes the degradation, for example, by illegally deforesting a Permanent Preservation Area. It is imputation for its own actions.
>
> Although less common, the co-liability of the Government arising from the omission of its duty to control and oversight the integrity of the ecologically balanced environment is not very different in essence, as demonstrated by several cases cited below, to the extent that it contributes, directly or indirectly, to the degradation of the environment itself, as well as to the aggravation, consolidation, or perpetuation of this degradation, all without prejudice to the adoption of disciplinary, criminal, and civil measures against public agents that are negligent or lazy, including with regard to misconduct in public office.
>
> …
>
> It is worth emphasizing that in environmental civil liability, a completely special regime, fault does not enter through the front door, nor through the back door, or even as a measure of the State's duties…"

299. The breadth of this special regime was considered in *Paranagua Port* STJ Special Appeal No. 1.114.398 (2012). The case concerned a claim by a fisherman against Petrobras in respect of the leakage of naphtha from a vessel owned by a wholly-owned subsidiary of Petrobras into the Paranagua Port. In a repetitive appeal by a unanimous decision of a 10-justice panel, the STJ held that Petrobras was liable as a polluter despite its argument that the leakage was caused by displacement of a signal buoy by a third party. Reporting Justice Sidnei Beneti stated:

> "The allegation of fault of a third party does not release the liability of the carrier of dangerous cargo, due to the objective nature of this liability.
>
> The case pertains to the full risk theory, thus giving rise to the strict nature of the liability.
>
> Moreover, the exclusion of liability for fault of a third party, argued based on the allegation that the manoeuvre that caused the accident was caused by the fact that the signal buoy was displaced could never be accepted.
>
> The environmental damage, the consequences of which have spread to the injured party (as well as to the other injured parties), is, by express legal provision, of strict liability (article 225, paragraph 3, of the Federal Constitution and article 14, paragraph 1, of the Brazilian Environmental Law), imposing, therefore, on the polluter, to compensate, to subsequently charge a third party who may be liable for the fact.
>
> Therefore, the allegation of the occurrence of an act of God as defence to liability is invalid."

300. In *Olapa* STJ Special Appeal No. 1.346.430 (2012), Petrobras was held liable for contamination caused by the rupture of its oil pipeline, notwithstanding that the collapse of the pipeline was caused by torrential rains creating a landslide. Reporting Justice Luis Felipe Salomão explained the imposition of strict liability by reference to the academic writing of Annelise Steigleder:

> "Annelise Monteiro Steigleder teaches that according to the provisions of article 14, paragraph 1, of the Brazilian Environmental Law, liability for environmental damage is strict, informed by the Full Risk Theory, assuming that there is an activity that poses risks to health and the environment, and the causal link 'is the binding factor that allows the risk to be integrated into the unit of an act that is the source of the obligation to compensate', so that the one who exploits "economic activity places itself in the position of guarantor of environmental preservation, and the damage that concerns the activity will always be linked to it" which is why the person responsible for the environmental damage cannot invoke exclusions of civil liability.
>
> > Liability for environmental damage is strict, as set forth in article 14, paragraph 1, of the Brazilian Environmental Law, encompassed by article 225, paragraphs 2 and 3, of the 1988 Federal Constitution, and its assumption on the existence of an activity entailing risks to health and the environment, with the entrepreneur being obligated to prevent such risks (prevention principle) and to internalize them in its productive process (polluter-payer principle). It

also presupposes the damage or risk of damage and the causal link between the activity and the effective or potential result.

The causal link is the binding factor that allows the risk to be integrated into the singularity of the act, which is the source of the obligation to indemnify. It is an objective element, for it alludes to an external bond between the damage and the fact of the person or thing.

While in fault-based civil liability, attribution of the damage shall be connected to the idea of predictability, in strict liability the predictability element does not exist, with the criteria of attribution of damage to the agent being widened, coming to a nearly purely material focus, so much so that, with the evidence that the action or omission was the cause of the damage, the attribution is virtually automatic. The legal system supposes that anyone who employs activities encumbered with strict liability shall exercise a judgment of prediction by the simple fact of performing them, thus accepting the damaging consequences inherent thereto.

The party exploiting the economic activity puts itself in the position of guaranteeing environmental preservation, and the damage regarding the activity shall always be bound thereto. There is no investigation on the action or practices of the polluter/predator, for the risk substitutes them.

The causal link is the assumption that concentrates the biggest issues in from several concurrent causes, simultaneous and successive, rarely presenting a single linear source.

...

The full risk theory originally gave standing to the strict liability and proclaims the redress of the damage even when it is not voluntary, with the agent being liable for any act that it materially caused, except for facts exterior to mankind. In the words of Caio Mário da Silva Pereira, it is "a purely negativist theory. It is not the case to ponder on how or why the damage occurred. It suffices to assess whether there was damage, bound to any fact, to assure compensation to the victim". Commenting on such theory, Lucarelli states that "the compensation is owed only due to the fact there is the activity of which the loss arises from, regardless of analysing the subjectivity of the agent, it being possible to hold liable anyone to whom somehow the loss may be attributed. This stance does not admit circumstances excluding liability, such as acts of God,

> force majeure, the action of third parties or the victim him or herself", given that such events are deemed "conditions" of the event.
>
> The adoption of this theory is justified by the scope of protection granted by article 225, head provision, of the Federal Constitution, to the ecologically balanced environment, with the institution of a veritable obligation of safety for the environment being envisioned. It is an understanding defended by Antônio Herman Benjamin, Jorge Nunes Athias, Sérgio Cavalieri Filho, Édis Milaré, Nelson Nery Jr., José Afonso da Silva, Sérgio Ferraz. (MILARÉ, Édis; MACHADO, Paulo Affonso Leme (Organizer). Doutrinas Essenciais de Direito Ambiental: responsabilidade em matéria ambiental. São Paulo: Revista dos Tribunais, vol. v, 2011, pages 43-48)."

301. In *Bioenergia* STJ Special Appeal No. 1.373.788 (2014), a landowner was held liable, under Article 14, paragraph 1 of the Environmenal Law, to a trespasser who came into contact with toxic waste residues deposited on the owner's private land and suffered burns. The STJ rejected the landowner's argument that it was not liable because the act of trespass broke the chain of causation. Reporting Justice Paulo de Tarso Sanseverino stated:

> "The civil liability for environmental damage, whether due to damage to the environment itself (public environmental damage), or to violation of individual rights (private environmental damage), is that of strict liability, based on the integral risk theory, pursuant to article 14, paragraph 1, of Brazilian Environmental Law …
>
> The polluter pays principle, recognised in this legal provision, whose civil liability is not only strict, according to the full risk theory -, is fully applied.
>
> …
>
> Strict liability is therefore based on the concept of social risk, which is implied in certain activities, such as the industry, the means of public transportation, and power sources.
>
> Therefore, strict liability, based on the risk theory, is an imputation attributed by law to certain people to reimburse the damage caused by activities carried out in their interest and under their control, without proceeding with any questioning regarding the subjective element of the conduct of the perpetrator or their representatives. Thus, the causal relation between the damage suffered by the victim and the situation of risk created by the perpetrator is sufficient.

The obligation to indemnify is strictly imputed to whomever knows and dominates the source of the risk, and shall, based on social interest, be liable for the harmful consequences of their activity regardless of fault.

…

In risk-benefit, the strict liability is based on the fact that the responsible agent gets the benefits and must also bear the charges *("ubi emolumentum, ibi onus"*).

In professional risk, the harmful event is the result of an activity or occupation carried out by the responsible agent.

In the created risk, similarly to the previous one, the strict responsibility is attributed to the one who creates a situation of hazard through his/her activity or occupation.

In practice, there is no significant difference between such modalities of the risk theory, as the agent may try to rule out its civil liability by means of proving some cause of break of the causal link, such as the victim's exclusive fault, exclusive third party fact and force majeure.

The modality that presents the most striking peculiarities is exactly the full risk theory, which matters at the moment.

It constitutes an extreme form of risk theory in which the causal link is strengthened so as not to be disrupted by the implementation of the causes that would normally affect it (e.g., victim's exclusive fault; sole fact of a third party, force majeure).

Such modality is exceptional, as it can be used as a basis for those legal cases in which the risk caused by the economic activity is also extreme, as it occurs with nuclear damage (CF, article 21, XXIII, subitem "c", and Law No. 6,453/77).

The same occurs as environmental damage (Federal Constitution/88, article 225, head paragraph and paragraph 3, and Brazilian Environmental Law, article 14, paragraph 1), in view of the growing concern of the society with the environment.

In the academic writings, the eminent Justice Herman Benjamin affirms that, in the civil liability for the environmental damage, the exclusionary conduct of the third part act, fault of the victim, act of God or force majeure are not accepted (BENJAMIN, Herman *Responsabilidade Civil pelo Dano Ambiental* [Liability for Environmental Damage] 14.3. *O risco integral* [The full risk] in: *Responsabilidade civil* v.7 - Environmental law/ Nelson Nery Junior, Rosa Maria de Andrade Nery organizers. -- São Paulo: Editora Revista dos Tribunais, 2010. page 501/501), verbis:

> The Brazilian Environmental Law includes the civil liability of the degrader in its strict form, based on the full risk theory, which concept meets its basis "in the idea that the person who creates the risk must redress any damage arising from their enterprise. Therefore, evidence of the action or omission on the part of the defendant, the damage and the causal link are sufficient.
>
> ...
>
> The Brazilian Law, especially after the Federal Constitution of 1988 (it is the duty of all...), does not accept any distinction - rather than in case of recourse action - between the main claim, the accessory claim and the co-claim.
>
> Nelson Nery Junior and Rosa Maria B. B. de Andrade Nery are completely right when affirming that 'regardless of the participation of someone in the cause of damage, they shall have the duty to compensate', being accountable for the totality of the damage, even if they have not caused it completely.
>
> We all know that 'one of the major difficulties one can find in actions related to the environment is precisely to determine from whom the emission that caused the environmental damage came, especially when this occurs in large industrial complexes where the number of companies in activity is high. It would not be reasonable that, due to the inability to accurately establish with whom the isolated liability lies, one allowed the environment to remain without redress."
>
> According to Justice Herman Benjamin's lesson, the civil liability for environmental damage stems directly from the fact that the polluter is developing a risky activity from which damage to the environment or to third parties has occurred, thus separating any analysis of the subjectivity of the agent's conduct, also not admitting some of the traditional exclusion factors of civil liability, such as act of God, force majeure, third party act or the victim's own fault."

(iii) The Vicuña

302. Consideration was given to the limits of environmental liability in *Vicuña* STJ Repetitive Theme 957, Special Appeals Nos. 1.596.081 & 1.602.106 (2017). The claims arose out of the explosion of a ship, causing contamination of the surrounding water by the vessel's fuel and, to a lesser extent, its cargo of methanol, leading to a suspension of fishing in the surrounding area. The cause of the explosion was lack of maintenance of the vessel. The STJ held that the purchasers of the methanol being transported by the ship were not liable to the claimants, based on the absence of any

causal link between the environmental damage resulting from the explosion and the acts of the companies that acquired the cargo.

303. The STJ approved the conclusions of the reporting justice in the lower court, namely:

i) The purchasers of the methanol were not responsible for transportation of the same and did not take ownership of the cargo until delivery. Therefore the commercial activity of the purchasers did not give rise to a risk of environmental damage caused by transportation of the cargo.

ii) The methanol was not a cause of the explosion and, because most of it evaporated following the spillage, it was not a cause of the suspension of fishing in the area.

iii) On the other hand, the commercial activities of the owner of the vessel transporting the flammable cargo and the port terminal that operated the unloading of the cargo gave rise to an inherent risk of environmental damage. Therefore, they both fell within the category of persons who possibly caused the damage.

iv) Having identified those who possibly caused the damage, the causal link was broken with respect to any others (including the purchasers); the application of the full risk theory and requirement for full redress was restricted to those that possibly caused the damage.

304. In delivering the unanimous decision of the ten-justice panel, Reporting Justice Ricardo Villas Bôas Cueva stated:

> "… the Superior Court of Justice has a firm rule, which has even been consolidated in the judgment of two other appeals … in that:
>
> > "... liability for environmental damage is strict, substantiated by the theory of full risk, with the causal link being the agglutinating factor that allows the risk to be integrated into the unity of the act, and it is unreasonable for the company responsible for the environmental damage to invoke exclusions of civil liability to rule out their obligation to indemnify" (Special Appeal No. 1.374.284/MG [*Cataguases*], Reporting Justice LUIS FELIPE SALOMÃO, SECOND PANEL, judged on 27 August 2014, Electronic Court Gazette on September 5, 2014 and Special Appeal No. 1.354.536/SE, Reporting Justice LUIS FELIPE SALOMÃO, SECOND PANEL, judged on 26 March 2014, Electronic Court Gazette on 5 May 2014).
>
> …
>
> It must be noted, however, that unlike what the appellant attempts to claim, the application of the theory of integral risk to cases of civil liability for environmental damage does not hold

> the plaintiffs of suits for damages harmless from the duty to demonstrate the existence of a causal link between the damaging effects that they claim to have suffered and the acts or omissions of the parties that they considered to have caused, either directly or indirectly, said damage.
>
> Along these lines, the well-established case law from this Court on the matter must be stressed, for it is firm in stating that, considering the fact that the liability for environmental damage is strict (and based on the theory of full risk), it is crucial, to entail the duty to indemnify, to demonstrate the causal link that connects the damaging result to the acts actually performed by the party that allegedly caused it.
>
> …
>
> Finally, it is worth highlighting that this Superior Court has already had the opportunity to state that "for the purposes of determining the causal link of the environmental damage, those who do, those who do not do when they should do, those who don't mind them doing, those who finance them doing, and those who benefit when others do, are all treated equally"" (Special Appeal no. 650,728), but the appellants do not fit into any of these situations.
>
> It can be concluded, therefore, in a brief summary, that the appellants, as mere buyers of the methanol transported by the Vicuña ship, are not liable for redressing the losses (of material and moral nature) allegedly suffered by professional fishermen due to the ban on fishing in the region affected by the environmental contamination resulting from the explosion, on 15 November 2004, of the referred vessel.
>
> This is because, since the buyers of the cargo of the aforementioned ship are not directly responsible for the accident, they could only be held liable – as indirectly responsible for the environmental damage – if it were demonstrated (i) the existence of omissive behaviour on their part; (ii) that the risk of accidents in maritime transport was inherent to their activity, or (iii) that it was their responsibility, and not of the selling company, to hire the transport for the cargo that was destined for them.
>
> As it is certain that none of the aforementioned circumstances were verified, there is no duty to compensate due to the absence of the causal link which is essential for its characterisation."

(iv) Affirmation of Mangroves

305. The case of *Paraíba do Sul River* STJ Special Appeal No. 1.747.622 (2018) concerned a CPA brought against a number of defendants who carried out civil engineering and urban development works on the banks of a protected stretch of the Paraíba do Sul River

without relevant environmental licences or impact studies. Two of the defendants ("Goloni" and "Flexipar") successfully argued at first instance that they should not be held responsible on the ground that their contribution to the environmental degradation was minimal in comparison with the others but that was overturned in the civil appeal. Having referred to Article 3, IV and Article 14 paragraph 1 of the Environmental Law, Reporting Justice Guilherme Calmon Nogueira da Gama stated:

> "7. From the wording of the above-mentioned articles, joint and several liability can be inferred within the scope of Environmental Law, whereby liability will fall on all those who directly or indirectly caused environmental degradation, provided that a causal link can be established between the conduct or activity and the damage. It is important to highlight that once joint and several liability is established, each polluter/degrader responds for all. And the holder of the cause of action may demand compliance with the obligation from certain debtors, from all of them jointly, or from the one with the best economic condition.
>
> 8. The definition of the indirect polluter has been broadened, expanding the list of those jointly responsible. In this sense, an excerpt from the Superior Court of Justice (STJ) summary:
>
> > "(...) 13. For the purpose of determining the causal link in environmental damage, those who do something, those who do not do it when they should […], those who let it be done, those who do not care when it is done, those who finance it so that it is done, and those who benefit when others do it are considered under same conditions.
> >
> > 14. Once the causal link between the appellants' action and omission with the environmental damage in question has been established, the duty to promote the recovery of the affected area and to compensate for any remaining damage arises, objectively, in accordance with article 14, paragraph 1, of Law 6.938/81. (...)"
>
> (Special Appeal to the Superior Court of Justice 650728/SC, Reporting Justice HERMAN BENJAMIN, SECOND PANEL, Electronic Court Register (Dje) of 2 December 2009).
>
> 9. The case law of the Superior Court of Justice is consistent with the impossibility of any of the parties involved claiming, as a way of exempting themselves from the duty to make reparations, that they did not directly and personally contribute to the environmental damage, considering precisely that environmental degradation imposes, among those who contribute to it, the joint and several liability for full reparation of the damage (Special Appeal to the Superior Court of Justice 880160 / RJ - Reporting Justice Mauro Campbell Marques – Court Register (DJ) of 4 May 2010).

> 10. There is also precedent in this Court's case law to the effect that, even in the case of multiple polluting agents, there is no obligation to form a joinder of parties since they are jointly and severally liable for the full reparation of environmental damage (it is possible to sue any of them, individually or jointly, for the whole outcome)."

306. In the STJ, Flexipar argued that no causal link had been demonstrated between its conduct and the damage attributed to it. That ground of appeal was rejected by the Court on the narrow basis that the underlying finding of joint and several liability had not been challenged. In the monocratic decision of Reporting Justice Mauro Campbell Marques, he stated:

> "… all those who directly or indirectly caused environmental degradation may be sued for this reparation, as long as a causal link can be established between the conduct/activity and the damage, and one, some or all of the polluters may be sued.
>
> As can be seen, the dispute was decided based on joint and several liability resulting from the actions of multiple agents responsible for environmental degradation, relating the execution of works without observing environmental care and environmental damage (silting of the riverbed), this being the causal link in the specific case.
>
> However, by appealing and arguing that there must be a relationship between its specific conduct and the environmental damage, the party ignored the legal premise that supported the appealed decision (environmental damage caused by the actions of multiple polluting agents, which represents joint and several liability), that is, it did not challenge the grounds that liability is joint and several in these circumstances."

307. A distinction was drawn between the test to establish fault-based civil liability and the test to establish strict liability under the Environmental Law in the judgment of Justice Nancy Andrighi, Reporting Justice in *Esso* STJ Special Appeal No. 1.612.887 (2020):

> "In fault-based civil liability, the imputation of the duty to compensate depends essentially on the conscious and culpable breach - in the broad sense, since it can be due to wilful conduct/misconduct or fault in the strict sense - of a legal duty. The obligation to make reparation is a punishment imposed on culpable conduct that has a causal link with the harmful result. As a consequence, in fault-based liability, if fault is not proven, the duty to compensate the damage cannot be attributed to the person responsible.
>
> More sensitive types of damage, such as environmental damage, are, however, governed by a model of strict liability, generically provided for in the sole paragraph of art. 927 of the CC/02 and

> in various sparse legislation, such as Law 6.938/1981, which aims to favour repairing the damage, regardless of fault.
>
> …
>
> In fact, according to the legal scholarship, "the followers of the full risk theory understand that this presupposition [the causal link] is dispensable, since the duty to indemnify is present only in the face of damage, regardless of whether or not there is a causal link between the conduct and the damage" (MUNIZ, Luciana Rocha Melo. Objective liability in the civil code. Revista da Esmese, Aracaju, no. 11, p. 29-71, 2008.
>
> …
>
> The nexus in fact arises from the exercise of the environmental risk activity, which is why "the person who exploits the economic activity places himself in the position of guarantor of environmental preservation, and the damage that concerns the activity will always be linked to it, so the allegation, by the person liable for the environmental damage, of elements that exclude civil liability is inappropriate and, therefore, the discussion about the absence of liability due to exclusive fault of a third party or the occurrence of force majeure is irrelevant." (Motion for Clarification in Special Appeal 1346430/PR, Fourth Panel, DJe published on 14 February 2013) …".

(v) Experts' evidence

308. Professor Dantas agreed that for Article 14, paragraph 1 to be engaged, it was necessary to establish a causal link between the activity (for which the polluter might be directly or indirectly responsible) and the environmental damage:

> "Q. The term "its activity" is clearly a reference to the activity that is referred to in Article 3, item IV, isn't it, if we go back to page 2 of this document?
>
> A. Yes, one may say that.
>
> Q. And so the term "its activity" is therefore a reference to the activity for which the polluter is directly or indirectly responsible under the "polluter" definition, isn't it?
>
> A. Yes.
>
> Q. The focus in the "polluter" definition is on the causal link between the activity and the degradation, isn't it?
>
> A. Yes.
>
> Q. The degradation of environmental quality in turn needs to give rise to damage for the purposes of engaging the

> indemnification and repair obligation in Article 14, paragraph 1; yes?
>
> A. Yes.
>
> Q. And so the obligation -- the subject of the obligation in Article 14, paragraph 1, is damage caused by its activity; in other words, damage caused by the activity for which the polluter is directly or indirectly responsible; yes?
>
> A. The activity that causes the damage.
>
> Q. For which the polluter is directly or indirectly responsible?
>
> A. It's the direct or indirect causer."

309. In cross-examination, Professor Dantas agreed that Justice Benjamin's observations in *Mangroves* STJ 650.728 and *Jacupiranga* STJ 1.071.741 were correct statements of the regime of environmental civil liability in respect of both direct and indirect polluters.

310. Professor Dantas has quoted the Benjamin statement in his own academic writings, describing a polluter as someone who somehow contributes to the degradation of environmental quality with a causal link between their conduct, whether by commission or omission, and the damage being established. The imposition of liability on those who contributed directly or indirectly to the occurrence of the environmental damage is justified. He has stated that the polluter can be any person, as long as they can somehow be related to the environmental damage resulting from the conduct.

311. Professor Dantas was invited to consider text extracts from Professor Milaré's book on Environmental Law (2021), including the following:

> "The adoption of the full risk theory has the following main consequences that facilitate the duty to repair: (i) the dispensability of investigating fault; (ii) the irrelevance of the lawfulness of the activity; and (iii) the inapplicability of exclusions of causation; and (iv) the application of the rules on joint and several liability."

312. Professor Dantas agreed that the above factors were a correct statement of Brazilian Law but did not agree that they stemmed from the full risk theory. His position is that the essential elements of civil liability, namely, conduct, causal link and damage, must be established first, before the full risk theory and its consequences applies. He considers that the full risk theory does not dispense with the need for a causation link between an action and damage, even if the action is the operation of an activity. His response to the academic writings of Pereira and Lucarelli quoted in *Olapa* was qualified agreement:

> "Q. What Caio Mário da Silva Pereira is saying here is not that there is no need for a causal link; what he's saying is that it suffices to assess whether there was damage bound to any fact to

> assure compensation to the victim. And the fact that he's referring to there is the fact of the activity, isn't it?
>
> A. And I don't agree.
>
> …
>
> Q. But the passage from Lucarelli does not say that there is no need for causation. What it is saying is that the right to compensation or the obligation to pay compensation arises from the fact that there is the activity from which the loss arises; in other words, the loss must have been caused by the activity, but that is what gives rise to the obligation to pay compensation. So there is need for a causal requirement but the causal requirement that Lucarelli is describing is the causal requirement between the activity and the loss, isn't he? Yes?
>
> A. Well, that's why I think the arguments are overlapped here, and it is difficult to agree or disagree fully because there are parts of these quotations that I agree with. I agree that, if from the activity or the operation we had the loss, then there is a causation link, and I agree with the final part of the argument when he says that you can't exclude anything else. The part I don't agree with is that -- when he says, "It is possible to make liable all of those whose loss can be imputed to". I think here he is broadening the causation link. I believe that those who operate the activity or are linked to the activity can be made liable. That's why I understand your effort, but this is an overlapping of arguments where it's impossible to say whether I agree or don't agree.
>
> …
>
> Q. … So where it says, "to hold liable anyone", if one were to say "anyone responsible for the activity", then you would accept, I take it, that that's a correct statement?
>
> A. All of those who caused or gave rise to the cause, that had the conduct, that were practising or exercising the activity, then yes."

313. Professor Dantas' view is that the risk of the activity is exclusive to the direct polluter. He agreed in cross-examination that the full risk theory strengthens the causal link so as to prevent it from being broken by factors such as the victim's fault, third party fault or *force majeure*. He also agreed that the defendant's conduct does not need to constitute the only cause of the environmental damage; a contributory cause would be sufficient, even if there were other contributory causes, provided that there were a causation link connecting the conduct to the damage. There could be a number of causes but in all of them it was necessary to identify a causation link between a conduct, that is actions and omissions, and the damage.

314. When it was put to Professor Sarlet that the courts were concerned to look at acts and omissions when considering cases involving environmental civil liability, he responded:

> "Yes, they must look at them because, in order to attribute responsibility as an author which is directly or indirectly responsible, and when we use the multifactorial test, which is only a name that describes what the STJ has been doing, especially after the Mangroves case, it's really a case of verifying whether we have actions or omissions. This is evident. We have actions or omissions which may involve an activity and its exploitation but it's the activity that attracts the full risk theory. That's why Article 3, item (IV), refers to "activity" and not "actions" or "omissions". In fact, in the same cases where the STJ refers to concrete "actions" and "omissions", they also use in many of these cases the term "activity" and also evidently the full risk theory which is only attributed or is strictly linked to the activity."

315. Regarding Justice Benjamin's statement in the *Mangroves* case that there must be a causal link between the defendant's actions and omissions and the environmental damage before any obligation to compensate arises, Professor Sarlet stated:

> "For the attribution of responsibility or liability there should be factors for the imputation of responsibility or liability. These can be actions or omissions. The Benjamin test provides for a number of possibilities and that demonstrates this also."

316. Professor Sarlet's view is that under the multifactorial test, the imputation of responsibility could arise in relation to acts and omissions but could also arise in relation to the activity. His position is not that there is no need for a causal link to be established between the activity and the damage; rather, the link for imputation is a normative one, based on the factors described by Justice Benjamin so as to give rise to legal responsibility.

317. Professor Sarlet clarified that there are two links required for liability under Article 14, paragraph 1: (i) a factual causal link between the damage and the activity or action and omissions of the defendant; and (ii) an attribution of liability or responsibility to those who are directly or indirectly responsible for the activity:

> "… it's not a closed list because what makes someone an indirect polluter is that they have some form of effective contribution that connects them to the activity that caused the damage, and that's why the legal concept is broad. It doesn't say who the indirect polluter is or the direct polluter; it only says directly or indirectly responsible."

318. Professor Dantas agreed that in *Vicuña* the activity that caused the environmental degradation was the activity of maritime goods transportation, rather than the purchase of chemical products carried out by the defendants. He agreed that participation in the underlying transportation activity would give rise to direct responsibility as a polluter.

He accepted the analysis of Justice Cueva that the owner of the vessel and the company responsible for the development of the port terminal where the explosion occurred both engaged in economic activities that formed part of the risks inherent in maritime goods transportation. As such, the full risk theory would have applied to them (if they had been sued). It did not apply to the purchaser of the cargo because its economic activity did not extend to maritime transportation or the risks inherent in maritime transportation.

319. Professor Dantas agreed in cross-examination that in *Vicuña* Reporting Justice Cueva confirmed the application of the full risk theory to both direct and indirect polluter categories. He also agreed that Justice Cueva recognised that the full risk theory did not dispense with the need to demonstrate a causal link between *"the damaging effects that they claim to have suffered and the acts or omissions of the parties that they considered to have caused, either directly or indirectly, said damage"*.

320. Both experts agreed that the mere condition of holding shares in a company was not sufficient to amount to conduct that causes environmental harm, as stated clearly in *Braskem* TRF Interlocutory Appeal No. 0802524-57.2020.4.05.0000 (2022). That case raised the issue whether a claim for environmental damage could be brought against the minority shareholder (Petrobras) and controlling shareholder (Odebrecht) of Braskem, the operator of the rock salt mine giving rise to the pollution. The TRF rejected an argument that the companies' legal standing was based on indirect liability for environmental damage and the principle of disregard of the legal personality of Braskem, holding that neither Petrobras nor Odebrecht had standing to be sued:

> "Environmental civil liability falls on the direct polluter and also on the indirect polluter, who, although does not cause the damage, contributes to it, with the law understanding that such a contribution is capable of generating liability, in solidarity with the direct responsible party.
>
> ...
>
> Therefore, to hold the polluter civilly liable and obtain environmental reparation, it is necessary to prove that only the elements of strict civil liability are present, namely: activity, damage and causal link.
>
> …
>
> A considerable part of academic writing has supported the idea that there is only a contribution from someone (indirect polluter) to the damage caused by another (direct polluter) if that someone fails to observe a safety duty assigned to them by the legal system, precisely to control the damage. An indirect polluter is, therefore, someone to whom the standard imposes measures to avoid the polluting event and the degradation of the environment, but does not comply with them, causing, through their undue action or lack of action, the occurrence of environmental damage."

321. In contrast, controlling shareholder status was considered to be relevant in the *TAG* case STJ Interlocutory Appeal No. 2039216-80.2013.8.26.0000 (2014) and TJSP Civil Appeal No. 2023.0000723229 (2023). That case concerned a claim against Petrobras in respect of the installation of a natural gas pipeline by TAG, a wholly-owned subsidiary of Petrobras Gas S/A-Gaspetro, itself a wholly-owned subsidiary of Petrobras. The STJ upheld the finding of the TJSP that Petrobras had standing as a defendant, on the basis that it held all the shares and was the controlling company of TAG, and would be the main beneficiary of the gas transport operation once the works were completed.

(vi) Conclusions on polluter definition

322. Weighing up the competing views of the experts, assessed against the written law and the STJ case law, the following principles emerge regarding the approach to identifying a polluter for the purpose of the Environmental Law.

323. First, on a literal interpretation of Article 3, IV of the Environmental Law, a polluter is defined as a person or entity who is responsible for the polluting activity. Responsibility for such activity is expressly identified as direct or indirect. Regardless of whether it is direct or indirect, responsibility for the activity is imputed by law, giving rise to an obligation to compensate for any environmental damage caused by the activity.

324. Second, once identified as responsible for a polluting activity for the purpose of Article 3, IV, no conceptual distinction is made between those who are held to be directly responsible and those who are held to be indirectly responsible.

325. Third, as agreed by the experts, a broad concept of polluter, based on the multifactorial approach identified by Reporting Justice Benjamin in *Mangroves* STJ 650.728, has been established and applied consistently in cases that have been considered by the STJ, including *Jacupiranga* STJ 1.071.741¸ *Paranagua Port* STJ 1.114.398, *Olapa* STJ 1.346.430, *Bioenergia* STJ 1.373.788, *Vicuña* STJ 1.596.081 & 1.602.106, *Paraíba do Sul River* STJ 1.747.622 and *Esso* STJ 1.612.887. It is consistent with the prevailing case law of the STJ, which, as Professor Dantas accepted, provides the best evidence of how the written law should be interpreted and applied.

326. Fourth, although Professor Dantas objected to the term "multifactorial approach" on the basis that it is not explicitly used in the STJ cases, he accepted that responsibility could be based on a number of factors and arise in a variety of situations. Professor Sarlet is not isolated in using the term to describe the applicable test. At the national legal conference arranged by the Federal Justice Council held on 25 and 26 November 2024, the agreed Statement 33 used the term *"multifactorial causal chain (factual and normative)"* in the context of *"the broad concept of polluter, encompassing both direct and indirect polluters"* pursuant to Article 3, IV.

327. Fifth, risk associated with the polluting activity is the foundation for the imposition of strict liability for any ensuing environmental damage, based on the full risk theory, the polluter pays principle and special regime of restorative justice, as explained in *Cataguases* STJ 1.374.284 and *Esso* STJ 1.612.887.

328. Sixth, breach of a specific legal duty of safety, as contended for by Professor Dantas, is one factor that can satisfy the test of indirect responsibility under the Environmental

Law, but it is not the only factor that can ground indirect responsibility. Article 3, IV does not contain any reference to the suggested test for a specific legal duty of safety to be owed, or breach of such duty, as an essential requirement for indirect responsibility for the activity.

329. Seventh, although there are references to acts and omissions in breach of a duty of safety in cases such as the TRF in *Braskem*, there is no consistent case law in support of such requirement – see cases in which conduct or fault were irrelevant: *Liberian Ship* STJ467.212, *Cubatao* STJ 67.285, *Brazuca* STJ1.363.107 and *Vicuña*. It is common ground that failure to comply with a duty of safety could give rise to liability as a polluter but Professor Dantas' opinion that it is an essential requirement for indirect polluter liability is not supported by the *Mangroves* line of cases. On the contrary, the STJ cases emphasise the broad concept of polluter for the purpose of Article 3, IV, in accordance with the full risk theory.

330. In summary, I accept Professor Sarlet's opinion that the settled case law of the STJ has in practice adopted a multifactorial approach to the issue of responsibility under Article 3, IV. There is no fixed list of the circumstances in which responsibility for a polluting activity will be imputed to a person or entity; each case must be analysed on its particular facts. The STJ cases indicate that it includes factors such as (i) control over the polluting activity; (ii) participation and/or active involvement in the activity; (iii) financing the activity; and (iv) economic benefit from the activity.

Causation test

(i) The dispute

331. Article 14, paragraph 1 of the Environmental Law provides that the polluter must indemnify or repair damage caused to the environment and to third parties affected by its activities.

332. It is common ground that a factual causal link is required between the activity, for which a person or entity is directly or indirectly responsible, and the environmental damage in respect of which compensation is claimed. The dispute is centred on the appropriate causation test that must be applied. Professor Sarlet's opinion is that the equivalence of conditions test is applicable. Professor Dantas' opinion is that the Article 403 test of direct and immediate causation is applicable.

(ii) Expert evidence

333. Professor Dantas relies on the STJ decision in *Vicuña*, and in particular the judgments of Justice Gallotti and Justice Salomão in that case, in support of his view that Article 403 of the Civil Code applies to cases of civil environmental liability. Although he accepted that Reporting Justice Cueva did not make any explicit reference to the Article 403 test, his evidence was that nonetheless the Article 403 test of direct and immediate causation was applicable and applied in the case. He considered that Justice Cueva was wrong when he indicated that the necessary causal link would have been established on the part of the purchaser of the cargo if the cargo had caused the explosion because purchasing the cargo in that scenario would not be the direct and immediate cause of the damage. I note that Justice Cueva's illustration did not form part of the determining

grounds in the case but it serves to highlight that he did not consider that the test of direct and immediate causation would apply.

334. As articulated in his academic writings, Professor Sarlet also disagrees with the conclusion reached by the STJ in *Vicuña* but for a completely different reason. His view is that the court should have held the purchasers of the cargo liable for the environmental damage based on the *conditio sine qua non* ("but for") test for causation. However, he accepted that the court in *Vicuña* rejected such characterisation of the purchasers and therefore his opinion on that point would not likely prevail in the STJ.

335. Professor Sarlet agreed in cross-examination that Justice Cueva emphasised that, the fact that liability is strict and based on integral or full risk theory, does not change the need for the claimant to demonstrate a causal link between the actual act or omission of the defendant and the damage. On the facts of the case, the defendant's conduct, comprising the purchase of the cargo, did not cause the environmental contamination of the port or the fishing ban.

336. He was asked about the following passage in Justice Cueva's judgment:

> "It is not reasonable to also affirm that the liability of the appealed parties would be a logical result from possible omissive behaviour, as this, as known, is only verified in cases in which the agent (supposed polluter), having the duty to prevent degradation, it still fails to do it, benefiting, even if indirectly, from the behaviour of a third party directly responsible for the damage caused to the environment.
>
> Also, it cannot be said that those risks inherent to sea transportation are related to the activities developed by the respondents. "

337. In response, Professor Sarlet stated:

> "Yes. I see the reference to the duty but also a reference in the same paragraph to benefits, whether directly or indirectly, and also, in the following paragraph, risks that are inherent to maritime transportation which are related to the activity -- which are not related to the activity of the defendant. So they talk about the risk of the activity on the following paragraph."

338. When asked about the three scenarios which Justice Cueva indicated could give rise to indirect responsibility as a polluter, namely, that: (i) there was omissive behaviour on their part, (ii) the risk of accidents in maritime transport was inherent in their activity, or (iii) they were responsible for the transport of the cargo, Professor Sarlet stated:

> "A. If they had incurred in any of these alternatives, they could be held responsible as indirect polluters, but because none of these were verified, they were not held responsible.
>
> Q. And what the court is doing here is looking, isn't it, at the link between the purchasers' acts and the damage; yes?

> A. Not just that. They are also clearly connecting one of the hypotheses to the risk of the activity…"

339. Professor Dantas' opinion on this issue rests primarily on the judgments of Justice Gallotti and Justice Salomão. Justice Gallotti agreed with the unanimous judgment of Justice Cueva and produced a short additional judgment, stating that the claimant had not identified the causal link that would be necessary for strict environmental liability.

340. Justice Salomão also agreed with the unanimous judgment of Justice Cueva, adding additional comments after summarising the salient facts of the case:

> "It is undeniable that the environmental liability in relation to the fact in question is strict. However, without the causal link one cannot attribute to the defendants the cause of the damage.
>
> From the appellate decision mentioned below, I extract and transcribe the following: In this case, the defendants/appellees are not polluters, not even by comparison, as they would only acquire the cargo that did not reach them, as the explosion of the vessel occurred at the sea terminal, before the transfer of the thing. The act of acquiring a given product alone does not characterize the causal link with the claimed damage, since the mere acquisition, without the transfer of the acquired thing, is not the cause of the damage. The losses were caused by the explosion of the vessel, without bearing a relationship with the purchase of the product transported by it.
>
> …
>
> In this case, even though it is the case of environmental damage, the defendants did not contribute to the occurrence of the explosion of the vessel, and may not be held liable for something that was not within their reach.
>
> …
>
> Thus, as the defendants limited themselves to acquiring the load, which was not even delivered to them, since the explosion occurred when the vessel was still moored at the maritime terminal for discharge, they cannot be considered polluters, even by equity.
>
> Moreover, it does not seem reasonable to impute to the defendants the liability for losses caused by the explosion of the vessel, since the harmful event occurred before the transfer. Please note that the defendants were never owners of the load (as the transfer did not occur), nor did they have them under their custody, which prevents them from being considered causers of the claims losses, especially because they had no domain over the risk inherent to the product transportation, loading, and unloading activity.

> A pure and simple application of the theory of equivalence of conditions leads to break of the causal link between the acquisition of the product and the explosion of the vessel, mainly in the case of records, in which it was found that the possible causing agents of the damage are the owner of the vessel and the maritime terminal.
>
> …
>
> … once it has been defined who has possibly caused the damage, the causal link is broken with respect to the others, and the application of the full risk theory is restricted to those that possibly caused the damage, which are required to redress it."

341. Justice Salomão set out the basis of strict liability in environmental cases:

> "Note that strict civil liability, based on the risk theory, was developed based on the finding – initially in the field of occupational accidents, gradually extending to contemplate dangerous activities, such as transportation, mining, gas and nuclear energy – that the civil liability based on fault and the illegality of the act sometimes generated iniquities, proving insufficient to enable the redress of damage and demonstrate that the party responsible for the activity caused the damage. In addition, the theory that induces those who develop potentially dangerous activities shall ensure that the activity will not cause harm to others, because if they occur, they cannot refrain from the duty of indemnification, arguing the absence of fault, as their liability shall be strict. "The obligation to redress the damage only arises from the mere exercise of an activity which, if causes damage to third parties, will cause, for the party who hold control of the activity, the duty to indemnify" (MELO, Nehemias Domingos de. Da culpa e do risco como fundamentos da responsabilidade civil. [Fault and risk as principles of civil liability] São Paulo: Atlas, 2012, pages 29-30)."

342. Professor Sarlet agreed that Justice Salomão expressed the view that environmental civil liability required a causal link between an act or omission of the responsible party and the damage. In considering the requirement for such a causal link, Justice Salomão referred to the writings of academic Sergio Filho on civil liability:

> "Sergio Cavalieri Filho, with reference to the notes by Anderson Schreiber, reflects that the arrival of strict liability required double attention when analysing the causal link, the interruption of which consists of the only way of excluding the duty to indemnify; the whole discussion, in strict liability actions starting gravitating around the legal concept of causal link. Currently, it is even affirmed that the decision on liability, in cases of strict liability, turns out to be translated into the decision on the existence of a causal link between the fact and the damage

> (CAVALIERI SON, Sergio. Programa de responsabilidade civil. [Civil liability program] São Paulo: Atlas, 2015, pages 69-73).
>
> …
>
> This means the law is consistent with the comparative law and with the content of the legal writing that "the obligation to redress the damage only arises from the mere exercise of an activity which, if causes damage to third parties, will cause, for the party who hold control of the activity, the duty to indemnify" (MELO, Nehemias Domingos de. Da culpa e do risco como fundamentos da responsabilidade civil. [Fault and risk as principles of civil liability] 2 ed. São Paulo: Atlas, 2012, page 30)."

343. Justice Salomão relied on the judgment of Reporting Justice Bellizze in the *Brazuca* STJ Special Appeal No. 1.615.971 (2016), which concerned a claim for contribution between the two defendants held liable for environmental damage in the *Brazuca* case referred to above. In that case, the Court held that civil liability (whether strict or fault-based) required a causal link between the damage and the commission or omission of the perpetrator. Such causal link must be assessed on the basis of the theory of adequate causality under Article 403 of the Civil Code; the action or omission of the perpetrator must be determinant and directly associated with the loss. However, it also held that the adoption of the theory of adequate causality could lead to a finding that several actions or omissions perpetrated by more than one entity were necessary and determinant causes of the damage. In such circumstances, the Court could apportion the compensation according to the degree of culpability and extent of the damage caused by each entity. On the facts of the case, there was concurrent liability on the part of Petrobras, the owner of the gas tanks, and Brazuca, the owner of the gas station; accordingly, damages for pecuniary losses were apportioned equally between them.

344. On the basis of those academic writings and the *Brazuca* decision on civil liability, Justice Salomão's view was that the equivalence of conditions (*conditio sine qua non*) theory did not apply to civil liability; its application was limited to criminal liability. The test applied by Justice Salomão was direct and immediate, or adequate, causality found in Article 403 of the Civil Code:

> "The basic idea of the legal writing is that there is only an adequate causal relationship between the fact and the damage when the act practiced by the agent is such as to cause the damage suffered by the victim, according to the normal course of things and the common experience of life."

345. Professor Sarlet disagreed with this analysis, noting that it was not part of the unanimous judgment by the Reporting Justice and was inconsistent with the reasoning of Article 3, IV and the full risk theory. In clarifying his position, Professor Sarlet stated:

> "… there is a causality in a broader sense implying two relationships, the imputation of responsibility to those that contributed directly or indirectly, and it is at this level of

> imputing responsibility to those who contributed directly or indirectly to the activity where there is no exclusion of responsibility due to the traditional reasons, excluding of course the intent. Now, when we talk about the second link, which is the link between the activity and the damage -- I also made this clear -- of course then there is a naturalistic relationship between the damage and the conduct, but this also has to be verified on a case-by-case basis to see if it leads to liability. And in this case, the exclusion of all of these other clauses have to do with the imputation of responsibility and here I'd like to make it clear that I'm talking about the second link. This is my position."

346. Professor Sarlet explained the theory of equivalence of conditions as follows:

> "… the equivalence of conditions, the sine qua non conditions, attributes any circumstance which has helped in producing the damage, the quality of a cause, therefore any cause may have been possible to have generated the damage."

347. Professor Sarlet made the point that the unanimous judgment of the Reporting Justice recognised that activities such as creating the risk of explosion or transporting the cargo could have given rise to indirect responsibility and liability on the part of the defendant; this was inconsistent with a requirement for direct and immediate, or adequate, causation.

348. It was also observed by Professor Sarlet that the *Brazuca* case on concurrent liability of Petrobras and Brazuca was concerned with the causation test in civil liability (both strict and fault-based); it was not concerned with the causation test under the Environmental Law based on the full risk theory.

349. Professor Dantas accepted that the Court of Appeal (as opposed to the STJ) in *Vicuña* stated that the theory of equivalence of conditions is adopted by the full risk theory. He also accepted that the Benjamin statement in *Mangroves* does not require that the person's conduct should have been a direct and immediate or necessary cause of environmental damage. But he disagreed with the proposition that when the activity has caused environmental damage, the causal link between the defendant's conduct and the damage essentially depends on the causal link between the defendant's conduct and the activity:

> "Q. The Benjamin statement takes as a given that the activity has caused environmental damage but seeks to provide guidance as to the nature of the required causal link between the relevant person and the activity, doesn't it?
>
> A. I don't think that we can derive that much from the statement this is my opinion. You can't reach this level of conclusion based on this statement."

350. Professor Dantas agreed in cross-examination that, although Justice Salomão suggested in *Vicuña* that the relevant test of causation in environmental civil liability is the test of direct and immediate or necessary causation set out in Article 403 of the Civil Code, (i)

none of the other nine justices approved or adopted his reasoning on this issue; (ii) it did not form part of the determining grounds in that case, which included in the summary the absence of any causal link on the basis that the purchaser of the cargo did nothing to contribute to the accident, not even indirectly; and (iii) the cases relied on by Justice Salomão, in support of his opinion that the Article 403 test of causation should apply (*Brazuca* contribution proceedings, *ParkShopping* Consumer Code case and *Hospital Escape* fault-based claim), were civil cases rather than civil environmental cases.

351. The comments by the justices in *Vicuña* must be read in the light of the subsequent case of *Gold* STJ Special Appeal No. 1.816.808 (2019). In that case, a developer of land sought to appeal against a ruling that it was responsible for full remedial measures to repair environmental damage resulting from the silting up of a lagoon. Although it accepted responsibility for dredging the lagoon, the developer disputed liability for carrying out works to a dam that it did not build and on land that it did not own. The appeal was rejected by Reporting Justice Herman Benjamin and a unanimous panel. The summary includes the following:

> "According to the settled case law of the STJ, under the terms of article 14, § 1, of Law 6.938/1981, civil liability for environmental damage is strict, joint and unlimited in nature, based on the full risk theory. If unlimited and not subject to prior restriction, the application of article 403 of the Civil Code is obviously excluded ..."

(iii) Conclusions on causation test

352. Weighing the competing views of the experts against the written law and STJ case law, the following principles can be derived.

353. First, Article 14, paragraph 1 does not state explicitly the particular causation test that must be applied to determine whether environmental damage has been caused by an activity.

354. Second, under the full risk theory, no distinction is drawn between main and secondary causes, or direct and indirect causes; all who contribute to the occurrence of environmental damage shall be held liable for the full extent of the damage: *Jacupiranga* STJ 1.071.741; *Bioenergia* STJ 1.373.788.

355. Third, there is no differentiation between concurrent, simultaneous and successive causes of environmental damage; it is sufficient that the polluter's activity is a contributory cause of the damage: *Olapa* STJ 1.346.430.

356. Fourth, strict liability is applicable in environmental damage claims based on the fact that there are particular difficulties in investigating and identifying the material and contributory causes of resulting damage. The courts have adopted the policy imperative mandated by the Environmental Law to preclude reliance on exclusions that would otherwise apply to break the chain of causation in civil liability claims: *Jacupiranga* STJ 1.071.741; *Olapa* STJ 1.346.430; *Bioenergia* STJ 1.373.788.

357. Fifth, the lack of differentiation between main and secondary causes, the absence of any requirement to investigate and identify a direct and proximate cause of the damage, and the inability of a polluter to rely on general civil law exclusions or interruption of the causal chain are factors that are inconsistent with the Article 403 test of direct and immediate causation.

358. Sixth, the unanimous judgment of the STJ in *Vicuña* did not apply the Article 403 test of direct and immediate causation; the illustrative scenarios referred to by Justic Cueva, which he said could have given rise to liability, were inconsistent with the application of Article 403.

359. Seventh, although Justice Salamão did apply such a test in *Vicuña*, he did so relying on civil liability cases which were not directly applicable. His analysis was not adopted by Reporting Justice Cueva and his conclusion was not included in the unanimous judgment of the court or the summary.

360. Finally, the STJ expressly disavowed the application of Article 403 in cases of environmental damage in *Gold* STJ 1.816.808.

361. In summary, I accept the opinion of Professor Sarlet that the applicable causation test in environmental damage cases is that of the equivalence of conditions, or the *conditio sine qua non* test.

Subsidiary enforcement

(i) The issue

362. It is common ground that environmental damage liability can be joint and several where there are multiple polluters. The issue between the parties is whether indirect polluter liability is subject to the principle of subsidiary enforcement where they are jointly and severally liable with a direct polluter.

363. The Claimants' case is that for the purposes of environmental civil liability, no distinction is drawn between main and secondary causes; they can choose to sue and enforce against any or all of the direct and/or indirect polluters. A private law direct or indirect polluter is not entitled to rely on a defence that a third party has greater or equal liability but it is open to them to seek redress from any other polluter through recourse action, in which their relative culpability can be assessed.

364. BHP's case is that the principle of subsidiary enforcement applies to private and public indirect polluters, so that a claimant can only enforce against an indirect polluter if (a) they succeed in a claim against the direct polluter; (b) they initiate enforcement against the direct polluter; and (c) such enforcement against the direct polluter has not been satisfied.

(ii) Expert evidence

365. There is clear support for the principle of subsidiary enforcement as regards the State in the *Restatement of Precedent 652* (2022) which clarified that the civil liability of a public administration for damage to the environment, arising from omission of its duty to supervise, is joint and several liability, but is enforceable on a subsidiary basis. The

summary of ruling in *Jacupiranga*, which is one of the cases that gave rise to *Restatement of Precedent 652*, states:

> "4. Whatever the legal classification of the degrader, be it public or private, under Brazilian law, civil liability for environmental damage is strict, joint and several and unlimited, and it is governed by the principle of polluter-payer, of full redress, of priority of redress in natura, and of the favour debilis; the latter legitimates a series of techniques to facilitate access to justice, among which is included the reversal of the burden of proof in favour of the environmental victim.
>
> ...
>
> 13. The Administration is jointly and severally, restrictively and unlimitedly liable, pursuant to the Brazilian Environmental Law, for urban and environmental damage resulting from the omission of its duty to control and inspect, to the extent that it contributes, either directly or indirectly, both to the environmental degradation itself, and to its aggravation, consolidation, or perpetuation, all without prejudice to the adoption, against the negligent or insidious public agent, of disciplinary, criminal, civil, and administrative measures in the field of misconduct in public office.
>
> 14. In cases of omission of the control and supervisory duty, the joint and several environmental liability of the Government is an enforceable secondary liability (or with order of preference).
>
> 15. Joint and several liability and subsidiary enforcement means that the State is part of the enforceable instrument under the condition that, as reserve debtor, it is only called upon to pay the debt if the original, direct, or material degrader (= principal debtor) fails to do so, either due to total or partial exhaustion of assets or insolvency, or due to impossibility or incapacity, including technical incapacity, of compliance with the judicially imposed remedy, always ensuring the right of recourse (article 934 of the Civil Code), disregarding the legal personality (article 50 of the Civil Code)."

366. In *Jacupiranga*, the paradigm judgment for the *Restatement of Precedent 652*, Reporting Justice Benjamin explained the rationale for subsidiary enforcement against the State, namely, avoiding a double burden on society as a result of environmental damage:

> "… it is inspired by reasons of a social, political, and economic nature, and by reasons of justice as well, since it would be inadvisable to call the State - which, as a result of its anomalous position, in the end, as the representative of society-victim of the urban-environmental damage, is also harmed - to be held liable,

> in the front line, for the degradation materially caused by a third party and which only benefits or profits them alone."

367. Professor Sarlet's opinion is that the *Restatement of Precedent 652* was limited to state entities and does not apply to private entities. There is no STJ precedent finding that the subsidiary enforcement principle applies to private law entities and such extension of the principle would be contrary to existing STJ jurisprudence, as well as the full risk theory.

368. Professor Dantas' opinion is that, although the *Restatement of Precedent 652* referred only to state entities, the principle of subsidiary execution must apply equally to private entities to give effect to the principle of *isonomy.*

369. Professor Dantas relies on the *Coal Case* STJ Special Appeal No. 647.493 (2007), Reporting Justice Joao Otavio de Noronha, which concerned a CPA against the Federal Government, coal mining companies and their shareholders in respect of environmental damage. In a unanimous decision, the STJ determined that: (a) the Federal Government was liable for failing to comply with its supervisory obligations, by way of fault-based liability under the Civil Code; (b) each mining company was liable for damage in respect of that part of the land it polluted, directly or indirectly; (c) where more than one mining company polluted an area of land, even indirectly, they were jointly and severally liable in respect of such pollution, regardless of their contribution to the degradation. Further, it was held that, in the absence of abuse of the corporate personality, the disregard doctrine (piercing the corporate veil) was not applicable; the managing partners were in any event primarily liable as polluters but by way of secondary liability pursuant to Articles 942 and 1,024 of the Civil Code.

370. In cross-examination, Professor Sarlet agreed that the shareholders of a limited liability company should get the same protection of subsidiary enforcement as the managing partners of the company. Professor Dantas agreed that the context of this part of the decision, that the managing partners were liable as polluters by way of secondary liability, was Article 1,024 of the Civil Code, which concerned enforcement against the partners' assets in respect of the company's debts. His evidence was that there were many cases involving the State as indirect polluter but he was unable to identify any case where the principle of subsidiary enforcement was held to apply generally to private law indirect polluters.

(iii) Conclusions on subsidiary enforcement

371. In my judgment, the principle of subsidiary enforcement does not apply in this case for the following reasons.

372. Firstly, the *Restatement of Precedent 652* contains a clear exposition of the applicability of the principle of subsidiary enforcement to state entities held to be indirect polluters; it does not consider or make any pronouncement in respect of such applicability to private law entities.

373. Secondly, there is a clear line of STJ jurisprudence in which private law indirect polluters have been sued, without the need for the direct polluter to be joined and without any suggestion that enforcement would be limited to a subsidiary basis – *Liberian Ship* STJ No.467.212; *Cubatão* STJ 67.285; *Paranaguá Port* STJ 1.114.398;

Brazuca STJ 1.363.107; *TAG* STJ 2039216-80.2013.8.26.000; and *Vicuña* STJ 1.596.081.

374. Thirdly, the STJ has said in a number of cases, namely, *Krupp* STJ 578.797, *Liberian Ship* STJ No.467.212; *Cubatão* STJ 67.285; and *Paranaguá Port* STJ 1.114.398, that an indirect polluter could seek redress from the direct polluter by way of a separate recourse action, having paid the damages awarded to the claimant. This is not consistent with the concept of subsidiary enforcement whereby the indirect polluter could only be sued after liability and failed enforcement against the direct polluter.

375. Fourthly, the *Coal Case* STJ 647.493 was concerned with the managing partners' liability for the debts of the mining companies under the Civil Code, as direct polluters; it was not concerned with subsidiary enforcement of indirect polluters. It is notable that the STJ in that case did not refer to the principle of subsidiary enforcement in respect of the mining companies, some of whom might be liable as indirect polluters.

376. Fifthly, I accept Professor Sarlet's evidence that the principle of *isonomy* does not require all parties to be treated in the same way; it requires all private law entities to be subject to a system of legal equality. There is no support in the cases or academic writings for the proposition that private law entities should be treated in the same way as public law entities. On the contrary, the extract from the *Civil Law Course* by jurist Fabio Ulhoa Coelho, relied on by Professor Dantas, describes a regime of legal inequality, whereby public interests must always prevail over individual interests, pursuant to which prerogatives are granted to persons governed by public law that are not granted to those governed by private law.

Summary of the applicable legal principles

377. In summary, for the purpose of determining whether BHP are strictly liable for environmental damage caused by the collapse of the dam under the Environmental Law, the applicable legal principles are as follows.

378. First, Article 14, paragraph 1 of the Environmental Law imposes on the polluter, as defined by Article 3, IV, strict liability for damage caused to the environment and any third parties affected by the polluter's activity.

379. Second, Article 3, IV of the Environmental Law defines a polluter as a person or entity who is directly or indirectly responsible for the polluting activity. There is no conceptual distinction between those who are held to be directly responsible and those who are held to be indirectly responsible for the polluting activity.

380. Third, the prevailing case law of the STJ has adopted a broad concept of polluter, based on the multifactorial approach identified by Reporting Justice Benjamin in *Mangroves* STJ 650.728. There is no fixed list of the circumstances in which responsibility for a polluting activity will be imputed to a person or entity; each case must be analysed on its particular facts. The STJ cases indicate that it includes factors such as: (i) control over the activity; (ii) the creation of risk, participation and/or active involvement in the activity; (iii) financing the activity; and (iv) economic benefit from the activity.

381. Fourth, a factual causal link is required between the activity, for which a person or entity is directly or indirectly responsible, and the environmental damage in respect of

which compensation is claimed. The applicable causation test in environmental damage cases is that of the equivalence of conditions, or *conditio sine qua non* test.

382. Fifth, a polluter is precluded from escaping liability under the Environmental Law by invoking civil liability exclusions, such as *force majeure*, acts of third parties, or supervening acts.

383. Sixth, where there is more than one polluter, they are jointly and severally liable to the person(s) who have suffered as a result of the environmental damage, regardless of whether they are directly or indirectly responsible for the polluting activity and regardless of the extent of their contribution to the same.

384. Seventh, claimants can choose to sue and enforce against any or all direct and/or indirect polluters. The principle of subsidiary enforcement against indirect polluters applies to state entities but not private persons or entities.

385. Eighth, a polluter is entitled to bring a recourse action against a co-polluter in which their relative culpability will be assessed for the purpose of determining the amount of contribution.

9. STRICT LIABILITY

The issue

386. The Claimants' case is that BHP are liable as a polluter because they are both directly and indirectly responsible for the activity which caused the collapse:

i) BHP (and Vale) exercised controlling power, supervision and influence over all aspects of Samarco's operations, acting in their own interests.

ii) Through the Samarco Board, BHP (and Vale) made decisions which were connected to both the creation, development, and operation of the dam and the direct and indirect causes of the collapse; in particular, the P3P Project, the P4P Project, Project 940, and the disposal of Vale's Alegria tailings behind the dam.

iii) BHP representatives, acting inside and outside the Samarco Board, committees and sub-committees, directly participated in the development and implementation of measures intended to mitigate and manage the risks of the activity, including the risk of a collapse of the dam.

iv) BHP substantially invested in the mining and tailings disposal activity and derived substantial financial and commercial benefits from the same.

387. The Defendants' position is that BHP are not a direct polluter because they did not own or operate the dam; and they are not an indirect polluter, even on the Claimants' proposed test.

i) Even if, which is disputed, BHP-affiliated individuals participated in the governance of Samarco, through the Samarco Board or through its committees and sub-committees, that would merely amount to the exercise of controlling shareholder power, which is not sufficient to establish liability.

ii) Approval of the P3P Project, the P4P Project and Project 940 does not establish liability and BHP's involvement in them, when compared to the significant roles and responsibilities of Samarco's large and well-resourced project teams, was fairly peripheral. Likewise, BHP did not have control over the disposal of the Alegria tailings by Vale. In any event, none of these projects or activities materially caused, or contributed to, the collapse.

iii) BHP had no control over, and did not directly participate in, the management of the risk of collapse of the dam, or in health and safety matters. The fact that BHP sought to influence or monitor Samarco in respect of such matters does not amount to control and is insufficient to impose responsibility for the activity.

iv) The Claimants' reliance on BHP's funding of Samarco and the benefits they obtained from their interest in it do not, alone, give rise to liability.

The activity

388. The relevant activity in this case was the activity of mining and the storage of iron ore tailings in the Fundão Dam. It is not disputed by BHP that this activity caused environmental degradation and damage such that it is a polluting activity under the Environmental Law.

Responsibility for the activity

389. As submitted by BHP, and agreed by Professor Sarlet in cross-examination, it is common ground that having and exercising controlling shareholder power does not without more impose liability. Therefore, it is necessary to consider further the structure of ownership and shareholder power of BHP, together with the nature and extent of the exercise of such power regarding the activities of Samarco.

(i) DLC Structure

390. BHP UK, formerly known as Billiton plc and BHP Group plc, is a company incorporated in England, UK. BHP Australia, formerly known as BHP Limited, is a company incorporated in Australia.

391. On 29 June 2001 BHP UK and BHP Australia entered into a dual listed company agreement ("the DLC Structure Sharing Agreement"), whereby they agreed that the businesses of both companies would be operated as if they were a single unified economic entity, through boards of directors comprising the same individuals and a unified senior executive management. Pursuant to the DLC Structure Sharing Agreement, the companies agreed to equivalent economic returns and equivalent voting rights in relation to matters that affected the shareholders of each company in a similar way. Each company guaranteed certain contractual obligations of the other company, effectively sharing their respective obligations and debts.

392. In its 2014 Annual Report, BHP described its structure as a dual listed company structure, with two parent companies, BHP UK and BHP Australia, operated as a single economic entity, run by a unified Board and management team.

393. Management and control of the business of the BHP Group was vested in the Board of Directors, comprising the same individuals on each of the BHP UK Board and the BHP Australia Board. In practice, they functioned as a single Board.

394. The BHP Board delegated authority for specific areas of responsibility to permanent committees, namely: (i) the Risk & Audit Committee; (ii) the Remuneration Committee; (iii) the Nomination & Governance Committee; (iv) the Sustainability Committee; and (v) the Finance Committee.

395. The Chief Executive Officer ("CEO") of the BHP Group had delegated authority to achieve the corporate purposes. Prior to 10 May 2013, the CEO was Marius Kloppers; from 10 May 2013, the CEO was Andrew Mackenzie.

396. The CEO delegated authority to a senior management team, the Group Management Committee ("GMC") (from 2016, known as the Operations Management Committee). As CEO, in 2013, Mr Mackenzie carried out a reorganisation of the BHP Group structure. The GMC was reorganised to comprise: (i) the CEO and Executive Director; (ii) Presidents of the Businesses, each acting as a representative on the GMC; (iii) President, Human Resources; (iv) President, Health, Safety, Environment, Community, Marketing and Technology; (v) Chief Financial Officer; (vi) Chief Legal Counsel; and (vii) President, Governance and Group Company Secretary.

397. Until 2013, BHP organised and managed its Group-wide assets through customer sector groups ("CSGs"), including the Iron Ore CSG. Following the 2013 reorganisation, the number of CSGs was reduced from eight to five and they were renamed Businesses: Petroleum and Potash; Copper; Iron Ore; Coal; and Aluminium, Manganese and Nickel.

398. The President of the Iron Ore Business, Jimmy Wilson (who succeeded Ian Ashby), had responsibility for setting the Iron Ore Business strategy. Reporting to him was the Iron Ore Executive Committee ("Iron Ore ExCo"), including Jeff Zweig, who succeeded Chris Campbell as Vice President for Strategy and Development.

399. Within the Iron Ore CSG/Business, responsibility for Samarco was effected through the Vice President of Strategy and Development, the Head of Iron Ore Brazil and the Iron Ore Brazil Team ("BRIO"). Rogério Nogueira, and subsequently Sérgio Fernandes, had responsibility for business development in Iron Ore Brazil. This included responsibility for Samarco's strategy, budget, direction and oversight of operations, and major projects.

400. The BHP Group operating model incorporated group functions to support the Businesses and operate under a defined set of accountabilities authorised by the GMC. Core principles of the operating model included mandatory performance requirements, common organisational design, common systems and processes, and common planning and reporting.

401. In cross-examination, Mr Campbell confirmed that the unified DLC management structure extended to responsibility for the Iron Ore CSG:

> "Q. Under the DLC structure, BHP Australia and BHP UK operated through boards of directors that comprised the same individuals -- correct?

A. That is correct.

Q. -- and a common CEO –

A. That is correct.

Q. -- and unified executive management?

A. That is also correct.

Q. The Iron Ore executive team was part of the unified executive management of the DLC having responsibility for the Iron Ore CSG?

A. That's also correct."

402. Thus, although BHP UK and BHP Australia remained separate legal entities, they operated as a single unit. This included management of the BHP Group, management of group assets, and sharing the returns on all businesses within the BHP Group, including Samarco.

(ii) Ownership of Samarco

403. During the period October 2008 through to November 2015 Samarco was the owner and operator of the Germano iron ore mining complex ("the Germano Complex") in Minas Gerais, Brazil, including the Fundão Dam.

404. Samarco was formed in 1973. By 2000, Samarco was owned 50% by BHP Brasil and 50% by Vale (initially through S.A. Mineração da Trindade – Samitri ("Samitri"), a company acquired by Vale in 2000).

405. BHP Brasil is a wholly-owned subsidiary of BHP, through a matrix of shareholding companies within the BHP Group:

i) The shares in BHP Brasil are held by BHP Minerals (47.08%), Marcona (40.35%) and BHP IFC (12.57%).

ii) Marcona is a wholly-owned subsidiary of BHP IFC.

iii) BHP IFC and BHP Minerals are wholly-owned subsidiaries of BHP Holdings International.

iv) BHP Australia holds 11.5% of the shares in BHP Holdings International and 88.5% of the shares in BHP Holdings International through another wholly-owned subsidiary, BHP Holdings USA.

406. BHP Brasil is a holding company, registered in Brazil for the purpose of investment in Samarco. Indeed, as at May 2012, it had no employees and was used simply for recording, receiving and transferring to BHP dividend payments from Samarco, together with associated tax and auditing responsibilities.

407. Thus, although 50% of the shareholding in Samarco is held by BHP Brasil, the ultimate owner of that shareholding is BHP Australia and any returns from Samarco are shared with BHP UK through the DLC structure. The significance of these structures is that in practice, although separate corporate entities, BHP UK and BHP Australia treat the Iron Ore CSG/Business, Iron Ore Brazil and Samarco as part of the BHP Group.

(iii) The SSA

408. The Samarco Shareholders Agreement dated 29 June 2000, as amended ("the SSA") set out the terms on which Samarco would be operated and controlled as a joint venture by BHP Brasil and Vale.

409. Clause 3.1 of the SSA, and Articles 8 and 9 of the Samarco Byelaws provided that a General Shareholders' Meeting might be convened at the request of the Shareholders, the Board of Directors of Samarco or the Audit Committee. The General Shareholders' Meeting was the highest corporate body of Samarco, with powers to decide on all business related to the company's purposes.

410. Clause 3.7 provided that on the request of Vale or BHP Brasil, the shareholders would hold a meeting before any General Shareholders' Meeting or any meeting of the Board of Directors of Samarco, to discuss and make any decisions regarding the matters on the agenda for such meeting. Clause 4.14 provided for the shareholders to instruct the Board of Directors to act in accordance with any agreed decisions.

411. Clauses 3.7.5 and 4.4 provided that in the event that a member of the Board of Directors of Samarco opposed, refused to accept or failed to act in accordance with the direction of the Shareholders as required by Section 3.7, the meeting would be immediately adjourned and any shareholder would have the right to call a General Shareholders' Meeting to implement the agreed decisions.

412. Clause 4.2 provided that Samarco would be administered by a Board of Directors elected by the shareholders at a General Shareholders' Meeting and by an independent Executive Board elected by the Board of Directors of Samarco.

413. Clause 4.5 of the SSA provided for a Board of Directors ("the Samarco Board") of eight members, four of whom were effective or full members and four of whom were alternate members, who voted only when the relevant effective member was not present. BHP Brasil and Vale each appointed two effective members and two alternate members to the Samarco Board. The Chairman and Vice Chairman of the Samarco Board served for a period of one year; they were appointed in alternate years by BHP Brasil and Vale respectively.

414. The Samarco Board had management powers, including the power to set Samarco's general policies, elect and dismiss the Executive Board, establish their duties, and monitor their performance. The Samarco Board also had power to approve the business plan, budget, mining plan, expansion plans and other technical matters.

415. Clause 4.15 provided that the Board of Directors of Samarco would elect the CEO, who was required to be a suitably qualified manager with appropriate extensive management experience.

416. Clause 4.16 provided that the Executive Board of Samarco should be independent. The CEO was required to select and submit for confirmation by the Board of Directors of Samarco the names of up to four other candidates to be executive officers who, together with the CEO, formed Samarco's Executive Board.

417. Clause 4.18 provided that Samarco's Executive Board would carry out its functions pursuant to premises, goals, and performance criteria established by the Samarco Board, to be periodically checked, by means of objective performance standards, approved by the Samarco Board, sufficient to allow for an adequate evaluation of the Executive Officers' performance.

418. Clause 5.1 provided that certain specified issues, such as high value transactions, approval of the business plan and approval of the annual budget, required a supermajority of 60%. Clause 5.2 provided that certain specified issues, such as a change in the purpose or structure of the Group, required a supermajority of 80%. Clause 5.4 provided that all matters listed in clauses 5.1 and 5.2, were subject to the approval of the Samarco Board or approval at a General Shareholders' Meeting.

419. Clause 6.1 entitled the BHP Brasil and Vale shareholders to nominate an independent auditor, who was appointed by the Samarco Board for a period of no more than three years.

420. Clause 7.1 provided that Samarco's policy was to maximise the distribution of the available cash to the shareholders, provided all relevant legal requirements were met and Samarco's financial condition was sufficient to allow for such distributions, including, but not limited to, the retention of an adequate level of working capital and recognition of future cash requirements for capital and operational purposes, as set out in the Business Plan and the Budget.

421. Clause 9 required the shareholders to exercise reasonable best efforts to reach agreement on all matters requiring a decision; in the event of a failure to reach agreement by mere majority (save for the supermajority decisions required by clauses 5.1 or 5.2), the matter would be deemed to be rejected. This general provision was subject to exceptions, including:

    i) clause 9.3.2, which provided that a deadlock in relation to the approval of an expansion of operations, where certain conditions, including funding, were met, should be resolved in favour of undertaking the expansion;

    ii) clause 9.3.3, which provided that a deadlock in relation to the amount of any dividend distribution or other profit sharing plan should be resolved by use of the percentage of dividend or other form of profit sharing for the immediately preceding year;

    iii) clause 9.3.4, which provided that a deadlock in relation to technical matters should be resolved by independent technical expert determination in arbitration.

422. Clause 10.1 provided that funding requirements for Samarco and its subsidiaries would be met pursuant to a mutually approved financial schedule by the Samarco Board, which should specify: (i) the capital contributions required to be made by each of Vale and BHP Brasil in proportion to their respective participating interests; and (ii) long

term domestic and international financing contracted for directly by Samarco or its subsidiaries, consistent with current market conditions. Target debt-to-equity ratios for Samarco were required to be set out in the business plan.

423. Clause 15.1 provided that the SSA would be governed by, construed and interpreted in accordance with the Laws of Brazil.

424. Clause 16.7 of the SSA provided that any notice or communication required under the SSA should be in writing and delivered to BHP Australia in Melbourne (in respect of BHP Brasil), with a copy sent to BHP Brasil in Brazil.

425. It is evident from the above provisions, that the structure of the governance of Samarco, through the SSA and Samarco Byelaws, enabled BHP and Vale to exercise effective power and control over Samarco.

426. First, BHP and Vale had effectual control over the Samarco Board, through their power to appoint the effective members and alternate members (Clause 4.5 of the SSA). In practice, this ensured that the Samarco Board was comprised entirely of BHP and Vale representatives.

427. Second, although clause 4.16 of the SSA expressly stated that the Executive Board should be independent, the Executive Board comprised a CEO elected by the Samarco Board and four Executive Officers approved by the Samarco Board. As such, BHP and Vale had power to determine the membership of the Executive Board.

428. Third, the Samarco committees, namely, financial, operational, technical and other advisory committees established by the Samarco Board, all had shareholder representation from BHP and Vale, to advise it on implementing the Business Plan, conducting operations, and performing other duties. This afforded BHP and Vale the opportunity to influence and control Samarco's business beyond high level strategy and direction, extending into operation of the business.

429. Fourth, the ability of BHP and Vale, as joint shareholders, to discuss and reach decisions on agenda items in advance of Samarco Board meetings, and to adjourn such meetings to allow for a General Shareholders Meeting if the Samarco Board refused to act in accordance with any agreed directions, enabled the shareholders to dictate decision-making by the Samarco Board.

430. Fifth, key decisions in respect of Samarco's operations specifically required shareholder approval, including certain decisions requiring a vote of a supermajority of 60% or 80% of voting stock. Since Samarco had only two shareholders, each holding 50% of the shares, the effect of the supermajority requirements was that such matters required the shareholders' unanimous approval.

431. In summary, the structure of the joint venture, as established under the SSA, ensured that the Samarco Board was made up entirely of BHP and Vale representatives. By design, the Executive Board was subservient to the will of the Samarco Board. As BHP and Vale were 50/50 shareholders, decisions of the Samarco Board could only be made by their joint agreement. It followed that Samarco's corporate governance structure guaranteed the ability of BHP and Vale jointly to control Samarco.

(iv) Appointments and reporting chain

432. From the Samarco corporate governance records, BHP employees were appointed to influential positions within Samarco.

433. Between 2008 and 2011, Marcus Randolph, the Group Executive and Chief Executive, Ferrous and Coal at BHP, and Ian Ashby, President of the Iron Ore CSG, were effective members of the Samarco Board. During that period, the alternate members were variously: (a) John Slaven, the Chief Development Officer of the Iron Ore CSG; (b) Sebastião Ribeiro, BHP Brasil's Chief Operating Officer and CEO, President Iron Ore Brazil (1984 - 2009), Vice-President BHP Iron Ore Americas; (c) Rogério Nogueira, General Manager of Business Development for Brazil and the Americas, part of the Iron Ore CSG; and (d) Christopher Campbell, Vice President, Strategy & Business Development in the Iron Ore CSG at BHP in 2010-2011.

434. In 2012, Mr Randolph and Mr Wilson, President of Iron Ore from 2012 to 2016, were effective members of the Samarco Board. The alternate members were Jeffrey Zweig, Vice President of Strategy & Development of Iron Ore at BHP between 2012 and 2014, and Sérgio Fernandes, General Manager of Business Development - Americas and CEO of BHP Iron Ore, Brazil.

435. Between 2013 and 2014, Mr Wilson and Mr Zweig were effective members of the Samarco Board. The alternate members were Mr Fernandes and Margaret Beck, Vice President of Finance for Iron Ore Business, BHP, with responsibility for governance and risk management.

436. In 2015, Mr Wilson and Tony Ottaviano, Vice President, Business Development, BHP Iron Ore (2006 - 2011), and Vice President, Strategy, Development & Planning, BHP Iron Ore (2011 - 2016), were effective members of the Samarco Board. The alternate members were Mr Fernandes and Margaret Beck.

437. In cross-examination, Mr Campbell of BHP agreed that irrespective of the particular form of ownership or interest that BHP might have in any part of the business, the relevant CSG/Business would be responsible for all of the Group's interests in the specified sector. Further, although he held a number of roles at BHP between July 2001 and 2013, Mr Campbell confirmed that, throughout this period, he remained employed by the BHP Group regardless of the formal title he held or the company within the group to which he was assigned. This understanding, namely, that regardless of title and contract, all BHP-affiliated individuals were part of the BHP Group, was echoed by Mr Beaven, Mr Corless, Mr Gillespie and Mr Wetzig.

438. Mr Campbell's understanding was that the role of the Samarco Board was to monitor the performance of Samarco's management and to set its general policies. The Samarco Board was also there to review and agree strategy and direction of the company. The Samarco Board also expected and required the management team to consider risks and to present to it their consideration of risks, any mitigating controls that were in place, the effectiveness they viewed such controls as having, and any other relevant issues that might arise.

439. Mr Campbell explained that the appointment of senior Iron Ore individuals to the Samarco Board was to ensure that the Iron Ore CSG's interests were properly

represented and protected on the Samarco Board. He could not remember any situation in which there was a conflict between the interests of Samarco and the interests of BHP Brasil (or BHP more generally); he thought their interests were aligned.

440. He attended each of the ordinary Samarco Board meetings held while he was an alternate director, although he did not have a vote unless a BHP Brasil-appointed director was unable to attend. His evidence was that the Samarco Board sought to operate by consensus and he could not recall any difference of opinion between directors on which a vote was required.

441. Mr Campbell's evidence was that there was a system of pre-board meetings held by BHP Iron Ore management shortly prior to each Samarco Board meeting. Although attended only by BHP, the senior representatives at BHP (Mr Randoph) and Vale (Mr Martins) would also take the opportunity to meet and discuss the agenda items. Mr Campbell agreed that the purpose of the pre-board meetings was to discuss the issues arising and reach agreement, so that there was alignment.

442. Mr Campbell's recollection was that there was never any conflict between Samarco management and the shareholder representatives; there was alignment on all issues. He considered that Samarco was not subservient to BHP Brasil and Vale but would be expected to follow their recommendations in the absence of any specific objection.

443. The CEO of Samarco was appointed by the Samarco Board. In practice, this appointment was controlled by BHP and Vale. This was illustrated clearly in 2011 when Vale and BHP determined to replace José Tadeu Moraes ("Tadeu") as CEO of Samarco. The issue was discussed in an email dated 13 September 2011 sent to Mr Campbell, Mr Nogueira and Mr Ashby by Mr Randolph, copied to Marius Kloppers, then the CEO of BHP:

> "Today Martins (CCO of Vale) and I met with Tadeu (outgoing CEO), Ricardo (incoming CEO) and Roberto (Executive Director of Marketing) and informed them of the CEO change in Samarco. In the discussion, we broke down Ricardo's work into "things we require" and "things we recommend". …"

444. There were three Board committees at Samarco: the Finance & Strategy Committee, the Remuneration Committee and the Operations Committee. Each committee was supported by sub-committees, set up to provide support on specific areas from the shareholders, namely, the Treasury, Taxes, Audit, Performance Management, Capital Projects and Technical Sub-committees. The composition of the Samarco Board committees were two members from each of BHP and Vale, and three members from Samarco. Although BHP and Vale did not always have an equal number of representatives, at all times they each had at least one member on every committee and sub-committee.

445. The BHP appointees that sat on the Samarco committees and sub-committees were selected by Iron Ore management. Mr Slaven's emails dated 8 May 2009 and 31 August 2010, stipulating which individuals would represent BHP at committee level, illustrate the extent to which BHP determined the appropriate BHP composition of the committees and sub-committees; it was not a matter that was left to Samarco, or indeed, BHP Brasil.

446. The most senior key BHP representatives based in Brazil, responsible for overseeing Samarco's operations, strategic agenda, governance and risk management on BHP's behalf were: Mr Ribeiro between January 1984 and March 2009; Mr Nogueira between 2009 and 2011; and Mr Fernandes between May 2012 and December 2015. The responsibilities of the role included:

i) provision of direction and oversight to Samarco operations, finance function and major projects;

ii) pursuit of growth opportunities in Brazil and the Americas;

iii) successful delivery of the P4P project;

iv) development of Samarco's Resource Development Plan, Life of Asset Plan, 5-Year Plan and the budget, maintaining adequate budget and management control procedures;

v) ensuring conformance with the BHP Charter, the BHP Group Level Documents, Code of Conduct and relevant statutory obligations;

vi) commitment to health, safety, environmental responsibility and sustainable development;

vii) ensuring BHP Brazil Iron Ore's interests were protected in Samarco commercial dealings with Vale.

447. During their tenure as part of Iron Ore Brazil, each of these individuals held senior positions within Samarco, on appointment by BHP. Such appointments included the Samarco Board of Directors, the Finance & Strategy Committee, and the Technical and/or Operations Committee. Mr Nogueira and Mr Fernandes were members of the Samarco P4P Steering Committee. Mr Fernandes was a member of the Samarco Risks Committee and the Risk Owner for BHP's material risk "Failure of Samarco Tailings Dam".

448. Mr Ribeiro, Mr Nogueira and Mr Fernandes directly reported to Mr Slaven and/or Mr Campbell in their roles on the BHP Iron Ore Executive Committee. This ensured that BHP Iron Ore retained control over all BHP representatives on the Samarco Board. In cross-examination, Mr Campbell agreed that the purpose of the Iron Ore CSG appointments to the Samarco Board was to ensure that the Iron Ore CSG's interests were properly represented and protected on the Samarco Board.

449. BHP's position is that the above evidence could amount to no more than establishing that they held, and exercised, controlling shareholder power (if, which they dispute, BHP exercised controlling shareholder power alone). I reject that submission. It is recognised that controlling shareholder power could be exercised simply through voting at shareholder meetings on high-level matters, such as strategic decisions, remuneration of officers and dividends. If limited to such matters, it is unlikely that, without more, it would give rise to responsibility for the activity of the company. However, controlling shareholder power could also be used at a more granular level in respect of the detailed business decisions and operations of the company. Exertion of such authority could give rise to responsibility for the activities of the company.

450. It is evident from the contemporaneous documents that the BHP Iron Ore Brazil team were involved in the activities of Samarco at every level, from strategic decisions and dividend shares to detailed operational matters at Samarco.

451. Examples include Evilmar da Fonseca, the BHP Iron Ore Brazil Operations Manager between 2008 and 2012, who was engaged to provide an overview of Samarco's operations. His responsibilities included discussion regarding the annual budget, five-year plan and Samarco Board key performance indicators ("KPIs"). His membership of Samarco sub-committees included the Treasury, Capital Projects, Performance Management, Technical and Audit Sub-Committees. The range of issues falling within the remit of those sub-committees included iron ore pricing, waste disposal, tailings dam and water balance issues.

452. Guilherme Ferreira was the BHP Iron Ore Brazil Project Manager between 2009 and 2016, who had specific responsibility for the P4P project and was a member of the P4P Steering Committee. His membership of Samarco committees/sub-committees included the Operations, Capital Projects, Performance Management, Technical and Risks Sub-Committees. Mr Ferreira was BHP's control owner for five critical controls relating to the risk of a dam failure. As part of this role, he visited Samarco's mine and dam facilities and recorded findings relating to the freeboard, beach width, geometry of the dikes, and tailing systems.

453. The depth of involvement by BHP Iron Ore Brazil in the detailed operation and management of Samarco is illustrated by the monthly spreadsheets that were sent by the Iron Ore Brazil Team to Samarco, identifying deadlines for deliverables on topics such as costs, cash flow, planning, production, projects, risk and critical incidents. Matters of significance were reported to the Head of Iron Ore Brazil, who would, in turn, report such matters to the Vice President of Strategy and Development, BHP Iron Ore, thereby facilitating oversight and control by BHP.

454. The above matters demonstrate that control over Samarco was maintained by BHP (jointly with Vale), through exercise of their powers under the SSA to ensure BHP representation and involvement at every level, through the Iron Ore CSG/Business and Iron Ore Brazil.

(v) Risk and audit control

455. At BHP risk was managed through (i) operational management, (ii) group risk management and (iii) internal audit.

456. As Chief Financial Officer of BHP, Mr Beaven had responsibility for the BHP Group risk function from October 2014 to March 2016. Risk, Audit and Assurance ("RAA") reported risk and audit information directly to the Group Risk and Audit Committee ("Group RAC"), the BHP Board Sustainability Committee ("SusCo") and the GMC.

457. RAC meetings were convened twice a year for each of BHP's CSGs (later BHP Businesses). The CSG RACs reported to the Group RAC. The Iron Ore risk team produced risk management updates and reports for the Iron Ore RAC meetings.

458. Mr Victor was the Manager for Risk and Governance from 2010; Manager of Risk for BHP's Iron Ore operations from September 2012; and Head of Risk for Iron Ore from

May 2015. Between 2012 and 2015 Mr Victor reported to Mr Corless, Head of Risk and Governance at BHP Iron Ore between September 2011 and May 2015. The Iron Ore risk function reported to the Vice President of Finance, Iron Ore (Uvashni Raman from 2011 to 2013 and then Margaret Beck from 2013), and to Colin Gomm, a Vice President within RAA.

459. Although Samarco was not obliged to comply with the performance requirements of BHP's Group Level Documents ("GLDs"), in practice, it adopted the BHP standards from 2008 onwards and compliance was assessed in accordance with the core risk management framework set out in Group Level Document GLD 0.17.

460. GLD 0.17 required the relevant business to identify material risks affecting the business in a material risk register, determining materiality by conducting analyses of risks as set out in documents called "bowties". For a given risk, the bowtie would identify the risk, the Maximum Foreseeable Loss ("MFL"), the critical controls in place, and then the Residual Risk Rating ("RRR").

461. MFL was the plausible worst-case scenario if the risk event occurred, on the assumption that there were no effective controls in place to prevent or mitigate the risk. MFL was expressed according to impact types, including health and safety, environment, community, reputation, legal and financial impact. Health and safety impact was generally expressed in terms of a number of fatalities and financial impact was expressed as a financial figure.

462. The impact levels corresponded to a "severity level/factor" set out in a table in an Appendix to GLD 0.17. Any risk with a financial impact MFL of US $250 million or more, or a severity level of level 5 or more in terms of non-financial impact, was classified as a "material risk".

463. In order to determine the RRR for the risk, it was first necessary to identify the "severity factor". This required an assessment of the highest expected impact associated with the risk event, on the assumption that any mitigating controls in place for that risk were reasonably effective. Mitigating controls were controls that were designed to reduce the impacts if the risk event occurred. The severity factor was expressed as a figure which was identified applying the scale set out in a table in GLD 0.17 which ran from 1 to 1000.

464. The "likelihood factor" required an assessment of the likelihood of an impact at the selected severity level, on the assumption that any preventative controls in place for that risk were reasonably effective. Preventative controls were controls that were designed to prevent the risk event occurring. The assessment of the likelihood that the impact would occur was expressed as a figure taken from a scale which was set out in a table in GLD 0.17. The scale ran from 0.03, which corresponded to a likelihood assessment of "very rare", to 10, which corresponded to a likelihood assessment of "almost certain" that the risk event would occur and result in an impact at the selected severity level.

465. The RRR was calculated by multiplying the severity factor by the likelihood factor. For the risks within Iron Ore, the range was around 10 to 1000. Any risk with an RRR of 90 or more was classified as a "material risk".

466. Following introduction of the 1SAP Release 4 system, it became the primary repository of BHP's master data relating to material risks and critical controls, and assigned accountability for such risks and controls to senior staff. The implementation of the 1SAP system also involved new control assessment procedures, namely, "Control Design Assessments" ("CDAs") and "Control Effectiveness Tests" ("CETs").

467. Designated "control owners" were responsible for ensuring that each control was operating effectively, and designated "risk owners" were ultimately responsible for ensuring that each risk was well managed. The risk and control owners had to conduct assessments of their risks and controls at least annually.

468. The Iron Ore risk management team would assimilate the material risks reported by the business into a central Iron Ore risk register, and twice a year, would create a Risk Management Update for the Iron Ore RAC, which identified the most significant material risks within Iron Ore.

469. The Iron Ore RAC meetings were attended by senior Iron Ore individuals such as the Iron Ore President. The purpose of the meetings was to discuss material risks and audit issues within the Iron Ore CSG. Each CSG within BHP had its own equivalent RAC, known as the Business RACs ("BRACs"). The Group RAC sat above the Business RACs. From around 2013, additional risk updates were provided to the Iron Ore ExCo on a monthly basis.

470. Samarco had its own risk management team and its own risk management processes. Prior to 2013, BHP Iron Ore did not make its own assessment of any Samarco risks; apart from a high-level check, it simply incorporated Samarco's reporting into the Iron Ore register. From 2013, BHP implemented new risk management reporting processes using the 1SAP system. This required every material risk to have a designated BHP risk owner and designated BHP control owners, who were required to complete periodic assessments within the system. To facilitate this new system, as confirmed by Mr Victor in his evidence, BHP Iron Ore created its own risks and controls in respect of Samarco risks, including the assignment of BHP Brasil and BHP Iron Ore risk and control owners, who were required to conduct formal assessments of the risks and controls. Following the introduction of the 1SAP system, although the critical controls used were effectively the same as those used by Samarco, the risk assessment entered into the system reflected BHP's independent view. The Iron Ore risk ratings were informed by work completed by Samarco but were determined by BHP.

471. Mr Corless confirmed that in relation to Samarco, insofar as the risk was treated as sitting within the business development arm of the Iron Ore CSG, the risk owner was Mr Zweig. The risk owner was responsible for performing the material risk control assessment ("MRCA") analysis, taking account of the CDA and CET results, as well as audit findings and other available management information. Further, the risk owner was responsible for identifying any issues, creating and closing out remediation tasks in a timely fashion.

472. The Samarco risk was represented in the risk register and on the RAC reports. Mr Arnold of Iron Ore was the control owner for the risk management process; Mr Ferreira of Iron Ore Brazil was the control owner for the remaining five critical controls in respect of Samarco, namely, dam design, failure modes and effects analysis ("FMEA"), dam monitoring, ITRB and incident response.

473. Bow-tie risk assessments were carried out by Germano Silva Lopes, the general manager of Samarco, including assessment of risk events defined as "critical failure of dam operation" and "critical failure of dam implementation". BHP provided training and monitored Samarco's assessment and control of the risks. Recommended actions were monitored by BHP through monthly tracker lists.

474. BHP were proactive in raising questions in respect of Samarco's risk assessment and controls, as illustrated by Mr Arnold's email dated 21 June 2013 to Mr Fernandes and Mr Ferreira and others, copied to Mr Corless:

> "The Dam Failure risk is now 'Requires Significant Improvement'. Given this significance of this risk and the low rating, do we feel this is the correct rating and the correct remediation plans? Also per the Dam Break study and work last year, it appears the fatalities are a lot higher based on response times, community population etc."

475. Mr Corless agreed in cross-examination that there was no automatic incorporation or cutting and pasting of whatever Samarco sent to BHP Iron Ore in terms of risk reporting within the Iron Ore risk register. Upon receipt of Samarco's risk information, the Iron Ore risk team, both in Perth and Brazil, carefully reviewed it, asked for further information and raised queries where considered appropriate, so that they could satisfy themselves that a fair representation of the risks was entered into the Iron Ore risk register.

476. In April/May 2014, Mr Cardoso, Finance Manager, Brazil Iron Ore, BHP, established the Samarco Risks Sub-Committee, with representation and participation from Samarco, Vale and BHP, to provide discussion and oversight of the risk management frameworks at Samarco.

477. Samarco did not have its own internal audit team and relied on its shareholders for that function. BHP and Vale conducted their own audit planning processes in respect of Samarco. During the period 2007-2015, Mr Lynch's role was as senior audit manager for Group Risk Assessment and Assurance ("RAA") for South America, based in Santiago, Chile.

478. For each financial year RAA created a high-level audit plan across BHP. The audit plan was approved by Group RAC and SusCo. From 2013, the general policy determined by RAA was to carry out an audit each year at each business but to alternate between business assurance and technical audits. For each audit included in the annual plan, a detailed scope for the audit would be developed, setting out the objectives of the audit, the processes to be audited, key dates and milestones, and details of the audit team.

479. Following a site visit, review of documentation and discussions, the audit team would prepare their preliminary findings and, from 2010, propose a provisional 'rating' for each finding. A Priority 1 (P1) rating was a finding that something very serious had been identified which required immediate management action. A Priority 2 (P2) rating was a moderate control weakness which had the potential to become serious if not remediated. A Priority 3 (P3) rating was a minor weakness. Repeat findings, regardless of the rating, would also receive attention from senior BHP management and at CSG level, as such findings indicated that the management of the business had not given

sufficient attention to addressing the cause and the resolution of issues. An overall 'process rating' would also be proposed for each process which had been audited, based on the specific findings that had been made.

480. A closing meeting would take place with the management of the business at which the audit team would present the draft findings, recommendations, and ratings from the audit. After the closing meeting, the management of the business was required to inform the audit team of the action which management intended to take to address each finding, including giving a responsible person and due date for implementing each management action. The management actions were recorded in an action tracker, so that progress could be monitored.

481. The draft audit report would be sent to the audit sponsor for their final review, comments and management action plans, following which the report would be finalised and issued to senior management. In the case of Samarco, this included the CEO at Samarco, the CEO at Iron Ore and senior managers within RAA.

482. Mr Wetzig was engaged by RAA to support business audits in aspects that required technical knowledge, in particular audits of project management. He reported to Peter Lynch, who was senior manager for business audits in South America, and who reported to Garner Dotson. He was assigned to conduct technical audits alongside Neil Salvano, a manager in the technical team.

483. The technical audits involved an inspection of the asset and infrastructure, interviews with individuals responsible for specific controls and risks associated with the maintenance and operation of the facilities, and review of documentary records. The auditors prepared drafts of any findings, followed by a moderation meeting attended by the whole audit team, to review the draft findings and proposed ratings. The audit reports would give a process rating, such as "Well-controlled", "Requires some improvement", or "requires significant improvement" which was intended to present an overall assessment of the risk and control environment, based on the number and severity of the findings in each process area and taking into account the scope of the audit.

484. Proposed management actions would be recorded in the audit report, with a date by which the remedial action was to be implemented. The audit manager would circulate a draft report for review and any comments from RAA and the business, before issuing a final report. BHP internal audit would conduct checks to verify that the agreed actions were implemented by the agreed date.

485. In summary, BHP Group RAA assumed responsibility for risk assessment, control, mitigation and management within the BHP Group. At least from 2013, this included responsibility for all Samarco risks. As part of that responsibility, BHP planned, designed and carried out financial and technical audits of Samarco's operations, the findings of which were reported to, and considered by, BHP at the GMC and subsequently monitored.

(vi) The P3P Project

486. Between 2003 and 2005, as Vice President and chief development officer ("CDO") of the Carbon Steel Materials CSG in BHP (including BHP Iron Ore), Mr Beaven's

primary role was to expand the CSG's business in Brazil. In particular, the Third Pellet Plant ("P3P") project was intended to substantially increase Samarco's annual iron ore production capacity by nearly 8 million metric tonnes at an effective cost to BHP of about US$590 million.

487. Mr Beaven was an alternate director of the Samarco Board and, as such, he attended Samarco Board meetings in that period. He confirmed in evidence that it was not unusual for representatives of BHP and Vale who were not formal members of the Samarco Board to attend board meetings:

> "I wouldn't be surprised to see that person attending the board because they would have had some involvement with the Samarco team prior to the board taking place and they would presumably be interested in seeing that what they had discussed with the Samarco team prior was actually reflected in the board, and then, in the event that there was discussions post that board, they would have heard the information first-hand. "

488. Samarco officers and general managers would also attend the Samarco Board meetings but they would make presentations on relevant topics and then leave the board members to their deliberations. The decision by Samarco as to whether it should undertake a project such as P3P was made by the Samarco Board, the members of which were appointed by BHP and Vale. At the Samarco Board meeting on 29 June 2005, the Board resolved to support the Samarco P3P project study and approved Samarco's request for funding. Although Samarco's management team was given authority by the Board to carry out preliminary engineering investigations and feasibility studies, any formal commitment to the P3P project had first to be endorsed by the Board.

489. BHP employees who were directors of Samarco, were subject to internal limits on their authority imposed by BHP. Investments above their level of authority necessitated approval through the BHP investment committee process.

490. The investment process at BHP entailed the following stages: (i) the identification phase stage ("IPS"), which confirmed the business case for a project at a high level and recommended option; (ii) the selection phase stage ("SPS"), during which the project's business case was refined to a greater level of detail and probability; and (iii) the definition phase stage ("DPS"), in which the business case and planning details were confirmed in greater detail and probability, and it was determined whether there was a sufficient business case to seek approval for the project from the BHP Board. Projects over a certain threshold, also required an independent peer review ("IPR").

491. The P3P project required an IPR. The terms of reference for the P3P project IPR were set out in a memorandum dated 13 July 2004. IPR reports were produced in June, August and September 2005.

492. By a memorandum dated 12 October 2005, Mr Goodyear, the CEO of BHP, attached for the BHP Board the investment approval request for the P3P project, recommending the Board approve the Samarco expansion to proceed to execution.

493. On 19 October 2005 at a BHP Board meeting, BHP approved capital expenditure of US$589 million (BHP's share) in respect of the P3P project. On 20 October 2005 at a

Samarco Board meeting, the Samarco Board approved the P3P project with a budget of US$ 1,183 million.

494. Mr Beaven's evidence was that:

> "Q. … if the BHP board had not approved the project the day before, as I understand your evidence, the BHP representatives on the Samarco board, on 20 October, would not have been authorised to approve the project and would not have approved the project; is that fair?
>
> A. That's fair.
>
> Q. And presumably the same result would have followed if the investment committee of BHP had not endorsed the execution of P3P and had not allowed it to be taken forward for approval by the BHP board?
>
> A. That's correct."

495. In summary, BHP undertook its own assessments of the risks and benefits of the P3P project. BHP used its internal investment processes to consider the project and commissioned an independent peer review of the same. BHP Board approval was required before the BHP Brasil-appointed directors on the Samarco Board could approve the P3P project. In reality, the decision was taken by BHP and Vale.

(vii) The P4P Project

496. BHP Iron Ore's growth strategy was reflected in the CSG's five-year plan guidelines for Y2012-2016:

> "The Iron Ore vision is to be the premier global iron ore producer. The primary objective is to deliver long-run value for our shareholders through safe, sustainable, and profitable growth of Western Australia Iron Ore and Samarco, plus secure additional global opportunities.
>
> …
>
> Samarco's growth strategy is to increase pellet capacity to around 30Mtpa by 2014 through the development of the fourth pellet plant project (P4P). Further, Samarco's Shadow RDP has identified sufficient development potential to support a fifth phase of growth."

497. The milestones identified in the plan included the following actions for BHP Iron Ore Brazil: (i) 5 Year Plan Financials and 10 Brazil Overview issued to Chris Campbell for review and final sign off; (ii) Update Samarco 5 Year Plan Financials and summary submitted to CSG for review; and (iii) Samarco 5 Year Plan final sign off.

498. The final BHP Iron Ore 5 Year Plan, dated 10 May 2011 and signed by Mr Ashby, the President of Iron Ore, stated:

> "Samarco will carry out the approved growth program which includes the successful execution of P4P (fourth pellet plant), conclusion of P5P (fifth pellet plant) studies and submission to the Board for execution, and conclusion of P6P (sixth pellet plant) identification phase studies. Through delivery of this growth program Samarco's pellet production is expected to reach a capacity of 30Mtpa."

499. The 5-year capital expenditure programme for Samarco included substantial investment in respect of the P4P project, namely, USD 71 million (2011), USD 425 million (2012), USD 718 million (2013) and USD 554 million (2014).

500. The decision whether to proceed with the P4P Project was a decision for the Samarco Board. However, in order for the BHP Brasil-appointed directors on the Samarco Board to be authorised to vote in favour of the investment at a Samarco Board meeting, the P4P Project investment would first need to go through the BHP Board, consistent with the BHP Delegation of Authority levels at that time. This meant that the P4P Project had to go through BHP's Investment Committee process.

501. On 21 October 2010 an Iron Ore Exec Meeting was held, attended by Mr Campbell in his capacity as the incoming Vice President of Strategy and Business Development, at which it was decided that Iron Core ExCo would grant approval for execution of the P4P project at the December 2010 Samarco Board Meeting, subject to BHP Board Approval. It was agreed that Mr Ashby would take the project forward to Mr Randolph and the BHP Investment Committee on 14 December 2010 for approval to take to the BHP Board in February 2011.

502. At the Samarco Board pre-meeting on 8 December 2010, the Iron Ore members agreed that they would approve the P4P project at the Samarco Board Meeting. However, Vale wanted to delay the project, as explained by Mr Randolph in his email to Mr Kloppers of the same date:

> "This project has not received the environmental approval necessary to construct the pellet plant. It sounds like this isn't going to be received until early-mid March. Additionally, key agreements around waste dumps and tailings disposal are not in place. The Samarco Board therefore deferred a decision on P4P until the April Board. Martins has given me his word that Vale will approve it at that Board. We will therefore restructure our internal BHPB approvals to have them done before April. Next weeks IC meeting on this will be cancelled."

503. In due course, the BHP Investment Committee endorsed the P4P project, subject to licensing approvals. At the Board Meeting on 2 February 2011, the BHP Board agreed to delegate authority to Mr Kloppers, the CEO, to approve the requested capital expenditure for execution of the P4P project. Mr Kloppers approved the relevant expenditure and the P4P project went ahead.

504. There remained some concern within BHP that Vale might withhold its consent to the project; if so, that would require BHP to use the deadlock provisions in the SSA to implement it but that could necessitate Samarco funding the project through cashflow.

Notwithstanding those concerns, negotiations between BHP and Vale continued and agreement was reached.

505. At the Samarco Board Meeting on 6 April 2011 the long-term mine plan was discussed, including consideration of the tailing storage capacity necessary to support the P4P project. The project was approved:

> "The Board approved the P4P project for execution as presented, subject to the approval of the project by the Administrative Board of Vale, expected by April 19th. The Board also approved the immediate establishment of the P4P Steering Committee, whose composition and structure should be proposed by Samarco and ultimately approved by the Operations Committee."

506. The P4P Steering Committee was established to oversee and deliver the P4P project. It comprised representatives of Samarco, Vale and BHP. Its role was to provide direction and guidance to Samarco and it had authority to make decisions regarding changes to the scope, schedule and budget of the project up to a cap. The role of the BHP representative, Mr Ferreira, a BHP project manager, was to monitor physical and financial indicators, as well as risk management, safety and environmental aspects of the project, conduct assessments and provide regular reports to the CSG, for the Execution Phase Review ("the EPR") and to the P4P Steering Committee. Alan Paddon was appointed as Leader of the EPR.

507. For the project execution phase, Paulo Rabelo was appointed as the Project Director. Bill Marshall, who had worked on other BHP projects, was appointed to the project team to provide support to the Samarco project general manager, Maury de Souza. BHP was concerned that they did not have the requisite skills and experience and recommended that a close eye should be kept on the project.

508. Thus, although it followed the formal processes through the Samarco Board, the decision to go ahead with the P4P project was taken by BHP and Vale. Control and monitoring of the P4P project by BHP continued from the initial feasibility studies through to project execution.

(viii) Project 940

509. A further example of BHP's involvement in, and control over, the activities of Samarco is Project 940, which entailed raising the dam to El. 940m. The Project 940 Working Group was established in 2015 to supervise the implementation of Project 940. During Governance Update Meetings BHP, Vale, and Samarco representatives discussed construction, planning, engineering, health and safety and CAPEX matters associated with the project. They received monthly reports, documenting project risks, including the risk of failure in the foundation of the dam during execution of the work, and the risk of liquefaction.

(ix) Financial investment and benefit

510. Mr Matthew Gillespie was acting Financial Controller for the Iron Ore CSG between May 2010 and October 2012 and Financial Controller from October 2012 until January

2015. He also sat on Iron Ore's RAC, with a focus on financial, rather than operational, risks. His evidence was that Samarco contributed about US$500 million per year on average to the BHP Group. In the financial year 2012, Samarco contributed US$1 billion to BHP's underlying EBIT.

511. The P4P Project was approved and funded by a Samarco bond issue. At a BHP Board meeting held on 15-16 August 2012 it was recorded that:

> "The Board noted the report from the Finance Committee Chairman that the Finance Committee has agreed to recommend to the Board that it consider delegating authority to the Finance Committee to among other things, approve: … asset financing for … the Samarco joint venture, in the amount of up to … US$1,000,000,000 … to support growth capital expenditure projects that are already Board approved … and
>
> the Board noted that if the delegation is made, the Committee will be presented with information in relation to the funding costs for any debt raising it is asked to approve."

512. The Samarco transaction documents for the bond issue were subject to scrutiny and endorsement by Group Treasury at BHP.

513. The Samarco Board made the decisions as to the level of dividends Samarco would pay to its shareholders but, in practice, this was decided between the shareholder representatives in advance of the Board meetings. Where issues arose as to the level of dividends, Samarco asked the shareholders to propose a plan for the dividends and recommend the budget. Dividends were repatriated to the shareholders on a 50:50 basis, and BHP's share would be divided equally between the DLC entities. For that purpose, BHP Group Treasury had direct access to BHP Brasil's bank account.

514. There was a tension between Vale's more aggressive approach to borrowing in order to pay dividends and BHP's more conservative approach, that was wary of Samarco borrowing funds to pay dividends as well as raise debt for the P4P project. An agreement was ultimately negotiated by Vale and BHP through the Finance and Strategy Committee that was adopted by Samarco in its Board meeting. By email dated 26 July 2013, Chloe Lennox, Manager, Group Treasury and Corporate Finance at BHP stated:

> "Our Treasury meeting with Vale and Samarco went well yesterday and, as expected, they are happy to raise funds to allow for the flexibility to pay a dividend if the market continues to be strong. Unfortunately we have not received the financial forecast from Samarco yet and we are still confirming the form of the Board paper for the US Bond. We will send them through to you once we have them though."

515. Mr Gillespie agreed that BHP's strategy prevailed:

> "Q. So what we see, don't we, is BHP Group Treasury, via Chloe Lennox in particular, playing an active role in both the Treasury

> Sub-committee and the Finance and Strategy Committee of Samarco in order to push the BHP view as to the optimum use of funds through Samarco; yes?
>
> A. No, I don't agree with that. The committee is a formation of a number of representatives from Samarco and BHP and Vale, so to refer to Chloe as the architect would be unfair.
>
> Q. Well, obviously Chloe needs to bring Vale round to her view of things, but we saw in the email that that's precisely what she thought she had achieved, isn't it?
>
> A. Yes, it would refer to that -- yes, I'd agree with that."

516. The dividend was approved at the Samarco Board meeting on 4 December 2013.

(x) Non-controlled joint venture

517. It is said by BHP that Samarco was an independent, non-controlled joint venture. The Claimants' case is that Samarco was not independent; it was controlled and operated by BHP and Vale as a valuable asset.

518. In 2008-2009 Booz & Co were commissioned to carry out a review of the corporate governance of Samarco. The report contained a number of recommendations, including the following:

i) Samarco should be seen as a venture that acts on shareholders' decisions, rather than one that pursues its own business purpose. The JV is a format for negotiating and reaching agreement on operating a company that benefits both parties. Appointed members of the JV board represent the parent companies' interests. The objective is to maximise value within decisions made by the shareholders.

ii) The vision for Samarco is a shared asset of parent companies whose objective is to maximise value given shareholders' decisions on key strategic issues. The Board represents the parent companies' interests, negotiating and ensuring agreement, also within the shareholders' decisions. Management act on the board's decisions rather than on their own to further the JV.

519. The Booz recommendations were adopted by Samarco as set out in its corporate governance document dated 5 December 2014. That document described Samarco as a privately held company, controlled in equal parts by Vale and BHP Brasil and stated that the model adopted by Samarco was a Joint Venture that acts in line with shareholders' decisions, rather than pursuing its own business purpose:

> "▪ The Joint Venture in a format of negotiation and reaching agreements to operate the company in a way that benefits both parties
>
> ▪ Aims to maximise value in line with the decisions made by shareholders

> ▪ Members appointed to the Joint Venture's Board of Directors represent the interests of the shareholders
>
> ▪ The Executive Board has limited freedom to decide on more strategic issues, which requires prior agreement between the shareholders."

520. Graham Reynolds of BHP and Mr Wilson, then President of BHP Iron Ore, agreed that Samarco was an "Independent Joint Venture", defined in BHP's operating model GLD.001 as:

> "A defined non-controlled joint venture and minority interest that is a producing entity valued above the group approval threshold where BHP Billiton either jointly operates or has influence via management appointment processes and has an ability to implement selected BHP Billiton standards."

521. This can be contrasted with a Third Party Operated Joint Venture, which was defined as:

> "A defined non-controlled joint venture and minority interest that is a producing entity valued above the group approval threshold where BHP Billiton has limited or no direct influence and cannot implement BHP Billiton standards."

522. Regardless of the label attached to it, Samarco did not operate as an independent, arms' length company. From its corporate objectives through to operational management and activities, in practice, it was controlled and operated by BHP and Vale.

Conclusions on responsibility

523. Drawing together the above strands of evidence, I conclude that BHP (together with Vale) was directly and/or indirectly responsible for the activity of Samarco in owning and operating the Fundão Tailings Dam.

524. First, it is important to appreciate that Article 3, IV of the Environmental Law provides that a corporate entity can be directly or indirectly responsible for the polluting activity. Implicit in the provision is recognition that responsibility is not limited necessarily to direct corporate or other legal ownership, or direct operation of the facility in question. Although BHP UK and BHP Australia were separate legal entities and Samarco was a separate company, through the DLC structure and the organisation of companies within the BHP Group, BHP (together with Vale) were the ultimate owners, controlling shareholders and the directing mind of Samarco. BHP Brasil was a holding company set up for the purposes of investment in Samarco. In practice, the Iron Ore CSG/Business, Iron Ore Brazil and Samarco operated as part of a single BHP Group.

525. Second, Samarco's corporate governance structure, through the SSA and the Samarco Byelaws, facilitated BHP's ability to control Samarco with Vale. The SSA provided for appointments to the Samarco Board to be determined by BHP (with Vale), ensuring that their interests were always represented. The Executive Board was subservient to

the will of the Samarco Board and, therefore, subservient to the will of BHP and Vale. As BHP and Vale were 50/50 shareholders, almost all decisions of the Samarco Board could only be made by their joint agreement.

526. Third, BHP used their powers under the SSA to exercise control over Samarco. BHP and Vale membership of the committees and sub-committees established by the Samarco Board ensured that BHP, through BHP Iron Ore and the Iron Ore Brazil team, were involved in the activities of Samarco at every level, from strategic decisions and dividend shares to detailed operational matters.

527. Fourth, BHP assumed responsibility for risk assessment, control, mitigation and management within the BHP Group and specifically within Samarco. BHP carried out financial and technical audits of Samarco's operations, the findings of which were reported to, considered and monitored by, BHP at the GMC.

528. Fifth, BHP exercised control over Samarco's activities, including its short and long-term strategy, investments, production, financial and technical risk assessment and management through the audit process, funding arrangements and the payment of dividends.

529. Sixth, BHP participated and was involved in Samarco's activities. In particular, BHP reviewed, assessed, approved and funded (or facilitated the funding of) the P3P Project, the P4P Project and Project 940. In addition, BHP monitored and procured management of the implementation and execution of those projects.

530. Finally, Samarco was an asset in which BHP substantially invested and from which it derived substantial financial and commercial benefits.

531. For the above reasons, I conclude that BHP were directly and/or indirectly responsible for the activity of Samaro which caused the collapse. As such, they were polluters for the purpose of Articles 3, IV and Article 14, paragraph 1 of the Environmental Law.

532. It is not disputed that the mining and tailings storage activity of Samarco caused the environmental damage suffered as a result of the collapse. It follows that BHP are strictly liable for the collapse of the Fundão Dam.

Alternative strict liability case

533. The Claimants' secondary strict liability case is based upon Article 927, sole paragraph, of the Civil Code, which provides that:

> "There will be an obligation to redress the damage, regardless of fault, in the cases specified by law, or where the activity usually developed by the author of the damage involves, by its nature, risk to the rights of others."

534. It is common ground that this general strict liability regime only applies where a special regime does not. It is also common ground that the Environmental Law is a special regime which applies to cases of environmental damage. The claims brought by the Claimants are made pursuant to the Environmental Law in respect of environmental

damage. It follows that this provision does not apply to this case and it is unnecessary to consider its potential application.

10. FAULT-BASED LIABILITY

The Issues

535. The Claimants rely on three alternative arguments for their fault-based claim. The primary case on fault-based liability is pursuant to Article 186 of the Civil Code. The allegation is that BHP by commissive and/or omissive negligent conduct caused the collapse; BHP had a positive duty to mitigate the risk of a collapse arising from their creation and/or contribution to the risk and/or voluntary assumption of responsibility in respect of the risk. It is said that the risk of liquefaction was readily foreseeable and detectable prior to the collapse; this did not depend on the identification of the precise liquefaction trigger. It was apparent by August 2014, at the latest, that the dam was showing serious signs of distress, and the continued raising of the dam should have stopped until it was made safe.

536. The secondary case is that if, contrary to their primary argument, Article 186 of the Civil Code requires the Claimants to establish a specific legal duty to act, that requirement is satisfied by BHP's failure to protect the environment under Article 225 of the Constitution and/or BHP's breach of duty to members of the community in which Samarco operated, under Article 116 of the Corporate Law.

537. The tertiary case is that if, contrary to their primary and secondary arguments, fault-based liability is not established under Article 186 of the Civil Code, the Claimants rely on Articles 116 and 117 of the Corporate Law, which provide for the liability of controlling shareholders who have acted in breach of the duty to respect and loyally heed the rights and interests of the community, including by abusive exercise of their controlling power.

538. BHP's case is that they did not cause the collapse by any culpable voluntary act or omission within the meaning of Article 186 of the Civil Code. The Claimants' case is misconceived because it involves an attempt to make BHP liable in respect of Samarco's operations. The requirements of Article 186 are not satisfied because: (a) BHP did not commit an unlawful act, or an unlawful omission in breach of a specific legal duty to act; (b) BHP did not breach any standard of care or duty; and (c) in any event the Claimants have not established the necessary causal link between the alleged acts or omissions and the collapse. There was no fault. Lateral extrusion as a trigger for liquefaction was not widely recognised and there was not any recognised process to test for lateral extrusion. Therefore, failure by liquefaction flowslide was unforeseeable.

539. In response to the secondary case, it is said that Article 225 of the Constitution and Article 116 of the Corporate Law do not give rise to specific legal duties that can be read across to Article 186 of the Civil Code so as to satisfy the requirement for breach of a specific legal duty in respect of omission cases.

540. In response to the tertiary case, it is said that Articles 116 and 117 of the Corporate Law give rise only to duties to a controlled company itself, actionable by the company (or its shareholders through a derivative action); they do not create any freestanding rights of claim to third parties, such as the community. Article 116 constrains the use of

controlling power, when exercised by a controlling shareholder but it does not give rise to any duty to ensure that its activities are conducted in a way which minimises the risk of damage to the community. In any event, it is said that none of the matters alleged by Claimants would fall within the scope of abuse of controlling power provided for in Article 117.

Article 186 of the Civil Code

541. Article 186 of the Civil Code states:

> "Anyone who, by voluntary act or omission, negligence or imprudence, violates a right and causes damage to another, even if exclusively moral damage, commits an illicit act."

542. Article 927 (head paragraph) of the Civil Code states:

> "Anyone who, through an illicit act (articles 186 and 187), causes harm to another is obliged to repair it."

543. Professor Rosenvald and Professor Tepedino prepared a joint statement dated 15 April 2024 on the material Brazilian law expert issues of fault-based civil liability. They agree that the requirements for imposing fault liability under the Civil Code are: (i) illicit/unlawful conduct by voluntary act or omission; (ii) fault; (iii) damage; and (iv) a causal link between the illicit/unlawful conduct and the damage.

544. The experts agree that Article 188 of the Civil Code exonerates a defendant who acts in legitimate defence or in the lawful exercise of a recognised right, or to remove an imminent danger to property, none of which is in play in this case. Further, they agree that where damage is caused by the unlawful conduct of more than one person so as to attract liability under Article 186, those persons will be jointly and severally liable to the claimant pursuant to Article 942 of the Civil Code.

545. The issues between the legal experts are as follows:

i) whether liability for omissions depends on the breach of a specific legal duty and, if it does, the source of the duty;

ii) what is required to establish fault for the purpose of Article 186;

iii) the correct approach to causation;

iv) whether a shareholder can be liable for damage directly caused by the company's acts or omissions under Article 186.

(i) Act or omission

546. It is common ground that the requirement of unlawfulness requires the Claimants to establish that the relevant act or omission was contrary to the legal system. There is an issue between the experts as to whether this requirement can be satisfied only by violation of a written law or contract, or also by violation of general principles or customs.

547. The legal experts agree that an illicit activity occurs through wrongful behaviour, namely, an act that is negligent, imprudent or lacking in skill, that violates a right, causing damage to others. In relation to commissive acts, there is no requirement to demonstrate that the defendant acted contrary to any specific legal duty because Article 186 of the Civil Code embraces the principle of *neminem laedere*, the duty not to cause harm.

548. A dispute exists between the legal experts as to what is required for the imposition of civil fault liability in respect of omissions. There appears to be consensus among the academic writing of jurists that not every omission leads to civil liability (Caio Mário da Silva Pereira); there is no general obligation to avoid damage to others; only an obligation not to cause harm (J.M de Carvalho Santos); and no liability arises for mere failure to act in respect of a moral duty (Pontes de Miranda). None of that is in dispute. The issue is centred on what gives rise to the legal duty; whether, in an omissions case, breach of a pre-existing specific legal duty to act must be demonstrated, or whether the Brazilian Courts adopt a broader approach to identify any legal duty, applying a rolled up test of whether the omission was negligent against the pre-existing factual circumstances of the case.

549. Professor Rosenvald's opinion is that although there are different concepts of act and omission in civil liability, in practice, Brazilian courts do not differentiate between acts and omissions. Usually, all the requirements of Article 186 of the Civil Code are interpreted together; the main reference point for both illicit acts and omissions is the defendant's negligence. Conceptually, although it can be said that omissions require a pre-existing duty to act, omissions are enforceable on the same terms as negligent acts. In particular, Professor Rosenvald's view is that there is no need to identify a specific legal duty set out in legislation; the duty may arise from the defendant's conduct, by reason of the creation of, or contribution to, a risk. Thus, the duty may arise from different sources, such as a written legal duty, conventions or prior acts, such as the creation or contribution to a risk, or assumption of responsibility for a risk.

550. Professor Tepedino's opinion is that omission consists of undue abstention, that is, it occurs when the defendant does not perform an act or adopt behaviour that he was required to perform or adopt by virtue of written law or contract. Therefore, to be considered illicit, an omission is subject to a previously established legal or contractual duty. The violation of a pre-existing legal or contractual right is determined on the basis of the concept of normative fault, according to which an agent who violates a certain standard of behaviour which is reasonably expected under the circumstances of the specific case is at fault.

551. Professor Rosenvald and Professor Tepedino discussed in their reports and were cross-examined on a number of STJ and other cases in which the nature and basis of the pre-existing legal duty were considered.

552. In the *Tobacco Case* STJ Special Appeal 1.113.804 (2010), the STJ rejected a claim for moral damages against a cigarette manufacturer by the family of a smoker who died from lung cancer on the ground that the defendant did not owe any legal duty to inform the deceased of the risks of smoking. However, in delivering the unanimous judgment of the court, Reporting Justice Salomão considered whether the principle of good faith and, consequently, the accessory duty of information, was engaged by reference to the general principles of law or customs and the reasonable views of people in the relevant

period, prior to introduction of the Consumer Defence Code and restrictive smoking legislation. This analysis assumed that the material legal duty could arise outwith the letter of the law through general principles of the law or from customs forming part of the legal system.

553. As explained by the Reporting Justice, the central question was whether there was:

> "a legal duty that is extracted neither from the cold letter of the law, nor from the subjectivism of the hermeneut of the law, but, eventually, from the legal system, understood as a coherent system with its own rules and principles, with contents variable over time and space.
>
> …
>
> [I]t follows that 'unlawfulness', which gives rise to civil liability, is not synonymous with 'illegality', but with violation of a pre-existing duty contemplated by the system, either by law or by principles deriving from the law."

554. The *Bus Robbery* case, Superior Labour Court (SLC) 28900-66.2006.5.17.0007 (2011) concerned a claim against an employer by the estate of a bus driver employee who died when his bus was attacked by robbers. The employer was held liable because it had failed to install measures to keep the employee safe. The court stated that, when the employer's omission is at stake, the following aspects must be taken into account: a) the existence of a duty to act (which can come from the law, a legal transaction or even the creation of a risk to the legal interest being protected); b) the creation of a situation of specific danger to the legal interest being protected by the fact that generates the duty to act; c) the possibility of adopting measures aimed at preventing the conversion of the danger into actual injury; and d) the employer's conduct in face of the aforementioned duty (which, in order to give rise to its liability, must be omissive or different from that required by the mandatory rule).

555. Although Professor Tepedino identified that, on the facts of the case there were a number of other specific legal duties on the employer, nonetheless, the SLC considered liability with express regard to Article 186 of the Civil Code and stated:

> "Civil liability for omission arises from the failure to fulfil the duty to prevent injury to the protected legal sphere of others. This duty can come from the law, from a legal transaction or from the risk created for the legal interest."

556. In the *Hospital Escape Case* STJ Special Appeal 1.307.032 (2013) a claim was brought against a hospital after a 15-year-old patient was hospitalised for treatment of bacterial meningitis. The patient escaped from the hospital before his treatment was completed. He was not returned to the hospital but sent by his parents to other hospitals. His health continued to deteriorate, and he died three days later. Reporting Justice Araújo considered that civil liability required conduct by act or omission of the defendant *"whether or not derived from a pre-existing legal duty, depending on the nature of the obligation giving rise to the liability."* In his concurring judgment, Justice Buzzi took a different position, namely, that *"conduct by omission, capable of generating a duty*

to redress presupposes the existence of a pre-existing legal duty, of which the party that had the duty of watching the patient, did not do so."

557. The *Wire Fence* case STJ Special Appeal 1.860.324 (2021) was a claim brought by the family of a motorcyclist killed in a road accident. The defendant farmer had, a few months before the accident, lawfully removed the gate to his private road and replaced it with a wire-fence that turned the previously straight road into a curved road. Although it was known that there would be other local traffic on the road, he failed to signal the detour or the fence. The motorcyclist collided with the fence. Delivering a unanimous judgment, Reporting Justice Andrighi stated that the defendant's liability did not stem from the construction of the wire fence on his land or the absence of a gate to his property; rather, liability was based on the defendant's creation of a risk, giving rise to a duty to provide a warning sign of the danger.

558. In the *Negligent Birth* case STJ Special Appeal 1.698.726 (2021), the STJ considered principles applicable to omissive conduct and whether there was a causal link between the conduct of the doctor who assisted in the delivery and the injury to the minor. The omissive conduct of the doctor was established as a failure to monitor the labour correctly and keep a proper record in the medical notes. Reporting Justice Villas Bôas Cueva stated that:

> "The causal link as an assumption of civil liability is better assessed, in the legal-normative plan, according to the theory of adequate causality, in which the occurrence of a certain fact makes the occurrence of the result probable.
>
> … in cases of omissive conduct, causation must be assessed normatively, based on the agent's legal duty to avoid the damaging result (or produce a different result), whether of a legal, contractual nature or because the agent itself has created or aggravated the risk of the occurrence of the result".

559. BHP submit that this statement was in relation to causation, and so far as concerns the duty question, obiter, because, as Professor Tepedino noted, the doctor's liability in that case was expressly based on his failure to comply with a specific legal duty. Notwithstanding those valid points, Justice Cueva took the opportunity to clarify the broader test, by quoting from the academic text of Domingos Riomar Novaes:

> "For Sérgio Cavalieri Filho, the omission cannot even physically or materially generate the damage, since "nothing comes from nothing". Nevertheless, it acquires sufficient legal relevance to assign liability to the agent when it evades the legal duty to act to avoid the production of the damage. The [author] points out that the legal duty to act, to perform an act aimed at preventing the damaging result, may originate in the law, in a legal transaction or even in a conduct previously practiced by the agent itself that has, with it, created the risk of the occurrence of the result. In such cases, not preventing damage from occurring would be the same as allowing the cause to operate."

560. In the *Rally* case, STJ Special Appeal 2.108.182 (2024), the organiser of a rally was found liable to pay moral damages to the wife of a driver who had an accident but was not assisted by the defendant's medical team and ambulance who did not go to the scene of the crash. The STJ held that the defendant was liable by its omissive behaviour in deliberately failing to send ambulances to the scene of the accident. Reporting Justice Andrighi explained that the event consisted of a motor racing competition; therefore accidents were foreseeable, as evidenced by the defendant, as organiser, procuring ambulances and medical staff at his disposal. In this context, the appellant had the legitimate expectation that her husband, as an amateur pilot participating in the event, would receive, at the very least, a rescue attempt by the medical team or ambulances present, in the event of an accident. The organiser's failure to deploy the medical team amounted to omissive and negligent behaviour.

561. Professor Tepedino suggested that the duty to provide assistance in this case could have arisen through contract, the criminal law or medical ordinance but none of those was referred to in the judgment as the basis for a pre-existing legal duty. Professor Rosenvald's explanation that this must have been based on assumption of responsibility as a source of the legal duty is more consistent with the court's analysis.

562. In the *Odair* case, TJPR State Court of Parana 0001084-23.2019.8.16.0075 (2022), the claimant's son was invited by Mr Odair to swim in a reservoir. He drowned. Mr Odair was found liable. The TJPR found that Mr Odair created the risk by inviting the minor to swim in an inappropriate place, thereby undertaking the position as guarantor of the minor's safety. Reliance was placed on the legal scholarship of Sergio Cavalieri Filho, who explained civil liability for omission as analogous to liability under the Penal Code arising out of an assumption of responsibility and creation of risk. BHP's position is that this case does not assist because it is not an STJ case and relies on an academic theory that Professor Rosenvald accepted in cross-examination is a minority view. Further, as Professor Tepedino explained, the case could be explained as unlawful commissive conduct, the invitation to swim and illegal entry into the reservoir. I accept that this case is of limited assistance for those reasons.

563. Weighing up the views of the Brazilian legal experts against their evidence on the material STJ cases and legal doctrine, I prefer Professor Rosenvald's opinion on this issue for the following reasons.

564. First, Article 186 of the Civil Code establishes the general principle that prohibits the violation of the rights of third parties, summarised in the maxim *neminem laedere*, not to cause harm.

565. Second, Article 186 is a general provision that, on its face, does not seek to circumscribe the situations in which fault liability may arise as the result of an act or omission.

566. Third, against that background, the absence of any express stipulation, that a relevant omission must be in breach of a specific written legal duty, provides support for Professor Rosenvald's opinion that illicitness can derive from a broader scope of rules and principles arising from the pre-existing facts of a particular case, such as creation of the risk or assumption of responsibility.

567. Fourth, further support for Professor Rosenvald's stance can be found in the STJ case law, (a) as a matter of theory - *Tobacco Case* STJ 1.113.804 (2010); *Negligent Birth*

Case STJ 1.698.726 (2021); and (b) by application - *Hospital Escape Case* STJ 1.307.032 (2013) (Reporting Justice Opinion); *Wire Fence Case* STJ 1.860.324 (2021); and *Rally Case*, STJ Special Appeal 2.108.182 (2024).

568. Fifth, I note that other courts appear to have adopted a similar approach - *Bus Robbery Case*, SLC 28900-66.2006.5.17.0007 (2011) and *Odair*, TJPR 0001084-23.2019.8.16.0075 (2022). Although little weight can be placed on the cases which are not STJ decisions, they are consistent with the general thrust of the STJ judgments.

569. Sixth, support for Professor Tepedino's position can be derived from the dissenting (but concurring) opinion of Justice Buzzi in the *Hospital Escape Case* STJ 1.307.032 (2013). However, that does not displace the weight of the evidence in favour of the broader approach to identification of a pre-existing legal duty, namely, that is not limited to the written law or contract but can extend to a duty arising out of the factual circumstances, including creation of the risk or assumption of responsibility.

(ii) Article 225 Constitution & Article 116 Corporate Law

570. Having reached the above conclusion, it is not strictly necessary to consider the alternative basis for a pre-existing specific legal duty, namely, Article 225 of the Constitution and/or Article 116, sole paragraph of the Corporate Law. I deal with it briefly. I reject the Claimants' secondary argument that Article 225 of the Constitution or Article 116 of the Corporate Law could be relied on to give rise to a specific legal duty for the purpose of Article 186 of the Civil Code.

571. The argument based on Article 225 has fallen away. Professor Rosenvald clarified that there was an error in his original report, incorrectly linking Article 225 of the Constitution with illicitness as provided in Article 186 of the Civil Code. That error was corrected in a list produced prior to his oral evidence and confirmed in cross-examination:

> "Q. So just so we're very clear, you're not contending for a combination of Article 225 with Article 186? You're not contending for that? You're contending instead for a combination of 225 with 927, sole paragraph; is that correct?
>
> A. Precisely."

572. Having already dismissed any claim based on Article 927, sole paragraph of the Civil Code, strict liability arising, if at all, pursuant to the Environmental Law, there is no need to consider whether, and if so, how, Article 225 might operate with Article 927.

573. In any event, Professor Tepedino's opinion, which I accept as correct, is that Article 225 of the Constitution is a general provision; it could not be relied on as giving rise to liability under Article 186 in the absence of another specific legal obligation. Professor Rosenvald confirmed in cross-examination that he was unaware of any case where liability for damages was based on Article 225 of the Constitution.

574. Article 116, sole paragraph, of the Corporate Law provides:

> "The controlling shareholder must use its controlling power with the aim of making the company achieve its object and fulfil its social function, and has duties and responsibilities towards the other shareholders of the company, those who work in it, and the community in which it operates, whose rights and interests must be loyally respected and heeded."

575. Article 117 of the Corporate Law states:

> "A controlling shareholder shall be liable for any damage caused by acts performed with abuse of power.
>
> 1. An abuse of power may take any of the following forms:
>
> (a) guiding the corporation towards purposes unrelated to its corporate object or harmful to national interests …
>
> …
>
> (g) …to approve, or cause to be approved, irregular accounts rendered by managers (officers and directors) as a personal favour, or to fail to investigate a complaint which he knows, or should know, to be well founded, or which gives grounds for a reasonable suspicion of irregularity.
>
> …"

576. Article 246 of the Corporate Law states:

> "A controlling company shall be obliged to compensate any damage it may cause to a controlled company by any acts infringing the provisions of articles 116 and 117.
>
> 1. Proceedings for compensation may be brought by:
>
> (a) shareholders representing five per cent (5%) or more the capital;
>
> (b) any shareholder, provided he guarantees payment of court costs and legal costs in the event of the action being dismissed."

577. The Claimants' argument that Article 116, sole paragraph of the Corporate Law imposes a legal duty on a controlling shareholder, breach of which can constitute an actionable omission under the terms of Article 186 of the Civil Code, does not stand up to scrutiny. As Professor Tepedino explained, Article 116, sole paragraph, establishes a general principle that requires the controlling shareholder, when exercising its controlling power, to use that power to ensure that the company accomplishes its purpose and observes its social function. The duties and responsibilities imposed on the controlling shareholder under those provisions are solely related to the controlled company and its shareholders, and do not create any autonomous duties or responsibilities towards third parties.

578. Professor Tepedino explained in his reports and in cross-examination that, where a controlling shareholder breaches Article 116, sole paragraph by an omission, this cannot be relied on as illicitness under Article 186. When read together with Articles 117 and 246, it is clear that the regime of liability for a controlling shareholder under the Corporate Law is concerned with the rights and interests of the controlled company. This is reflected in the distinct scope of liability under Article 117, directed towards damage to the controlled company caused by abuse of power by the controlling shareholder, together with the restricted classes of shareholders permitted to bring claims for compensation arising out of infringement of Articles 116, sole paragraph and 117.

579. Professor Rosenvald was not able to identify any case, or legal doctrine, in which support can be found for the proposition that Article 116, sole paragraph of the Corporate Law could supplement Article 186 of the Civil Code by producing the pre-existing legal duty to act. In cross-examination, he agreed that it is not possible to discern from Article 116, sole paragraph any specific act that the controlling shareholder must, or must not, do because it is expressed in very general terms. It follows that it is not possible to extract from Article 116, sole paragraph any pre-existing specific legal duty to act, if required for the purpose of Article 186 of the Civil Code.

580. For the above reasons, I prefer the opinion of Professor Tepedino on this issue. Article 116, sole paragraph is a general clause, directed towards the interests and rights of controlled companies, which does not create any specific legal duties on the part of a controlling company towards third parties. It could not be used to remedy any deficit in the required pre-existing legal duty to act under Article 186 of the Civil Code.

(iii) Fault requirement

581. It is agreed by the Brazilian Law experts that fault is to be assessed by reference to the standard of conduct of an average person in the defendant's position, having regard to their professional qualifications and applicable industry standards, the activity in which they are engaged and the circumstances of the case. The concept of fault encompasses negligence, imprudence and lack of skill.

582. A potential issue between the experts as to whether the test involved any subjective element of foreseeability of harm has dissipated, in the light of the Claimants' concession that in the case before the Court, fault can be assessed on an objective basis.

583. In this case, BHP must be judged as controlling shareholders of Samarco having regard to their relevant acts and omissions in respect of the tailings dam in all the circumstances of the case.

(iv) Causation

584. Professor Rosenvald and Professor Tepedino agree that there must be a cause and effect link between the relevant act or omission and the damage for liability under Article 186 of the Civil Code. There will be no liability on the part of the defendant if a break in the chain occurs, such as *force majeure*, exclusive act of the claimant, or third-party act.

585. The only legislative framework for the causal link is Article 403 of the Civil Code which provides:

> "Even where non-performance results from the debtor's wilful misconduct, losses and damages only include effective losses and lost profit that are the direct and immediate effect of non-performance, without prejudice to the provisions of the legislation governing procedure."

586. Although Article 403 of the Civil Code is included in the chapter of the code on contractual liability, the experts agree that the Brazilian Courts, including the STJ, very commonly apply the causation test set out in Article 403 to claims under Article 186, including non-contractual claims.

587. There is a debate as to which of several theories should be applied, as the appropriate interpretation of the Article 403 test in civil liability claims, namely: (i) the theory of immediate and direct damage; (ii) the sub-theory of necessity; and/or (iii) the theory of adequate causation.

588. In the *Hospital Escape Case* STJ Special Appeal 1.307.032 (2013) (see above), the summary, taken from the judgment of Reporting Justice Araújo, stated:

> "In the determination of the causal link, the majority academic writings of the Civil Law adopts the theory of adequate causality or direct and immediate damage, so that the causal link only exists when the damage is a necessary and adequate effect of a cause (action or omission). This theory was accepted by the 1916 Brazilian Civil Code (article 1,060) and by Brazilian 2002 Civil Code (article 403)."

589. Reporting Justice Araújo referred with approval to the teaching of Cavalieri Filho, who rejected the theory of *"sine qua non"* ("but for") causation and commended the theory of adequate causality:

> "How to establish, among several conditions, which was the most appropriate? There is no theoretical rule, no hypothetical formula to solve the problem, so that the solution will have to be found in each case, paying attention to the factual reality, with common sense and consideration. An adequate cause will be one that, according to the normal course of things and the common experience of life, proves to be the most suitable to generate the event.
>
> …
>
> It should be noted that the expression 'direct and immediate effect' does not indicate the cause chronologically more linked to the event, temporally closer, but rather the one that was the most direct, the most determining according to the natural and ordinary course of things. Often the cause temporally closest to

> the event is not the most determinant, in which case it should be disregarded, because it is a mere concause."

590. The required causal link was summarised by Reporting Justice Araújo as when the conduct or omission is decisive and directly linked to the damage.

591. The *Brazuca Recourse Case* STJ Special Appeal 1.615.971 (2016) concerned a contribution claim by the Brazuca Petrol Station and its owner against Petrobras arising out of a fuel leak, and counterclaims by Petrobras seeking compensation for the redress which it was obliged to make in respect of environmental damage. The STJ determined, under the adequate causation theory adopted by Article 403 of the Civil Code, that contributory fault in the occurrence of the harmful event had been established, with each party being held proportionally liable for its respective contribution to the damage.

592. In *Parkshopping Case* STJ 790.643 (2016) the claimants brought a claim against a shopping centre owner in respect of damage to their vehicle following its theft from the shopping centre car park. Parkshopping argued that the damage to the claimants' vehicle only occurred during the subsequent police chase, so that it was not a direct result of the shopping centre's conduct. The STJ rejected that argument on the basis that the test of adequate causation under Article 403 of the Civil Code was satisfied. The failure of the shopping centre to guard adequately the vehicle was decisive in the occurrence of damage, albeit that it occurred during the police chase.

593. The *Demarco* case STJ Special Appeal 1.718.564 (2020) concerned claims for compensation arising out of the presentation of false documents to the Brazilian Securities and Exchange Commission. In examining the causal link required between the illicit act and the losses suffered by the companies, Reporting Justice Sanseverino observed:

> "The concept of causation has traditionally been established on the basis of a naturalistic conception, inspired by natural laws, which does not appear to be the most appropriate, because although the legal system is open to receiving subsidies from the natural sciences, the concept of cause and, consequently, the very definition of causal link are eminently legal-normative notions.
>
> …
>
> … an adequate cause is the fact that demonstrates the best aptitude or greatest suitability for causing a harmful result, presenting the occurrence of a certain harmful result as a normal consequence and probable effect.
>
> …
>
> The practical problem is that this concept of adequate cause creates difficulties when the fact in question is the result of a complex causal process, presenting a multiplicity of possible causes, making it difficult to establish which of them would be the most adequate.

…

Other criticism levelled at the Adequate causality theory is the difficulty it presents in solving the problem of interrupting the causal link, since it would not have a satisfactory explanation when the interrupting factor is a fact not attributable to the person responsible, giving rise to the development of the theory of direct or immediate damages.

…

The core of the theory lies in establishing the notion of "necessary causation" or "necessity of the cause", which is particularly relevant in complex causal procedures in which more than one series of causes concur. The normal course of the causal link is diverted by the appearance of a new factor, which ends up leading to the harmful result, and this circumstance is qualified as an "extraneous cause", breaking the "link of necessity between the cause and the effect". The important thing is that the direct and immediate cause is not necessarily the closest, and the distance is not temporal, but logical.

In Brazilian case law, the theory of direct and immediate damage was enshrined in a Supreme Federal Court (STF) ruling by Justice Moreira Alves, recognising it as the theory adopted in our legal system to explain the causal link, eliminating the drawbacks of the other theories (equivalence of conditions and adequate causality)…

…

I personally believe that the theory that best explains the causal link, in terms of Civil liability, is that of adequate causality, which does not rule out the practical usefulness of the other theories, because the verification of the facts that can be considered causes of a certain harmful event, before being a theoretical problem, is a practical objection, where all its difficulties lie.

Theories are nothing more than tools at the disposal of legal practitioners, and the activity of the judge can be compared to that of a doctor who, in order to deal with a particular illness presented by his patient, can rely on more than one alternative treatment without any of the possible techniques proving to be wrong.

It is enough to note the possibility of combining the theories in legal practice, as already mentioned, which is aimed at solving concrete problems, which basically consist of establishing whether a certain fact can be considered the cause of a certain harmful event."

594. In the *Negligent Birth* case STJ Special Appeal 1.698.726 (2021) (see above), the STJ considered whether there was a causal link between the conduct of the doctor who assisted in the delivery and the injury to the minor. Reporting Justice Villas Bôas Cueva stated that:

> "The causal link as an assumption of civil liability is better assessed, in the legal-normative plan, according to the theory of adequate causality, in which the occurrence of a certain fact makes the occurrence of the result probable."

595. In the *Premature Birth* case STJ Special Appeal 2.069.914 (2023), featuring concurrent causes, only one of which was attributed to the hospital's negligence, Reporting Justice Buzzi stated:

> "The causal link is an assumption of liability, whether strict or fault-based, and its measurement, within the scope of civil law, is carried out based on the provisions of article 403 of the Civil Code (CC), according to which the recoverable or compensable losses are those that arise directly and immediately from its triggering event.
>
> Indeed, theories were developed to better elucidate the aforementioned precept, having the national civil law, adopted, primarily, the theories of adequate causality and direct and immediate damage, whose similarities are very accentuated, since they only consider the causal link to exist when the damage is a necessary and/or adequate effect of a cause (action or omission) …"

596. Although Professor Rosenvald quibbled at what he considered to be the conflation of distinct theories, he accepted that the theories are elucidation of the Article 403 test rather than a replacement for it. More significantly, the enunciations of the causal test in slightly differing terms in the cases serve to indicate that the STJ adopts a pragmatic approach to the application of Article 403 to the facts in cases of civil liability.

597. Despite their differences as to the applicable legal theory, Professor Rosenvald and Professor Tepedino agree the following.

i) The direct and immediate test set out in Article 403 of the Civil Code is applied by the STJ as opposed to the *"sine qua non"* ("but for") test of causation.

ii) In applying the Article 403 test, the STJ has used variously the identified theories, namely, direct and immediate, adequate or necessary causal link, sometimes separately and sometimes in combination.

iii) The STF has endorsed the theory of direct and immediate cause, which is not necessarily the closest in time and distance but the most logical, and excludes any break in the chain of causation.

iv) In the adequate causation theory, the question is whether the act or omission is the most adequate cause for the occurrence of the damage. The most adequate

cause is one that, on analysis of the facts, produces the harmful result as a normal consequence and probable effect.

v) Regardless of the theory applied, there will only be causation for the purpose of civil liability if the damage is a necessary consequence of the illicit act of the defendant.

(v) Shareholder liability

598. BHP submit that a shareholder of a company is not liable under Article 186 for damage caused by the activities of the company. It is argued that the shareholder's acts and omissions vis-à-vis the company are regulated by the Corporate Law. Applying the causation test applicable in civil law, it is said that there is not a sufficient causal link between the shareholder's acts and omissions and the damage, where the damage was caused directly by the company's acts or omissions. Further, it is said that if a shareholder were liable in respect of damage caused by the acts or omissions of the company, the principle of separate legal personality would be violated.

599. The Claimants accept that the fault-based claims made against BHP must be grounded in acts and omissions that can be attributed to BHP, rather than the conduct of Samarco. BHP's assertion that there can never be a causal link between the conduct of a controlling shareholder and the activities of a controlled company is unsupported by any authority or reasoned argument. Article 186 of the Civil Code provides for the liability of a defendant company in respect of its own actions or omissions rather than those of a third party. That is consistent with the principle of separate legal personality that a defendant company such as a controlling shareholder be held responsible and liable for its own conduct.

600. This submission does not raise any separate issue of Brazilian Law. It is not part of the Claimants' case that BHP could be liable under Article 186 of the Civil Code merely by reason of their status as ultimate and/or controlling shareholders in Samarco. The case is firmly put on the basis of BHP's control over, and participation in, Samarco's operations, amounting to the acts and omissions that are said to have caused the damage.

601. BHP are not exonerated from any potential civil liability by reason of their status as shareholders. This was illustrated by the *Latina Derailment Case* TJSP Civil Appeal 0194012-30.2008.8.26.0100 (2013). The case concerned a claim under Article 927, sole paragraph, of the Civil Code against the defendant controlling shareholder of a concessionaire company responsible for a stretch of railway on which a train had derailed and spilled its cargo. The court dismissed a preliminary argument that the controlling shareholder lacked standing; although it was a separate legal personality, it had obtained the concessionaire's controlling interest, demonstrating that the companies belonged to the same business group and had an unequivocal sharing of interests.

602. The Court is acutely aware of the distinction to be drawn between the actions of Samarco and those of BHP. Regardless of the strength of any case against Samarco, that would not be sufficient in itself to impose liability on BHP. The relevant question is whether the Claimants have established the necessary elements to satisfy the test for liability under Article 186 of the Civil Code against BHP.

Corporate Law

(i) The issue

603. The Claimants' case is that the BHP defendants were part of the BHP Group and therefore fell within the definition of controlling shareholders for the purpose of Article 116 of the Corporate Law. BHP were in breach of their duties and responsibilities as a controlling shareholder of Samarco under Article 116 and such breach of duty amounted to an abuse of power within the meaning of Article 117 of the Corporate Law. BHP is liable to the Claimants for breach of their duties under Articles 116 and 117.

604. BHP's case is that they do not fall within the definition of controlling shareholder for the purpose of Article 116. The Corporate Law imposes on Samarco a social function and Samarco would be liable for any damages caused to third parties through breach of that social function. In contrast, Articles 116 and 117 of the Corporate Law do not impose autonomous duties on a controlling shareholder, breach of which could give rise to liability for claims by third parties, such as the Claimants.

605. Article 116, sole paragraph, of the Corporate Law provides:

> "A controlling shareholder is defined as an individual or a legal entity, or a group of individuals or legal entities bound by a voting agreement or under common control, which:
>
> (a) possesses rights which permanently assure it a majority of votes in resolutions of general meetings and the power to elect a majority of the corporation officers; and
>
> (b) in practice uses its power to direct the corporate activities and to guide the operations of the organs of the corporation.
>
> Sole paragraph. The controlling shareholder must use its controlling power with the aim of making the company achieve its object and fulfil its social function, and has duties and responsibilities towards the other shareholders of the company, those who work in it, and the community in which it operates, whose rights and interests must be loyally respected and heeded."

606. Article 117 of the Corporate Law states:

> "A controlling shareholder shall be liable for any damage caused by acts performed with abuse of power.
>
> 1. An abuse of power may take any of the following forms:
>
> (a) guiding the corporation towards purposes unrelated to its corporate object or harmful to national interests …
>
> …

> (g) …to approve, or cause to be approved, irregular accounts rendered by managers (officers and directors) as a personal favour, or to fail to investigate a complaint which he knows, or should know, to be well founded, or which gives grounds for a reasonable suspicion of irregularity.
>
> …
>
> 3. The controlling shareholder who holds the position of manager or fiscal council member also has the duties and responsibilities specific to the position."

607. Article 243, para.2 states:

> "A controlled company is one in which the controlling company, directly or through other controlled companies, holds shareholder rights that permanently assure it a preponderance in corporate resolutions and the power to elect the majority of the management."

608. Article 246 of the Corporate Law states:

> "A controlling company shall be obliged to compensate any damage it may cause to a controlled company by any acts infringing the provisions of articles 116 and 117.
>
> 1. Proceedings for compensation may be brought by:
>
> (a) shareholders representing five per cent (5%) or more the capital;
>
> (b) any shareholder, provided he guarantees payment of court costs and legal costs in the event of the action being dismissed."

609. Article 1 of the Corporate Law provides:

> "The capital of a company or corporation shall be divided into shares, and the liability of the partners or shareholders shall be limited to the issue price of the shares subscribed to or acquired".

610. Article 49-A of the Civil Code provides:

> "The legal person is not to be confused with its partners, associates, founders, or managers.
>
> Sole paragraph. The autonomy of assets of legal entities is a lawful instrument for allocating and segregating risks, established by law with the purpose of encouraging businesses, for the generation of jobs, taxes, income and innovation for the benefit of all".

611. In the joint statement dated 17 April 2024, Professor Muller Prado and Professor Marcelo Trindade agree the following matters:

i) To be considered a controlling shareholder, an individual/entity or group of individuals/entities must meet the requirements of Article 116 of the Corporate Law.

ii) The Corporate Law acknowledges the existence of joint control and indirect control. When two shareholders each have 50% and jointly they meet the requirements of Article 116 of the Corporate Law, there is joint control.

iii) The Corporate Law acknowledges indirect control in Article 243, paragraph 2. The qualification of an individual/entity as an indirect controlling shareholder of a company presupposes that the necessary requirements for the establishment of direct control are met at the base of the corporate chain.

iv) The Corporate Law does not define abuse of controlling power. The list of scenarios for abuse of controlling power set out in Article 117, paragraph 1 of the Corporate Law is not exhaustive.

v) Article 117 of the Corporate Law is the basis for a potential claim for liability. The liability of the controlling shareholder for a violation of Article 117 is fault-based.

vi) The Corporate Law does not provide any specific test of causality to ascertain the existence of an obligation to indemnify. The same test of causality applicable to cases of civil liability set forth in the Civil Code (including Article 403 of the Civil Code) applies to liability actions against the controlling shareholder.

612. The material issues on which the Corporate Law experts disagree are:

i) Whether it is necessary to establish that the entity in question meets the test set out in (a) and (b) of Article 116, or whether there is a presumption of the exercise of controlling power by indirect shareholders who are part of a control group.

ii) Whether the nature of the duties imposed by Articles 116 and 117 are limited to an obligation to use controlling power for purpose of the controlled company's objects and social function, together with a prohibition on abuse of the controlling power; or whether it extends to an active freestanding duty on the controlling shareholder to avoid and prevent damage to the community and minimise risks that the company's activities negatively impact the community.

iii) Whether Article 116, sole paragraph, can give rise to liability on the part of the controlling shareholder to third parties.

(ii) Controlling Shareholder - Article 116

613. Professor Prado's opinion is that to be considered a controlling shareholder, a shareholder must satisfy the requirements of (a) and (b) of Article 116, (i) individually or (ii) jointly with the other shareholder(s) bound by a voting agreement. However, there is a relative presumption of control; where, in accordance with Article 116 (a) the shareholder group elects a majority of managers and has a majority at the general

meeting of the company, it is presumed that they use their power to influence the direction of the company's business and the actions of managers outside the general meeting. Even if there is no shareholder alone that has a majority of votes, they may enter into a voting agreement with other shareholders to exercise the power of control jointly as a group so as to satisfy the test in Article 116.

614. Professor Trindade's opinion is that it is necessary to establish that the entity in question (i) holds voting stock (or shareholder' rights) to ensure, on a permanent basis, that it will prevail in deliberations at the general shareholders meetings and will have the power to elect the majority of the company officers; and (ii) actually uses its power to direct the business of the company and the functioning of the company bodies.

615. In cross-examination, Professor Trindade agreed that the status of controlling shareholder for the purpose of Article 116 may be conferred on an individual or group. Such status arises where there are majority voting rights within the highest body of the company, the general meeting, and the power to elect the majority of the management body or bodies of the company (Board of Directors and/or Executive Board); together with effective use of the controlling shareholder's power to direct the company's activities and guide the functioning of the company's bodies.

616. Professor Trindade agreed that control could be achieved by means of a shareholders' agreement, which could operate at the level of the base company or at the level of any holding company. He also agreed that the Corporate Law does not preclude a director from representing the interests of its appointing shareholder but subject to the director's overriding duty to the company. Therefore, if their interests are aligned, the members of the board can simultaneously represent the interests of both the control group members and the company.

617. In cross-examination, Professor Trindade clarified that, in his view, the concept of indirect control is implicit in Article 116, albeit stated explicitly in Article 243. Regardless of that distinction, he accepted as correct the statement of Reporting Commissioner Pablo Renteria in the *CNP/CSH case* CVM 19957.009575/2017-73 (2018), that:

> "the Brazilian legal system admits the existence of complex control structures, which unfold in successive degrees of the corporate chain until reaching, at its top, the person or group of people who effectively hold the political power to determine the direction of the company."

618. In cases of joint and indirect control, the CVM has concluded that each member of the control group is individually considered a controlling shareholder for the purpose of liability – see *CNP/Wiz* CVM 19957.003190/2019-64 (2018); *Oi* CVM 19957.004415/2016-57 (2023). In cross-examination, Professor Trindade accepted that the isolated action of one control group member could potentially give rise to liability under Articles 116 or 117, even where the action was not taken jointly with all control group members, provided that the individual's action was as a member of the control group.

619. He also agreed that the concept of use of power to direct the corporation's activities and to guide the operations of the corporation's bodies can take place either within the general meeting or outside of the general meeting.

(iii) Nature and scope of the duties

620. Professor Prado notes that Article 116, sole paragraph provides that the controlling shareholder has (i) the duty to use their power to ensure that the company complies with its social function; and (ii) the duty to loyally respect and heed the rights and interests of three categories of people, namely, the other shareholders of the company, those who work for the company and the community in which it operates. She considers that a literal interpretation, based on the express reference to *"the community"* in Article 116, must be read as identifying a specific obligation to the community. This is reinforced by the historical interpretation, which acknowledges that the controlling shareholder's practices affect third parties, and by the teleological interpretation of the legislation, the purpose being to require the exercise of controlling power with diligence so as to avoid or mitigate the risks of economic activity. Further, the systematic interpretation requires that Article 116 should be read in accordance with constitutional principles, thus reinforcing compliance with the company's social function and justice.

621. On this basis, it is her view that the controlling shareholder has the same duty of loyalty to the community as they do to other shareholders and employees of the company. In practice, this duty of loyalty to the community includes identification and management of the risks to which community members are exposed and implementing effective policies, processes, procedures, governance structures, and communication channels to ensure that such risks are appropriately identified, monitored, managed, and mitigated.

622. Professor Prado's opinion is that controlling power is only legitimate when it respects the interests of third parties, through the means available to the controlling shareholder and according to adequate internal structures. The shareholder's duty of loyalty to the community includes the duty to determine the proper management of business risks and to properly monitor and control them, in view of the legitimate expectations of potentially affected third parties. Failure to act or take measures constitutes a breach of the controlling shareholder's duty to the community, amounting to an abuse of power for the purpose of Article 117.

623. Professor Trindade disagrees with Professor Prado. His view is that the core purposes of the Corporate Law are (a) to establish a regime for the creation and operation of corporate entities with separate legal personality from their shareholders and with shareholders having limited liability; and to that end (b) to establish corporate bodies and regulate their relationships with the company and one another (corporate bodies being e.g. officers who together form an executive board; board of directors; general shareholders' meeting; the controlling shareholder).

624. Articles 116 and 117 of the Corporate Law must be understood systematically, within that framework. They create duties for controlling shareholders owed (only) to the company itself and to minority shareholders. They work by placing limits on the controlling power, providing that if and when it is (or, exceptionally, has to be) exercised, it may only be used to achieve the corporate purpose and further the company's social function (which requires the interests of minority shareholders, employees and the community to be taken into account). What is prohibited is

reprehensible and abusive conduct in the exercise of controlling power, carried out with an intention to cause harm or act abusively towards the company or minority shareholders. Articles 116 and 117 do not impose the same duties of care and loyalty on controlling shareholders that are placed on managers, who (particularly in the case of officers) have day to day responsibility for running a company and represent it in dealings with third parties (still less do they impose duties that are more intensive still). Rather, the duties reflect the further remove at which a controlling shareholder sits within the corporate structure.

625. Professor Trindade's opinion is that Article 117 of the Corporate Law provides for liability arising from the abuse of controlling power but, as for Article 116, sole paragraph, this provision only regulates the internal actions of the controlling shareholder, that is, their relationship with (and within) the company itself and with the other shareholders.

626. I prefer the opinion of Professor Trindade on this issue because it is in alignment with the cases, including STJ authority.

627. In *DIG* STF Extraordinary Appeal 113.446 (1988), the STF defined abuse of power as the illegitimate exercise of power, to harm a category of shareholders or to satisfy exclusively the personal interests of some.

628. This was expanded on in *Banco Mercantil* CMV 04/2009 (2013) and *Sudameris* STJ Special Appeal 1.337.265 (2018), where it was stated that abuse of power required the presence of three elements, namely: (i) the exercise of power by the controlling shareholder(s); (ii) the unlawfulness of this exercise; and (iii) the loss to the company and its shareholders.

629. In *Ordene* STJ Special Appeal 1.636.561 (2018) the STJ emphasised that proof of damage was indispensable but proof of the controlling shareholder's subjective intention to damage the company or minority shareholders was unnecessary.

630. Finally, in *Luz Cataguazes-Leopoldina* CVM (2006), it was held that duties and responsibility to the shareholders, workers and community do not override the interests of the company.

(iv) Third parties

631. Professor Prado's view is that the duties under Article 116, sole paragraph can be owed to third parties. If the controlling shareholder fails to comply with their duty to the community based on Article 116, sole paragraph of the Corporate Law, this will amount to a violation of the rights of community members under Article 186 of the Civil Code. Further, Article 117 gives rise to a right to take legal action for the shareholders of the company, those who work for it and the community as identified in Article 116. When the rights of those in these positions are violated by conduct that constitutes an abuse of controlling power, in accordance with the general principles of civil liability, they have a right to claim for the damage they have suffered and standing to sue in their own name, in accordance with Article 17 of the Civil Procedure Code.

632. An abuse of controlling power is the illegitimate exercise of this power. The attribution of liability to the controlling shareholder under Article 117 is individual, even in the

case of joint control. However, if the breach of duties and obligations occurs by a joint action of the joint controlling shareholders, both will be jointly and severally liable.

633. Professor Trindade's opinion is that Articles 116 and 117 of the Corporate Law do not grant rights to third parties against the controlling shareholder, but only govern how the controlling power should be exercised. For this reason, the Corporate Law only regulates possible claims against the controlling shareholder with the purpose of seeking compensation for losses suffered by the company, where the compensation is provided to the company itself, as set out in Article 246 of the Corporate Law.

634. I prefer the opinion of Professor Trindade on this issue. Professor Prado's views are contrary to the decision of the STJ in *Brasal* STJ Special Appeal 633.338 (2006), in which Reporting Justice Ari Pargendler delivered the majority opinion, quoting the teaching of Modesto Carvalhosa and stating:

> "… the imputation of responsibility for the violation of articles 116 and 117 of Brazilian Corporate Law, is subject to the provisions of article 246 of the same provision.
>
> …
>
> Articles 116 and 117 of Brazilian Corporate Law, authorise the filing of an action by the controlled company against the controlling company; the effect of the respective granting is reflected directly on the controlled company, and only indirectly on its shareholders."

635. Professor Prado was unable to identify any clear statements in the legislative history of the Corporate Law showing that an autonomous duty to third parties was intended. More significantly, she agreed that there are no cases involving claims on the part of the community under Article 116 or 117.

(v) Conclusions on Corporate Law

636. Drawing together the evidence on this issue, there are two limbs of the test for controlling shareholder as defined by Article 116. Limb (a) is shareholder rights that permanently assure the individual or group a majority of votes in resolutions of general meetings and the power to elect a majority of the corporation's managers. This limb is satisfied on the facts of this case by the Shareholders Agreement. Although the parties to the Shareholders Agreement were Vale and BHP Brasil, indirect control was effected by the BHP Group through its corporate chain. Limb (b) is satisfied on the facts (irrespective of any presumption) by the exercise of power as explained earlier in this judgment in relation to the Environmental Law claim.

637. The nature of the duties imposed by Articles 116 and 117 are limited to an obligation to use controlling power for the purpose of the controlled company's objects and social function, together with a prohibition on abuse of the controlling power. The duty does not extend to an active freestanding duty on the controlling shareholder to avoid and prevent damage to the community and/or minimise risks that the company's activities negatively impact the community.

638. For the reasons set out above, I accept the evidence of Professor Trindade that Articles 116 and 117 do not impose any duty owed directly to, or actionable by, third parties.

639. It follows that no liability can arise on the facts of this case under the Corporate Law.

Applicable test for civil fault liability

640. In summary, my conclusions on the legal test for civil fault-based liability are as follows.

641. First, the requirements for imposing fault liability under the Civil Code are: (a) illicit/unlawful conduct by voluntary act or omission; (b) damage; and (c) a causal link between the illicit/unlawful conduct and the damage.

642. Second, for the purpose of Articles 186 and 927, head paragraph, of the Civil Code, an illicit activity occurs through wrongful behaviour, namely, an act or omission that is negligent, imprudent or lacking in skill, that violates a right, causing damage to others.

643. Third, it is necessary to identify a pre-existing legal duty for civil liability in respect of omissions but the duty may arise from different sources, such as a written legal duty, contracts, conventions or prior acts of the defendant, such as the creation or contribution to a risk, or assumption of responsibility for a risk.

644. Fourth, Article 225 of the Constitution and/or Article 116 of the Corporate Law could not be used to rectify any failure to satisfy the test for a pre-existing legal duty under Article 186.

645. Fifth, no relevant liability can arise on the facts of this case under Articles 116 and/or 117 of the Corporate Law.

646. Sixth, for the purposes of this case, fault for the purpose of Article 186 is to be assessed on an objective basis by reference to the standard of conduct of an average person in the defendant's position, having regard to their professional qualifications and applicable industry standards, the activity in which they are engaged and the circumstances of the case.

647. Seventh, the test for the causal link between the illicit act and damage required for the purpose of fault-based civil liability is that set out in Article 403 of the Civil Code, namely, direct and immediate, necessary or adequate causation.

648. Eighth, where damage is caused by the unlawful conduct of more than one person so as to attract liability under Article 186, those persons will be jointly and severally liable to the claimant pursuant to Article 942 of the Civil Code.

649. Finally, BHP's status as a shareholder of Samarco is neither sufficient to establish liability under Article 186, nor a defence to a claim under Article 186.

11. ILLICIT ACTS & OMISSIONS

The issues

650. The Claimants' case is that BHP together with others caused the collapse by their voluntary acts or omissions, negligence or imprudence within the meaning of Article 186 of the Civil Code. By August 2014, at the latest, BHP knew, or should have known, that there were serious problems in relation to the dam's drainage and stability, such that it was in a precarious state and vulnerable to liquefaction. Notwithstanding this, BHP approved increased production and the continued raising of the dam, without rectifying the dam's inadequate drainage, any proper liquefaction study or carrying out a proper stability analysis, to determine whether work could continue safely. These negligent acts and omissions were a direct and immediate cause of the collapse.

651. BHP's defence is that they did not assume any responsibility for the safety of the dam. The risk management approach to Samarco which BHP devised in 2013 was an internal BHP process, which aimed to reflect the risks to which BHP were indirectly exposed via BHP Brasil's shareholding in Samarco. The internal audits which BHP's RAA function carried out at Samarco were to provide periodic independent assessments to Samarco management about the quality of the controls which Samarco had in place to manage Samarco's risks. These activities did not involve any assumption of responsibility for the operational management of risk at Samarco: that remained the responsibility of Samarco's full time staff, including its dedicated risk management team and (in respect of dam-related risks) its substantial geotechnical department, supported by external specialists.

652. It is common ground that the question of fault in relation to the alleged acts and omissions of BHP is to be assessed by considering BHP's conduct having regard to BHP's contemporaneous knowledge; whether BHP knew or should have known at the time relevant to each alleged act or omission that the safety of the dam had been or was being compromised.

653. It has been contended by BHP that the knowledge and conduct of the BHP-affiliated directors on the Samarco Board and the BHP-affiliated members of the Samarco committees and sub-committees should not be attributed to BHP. I reject that argument. BHP accepts that it acted through the Boards of Directors of BHP and that knowledge of the Board of Directors is attributable to BHP. For the reasons set out in the strict liability section of this Judgment, the BHP Board delegated authority to the Group services, including RAC, Sus.Co and Finance, and to the CEO. The CEO delegated authority to the GMC, which included the Presidents of the Businesses, including Iron Ore. Through such delegated authority, BHP controlled, and assumed responsibility for, Samarco; in particular control was maintained through the Samarco Board and committee structure. The reporting lines to and from Samarco, BHP Brasil and Iron Ore Brazil, together with use of the 1SAP system, ensured that BHP was, or should have been, aware of the matters addressed below.

654. Legitimate concerns have been raised by BHP regarding the evolving and changing nature of the illicit acts relied on by the Claimants. The material allegations, considered below, have been pleaded but it must be said that at times the path through the pleadings to find them is somewhat tortuous.

655. I have found it convenient to consider the material allegations of fault in the following order:

i) response to drainage issues;

ii) violations of the 200 metre beach width;

iii) design and monitoring in respect of the Setback;

iv) audits and risk assessment;

v) absence of liquefaction risk assessment and stability analysis;

vi) continued raising of the dam in the vicinity of the Setback;

vii) reliance on reports as to stability of the dam.

(i) Drainage issues

656. As set out above, the geotechnical experts agree that, although the dam was designed as a drained stack, as constructed there was inadequate provision for internal drainage, leading to saturated tailings in the structural part of the dam. This was particularly evident from the numerous seepage incidents that occurred between 2013 and 2015.

657. The ITRB, which reported directly to the Samarco Board, repeatedly noted that there were deficiencies in the drainage of the dam and advised that the dam's internal drainage system should be rectified. In particular, ITRB Report No.8 dated January 2014 expressly referred to the seepage incidents in 2013, associated with small slumps of the downstream slope in areas with a phreatic surface close to the slope surface. The ITRB considered that the El. 826m blanket drain did not contribute to control of the phreatic surface at the left abutment. Recommendations were made for additional drainage and for the Setback to be filled in as soon as possible.

658. Mr Ferreira, Project Manager within BHP Iron Ore, attended the closing meeting and his notes recorded the above ITRB concerns and recommendations. He sent his notes to Mr Fernandes, then General Manager of Business Development at BHP Iron Ore Brazil, and Ms Thais Jacques, a junior engineer in Brazil Iron Ore. The findings and recommendations from ITRB Report No. 8 were highlighted at a Performance Management Subcommittee meeting on 31 January 2014, which was attended by Messrs Fernandes, Ferreira, and Andre Cardoso, Financial Planning Manager at Brazil Iron Ore. The report was uploaded to 1SAP within BHP.

659. ITRB Report No. 10 dated July 2014 noted evidence of an increase in piezometric pressures at the abutments and recommended that additional blanket drains should be installed, in accordance with advice given by DAM. The ITRB also recommended that new piezometers be installed above the level of the existing blanket towards the reservoir in order to obtain a better definition of the surface of the phreatic line on the beach. This report was received by Messrs Fernandes, Ferreira, Corless, Arnold (Risk and Governance at BHP Iron Ore) and Victor (Head of Risk and Governance at BHP Iron Ore), Ms Jacques and Ms Beck. The report was uploaded to 1SAP within BHP.

660. ITRB Report No.11 dated 20 November 2014 referred to the serious incident of seepage and cracking at the left abutment in August 2014. The ITRB recommended that the Setback should be filled in as a matter of priority, future placement of tailings at the left abutment should ensure that the Setback did not exceed 20 metres in height and that a minimum beach of 200 metres must be observed. It emphasised that the phreatic line

must be monitored and controlled, installing additional piezometers and that the resistance parameters obtained from the back analysis should be used for the dam. Further, the ITRB noted that the FMEA analysis carried out by Samarco identified that the highest risk elements included insufficiency of the internal drainage of the dam, resulting in saturation of the downstream slope and rupture. ITRB Report No. 11 was sent to Mr Ferreira, who attended the closing meeting, and also to Mr Fernandes.

661. From the above, it is evident that senior members of BHP Iron Ore were informed of the serious, ongoing deficiencies in the internal drainage of the dam, the risk of rupture associated with those deficiencies and the recommended remedial measures, including filling in the Setback. Despite this knowledge, Mr Ferreira did not include any of these matters in the CETs he completed as risk control owner for Dam Monitoring. It was not until November 2014 that work started on an additional blanket drain, at 860 metres, and the inadequate drainage in the dam, particularly at the Setback, was not resolved.

662. As early as 30 August 2012, Samarco's FMEA identified a potential failure mode as rupture caused by insufficiency of the internal drainage system. Mitigating action was identified as: "Perform flow analyses considering partial/total clogging of the internal drainage system." This issue was repeated in each of the biannual FMEA reports until 30 July 2015, when it was identified as "Critical". By that time, the abutment drains had been completed (after three years) but there was an outstanding action to finalise the 3D study of the 940 metre project, observing the behaviour of the water table between the blanket drains.

663. Despite knowledge of the persistent and serious issues of insufficient internal drainage for the dam, together with the ongoing failures to implement the recommendations and mitigating actions, Mr Ferriera assessed the FMEAs for November 2013 and November 2014 as "Pass". The failure on the part of BHP to recognise the need for, and demand, remedial action allowed the build -up of a mass of saturated tailings within the structural part of the dam.

(ii) Beach width

664. The Operations Manual for the dam required a minimum beach width of 200 metres to be maintained. In May 2012 Pimenta de Ávila produced a Technical Opinion in which he reiterated that the minimum 200 metres beach width must be carefully respected. The minimum beach width of 200 metres was not maintained, as found by the Panel Report and examined in the geotechnical section above.

665. BHP made a positive finding in the 2013 Samarco Audit that the 200 metres minimum beach width was being respected. Mr Wetzig's Work Paper 4410-1253 recorded that the upstream raises were kept in an unsaturated state and that a minimum beach length of 200 metres was maintained or exceeded. This is contradicted by the Panel Report findings and no supporting documentation has been identified that would justify the assertion. In cross-examination, Mr Wetzig recalled that, at the time of the audit, Samarco provided him with reports containing information about the beach width. Although, understandably, given the passage of time, he could not recall the detail of the reports, he accepted that the Panel Report graph of consolidated results showed that the minimum beach width was violated on a number of occasions during the audit period.

666. Information as to the repeated violations of the minimum beach width was provided to senior members of BHP Iron Ore.

i) Presentation materials for the Operations Committee meeting on 13 November (attended by Mr Fernandes) and the Samarco Board meeting on 4 December 2013 (attended by Messrs Wilson, Zweig, Lynch, Fernandes and Gillespie) depicted the beach width as 176 metres.

ii) Presentation materials for the Performance Management Subcommittee meeting dated 13 June 2014 depicted the beach width at 160 metres and 184 metres. This meeting was attended by Messrs Fernandes, Ferreira, and Cardoso.

iii) Presentation materials for the Performance Management Subcommittee meeting dated 7 August 2014 (attended by Messrs Fernandes, Ferreira, and Cardoso) and the Operations Committee Meeting dated 19 August 2014 (attended by Mr Fernandes) depicted the beach width as 135 metres.

iv) Presentation materials for the Operations Committee meeting dated 19 November 2014 (attended by Mr Fernandes) and the Samarco Board meeting dated 10 December 2014 (attended by Messrs Wilson, Ottaviano, Fernandes, Lynch, Ms Beck and Ms Torres) depicted the beach width as 130 metres.

667. Although the CETs completed by Mr Ferreira in 2013 and 2014 indicated that regular measurement and records were kept by Samarco, his failure to identify the violations of the beach width depicted in presentations to the Operations Committee and the Samarco Board indicate deficient assessment on his part. Dr Marr agreed in evidence that it would be very simple to maintain a reliable record of beach width.

668. In cross-examination, Mr Corless agreed that insofar as the minimum beach width of 200 metres was violated, the applicable design specifications would not be met.

669. BHP's failure to identify or require remediation in respect of the violations of the beach width facilitated encroachment of the slimes towards the structural face of the dam and enabled a mass of saturated materials to build up at the dam, increasing the risk of liquefaction.

(iii) The Setback

670. It is common ground that the Setback was a major alteration to the original geometry of the dam but that no design was produced and no independent geotechnical review of the change was carried out.

671. Professor Gens found no engineering justification for the failure to produce a design or carry out a proper stability evaluation. Dr Marr agreed:

> "Q. And so this was a significant structural alteration which had the potential to reduce stability, and would you expect, in those circumstances, to see a proper design for a change to the alignment which had those consequences or those potential consequences?

> A. I would expect to see someone knowledgeable in stability to have assessed the potential impact of this on the stability of the Dam.
>
> Q. And have you seen amongst the documentation anything approaching that sort of analysis?
>
> A. No.
>
> …
>
> Q. Indeed no one has come up with any proper engineering justification, have they, for the absence of a design?
>
> A. Not to my knowledge.
>
> Q. Is it fair to say also that no responsible mine owner could justify the continuation of their operations without there being a proper design and stability analysis which took account of the realignment?
>
> A. You would expect to see that, yes -- sorry, from a technical standpoint, you would expect to see that…"

672. BHP Iron Ore was, or should have been, aware that there was no design or engineering review of the Setback because it was identified as outstanding in ITRB Report No.5 dated October 2012, copies of which were sent to Mr Ferreira, Mr Fernandes and Mr Wetzig. In cross-examination, Mr Wetzig agreed that from ITRB Report No.5 it was clear that, not only had the ITRB not been involved in the design of the Setback, but the ITRB had not received or reviewed any design documentation in respect of the Setback. Having requested the design for review, the ITRB did not receive the missing information; it was not recorded as produced or reviewed in subsequent ITRB Reports Nos.6 and 7, copies of which were sent to Mr Ferreira and Mr Fernandes.

673. Despite this obvious and serious omission, Mr Ferreira, who was the control owner for most of BHP's critical risk controls, including Dam Design, rated the CETs in 2013 and 2014 as "Pass", commenting that the design complied with Brazilian and international standards. No reference was made to the Setback or the absence of any design or stability analysis.

674. During the Samarco internal audit for FY14 (audit carried out in July 2013 and report dated September 2013), Mr Wetzig became aware that the alignment of the dam was different from the original design by Pimenta di Ávila and that the Setback was created as a result of the structural weakness of the secondary gallery. He was not aware of any drawings, formal design or engineering analysis in respect of the Setback and did not recall Samarco producing any independent engineering review of the Setback design.

675. Mr Wetzig agreed in cross-examination that the change in axis of the dam was a change in the characteristics of the dam, which should have given rise to review or revision of the operations manual. The operations manual for the dam was not revised to reflect the

changes to the design of the Setback or the design concept regarding disposal of sands and slimes.

676. Mr Wetzig also agreed that the Setback was a modification to the dam geometry that should have prompted a review of the stability of the dam. No such stability analysis was carried out. Finally, Mr Wetzig agreed in cross-examination that drainage of the sands was critical to avoid their saturation and potential liquefaction; therefore, the appropriate placement of a sufficient number of piezometers was key to monitoring the existence and extent of saturation, the water pressure and phreatic level. He was unaware that there were no piezometers in the area of the Setback at the time of the audit.

677. Notwithstanding these glaring omissions from the audit report, the overall Material Risk Control Assessment (MRCA), for which Mr Zweig and then Mr Fernandes had overall responsibility, was assessed as "Well controlled" in 2013 and 2014.

678. A design for the Setback and independent engineering review of such design would have entailed assessment of the shear strength and permeability of the tailings at the left abutment, a liquefaction potential study and an undrained stability analysis. Such a review would have disclosed the fragility and instability of the dam at the left abutment.

(iv) Audits and risk assessments

679. At the beginning of May 2013 Gary Bentel, a former BHP geotechnical engineer, contacted Andrew Robertson, a geotechnical consultant, to ask whether he would carry out an asset integrity audit at Samarco. In his response, Dr Robertson raised the following concerns:

> "I have been involved in dam audits for Samarco since the 1990's. Initially at the request of BHP and for the past 10 years at the request of Samarco. These were individual independent audits, and were done generally once or twice a year depending on the construction activities. For all but the last two years almost all of the dam engineering was done by Pimenta de Avila Consultoria, a very competent tailings dam consulting/engineering company. There was continuity and engineering memory in the consulting design services.
>
> During the years they have increased the size and competency of their internal Geotechnical Department and started branching out by doing some of the engineering and construction supervision themselves and using a mix of consultants - often not well coordinated, and there is a material loss of continuity and engineering memory. The Geotechnical Department is enthusiastic and well versed in the Samarco specific structures but lack experience in dam and tailings engineering generally.
>
> 4 years ago I recommended they establish a Review Board to enable the frequency of review to be increased. They did this (while I continued as an independent 'auditor') but the Review

> Board was poorly used, and I found them ineffectual. Two years ago they asked me to join the Review Board and I agreed.
>
> Dr Angela Kupper is the Chair person for the Review Board. She is from AMEC in Edmonton - originally from Brazil, but North American trained and experienced PhD from the Morgenstern school - and very competent. Paulo Abrau - is a Review Board member and a competent all round tailings engineer. The other two members are Waldyr, a professor of soil mechanics from U of Oro Preto, good theoretical soil mechanic, but limited engineering design and construction experience and Rui Mori, a practical geotechnical construction specialist who, in my opinion, has not maintained his theoretical understanding of soil mechanics. Working together the Review Board should be effective.
>
> Recently the Samarco management has had a tendency to change pre-planned meeting dates at short notice and I and Angela have had difficulty meeting their revised schedules. Our itineraries are established many months ahead.
>
> The geotechnical engineering structures at Samarco are complex both for both design and operational considerations. While they have done much to try to maintain adequate tailings containment facilities, Samarco has consistently deferred actions to provide or implement contingency and redundancy measures to ensure that they have capacity for continued tailings storage in the event of missing construction deadlines, or unexpected behaviour from tailings containment structures. They have pushed the dams to limits of operating tolerances that are beyond what I consider appropriate. And continue to do so.
>
> Because of Samarco schedule changes, I was not able to attend the most recent Review Board Meeting. Angela was also not able to attend.
>
> With this background you can decide if it is appropriate that I perform an 'independent' review of the dams. I will send you by separate email an introduction to Dr. Vinod Garga an Geotechnical engineer with Dam and Tailings dam experience who spends time in both Brazil and Vancouver and consults in English and Portuguese in both countries."

680. This email exchange was forwarded to Mr Salvano and Mr Wetzig, members of the RAA technical audit team. Despite Dr Robertson's serious concerns, no action was taken.

681. The scope of the Samarco technical audit FY 2014 (carried out in 2013) included asset integrity regarding catastrophic failure of the wall in one of the tailings storage facilities of Samarco. The audit report included a Priority 2 rating (a weakness in the design or operating effectiveness of a control that if unmitigated and prolonged could become a

serious control risk) in respect of the problems that had been identified with the initial construction of the dam, namely, the defective foundation drains and decant drains. A particular concern noted was the failure of quality processes to prevent the defects and the failure of the ITRB to make any recommendations to ensure similar events did not occur in future development of the dam.

682. The recommendations included the establishment of QA and QC of construction as a critical control, accurate records of construction activities, formal procedures for sign-off or certification of work and accurate as-built records. A further recommendation was made:

> "For those instances where SAMARCO may decide not to follow-up with any of the recommendations of the Independent Tailings Review Board (ITRB), the reasons for such decision should be justified and documented."

683. When reviewing the draft audit findings, by email dated 30 July 2013, in addition to comments on the issues of concern regarding Samarco, Mr Salvano queried whether a specific finding should be made in respect of the ITRB:

> "I am concerned that Samarco does not appear to be "managing" these facilities. It just seems to "operate" them and 'what happens happens' - without any effort to anticipate problems (eg; blockages in the decant water system) or to make sure that past mistakes are not repeated (eg: the QC failures in the embankment drainage systems). This is the key observation which we should make in our audit Findings and Asset Integrity overview - because it is only by Management changing that way of working that further (and different) problems will be avoided. Otherwise, they merely fix-up the problems which Audit finds, which is necessarily a reactive and post facto process.
>
> …
>
> I'm am getting the feeling - informed by your Findings and Alan Robertson's email before the audit - that we should consider an audit Finding about the ineffectiveness of that Review Committee - based on its apparent lack of effective action on the decant and drainage QC matters, the frequency of meetings, the last night changes which prevent all members attending, etc. That Review Committee is a critical control for the shareholders (ie: BHP Billiton and Vale) in assuring that Samarco is managing the risks in these TSFs to tolerable levels.
>
> …
>
> My preliminary view is that each of the three items which you have identified is a P2. If the evidence is there for a Finding on the TSF Review Committee as well, then that will also be at least a P2. The process rating is going to be at least "requires some improvement" and may be "requires significant improvement"."

684. Mr Wetzig discussed this with Dr Garga and decided against including a finding in respect of the ITRB on the grounds that: (i) the ITRB was instituted after the serious incident in 2009, mostly as a reaction to that incident; (ii) they were an advisory body, not regulatory; and (iii) they did not audit.

685. Overall, the audit findings included for safety, a P1 and P3, and for asset integrity, four P2s. Despite that, the process ratings for safety and asset integrity were both amber ("requires some improvement"), rather than red ("requires significant improvement").

686. The view of Mr Wetzig and Dr Garga was that asset integrity should be rated as "requires significant improvement". Following a moderation meeting with Mr Villalobos and other auditors, the final rating for Asset Integrity was agreed as: "requires some improvement."

687. On 1 August 2013, the closing presentation was sent to Mr Dotson, Vice President Assurance Americas, who questioned why the rating for asset integrity was not red ("requires significant improvement"), given that there were four P2 ratings. The surprising response from Mr Guzman was that the amber rating was selected, not on merit, but to avoid distracting the management from dealing with a fatality that occurred that could impact the conclusion of the P4P project.

688. The evidence of Mr Lynch was that if Asset Integrity had been rated as "requires significant improvement", it would have attracted greater scrutiny at senior levels within BHP. Mr Beaven's evidence is that he would have expected P1 or P2 audit findings in relation to material design, construction or operational deficiencies in the tailings dams to be identified and reported to the GMC. He agreed that, if the September 2013 Samarco audit had notified the GMC of additional findings, namely: (i) the absence of any design for a substantial change in the geometry of the dam; (ii) the absence of piezometers in a part of the dam that had experienced a number of incidents of seepage and slope saturation; and (iii) repeated failure by Samarco to observe a minimum beach width requirement in the operation manual, the GMC would have insisted on remedial action being taken to address them.

689. Reliability of the risk assessment process was called into question by inconsistencies in the approach taken to assessment of the risk of injury or death at Samarco.

i) A bow-tie assessment by Samarco in 2009/2010, in respect of the risk of collapse of the Germano and Fundão tailings dams, indicated that the consequence of such a failure was a maximum possible loss of 100 fatalities in the downstream area of Bento Rodrigues, if there was a domino effect and the Santarem water dam also collapsed (Severity Level 7).

ii) Samarco/BHP documents dated June and July 2011 again identified the risk of rupture of the Germano and Fundão tailings dams but showed the number of fatalities at Bento Rodrigues as 10 (Severity Level 5), rather than 100 (Severity Level 7).

iii) By the time of the August 2012 Iron Ore RAC meeting, the figure for fatalities had been reduced further from 10 to 5. The figure of 5 fatalities was also used in an Iron Core ExCo monthly risk management report dated January 2014,

> which noted that a dam breach would reach the community downstream of the dam, Bento Rodrigues, in less than 10 minutes.

690. The Iron Core ExCo presentation dated May 2013 showed the risk of critical failure of the Samarco dam operation as "amber" in the CSG material risk profile: "MRCA requires some improvement." The remediation tasks in respect of that risk were identified as: (i) develop and implement measuring the flow of the tailings (July 2013) and (ii) develop and implement mutual aid plan (July 2013).

691. The mutual aid plan was cancelled but Samarco instead introduced new plans, to disseminate, train and provide an emergency action plan and business continuity plan, and to perform an internal dams disruption simulation. Simulations of the Samarco dams emergency action plan and the business continuity plan – crisis prevention and management system were conducted on 21 November 2013, as confirmed by Mr Lopes in his email of 25 November 2013.

692. The report in 1SAP dated November 2013 in respect of the dam safety emergency response plan recorded a 'pass' in relation to CET test 1 (incident response) with the following comments:

> "Samarco did a rupture simulation in [November 2013] but the results has not reported yet. The rupture model need be updated according to the level of the [tailings] dams and Santarém water dam.
>
> Need some improvement [regarding] the evacuation plan and diagrams for Bento Rodrigues. Samarco is waiting [for] the best time to do an evacuation simulation in [relation to] the municipality."

693. Mr Ferreira's comments included:

> "Need some improvement in the evacuation plan for Bento Rodrigues and an update of the rupture simulation for all dams."

694. This indicated that a simulation of the evacuation plan for Bento Rodrigues, to demonstrate that all operations personnel and persons potentially in the path of a dam failure would be evacuated to safety in advance of a failure, had not been carried out. Despite that omission, the CET was given a 'pass' mark. Mr Corless was unable to recall whether an evacuation simulation was ever carried out in relation to the residents of Bento Rodrigues. There is no evidence of such a simulation and no final evacuation plan was produced by Samarco.

695. Senior levels at BHP were aware of deficiencies in respect of the risk assessments for Samarco. On 3 December 2013 Mr Arnold sent an email to Mr Corless and others, copied to Mr Victor, recording completion of the 1SAP risk management entries, ready for completion of the MRCA by the risk owners. He expressed the view that the quality of the CETs documented by Mr Ferreira were poor, stating:

> "For his controls, there are no comments on the tests and no attachments and I have included screen prints for all CET's within the attached document.
>
> …
>
> Incident Response
>
> o Control design raised no issues and the resource requirement are available for all conditions across normal operation, shut-down and mainly in emergency situations.
>
> o Control Effectiveness was rated as Pass, however there was noted some improvement in the evacuation plan for Bento Rodrigues and a update of the rupture simulation for all dams (BA - Given the former remediation plan and known issues with this, I feel this control should probably be fail / deficient and a remediation raised and addressed. However, this can still be raised at the risk level if the risk remains Requires Some Improvement)."

696. Mr Corless shared Mr Arnold's concerns and they agreed that Mr Ferreira should be contacted and given the opportunity to provide more documentation in support of the assessments.

697. On 5 December 2013 Mr Lopes at Samarco sent further information to Mr Ferreira so that Mr Ferreira could produce a revised CET. This included information regarding the simulations carried out on 21 November 2013, where the Emergency Action Plan (PAE) of the Samarco Dams, the Business Continuity Plan - Dams, and the Crisis Prevention and Management System were tested.

698. Mr Arnold continued to express his view that the CET should have been a 'fail' rather than a 'pass', as set out in his email dated 12 December 2013 to Mr Corless:

> "I think the ratings reflect the current understanding of the controls and overall risk assessment of the Dam, both from a Samarco and BHP perspective. I believe the BHP rating of 'Requires Some Improvement' would be appropriate, with ongoing remediation's and work surrounding the Emergency Action plans are still required going forward.
>
> I think the Incident Response control would lend itself to a Fail (it was rated as Pass), which generally corresponds to the results from Samarco's MRCA and the general understanding within BHP."

699. Mr Fernandes questioned whether the "well controlled" classification was appropriate but he maintained his position that the risk of rupture was well controlled and it was not revised.

700. In the Iron Core ExCo monthly report of January 2014 the risk assessment was changed from "requires some improvement" to "well controlled" based on the stated assumption that the remediation tasks had been completed.

701. A later 1SAP entry with an effective date of 1 July 2014 included the following comments in respect of a test carried out on 27 November 2014 which was assessed as a 'pass':

> "Emergency Plans for the Dams and for operations are in place. Gap in Emergency plans for evacuation of Bento Rodrigues, the Community which is downstream of the dams.
>
> The Tactical Response Plans have been done involving Samarco's operation team and contractors. People from Bento Rodrigues, the community that is downstream of the main dams, were not involved."

702. The scope of the FY 2014 technical audit included asset integrity and a review of Samarco's management of risks associated with its tailings facilities. The Asset Integrity Risk and Control Matrix ("RACM") for the Samarco tailings dam technical audit was dated 5 February 2013. It identified the control design effective test steps and control operating effective test steps against a number of potential causes of failure of the dam, namely, inadequate design, defective construction, inadequate strength of tailings, excessive pore water pressure, internal seepage erosion, failing of the tailings delivery or water recovery pipes, overtopping, liquefaction and inadequate maintenance.

703. The working test papers for the audit included findings by Dr. Vinod Garga, an external engineer, regarding the risk of failure of the retaining embankment due to inadequate design. Referring to the initial construction defects in the starter dam and changes to the design, Dr Garga noted that the recommendation of an assessment of the liquefaction potential of saturated slimes, on top of which the dam had been raised, had not been carried out. He did not consider that a liquefaction assessment was critical but this was based on the erroneous assumption that the minimum width of the beach kept the slimes away from the upstream face of the dam and the tailings remained unsaturated.

704. BHP Iron Ore was aware of the August 2014 seepage and cracking incident through the ITRB. ITRB Report No.11 dated 20 November 2014 recorded the detection on 26 August 2014 of: (i) seepage with artesianism and significant flow downstream of the toe of the dam on the left bank; and (ii) cracking on the slopes and berms of the Fundão dam in the displaced section of the dam axis. The ITRB's recommendations included:

i) regarding the seepage, to determine the water outlet point below the embankment, install a system for measuring flow and turbidity, chemical analysis of water and installation of piezometers;

ii) regarding the cracking at the Setback, to fill in the area as quickly as possible in order to return the axis to its design position; pending reinstatement, to ensure that the elevation of the displaced axis was less than 20 metres and that a

minimum beach of 200 metres was observed; and monitoring of the phreatic position with piezometers.

705. In July/August 2015 there was another technical audit of Samarco ("the FY2016 Samarco Audit"), which did not cover tailings dams. However, there was a separate audit of the monitoring that was performed by BHP Brasil in respect of the risk of a tailings dam failure, that is, an audit of the risk management system of BHP itself in relation to Samarco's activities. A request for information was sent in respect of the Catastrophic Failure of a Tailings Dam (BHPB IO Brazil audit) against four critical controls, namely, Dam Design, Failure Mode & Effects Analysis (FMEA), Dam Monitoring and Independent Tailings Review Board (ITRB). In particular, evidence was requested regarding control of the beaches, and stability analyses and inspection of any unexpected cracking or seepages.

706. Mr Wetzig could not recall the details of information provided by Mr Fernandes, as risk owner, in response to the requests. The August 2014 cracking incident was within this audit period. In the ITRB Report No.11, there was a clear recommendation that the setback area should be filled in as quickly as possible in order to return the axis to its design position and the elevation of the displaced axis in the meantime should be kept below 20 metres. Mr Wetzig could not recall whether Mr Fernandes provided any evidence verifying that a stability analysis had been prepared in the light of the August 2014 cracking incident. He was unaware of the later seepage incidents.

707. Mr Wetzig's findings during the audit were that the dam design, dam monitoring and ITRB controls, as described in 1SAP or the GRC of 1SAP, did not reflect what the Iron Ore Brazil team were doing. The Brazil team had not performed any control design assessments ("CDAs"), as provided for under GLD 0.17. There was a deficient verification approach in relation to each of the controls. Therefore, his assessment was that the CETs recorded as having been performed by Iron Ore Brazil should not be treated as providing adequate confirmation that sufficient verification had been achieved as contemplated in the GRC.

708. He recorded that the MRCA was limited to a one-line sentence which stated that the risk was well controlled; the application of the methodology recommended by Iron Ore risk management for performing the MRCA was not reflected in the MRCA wording uploaded by Iron Ore Brazil in GRC. This was inadequate for the purpose of BHP's risk management system.

709. Notwithstanding those deficiencies, Mr Wetzig's assessment, set out in an email dated 11 August 2015 was that:

> "based on the documentary evidence provided by BHPB IOB, which consists of Samarco's internal reports and ITRB reports, it could be concluded that:
>
> o The risk of Tailings Dam Failure is well controlled by Samarco
>
> o The activities that BHPB IOB perform to carry out the monitoring of Samarco's management of the risk, are adequate, although not reflected in the deficiently worded three critical controls listed above.

> o The role exerted by the ITRB is of the utmost importance, as it technically steers Samarco's management of the risk and provides technical recommendations in relation to both operational issues and design and construction of raises of existing dams as well as design of new dams."

710. In the internal audit report for the Iron Ore Brazil Technical Audit dated August 2015, it was recorded that:

> "The process to assess MFL and RRR was based on the output of the Samarco assessment of MFL and RRR and did not include a formal process to assess risks in a BHP Billiton context to evaluate the BHP impact. It should be noted that Group RM identified several gaps in Samarco's critical control effectiveness assessments and RRR calculations during the internal audit conducted in August 2015.
>
> A governance structure for the Samarco Joint Venture was clearly defined by the Joint Venture Agreement and it was well established. The governance structure included several committees and forums to oversee the risks associated with Samarco's activities. Iron Ore Brazil participates in the committees and forums and it was actively involved in several governance activities, such as: reviewing Samarco's material risks, verifying Samarco's critical controls, participating in Samarco's risk reduction project reviews and participating in Samarco's significant incidents investigations (ICAMs). On review of the two material risks selected for verification, "Multiple Fatalities" and "Critical Failure of the Tailings Dams", it was noted that critical controls did not fully reflect these governance activities and the role of the Iron Ore Brazil team. Instead the design and operating criteria of some of the critical controls were defined by activities performed by Samarco. Therefore, Iron Ore Brazil could not directly mitigate those risks. A specific critical control was common to the all five material risks, "Risk Management Process," which referred to the effectiveness of the Samarco's risk management process to prevent Samarco's material risks. Samarco and Iron Ore Brazil assessed this control as adequate; however the audit of Samarco revealed that the risk management process at Samarco required some improvement.
>
> Group RM recommends that a formal process to identify the risks associated with the Joint Venture is implemented (potentially linked to the 5Y Plan), and a review of the critical controls is conducted to ensure that they clearly reflect the governance role performed by the Iron Ore Brazil team."

711. The Iron Core ExCo monthly report for January 2014 was prepared by Mr Corless and recorded the change in 'Samarco Critical Dam Failure' from 'Requires Some Improvement' to 'Well Controlled' due to completion of remediation tasks. Jeff Zweig

produced a presentation regarding the risk of critical failure of the dam operation. The overall rating was "well controlled". The preventative controls were all assessed as adequate:

i) dam design - dams designed and constructed to Brazilian Standards, which are aligned with international standards (ICOLD); water management designed for '1 in 10,000 year' rainfall event;

ii) FMEA - annual FMEA analysis - technical risk assessment detailing the critical technical operating and maintenance controls;

iii) dam monitoring - daily dam monitoring using manual and automated sampling; data is subject to periodic external and internal audits;

iv) ITRB - ITRB is composed of 3 independent and internationally recognized geotechnical experts that audit Dam, advise and support Samarco's Executive Board periodically (at least 3 times a year);

v) incident response - dam safety emergency response plan to evacuate in the event of failure; and

vi) risk management process - effective risk management process to identify, analyse, evaluate and treat risks.

712. Mr Victor considered that the ITRB was very important, providing independent tailings dam advice to Samarco and the Samarco Board. However, in an email dated 25 June 2015, Mr Ferreira expressed the view that the ITRB was no longer effective; the reduction in the number of participants left the inspections with few members, with the latest one taking place with only one member.

713. The Samarco audit FY 2016 identified the following adverse findings in relation to risk management, namely, deficiencies in the methodology to evaluate critical controls to inform material risk overall assessment; and inadequacies in the application of the RRR calculation:

> "2.1 The annual critical control effectiveness was conducted using a method designed by Samarco based on detailed calculations. The formula used not always represented the effectiveness the individual control. Furthermore, the method defined by Samarco to assess the overall material risk level did not account for additional analysis to evaluate individual critical control scores. Evidence was found where controls had been rated below 65% or inadequate, however it was not clear how these scores were reflected in the overall material risk assessment.
>
> 2.2 For the six material risks sampled, the RRR was calculated using the most likely scenario which was different to the plausible worst case scenario, however for 4 material risks the selection of different scenario resulted in a lower severity. There was no process to ensure that the scenario selected for RRR

> calculation represented the higher overall RRR for all events with 3 different scenarios for MFL and RRR.
>
> Verbal discussions with management indicated that there was a perception that the reduction in severity from MFL to RRR was due to the controls, but it was confirmed that some of the difference is accounted for [by] selection of different event/scenario."

714. The RRR calculation was distorted by use of the most likely scenario, rather than use of the plausible worst case scenario. For "Critical failure in Implementation of Tailings dam" material risk, the plausible worst case scenario had an MFL of $3.7 billion based on dam failure but the most likely scenario chosen to determine the RRR was based on project delay with a severity of $22 million. For "Disruption of embankment" material risk, the plausible worst case scenario was four fatalities but the most likely scenario chosen to determine the RRR had a severity of one fatality.

715. The potential risk if not remediated was described as follows:

> "The method for defining material risk events and assigning the MFL and RRR may lead to incorrect assignment of RRR or incorrect perspective of adequacy of controls in place to reduce severity. This may result in lack of management action or intervention on an inadequately controlled risk."

716. Mr Victor confirmed in cross-examination the method of calculating RRR:

> "Q. So can you confirm how BHP would calculate the RRR?
>
> A. Yes, BHP would establish the plausible worst-case scenario for a risk event, would apply the controls of that risk assessment and, based on the actual assessment outcomes, will determine likelihood of that event happening.
>
> …
>
> Q. So the RRR required consideration of the highest expected impact associated with the risk event, assuming mitigating controls in place for that risk were reasonably effective?
>
> A. Correct."

717. The FY16 Samarco Iron Ore Brazil Technical Audit Report dated August 2015 reported on the Group RAA technical internal audit at BHP Iron Ore Brazil during August 2015, covering the period July 2014 to June 2015. This internal audit formed part of the FY2016 Internal Audit Plan, as agreed with management and approved by both the BHP RAC and the Iron Ore RAC. The scope of the audit was verification of risk management at Samarco:

i) BHP Iron Ore process for identification of material risks related to Samarco Joint Venture, including the assessment of the adequacy of evaluation of MFL severity and RRR;

ii) effective management of material risks identified by BHP Iron Ore, including the design and implementation of associated selected critical controls for the material risks, 'Critical Failure of the Dam' and 'Multiple fatalities'; and

iii) BHP Iron Ore monitoring, control and reporting of material risks on an ongoing basis.

718. The findings included a Priority 2 finding in respect of inadequate application of the risk management process to reflect the risk associated for BHP with the Samarco JV:

> "Risk assessment: The process to assess MFL and RRR was based on the output of the Samarco assessment of MFL and RRR, and did not include a formal process to assess risks in a BHP Billiton context to evaluate the BHP impact.
>
> BHP Billiton Iron Ore Brazil aggregated Samarco risks into two material risks at BHP Billiton level, 'Multiple fatalities' and 'Production loss'. For these 2 material risks, the method used by to determine MFL and RRR was to select the highest MFL and RRR of the aggregated risks, however for 5 risks loaded into GRC it was found that the highest MFL or RRR were not selected. For example,
>
> - "Multiple fatalities" material risk MLF was assessed as level 5 which was inconsistent with the level 6 Samarco's Explosion of starch silos material risk (33 fatalities).
>
> - "Production Interruption" material risk MFL was assessed as level 5 ($716M), however it was not clear how this had been calculated.
>
> - In both cases, there were Samarco material risks with RRR 90 and 100, while the RRR of BHP Billiton's material risks was 30.
>
> Additionally, there was no description in GRC for the basis of the MFL and RRR.
>
> Risk training: There was no formal training in the last 2 years for BHP Billiton risk or control owners that could be evidenced. Evidence was provided of the visits from Iron Ore, but there was no clarity about the training being delivered.
>
> Inadequate application of the Risk Management Process may lead to incomplete assessment and management of the risk for BHP Billiton associated with the Samarco Joint Venture."

719. Following this audit, revised controls for the tailings dam monitoring and the risk management process at Samarco were introduced but Mr Victor was unable to recollect whether they were loaded into 1SAP prior to the dam collapse.

720. As recognised by Mr Beaven, if the August 2015 Samarco audit had notified the GMC of additional findings, namely, cracking, slope movement and saturation within the dam, and the absence of any stability analysis for the affected area, the GMC would have insisted on remedial action being taken.

721. The deficiencies in risk assessment at the dam reflected an earlier concern raised by Lucas Dow, head of group HSEC at BHP. On 12 September 2012 he produced a memorandum summarising a review of significant dams risk. He recorded that eight dam risk audits had been undertaken by Group RAA over the previous two years, of which all but two noted tailings risks as well controlled. The opinion of the HSEC reviewers was that five of the eight audits were undertaken without personnel with relevant engineering expertise and sufficient experience in large dam design and management.

> "On the back of the review a number of businesses appear to be understating the materiality of their dam risks. Many risk assessments do not appear to consider the full range of potential consequences, nor the impact of cumulative consequences that are often associated with large dams…
>
> Control effectiveness, applying the methodology described above, has been assessed as variable and consequently it is not possible to determine whether all material risks are well controlled. Generally gaps in control effectiveness link to a potential understatement of dam materiality, meaning controls are not necessarily commensurate with the appropriate level of risk associated with the dam. This may be attributed to a lack of clear facility accountability coupled with insufficient engagement of resources competent in dam management.
>
> In order to improve the identification, assessment and management of material dam risks it is recommended that businesses undertake the following actions:
>
> 1. As part of their risk management processes review the materiality rating of dam risks with consideration of criteria such as criticality of dam facilities to production, dam height, dam size and the full suite of HSEC consequences in the event of a failure.
>
> 2. Identify controls and assess control effectiveness for dam design and operation in light of dam materiality, applying recognised dam guidelines[4] and regulatory requirements.
>
> 3. Engage qualified dam expertise to assist with the actions described above.
>
> In addition it is recommended that Group RAA increase the review of dam risks as a focus area within the scope of Technical audits, ensuring that appropriately experienced personnel

> undertake such audits. This may require externally sourced expertise where not internally available.
>
> Execution of the recommendations identified above combined with GLD.017 Risk Management provide effective an effective framework for the identification and control of dam risks. As such the inclusion of a specific GLD requirement pertaining to tailings dam design and control is not considered necessary at this point in time. This will continue to be monitored on the back of annual risk assessments undertaken by the business combined with Technical audit results."

722. Following the dam failure at Mount Polley in Canada in August 2014, a slide presentation was prepared by BHP dated March 2015, referring to the above Dow Bentel review and the recommendations made therein. Quite rightly, BHP was concerned to ensure that their operations were as safe as they could be. As recognised by Mr Dow, BHP's risk management framework was careful, comprehensive and effective. Unfortunately, in the case of the Fundão Dam, it was not properly implemented. Mr Ferreira's assessments of CETs in respect of Dam Design, Dam Monitoring, and FMEA controls were obviously deficient. The MRCA ratings of 'well controlled' between 2013 and 2015 were unjustifiable on any objective basis. As a result, there were gaps and weaknesses in BHP's assessment and control of the risk of failure in respect of the tailings dam.

(v) Liquefaction study

723. The Panel Report found no credible pre-failure assessment of liquefaction for the Fundão Dam in any of the documents it reviewed.

724. Following the serious seepage and cracking at the left abutment in August 2014, Pimenta advised that the potential for liquefaction should be considered and an undrained stability analysis should be carried out.

725. Failure modes and effects analysis ("FMEA") was one of the controls used to identify possible modes of failure of the dam, together with the causes and effects of each such failure.

726. The FMEA dated 30 August 2012 identified mitigation measures in respect of the risk of static liquefaction, namely, review of the instrumentation plan near the abutments and conduct of liquefaction potential studies.

727. The FMEA dated 21 May 2013 recorded that the review of the instrumentation plan near the abutments was in progress and the liquefaction potential studies were in their initial phase.

728. These FMEAs were sent to Mr Ferreira in November 2013.

729. The FMEA dated 27 November 2013, sent to Mr Fernandes and Mr Ferreira on 3 June 2014, identified a risk of rupture of the Fundão Dam through slope instability caused by static liquefaction and the mitigation action required as:

> "Actions (2012): Carry out liquefaction potential studies (IN THE INITIAL PHASE). Action (2013): conclude liquefaction studies to support the analyses."

730. The FMEA dated 16 July 2014, sent to Mr Fernandes and Mr Ferreira on 27 November 2014, identified a risk of rupture of the Fundão Dam through slope instability caused by static liquefaction and the mitigation action required as:

> "Actions (2012): Carry out liquefaction potential studies (IN THE INITIAL PHASE). Action (2013): conclude liquefaction studies to support the analyses. Comment (2014) Complement the studies to increase sample representativeness or conduct new studies if necessary due to changes in the tailings."

731. The FMEA dated 3 December 2014 identified a risk of rupture of the Fundão Dam through slope instability caused by (i) static liquefaction, (ii) failure of the internal drainage system (blanket drain) with pore pressure/phreatic increase, or (iii) insufficient internal drainage system. For each of those causes, the effects were stated to be:

> "Global rupture (in non-drained conditions) with discharge of water and sediment reaching the Santarém dam reservoir and the area downstream."

732. The severity for liquefaction failure was level 10 in respect of financial impact, environmental impact and impact on human health and safety; and level 9 in respect of impact on socio-cultural heritage. The mitigating actions required were recorded as follows:

> "Actions (2012): Conduct liquefaction potential studies (IN THE INITIAL PHASE). Action (2013): conclude liquefaction studies to support analysis. Comment (2014): Complement the studies to increase the representativeness of the samples or conduct new studies if necessary due to changes in the tailings. (2014/02) Prioritise internal abutment drainage and axis return."

733. The critical control for the FMEA operating standard in 1SAP provided:

> "An annual FMEA Analysis is completed and all significant actions implemented / gaps closed within an appropriate basis.
>
> Risk analysis commensurate with geotechnical/geological complexity demonstrating preventative controls linked to causes and mitigating controls liked to impacts.
>
> Identification of leading indicators of failure or uncontrolled release and controls required to manage all potential issues.
>
> FMEA informs changes to the operating, maintenance and inspection/monitoring procedures.
>
> BHPB monitoring of the critical control includes:

> 1) Direct monitoring directly related to the Material Risk (ratings, critical control performance, action tracking, event monitoring)
>
> 2) Oversight of key critical control performance through Samarco responsible risk and critical control owners."

734. The validation test steps that BHP were required to take included obtaining the latest version of the FMEA, ensuring that the risk analysis was appropriate to the geotechnical complexity, independent review of the FMEA by an engineer or engineering panel, review of the risk register and assessment of the controls.

735. The FMEAs in 2014 recorded that the liquefaction potential studies were necessary but still in the initial phase, they needed to reflect changes in the tailings, which were known to be saturated, and should prioritise the Setback.

736. The FMEA dated 30 July 2015 recorded that the liquefaction potential studies were still in the initial phase.

737. Despite the same outstanding mitigation actions from 2012 through to 2015, and acceptance by Mr Corless in cross-examination that there was no evidence in 1SAP that the required liquefaction potential studies were ever performed, Mr Ferreira continued to assess this CET as 'pass'.

738. A liquefaction potential study, as required in the FMEAs over a period of three years, would have led to a stability analysis using undrained shear strength parameters and shown that the dam, in particular the left abutment, was in an unsafe condition.

(vi) Continued increase in height of dam

739. The seepage, cracking and slope movement that occurred at the left abutment in August 2014 presented clear physical evidence that there was instability in the tailings dam in that location. The Panel Report considered that the left abutment showed serious signs of distress and described the dam as in a very fragile state.

740. ITRB Report No.11 dated 20 November 2014, of which BHP had knowledge, raised stability concerns regarding the continued increase in the height of the crest along the displaced axis of the Setback. Dr Marr accepted that this was the inference one could draw from the report.

741. Action was taken to stabilise the slope by the formation of a berm and piezometers were installed to monitor saturation levels. However, repeated seepage incidents occurred throughout 2015, including at the left abutment, dispelling any notion that saturation of the tailings, and therefore, the stability of the dam, had improved.

742. Despite those clear warning signals, BHP, through its control of Samarco, continued to increase the height of the dam.

(vii) Contemporaneous reports as to stability of the dam

743. The Claimants' case is that the risk of liquefaction in the dam was readily identifiable before the collapse and the continued raising of the dam along the alignment of the

Setback was objectively unsafe. The collapse of the dam could have been avoided. By August 2014 at the latest, further raises to the dam should have stopped until a proper safety review had been carried out and reinforcement measures had been undertaken to ensure an adequate margin of safety at the dam.

744. BHP's case is that it is not correct to say that a stability review of the dam prior to 5 November 2015 would have identified that the dam was at serious risk of collapsing due to liquefaction. Although contemporaneous reports contained recommendations in relation to various measures which could be taken at the dam, including measures to preserve stability, none suggested or recommended that operations should stop because the dam was at risk of imminent failure. Indeed, there were certificates of stability up to the date of the collapse. The contemporaneous data did not clearly indicate a susceptibility to liquefaction, or that there was a significant risk of liquefaction.

745. The starting point is that Pimenta de Ávila, the engineer of record for the dam, produced an emergency action plan dated 6 March 2008 as part of the conditions for the operating licence for the dam. The report stated that Fundão tailings system risk management should include visual inspections, monitoring and periodic safety assessments. The establishment of systematic routines, including technical inspections, periodic safety assessments and the monitoring and analysis of instrument readings, was a fundamental factor in good risk management of the system. He explained that monitoring the behaviour of the dam with the help of instrumentation, such as the installation of piezometers and water level measuring devices, would make it possible to foresee unsatisfactory behaviour in the dikes, which could not be verified with the naked eye.

746. Pimenta de Ávila prepared statements of stability condition on 12 November 2008, 10 September 2009 and 9 September 2010. In each statement, the dam structure was declared to be in an adequate condition.

747. Against that background, I turn to consider the material reviews and reports carried out by various geotechnical engineers as the incidents that occurred at the dam unfolded.

748. On 11 December 2009, following the piping incident, AMEC Earth & Environmental prepared an audit report for Samarco:

> "The design safety factors for the slopes and drains as presented in the original report are considered adequate. It is recommended that more samples be taken and tests carried out to confirm the design parameters and to assess the variability of the foundation material, especially downstream of Dike 1.
>
> Due to a construction problem with the underdrain drain of Dike 1, the Fundão Dam was in the process of being restored at the time of the visit on 1 December 2009. The drain had been sealed upstream and work was continuing in the area between Dike 1 and Dike 1A, which was built as part of the restoration project. The project was revised to include contingency drains on the abutments and a blanket drain at a higher elevation. We congratulate SAMARCO on the way it reacted to the problems that occurred in the construction of Dike 1 and on the decisions taken.

> The tailings disposal between Dikes 1 and 1A will not benefit from underdrain (as in the Germano Dam and Germano Pit), which will lead to a lower density of the tailings deposit and therefore a lower shear strength. This aspect should be taken into account when re-evaluating the design of Dike 1 after restoration. Lateral tailings disposal with steep beach formation is recommended to improve drainage and verify density, strength and liquefaction potential. These parameters should be determined in situ once the sandy tailings have been dumped. The project should be reviewed with these parameters and modified, if necessary, before proceeding."

749. This report provided a clear warning as to the implications of the failed foundation drains; in particular, attention was drawn to the resulting lower density and lower shear strength of the tailings. It emphasised the need for re-evaluation of the changed design and assessment of the liquefaction potential.

750. The FY 2011 Samarco Audit raised additional concerns as to the adequacy of monitoring carried out at the dam:

> "The manual piezometers are currently read once per month. This was not sufficiently frequent to detect the blocked underdrain and change in phreatic conditions that resulted in the recent seepage event through the dam wall.
>
> Cause: Site personnel did not realize how quickly the phreatic conditions can change near the wall of the Tailings Dam.
>
> An undetected change in the phreatic level in the embankment could cause seepage and channelling through or under the wall. In the worst case, a section of the embankment may fail, resulting in the discharge of tailings into the environment downstream of the dam.
>
> The manual piezometers should be read on a weekly basis until the proposed system of electronic reading via radio telemetry has been approved, installed and commissioned."

751. There is no evidence that this advice was followed until the serious seepage and cracking incident occurred in August 2014.

752. Following discovery of the defective decant galleries, AMEC produced a further independent review report dated August 2010, in which the following comments were made:

> "Construction of tailings dams by the upstream method (especially with relatively small compacted fill elements) has a poor track record internationally with several examples of problems and failures all over the world. Due to the high risk associated with this construction technique, it is becoming increasingly difficult to justify such projects nowadays."

753. It was recommended that the drainage blanket at 826m be extended towards the abutments to increase the efficiency of the drain when required to deal with future tailings deposits. With regard to the defects discovered in the secondary gallery, recommendations included the following:

i) A detailed assessment of the design and the construction of the two galleries should be carried out by a specialist structural engineer to determine, in view of the performance of the galleries under the current loads, the prognosis for the performance of the galleries under future loading conditions (final dam crests at El. 920 and El. 940m) and the feasibility of repair of the galleries.

ii) A detailed geotechnical assessment of the foundation conditions along the entire length of the galleries should be carried out before final review of the options for structural rehabilitation of the galleries.

iii) All options should consider the final conditions of the dam and should be independently reviewed by geotechnical hydrotechnical and structural specialists.

754. An ITRB report dated 8 September 2010, in respect of the problems discovered in the decant galleries, raised a concern that Samarco did not have adequate records of discrepancies between the design and final construction of the dam structures. As a result, the ITRB did not have sufficient data to make its intended assessment.

755. In September 2010 a Technical Safety Report was prepared by Pimenta de Ávila, based on a site inspection on 30 July 2010. Taking into account the stabilising berm constructed as part of the Piping Incident remedial works, Pimenta calculated the lowest Factor of Safety, in the section with the greatest height, as FOS 2.02. On that basis it was concluded that the dam was in an adequate safety condition in terms of the physical stability of the dam.

756. On 20 November 2010 Dr Robertson produced a report on the tailings dam audit. The calculated Factors of Safety for the dam, after re-design, with regard to the risks of instability, were above 1.5 but the following concerns were identified in respect of the overflow:

> "The slime zone will be adjacent to the 'sandy tailings beach' as it advances in the upstream direction. The slime must have high pore pressure and low shear resistance. The resulting geometry may not generate adequate safety factors regarding the risk of instability. "The history of slime (quick elevation) must be modelled to allow for determination of pressures and pore-pressure dissipation indices, and to estimate resistance indices." These results can then be used in slope stability calculations. The uncertainty of the slime's variability in relation to the initial void ratio and permeability coefficient, and therefore in relation to the pore-pressure dissipation indices, must be foreseen and taken into account. If analyses of the resulting stability conditions reveal inadequate stability, consideration should be given to installing a dyke upstream of Dyke A1 in order to increase the width of the sandy beach (Dyke A2)."

757. Thus, Dr Robertson highlighted the high pore pressure and low shear resistance of the slimes and recommended that a stability analysis should be performed. A further more general concern was raised by Dr Robertson, relating to the reactive, rather than proactive, approach to risk at the dam:

> "The risk profile of the tailings dams currently observed at Samarco is the highest risk profile among the mining units of comparable size known to the rapporteur. It far exceeds the limits prescribed by industry standards.
>
> There is a need to introduce changes in the culture of "just-in-time management and programming" of processes that present high variability and behavioural risks that diverge from forecasts. The geotechnical structures and tailings dams of Samarco's projects fall into this category. Samarco is aware of this need and has even organised a Tailings Committee and an Independent Tailings Systems Assessment Board (ITRB), partly to address this need.
>
> …
>
> Samarco has made a number of changes in the personnel area and in the management area, in order to ensure that the supervision work is carried out by duly appointed employees or staff. However, some aspects related to the continuity of the supervision structure, the communication of essential information and the carrying out of investigations, engineering projects and works, with adequate deadlines or contingency margins, will have to be improved if Samarco is to effectively reduce its risk profile regarding the handling and storage of tailings."

758. On 13 April 2011 Dr Robertson produced a tailings dam audit report, in which he noted that the beach was well-developed and the drainage for the beach appeared to be functioning efficiently but:

> "With the foam that forms on the sand tailings pond water it is difficult to determine the width of the beach. It is recommended that the location of the beach limit be determined by whatever practical method that may be applicable, and that soundings be taken of the pond bottom to determine the depth of water in the pond and pond bottom profile. This information is important to understanding the manner in which the slimes and sands are intermixing and the pond bottom behaviour."

759. A particular concern was raised regarding the flow of slimes from Dike 2 into the Dike 1 impoundment:

> "No beach slope has formed at the entry point. It is apparent that with the rate of slimes deposition and the low permeability of the slimes that any settled slimes maintain high pore pressures and

> very low shear strength resulting in sustained liquefaction and failure likely to result in an essentially flat pond bottom. Determination of the topography of this pond bottom and the depth of the 'water cap' is important in order to be able to model the deposition and determine at what level at which to set the stoplogs in the decants to minimize the pond size while minimizing the amount of solids in decant water. These two optimizations are in conflict."

760. In April 2011, new terms of reference were introduced for the ITRB, under which it was required to report directly to the Samarco Board of Directors on matters relating to dams and tailing disposal, including aspects of plan, design, construction and operation, as well as risk management.

761. On 31 August 2011 Geoestável, consultant geotechnical engineers, prepared a Declaration of Condition of Stability, which declared that the dam was in an adequate condition of safety in relation to the size of the hydraulic structures and physical stability. For Dikes 1 and 1A the review indicated the lowest factor of safety as a value higher than 1.5; the same was confirmed for Dike 2 although the factor of safety was not identified.

762. In ITRB Report No.3 dated November 2011, concerns were raised regarding the timing of information provided to the ITRB and inadequate time allowed for discussion of the issues. Further, the ITRB was critical of the method of risk analysis proposed in respect of the dam:

> "A "bow tie" risk analyses approach was proposed by Samarco for the risk assessment of the tailings facilities. This approach is based on listing potential causes of incidents with their consequences to define the risks and on identifying preventative measures for the causes and corrective measures for the consequences to manage those risks. The ITRB considers that while this approach is suitable for operational risks and events with relatively high frequency of occurrence and relatively limited or moderate consequences of failure, it is not suited for risk analyses of dams and complex dam systems where (i) often there aren't simple cause-effect relationships and (ii) the probability of failure is very low, the consequences of failure are extreme and the life of the structure is very long. Failure Mode and Effects Analysis (FMEA) is a more suited approach to evaluate the risks of such systems and to prioritize adequate actions."

763. In May 2012 Pimenta de Ávila produced a Technical Opinion regarding the installation of additional abutment drains. Pimenta noted that the efficiency of the blanket drain could not be assessed and geotechnical test results on the tailings disposed of in the dam, requested at the time of the original project, had not been provided. The conclusions and recommendations included:

i) The actual flow model in the region of the development was predominantly three-dimensional, mainly due to the terrain surface in the abutment region and

the "V"-shaped valley, with actual flow in the direction of the blanket drain. Therefore, the two-dimensional analyses tended not to portray accurately the real flow model.

ii) The additional abutment drains should be installed.

iii) The minimum beach length of 200 metres established in the Operating Manual must be carefully respected.

iv) It was necessary to monitor the behaviour of the dam, in order to confirm the structure's performance against the simulated flow model.

v) It was recommended that tests be carried out on the tailings in order to certify the values used in the analyses, particularly as the tailings testing provided for in the original project was not carried out.

764. In August 2012 a technical safety report prepared by Geoestável expressed concern as to the condition of the Kananet pipes for the blanket drain. Erosion was noted on the left and right abutments. The Dike 1 impoundment was assessed as showing *adequate* conditions of overall stability in terms of global ruptures, compared with an assessment of *good* conditions of overall stability in 2011. However, it was stipulated that it was necessary to ensure that the tailings beach had a minimum length of 200 metres as specified in the Operations Manual. In respect of the Dike 2 impoundment, it was understood that the body of the dam was of adequate safety but subject to the following caveat regarding the slimes:

> "Thus, the structure meets the stability conditions considering potential critical ruptures in the downstream slope. However, due to the uncertainty regarding the resistance parameters of the slime located below the base of the pile caps (upstream slope), it is not possible to ensure that the coefficients are in accordance with the minimum safety factors recommended by the ABNT NBR 13028 Standard for the downstream slope."

765. Despite those concerns, on 18 August 2012 Geoestável provided a Declaration of Condition of Stability in respect of the dam.

766. The ITRB Report No.5 dated October 2012 noted that Samarco's initial plan of having three meetings per year was changed to two meetings in 2012 with the January meeting being cancelled. This resulted in a very compressed schedule and the inability to review all the tailings structures during any one meeting or during the two meetings that year. The ITRB was forced to place reliance on presentations made in the absence of full discussion. Notwithstanding that difficulty, key findings included:

> "The design of the New Fundão Dam or 'Fundão Buttress' was presented by design engineers Geostavel. The ITRB recognizes that this design is a "work in progress" with much of the design still in its conceptual stage.
>
> …

> • The feasibility of a sand stacking system relies on effective drainage of the deposit to prevent a high liquefaction potential. The underdrain / rate of construction / transient seepage regime.
>
> • The design must be for the 940 raise for stability + seepage
>
> • Water management is critical for the feasibility of the construction of the buttress:
>
> o Main and/or secondary galleries need to stay in operation
>
> o Auxiliary decant spillway needs to stay in operation
>
> o Any future decant spillway would also be required to stay in operation
>
> o Decant facility for the tailings construction water
>
> All of these facilities need to be operational and reliable under the future loading. All of these galleries/decant facilities would pass under the starter dam - this needs to be addressed.
>
> There are considerable design challenges yet to be resolved in the design of the NFD (or Fundão Buttress). The ITRB looks forward to reviewing the advanced design at the next review meeting."

767. In relation to the Setback, the ITRB sought further information to better understand the reason for the change in dam crest arrangement. This included a description of the change in location/orientation of the crest to avoid additional loading on the secondary gallery. Unfortunately, the next meeting, held in April 2013, was not attended by either Angela Küpper of AMEC or Dr Robertson, the ITRB members who had sought this information. As a result, the absence of explanation and details regarding the Setback was not followed up, then or at subsequent meetings.

768. On 5 February 2013 Geoestável produced a conceptual design report for the proposed increase in the height of the dam to 940 m. The report included consideration of the risk of static liquefaction of the sandy tailings:

> "Saturated, soft, or loosely compacted sands are susceptible to liquefaction. This statement is valid for both dynamic requests and static load conditions.
>
> Since the tailings are released hydraulically, the tendency is for it to present itself with low relative compactness. Therefore, it is important to study the potential for liquefaction of the tailings under saturated conditions and what are the necessary measures to avoid and/or live with the occurrence of the phenomenon in adequate and safe conditions.
>
> There are several approaches to evaluate the potential for sand liquefaction, including sandy tailings from mining processes, but

> basically there are two lines being followed: one that uses results from laboratory tests and the other, results from field tests.
>
> …
>
> In principle, it is planned to use the methodology proposed by Olson (2001) for the evaluation of the liquefaction potential of soils, which is based on correlations between shear strength ratios and penetration strengths normalized from the results of field tests (SPT and/or CPT). These correlations were established based on retro-analyses of several historical events of liquefaction flow ruptures induced by cyclic and static loads.
>
> …
>
> For soils that show a clear tendency to contraction from the previous analysis, the potential or not to establish a liquefaction trigger in the investigated area is then analyzed. In terms of liquefaction flows under static stresses, this analysis basically consists of evaluating whether or not the acting static shear stresses exceed the peak shear strength of soils susceptible to liquefaction. The proposed methodology for the analysis of the liquefaction trigger (for static and/or dynamic loads) is based on the following procedures (Olson, 2001 and 2006) …
>
> …
>
> If the evaluation proposed here indicates a risk of liquefaction for the Fundão Dam Raising deposit, project measures will be taken to avoid a rupture due to this phenomenon, for example: greater rigor in the limitation of the tailings beach, modification of slopes, etc. until an expected equilibrium situation is reached for the deposit."

769. In its Report No. 7 dated September 2013, the ITRB expressed concern regarding drainage from the Vale waste pile, noting that the piezometric level was already higher on the left side of Dike 1, compared to the rest of the dam. It recommended measuring the flow at the toe of Dike 1 and presenting the data at subsequent ITRB meetings.

770. On 4 September 2013 VOGBR prepared a Technical Safety Report (finally approved on 17 December 2013), in which it assessed the dam as stable, with a Factor of Safety of 2.086 and adequate conditions of safety. It was noted that there were problems at the left abutment and intervention measures were recommended, including monitoring by piezometers. Despite its recognition of high water pressure levels at the left abutment, the stability analysis was carried out using drained strength parameters. Surprisingly, it made no reference to the Setback or to any impact caused by the flow of slimes into the Dike 1 impoundment. VOGBR's Statement of Stability Condition dated 6 September 2013 declared that the dam structure had adequate safety stability, provided that there was compliance with the recommendations contained in the action plan.

771. In January 2014 ITRB Report No.8 noted that Dike 1 monitoring showed a satisfactory condition of stability, despite high neutral pressures downstream of the vertical drain, towards the left abutment. The ITRB considered that this indicated inoperability of the internal drainage, resulting from the hydraulic basin formed in front of the starter dike and below the horizontal blanket at El. 826m. The ITRB observed during a field visit that there was evidence of a lack of care, concerning inadequate maintenance, with water discharging from drainage pipes directly onto the unprotected slope surface and rainwater puddling on the berms. It was also noted that the erosion on the downstream slope near the left abutment had not been repaired.

772. The ITRB assessed that the piezometric readings from the upper blanket drain of Dike 1 indicated the need for additional blanket drains at higher elevations in the future. The Board called for the ongoing work to fill in the Setback and return Dike 1 to its original alignment to be accelerated. The seepage events at the left abutment indicated that the blanket drain at El. 826m was not controlling the phreatic surface at this location and additional abutment drains should be considered.

773. The February 2014 ITRB Report No.9 noted, in connection with the proposed raising of the dam to 940 metres, that the risk of tailings liquefaction was a material design consideration. Important aspects included the drainage system, clearance of free water from the dam crest and raising rates within the ranges already practiced for each type of tailings deposit. Comments included:

> "The Board reiterates the request made in the last ITRB report to present a compilation of all the geotechnical tests already carried out on materials in Samarco's area, given their usefulness and importance to all Samarco's current and future projects in this area.
>
> • With the raising of the Germano/Fundão dams, the Board stresses the importance of obtaining shear strength and permeability data for both the foundation materials and the tailings for high values of confining stress, even if it is necessary to use specialized laboratories abroad.
>
> • At future Board meetings all existing information (e.g. drilling logs, SPT results) should be available for consultation, including field information even if it is not processed."

774. In ITRB Report No.10 dated July 2014 it was noted that two designers, DAM and VOGBR, conducted stability studies of the Fundão and Germano dams for the proposed raising to 940 metres but the two designers did not use identical material strength values as expected:

> "For the Fundão Dam, the company DAM presented a model in which the phreatic line runs parallel to the downstream slope, below the new blanket drain, at El. 887 m, with a factor of safety of 1.42. This modelling of the phreatic level parallel to the slope indicates low and undesirable factors of safety for other scenarios.

> For the Fundão Dam, the analyses conducted by VOGBR indicate that in any modelling of the phreatic level, the factors of safety is always greater than 1.5."

775. Thus, the designers produced conflicting Factors of Safety: the FOS 1.42 by DAM indicated inadequate stability; the FOS 1.5 and above by VOGBR indicated adequate stability. The ITRB recommendations included that: (a) Samarco should conduct strength tests on the compacted sandy tailings as well as on the foundation soils with high loads, as a matter of urgency; and (b) the designers should review percolation studies to more realistically model piezometric conditions.

776. On 4 September 2014 VOGBR issued its Statement of Stability Condition, in which it declared that the dam structure had adequate safety stability. The accompanying technical report included a stability analysis showing a Factor of Safety of more than 1.5. There are significant difficulties with this analysis, particularly as the serious seepage, movement and cracking at the left abutment had by then been discovered.

777. First, it was based on an inspection carried out on 23 and 24 July 2014, before the cracking incident was discovered on the Setback. As a result, it had already been overtaken by events.

778. Second, although no nonconformities were noted at the left abutment, it was recorded that weather conditions prevented the VOGBR team from carrying out a detailed inspection of the crest and upper slopes of the dam.

779. Third, VOGBR used the same drained shear strength parameters as for its 2013 analysis, based on a GeoFast report from September 2013. Dr Marr correctly notes that the use of constant strength parameters is appropriate provided that nothing has happened that would have potentially affected them. In this case, there were developing issues associated with changes at the dam that should have prompted a review. In particular, the GeoFast report did not consider the presence of slimes in the Dike 1 impoundment and did not take account of the Setback.

780. Fourthly, and more significantly, in carrying out its stability analysis, VOGBR assumed, wrongly, that the blanket drain at El. 826m was effective; this was demonstrably wrong, given the incidents of seepage during 2013 and 2014, as recognised by the ITRB. Despite the clear indication of saturation, VOGBR used drained strength parameters in its analysis.

781. Fifthly, VOGBR took, as the critical failure surface for its stability analysis, a surface that passed through bedrock; clearly, this was an unrealistic representation of the stability of loose, contractive sand tailings. Dr Marr noted that VOGBR's stability analysis concluded that the factor of safety was 2.24, an unexpected increase in the factor of safety obtained in 2013, which should have given rise to some reconsideration.

782. Following the cracking and seepage incident at the left abutment in August 2014, on 28 August 2014 Samarco constructed a reinforcement embankment at the toe of the setback slope, as recorded in its report dated 29 August 2014. A diagram annexed to the report indicated a Factor of Safety of 1.68 with the reinforcement berm in place, based on a drained strength stability analysis (ESA).

783. Pimenta de Ávila carried out a site inspection on 4 September 2014 and prepared a report dated 15 September 2014. The report recorded Samarco's observations of several cracks transverse to the Setback at the left abutment and another set parallel to the crest, as well as signs of compression planes also parallel to the toe of the Setback slope. Pimenta's opinion was that these cracks characterised the beginning of slippage movement in the structural part of the dam. It was recommended that a potential condition of static liquefaction should be considered and stability of the berm should be assessed using the Olson method.

784. ITRB Report No.11 dated 20 November 2014 expressed the view that the cracking incident appeared to involve a circular rupture passing through the tailings below the compacted region of the raising dikes, a view that Dr Marr agreed seemed credible. The ITRB also noted that displacement of the axis (the Setback) led to the construction of the raising dikes on an area of material of possible lower resistance (the slimes), and with a higher phreatic surface in the area of rupture. It was recommended that the Setback should be filled in as quickly as possible in order to return the axis to its design position. The ITRB noted that the FMEA analysis identified a risk of rupture of the dam caused by insufficiency of the internal drainage, resulting in saturation of the downstream slope, although it did not have the opportunity to see all of the FMEA results or to analyse them.

785. Anelisa Vasconcelos, a project engineer at Samarco, inspected the cracking at the Setback and carried out a back analysis, to identify the strength of the material based on observed failure, so as to establish the necessary reinforcement required to stabilise the structure. At the request of Joaquim Pimenta, Ms Vasconcelos also prepared a liquefaction analysis. In December 2014 she sent her analyses to Mr Pimenta:

> "Attached, the stability analyses carried out considering the scenarios before and after the construction of the balance berm. It turns out that using the post-peak parameters, the berm will not be enough to circumvent the problem. I'm going to analyze what the proper geometry is for the structure to have a safety factor greater than or equal to 1.5."

786. Mr Pimenta responded:

> "You can use geometry that results in Safety Factor - F.S.> 1.1 in the post-liquefaction condition and F.S. >1.5 in the peak condition.
>
> I think this condition will be met with a berm whose geometry has a medium slope (from the crest to the toe, from 1:6 to 1:8.
>
> Please keep me posted about any news and we exchange information by Email. If necessary, we schedule a meeting."

787. Uncertainties surround the Vasconcelos retroanalysis and what it showed. It is difficult for the Court to reach any firm conclusions based on the incomplete documentation and sparse statements from the relevant individuals. Regardless, Pimenta provided a clear recommendation that an undrained stability analysis (USA) should be carried out that was required to satisfy a Factor of Safety of greater than 1.5 using peak USA; greater

than 1.1 using residual USA. None of the subsequent pre-collapse stability analyses that have been produced in these proceedings, using undrained strength parameters, met those criteria.

788. In April 2014, an engineering consultancy, Terratek, presented a preliminary study for a tailings pile that would raise the deposit further above El. 940 m. However, that considered the placement of filtered and dried tailings which would not be subject to liquefaction; as a result, it was not representative of the condition and stability of the saturated tailings in the dam.

789. The ITRB Report No.12 dated 6 April 2015 noted that the infilling of the Setback was delayed by the construction of the additional blanket drain in the area of the Grota da Vale for the 940 metre project. The monitoring data and the results of the December 2014 FMEA were provided but the ITRB reiterated that all presentations, data and project reports should all be available before and for consultation during the meeting.

790. On 28 August 2015 VOGBR issued its Stability Assessment, in which it declared that the dam was in an adequate safety condition as at 2 July 2015. That assessment was supported by VOGBR's Technical Safety Report dated 3 November 2015, two days before the collapse of the dam. Its stability analysis indicated a Factor of Safety of 1.68. However, it is striking that the report did not refer to the numerous incidents of seepage or the cracking at the left abutment, which Dr Marr observed was a surprising omission.

791. Criticism by Professor Gens as to the quality and reliability of the VOGBR report is well-founded. The report stated that the dam was based on separation of the sands and slimes, a situation which demonstrably had not been maintained. It referred to some of the seepage incidents but ignored others, omitting any reference to the most serious incident of cracking and seepage at the left abutment in August 2014. It did not consider the impact of the Setback, by then 40 metres high, on the overall stability of the dam. As in previous reports, VOGBR used a critical failure surface through foundation material and used the GeoFast report. VOGBR included the stability analysis prepared by Samarco, using drained strength parameters and indicating a Factor of Safety of 1.68, despite the fact that the presence of a large mass of saturated and contractive materials at the Setback must have been evident by that stage. The monitoring results evaluated did not include the piezometers that had been installed at the Setback after the 26 August 2014 slope stability incident, which would have shown the presence of a high water table at the Setback.

792. The information available prior to the collapse, far from offering comfort as to the stability of the dam, indicated, or should have indicated, the need for a liquefaction study in respect of the condition of the dam:

i) The AMEC report of 11 December 2009 warned that the failed foundation drains would lead to low density and lower shear strength of the tailings; it recommended that the changed design should be re-evaluated and the liquefaction potential should be assessed.

ii) The AMEC report of August 2010 raised concerns regarding the performance of the defective galleries under future loading and advised that an independent review of the dam should be carried out by geotechnical hydrotechnical and structural specialists.

iii) Dr Robertson's report of 20 November 2010 issued a warning about the high pore pressure and low shear resistance of the slimes encroaching into areas designed for the sands, and the impact on stability of the dam.

iv) Pimenta de Ávila's Technical Opinion of May 2012 stressed the importance of maintaining the 200 metre beach width and monitoring the dam's performance; further, it was recommended that the tailings should be tested to verify the values used in the analyses.

v) Geoestável's technical safety report of August 2012 echoed the importance of maintaining the 200 metre beach width and its stability assessment was subject to a caveat regarding uncertainty as to the resistance parameters of the slimes.

vi) There was no design prepared or impact study in respect of the Setback, despite requests by the ITRB for information in Report No.5 dated October 2012. Pimenta de Ávila was not consulted or involved in any review of the Setback. Therefore, an assessment of the impact of the Setback in moving the crest of the dam over the slimes, did not take place.

vii) Geoestável's report of 5 February 2013, in the context of the proposed raising of the dam to 940 metres, warned of the importance of a liquefaction study for the saturated, loosely compacted sands.

viii) ITRB Reports No.9 dated February 2014 and No.10 dated July 2014 strongly recommended that shear strength and permeability data must be obtained for the tailings, as a matter of urgency.

ix) There was clear evidence of seepage and cracking incidents, particularly at the left abutment in 2014, indicating slope instability.

x) The VOGBR reports were seriously and obviously deficient for the reasons set out above.

xi) Following the serious seepage and cracking at the left abutment in August 2014, Pimenta advised that the potential for liquefaction should be considered and an undrained stability analysis should be carried out.

793. The clear inference to be drawn from the reports and advice was that additional information was required as to the shear strength and permeability of the tailings, the liquefaction potential should be assessed and an undrained stability analysis carried out. The evidence before the Court indicates that the recommendations contained in the above reports were not followed.

Irrelevant matters

794. There were a number of matters that I have considered but not addressed in any detail in this Judgment because they were not pursued with any enthusiasm by the parties at trial and/or have proved to be irrelevant to the issues in dispute. These include the following.

795. Incorporation of the Alegria tailings and slimes in the dam is not relevant to the issue of civil liability. The origin of the materials had no bearing on the causes and

management of the drainage, slimes and Setback issues that gave rise to the risk of liquefaction and instability of the dam.

796. The Prístino Report, dated 21 October 2013, was produced by the Prístino Institute at the request of the office of the public prosecutor of Minas Gerais for the purposes of revalidating the dam's operating licence for up to El 930m. The technical analysis identified a risk related to the possibility of erosion of the dam and destabilisation of the Vale Sterile Waste Pile as a result of contact between those structures. Although there were seepage issues identified in that area, drainage was installed to ensure that water flowing from the Grota da Vale, in which the Vale Sterile Waste Pile was located, did not infiltrate the dam. There is no evidence that those issues were linked to the cause of the collapse.

797. The existing licence, allowing the tailings dam to be developed to El. 920m, and the subsequent licence, permitting the dam to be raised to El. 940m, are not material to the issue of civil liability. No disputes arise on the joint statement and clarification by the licensing experts. SUPRAM, the agency responsible for environmental licensing in Minas Gerais State, had no expertise to consider, analyse or evaluate the safety or stability of mining dams and would not have had the technical capacity to do so.

798. Further, the experts agreed that, although theoretically possible, it is unlikely that SUPRAM would refuse to renew a licence for an expansion or modification, or renew the licence for an approved activity already in operation, provided that the activity and its environmental impact were legalised activities.

799. The National Department of Mining Production ("the DNPM") did have relevant expertise but Article 7 of DN COPAM Normative Resolution 62/2002 provides:

> "The owners of the enterprise are responsible for the implementation of safety procedures in the phases of design, implementation, operation, closure of dams resulting from their industrial activities.
>
> Sole paragraph - The activities of the regulatory bodies do not exempt the owners of full responsibility for the safety of the dams and reservoirs in their undertakings, as well as the consequences of their malfunctioning".

800. Therefore, the submission and grant of licencing applications did not exonerate BHP from their obligation to assess and control the risk of collapse of the dam. BHP retained a duty to ensure that they did no harm.

Conclusions on fault liability

801. BHP's control of Samarco, their assumption of responsibility for risk assessment, management and control of the tailings dam, and their full participation in the tailings dam operations, gave rise to a legal duty to avoid harm caused by any act or omission that was negligent, imprudent or lacking in skill.

802. The standard of conduct by which BHP must be assessed on an objective basis is by reference to the conduct of an average mining and tailings dam business owner, actively

involved in the planning, operation, risk assessment and control of the dam. Although BHP were controlling shareholders of Samarco, through delegated authority through the BHP Group, they assumed responsibility for identification, assessment and mitigation of risk at Samarco.

803. By August 2014, BHP knew, or should have known that: (i) the internal drainage of the dam was inadequate to prevent saturation of the sand tailings; (ii) the minimum beach width of 200 metres was regularly violated, enabling the weak and impervious slimes to intermingle with the sands; (iii) the Setback had moved the crest of the dam over the slimes and increased vertical loading on the same; (iv) there was no credible liquefaction study or stability analysis; and (v) the serious seepage, cracking and movement at the left abutment indicated that the slope had become unstable.

804. BHP are not entitled to rely on the certificates of stability produced by VOGBR given the obvious deficiencies in the underlying reports; in particular, the use of drained shear strength parameters despite the visible saturation of the tailings. The overwhelming thrust of the other contemporaneous reports was that (a) shear strength and permeability data must be obtained for the tailings; (b) liquefaction potential should be considered; and (c) stability should be assessed using recommended factors of safety.

805. BHP's own FMEA reports, prepared by Samarco and used by BHP in their overall risk assessments, identified the need for liquefaction studies as mitigation action in respect of potential failure of the dam. Those action items remained outstanding from 2012 through to 2015 and the date of collapse.

806. In those circumstances, BHP were negligent, imprudent and/or lacking in skill, in allowing the saturation of tailings and encroachment of slimes to develop, in failing to carry out the above studies and remediation actions recommended by experienced engineers, and in causing Samarco to continue to raise the height of the dam, in particular, at the Setback.

807. The direct and immediate cause of the collapse of the dam was a combination of (i) inadequate internal drainage; (ii) encroachment of slimes into the structural part of the dam, including through formation and retention of the Setback; (iii) failure to carry out any credible liquefaction study or stability assessment; (iv) failure to carry out remediation work to stabilise the slope; and (v) continued raising of the dam in those circumstances.

808. For the reasons set out above, I conclude that, even if not liable under the Environmental Law, BHP would be liable under Article 186 of the Civil Code.

12. LIMITATION/PRESCRIPTION

809. The collapse of the dam occurred on 5 November 2015.

810. Four relevant claim forms have been issued:

i) On 2 November 2018, the Claimants issued proceedings against BHP UK (but not BHP Australia) by way of a Part 7 claim, E50LV008 (now case number HT-2022-000304).

ii) On 5 November 2018, the Claimants issued further proceedings against BHP UK (but not BHP Australia) E50LV010 (now case number HT-2022-000304).

iii) On 3 May 2019, a new claim form was issued against both BHP UK and BHP Australia, HT-2019-LIV-000005 (now case number HT-2022-000304).

iv) On 24 February 2023 a further claim form was issued against both BHP defendants, HT-2023-000058.

811. Article 189 of the Civil Code establishes that a right to claim for violation of a civil right arises on the date of injury or damage and is extinguished by prescription within the periods set out in Articles 205 and 206. Article 205 provides that the general prescription period is ten years. This is subject to shorter periods in specific cases. Article 206, Paragraph 3(V) of the Civil Code provides that the prescription period in respect of the right to claim for civil redress is three years.

812. BHP's case on limitation is as follows:

i) All the above claims are out of time because the claim forms did not contain sufficient information, as required by Brazilian Law, to stop time running.

ii) Alternatively, the third and fourth claim forms were issued after the three-year limitation period and therefore are time-barred by prescription.

813. The Claimants raise a number of points in response:

i) Pursuant to Article 200 of the Civil Code, the criminal investigation and proceedings that were commenced in Brazil in November 2015 postponed the start of the prescription period until at least 2024.

ii) The ADIC CPA filed against Samarco on 17 November 2015 in the Brazilian federal courts, the subsequent 20bn CPA or the 155bn CPA, interrupted prescription in respect of all claims arising out of the collapse, not just against Samarco but also, by virtue of Article 202 and Article 204, paragraph 1 of the Civil Code, against any others jointly and/or severally liable for damage caused by the collapse.

iii) Claims in vindication of diffuse or collective rights, including claims for damage to the environment, are not subject to prescription.

iv) The prescription period is five years pursuant to Article 27 of the Consumer Defence Code.

v) The claims by the municipalities and utilities are subject to a five-year prescription period pursuant to the 1932 Decree.

vi) Reliance is also placed on the Term of Commitment entered into by Samarco, BHP Brasil and Vale on 26 October 2018.

vii) Certain Claimants may be entitled to extended prescription periods, by reference to (a) filing of protests in Brazil, (b) lack of capacity, (c) their date of knowledge and/or (d) continuing damages.

(i) Claim details necessary to stop limitation

814. The dispute between the parties is whether the claim forms issued and served by the Claimants contained sufficient details so as to stop time running for the purpose of the rules of prescription. The issues raised are (a) whether Brazilian Law or the Law of England and Wales applies; and (b) whether the necessary procedural steps were completed (or would be deemed to be completed) prior to expiry of the 3-year period set out in Article 206 of the Civil Code.

815. Article 15(h) of EC Regulation 864/2007, as amended ("the Rome II Regulation"), provides that the applicable law governs the manner in which an obligation may be extinguished and rules of prescription and limitation, including rules relating to the commencement, interruption and suspension of a period of prescription or limitation. It is common ground that Brazilian Law is the applicable law for non-contractual obligations and, as such, is the applicable law for matters of prescription.

816. The Claimants' case is that the Brazilian rules of prescription, which include Article 202 (I) of the Civil Code, provide that service of the claim form is the key procedural step required to stop time running. However, what amounts to proper service will be a question of procedural law. Matters of evidence and procedure are excluded from the scope of the Rome II Regulation by Article 1(3) of the same. Such matters are governed by the law of the forum and are therefore subject to the requirements set out in the English Civil Procedure Rules (rather than the Brazilian Civil Procedure Code).

817. BHP's case is that Article 15 of the Rome II Regulation sets out a non-exhaustive number of matters which must be determined in accordance with the law applicable to non-contractual obligations, which cannot constitute matters of procedure for the purpose of Article 1(3). Reliance is placed on two decisions.

818. In *Vilca v Xstrata* [2018] EWHC 27 (QB), Stuart-Smith J (as he then was) held that the issue and service of a claim form, and particulars of claim raising English law claims, that were subsequently accepted as invalid because Peruvian law applied, did not stop time running for the purpose of the Peruvian law of limitation which applied to the Peruvian law claims. It was common ground that, in principle, service of a claim form and particulars of claim was the English equivalent of the commencement process under Peruvian Law; therefore the issue was the scope of any interruption effected by their service, and whether that scope was sufficient to include the Peruvian law claims. On the facts of that case, the Peruvian claims were not advanced until after expiry of the limitation period and therefore were statute-barred.

819. In *Pandya v Intersalonika General Insurance Co SA* [2020] EWHC 273 (QB), Tipples J held that the requirement under Greek law that the claim form must be both issued and served to stop time running was not a matter of procedure but a matter of limitation law falling within Art 15(h), which should be construed widely - see [28] and [40]. On the facts of that case, the claim form was not served until after expiry of the limitation period and therefore the claim was statute-barred.

820. BHP submit that Brazilian law specifies, at Article 319 of the Civil Procedure Code, certain matters that must be included in a statement of claim in order that it can be validly commenced and stop time. That is a matter pertaining to the conditions necessary for the limitation period to be interrupted. It is thus a substantive pre-requisite

to the interruption of the period of limitation and falls within Article 15(h). Accordingly, Brazilian law applies to the question of whether the claim form contained sufficient information for the purposes of limitation.

821. In my judgment, a distinction must be drawn between the substantive rules of prescription, which it is agreed are subject to Brazilian law by reason of Article 15(h), and the procedural rules for effecting valid issue and service of a claim in this jurisdiction, which should be characterised as procedural and therefore fall to be governed by English law, the Civil Procedure Rules 1998 ("the CPR"). There may be cases in which it is unclear whether a specified requirement falls into the category of substantive law or procedural/evidential law. This is not such a case.

822. It is not in dispute that the claim forms articulate the essential basis of claims against the defendants for damages under Brazilian Law arising out of the collapse of the Fundão Dam. CPR 16.2 stipulates that a claim form must (a) contain a concise statement of the nature of the claim; (b) specify the remedy which the claimant seeks; (c) contain a statement of value in accordance with rule 16.3 (which can be a statement that the value is not known); (d) contain a statement of the interest accrued on that sum, where the only claim is for a specified sum; and (e) contain such other matters as may be set out in a practice direction. The claim forms satisfy those requirements. They set out a concise statement of the nature of the claim for damages arising out of the collapse of the dam, identify the provisions of Brazilian law relied on, and state that the value of the claim is unlimited. There is no current complaint that issue and service of the claim forms did not comply with the requirements of the CPR.

823. The English procedural rules governing the commencement of proceedings by the issue and service of a claim form define the fundamental basis on which jurisdiction over the matter is conferred on the court. The service of originating process is the act by which the defendants are subjected to the court's jurisdiction. Attempts to superimpose the diverse rules of service of foreign courts, as distinct from a requirement that there should be valid service of a claim, would cause uncertainty and procedural chaos.

824. BHP accept that if the Rome II Regulation does not apply, then English law, as the *lex fori,* would apply. Further, BHP accept that issue of the claim forms, which were validly served on the defendants, would be sufficient to stop the running of time for limitation.

825. Even if the Brazilian rules on commencement of proceedings applied, there is no real dispute between the Brazilian law experts that, it is likely that the claim forms would be effective to stop time running.

826. Article 202(I) of the Civil Code provides for prescription to be interrupted by order of the court which orders the service of process, provided that the claim is then properly served.

827. Article 312 of the Civil Procedure Code provides that a claim is considered to be initiated by the filing of the statement of claim; it will not be effective to interrupt the prescription period until it has been validly served but, by reason of Article 240, when served, the interruption of prescription is retroactive to the date of filing.

828. Article 319 of the Civil Procedure Code provides that a statement of claim shall set out a number of details, including the factual and legal grounds of the claim, the request for

relief and its specifications, and the value of the claim. Professor Rosenvald and Professor Tepedino agree that some of the requirements are treated by the case law as being of greater importance than others; the essential question is whether a comprehensible claim has been articulated. If the statement of claim does not comply with those requirements, Article 321 empowers the judge to order the claimant to correct or complete it within 15 days, stating precisely what must be corrected or completed.

829. If the defect is serious, then the date of prescription may run only from the date of the necessary amendment. If the defect is not serious, then the prescription analysis is unaffected. In this case, BHP complain that the claim forms are brief and generic but Article 319 does not stipulate that full particulars must be included; on a fair reading, they articulate a reasonably comprehensible claim. The material complaint made by BHP is that the claim forms stated the value of the claim as being "unlimited" but did not identify a precise figure. In cross-examination, Professor Tepedino agreed that an incorrect or omitted value from a claim form would not be considered a sufficiently serious defect so as to impact on the interruption of prescription.

830. For the above reasons, regardless of whether English law or Brazilian law applies to the requirements for issue and service of the claim forms, they would be considered to be valid to stop time running for prescription on the date of issue. Pursuant to CPR 7.2, this is the date on which the court seal is affixed to the claim form; alternatively, pursuant to Article 312 of the Civil Procedure Code, this is the date of filing.

(ii) Criminal proceedings

831. Article 200 of the Civil Code states:

> "When the action originates from a fact that must be ascertained in the criminal court, the prescription period will not run before the respective final judgment."

832. The Claimants' case is that, pursuant to Article 200 of the Civil Code, the criminal investigation and proceedings that were commenced in Brazil in November 2015 interrupted the running of time for the purpose of prescription. Such interruption will continue until the conclusion of all those criminal proceedings, including appeals, some of which were not finally concluded in 2024/2025 and some of which remain outstanding.

833. BHP's case is that the suspension under Article 200 only applies to civil claims that depend upon the prior determination of criminal allegations, referred to in case law as a 'prejudicial relationship'. Further, the suspension in respect of Article 200 applies to civil claims in respect of the liability of the criminal defendant, and will only apply to civil claims against parties other than the criminal defendant where those claims are to enforce vicarious liability for the criminal act.

834. Professor Rosenvald's opinion as to the effect of Article 200 is that the prescription period of a civil action that originates from a fact that must be determined in the criminal court does not begin with the breach of the right, but from the definitive determination of the fact in the criminal court. As a result, if a civil action originates from an event that is being investigated in the criminal sphere, its prescription period will remain

suspended until the end of such investigation or final determination. Liability can extend to parties that are not defendants to the criminal proceedings.

835. Professor Tepedino's opinion is that Article 200 is an exception to the general rule that civil liability is independent from criminal liability. Its application is limited to a cause of action that is dependent on a fact that can only be determined in the criminal court. He argues that the case law is consistent with his understanding as to the meaning of the necessary prejudicial relationship between the criminal and civil proceedings, the paradigm case being a claim for compensation against a defendant arising from the defendant's criminal conviction, or against a third party who is vicariously liable for the defendant's criminal act.

836. I start by considering the express language of the provision. I reject BHP's submission that the reference to *"a fact that must be ascertained in the criminal court"* is confined to the determination that a crime has been committed. That would be an artificial constraint on the words used. A fact ascertained in the criminal court may extend to a number of different strands of evidence forming part of the factual matrix leading to conviction or acquittal. In this case, such facts could include the cause of the collapse, acts or omissions of fault, responsibility for the failure and attribution of liability. Indeed, in the documents relating to the criminal proceedings that have been produced, those matters formed part of the facts adduced and determined by the criminal court.

837. The words *"when the action originates from a fact"* indicates that the relevant fact(s) form the foundation for the civil action. It does not follow that Professor Tepedino's view, namely, that the civil lawsuit must necessarily depend on the determination of facts that prove authorship or materiality in the criminal court, is correct. The absence of the word *"depends"* in Article 200 can be contrasted with its use in Article 315 of the Code of Civil Procedure, which states:

> "If cognizance of the merits depends on checking the existence of a criminal fact, the judge may determine the stay of the proceedings until the criminal courts issue a ruling."

838. Finally, the words *"the prescription period will not run before the respective final judgment"* are sufficiently wide to encompass any appeals.

839. Against that literal interpretation, I consider the background to this provision and its interpretation in the STJ case law.

840. The 2002 revisions to the Civil Code reduced the standard prescription period from 20 years to 3 years. The rules on suspension and interruption of the prescription period were intended to ensure that claimants are not unfairly shut out, or forced to bring a premature claim, as explained by Reporting Justice Cueva in *Jolivan* STJ Special Appeal 1.631.870 (2017).

841. In *Salineira* STJ Special Appeal 1.131.125 (2011), Reporting Justice Uyeda held that Article 200 did not apply to a claim for moral damages in respect of a fatal traffic accident. The prescription period was not suspended by virtue of an ongoing police inquiry into the circumstances of death because it was not a 'prejudicial issue' for the civil compensation claim; the outcome in any criminal proceedings would not change the basis for civil redress.

842. A similar conclusion was reached by the STJ in *Sul América* STJ Special Appeal 1.180.237 (2012). The case concerned a claim for compensation for personal injury sustained in a traffic accident. On the facts of the case, the STJ stated that Article 200 did not apply because there was no evidence of any criminal investigation or criminal action and, therefore, no 'prejudicial relationship'. However, Reporting Justice Sanseverino recognised that Article 200 could apply where there was a 'prejudicial relationship':

> "The rule in Article 200 of the Civil Code, which prevents the prescription from running out before the criminal action is resolved, is situated in this context. The purpose of this rule is to avoid the possibility of contradictory solutions between the civil and criminal courts, especially when the outcome of the criminal case is decisive for the outcome of the civil case. For this reason, the victim is allowed to wait for the criminal case to be resolved and only then file a civil claim for compensation. In any case, it is essential that criminal proceedings are underway or, at least, that a police enquiry is being carried out until it is closed."

843. A further example where Article 200 did not apply was *Marcondes* STJ Internal Special Appeal 1.139.896 (2013), a road traffic case in which the person who caused the accident had died. In those circumstances, Reporting Justice Ferreira stated that there would be no reason to wait for the police inquiry to be carried out, as there was no criminal authorship to be ascertained.

844. The above cases of *Salineira, Sul América* and *Marcondes* mark the high point of the STJ case law in support of Professor Tepedino's interpretation of Article 200. Since 2013, STJ judgments have provided greater insight into the application of Article 200 which strongly suggests a different approach.

845. In *Umuarama Diocese* STJ Special Appeal 1.393.699 (2013), the STJ applied Article 200 to a claim for sexual abuse perpetrated by a priest against a minor on the settled basis that the prescription period does not run while the event giving rise to civil compensation is discussed in the criminal sphere. Reporting Justice Andrighi explained that:

> "[14] … it must be emphasized that every crime is a "fact that must be investigated in the criminal court", with the sole exception of those in which, if a complaint or legal representation is required, there is no initiative on the part of the individual to investigate it within the prescription period of 6 (six) months …
>
> [15] In the light of these premises, it is concluded that article 200 of Civil Code/02 does not offend the theory of *actio nata*, nor the independence of the civil and criminal spheres. On the contrary, its incidence adjusts to the hypotheses in which, once the three-year prescription period has started elapsing for the exercise of the action for damages, the criminal procedure to investigate the same fact begins, in the meantime, giving rise to the suspension of the prescription until the final criminal lower court judgment.

> [16] The text of the law does not require, for the special cause of suspension of prescription to apply, that the fact – i.e. materiality and authorship – necessarily depends on verification in the criminal sphere. Because, if so, article 110 of the Civil Procedure Code provides the possibility of staying the civil proceedings until the criminal court makes a decision on the matter.
>
> [17] However, if the criminal procedure is not initiated within a period of 3 (three) years, there is logically no question of suspending the prescription of the action for damages in the civil court, so that, in this case, the inertia of the party in filing the action for cognizance within that period will be punished with the denial of that claim, leaving only the possibility of executing the lower court judgment definitively rendered by the criminal court."

846. This approach was adopted in *Jolivan* STJ Special Appeal 1631870/SE (2017), a case in which Article 200 was held to apply to a claim for damages arising out of a fatal traffic accident, which was started within three years of the closure of the police investigation. Reporting Justice Cueva stated:

> "In the case of civil liability ex delicto, the exercise of the victim's subjective right to compensation for damages suffered only becomes fully viable when there is no longer any doubt about the context in which the unlawful act was committed, especially with regard to the full definition of authorship, which is usually the subject of concomitant investigation in the criminal sphere.
>
> The cause preventing the expiry of the prescription period laid down in Article 200 of the CC/2002 aims to protect victims' rights to compensation for damages arising from offences that are both civil and criminal. This is a way of mitigating the damage caused by the pending investigation by the state's criminal justice system, which is notoriously slow and cannot result in a new process of victimisation
>
> …
>
> Once a criminal investigation or criminal action has been initiated, the person who has suffered damage as a result of an act that also constitutes a criminal offence can choose to file a civil claim in advance, under Art. 935 of the CC/2002, or wait for the matter to be resolved in the criminal sphere, an alternative protected by Art. 200 of the CC/2002."

847. In *Jolivan* the decision in *Marcondes* was expressly referred to and distinguished on its facts. It was explained that Article 200 would not apply in two situations: (i) when it was established that there was no 'prejudicial relationship' between the civil and criminal instances; or (ii) when there was not even any police enquiry.

848. *Pentecostal Mission* STJ Special Appeal 1.704.525 (2017) concerned a claim for moral damages for insults against religion of a public and vexatious nature. The STJ held that Article 200 applied on the basis that the civil and criminal actions dealt with the same facts, thereby constituting a 'prejudicial relationship', regardless of the outcome of the criminal investigation or prosecution. The summary is instructive because it demonstrates that the application of Article 200 is not confined to claims for compensation based on a criminal conviction and may extend to claims against connected third parties:

> "2. The purpose of the appeal is to determine the legality of the declaration of prescription of the claim for compensation for moral damage suffered by the appellants, considering that the same harmful event can be understood as a fact defined as a crime and, therefore, a crime, which would interrupt the prescription period, in accordance with the provisions of article 200 of CC/2002.
>
> 3. The command of article 200 of CC/02 applies when there is a harmful relationship between the civil and criminal spheres, meaning when the conduct actually originates and is also to be investigated in the criminal court, and the existence of an ongoing criminal action or at least a police investigation is sufficient.
>
> 4. It is not possible to rule out the application of article 200 of CC/2002 in cases that involve, in addition to the claim for compensation, discussions related to the existence of joint and several liability between the author of the offense and the person who is the defendant in the dispute, due to the relationship of agent."

849. It was confirmed by the STJ that Article 200 applied regardless of the outcome of the criminal proceedings in *Medical negligence* STJ, Internal Special Appeal 1.311.109 (2019), a case in which the defendant was acquitted in criminal proceedings but the subsequent civil claim was held to be in time. Reporting Justice Bellizze stated that the prescription period for the claim for damages against the perpetrator of the unlawful act runs from the date of the final and unappealable criminal sentence.

850. A similar approach was taken in *Padovan* STJ Special Appeal 1.802.170 (2020), Reporting Justice Andrighi; *Plea bargain* STJ Internal Special Appeal 1.668.968 (2020), Reporting Justice Filho; and *TMB* STJ Special Appeal 1.919.294 (2021), Reporting Justice Andrighi.

851. In *Online insults* STJ Special Appeal 1.747.913 (2020), Article 200 was applied, Reporting Justice Andrighi holding that it was sufficient that there had been a police investigation into the facts giving rise to the civil claim, regardless of whether there was any subsequent criminal prosecution.

852. In *State of RN* STJ Internal Special Appeal 2.096.090 (2022), a case concerning a claim for moral damages arising out of a fatal traffic accident, Reporting Justice Humberto

Martins applied Article 200 in circumstances where the state was strictly liable for the accident and therefore there was no need to establish fault.

> "Furthermore, with regard to the prescription, the court of origin aligned itself with the case law of the STJ to the effect that, in the light of article 200 of the Civil Code, although civil and criminal liability are distinct and there is a prejudicial relationship between them, the criminal action in progress has the legal nature of a cause that prevents the prescription from running, the course of which only resumes once the criminal proceedings have become res judicata. "

853. A similar conclusion was reached in *Soares* STJ Internal Special Appeal 2.158.606 (2023).

854. Thus, there is a consistent line of STJ authority that Article 200 will operate to suspend the period of prescription wherever the incident or fact that gives rise to the civil claim for compensation could also amount to a criminal offence. The STJ has explicitly stated that Article 200 will apply regardless of the outcome of the investigation and/or prosecution in the criminal sphere. This is inconsistent with the suggestion that it is limited to claims for compensation based on criminal convictions. The requirement is simply that the same facts which are under criminal investigation and/or subject to a criminal action are material also to the non-contractual civil claim. The period of suspension will continue until the criminal investigation, or the criminal action, is completed or abandoned, including any final appeal.

855. As to the relationship of dependency considered by Professor Tepedino, where the civil claim turns upon the findings of a criminal court, Article 315 of the Civil Procedure Code provides that the court may stay the civil claim to await the criminal decision. That additional procedural power does not detract from the breadth or purpose of Article 200.

856. BHP rely on a recent decision of the TJMG on 16 December 2024, issued after the experts had given their evidence on this issue. Claim 1.0000.24.276699-6/001 concerned a claim against Vale arising out of the collapse of the Brumadinho Dam. The Minas Gerais State Court of Appeal rejected the applicability of Article 200, on the ground that there was no doubt about the authorship of the environmental crime. In those circumstances, the civil claim did not depend on the determination of a fact that must be ascertained in the criminal proceedings. This decision supports Professor Tepedino's position but it is out of line with the approach taken by the STJ and it does not appear that those earlier decisions were drawn to the attention of the court. Given that it is an isolated case and is not at STJ level, it is not sufficient to displace the weight of authority pointing in the other direction.

857. The criminal investigation and subsequent criminal proceedings were concentrated on matters surrounding the collapse. They included the cause(s) of the collapse, creation of the risk, the state of knowledge of those involved regarding the instability of the dam, role of the shareholders of Samarco and external advisers, and questions of fault or wrongdoing.

858. On 20 October 2016, the Federal Public Prosecutor's Office filed a criminal indictment before the Ponte Nova Subsection of the Federal Court of Minas Gerais, against four legal entities and 22 individuals. BHP were not parties named on the indictment. Samarco, Vale and BHP Brasil were named, as were Mr Wilson, Mr Ottaviano, Mr Beck, Mr Zweig, Mr Randolph, Mr Fernandes, Mr Ferreira and Mr Cardoso.

859. On 6 August 2019 the criminal action against Mr Randolph was dismissed; there was no appeal; therefore, the dismissal became final and unappealable on 13 September 2019. On 16 December 2019 the criminal action against Mr Wilson was dismissed; there were appeals but they were dismissed; the dismissals became final and unappealable on 25 September 2024. On 14 November 2024 all other criminal actions were also dismissed. There remain extant appeals in respect of some of the defendants, including Mr Fernandes, Mr Ferreira and Mr Cardoso.

860. Although it might be argued that some of these individuals were not employed directly by the BHP Group, it is accepted that Mr Randolph and Mr Wilson were BHP employees. The criminal investigation and action against Mr Wilson continued from November 2015 until 25 September 2024. In cross-examination, Professor Tepedino agreed that a criminal prosecution of an individual would stop time running for the purposes of a civil claim against the individual and their employer.

861. For the above reasons, I conclude that Article 200 applies in this case, to suspend the prescription period and stop it running until at least September 2024. It follows that the four claim forms were issued in time and the claims are not statute-barred for prescription.

862. That would be sufficient to determine the issue of prescription in these proceedings but, for completeness, I now turn to deal with the alternative arguments put forward by the parties.

(iii) CPAs

863. There were numerous CPAs arising out of the collapse of the dam but the material CPAs for the issue of prescription are:

i) The Association for the Defence of Collective Interests "ADIC" CPA was filed on 16 November 2015 against Samarco in respect of Article 14, paragraph 1 of the Environmental Law and Article 225 of the Brazilian Constitution.

ii) The 20bn CPA was filed on 30 November 2015 against Samarco, Vale and BHP Brasil in respect of Article 14, paragraph 1 of the Environmental Law, Article 927, sole paragraph of the Civil Code, Article 225 of the Brazilian Constitution and Article 116 of the Corporate Law.

iii) The 155bn CPA was filed on 28 April 2016 against Samarco, Vale and BHP Brasil, the Federal Government and several other public entities. The basis of claim included Articles 3 and 14 paragraph 1 of the Environmental Law.

864. The Claimants' case is that the ADIC CPA, alternatively, the 20bn CPA or the 155bn CPA, interrupted prescription in respect of all claims until the conclusion and ratification of the Reparations Agreement in November 2024.

865. BHP's case is that the CPAs are only capable of interrupting time in respect of the Environmental Law claim. The 20bn CPA interrupted prescription being first in time but it concluded on 24 September 2018, alternatively 19 September 2019, when settled pursuant to the GTAC.

866. An Ação Civil Pública ("CPA") is a form of class action, which can be brought to vindicate diffuse, collective and homogeneous individual rights or interests deriving from a single event or common origin, such as an environmental disaster, in circumstances where numerous individuals have suffered loss. CPAs are not brought by an individual but by the Public Prosecutor's Office, the Public Defender's Office, the Federal Government, the States, the Federal Districts, the Municipalities and other public agencies and companies.

867. CPAs are governed by the Civil Public Actions Law No. 7.347/1985 ("the CPA Law") and the Consumer Defence Code.

868. Although CPAs include the power to order remedial work, such as restoration in respect of environmental damage, and may include monetary compensation, they do not result in awards of damages to individuals. Rather, a generic sentence is determined, addressing liability and requiring a defendant to compensate affected persons. All those affected are treated as potential beneficiaries of the action, and are entitled to enforce their individual rights in respect of the generic sentence by liquidation and enforcement proceedings once the CPA claim has been determined. However, individuals are entitled also to pursue their individual claims in the civil courts. They may choose to wait until the conclusion of the CPA to see what remedy it offers but they are not obliged to wait until the CPA has been determined if they wish to commence their own action.

869. Professor Rosenvald and Professor Tepedino agree in their Joint Statement on Limitation the following:

i) CPAs filed in Brazil interrupt the prescription period in relation to all co-debtors as long as they are jointly and severally liable.

ii) CPAs may target both diffuse and collective interests, in addition to homogeneous individual interests.

iii) For a party to benefit from the interruption of prescription, the cause of action (*causa de pedir*) in the CPA must be the same as that of the individual actions.

870. The issues in dispute between the parties are:

i) the nature of the cause of action in the CPAs that will bring into effect any interruption of prescription for the purpose of a civil claim;

ii) whether the individual Claimants must be part of the collective or community represented in the CPA;

iii) whether it is necessary for an individual claimant to seek a stay of their claim in order to benefit from the interruptive effect of a CPA;

iv) whether the ADIC CPA or the 20bn CPA was first in time for the purpose of any interruption to prescription;

v) the date of the last act of process, which would re-start the prescription period running.

871. The first issue concerns the nature of the cause of action in the CPAs giving rise to the interruption of prescription. I consider that the experts' agreement set out above is clear and supports Professor Tepedino's position that it is the legal basis of the claim that is relevant, rather than Professor Rosenvald's position, namely, that it is the harmful event (the remote cause of action) or the object of the claim that is relevant.

872. The Claimants rely on the *Bahamas Ship* cases, including *Bahamas Ship 4* STJ Internal Special Appeal No. 2185740 - RS (2022/0247558-2) (2022). The decision in that case was that valid service of process in a class action, even if it concerns diffuse rights, constitutes an interruption to the prescription period for filing an individual action. That is not controversial. Although there were references in the appeal and in the short judgment to claims based on the same facts, the argument on appeal was whether the class action dealing with diffuse rights could interrupt prescription in respect of actions dealing with individual rights. The STJ did not consider whether prescription would be interrupted in respect of different causes of action, other than the environmental damage claims the subject of the class action.

873. I accept Professor Tepedino's understanding that prescription is concerned with the period within which a claim for breach of a right must be filed. When considering whether a class action interrupts the prescription period for individual claims, what is required is the same cause of action in respect of the same facts.

874. The cause of action articulated in the ADIC CPA is a claim for strict liability under Article 14, paragraph 1 of the Environmental Law. The 20bn and 155bn CPAs, likewise, are claims for strict liability under the Environmental Law. They include references to the Corporate Law and Civil Law but only in relation to the standing of controlling shareholders and indirect polluters; not as an independent cause of action. On a fair reading of the documents, they do not make claims in respect of fault-based liability. It follows that the ADIC CPA, the 20bn CPA and the 155bn CPA would only give rise to an interruption in the prescription period for the claims under the Environmental Law.

875. The second issue is whether the individual Claimants must be part of the collective or community represented in the CPA. Article 103 (III) of the Consumer Defence Code states that the res judicata effects of a CPA judgment will benefit all victims and their successors, defining them by reference back to Article 81 (III) of the Consumer Defence Code. Professor Rosenvald explained in cross-examination that Article 103(III) is concerned with individual, homogeneous interests; not community interests. Article 81 (III) makes clear that individual homogeneous rights holders are not defined by membership of a category or class; they are simply defined as being individuals whose rights have a common origin.

876. In cross-examination, Professor Tepedino accepted that the holders of homogeneous individual rights would benefit from a CPA provided they were victims of the same environmental accident.

877. The third issue is whether it is necessary for an individual claimant to seek a stay of their claim in order to benefit from the interruptive effect of a CPA. Professor Tepedino's reliance on Article 104 of the Consumer Defence Code is misplaced. It is not concerned with prescription but rather with the *res judicata* effect of CPA judgments. As pointed out by the Claimants, if an individual had already filed a claim, they would have no need to rely on the CPA to interrupt prescription in respect of that claim.

878. I accept the explanation of Professor Rosenvald that the interruptive effect of the CPAs extending to individual spheres protects the individual interests, allowing victims to benefit from the positive effect of the class action judgment, while maintaining the right to seek redress individually if necessary.

879. It is common ground that the effect of interruption of the period for prescription will extend to joint and several debtors as set out in Article 204, paragraph 1 of the Civil Code. It is also common ground that Article 202, head paragraph, of the Civil Code allows for only a single interruption, that is the first in time. Further, Article 202, sole paragraph provides that the interrupted prescription period begins to run again from the last act of the process to interrupt it.

880. The fourth issue raised is whether the ADIC CPA or the 20bn CPA was first in time.

881. The Claimants' position is that the ADIC CPA was first in time and interrupted prescription for the Claimants' individual claims. The ADIC CPA was issued on 16 November 2015. Samarco's voluntary appearance on 12 January 2016 dispensed with the need for formal service. Professor Rosenvald notes that by application of Article 240 of the Civil Procedure Code, which usually applies when a claim is served, but also applies when a spontaneous appearance dispenses with the need for service, the date of interruption for limitation purposes has retroactive effect to the original date of filing. Hence, the ADIC CPA interrupted prescription on 16 November 2015.

882. BHP's position is that the 20bn CPA was first in time. The 20bn CPA was filed on 30 November 2015, after the filing of the ADIC CPA. However, there was an order for service and Samarco elected to enter an appearance on 18 December 2015, thereby precipitating service to that date. Hence, this appearance resulted in the 20bn CPA interrupting prescription, as from 18 December 2015, before the date of its appearance in the ADIC CPA.

883. Interesting as this issue is, particularly in the absence of any direct authority on the same, I deal with it very shortly because it is now academic. I prefer the Claimants' analysis. The ADIC CPA was filed first in time. Following service of both the 20bn CPA and the ADIC CPA, the retroactive effect of service by Article 240 of the Civil Procedure Code resulted in the interruption of prescription occurring on the date of filing of the ADIC CPA. Therefore, it was first in time.

884. The fifth issue concerns the last act of process, which would re-start the prescription period running.

885. It is common ground that the last act of a CPA occurs when there is judgment on the merits which is rendered res judicata. Article 487(III)(b) of the Civil Procedure Code provides that there is resolution on the merits when the judge ratifies a settlement. The

settlement of a CPA can be achieved through a conduct adjustment agreement ("TAC"), which must be approved and ratified by the court. Thus, where a CPA is settled by agreement, and that agreement is ratified by a judgment, there is a judgment on the merits. The certification of that judgment as res judicata consequently marks the last act of the CPA.

886. On 2 March 2016 the TTAC was signed by all parties to the 20bn CPA. The TTAC provided for the creation by Samarco, Vale and BHP Brasil, of a private, independent foundation, the Renova Foundation, with the purpose of managing schemes for remedying the impacts of the collapse. However, on 28 April 2016 the MPF filed the 155bn CPA. As there was significant overlap between these CPAs, on 5 May 2016 the court ordered ratification of the TTAC and suspension of the 20bn CPA until the obligations set out in the TTAC were concluded.

887. On 17 March 2017, the 12th Federal Court held that, having regard to the ratification decision given within the proceedings of the 20bn and 155bn CPAs, the ADIC CPA was stayed until further judicial order.

888. On 25 June 2018 the parties to the TTAC signed the Terms of Conduct Adjustment – Governance ("GTAC"), whereby a process was established for the renegotiation of the TTAC. The GTAC was ratified on 8 August 2018 by the 12th Federal Court, terminating the 20bn CPA, staying the 155bn CPA and extending the procedural effects of the decision to other related proceedings, including the ADIC CPA.

889. On 24 September 2018, the 12th Federal Court certified that the part of the judgment ratifying the GTAC, and the part of the judgment dealing with the extinction/suspension of the CPAs, became res judicata.

890. BHP's position is that the merits of the 20bn CPA and the ADIC CPA were settled pursuant to the GTAC on 24 September 2018. Therefore, any interruption to the prescription period based on the CPAs came to an end on that date.

891. The Claimants' position is that the CPAs were not finally terminated on the merits until the recent Reparations Agreement.

892. On 25 October 2024, the Federal and State Government entities, Public Prosecutors Offices, Samarco, Vale, BHP Brasil and the Renova Foundation signed the Reparations Agreement. On 6 November 2024, the Federal Supreme Court (the STF) ratified the Reparations Agreement.

893. On 18 November 2024, Judge Cobucci of the 4th Federal Court of Belo Horizonte terminated the 155bn CPA. On 17 December 2024 the ADIC CPA was terminated and on 20 January 2025 the 20bn CPA was terminated.

894. I reject the Claimants' case that the Reparations Agreement alters the analysis of when the formal last act of the 20bn CPA or ADIC CPA occurred. I accept BHP's analysis as correct. The certificate dated 24 September 2018 expressly provided that the part of the 8 August 2018 judgment that ratified the GTAC and dealt with extinction/suspension of the CPAs was res judicata. That had the effect of settling the 20bn CPA and dismissing the ADIC CPA. The legal effects of the ratification were the resolution on the merits of those CPAs.

895. The later renegotiation of the TTAC and GTAC provisions, leading to the Reparations Agreement, did not reactivate those CPAs or unravel their conclusion on the merits. The subsequent three termination decisions by Judge Cobucci clarified that ratification of the Reparations Agreement by the STF on 6 November 2024 had the effect of extinguishing all other judicial and administrative proceedings, of which there were many, as listed in attachments to his decisions. However, this does not preclude a finding on analysis that the 20bn CPA and ADIC CPA were already concluded.

896. For those reasons, I conclude that the interruption to the period of prescription by the CPAs terminated on 24 September 2018.

(iv) Environmental claims

897. The Claimants' case is that the STF decision in "Theme 999" establishes that claims in vindication of diffuse or collective rights, including claims for damage to the environment, are not subject to prescription. They contend that this principle extends to claims advanced by the Indigenous and Quilombola ("the IQ Claimants") for damage to their lands and biodiversity, practices, traditions and knowledge, network of social and spiritual relations and the community's quality of life; and claims by the Municipalities for damage to cultural heritage, landscape, tourism, the quality of life of the community and public property.

898. BHP dispute the Claimants' interpretation of Theme 999. Their case is that it establishes only that public environmental claims – those seeking redress for damage to the environment itself – are not subject to prescription. Such public environmental claims may only be brought in accordance with the mandatory provisions of the CPA Law. The claims brought in these proceedings by the Municipalities and the IQ Claimants do not seek to repair public environmental damage and are not brought in accordance with the CPA Law. Consequently, Theme 999 is not applicable.

899. It is common ground that the Constitution and the Environmental Law do not provide for any special period of prescription for claims for damage to the environment. Therefore, the starting point is that they are subject to the same prescription rules as any other civil liability claims.

900. Theme 999 (Indigenous community of Ashaninka-Kampa) STF Extraordinary Appeal 654833/AC (2020) concerned a CPA filed by the Federal Prosecution Office ("the MPF") against various defendants on behalf of the Ashaninka-Kampa Indigenous community, seeking to redress material, moral and environmental damage resulting from invasion of, and illegal extraction of wood from, the community's lands. In the lower courts, compensation was awarded: (i) in favour of the Ashaninka-Kampa community for damage caused by the illegal logging, extraction of timber and moral damage, to be managed by the Indigenous Peoples National Foundation ("FUNAI"); and (ii) by transfer of sums to the Federal Fund for Diffuse Rights ("the FDD") to fund the environmental restoration.

901. Reporting Justice Alexandre de Moraes delivered the judgment of the full court, the summary of which stated:

> "1. The debate in these records revolves around whether the principle of legal certainty, benefiting the author of

> environmental damage in the face of government inaction, should prevail; or if the constitutional principles of protection, preservation, and restoration of the environment, which benefit the entire community, should take precedence.
>
> 2. In our legal system, the rule is the prescription of the reparatory claim. Not being subject to prescription, on the other hand, is an exception. It depends, therefore, on external factors that the legal system deems timeless.
>
> 3. Although the Constitution and ordinary laws do not specify the prescription period for the redress of environmental civil damages, with the norm being the stipulation of a time limit for compensatory claims, constitutional protection of certain values needs the recognition of claims not subject to prescription.
>
> 4. The environment must be considered a common heritage of the entire humanity, for the guarantee of its full protection, especially in relation to the future generations. All conducts of the state Government must be directed to the full internal legislative protection and adhesion to the international agreements and treaties that protect this fundamental human right of 3rd generation, to avoid harm to the community given an assignment of a certain asset (natural resource) to an individual purpose.
>
> 5. The redress of the damage to the environment is an unwaivable fundamental right, the acknowledgement of the necessity regarding the restoration the environmental damage being necessary."

902. The thesis established was:

> "The right to claim civil redress for environmental damage is not subject to prescription."

903. Theme 999 was brought under Article 927(III) of the Civil Procedure Code and, therefore, is binding on all lower courts. What is in issue before this Court is whether any of the claims brought by the Municipalities and/or the IQ Claimants in these proceedings fall within the ambit of the thesis in Theme 999.

904. Professor Rosenvald and Professor Tepedino agree in their joint statement on prescription that Brazilian case law recognises two types of environmental damage. It is either (a) public, and, therefore, compensation for the damage is directed to a fund (Federal or State) for the direct recovery of the environment; or (b) private, and, therefore, compensation for the damage is directed to natural and legal persons, becoming part of their private assets.

905. Professor Tepedino draws a distinction between those two types of environmental damage. Damage to the *macrobem* is damage that affects the environment and the ecosystem. It is considered diffuse damage, because it affects the interests of the entire

community, and is not individual damage. In contrast, damage to the *microbem* refers to individual damage (patrimonial or moral) that results from damage to the *macrobem*.

906. In *AES* STJ Special Appeal No. 1.641.167 (2018) Reporting Justice Andrighi explained the difference between environmental damage and personal damage suffered by individuals caused by environmental pollution, quoting from a work of jurisprudence by Professor Milaré:

> "the Law sees environmental damage from two distinct aspects: a) collective environmental damage (...) and b) individual environmental damage or personal environmental damage, suffered by people and their property (...) as occurs, for example, with the contamination of a watercourse due to the transport of harmful chemicals. (...) In the first case, that is, a public civil action conveying a claim for redress of collective environmental damage (...) it is included in the list of actions not subject to prescription. (...) In the second case, that is, in the case of reflex or damage inflicted to microbes and the environment, then the prescription rules will be defined by the provisions of the Civil Code, as it has determined holders. …"

907. When considering whether any of the claims in these proceedings fall to be categorised as collective environmental damage, not subject to prescription, or individual/personal environmental damage, subject to the general civil rules on prescription, regard must be had to the legislative framework for such claims.

908. Article 1(I) of Law No. 7.347/1985, the CPA Law, states:

> "The provisions of this Law shall govern, without prejudice to popular action, actions for liability for moral and patrimonial damage caused:
>
> I - to the environment
>
> …
>
> III - to property and rights of artistic, aesthetic, historical, tourist and landscape value;
>
> IV – to any other diffuse or collective interests;
>
> …
>
> VII – to the honour and dignity of racial, ethnic, or religious groups;
>
> VIII - to public and social heritage."

909. As set out above, there are restrictions on those who have standing to bring a CPA in accordance with Article 5.

910. Article 3 of the CPA Law specifies the remedies that may be sought in such a claim, namely, an award of money or a mandatory or prohibitory injunction. Article 13 states:

> "If an award of money is made, the compensation for the damage caused will revert to a fund managed by a Federal Council or by State Councils, which must include in their composition the Public Prosecutor's Office and representatives of the community, and its resources will be used to restore the damaged property."

911. The stated exception to the application of the CPA Law for actions seeking restoration or compensation for damage to the environment is a "popular action" pursuant to the Popular Actions Law. This enables an individual to request the annulment or the declaration of nullity in respect of acts harmful to the property of the Federal Government. However, any compensation that may be ordered in such an action is not paid to the individual but to a fund that will restore the environmental harm.

912. Thus, there are rules governing the persons who can bring collective actions for environmental damage, the remedies available and the treatment of any monetary compensation awarded by the court. That was reflected in Theme 999, a CPA in which the sums awarded were paid to FUNAI and the FDD, on the basis that the compensation did not become part of the assets of any entity but was linked to environmental restoration work.

913. In my judgment, the ambit of the thesis in Theme 999 is limited to public environmental claims, that is, claims for relief regarding the restoration of damage to the environment. It does not extend to claims for individual or collective compensation arising out of damage to the environment.

914. That conclusion is reinforced by reference to the cases cited by the experts on this issue; all the cases in which the thesis in Theme 999 has been applied are in relation to CPAs.

915. The claims by the Municipalities and the IQ Claimants in these proceedings are set out in Section F of the Master POC. They are for compensation for loss and damage suffered by those Claimants, individually or collectively, as a result of the environmental damage caused by collapse of the dam. They are not claims for injunctive relief to restore the environment or for the establishment of a fund through which restoration work can be effected. Such restoration claims were made in the CPAs discussed above and are the subject of settlement in the Reparations Agreement.

916. For those reasons, the claims by the Municipalities and the IQ Claimants are private claims for civil compensation; they are not public environmental claims. As such, the thesis in Theme 999 does not apply. The claims are subject to the rules of prescription set out in the written law.

Consumer Defence Code

917. The Claimants' case is that the claims in these proceedings are subject to a five-year limitation period pursuant to Article 27 of the Consumer Defence Code on the basis that the collapse was a consumer event and they are 'consumers by equivalence'.

918. BHP's case is that the Consumer Defence Code does not apply because there is no consumer relationship in this case.

919. The stated purpose of the Consumer Defence Code is set out in Article 1 as consumer protection and defence of public order and social interest.

920. Article 2 defines a consumer as follows:

> "A consumer is any natural person or legal person who acquires or uses products or services as the final user.
>
> Sole paragraph. Groups of persons, even if they cannot be determined, who may have intervened in consumer relations will be deemed to be consumers."

921. Chapter IV of the Consumer Defence Code is entitled: "Quality of Products and Services, Prevention and Repair of Damage." Within Chapter IV, Section II is entitled "Liability for the Fact of the Product and Service". Article 12 provides for no-fault liability on the part of manufacturers, producers, builders and importers for compensation for repair damage to consumers caused by product defects including design, manufacture, construction, assembly and information defects. Article 14 provides for no-fault liability on the part of service providers for damage caused to consumers by defective service or information.

922. Article 17 is included in Section II and states:

> "For the purpose of this Section, all victims of the event are deemed consumers."

923. Section IV covers peremption and prescription. It includes Article 27 which states:

> "The right to claim redress for damages caused by a product or service fact provided for in Section II of this Chapter is subject to prescription in five years, starting the counting of the prescription time from the knowledge of the damage and its authorship."

924. Professor Rosenvald's opinion is that the rationale of the Consumer Defence Code is that any entity participating in the production chain will be liable for the harm caused by that production or product. Such liability will extend to consumers in the strict sense (i.e. those who purchase or use the product or service) and to consumers by equivalence or bystanders (i.e. those defined by Article 17 as victims of harm arising from the production chain). He states that the Brazilian courts have consistently held that victims of man-made environmental disasters are to be considered victims of an event for the purposes of Article 17 of the Consumer Defence Code, in the absence of a direct consumer relationship, entitling them to a prescription period of five years, rather than three years, by application of Article 27.

925. Professor Tepedino's opinion is that the extended limitation period of five years in respect of damage caused by a defective product or service applies to consumers who purchase the defective product or service or to consumers by equivalence, pursuant to

Article 17. His view is that Article 17 does not apply to environmental accidents unless it is established that there is a base consumer relationship, which allows the extension of the Consumer Defence Code provisions to the consumer by equivalence. Samarco is not a supplier of products to final consumers; the raw materials it sells are acquired by legal entities that reintroduce them into the production chain. Thus, there is no base consumer relationship between Samarco and consumers. If there is no base consumer relationship, there can be no consumer by equivalence.

926. It is clear from the overriding purpose and express words used in the Consumer Defence Code that the protection afforded arises in the context of a consumer relationship where a consumer accident occurs. The issue is how the STJ has interpreted the requirement for such a consumer relationship and whether it extends to environmental accidents such as the collapse of the dam. The parties have relied on a plethora of cases but I have concentrated on the more recent STJ cases so as to extract the current judicial consensus.

927. In *JBS Poultry 8* STJ Special Appeal No. 2.009.210 (2022), the STJ considered whether the claimants could be considered consumers by equivalence based on damage resulting from the defendant's exercise of a polluting business activity, poultry production. The court held that the Consumer Defence Code applied:

> "In the event of individual damage resulting from the exercise of polluting business activity involving the manufacture of products for sale, it is possible, due to the characterisation of a consumer accident, to recognise the figure of the consumer by equivalence, which attracts application of the provisions of the Consumer Defence Code."

928. When considering the approach by the STJ to the interpretation of Article 17, Reporting Justice Nancy Andrighi stated:

> "22. According to the case law of this Court, "those who, although not directly participating in the consumer relationship, suffer the consequences of the harmful event resulting from the external defect that goes beyond the object and causes injuries, creating a risk to their physical and mental safety, are held equivalent to consumers for legal purposes…
>
> 23. The equivalence, however, only applies in the cases of product or service liability, in which the use of the product or service is capable of generating risks to the safety of the consumer or of third parties, and may cause a harmful event known as 'consumer accident' …
>
> …
>
> 28. … we conclude that, for the existence of a consumer accident, an external defect needs to occur that causes damage, creating a risk to the physical or mental safety of the consumer, even if by equivalence.

> 29. Furthermore, as expressly provided by law, the consumer accident does not result only from the damage caused by the product itself, but can also result from injury arising from the production process itself, i.e., from the design, manufacture, construction, assembly, formulas, handling, etc.
>
> 30. We note, in this context, that the CDC adopted the enterprise risk theory, according to which "anyone who is willing to exercise any activity in the consumer market has the duty to be liable for any flaws or defects in the goods and services provided, regardless of fault" (CAVALIERI FILHO, Sergio. Programa de responsabilidade civil, 13th reviewed and expanded edition. São Paulo: Atlas, 2019, page 603).
>
> 31. In terms of case law, this Superior Court admits, under the terms of article 17 of the CDC, the existence of the figure of the consumer by equivalence in the events of environmental damage…
>
> 32. Therefore, contrary to what the defendant maintains, in the event of individual damage resulting from the exercise of a polluting business activity intended for the manufacture of products for sale, it is possible, due to the characterization of the consumer accident, to recognize the figure of consumer by equivalence, which attracts application of the provisions of the Consumer Defence Code."

929. In *Pedra do Cavalo 3* STJ Internal Special Appeal No. 2.047.558 (2023), claims were brought by fishermen impacted by environmental damage caused by the operation of the defendant's hydroelectric power plant. The relevant business activity was the production of energy. Reporting Justice Moura Ribeiro stated:

> "…the case law of this Superior Court, which, in cases similar to the one at hand (i.e. environmental damage resulting from the exploitation of business activity), established an understanding that it is possible, due to the characterisation of the consumer accident, to recognise consumer by equivalence (consumer bystander), which entails the application of the provisions of the Consumer Defence Code (Special Appeal 2.005.977/RS, Reporting Justice NANCY ANDRIGHI, Second Section, trial date 28 September 2022).
>
> It is not unknown that consumer defence law, when dealing with product and service liability, expanded the concept to encompass all victims of a harmful event, creating the notion of a consumer by equivalence (bystander), as provided for in article 17 of the Consumer Defence Code.
>
> Regarding who the bystander consumer is, Superior Court of Justice's case law has settled that one who, although not having directly participated in the consumer relationship, suffers the

> consequences of the harmful event resulting from an external defect that goes beyond its purpose and causes harm generating a risk to their physical and psychological safety, is equated to a consumer for legal purposes (Internal Interlocutory Appeal in Special Appeal No. 1.000.329/SC, Fourth Panel, trial date 10 August 2010, Published on 19 August 2010).
>
> In other words, to characterise a consumer accident, an external defect must occur that causes damage, generating a risk to the consumer's physical or psychological safety, albeit by equivalence."

930. In *Pedra do Cavalo 4* STJ Special Appeal No. 2.018.386 (2023), the central issue was whether the victims of the alleged damage resulting from the operation of a hydroelectric complex could be considered consumers by equivalence. Reporting Justice Andrighi stated:

> "21. … it is concluded that, in order to characterise a consumer accident, it is necessary to have an external defect that causes damage, generating a risk to the physical or psychological safety of the consumer, even if by equivalence.
>
> 22. In addition, with regard to the fact of the product, it is noted that the consumer accident, according to an express legal provision (article 12 of the CDC), does not result only from the damage caused by the product itself, but may also result from injury from the production process itself, that is, design, manufacturing, construction, assembling, formulas, handling, etc.
>
> 23. Likewise, with regard to the fact of the service, it is necessary to conclude that the consumer accident, according to article 14 of the CDC, arises from the damage caused by the provision of the service itself.
>
> 24. It should be noted, in this context, that the CDC adopted the theory of enterprise risk, according to which "anyone who is willing to carry out any activity in the consumer market has the duty to answer for any flaws or defects in the goods and services provided, regardless of fault" (CAVALIERI FILHO, Sergio. Programa de responsabilidade civil. 13. Extended and reviewed edition São Paulo: Atlas, 2019, p. 603).
>
> 25. In the case law context, this Superior Court admits, under the terms of article 17 of the CDC, the existence of the figure of the consumer by equivalence in the event of environmental damage… "

931. Reporting Justice Andrighi explained the basis on which the Consumer Defence Code would apply on the facts of the case, regardless of the absence of any direct consumer relationship, adopting a broad interpretation of the consumer by equivalence:

> "40. It should be noted, however, that the damages alleged by the claimants derive from the process of production of electricity as a whole, that is, from the activity carried out by the appellant itself, which, according to the content of arts. 12 and 14 of the CDC, is sufficient to attract the normative discipline of liability for the fact of the product or service and the characterisation of the figure of the consumer by equivalence.
>
> 41. It should not be forgotten, in this context, that the business activity carried out by the defendants, in kind, is intended for the production of a true product, since, under the terms of item I, of article 83 of the CC/2002, the energies that have economic value have the legal nature of movable property.
>
> 42. In addition, it is of little or no importance to inquire whether the energy produced is used by the defendants themselves, whether it is distributed to the citizen as an end user or whether it is delivered to an entity of the Government for subsequent distribution. This is because, in any case, it is observed that the appellees exploit the hydroelectric complex for the benefit of the business activity carried out by them.
>
> 43. Thus, in the event of individual damages resulting from the exercise of an activity of operation of hydropower potential causing environmental impact, it is possible, due to the characterisation of the consumer accident, the recognition of the figure of the consumer by equivalence, which attracts the incidence of the provisions of the Consumer Protection Code."

932. A similarly broad interpretation was adopted in *JBS Poultry* STJ Internal Special Appeal No. 2.138.785 (2023), by Reporting Justice Maria Gallotti:

> "In effect, the Superior Court of Justice has a settled position that it is possible to apply the Consumer Defence Code in the case of environmental damage to those who are not part of the consumption chain, in view of the provisions of article 17 of the Consumer Defence Code, which establishes the application of the consumerist microsystem to all victims of the harmful event, considered as bystanders.
>
> …
>
> … considering what is established in article 17 of the Consumer Defence Code, all innocent victims of consumption are considered consumers by equivalence or bystanders. In this case, the alleged environmental/noise pollution arises from the defendant's productive activity, which, even though is not directly related to consumption, must be considered as such for protection purposes.
>
> …

> In other words, if there is a consumption accident - and, in this case, the actual environmental damage caused by pollution -, the appellee will be characterised as a consumer by equivalence."

933. In *Pedra do Cavalo 2* STJ Internal Special Appeal No. 2.073.932 (2023), Reporting Justice Bellizze explained that a consumer accident, within the meaning of Article 12 of the Consumer Defence Code, is not restricted to damage caused by the product itself but may also arise from injury resulting from the production process.

934. A similar approach was taken by the STJ in further cases, including *Petrobras* STJ Internal Special Appeal No. 2.075.953 (2023); *Vale* STJ Internal Special Appeal No. 2.297.698 (2023); *Pedra do Cavalo 1* STJ Internal Special Appeal No. 2.084.649 (2024); *Wilson* STJ Internal Special Appeal No.2.090.423 (2024); *Brumadinho* STJ Proposed Allocation in the Special Appeal No. 2.124.701 (2024); and *Mariana* STJ Internal Special Appeal No. 2.602.353 (2024).

935. What emerges from the recent line of authority is that the STJ has adopted a broad interpretation of consumer to include individuals indirectly affected by the exercise of a polluting business activity. Relevant damage is not just that caused by the product itself but is capable of extending to damage resulting from the production process. It matters not that the processing of iron ore pellets, which requires the storage of iron ore tailings, does not give rise to any direct consumer relationship with the Claimants; it is sufficient that it is a business activity intended to produce a product, with the potential to cause environmental impact, for the collapse of the dam to be characterised as a consumer accident.

936. It follows that I accept Professor Rosenvald's opinion that Article 17 of the Consumer Defence Code would apply to the claims in this case, deeming the Claimants to be consumers by equivalence as victims of the collapse.

937. On that basis, I find that Article 27 of the Consumer Defence Code would apply a five-year period of prescription to the claims.

Public entities

938. The Claimants' alternative case is that the claims made by the Municipalities and the Utilities are subject to a five-year period of prescription set out in Article 1 of Decree 20.910/1932 (the "1932 Decree").

939. BHP's case is that the 1932 Decree only applies (by analogy) to public or administrative claims by the state and has no application to the claims advanced in these proceedings.

940. Article 1 of the 1932 Decree states:

> "The Federal, State and Municipal debts, as well as any right or action against the Federal, State or Municipal Treasury, of whichever nature are subject to a five-years limitation period that begins to run from the date of the act or fact of which they originated."

941. Despite the significant changes to the prescription periods in the Civil Code, the STJ has confirmed that civil compensation claims against the Treasury should still be subject to the five-year prescription period as provided in the 1932 Decree: *Municipality of Londrina* STJ Special Appeal No. 1.251.993 (2012).

942. By Decree Law No. 4,597, the five-year prescription period was extended to other public entities:

> "Article 2. Decree No. 20.910, of 6 January 1932, which regulates the five-year prescription period, includes the passive debts of independent government agency or para-statal entities and bodies, created by law and maintained through taxes, fees, or any other contributions, required by federal, state, or municipal law, as well as any and all rights and claims against them."

943. On its face, as submitted by BHP, the 1932 Decree provision is concerned with claims against public entities and does not address the applicable prescription period for claims by public entities. However, the STJ has applied the five-year prescription period to both claims against, and by, municipalities, pursuant to the principle of isonomy: *State of Rio Grande do Sul* STJ Internal Special Appeal No. 1.236.866 (2011); *Municipality of Monte Azul* STJ Internal Special Appeal No. 1.647.056 (2020); *Municipality of Guarujá* STJ Internal Special Appeal No. 2.218.347 (2023). Although Professor Tepedino considers that it should only apply in claims that are of a public nature, there is no authority limiting it to such claims.

944. Accordingly, I accept the analysis of the cases by Professor Rosenvald and conclude that the claims by the Municipalities and Utilities would be subject to a five-year period of prescription.

Terms of Commitment

945. On 26 October 2018, the MPF and others entered into an agreement with Samarco, Vale, BHP Brasil and Renova ("the Term of Commitment"), pursuant to which Samarco, Vale, BHP Brasil and Renova agreed to provide full redress to those affected by the collapse in accordance with the Brazilian law, the TTAC and the GTAC.

946. The Claimants' case is that the Term of Commitment amounted to an interruption of the prescription period.

947. Article 1, paragraph 1 provided:

> "There shall be no deterioration of rights and intentions of the affected people, based on the statute of limitations, on 5 November 2018."

948. This document does not seem to be of great assistance in this case. The experts agree that parties cannot agree to alter prescription periods. Article 202 of the Civil Code provides that interruption of prescription can occur "VI - by any unequivocal act, even if extrajudicial, that implies recognition of the right by the debtor." However, taken at face value, the words in Article 1, paragraph 1 do not amount to recognition of any right

of claim; they simply agree that there will be no deterioration in whatever rights exist as at 5 November 2018. This appears to be akin to a standstill agreement.

949. I note that some support can be found for the Claimants' interpretation in *Mariana* TJMG Appeal 5031710-23.2022.8.13.0105 (2023), a case in which the Minas Gerais State Court of Appeal held that by signing the Term of Commitment, BHP Brasil, Samarco and Vale recognised the right of the debtor for the purpose of Article 202 of the Civil Code, thereby interrupting prescription on that date.

950. However, regard must be had to Article 2 of the Term of Commitment, which provided that the provisions of Article 1 apply only to the Brazilian jurisdiction. It is not an answer for Professor Rosenvald to state, correctly, that Article 202 of the Civil Code does not provide for the restriction of the effects of any unequivocal declaration to any territorial limit. The significance of Article 2 is that it indicates that the parties did not intend any unequivocal declaration as to recognition of the right of the debtor. On that basis, it would have no impact on any issue of prescription, at least in this jurisdiction.

951. If the Claimants were forced to rely on the Term of Commitment, I do not consider that it would change their fate.

Extension of prescription for individual claimants

952. Subject to the Court's findings on prescription as set out above, there are a number of miscellaneous issues, whereby certain Claimants may be entitled to extended prescription periods in respect of their individual claims.

953. A number of these issues are agreed, as set out in the Brazilian law experts' joint statement on prescription. It is agreed that commencement of an individual claim, in Brazil or this jurisdiction, will result in interruption of the prescription period for that individual only, against, not only the defendant who is party to the claim, but also, pursuant to Article 204, paragraph 1 of the Civil Code, any jointly and severally liable defendants.

954. Further, if and to the extent relevant, it is common ground that Article 3 of the Emergency and Transitional Legal Regime Law, introduced as a result of the COVID pandemic, suspended any prescription periods that were running as from 12 June 2020 until 30 October 2020.

955. The issues in dispute concern (a) interruption by protest; (b) lack of capacity of individuals; (c) date of accrual of the cause of action; and (d) continuing damages.

(a) Interruption by protest

956. Article 202 (II) of the Civil Code provides for the interruption of prescription by means of a judicial protest in accordance with Article 202 (I) of the Civil Code and Articles 726 to 729 of the Civil Procedure Code. There is a dispute between the experts as to whether the protest must explicitly state that the intention is to interrupt prescription.

957. The requirement set out in Article 726 is for the person making the protest to make the defendant aware of their intention. That would not necessarily require a statement in terms that the intention was to interrupt prescription. It would be a matter for the Court,

in each case, to construe the relevant document and determine whether it satisfied the test.

(b) Capacity

958. Professor Rosenvald and Professor Tepedino agree in their joint statement that prescription does not run against persons absolutely lacking in capacity, defined in Article 3 of the Civil Code as minors under the age of 16 years.

959. It is also common ground that prescription does not run against those over 16 years who by reason of disability, do not have the capacity to perform acts of civil life.

960. There is a dispute between the experts as to when time starts running against incapacitated adults. Articles 747 to 758 of the Code of Civil Procedure provide for a process of interdiction, whereby the court can determine the capacity of an individual to perform civil acts and, where appropriate, appoint a guardian.

961. Professor Tepedino's opinion is that time starts running when a guardian is appointed to act for an incapacitated person who is interdicted; likewise, for a person who has limited capacity, time starts running when a legal representative is appointed to act for them.

962. Professor Rosenvald's opinion is that whether, and if so, when, time will stop running against an adult incapacitated party is a matter that will depend on the way in which the examining judge describes the level of loss of autonomy of that party.

963. There are conflicting STJ decisions on this issue. In *Testa* STJ Special Appeal No. 1.595.136 (2017) the court held that the prescription period was postponed until the incapacity was resolved, in that case by a judicial interdiction ruling and the appointment of a guardian. In contrast, in *Brentano* STJ Special Appeal No 1.866.906 (2020), the court held that the prescription period did not run in respect of a relatively incapacitated adult, stating that it could not turn a blind eye to the lack of determination of a person's incapacity and treat them as if they had full capacity. A similar decision was reached in *Da Silva* TRF-3 Civil Appeal 5008622-02.2021.4.03.6119 (2024). I note that *Brentano* and *Da Silva* were cases concerning claims by persons lacking capacity for death pensions in which it might be said that the decision was the just outcome in all the circumstances.

964. The logical starting point must be, as Professor Tepedino has stated, that the prescription period does not run against a person who lacks capacity until the appointment of a guardian or legal representative. At that point, they no longer suffer any prejudice by reason of their incapacity. It is likely that this would be the position adopted by the STJ in most cases. However, it appears that there may be difficult cases in which the court would apply a principled and purposive approach to application of the relevant legislation to avoid injustice.

(c) Actio Nata – accrual of right of action

965. Article 189 of the Civil Code provides that the right to claim arises upon breach of the right. It does not contain any requirement as to knowledge of the breach. Article 27 of the Consumer Defence Code provides that the 5-year prescription period in respect of

damage suffered by consumers (including consumers by equivalence) starts to run from the date of knowledge of the damage and its authorship.

966. BHP's case is that the prescription period starts to run when the damage becomes objectively discoverable.

967. The Claimants' case is that the prescription period for non-contractual liability will not commence until a claimant has unequivocal subjective knowledge of the nature and extent of the damage suffered, and the identity of the person responsible. Professor Rosenvald relies on the following STJ authorities in support of this position.

968. In *Asbestos* STJ Special Appeal No. 291.157 (2001) the STJ held that, in a claim by an employee against his employer for damages for personal injury caused by exposure to asbestos, time did not begin to run until the employee had knowledge of his incapacity.

969. *Malathion* STJ Appeal in the Special Appeal No. 1.236.863 (2011), concerned a CPA in respect of personal injury resulting from the mistaken use of a toxic chemical substance for pest control purposes at a health centre. Reporting Justice Benjamin upheld the decision of the lower court that the right of action accrued, not when the toxic substance was used, but when the injury manifested itself by the emergence of pathologies:

> "The prescription is correctly ruled out, which, when applicable, shall have, as initial date, the actual occurrence and identification of the extent of the injury (principle of actio nata, according to the Superior Court of Justice), especially in the field of protecting people's health and other rights of personality, as well as future damage, which appear in a deferred, protracted, or prolonged manner; which conditions often require sophisticated and expensive laboratory or field examinations.
>
> The application of insecticide or use of a toxic substance does not characterise, when viewed in isolation, the harmful event. In health-environmental civil liability, the damage only occurs, in theory, with the emergence and identification of the alleged injuries or pathologies. Before that, there is no right to claim compensation per se and, as a consequence, no prescription applies."

970. *AES Triunfo 3* STJ Special Appeal No. 1.354.348 (2014) concerned environmental damage consisting of the contamination of soil and groundwater in the place where the defendant lived, as a result of the toxic products used in the treatment of light poles intended for the distribution of electricity to consumers. As referred to above, this was a case in which the Consumer Defence Code was applied and the STJ held that the prescription period started when the claimant had unequivocal knowledge of the harmful act.

971. In *AES Triunfo 6* STJ Special Appeal No. 1.641.167 (2018), a claim for personal injury arising out of environmental contamination caused by a former wooden post production plant, Reporting Justice Nancy Andrighi stated:

> "…in case of reparation of individual rights and interests, even if caused by environmental damage - that is, of an individual environmental damage - the period of limitation set forth in the Civil Code is applicable.
>
> …
>
> "For the claim to be born, it is not necessary to presuppose that the holder of the right knows the existence of the right, or its nature, or the validity, or effectiveness, or the existence of the arising claim, or its extension in quality, quantity, time and place of provision, or other modality, or whoever is obligated, or who knows the holder who can exercise it. Therefore, in Brazilian law, the three-year prescription of the claim for compensation for an absolute unlawful act does not depend on knowing whether there was damage or who caused it ...
>
> However, in some cases, the case law of this Court has excepted this rule, in order to determine that the limitation period starts from the moment the offended party becomes aware of the unlawfulness."
>
> …
>
> Also in an appeal involving individual environmental damage, this Superior Court of Justice used the understanding that the starting date of the prescriptive period is the date of effective awareness of the environmental damage suffered by the individual.
>
> …
>
> From the stated above, it can be preliminarily concluded that: (i) environmental damage can take the form of homogeneous individual damage or even pure individual damage; (ii) in this circumstance, the case law of this Court indicates that the prescription for the claim for compensation for the loss has as its initial term the date of unequivocal knowledge of the damage by the offended part; and (iii) the filing of a collective claim, in accordance with the current legal system, causes the interruption of the prescription for individual claims."

972. Professor Tepedino recognises in the above cases the establishment of an exception that is applied to the general rule on prescription laid down by Article 189 of the Civil Code. In his opinion, in such cases, the limitation period begins when the damage can objectively be known by the victim, and not when the victim subjectively knows the damage. It is an objective test. In order for the limitation period to begin, it is sufficient that it is possible for the victim to objectively know the damage, and it is not necessary to know its extent or authorship.

973. Professor Tepedino cites a number of cases in which the STJ has held that the knowledge exception applies only where the claimant has no possibility of exercising their claim because there is no evidence of any violation of rights, including: STJ Special Appeal No. 1.794.362 (2021); STJ Interlocutary Special Appeal No. 1.733.730 (2023); and *Pittarelli* STJ Special Appeal No. 1.837.425 (2023).

974. I accept Professor Tepedino's analysis as correct. From the above cases, it is reasonably clear that: (i) the general rule is that the prescription period starts from the moment at which the injury to the right occurs; (ii) where the damage is personal injury, whether or not derived from environmental pollution, the prescription period starts from the moment at which the injury becomes manifest and the victim has unequivocal knowledge of the same; and (iii) the test is an objective one.

(d) Continuing damage

975. The Claimants' case is that in cases of continuing damage, where the same conduct or event continues to cause new damage over time, the right of action does not accrue until the damage ceases, alternatively that it continues to accrue on a daily basis until it ceases.

976. BHP's case is that there is no separate exception from the rule set out in Article 189 of the Civil Code for continuing damage.

977. In *Abandoned Property* STJ Special Appeal No. 1.659.500 (2017), an individual filed a claim against the owner of abandoned neighbouring land, which was not properly secured and was used by third parties for drug consumption and rubbish dumping. The STJ held that the misuse of the land was not a single incident but continuous ongoing damage, renewing the prescription period each day.

978. *Riverbank Ranch* STJ Special Appeal No. 1.081.257 (2018) concerned a CPA in respect of environmental harm caused by the construction of a building in a permanent preservation area. It was held that the prescription period had not started running because the maintenance of the buildings in the preservation area was an ongoing violation. Reporting Justice Og Fernandes explained:

> "Prescription is lifted, not because the environmental action is not subject to prescription, but because permanent damage extends the prescription period as long as it exists. It is a question of recognising the nature of the damage. Anyone who, over the years, has perpetuated environmental damage in the face of the existence of a Permanent Preservation Area (APP), if the facts are duly proven, will be obliged to cease the damage and answer for the respective compensation.
>
> In this case, the *actio nata* is not overlooked, since it is common ground in this Superior Court that the prescription period for an action for damages begins when the injury and its effects are realised.
>
> …

> In this case, the damage has been perpetuated, recreating or renewing every day the legal claim of the holder of the offended right. There is no need to talk about statutes of limitation in environmental actions arising from ongoing damage, at least as long as the environmental damage is perpetuated."

979. In *Construction Defects* STJ Special Appeal No.1.869.848 (2020), the claim was for damages in respect of ongoing defects in a property. Initial defects were discovered and repairs carried out but the repairs themselves were defective and incomplete, and further defects were discovered over time. On those facts, the court considered that the defects affecting the property were continuous, as a result of which the initial term of prescription was renewed on a daily basis.

980. Professor Tepedino's explanation, which I find persuasive, is that there is a significant distinction between the following causes of action.

i) There is a single harmful event, where the violation occurs at a specific moment in time but its effects persist over a longer period with immediate and deferred damage. The prescription period starts from the date of violation.

ii) There are periodic damages, where violation occurs periodically and is renewed over time through successive harmful events, such as a plant that periodically discharges waste into a river. The prescription period is renewed with each event.

iii) There are ongoing damages, when the harmful event is continuous, that is, where there is a continuous violation of the individual's right. The prescription period starts when the injury ceases, that is, when production of the damage is complete.

981. As recognised by the parties, it will be a matter for the second stage trial to determine which category of damage forms the basis of the claims for damages by each of the Claimants.

Conclusions on prescription

982. For the reasons set out above, I find that the claims which are the subject of these proceedings contained sufficient information, as required by Brazilian Law, to stop time running.

983. Pursuant to Article 200 of the Civil Code, the criminal investigation and proceedings that were commenced in Brazil in November 2015 postponed the start of the prescription period until at least 2024.

984. The ADIC CPA filed against Samarco on 17 November 2015 interrupted prescription in respect of all claims arising out of the collapse but such interruption terminated on 24 September 2018.

985. The ambit of the thesis in Theme 999 is limited to public environmental claims, that is, claims for relief regarding the restoration of damage to the environment. It does not extend to claims for individual or collective compensation arising out of damage to the

environment, such as claims by the Municipalities and the IQ Claimants, which remain subject to the general rules of prescription.

986. The prescription period for the claims is five years pursuant to Article 27 of the Consumer Defence Code.

987. The claims by the Municipalities and Utilities are subject to a five-year prescription period pursuant to the 1932 Decree.

988. The Term of Commitment entered into by Samarco, BHP Brasil and Vale on 26 October 2018 is of no assistance.

989. The general rule is that the prescription period starts from the moment at which the injury to the right occurs but subject to the characterisation of the injury; a distinction must be drawn between a single harmful event, periodic violations of right, and continuous violation.

990. Certain Claimants may be entitled to extended prescription periods, by reference to (a) filing of protests in Brazil, (b) lack of capacity and/or (c) their date of knowledge. It would be a matter for the Court, in each case, to determine these issues on the facts.

13. WAIVERS/RELEASES

991. BHP's case is that approximately 200,000 Claimants have received compensation from Renova through optional processes supervised and/or mandated by the Brazilian Courts and agreed settlement agreements containing releases discharging claims arising from the Collapse. Many others have settled litigation against Renova, Samarco, BHP Brasil, and/or Vale. They submit that where such Claimants have entered into such settlement agreements, which contain releases, any claims within the scope of those releases are barred and should be dismissed.

992. The Claimants' case is that Brazilian law requires waiver clauses to be interpreted restrictively and by reference to the particular subject matter of the compromise. On a proper construction of the sample settlement agreements before the Court, none has the effect of barring an individual Claimant's participation in these proceedings. In addition, compensation agreements are subject to validity control by Brazilian law and the Claimants contend that the settlement agreements are void, voidable, and/or do not bind them. However, it is agreed that determination of those matters would necessitate examination of the factual circumstances in which each agreement was concluded, an exercise that is outside the scope of this First Stage Trial.

993. The Court is invited to identify the relevant Brazilian legal principles governing the scope, effect, validity, enforceability and proper interpretation of settlement agreements; in particular, the principles applicable to release and waiver provisions. For this purpose, the parties have identified a sample set of 14 settlement agreements in the agreed list of issues. There are five categories of agreement: (a) the PIM General Agreements; (b) the PIM Water Agreements; (c) the Novel Agreements; (d) the Novel Water Damage Agreements; and (e) settlement agreements arising from the compromise of claims brought by individuals in Brazil, including settlement agreements arising from liquidation claims of the Mariana CPA settlement.

Background to the settlement agreements

994. On 2 March 2016, the parties to the 20bn CPA entered into the Terms of Agreement and Conduct Adjustment (the TTAC), in settlement of that claim. The TTAC provided for a not-for-profit foundation to be created by Samarco, BHP Brasil and Vale to provide full redress to victims of the collapse by way of remediation and compensation programmes.

995. In 2016 the Renova Foundation was established, implementing some 40 programmes of remediation and compensation. Compensation payments to victims of the collapse were effected through two programmes for mediated compensation ("PIM"); PIM Water for water interruption claims and PIM General for other heads of loss.

996. PIM Water opened in October 2016 and closed on 31 December 2017. It offered a fixed compensation amount calculated on the basis of the period the impacted communities were left without water and the average amount of local water bills. There was an enhancement of 10% for the elderly, children and those in particular categories of vulnerability. It did not address other heads of loss, such as claims for loss of earnings or personal injury. Those who received payments were required to sign waivers, covering damage related to water supply and distribution.

997. PIM General was opened in September 2016 and was closed to new applicants on 31 December 2021 (although the registration process continued until 1 January 2024). PIM General indemnified individuals and micro/small businesses for material damage, loss of income and moral damages (where such damages did not arise from water supply interruption). Following registration by applicants, Renova investigated the claims, usually on an individual basis but in some respects in accordance with a damage matrix. Those who received payments were required to sign waivers in settlement of their claims.

998. The PIM process involved a series of mediated meetings including a preparation meeting, an admission meeting, a meeting of clarification, a proposal meeting and a signature meeting. At the proposal meeting the affected person would have the opportunity to identify any issues or errors in the offer, in response to which Renova could re-assess its offer. The role of the mediator included clarifying any doubts about the PIM and ensuring that the affected person understood the offer of settlement, including any relevant releases. The affected individual or business could exercise their right to cancel the settlement within a period of 7 days (extended to 10 business days in Mariana) following signature.

999. Dissatisfaction with the speed and effectiveness of the PIM system gave rise to further proceedings, the result of which was the creation of the Novel System by order of Judge Mario in the Federal Court of Minas Gerais on 1 July 2020. The Judge created an alternative compensation scheme, offering a simplified process of proof and payment in accordance with a judicially fixed damage matrix, depending on occupation of the applicant. This offered the following optional alternatives to affected parties: (i) the PIM Programme, in accordance with the procedural rules, eligibility criteria and indemnification parameters applied by Renova; (ii) filing of an individual claim in court, requiring proof of damage; or (iii) the Novel System, using the damage matrix, simplified and flexible, based on the notion of rough justice.

1000. All affected persons seeking to use the Novel System were required to be represented by a lawyer by way of a power of attorney. The process was conducted through an online portal created by Renova that could only be accessed by the lawyers. Those who received payments were required to sign release and waiver agreements, including waiver of their claims and agreement not to pursue any claims abroad. Applicants had ten calendar days to accept the terms of the release and the agreements had to be approved by the court.

1001. The Novel System was expanded to include a water damage compensation scheme, by the decision of Judge Mario dated 30 October 2021. This scheme offered compensation for water interruption, with sums payable at a fixed rate per day of interruption.

1002. There have been a number of challenges to the above compensation schemes but none has been finally determined as unlawful.

1003. On 25 October 2024, following renegotiation of the TTAC and subsequent agreements, BHP Brasil, Samarco and Vale entered into a full and final judicial agreement for reparations regarding the Fundão Dam collapse, the Reparations Agreement.

1004. Clause 34 of Annex 2 of the Reparations Agreement acknowledged the releases contained in the settlement agreements signed under PIM.

1005. Clause 40 of Annex 2 of the Reparations Agreement provided that any settlement agreements signed under the Novel System:

> "resulted in the discharge of all individual claims of the applicant, including indemnification and financial claims of any nature… no additional payment or complementation of values is due, including as loss of profits…".

1006. On 6 November 2024 the Federal Supreme Court homologated the Reparations Agreement, deciding that it met the criteria of legality and reasonableness. The STF noted that the settlement resulted from mediation conducted in a qualified environment, which guaranteed the free expression of the parties and broad access to information. All parties to the agreement were well represented and were entitled to compromise on the mechanisms for redress and compensation of damages at hand. There was broad participation of the Public Prosecution Office and the Public Defender's Office, responsible for the protection of homogeneous collective and individual rights and for the representation of the underprivileged. The option for public management for environmental and socio-economic recovery was legitimate and appropriate. The adjustment provided for repair and compensation actions in relation to all categories of damage caused by the disaster. The amount agreed was significant and made it one of the largest environmental settlements in history.

1007. The effect of the Reparations Agreement is that all Brazilian lawsuits relating to the dam failure which are listed in Annex 23 to the Reparations Agreement have been extinguished, including previously stayed proceedings and outstanding appeals.

Applicable principles of Brazilian law

1008. In their joint statement on waivers, Professor Rosenvald and Professor Tepedino agree that a settlement agreement consists of a valid and effective contract in accordance with contractual principles. They agree that the proper interpretation of an agreement will have regard to four principles: (1) the private autonomy of the parties; (2) objective good faith; (3) the social function of the contract; and (4) contractual balance.

1009. It is also agreed that:

i) There is *prima facie* binding force in a contractual agreement, including an agreement of settlement and waiver.

ii) The extent and effect of an agreement, including the scope of any release/waiver, will depend on the terms of the agreement, properly interpreted.

iii) A release (*quitação*) is the acknowledgement, by the creditor, of the debtor's performance of the obligation, thus freeing them from the bond created by the obligation. Release may be total or partial.

iv) Settlements, like any contract, are subject to challenge regarding their validity by reference to established principles of contractual interpretation.

v) Contracts entered into with consumers are subject to the Consumer Defence Code, with special consumer protections.

vi) Adhesion contracts are characterised by standard terms in which the terms of the contract are stipulated unilaterally by one of the parties.

1010. The principles and rules applicable to contractual interpretation are set out in the Civil Code.

1011. Article 112 provides for the interpretation exercise to ascertain the intention of the parties:

> "ln declarations of will, more heed shall be given to the intention revealed therein than to the literal meaning of the text."

1012. Article 113 introduces an obligation of good faith in contractual interpretation:

> "Legal transactions shall be interpreted in conformity with good faith and the practice of the place in which they are made.
>
> § 1. Interpretation of a legal transaction shall give it the meaning that:
>
> I - is confirmed by the behaviour of the parties after the transaction was entered into;
>
> II - is consistent with the uses, customs, and practices of the market related to the type of the transaction;
>
> III - is consistent with good faith;

> IV - is more beneficial to the party that did not draw up the provision, if that party can be identified; and
>
> V - is consistent with a reasonable negotiation of the parties on the matter in question, as inferred from other provisions of the transaction and the parties' economic rationale, considering the information available at the time the transaction was entered into.
>
> § 2 The parties may freely agree on rules for the interpretation, filling of gaps, and integration of legal transactions other than those provided for by law."

1013. Article 114 provides that beneficial legal transactions and waivers are interpreted strictly.

1014. Article 320 provides that any debtor who pays is entitled to discharge:

> "Any discharge, which can always be given by a private instrument, will indicate the amount and the type of debt discharged, the name of the debtor or anyone having paid on their behalf, and the time and place of payment, along with the signature of the creditor or their representative.
>
> Sole paragraph. Even without the requirements established in this article, a discharge shall be valid if from its terms or the circumstances it can be concluded that the debt has been paid."

1015. Article 421 provides that contractual freedom shall be exercised within the limits of the social function of the contract.

1016. Article 422 provides that the contracting parties are bound to observe the principles of probity and good faith, both in entering into the contract and in its performance.

1017. Article 423 provides for the principle of *contra proferentem* to apply in respect of adhesion contracts:

> "When there are ambiguous or contradictory clauses in a contract of adhesion, the interpretation most favourable to the adhering party shall be adopted."

1018. Article 840 recognises settlement agreements:

> "It is licit for interested parties to prevent or terminate litigation through mutual concessions."

1019. Article 843 provides for restrictive interpretation of settlement agreements:

> "A settlement/transaction is interpreted restrictively. Rights are not transmitted by a settlement/transaction, but merely declared or acknowledged."

1020. Article 844 paragraph 3 provides that a discharge in a settlement can benefit non-parties to the settlement who are jointly and severally liable with the released party.

1021. Unsurprisingly, there is no dispute as to the applicability of the above legal principles, although it appears that there remain some issues between the parties as to their application in practice to the material settlements.

1022. Both parties have included submissions regarding the court's approach to future damage/future losses. However, the cases cited are mere examples of decisions concerning specific settlement agreements. None of them contains any overriding rule or principle that settlement agreements always or never, include or exclude, future losses. Against the relevant provisions of the Civil Code, it is necessary to consider the precise words used in the context of the claims and the settlement agreement, to determine what the intention of the parties was regarding the scope of any settlement and release.

1023. There are two issues of general principle to be considered by the Court: (a) whether the Consumer Defence Code applies; and (b) whether the settlement agreements constitute adhesion contracts.

(a) Consumer Defence Code

1024. The Claimants' case is that the Consumer Defence Code applies to the settlement agreements because: (i) the Claimants are victims of an environmental disaster, attracting the application of Article 17, and it would be consistent to apply the Consumer Defence Code to the settlement agreements arising from the disaster; and (ii) they were subject to abusive practices as defined in Chapters V and VI of the Consumer Defence Code, and are therefore deemed consumers.

1025. BHP's case is that the settlement agreements are regulated by the Civil Code, the principles of which are set out above. The Consumer Defence Code does not apply to the settlement agreements because: (i) there is no underlying consumer relationship between the parties; and (ii) Chapter VI of the Consumer Defence Code only applies to abusive clauses in consumer contracts, that is, a contract between a consumer and supplier regarding the provision of a service or product, which on any view does not cover the settlement agreements.

1026. For the reasons explained above, the Court has found that the Claimants were not 'consumers' as defined in Article 2 of the Consumer Defence Code but they were deemed to be 'consumers by equivalence' as set out in Article 17, despite the absence of any direct consumer relationship, thereby benefitting from a prescription period of 5 years pursuant to Article 27.

1027. Professor Rosenvald's argument is that, in those circumstances, all provisions of the Consumer Defence Code should be extended to apply to the settlement agreements. That argument does not stand up to scrutiny and is not supported by the STJ case law. In *JBS Poultry 8* STJ Special Appeal No. 2.009.210 (2022), Reporting Justice Andrighi considered whether those who suffered damage as the result of a polluting business activity could be characterised as consumers by equivalence under Article 17 and therefore, could rely on reversal of the burden of proof in Article 6, VIII of the Consumer Defence Code. Justice Andrighi found that Article 17 applied (and therefore

Article 6), on the basis that they were victims of a consumer accident, but stated that the equivalence only applies in the cases of product or service liability; not in cases of conformity or service defect. Thus, it was the nature of the claim, arising out of a consumer accident, that placed it under the umbrella of consumer protection. There was no suggestion that consumer protection would apply in relation to any contracts entered into between the parties, including settlement agreements, as opposed to the claims in respect of the consumer accident.

1028. Professor Tepedino's analysis is in line with the literal meaning of the Consumer Defence Code. The effect of the deeming provision in Article 17 is to extend the provisions of Chapter IV, Section II so as to include no-fault liability for defective products / services to victims of consumer accidents. But that deeming provision is expressly stated to be for the purposes of Section II. If it were intended that it should apply to the Consumer Defence Code as a whole, it could easily have included express words to that effect but it does not.

1029. As explained by Professor Tepedino in cross-examination, no-fault liability as a deemed consumer by equivalence has nothing to do with the protection afforded to consumers by Chapters V and VI through control of abusive practices in consumer contracts. That can be seen readily by perusal of those provisions.

1030. Chapter V is entitled "Commercial Practices". Article 29 is a deeming provision but limited to the contracts and contractual practices referred to in Chapters V and VI:

> "For the purposes of this Chapter and the following one, all persons, determinable or not, exposed to the practices contemplated therein, are deemed consumers."

1031. Chapter VI is entitled "Contractual Protection" and includes the following provisions:

Article 46:

> "Contracts that regulate consumer relations shall not bind the consumers, if they are not given the opportunity of having prior knowledge of its content, or if the respective instruments are written in a way that it is difficult to understand their meaning and scope."

Article 47:

> "Contractual clauses shall be interpreted in a manner most favourable to consumers."

Article 51:

> "Among others, the following contractual clauses relating to the supply of goods and services are null and void, if they:
>
> I. make it impossible, exempt, or mitigate the supplier's liability for any nature of defects in their products and services or entail a waiver or relinquishment of any rights—in consumer

> relationships between a supplier and a legal person consumer, compensation may be limited in justifiable situations;
>
> …
>
> III. transfer liabilities to third parties;
>
> IV. stipulate obligations considered unfair or abusive that put the consumer at an exacerbated disadvantage or that are incompatible with good faith or equity … ”

1032. Thus, these provisions are concerned with contracts that regulate consumer relations. The ambit of Article 29 is limited to consumer transactions. In the case of Article 51, it is concerned with contracts for the supply of goods and services, as accepted by Professor Rosenvald in cross-examination. But there is no consumer relationship between the Claimants and any of the signatories to the settlement agreements. They certainly do not deal with the supply of goods and services. It follows that these parts of the Consumer Defence Code are simply not engaged.

(b) Adhesion Contracts

1033. For the reasons set out above, provisions regarding adhesion contracts in the Consumer Defence Code do not apply to the settlement agreements. However, it is common ground that Article 423 of the Civil Code, which does apply, makes similar provision, namely, that where there are clauses of ambiguity or conflict, they should be construed in favour of the adhering party.

1034. Adhesion contracts are not defined in the Civil Code. The experts agree in their joint statement that an adhesion contract may be characterised by standard terms that are unilaterally stipulated by one of the parties.

1035. In *Mapfre* STJ Special Appeal No. 1.988.894 (2023), the STJ rejected an argument that in all cases standard written terms would amount to an adhesion contract. Reporting Justice Maria Isabel Gallotti approved and adopted the following definition by Reporting Justice Cueva in STJ Special Appeal No. 1.424.074:

> “The main characteristic of an adhesion contract is that it lacks a pre-negotiation phase, since it is drawn up unilaterally, and the other contracting party, who is the adherent, is only responsible for accepting the standardised clauses contained therein, so that they are not guaranteed interference in the content of the agreement.”

1036. In line with that authority, I accept Professor Tepedino’s identification of three factors that indicate an adhesion contract: (a) the unilateral imposition of the contractual content on the adherent; (b) the absence of negotiation in relation to any of its clauses; and (c) the absence of an alternative for the acquisition of the intended product or service. In cross-examination, Professor Rosenvald agreed that a determining factor would be whether the substantial contents of the contract were the object of negotiation.

1037. However, Prof Tepedino's additional suggestion, that settlement agreements can never be adhesion contracts because there is always the option of bringing a claim, goes too far and is not supported by authority. In theory, it is always open to a claimant to challenge an agreement through litigation but that fact alone does not pre-determine whether, as a matter of construction, the agreement constituted an adhesion contract. Each agreement must be considered against the factual matrix in order to determine whether there was free acceptance of the contract terms and conditions.

1038. Against that background, I turn to consider the sample agreements.

Sample 1 – Novel System – Fishing

1039. As set out above, under the Novel System, a claimant could agree to an indemnity based on the fixed damage matrix established by Judge Mario.

1040. The terms of the indemnity, in addition to stating the amount to be paid by way of settlement, included the following:

> "As previously informed, the Judge of the 12th Federal Court of Belo Horizonte, in the judicial decision of February 12, 2021, issued in the records of lawsuit No. 1037382-90.2020.4.01.3800, established that the free and voluntary adhesion to the novel indemnity system implies a definitive release and covers all financial claims arising from the Collapse, with the exception - of course - of any future damages."

1041. The terms of the adhesion instrument were:

> "I hereby state that I agree with the terms of the judgment issued by the Judge of the 12th Lower Federal Civil and Agricultural Court of the Minas Gerais Judiciary Section in the records of the lawsuit No. 1037382-90.2020.4.01.3800, and that I wish to adhere to the novel indemnity system for the definitive reparation of all damages resulting from the Fundão Dam collapse.
>
> I hereby further state that I am aware that, under the terms of the aforementioned court decision, the adhesion to the novel indemnity system implies a definitive release and covers all financial claims arising from the Collapse, with the exception - evidently - of any future damages."

1042. The release was in the following terms:

> "I, my heirs and/or successors in title, on my behalf, hereby grant to Renova Foundation the widest, complete, irrevocable, and irreversible release of liability for all damages, losses, casualties and/or claims related to the Fundão Dam collapse, not to make any further claims, either financial or in terms of obligations of any kind, judicial or extrajudicial, INCLUDING RECEIPT OF

> EMERGENCY FINANCIAL AID (AFE), WHETHER PRESENT OR FUTURE."

1043. The waiver/withdrawal was in the following terms:

> "The Claimant and their respective attorney hereby waive and renounce the right on which any and all lawsuits filed by the Claimant and their respective attorney in any court or before any foreign jurisdiction related to the Fundão Dam collapse against Renova Foundation and/or its sponsors (Samarco Mineração S.A. and its shareholders Vale S.A. and BHP Billiton Brasil Ltda.), and/or any subsidiary, affiliate, or any other company directly or indirectly related to Samarco Mineração S.A., Vale S.A. and BHP Billiton Brasil Ltda. I will instruct my legal representatives to take all necessary steps to give effect to this withdrawal/waiver. I undertake the obligation not to file, in any court or before any foreign jurisdiction, any lawsuits related to the Fundão Dam collapse."

1044. On a proper construction of the agreement, applying the principles of contractual interpretation set out above, I find as follows.

1045. The agreement is an adhesion contract. Although claimants had alternative options of using the PIM scheme or litigation to prove their claims, if they chose to use the Novel System, they were required to accept payment calculated using the fixed damage matrix and the standard terms used. As a result, any ambiguity or conflict must be resolved in the claimant's favour.

1046. The scope of the agreement is full and final settlement of all financial claims arising out of the collapse of the dam, subject to an exception for future damages. This would allow a claimant to make a further claim in respect of future events, such as a further dam incident, or new heads of damage, such as delayed personal injury, but does not enable a claimant to claim fresh damages over and above the settlement sum in respect of the recognised heads of damage covered by the indemnity. I accept BHP's distinction between future damages, a reference to possible, or unknown future damages, in contrast to certain damages, such as future lost profits which would have been known at the date of the settlement.

1047. I reject the Claimants' submission that future claims could be made in respect of any heads of loss, or periods of loss, not included in the calculated sum because that would turn the settlement into a mere interim agreement. It is clear from the judgment of Judge Mario that the purpose of the Novel System was to provide a swift, simple and inexpensive scheme for final resolution of the numerous claims so that the claimants could obtain the compensation they needed. Judge Mario carefully assessed the appropriate sums to fix in relation to each identified category of claimant, taking into account both past and future periods of loss and assessing probability of loss. This imperfect method of calculating damages was a recognised feature of the scheme, which a claimant could freely accept, or reject in favour of the PIM System or litigation.

1048. The terms of the release and waiver are clear and unequivocal. They release Samarco, Vale and BHP Brasil from liability for all damages, losses, casualties and/or claims related to the Fundão Dam collapse.

1049. The judicial crafting of the Novel System, explained in a careful, detailed judgment, together with the mandatory assistance of lawyers for a claimant would not preclude a finding that the settlement agreement was invalid, in accordance with contractual principle. However, those matters raise a strong presumption that the principles of objective good faith, autonomy, contractual balance and social function are satisfied.

Sample 1A – Novel Water Damage

1050. The terms of entry included the following declaration:

> "I further hereby declare to be aware that, under the terms of the mentioned court decision, the entry in the new indemnity system "implies definitive settlement and covers all financial claims pursuant to the Break, except: i) possible future damages; ii) issues related to the resettlements of Bento Rodrigues, Paracatu de Baixo and Gesteira (Barra Longa), object of Priority Axis 3; iii) issues related to cracks, structural damage and fissures on the properties, object of Priority Axis 4 and "ACP Linhares", iv) possible damage to human health, object of Priority Axis 2 and v) Emergency Financial Aid - AFE.""

1051. The terms of the settlement, in addition to stating the amount to be paid by way of indemnity, included the following:

> "I hereby declare to be aware and agree that the indemnity agreed herein comprises a single and definitive payment related to all and any past, current and future damages, claims, and losses related to the collapse of the Fundão dam, on November 5, 2015, except for the amounts related to the Emergency Financial Aid - AFE."

1052. The settlement was stated to extend to Samarco, Vale, BHP Brasil and any subsidiary, affiliate or any other company, national or foreign, directly or indirectly related to those companies.

1053. The terms of the release were as follows:

> "I, my heirs and/or successors in title, on my behalf, hereby grant to Renova Foundation the widest, complete, irrevocable and irreversible release of liability for all damages, losses, casualties and/or claims related to the Fundão dam collapse, not to make any further claims, either financially or in terms of obligations of any kind, judicial or extrajudicial, EXCEPT RECEIPT OF EMERGENCY FINANCIAL AID - AFE, WHETHER PRESENT OR FUTURE."

1054. The waiver/withdrawal was in the following terms:

> "The Claimant and his/her lawyer withdraw and waive the right to all and any possible suits filed by the claimant and his/her lawyer in any court or before any foreign jurisdiction related to the collapse of the Fundão Dam against Renova Foundation and/or its sponsors (Samarco Mineração S.A. and its shareholders Vale S.A. and BHP Billiton Brasil Ltda.), and/or any subsidiary, affiliate, or any other company directly or indirectly related to Samarco Mineração S.A., Vale S.A. and BHP Billiton Brasil Ltda. I will instruct my legal representatives to take all necessary measures for the effective withdrawal/waiver. I hereby undertake the obligation not to file, in any court or before any foreign jurisdiction, any lawsuits related to the collapse of the Fundão dam."

1055. On a proper construction of the agreement, applying the principles of contractual interpretation set out above, I find as follows.

1056. The agreement is an adhesion contract for the reasons set out above in relation to the Sample 1 agreement.

1057. Despite the fact that the Novel Water Damage Scheme was designed for and calculated damages by reference to, interruption to the water supply, the scope of the agreement is full and final settlement of all financial claims arising out of collapse of the dam. However, that is subject to an express carve out. Excluded from the scope of the settlement are specific categories of loss, namely future damages, resettlement issues, property damage, potential personal injury and emergency financial aid. On the face of the agreement, these are categories of loss that could be the subject of future claims.

1058. The terms of the release and waiver are clear and unequivocal. They release Samarco, Vale and BHP Brasil, and affiliated or related companies, from liability for all claims related to the Fundão Dam collapse. However, read in conjunction with the other terms of the full agreement, this is subject to the express carve out of specific categories of loss that could be the subject of further claims.

1059. The judicial design of the Novel Water Damage scheme, together with the mandatory assistance of lawyers for a claimant would not preclude a finding that the settlement agreement was invalid, as a matter of contractual principle. However, those matters raise a strong presumption that the principles of objective good faith, autonomy, contractual balance and social function are satisfied.

Sample 2 - PIM General – Professional fishermen

1060. As set out above, the PIM General scheme was a mediated settlement process based on investigation and proof of the claims.

1061. The purpose of the settlement agreement was stated to be as follows:

> "The purpose of this Instrument is the formalisation of a settlement regarding the payment of indemnification corresponding indemnified damage: (a) moral damage suffered by the Signatory arising from the Burst, and; (b) property

> damage suffered by the Signatory arising from the Burst, relating to the category(ies) of [fill out] of the PIM Eligibility Protocol, including loss of profits due to him/her by [12/31/2017]."

1062. The settlement was described as follows:

> "The signatory, on his/her own behalf, and on behalf of his/her heirs and/or successors, gives Renova Foundation full irrevocable and irreversible release regarding the damage indemnified in the Settlement Instrument, so they shall make no further claims, whether in or out of court."

1063. The release was in the following terms:

> "This release extends to Samarco Mineração S.A., it's shareholders Vale s.a. and BHP Billiton Brasil Ltda and their respective insurance companies, governmental entities and any of the remaining signatories of the TTAC, ending any and all judicial, extrajudicial or administrative claims related to the damage indemnified in this Settlement Instrument, in which the signatory or any entity representing him or her appears, in any way, as Plaintiff, or their heirs and successors, nothing more being due regarding the damage indemnified in this settlement instrument by these companies/entities to the Signatory, his/her attorney, his/her heirs and successors."

1064. On a proper construction of the agreement, applying the principles of contractual interpretation set out above, I find as follows.

1065. The PIM agreements are not adhesion contracts. Unlike the Novel System, the Renova mediated settlement scheme provided for a structured process that allowed for full discussion and negotiation of the terms of settlement. In those circumstances, it could not be said that the terms of settlement were unilaterally imposed on the claimant.

1066. It is agreed by the parties that the scope of the settlement agreement is expressly limited to the identified heads of damage arising from the collapse of the dam. These are identified as moral damage as a result of the collapse and property damage relating to the specified activity (fishing), including loss of profits for the period up to 31 December 2017. I accept BHP's argument that the moral damage is not otherwise limited and relates to all moral damage arising from the collapse.

1067. The terms of the release and waiver are clear and unequivocal. They release Samarco, Vale and BHP Brasil from liability for claims related to the indemnified damage, that is, they are more limited than the scope of the Novel scheme settlement agreements.

1068. The assistance of lawyers for a claimant would not preclude a finding that the settlement agreement was invalid, as a matter of contractual principles. However, those matters raise a presumption that the principles of objective good faith, autonomy, contractual balance and social function are satisfied.

Samples 7, 14A and 15A

1069. It is common ground that Sample Agreements 7, 14A and 15A are also PIM General settlement agreements in similar terms to Sample Agreement 2. As such, they are limited in scope, both as to scope of the indemnity and scope of the release/waiver.

Sample 3 – PIM General - Agriculture

1070. The scope of the settlement and release are as follows:

> "The parties themselves, their heirs and/or successors, give each other mutual, reciprocal, ample full, general, irreversible and irrevocable release, in order not to claim in or out of court, any damages related to, originating or resulting from the Collapse, with the exception of (i) any future damages that may arise as a result of the Collapse after signing this Conciliation Instrument or and (ii) any loss of profits after 31 December 2017, if the conditions for exercising the labour activity of the Signatory(ies) are not resumed or if the conditions for exercising the new productive activity replacing the previous one are not resumed."

1071. The release extends to Samarco, Vale and BHP Brasil.

1072. The terms of the scope of the settlement are clear, namely, full and final settlement of all financial claims arising out of collapse of the dam, subject to exceptions for future damage arising out of the collapse of the dam and loss of profits after 31 December 2017.

1073. The Claimants submit that it would be unfair to construe the settlement agreement as including compensation for moral or property damages, given that the calculation of the settlement sum shows "BRL 0.00" against those items. However, in the context of the mediated and negotiated process, this indicates that these heads of loss were expressly considered and the outcome was that no payment would be made in respect of those items.

1074. As set out above in relation to Sample Agreement 1, the exclusion of future damages arising as a result of the collapse would enable additional claims to be brought for unknown incidents or heads of damage but not for additional losses evaluated in respect of heads of damage included in the agreement.

Sample 4 – PIM General – Agriculture and cattle-raising activities

1075. The object of the settlement is described in clause 1 as follows:

> "This Settlement Agreement has the purpose of delivering an agreement upon the definitive payment of indemnification for all the damages suffered by the Signatory(ies) as a result of the Collapse, including all loss of profit regarding their agricultural and cattle-raising activities."

1076. The scope of the release is as follows:

> "The Signatory(ies) by themselves, their heirs and/or successors, grant mutual, reciprocal, broad, full, general, irreversible and

> irrevocable release to Renova Foundation, to make no further complaints, in or out of court, regarding the damage related to, originated from or resulting from the Collapse, as described in Clause One of this Settlement."

1077. The terms of the scope of the settlement are clear, namely, full and final settlement of all damages suffered as a result of the collapse of the dam, including all loss of profit regarding their agricultural and cattle-raising activities.

1078. I reject the Claimants' submission, that the settlement scope should be construed as limited to: (i) loss of profits only up to the date of the settlement; and (ii) moral damage related to agriculture and cattle-raising, on the basis that those are the itemised sums set out in the calculation of the indemnity. Such an interpretation would be contrary to the express terms of the agreement. The fact that this settlement is drafted in different terms to some of the other PIM General settlement agreement serves to demonstrate that they were the result of individual, mediated and negotiated processes.

Sample 5 – PIM Water

1079. The scope of the settlement is described as follows:

> "The purpose of this term is the payment of indemnity for the damages suffered by the Beneficiary regarding the damages related to water supply and distribution in the city of Governador Valadares as a result of the Event, except for the hypothesis of possible future damages that may arise after signing this term."

1080. The release was as follows:

> "After compliance with this agreement, the parties, by themselves, their heirs and/or successors will give each other full, general, irreversible and irrevocable release, with nothing else to claim in court or out of court about it regarding the related damage, originating or arising from the purpose described in the clause one of this term, except in the event of possible future damage."

1081. The release extends to Samarco, Vale and BHP Brasil.

1082. The terms of the settlement are clear. It is not disputed that they are limited in scope to the water supply and distribution claim, both as to scope of the indemnity and scope of the release/waiver.

Sample 15B – PIM Water

1083. The settlement and release provision is as follows:

> "In view of the payment agreed above, the BENEFICIARY grants the FULLEST, AMPLEST, GENERAL, RARE, IRRESTRICTED, UNRESTRICTED AND UNREVOCABLE DISCHARGE in favour of the SPONSOR (FUNDAÇÃO RENOVA), SAMARCO and its shareholders VALE S.A. and

> BHP BILLITON BRASIL LTDA., as well and their respective insurers, in relation to any and all property and non-property damages, including, but not limited to, loss of profits, material and moral damages and/or any other type of damage, of a punitive, exemplary, compensatory, consequential or any other nature, related to, arising from or originating from the suspension in the supply and distribution as a consequence caused by the EVENT."

1084. As for Sample Agreement 5, it is not disputed that the scope of the indemnity and scope of the release/waiver are limited to the water supply and distribution claim.

Samples 6, 8, 9 and 10 – Individual Agreements

1085. Sample Agreement 6 is stated to be entered into in connection with the small civil claims procedure and provides:

> "Upon payment of the amount mentioned in item 1 above, PLAINTIFF grants to DEFENDANTS, and to all entities directly or indirectly related and/or linked to Samarco Mineração S.A., Vale S.A. and BHP Billiton Brasil Ltda., full, general, absolute, and irrevocable discharge on the subject matter to the request, valid and applicable both in Brazil and in any other jurisdiction, and PLAINTIFF shall make no further claim for the facts that gave rise to this action.
>
> Plaintiff waives any rights and claims arising from the interruption of the supply and/or quality of water, related to the Fundão dam collapse, and waives the right on which this action is based, including the right to proceed with the action and the right to appeal."

1086. It is agreed by the parties that Sample Agreement 6 is limited to any rights and claims arising from the interruption of the supply and/or quality of water.

1087. Sample Agreements 8 and 9 are settlements entered into in connection with enforcement, by liquidation proceedings, under the GTAC. It is agreed that the scope of the settlement and release in each case is limited to moral damages arising out of the collapse of the dam.

1088. Sample Agreement 10 similarly is a settlement entered into in connection with enforcement, by liquidation proceedings, under the GTAC. It is agreed that the scope of the settlement and release is limited to restitution of loss of housing arising out of the collapse of the dam.

Challenges to validity of settlement agreements

1089. The Claimants have indicated that they may wish to challenge the validity of some of the settlement agreements. It appears to be common ground that the Brazilian court's ratification of a settlement agreement without analysis of merit does not give rise to substantive *res judicata*. Therefore, it would not preclude a validity challenge, at least

where the ratification has been procedural rather than substantive. It is also agreed that Article 178 of the Civil Code provides for a period of four years within which any claim for annulment in respect of voidable transactions must be made. This Court is not asked to determine any of these issues in this First Stage Trial.

14. MUNICIPALITIES – STANDING TO SUE

1090. BHP's case is that the Municipalities' claims should be dismissed as they do not have the constitutional capacity to bring proceedings abroad. Their bringing of these claims in the Courts of England and Wales constitutes acts that are exclusive to the Federal Government as representative of the Federative Republic of Brazil under Article 21(I) of the Constitution, namely: (a) a waiver of immunity from jurisdiction (such waiver being a prerogative of national sovereignty); and/or (b) establishing a legal relationship with a foreign State.

1091. It is said that the effect of the Municipalities bringing suit in England is to subject themselves to the jurisdiction of this Court, waiving jurisdictional immunity from which they benefit as a matter of Brazilian law. This is an act on the international plane, beyond the autonomy of the Municipality and one that only the Federal Government has the constitutional capacity to carry out. Therefore, Municipalities can only bring claims abroad through or with the Federal Republic of Brazil.

1092. The Claimants' case is that the Municipalities are local government bodies with their own separate legal personality which have administrative responsibility over defined territories within Brazil. They are thus legal persons distinct from the individuals and businesses whose interests they represent and distinct also from the Federal Republic of Brazil. The Municipalities are recognised as public entities by Article 41(III) of the Civil Code, subject to internal public law, as well as the Constitution.

1093. Under Brazilian law, Municipalities are treated as having the same capacity as a natural person so far as holding and exercising rights is concerned. In those circumstances, it is said that in the absence of express prohibition or limitation, Municipalities are in the same position as any other natural or non-natural legal person. Like any other such person they can therefore sue and be sued, both within Brazil and in courts outside Brazil.

1094. It is common ground that the issue of standing of a party is a matter for the *lex fori*, that is, the English Court, but the issue of capacity to bring proceedings of the Municipalities, as creations of Brazilian law, is subject to Brazilian law.

1095. Further, it is common ground that the Municipalities can sue and be sued in their own name before the Brazilian Courts, including in respect of damage to their own property.

1096. The issue is whether the capacity of the Municipalities to bring proceedings for damages is restricted to domestic proceedings in Brazil and does not extend to foreign proceedings, by reason of the Constitution.

1097. It should be emphasised that the role of this Court is not to determine the issue as a matter of law, no doubt to the relief of the Brazilian constitutional lawyers. The role of this Court is to determine the issue in accordance with Brazilian constitutional law,

proved as a matter of fact, by reference to the expert evidence of Professor Sarlet and Professor Tepedino and the legal materials identified by them.

1098. Professor Tepedino's position is that Brazilian law recognises the principle of immunity from jurisdiction. Immunity from jurisdiction is an expression of national sovereignty. Municipalities are endowed with autonomy, not with sovereignty. Municipalities are not legally authorised to file actions abroad, regardless of the matter, as this would represent (i) a waiver of immunity from jurisdiction (one cannot waive a right that one does not have); and (ii) the establishment of a legal relationship with a foreign country, which falls outside the sphere of the Municipalities' attribution (Articles 21, I, and 84, VII, of the Constitution).

1099. His view is that the Federal Government has exclusive jurisdiction, acting in the name of the Federative Republic of Brazil, to waive immunity from jurisdiction. Pursuant to Article 84, VII of the Constitution, the President of Brazil has exclusive constitutional powers to represent Brazil in relations with other countries. Any submission to the Judiciary, regardless of the cause of action or the claim made, falls within the prerogatives of National Sovereignty, which is constitutionally guaranteed in Brazil by the principle of immunity from jurisdiction. Filing an action in another country represents the establishment of a legal relationship with a foreign country and the submission of a claim to the foreign Jurisdiction, which falls within the exclusive powers of the President of Brazil. It follows that Municipalities cannot file actions in a foreign jurisdiction.

1100. Professor Sarlet's position is that Article 41 (III) of the Civil Code provides that Municipalities are legal entities governed by public law, and are thus endowed with their own autonomy and legal personality in the Brazilian legal system. Articles 1 and 18 of the Constitution grant Municipalities full autonomy to bring actions in relation to matters within their jurisdiction, which include the conservation of public property (Article 23 (I)), protection of the environment, and to fight against pollution (Article 23 (VI)). The Civil Code and the CPA Law expressly and/or implicitly recognise that Municipalities have standing to file such actions in relation to matters within their attribution.

1101. Professor Sarlet's view is that the Municipalities are not prevented from filing actions outside Brazil under Brazilian law. The legal scholarship on immunity against foreign actions applies only to the so-called acts of sovereignty or acts of state, but not to acts of management. A civil claim for compensation against a foreign private agent, even when made by a public body, such as a Municipality, is not an act of sovereignty or the State, but rather an act of management. In the case of an action seeking compensation for damage caused by environmental degradation brought against private companies based abroad, relations with foreign States are not in question, nor is the participation of international organisations.

1102. The Constitutional framework for the purpose of this issue is not a matter of dispute. The Federative Republic of Brazil is composed of the Federal Government ("the Union"), States, Municipalities, and the Federal District (Article 18 of the Constitution). They are all understood to be autonomous under Article 18. Pursuant to Article 41 of the Civil Code, they are also all designated as legal entities for the purposes of domestic public law. Each of these entities in Brazil has specific competences assigned to them by the Constitution.

1103. The Federal Government has exclusive competence to maintain relations with foreign states and participate in international organisations (Article 21(I) of the Constitution). That power is exercised exclusively through Brazil's President (Article 84 (VII) of the Constitution). The experts agree that these provisions reflect that only the Federal Government exercises the Federative Republic's rights of sovereignty under international law. As Professor Tepedino states, it necessarily follows that the Federal Government has the exclusive right to waive any such rights.

1104. The experts agree that Municipalities do not have sovereignty but do have autonomy. Article 30 of the Constitution provides that the Municipalities have autonomy in legislating upon matters of local interest and promoting the protection of local historic and cultural heritage. Further, Article 23 of the Constitution provides that the Federal Government, the States, the Federal District and the Municipalities have shared competence for protection for the environment, and preserving forests, fauna and flora.

1105. Professor Tepedino's opinion is that the Municipalities cannot file proceedings abroad because it would constitute a waiver of Brazil's sovereign immunity from jurisdiction by subjecting themselves to the powers of the English Courts. The Municipalities benefit from, but are not the holders of, Brazil's sovereign immunity; therefore, only the Federative Republic can waive that immunity. Reliance is placed on the academic writing of Professor Carmen Tiburcio and Professor Barroso, now President of the STF, in support of his view that if an entity is not the holder of the sovereign immunity, it cannot waive it.

1106. I prefer the opinion of Professor Sarlet on this issue. As he explained, a distinction must be drawn between sovereignty, the authority of the Federal Republic to govern itself and its laws, and administrative autonomy, the authority of private and public entities to conduct their own affairs, including by means of legal actions. By filing claims in the English Courts, the Municipalities submit to the jurisdiction of this Court to try the claims but that does not extend to any issue of sovereignty. The Municipalities do not purport to exercise any sovereign authority of the Federal Republic when advancing their private law claims. They are not required to surrender any such sovereign authority and the private law claims do not involve any issues of international relations.

1107. Professor Tepedino accepts that the Constitution contains express provisions where it is intended to impose restrictions on the Municipalities' powers, such as Article 52(V), which requires Federal Senate approval before a Municipality can enter into a financial transaction with an entity outside Brazil. There is no comparable restriction upon the Municipalities' ability to litigate outside Brazil and there is no STF decision that has ruled that the Municipalities do not have capacity to bring private law claims in this jurisdiction.

1108. Accordingly, I conclude that there is no constitutional impediment by way of incapacity for the Municipalities to bring proceedings in this jurisdiction. It follows that there they have standing in these proceedings.

15. CONCLUSIONS

1109. For the above reasons, I conclude as follows.

Cause of collapse

1110. The immediate cause of the collapse of the Fundão Dam was liquefaction of the tailings making up the structural portion of the dam. The probable mechanism was lateral extrusion of the slimes, causing reduction of lateral confinement of the overlying uncompacted and saturated sands, resulting in liquefaction failure.

1111. The tailings at the left abutment became susceptible to liquefaction because contractive, saturated materials were present within the structural portion of the dam. The overflow channel and creation of the Setback were significant factors in introducing slimes into the structural zone of the dam, exacerbated by the failure to maintain the designed beach width of 200 metres. The presence of layers of slimes in the structural portion of the dam created an additional impediment to downward drainage of the sand tailings and introduced a zone of potential weakness that could affect stability. Despite those circumstances, work continued to raise the dam at the left abutment, depositing sand tailings on top of the slimes. This caused increased loading on the slimes, which deformed laterally under compression and led to liquefaction of the contractive, saturated sand tailings.

1112. The risk of collapse of the dam was foreseeable. Against the obvious signs of contractive, saturated tailings and numerous incidents of seepage and cracking, it was imprudent to continue to raise the dam along the alignment of the Setback in the absence of proper written analysis of the stability of the Setback and the attendant risks. A stability analysis, carried out using undrained shear strength parameters, would have identified Factors of Safety below FOS 1.5. It is inconceivable that a decision would have been taken to continue raising the height of the dam in those circumstances and the collapse could have been averted.

Liability

1113. BHP are strictly liable as "polluters" in respect of damage caused by the collapse pursuant to Articles 3(IV) and 14, paragraph 1 of the Environmental Law.

1114. The alternative strict liability claim pursuant to Article 927, sole paragraph of the Civil Code does not arise.

1115. BHP are liable based on fault in respect of damage caused by the collapse, pursuant to Article 186 of the Civil Code.

1116. BHP are not liable in respect of damage caused by the collapse, pursuant to Articles 116 and/or 117 of the Corporate Law.

Prescription

1117. The claim forms issued in the proceedings before the Court contained sufficient information, as required by Brazilian Law, to stop time running.

1118. Pursuant to Article 200 of the Civil Code, the criminal investigation and proceedings that were commenced in Brazil in November 2015 postponed the start of the prescription period until at least 2024.

1119. The ADIC CPA filed against Samarco on 17 November 2015 interrupted prescription in respect of all claims arising out of the collapse but such interruption terminated on 24 September 2018.

1120. The ambit of the thesis in Theme 999 is limited to public environmental claims, that is, claims for relief regarding the restoration of damage to the environment. It does not extend to claims for individual or collective compensation arising out of damage to the environment, such as claims by the Municipalities and the IQ Claimants, which remain subject to the general rules of prescription.

1121. The prescription period for the claims is five years pursuant to Article 27 of the Consumer Defence Code.

1122. The claims by the Municipalities and Utilities are subject to a five-year prescription period pursuant to the 1932 Decree.

1123. The Term of Commitment document entered into by Samarco, BHP Brasil and Vale on 26 October 2018 is of no assistance.

1124. The general rule is that the prescription period starts from the moment at which the injury to the right occurs but subject to the characterisation of the injury; a distinction must be drawn between a single harmful event, periodic violations of right, and continuous violation.

1125. Certain Claimants may be entitled to extended prescription periods, by reference to (a) filing of protests in Brazil, (b) lack of capacity and/or (c) their date of knowledge. It would be a matter for the Court, in each case, to determine these issues on the facts.

Waiver/Release

1126. The settlement agreements are regulated by the general principles of contractual interpretation contained in the Civil Code. The Consumer Defence Code does not apply to the settlement agreements because there is no underlying consumer relationship between the parties and the settlement agreements are not consumer contracts.

1127. The Court has determined the issues of construction and principle arising in respect of the sample settlement agreements.

Municipalities

1128. There is no constitutional impediment by way of incapacity for the Municipalities to bring proceedings in this jurisdiction and they have standing in these proceedings.

Consequential hearing

1129. Following hand down of this judgment, the hearing will be adjourned to a date to be fixed for the purpose of any consequential matters, including case management of the second stage hearing or other disposal, any applications for costs or permission to appeal. Therefore, any relevant time limits are extended until the adjourned hearing or further order.